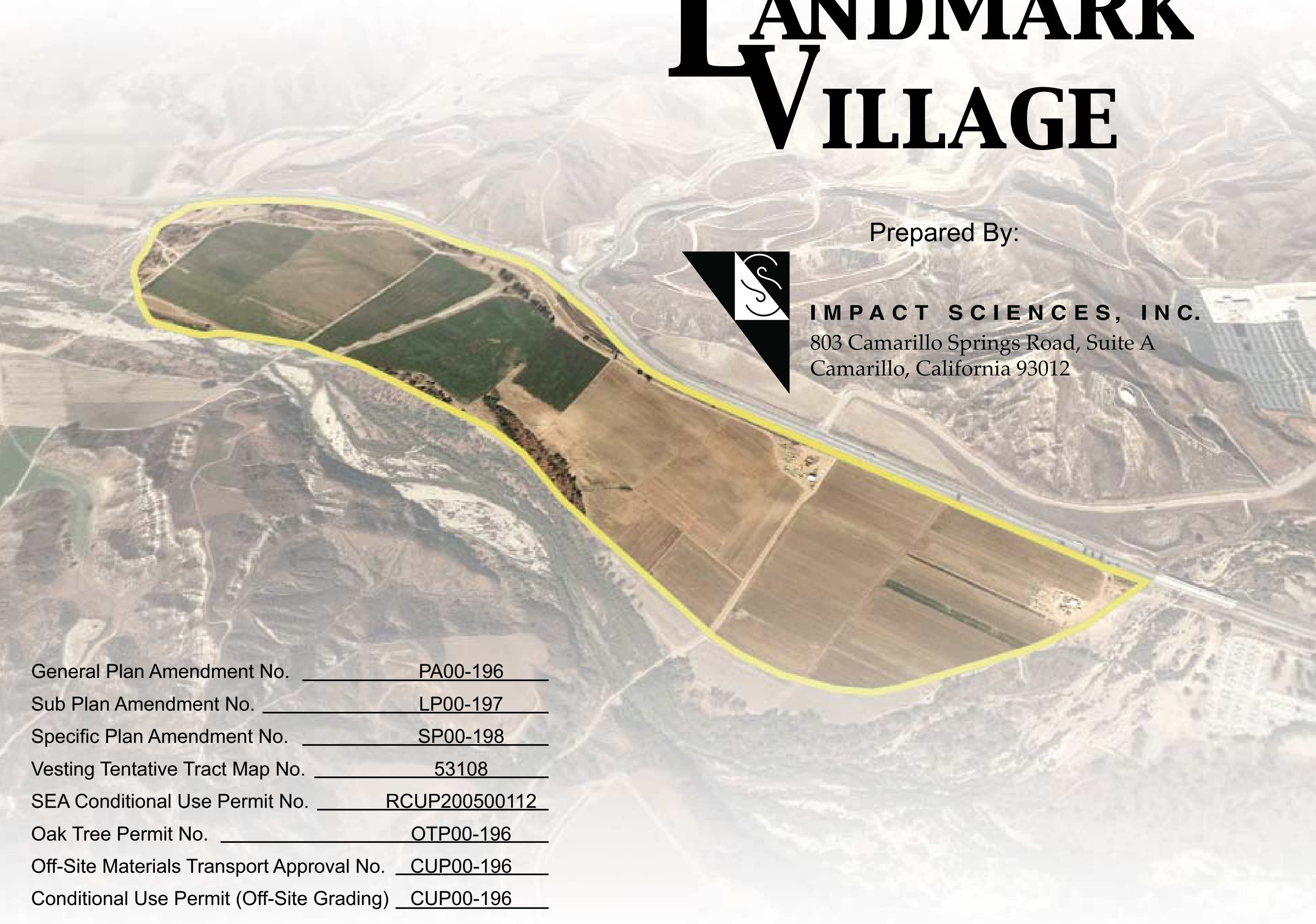
County of Los Angeles

Draft Environmental Impact Report

SCH No. 2004021002

Volume IV — Appendices
Appendix 4.3–Appendix 4.7

LANDMARK VILLAGE



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General Plan Amendment No.	PA00-196
Sub Plan Amendment No.	LP00-197
Specific Plan Amendment No.	SP00-198
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SEA Conditional Use Permit No.	RCUP200500112
Oak Tree Permit No.	OTP00-196
Off-Site Materials Transport Approval No.	CUP00-196
Conditional Use Permit (Off-Site Grading)	CUP00-196

NEWHALL RANCH
Newhall Ranch Company

NOVEMBER 2006

DRAFT
ENVIRONMENTAL IMPACT REPORT

for
LANDMARK VILLAGE

SCH No. 2004021002

Volume IV - Appendices
Appendix 4.3–Appendix 4.7

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Water Quality

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LANDMARK VILLAGE
WATER QUALITY TECHNICAL REPORT

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Project Number: PW0132
September 2006

Landmark Village
Water Quality Technical Report

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September 2006

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Acronyms

ASCE:	American Society of Civil Engineers
BAT:	Best Available Technology
BCT:	Best Conventional Technology
BMP:	Best Management Practice
BOD:	Biochemical Oxygen Demand
CASQA:	California Stormwater Quality Association
CEQA:	California Environmental Quality Act
CTR:	California Toxics Rule
CWA:	Clean Water Act
CWP:	Center For Watershed Protection
DCIA:	Directly Connected Impervious Area
DDT:	Dichlorodiphenyltrichloroethane
DLWC:	Department of Land and Water Conservation
EIR:	Environmental Impact Report
EMC:	Event Mean Concentration
HOA:	Home Owners Association
HEC:	Herrera Environmental Consultants
IRWD:	Irvine Ranch Water District
LACDPW:	Los Angeles County Department of Public Works
LARWQCB:	Los Angeles Regional Water Control Board
MBAS:	Methylene Blue Activated Substances
MEP:	Maximum Extent Practicable
MPN:	Most Probable Number
MS4:	Municipal Separate Storm Sewer System
NCDC:	National Climatic Data Center
NHC:	Northwest Hydraulic Consultants
NPDES:	National Pollutant Discharge Elimination System
NSWQ:	National Storm Water Quality Database
PAH:	Polycyclic Aromatic Hydrocarbons
PCB:	Polychlorinated Biphenyl
PCC:	Pacific Coast Civil Inc.
PDF:	Project Design Feature
PIPP:	Public Information and Participation Program
RTFA:	R.T. Frankian & Associates
RWQCB:	Regional Water Quality Control Board

SAR:	Sodium Adsorption Ratio
SCR:	Santa Clara River
SDRWQCB:	San Diego Regional Water Quality Control Board
SQMP:	Stormwater Quality Management Plan
SUSMP:	Standard Urban Stormwater Mitigation Plan
SWPPP:	Storm Water Pollution Prevention Plan
SWRCB:	State Water Resources Control Board
TDS:	Total Dissolved Solids
TKN:	Total Kjeldahl Nitrogen
TMDL:	Total Maximum Daily Load
TP:	Total Phosphorus
TPH:	Total Petroleum Hydrocarbons
TSS:	Total Suspended Solids
USEPA:	United States Environmental Protection Agency
USGS:	United States Geological Survey
WEF:	Water Environment Federation
WDR:	Waste Discharge Requirements
WHO:	World Health Organization
WMA:	Watershed Management Area
WMC:	Watershed Management Committee
WRP:	Water Reclamation Plant

1 INTRODUCTION

This report addresses the potential impacts of the proposed Landmark Village Project (the Project), a portion of the Newhall Ranch Specific Plan, on water quality in the Project's receiving waters, the Santa Clara River. To evaluate impacts of the Project on water quality, pollutants of concern are identified based on regulatory and other considerations. Potential changes in water quality are addressed for pollutants of concern based on runoff water quality modeling, literature information, and professional judgment. Impacts take into account Project Design Features (PDFs) selected consistent with the Los Angeles County Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge Elimination System (NPDES) Permit, including the Standard Urban Stormwater Mitigation Plan (SUSMP) requirements. The level of significance of impacts is evaluated using a weight of evidence approach considering significance criteria that include predicted runoff quality for proposed versus existing conditions, MS4 Permit and Construction General Permit requirements, and reference to receiving water quality benchmarks, including Total Maximum Daily Load (TMDL) waste load allocations and water quality standards from the Basin Plan and California Toxics Rule.

The report also assesses the potential for post-development peak stormwater runoff discharge rates, velocities, and durations to cause accelerated stream erosion and to impact stream habitat, and includes PDFs to address these impacts.

The purpose of this Water Quality Technical Report is to assess the Project's potential impacts on surface water quality and hydrology in the receiving waters and to identify Project Design Features for inclusion in the Project. GeoSyntec Consultants has prepared a Sub-Regional Stormwater Mitigation Plan for the Newhall Ranch Specific Plan (NRSP) (GeoSyntec, 2006a). This Landmark Village Water Quality Technical Report is an independent component of, and is consistent with, the framework for stormwater water quality and hydromodification management established by the NRSP Sub-Regional SWMP, and provides the project-level analysis for Landmark Village.

Potential hydrologic impacts related to stormwater volume and velocity from the 50 year storm event and the 50 year capital flood event are addressed in "Landmark Village Tentative Tract Map 53108 Drainage Concept" prepared by Psomas (Psomas, 2006) and the "Flood Technical Report" prepared by Pacific Advanced Civil Engineering, Inc. for the Landmark Village Project (PACE, 2006a). Potential biological impacts of the Landmark Village Project will be addressed in the Landmark Village Draft EIR, prepared by Impact Sciences, Inc. An engineering analysis of streambed fluvial stability in the Santa Clara River has also been prepared by Pacific Advanced Civil Engineering, Inc. (PACE, 2006b).

The approved Newhall Ranch Specific Plan was the subject of extensive environmental review in the previously certified Newhall Ranch Program EIR (State Clearinghouse No. 95011015) and related Revised Additional Analysis, Volume VIII (May 2003). This Project was assessed at the program level as part of the environmental analysis conducted for the Newhall Ranch Specific Plan. Portions of that analysis, including the certified Flood Section (Section 4.2 – Newhall Ranch Specific Plan EIR) and the certified Revised Additional Analysis (Section 2.3, Floodplain Modifications), have been used in the development of this Project SWMP.

2 ENVIRONMENTAL SETTING

2.1 Physical Setting

The Project site is located within the Newhall Ranch Specific Plan area, which is in an unincorporated portion of Los Angeles County, approximately 30 miles northwest of downtown Los Angeles. The site is in the Santa Clarita Valley, west of Interstate 5. The developed portion of the Project (tract map site) lies between the banks of the Santa Clara River to the south, SR-126 to the north, the confluence of Castaic Creek and the Santa Clara River to the east, and Chiquita Creek to the west (Figure 2-1). For the purposes of this report, the “Project developed area” refers to the proposed location of the Landmark Village development, while the “Project site” includes the tract map site, the borrow site and related haul routes, the Chiquito Canyon grading site, the utility corridor, and the potable and reclaimed water tank sites.

The Project impact boundary depicted on Figure 2-1 includes the developed portion of the Project (Landmark Village tract map site), as well as areas that will be temporarily disturbed during the construction phase of the Project, which includes the borrow site and other areas of grading, and areas where underground utilities will be installed.

The tract map site lies on a flat terrace above the Santa Clara River. The majority of the tract map site is currently used for agricultural purposes and is subject to agricultural disking. Topography across the site is relatively flat, with elevations ranging from 800 feet to 960 feet above mean sea level (msl). Habitat on the Project site varies in quality from high biological value in riparian areas adjacent to the Santa Clara River channel, to highly disturbed habitat such as upland agricultural areas. According to the Antelope Valley Area Soil Survey (Soil Conservation Service 1970), nine soil types occur on the Project site: Sandy alluvial land, Metz sandy loam, Hanford sandy loam (0 to 2%), Hanford sandy loam (2 to 9%), Sorrento loam (0 to 2%), River wash, Saugus loam (30 to 50%), Castaic and Saugus soils, and Zamora loam.

Fill has been placed on the tract map site as a result of road construction, utility line placement, and agricultural activities. Fill also exists at various locations on both borrow sites, ranging from minor spill fills to large dumped fill pads associated with historical uses.

The borrow site is characterized by sloping hillsides and adjacent agricultural use. The borrow site is dominated by coastal sage scrub and mixed chaparral, but also includes several small areas of non-native grassland and live oak woodland. Elevations on the borrow site range from approximately 920 feet (near the Santa Clara River) to 1260 feet above msl. The Chiquito Canyon grading site is dominated by agricultural/disturbed areas, non-native grassland and coastal sage scrub vegetation. Elevations at this grading site range from approximately 970 feet (near SR-126) to 1,190 feet above msl.

The drainage area that encompasses the tract map site consists of six sub-basins that independently drain toward the Santa Clara River (Psomas, 2006). There are currently no existing drainage or erosion/sedimentation control improvements located within the site other than minor agricultural drainage ditches and an insignificant amount of earthen bank protection along the Santa Clara River (PACE, 2006b). A jurisdictional delineation of waters and streambeds was conducted in accordance with the Army Corps of Engineers (ACOE) protocol in 2003 (Impact Sciences). The tract map site is generally bordered to the east by Castaic Creek, to the south by the Santa Clara River and to the west by Chiquito Canyon Creek. These drainages are under the jurisdiction of the ACOE. The Chiquita Landfill area drains through an agricultural drain located in the central portion of the tract map site that is also under the jurisdiction of the ACOE. There are no other drainage features within the Project boundaries that are under the jurisdiction of the ACOE.

The Project lies downstream from two water reclamation plants. The Saugus Water Reclamation Plant (WRP) is located 5 miles upstream from the Project, across Bouquet Canyon Road at Soledad Canyon Road, and the Valencia Water Reclamation Plant is located 1.5 miles upstream, just north of Magic Mountain Parkway at the Old Road. Both treatment plants discharge treated wastewater into reaches of the river lying upstream from the Project.

2.2 Project Area Land Uses

The Project site is located within the Newhall Ranch Specific Plan (NRSP) area, which was approved by the Los Angeles County Board of Supervisors in May 2003. The Newhall Ranch Specific Plan is a comprehensive document that guides future development of the Newhall Ranch property and serves as the zoning for the entire Specific Plan area. The Specific Plan contains a conceptual development plan, development regulations, design guidelines, and implementation mechanisms consistent with the goals, objectives, and policies of the Los Angeles County General Plan and Santa Clarita Area Plan. The NRSP is a large, master-planned development including approximately 21,000 homes and 19,000 jobs, along with recreational and mixed uses and public facilities. A complete description of the land uses included in the NRSP can be found in the Newhall Ranch Specific Plan (SCH # 95011015; February, 1999).

The proposed Project is to develop the 292.6-acre Landmark Village tract map site, along with 679.2-acres of land within the boundaries of the approved Specific Plan for several off-site, project-related components.[1] The Landmark Village project is located within the first phase of the Riverwood Village area of the approved Newhall Ranch Specific Plan. The land uses proposed as part of the project are consistent with the Newhall Ranch Specific Plan. The Land

[1] Portions of the proposed utility corridor and the proposed potable water tank site (located within the Valencia Commerce Center business park) are outside the boundaries of the Newhall Ranch Specific Plan.

Use Plan contained within the NRSP designates the Landmark Village Project for single and multi-family residential, commercial, and recreational land uses (Table 2-1 and Figure 2-2). Existing land use in the developed portion of the Project area consists completely of agricultural production. For modeling purposes, the existing site was assumed to have an imperviousness of 15 percent to account for compaction by machinery and soil saturation due to irrigation.

The Landmark Village Project consists of 1,136 multi-family units, 308 single-family detached units, and a maximum of 1,033,000 square feet of retail/commercial uses. The Project also includes an elementary school, a community park, private recreational facilities and various trail and road improvements.

Table 2-1: Proposed Land Uses Areas within the Landmark Village Development Area

Land Use	Area (Acres)
Single Family Residential	50.0
Multiple Family Residential	81.7
Commercial	36.5
Park/Recreation Center	21.3
Trails/Open Space	38.3
Roadway	55.8
School	9.0
Total	292.6

2.3 Associated Off-Site Project Components

In addition to the 292.6-acre tract map site, the project also includes approximately 750 acres of grading and/or development at off-site project locations.

2.3.1 Long Canyon Bridge

The Project includes construction of the Long Canyon Road Bridge. The bridge is intended as the primary bridge crossing over the Santa Clara River providing access to the central portions of the Newhall Ranch Specific Plan. The bridge will span approximately 1,000 feet over the Santa Clara River, with a width of approximately 100 feet. Support for the bridge will involve construction of 11 piers within the river corridor. Each pier will be spaced approximately 100 feet apart. Additionally, abutments and bank stabilization would be required on both sides of the bridge to protect against erosive forces.

2.3.2 Borrow Site

Site preparation will include a cut and fill grading operation with fill being imported to the site from a borrow site located south of the tract map site. To elevate the Project development above the floodplain of the Santa Clara River, soil would be imported from a borrow site located within Long/Adobe Canyon (Figure 2-1). The borrow site is located south of the Santa Clara River and is bounded by Long Canyon to the west and the proposed Mission Village development to the east. The total drainage area for the site is about 215 acres and flows generally northwest and westerly. The majority of the land is undeveloped with steep to moderate slopes.

The borrow site grading plan will excavate and reshape the hills and depressions forming the ridge separating Long and Adobe Canyons. Much of this work will occur along the top and bluffs of an unnamed plateau located just west of Sawtooth Ridge. This plateau ranges in elevation from a low of 1,130 feet at its northern most point to a high of 1,220 in the southeast, which is characterized by an increasingly steeper grade. The proposed grading plan would excavate the southeastern portion of this plateau, creating a gentler slope leading up to the top of the ridge. The resultant manufactured slope angle would range from 5:1 to 2:1 (horizontal/vertical). The grading plan also alters the western facing slope leading up to the plateau, creating a bench separated by two manufactured slopes stepping down the west-facing ridgeline defining Adobe Canyon at a 3:1 grade.

Additional earthwork is planned at the terminus of Adobe Canyon where a series of excavations will result in a manufactured slope approximately 100 feet in height at a relatively uniform 3:1 grade. A series of benches, swales and debris basins will also be constructed to collect, convey and release runoff in a controlled manner. Approximately six million cubic yards of earth may be excavated from the Long Canyon/Adobe Canyon area and transported across the Santa Clara River to the tract map site using existing at-grade agricultural crossings. All of this area is within the development footprint approved with the Newhall Ranch Specific Plan.

2.3.3 Chiquito Canyon Grading Site

To accommodate Project-necessitated improvements to SR-126 and debris basins for storm water flows that are collected by the Project storm drainage system, approximately 120 acres of land directly north of SR -126 and within Chiquito Canyon would be graded. The Conceptual Grading Plan would lower the area of the property near the intersection of Chiquito Canyon Road with SR-126 by approximately 60 feet when compared to the existing elevation. Rather than a gradual incline that extends upward at an increasingly greater grade, the reshaped slope would approximate the grade of SR-126 for about 1,500 feet east of the intersection with Chiquito Canyon Road. At this point, the grading plan creates a manufactured slope that extends upward at a uniform 3:1 grade reaching a high of 1,160 feet above msl. A series of benches, swales and debris basins will also be constructed to collect, convey and release runoff in a controlled manner. Approximately 1.2 million cubic yards of earth will be excavated from this area and placed as fill in the adjacent areas. All of this graded area is within the development footprint of the NRSP.

2.3.4 Water Tanks

Potable water would be conveyed to the tract map site from two separate water tank sites. One tank is proposed north of the SR-126 within the existing Valencia Commerce Center business park. The second potable water tank would be located within the borrow site, in an area to be graded as part of the proposed soil transfer. The Project would also implement a portion of the Specific Plan's reclaimed water storage and distribution system through one of the following two options: the first would include the installation of two reclaimed water tanks in Chiquito Canyon, north of the Chiquito Canyon grading site and the second option would include the conversion of an existing potable water tank on Round Mountain (east the tract map site and east of Interstate 5) to a reclaimed water tank. For the purpose of the impact analysis, the area for the water tanks and access roads to the tanks was estimated to be two acres each, for a total of four acres.

2.3.5 State Route 126 Improvements

Improvements to State Route 126 (SR-126) would be constructed in conjunction with the project. A 95.6 acre portion of the SR-126 project, extending from just west of the intersection of Commerce Center Drive and SR-126 to the western edge of Landmark Village, including the widening of the Castaic Creek/SR-126 Bridge, has been included in the Project analysis. Along with the bridge deck widening, bridge abutments are to be widened to approximately 500 LF of creek length of reinforced concrete transitioning to soil cement through 50 linear foot of creek length of rip-rap.

2.3.6 Utility Corridor

The Project also includes a 110 acre utility corridor that runs parallel to SR–126, from the western boundary of the tract map site to the approved Newhall Ranch Water Reclamation Plant near the Ventura County line, from the eastern boundary of the tract map site to the Old Road and then south to the Los Angeles County Sanitation District 32 Water Reclamation Plant. The utility corridor would serve to extend municipal services to the site. The utilities will be placed underground and a maintenance access road and potential future trail will be constructed above ground. As the impact area for the maintenance access road and trail have not yet been determined, the impacts of these Project components are assessed qualitatively in this report.

2.4 <u>Proposed Drainage Improvements – Project and Santa Clara River</u>

The proposed improvements on the Project site that would occur in and adjacent to the Santa Clara River, including bank stabilization, storm drain outfalls and associated energy dissipaters, and construction of Long Canyon Road Bridge across the River are described below. At limited locations on the Project site, such as at outlet structures, access ramps, or bridge abutments, grouted rip-rap or reinforced concrete would be used to minimize erosion. Approximately 18,600 linear feet (LF) of the River and Creek bank would be provided with buried soil cement protection. This would include approximately 11,000 LF fronting the tract map site and 6,400 LF on the south bank downstream (west) of the Long Canyon Road Bridge. Additional buried bank stabilization would be constructed as part of the approved Newhall Ranch Water Reclamation Plant (WRP) and between the Old Road and the Santa Clara River (protecting the utility corridor). The bank protection between the Old Road and the Santa Clara River was approved as part of the Santa Clara River Natural River Management Plan (NRMP). Approximately 6,600 LF of Turf Reinforcement Mat (TRM) or similar bank stability protection would be provide along the southern edge of the utility corridor downstream or west of the tract map site. Additional flood protection improvements would include the Long Canyon Road Bridge abutments (including rip rap) and piers, the widening of the bridge abutments (including rip rap) of the SR 126/Castaic Creek Bridge, and the various outlet structures and energy dissipaters both on-site and off-site. Finally, the above flood control improvements may necessitate the need for dewatering activities. These activities would be subject to the applicable requirements of the LARWQCB.

2.4.1 Proposed Project Drainage Improvements

Runoff from the six off-site drainage areas that drain through or onto the developed portion of the Project site, as defined by the Psomas Landmark Village Drainage Concept Report (Psomas, 2006) would continue to flow through the Project site. Runoff from the developed portions of the Project would be channeled through the proposed stormwater conveyance system and would be discharged to the Santa Clara River through 11 new outfalls after passing through the water quality treatment BMPs (see Section 5.3 for further detail). As required in the Los Angeles County Department of Public Works memorandum entitled, “Level of Flood Protection and Drainage Protection Standards,” all on-site drainage systems carrying runoff from developed areas are to be designed for the 25-year Design Storm (Urban Flood), while storm drains under major and secondary highways, open channels (main channels), debris carrying systems, and sumps will be designed for the Capital Flood.

2.4.2 Energy Dissipaters

To reduce storm flow velocities and prevent erosion at stormwater discharge points into the River, energy dissipaters consisting of either rip-rap or other larger reinforced concrete standard impact-type energy dissipaters would be constructed at the approximately 11 storm drain outlets into the River. These energy dissipaters would slow the rate of flow of runoff into the River to prevent erosion of the stream channel. Additional dissipaters would be located at the outlet of Chiquito Creek and Long Canyon Creek.

2.4.3 Bank Stabilization

The Conceptual Backbone Drainage Plan of the Newhall Ranch Specific Plan provides drainage and flood control protection to developed uses while preserving the Santa Clara River as a natural resource. The Drainage Plan utilizes several criteria that are to be implemented by projects that develop within the Specific Plan area. The primary criteria are as follows:

- Flood corridor must allow for the passage of Los Angeles County Capital Flood discharge without the permanent removal of natural River vegetation (except at bridge crossings);
- The banks of the River will generally be established outside of the “waters of the United States” as defined by federal laws and regulations and as determined by the delineation completed by the ACOE in August 1993;
- Where the ACOE delineation width is insufficient to contain the Capital Flood flow, the flood corridor will be widened by an amount sufficient to carry the Capital Flood flow without the necessity of permanently removing vegetation or significantly increasing velocity; and
- Soil cement will occur only where necessary to protect against erosion adjacent to the proposed development. Where existing bluffs are determined to be stable and there is no adjacent proposed development, no bank protection will be built.

Most of the proposed bank protection would consist of buried soil cement to provide scour and freeboard flood control protection. Soil cement bank protection provides a stable riverbank protection material, in terms of both surface erosion and structural stability. Additionally, soil cement bank protection will be mostly buried. The exposed top portion of the soil cement will be aesthetically and vegetatively compatible with the natural earth and vegetated bank area.

Hydrology impacts are evaluated in the Flood Technical Report (PACE, 2006a).

2.5 Receiving Water Bodies and Beneficial Uses

2.5.1 Santa Clara River

The Project will discharge from its storm drain and water quality control facilities directly to the Santa Clara River Reach 5[2], immediately downstream of its confluence with Castaic Creek. The Project site comprises 972 gross acres within the 1,618 square-mile Santa Clara River Basin Watershed.

The Water Quality Control Plan for the Los Angeles Region (Basin Plan) (LARWQCB, 1994, as amended) lists beneficial uses of major water bodies within this region (Table 2-2). Santa Clara

[2] The SCR is divided into reaches for purposes of establishing beneficial uses and water quality objectives. However, there are two reach classifications, one established by the Los Angeles Regional Water Quality Control Board (LARWQCB) and one established by the United States Environmental Protection Agency (EPA). Both of these reach classifications are used by the LARWQCB and the EPA in various documents, which at times is a source of confusion. This report will use the LARWQCB reach numbers.

River Reach 5 is listed and has specific beneficial uses assigned to it. As identified in Table 2-2, the existing, potential and intermittent beneficial uses of Santa Clara River Reach 5 include the following:

- MUN: Community, military, or individual water supply systems including, but not limited to, drinking water supply (a potential beneficial use)
- IND: Industrial activities that do not depend primarily on water quality
- PROC: Industrial activities that depend primarily on water quality
- AGR: Agricultural supply waters used for farming, horticulture, or ranching
- GWR: Groundwater recharge for natural or artificial recharge of groundwater
- REC1: Water contact recreation involving body contact with water and ingestion is reasonably possible
- REC2: Non-contact water recreation for activities in proximity to water, but not involving body contact
- WARM: Warm freshwater habitat to support warm water ecosystems
- WILD: Wildlife habitat waters that support wildlife habitats
- RARE: Waters that support rare, threatened, or endangered species and associated habitats
- WET: Wetland ecosystems

Table 2-2: Beneficial Uses of Receiving Waters

Water Body	Beneficial Uses[1]														
	MUN	IND	PROC	AGR	GWR	FRSH	REC1	REC2	WARM	COLD	WILD	RARE	MIGR	SPWN	WET[1]
Santa Clara River (Hydrologic Unit 403.51)	P*	E	E	E	E	E	E	E	E		E	E			E

[1]Waterbodies designated as WET may have wetlands habitat associated with only a portion of the waterbody. Any regulatory action would require a detailed analysis of the area.
E – Existing beneficial use; P – Potential beneficial use; I – Intermittent beneficial use *Asterixed MUN designations are designated under SB 88-63 and RB 89-03. Some designations may be considered for exemptions at a later date.
Source: Water Quality Control Plan for the Los Angeles Region (Basin Plan) (LARWQCB, 1994, as amended)

The Santa Clara River (SCR) watershed drains an area of 1,634 square miles in the Transverse mountain range of southern California. Elevations within the watershed range from sea level at the river mouth to 8,800 feet at the summit of Mount Pinos in the northwest corner of the watershed. The SCR flows generally from east to west from its headwaters near Acton to the

Pacific Ocean near the City of Ventura, approximately 40 miles downstream of the NRSP subregion.

Artificial streamflow in the Santa Clara River is derived from discharges of treated effluent from two wastewater treatment plants and runoff from agricultural fields and existing urban areas. Discharges from agricultural land use are decreasing as some of these areas convert to urban use. There are two regional wastewater reclamation plants in the area operated by the County Sanitation Districts of Los Angeles County that discharge tertiary-treated wastewater to the Santa Clara River. The Saugus Water Reclamation Plant outfall, located near Bouquet Canyon Road bridge, discharges 5 million gallons per day (MGD) creating surface flows from the outfall to near Interstate 5. The Valencia Water Reclamation Plant outfall is located immediately downstream of the Interstate 5 bridge and discharges 9 MGD, creating surface flows extending through the Project area and into the far eastern portion of Ventura County.

The reach of the SCR within and adjacent to the Project has multiple channels (braided). This kind of system is characterized by high sediment loads, high bank erodibility, and intense and intermittent runoff conditions. Combined with the relatively flat gradient of the SCR at this point (less than one percent), the SCR has a high potential to aggrade (deposit sediment) at low flow velocities (PACE, 2006a).

The following description of the physiography, climate, flows, and vegetation of the Santa Clara River are summarized primarily from Assessment of Potential Impacts Resulting from Cumulative Hydromodification Effects, Selected Reaches of the Santa Clara River, Los Angeles County, California (Balance Hydrologics, provided in Appendix F).

Physiography

The Santa Clara River flows through a complex, tectonically-active trough. Some of the most rapid rates of geologically-current uplift in the world are reported from the Ventura anticline and San Gabriel Mountains, just to the northwest and southeast, respectively, of the river. Slopes are very steep, with local relief of 3,000 to 4,000 feet being common. These faults bring harder, more resistant sedimentary rocks over softer and younger sedimentary formations, but all formations are fundamentally soft and erodible. On either side of the faults, sandstone and mudstones prevail. The northeastern and southeastern corners of the watershed are underlain by deeply-weathered granitic and schistose rocks, which produce sands that are coarser than those of other rock units when they weather and erode. The San Gabriel fault crosses the valley, bringing slightly more resistant rock to the surface and creating a local base level reflected as a slight rise or ‘bump’ on the river’s longitudinal profile.

Most geologic materials in the watershed decompose mainly to silts and clays and to sand, with some coarser materials. Most sediment moved by the Santa Clara River and its main tributaries is fine, with less than 5 percent bedload-sized material (>0.25 mm, or about 0.01 inches in diameter). Some gravels and cobbles do occur within the beds of the stream and in their alluvium. Nonetheless, both the bed and the sediment transported by the river tend to be finer than in most Southern California watersheds.

Flows

Downstream of the Valencia WRP, the SCR is perennial past the Los Angeles/Ventura County line (Systech, 2002) to approximately Rancho Camulos. Flows in the SCR can also be affected by groundwater dewatering operations or by diversions for agriculture or groundwater recharge. Throughout the Santa Clara River channel, there are complex surface water/groundwater interactions where both gaining and losing river segments are found. Downstream of the County line, however, the Santa Clara River flows through the Piru groundwater basin, which represents a "Dry Gap" where dry-season surface flows are interrupted and streamflow is lost to groundwater.

The SCR is underlain by several distinct alluvial groundwater basins in Ventura County—the Piru, Fillmore, and Santa Paula Basins. These basins are divided longitudinally by sills or ridges of bedrock that support areas of locally-high (shallow) groundwater, including the area upstream from the County line (above the Piru Basin), and upstream from the mouth Sespe Creek (the transition between the Piru and Fillmore Basins). This locally-high groundwater sustains summer baseflow and riparian vegetation within the SCR corridor even through relatively dry climatic cycles.

Flows in the SCR, as in most southern California streams, are highly episodic. For the gaged period between 1953 and 1996, annual flow at the Los Angeles/Ventura County line gage ranged between 253,000 acre-feet (1969) and 561 acre-feet (1961). Annual peak flows at the County line between 1953 and 1996 ranged from 68,800 cfs (1969) to 109 cfs (1960). Of note is that the second highest annual peak, 32,000 cfs in 1966, was less than half of the highest peak (68,800 in 1969). These large episodic events have a significant impact on the geomorphic characteristics of the Santa Clara River mainstem.

After studying the response of the river to several different anthropogenic and natural disturbances, Balance Hydrologics (2005) concluded that the Santa Clara River, as with many streams in semi-arid southern California, is highly episodic. Concepts of "normal" or "average" sediment-supply and flow conditions have limited value in this "flashy" environment, where episodic storm and wildfire events have enormous influence on sediment and storm flow conditions. In these streams, a large portion of the sediment movement events can occur in a matter of hours or days. Other perturbations which can potentially affect channel geometry appear to have transitory or minor manifestations. For example, effects on SCR channel width of 1980s levee construction was barely discernible by the first few years of the 21st century, probably mostly due to morphologic compensation associated with the storm events in the mid- to late-1990s. As a result, channel morphology, stability, and character of the Santa Clara River is almost entirely determined by the "reset" events that occur within the watershed.

Vegetation and Habitat Types

Much of the watershed upstream of the Newhall Ranch Specific Plan area receives rainfall averaging about 18 to 25 inches per year. As throughout Southern California, rainfall in the Santa Clara watershed alternates between wet and dry periods, a variation that is central to understanding the geomorphic history of the watershed. Wet cycles tend to persist for several years, sometimes for periods of 6 or 8 years, during which rainfall, although variable, may average about 140 to 150 percent of the long-term average. For the woody riparian vegetation along the banks and on islands in the braided channels, these are crucial periods for establishment and growth. During dry cycles, the roots of the riparian vegetation must grow downward to the water table or perched zones, and where it cannot do so, this band of vegetation will die back.

The existing SCR channel contains a variety of vegetation types (Impact Sciences, 2003). The active SCR channel is mostly barren due to scouring by seasonal storm flows. However, vegetation types on the adjacent terraces vary based on elevation relative to the active channel bottom and the frequency of flooding. The following series of vegetation types occur along a vertical gradient from the channel bottom to the highest SCR terrace on the floodplain: emergent herbaceous, woody shrubs, and trees.

The Santa Clara River corridor at the NRSP site supports three general categories of habitat (Impact Sciences, 2003): (1) aquatic habitats, consisting of flowing or ponded water; (2) wetland habitats, consisting of emergent herbs rooted in ponded water or saturated soils along the margins of the active channel; and (3) riparian habitat, consisting of woody vegetation along the margins of the active channel and on the floodplain. Both year-round and seasonal aquatic habitats are provided and are subject to periodic disturbances from winter flood flows. These flows innundate areas that are dry most of the year. They also carry and deposit sediment, seeds, and organic debris; form new sandbars and destroy old ones; and erode stands of vegetation. New stands of vegetation are created where vegetation becomes established by seeds or buried stems. Thus, the aquatic habitats of the river are in a constant state of creation, development, disturbance, and destruction.

2.6 Tributaries to the Santa Clara River

Several tributaries to the Santa Clara River drain into or adjacent to the Landmark Village Project site, including Chiquita Creek on the River's north bank, Long Canyon Creek on the south bank, and Castaic Creek, which enters the River upstream of the Project site (Figure 2-1). Project runoff from the developed portion of the Project will not be discharged to the tributaries; all Project runoff will be discharged to the Santa Clara River after receiving treatment in the Project PDFs. Construction phase activities (borrow sources and grading) will occur in areas that drain to Adobe Canyon, Long Canyon, and Chiquito Creek.

The Chiquita Creek drainage is approximately 4.8 square miles, with a stream length of approximately 22,000 feet. The Long Canyon Creek drainage area is approximately 1.5 square miles, with a stream length of approximately 1,000 feet. The Castaic Creek watershed, the largest of the tributary watersheds, is approximately 16.8 square miles below the Castaic Lake dam. The Project is bounded by Castaic Creek to the east and Chiquito Creek to the west. Long Canyon Creek is downstream of the Project site to the west.

2.7 **Existing Receiving Water Quality**

The existing wet and dry weather surface water quality in the Project area was characterized from available water quality monitoring data obtained from the following four sources:

1. Newhall Ranch Tributary Stormwater Monitoring. Two storm events were monitored in Potrero Canyon, San Martinez Grande Canyon, Middle Canyon, Chiquito Canyon, and an unnamed tributary in Long Canyon. This data is relevant in terms of characterizing the existing stormwater runoff within the Project area.

2. Newhall WRP. The Newhall Ranch is required to conduct pre-startup water quality monitoring at upstream and downstream locations from the outfall of the approved Newhall WRP. Wet and dry weather monitoring data were collected from two stations in the SCR from the spring of 2004 until the spring of 2006: one station is near the downstream boundary of the NRSP area near to the proposed WRP outfall location, and the second is about 2½ miles further downstream.

3. LA County Monitoring. The County of Los Angeles recently conducted in-stream monitoring on the mainstem of the SCR at a mass emission station located at The Old Road, upstream of the Project area. Both dry weather and wet weather monitoring data are available. The LA County monitoring data are the most current and are the only source of wet weather monitoring in the SCR immediately upstream of the Project area.

4. USGS Monitoring. The USGS collected a large number of water quality data in the SCR near the county line from 1951 through 1995. These data provide a historical perspective of wet and dry weather water quality in the SCR immediately downstream from the Project area.

Wet Weather Water Quality Monitoring

Wet Weather Monitoring Locations and Rainfall Conditions

NRSP Area Stormwater Monitoring**.** Newhall Land conducted stormwater monitoring of tributary streams in the NRSP area to characterize the existing surface water quality during wet weather conditions (the monitoring data is provided in Appendix C). Stormwater samples were collected during two storm events in March 2001 at five monitoring locations (Stations A-E) shown on Figure 2-1. Three of the five monitoring stations were located at the mouths of SCR tributaries in Potrero Canyon (Sta. A), San Martinez Grande Canyon (Sta. B), and Middle Canyon (Sta. D). The other two monitoring stations were located on tributaries upstream from the mainstem of the SCR; one was just downstream of the community of Val Verde in Chiquito Canyon (Sta. E) and one was on an unnamed tributary in Long Canyon, ¼ mile upstream of the 'Onion Field' (Sta. C). Aside from Station E, which is downgradient of existing residential development, the land uses in the areas tributary to the Stations A, B, C, and D are predominately open space with some agriculture and oil and gas operations.

Table 2-3 lists the rainfall depth and duration of the two monitored storm events. The first storm was a small event (0.2 inches) that was likely just large enough to result in stormwater runoff. The depth of the second event was larger and was equal to the median storm depth (0.7 inches) at the nearby National Climatic Data Center (NCDC) Newhall rain gauge (see location on Figure 2-1). The median depth of 0.7 inches is based on a storm event analysis which identified 452 storms exceeding 0.1 inches that occurred from October 1968 to September 1999.

Table 2-3: Depth and Duration of Storms Monitored at Project Site

Date	Depth (in)[1]	Duration (hours)[1]
03/06/01	0.2	3
03/08/01	0.7	10

[1] Based on rainfall measured at the Newhall rain gauge.

Newhall WRP Pre-Startup Monitoring. Newhall Land has conducted pre-startup receiving water quality monitoring for the approved Newhall Ranch WRP (Newhall, 2006) at two locations in the SCR (see Figure 2-1):

- NR1 is located in the SCR 300 feet upstream of the WRP outfall location, and
- NR3 is located in the SCR approximately 7,500 feet downstream of the WRP outfall.

Five storms with rainfall depths ranging from 0.1 to 0.6 inch were sampled at NR1 and NR3 and one very large storm with a depth of 4.45 inches was sampled at NR3 (Table 2-4). Grab sampling methods were used.

Table 2-4: Average Concentrations of Selected Constituents from Newhall Ranch Stormwater Monitoring

Constituent	Site A Mouth of Potrero	Site B Mouth of San Martinez	Site C Upstream of Onion Field	Site D Mouth of Middle Cyn	Site E Middle of Chiquito
TSS (mg/L)	835	41100	36000	5650	6645
TDS (mg/L)	7380	2825	190	160	205
Hardness (mg/L as $CaCO_3$)	2225	1205	147	58.5	107
Chloride (mg/L)	870	125	3	3	10.5
Nitrate-N (mg/L)	17.5	3.0	1.6	15.3	2.8
Total Copper (µg/L)	15	175	170	10	70
Total Lead (µg/L)	6.1	53.5	95.2	7.6	36.8
Total Zinc (µg/L)	40	330	330	30	225
Total Cadmium (µg/L)	0.3	11.2	2	0.4	1.9
Total Coliform (MPN/100ml)	40000	>160000	125000	>50000	>81200
Fecal Coliform (MPN/100ml)	4300	953	6300	>81200	81200

TSS. It is generally expected that TSS concentrations in alluvial streams will be elevated because of the combination of high sediment supply and instream transport and erosion. TSS concentrations in Table 2-4 are very high, due to the highly erodible, sandy alluvial soils in the tributary canyons. Highest TSS concentrations were measured at sites B and C, which were almost an order of magnitude greater than the other sites.

TDS. Total dissolved solids (TDS) are a measure of the dissolved cations and anions, primarily inorganic salts (calcium, magnesium, potassium, sodium, chlorides and sulfates). TDS is an impairing pollutant in Reach 3_E of the SCR as listed in the State's 2002 303(d) list of impaired water bodies. High TDS levels can impair agricultural, municipal supply, and groundwater recharge beneficial uses. Stormwater monitoring data collected in the NRSP area (Table 2-4) show differing TDS levels among the five monitoring stations. Measured TDS concentrations were very high at Sites A and B, while TDS concentrations at the other three sites were low to moderate. Sites A and B are located on the most downstream tributaries of the five monitoring stations in the NRSP area. Elevated TDS levels in runoff from these drainages is likely a result of the natural soil properties of the marine layers of the Pico formation, and the high groundwater table conditions in these two canyons, suggesting that groundwater discharges to the streams contributed to the elevated TDS levels.

Hardness. Hardness is a measure of the polyvalent cations, primarily calcium and magnesium. Hardness measurements are important because the toxicity of metals (and the associated water quality objectives) is an inverse function of the hardness. The stormwater monitoring data for hardness in the NRSP area (Table 2-4) were analogous to the data for TDS. Hardness concentrations were very high at Sites A and B, and low to moderate at the other three sites. High hardness at Sites A and B located on the downstream tributaries could be due to natural high levels of calcium and magnesium in the local soils (such as lime and gypsum deposits), and the high groundwater table conditions in these two canyons, suggesting again that groundwater discharges contributed to the elevated hardness levels.

Chloride. High levels of chloride in Santa Clara River Reaches 3_E, 7_E, and 8_E are causing impairment of listed beneficial uses for agricultural irrigation. Irrigation of salt sensitive crops such as avocados and strawberries with water containing elevated levels of chloride can result in reduced crop yields. As with TDS and hardness, monitoring data collected in the NRSP area (Table 2-4) found very high chloride concentrations at Site A, high levels at Site B, and lower concentrations at the remaining three sites.

Nutrients. Nitrate-nitrogen was the only nutrient measured in the NRSP area stormwater monitoring. As shown in Table 2-4, measured nitrate-nitrogen concentrations were generally low (less than 3 mg/L as N) at three of the sites, and were elevated at Sites A and D (17.5 mg/L and 15.3 mg/L, respectively). High nitrate levels can be associated with runoff from agricultural areas and nurseries, or associated with excessive fertilization of landscape areas in residential areas.

Metals. Table 2-4 presents average total copper, lead, zinc, and cadmium concentrations measured in the NRSP area stormwater monitoring. High concentrations of total copper, lead, and zinc were measured at Sites B, C, and E, and low to moderate concentration were measured at Sites A and D. Moderately high concentrations of total cadmium were also detected at Site B.

Elevated total metal concentrations are often associated with elevated TSS levels. Such trends are somewhat evident in the monitoring data, which exhibited highest total metal concentrations at sites with the highest TSS concentrations (Site B, C, and E). Site D, however, also had high TSS concentrations but low to moderate levels of total metal concentrations.

Indicator Bacteria. Pathogens are viruses, bacteria, and protozoa that cause illness in humans. The presence of fecal indictor bacteria (FIB) indicates the presence of fecal contamination and the potential presence of associated pathogenic organisms; however, it does not indicate the source of the contamination. There are numerous natural and anthropogenic sources of pathogen indicators. The average fecal coliform concentrations at monitoring Sites A, B, and C ranged from about 1,000 to 6,000 MPN/100 mL, which represents medium concentrations. Monitoring data from Sites D and E showed high fecal coliform concentrations, more than an order of magnitude greater than Sites A, B, and C.

2.7.1 LA County Department of Public Works Monitoring Data

The Los Angeles County Department of Public Works (LACDPW) initiated dry- and wet-weather monitoring in the Santa Clara River in the 2002/2003 season (LACDPW, 2003). The monitoring station (S29) is located in Santa Clara River Reach 8_E at The Old Road (Figure 2-1). It is approximately two miles upstream from the eastern boundary of the Project area. The monitoring station is downstream of the Saugus Water Reclamation Plant and upstream of the Valencia Water Reclamation Plant. The monitoring station is intended to provide long-term information about water quality trends in areas with heterogeneous land uses and has a tributary area of 411 square miles. Land use in the tributary area is 87 percent open space, 4.3 percent urban development, and 8.7 percent other land uses (LACDPW, 2003).

Monitoring at the mass emission station in 2002-2003 included four storm events. Table 2-5 lists the rainfall depth and duration of the four monitored storm events based on hourly rainfall measurements at the Newhall rain gage. The depth of each of the storms was greater than the median storm depth for the Newhall rain gage (0.70 inches). In particular, the storm event beginning on 2/11/03 was a very large event, with a total storm depth of almost 8 inches. Due to these large storm sizes, pollutant concentrations of samples may be highly diluted and not representative of concentrations in more frequent storm events. During large storm events, samples taken after the initial wash off of pollutants will generally have much lower pollutant concentrations. Also, groundwater effects, which increase hardness, are highly diluted.

: Depth and Duration of Storms Monitored for Newhall WRP

Date	Depth (in)[1]
12/08/04	0.12
2/17/05	0.6
2/18/05[2]	4.45
11/9/05	0.12
11/10/05	0.2
2/17/06	0.31

[1] Based on rainfall measured at the Newhall rain gauge.
[2] NR-3 only sampled

LA County Department of Public Works Monitoring Data. The Los Angeles County Department of Public Works (LACDPW) has conducted dry and wet weather monitoring in the Santa Clara River for three wet seasons - from 2002 through 2005 (LACDPW, 2005). The monitoring station (S29) is located in the Santa Clara River at The Old Road (Figure 2-1). It is approximately two miles upstream from the eastern boundary of the NRSP area. The monitoring station is downstream of the Saugus Water Reclamation Plant and the City of Santa Clarita and upstream of the Valencia Water Reclamation Plant. The monitoring station is intended to provide long-term information about water quality trends in areas with heterogeneous land uses and has a tributary area of 411 square miles.

Monitoring at the mass emission station included ten storm events. Composite samples were collected for most parameters, except grab sampling was used for bacteria analyses. Table 2-5 lists the rainfall depths and durations of the ten monitored storm events based on hourly rainfall measurements at the Newhall rain gage. The depth of eight of the ten storms was greater than the median storm depth for the Newhall rain gage (0.70 inches). In particular, the storm event beginning on 2/11/03 was a very large event, with a total storm depth of almost 8 inches.

Table 2-5: Depth and Duration of Storms Monitored by LACDPW at S29

Date	Rainfall Depth (inches)[1]	Storm Duration (hours)[1]
11/8/2002	1.6	21
12/16/2002	1.9	5
2/11/03	7.9	29
3/15/03	1.0	14
10/31/2003	0.30	4
12/25/2003	1.80	14
1/1/2004	0.4	9
10/17/2004	0.64	7
10/26/2004	2.22	13
1/7/2005	2.63	17

[1] Based on rainfall measured at the Newhall rain gage

Table 2-6 lists summary statistics of the monitoring data collected at the SCR mass emission station for the four events listed in Table 2-5. Comparison of these in-stream wet-weather monitoring data with the tributary monitoring data in the NRSP area (Table 2-4) indicates the following:

TSS. The average in-stream TSS concentration at the mass emission station was considerably lower than the average TSS concentrations measured in the NRSP area tributaries, most likely due to the large storm events that were monitored.

Hardness, TDS, and Chloride. The average in-stream concentrations of hardness, TDS, and chloride at the mass emission station were comparable with average concentrations in the three upstream tributary monitoring stations (Sites C, D, and E). This is consistent with the location of the mass emission station upstream of the tributary monitoring stations. The average concentrations found in the two downstream tributary stations (Sites A and B) were considerably higher than average concentrations at the upstream tributary stations and at the mass emission station.

Nutrients. In-stream nutrient concentrations were generally low. Only nitrate data was collected in the tributary monitoring stations. The average in-stream nitrate concentration at the mass emission station was lower, but generally comparable with the average concentrations at three of the five tributary monitoring stations (Sites B, C, and E). The nitrate concentrations at the other two tributary monitoring stations were comparatively much higher.

Metals. The average in-stream concentration for total metals was comparable to average concentrations at two of the five tributary monitoring stations (Sites A & D). Average total metal concentrations measured at the other three tributary monitoring sites (Sites B, C, and D) were much higher than the average in-stream concentrations at the mass emission station.

Indicator Bacteria. The average in-stream FIB concentration at the mass emission station was comparable to average concentrations at two of five tributary monitoring stations (Sites D & E). Concentrations of indicator bacteria in wet-weather flows at all monitoring stations were very high.

Table 2-6: Summary Results of LACDPW Stormwater Monitoring at the SCR Mass Emission Station (S29) during 2002-2003

USGS Water Quality Monitoring Data. The US Geological Survey (USGS) has collected stream flow and water quality data at a number of locations in the SCR watershed (http://waterdata.usgs.gov/nwis). Among the largest data sets are flow and water quality data collected at USGS station 11108500 located on the Santa Clara River just downstream of the Los Angeles / Ventura County Line. This station is located approximately one mile downstream of the NRSP area (Figure 2-1), and downstream of both existing Water Reclamation Plants.
The USGS collected water quality data between April 1951 and October 1995, probably using depth integrated sampling. These data thus provide a historical perspective of water quality in the SCR within the NRSP area.

Data presentation. To facilitate interpretation, the wet weather water quality data were grouped into two categories depending on the depth of 2-day antecedent rainfall measured at the Newhall rain gauge:

1. ***0.1 – 1 inches.*** Rainfall depths that would likely produce runoff volumes characteristic of more frequent, smaller storm events.

2. ***> 1 inch***. Rainfall depths that would likely produce runoff volumes characteristic of larger, less frequent storm events.

Selected General Constituents

The selected general constituents examined were Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Hardness and Chloride. TSS is a measure of the particulate matter suspended in water. Total dissolved solids (TDS) are a measure of the dissolved cations and anions, primarily inorganic salts (calcium, magnesium, potassium, sodium, chlorides and sulfates). TDS is an impairing pollutant in Reach 3 of the SCR as listed in the State's 2002 303(d) list of impaired water bodies. High TDS levels can impair agricultural, municipal supply, and groundwater recharge beneficial uses.

Hardness and chloride are important components of TDS. Hardness is a measure of the polyvalent cations, primarily calcium and magnesium. It is expressed as an equivalent concentration of calcium carbonate ($CaCO_3$). Hardness measurements are important because the toxicity of metals (and the associated water quality objectives) is an inverse function of the hardness. Chloride comprises a large proportion of the TDS and is responsible for impairments in its own right. High levels of chloride in Santa Clara River Reaches 3, 5, and 6 are causing impairment of listed beneficial uses for agricultural irrigation. Irrigation of salt sensitive crops, such as avocados and strawberries, with water containing elevated levels of chloride can result in reduced crop yields

Results for concentrations of TSS, TDS, chloride and hardness for the four datasets are listed in Tables 2-6 through 2-9. Rather than measuring TDS, the USGS station has recorded specific conductance (that is, the extent to which the sample conducts an electric current), which is related to TDS concentration. As a rough rule-of-thumb, TDS concentration can be estimated as 0.64 times the specific conductance (USDI, 1998). Using this rule-of-thumb, the average TDS concentrations at the USGS station averaged around 1,400 mg/L for storm flows.

Table 2-7: Average Concentrations of Selected Constituents from Newhall Ranch Tributary Stormwater Monitoring in March 2001

Constituent	Site A Mouth of Potrero	Site B Mouth of San Martinez Grande	Site C Long Canyon Upstream of Onion Field	Site D Mouth of Middle Cyn	Site E Middle of Chiquito
TSS (mg/L)	835	41,100	36,000	5,650	6,645
TDS (mg/L)	7,380	2,825	190	160	205
Hardness (mg/L as $CaCO_3$)	2,225	1,205	147	59	107
Chloride (mg/L)	870	125	3	3	11

Table 2-8: Newhall WRP Startup Wet Weather Water Quality Data for Selected General Constituents in the Santa Clara River during 2004 – 2006

Constituent	2-day Preceding Rainfall (in)	Sample Site	No. of Samples	No. of Detects	Minimum	Maximum	Average
TSS (mg/L)	0.1 – < 1.0 inches	NR1	5	5	32	107	58
		NR3	5	5	32	235	112
	≥ 1.0 inches	NR3	1	1	-	-	43,360

Constituent	2-day Preceding Rainfall (in)	Sample Site	No. of Samples	No. of Detects	Minimum	Maximum	Average
TDS (mg/L)	0.1 – < 1.0 inches	NR1	5	5	622	1,136	855
		NR3	5	5	698	2,020	1,076
	≥ 1.0 inches	NR3	1	1	-	-	2,100
Hardness (mg/L as $CaCO_3$)	0.1 – < 1.0 inches	NR1	5	5	304	464	387
		NR3	5	5	352	670	475
	≥ 1.0 inches	NR3	1	1	-	-	832
Chloride (mg/L)	0.1 – < 1.0 inches	NR1	2	2	84	117	100
		NR3	2	2	89	121	105
	≥ 1.0 inches	NR3	1	1	46	46	46

- = no or insufficient data

Table 2-9: LACDPW Stormwater Monitoring for Selected General Constituents at the SCR Mass Emission Station (S29) during 2002-2005

Constituent	2-day Preceding Rainfall (in)	No. of Samples	Minimum	Maximum	Average
TSS (mg/L)	0.1 – < 1.0 inches	3	542	2202	1205
	≥ 1.0 inches	7	53	6591	606
TDS (mg/L)	0.1 – < 1.0 inches	3	266	732	463
	≥ 1.0 inches	7	28	364	213
Hardness (mg/L)	0.1 – < 1.0 inches	3	140	428	256
	≥ 1.0 inches	7	15	170	105
Chloride (mg/L)	0.1 – < 1.0 inches	3	36	115	74
	≥ 1.0 inches	7	3	52	24

Table 2-10: USGS Water Quality Data for Selected General Constituents in the Santa Clara River at the County Line during 1951 – 1995

Constituent	2-day Preceding Rainfall (in)	No. of Samples	No. of Detects	Minimum	Maximum	Average
TSS (mg/L)	0.1 – < 1.0 inches	10	10	248	4730	2291
	≥ 1.0 inches	41	41	107	51200	10711
Specific Conductance (uS/cm)	0.1 – < 1.0 inches	33	33	831	4220	2246
	≥ 1.0 inches	42	42	637	3240	1309
Hardness (mg/L)	0.1 – < 1.0 inches	27	27	270	1500	773
	≥ 1.0 inches	37	37	250	1200	546

Constituent	2-day Preceding Rainfall (in)	No. of Samples	No. of Detects	Minimum	Maximum	Average
Chloride (mg/L)	0.1 – < 1.0 inches	34	34	21	290	122
	≥ 1.0 inches	39	39	14	192	61

TSS. It is generally expected that TSS concentrations in alluvial streams can be greatly elevated during storm runoff because of the combination of high sediment supply and a high capacity for instream transport and erosion. TSS concentrations in Table 2-6 to 2-9 are sometimes very high, due to the highly erodible, easily transportable, sandy alluvial soils and sediments. Highest TSS concentrations were measured at some of the tributary canyons (Table 2-6), but were also observed in the SCR (Table 2-7 and Table 2-8). These latter results show the capacity of high flows in the Santa Clara River for sediment transport and supports the conclusion that large rainfall events result in a “reset” of the main channel.

Average and maximum concentrations are much higher in the larger storms than the smaller storms at the downstream sites on the SCR. This was not the case for the upstream LACDPW station, however. The reason for this is not clear, and may reflect the sampling methodology and/or the limited number of storms sampled.

The average TSS concentrations were much higher at the lower SCR sites (NR-1, NR-3, USGS) than at the upstream LACDPW Mass Emission Station. This may reflect the difference in sampling techniques (grab sample versus composite sample), and/or occasionally large inputs of TSS from tributaries, such as some of those draining through the NRSP area (Table 2-6). It may also reflect a lower river bed gradient (and hence better settling characteristics) of SCR near the LACDPW station.

TDS. Stormwater monitoring data collected in the NRSP tributaries (Table 2-6) show greatly differing TDS levels among the five monitoring stations. Measured TDS concentrations were very high at Sites A and B, while TDS concentrations at the other three sites were low. It is highly unlikely that this is a land use effect. Elevated TDS levels in runoff at Site A and B is likely a result of the natural soil properties of the marine layers of the Pico formation, and the high groundwater table conditions in these two canyons, suggesting that groundwater discharges to the streams contributed to the elevated TDS levels. These greatly differing dissolved solid (TDS) concentrations are also reflected in some of the components that make up the TDS (chloride and hardness) as described below.

Concentrations of TDS in the SCR were low to moderate, and maximums did not approach the high values observed in tributaries A and B. Much higher average concentrations were observed at the three downstream SCR stations (NR-1, NR-3, USGS) compared with the upstream LACDPW station, and this could be due to their location downstream of the tributaries represented by Sites A and B, with their much higher salt content.

TDS concentrations were generally lower in the larger storms, reflecting a dilution effect.

Hardness. The stormwater monitoring data for hardness were analogous to the data for TDS. Hardness concentrations were very high at the tributary Sites A and B, and low to moderate at the other three tributary sites. High hardness at Sites A and B could be due to natural high levels of calcium and magnesium in the local soils (such as lime and gypsum deposits), and the high groundwater table conditions in these two canyons, suggesting again that groundwater discharges contributed to the elevated hardness levels.

In the SCR, average hardness values were greater downstream (NR3, NR1, USGS sites – Table 2-7 and 2-9) than at the LACDPW station (Tables 2-8). This is most likely due to the influence of tributary inflows of high hardness waters (such as measured at Sites A and B – Table 2-6), other groundwater inputs, and agricultural return flows that enter the Santa Clara River between these stations. However, the magnitude of hardness concentrations was somewhat inconsistent, with the USGS station (Table 2-9) showing higher average hardness concentrations than those measured at NR-1 and NR-3 (Table 2-7).

The average hardness concentration decreased with larger antecedent rainfall depth, as was found for TDS concentrations.

Chloride. Similar to TDS and hardness, monitoring data collected in the NRSP tributaries (Table 2-6) found very high chloride concentrations at Site A, high levels at Site B, and low concentrations at the remaining three sites.

As with the other dissolved ionic parameters (TDS and hardness) the average chloride concentrations at the LACDPW station (Table 2-8) were lower than those measured at downstream sites (NR1, NR3, USGS – Table 2-7 and 2-9). As described elsewhere, this is likely due to differences in salt content of local soils.

Overall, the average chloride concentrations during recent stormwater monitoring were highly variable and ranged between 3 mg/L and 120 mg/L, with the exception of the very high chloride concentrations detected at the mouth of Potrero Canyon (Site A). Average chloride concentrations at the USGS station were about 122 mg/L for storm flows. The Basin Plan objective for chloride is 100 mg/L.

Nutrients

The major nutrients nitrogen and phosphorous are described here. Phosphorous was measured as total phosphorous (TP) and sometimes as dissolved phosphorous. Dissolved phosphorous is the more bioavailable form of phosphorous compared to TP, which is often made up of a high proportion of particulate phosphorous. Nitrogen is measured variously as nitrate, nitrite, ammonia, and total Kjeldahl nitrogen (TKN). TKN is the measure of ammonia plus the organic forms of nitrogen. Nitrate, nitrite, and ammonia are the more bioavailable forms of nitrogen, and of these, nitrate (or nitrate + nitrite) has the higher concentration in natural waters and is more important than ammonia as a nutrient. Table 2-10 through 2-13 summarizes available data for these nutrients. Only nitrate was measured in the Newhall Ranch Tributary Stormwater Monitoring.

Table 2-11: Average Concentrations of Nitrate from Newhall Ranch Tributary Stormwater Monitoring in March 2001

Constituent	Site A Mouth of Potrero	Site B Mouth of San Martinez Grande	Site C Long Canyon Upstream of Onion Field	Site D Mouth of Middle Cyn	Site E Middle of Chiquito
Nitrate + Nitrite-N (mg/L)	17.5	3.0	1.6	15.3	2.8

Table 2-12: Newhall WRP Pre-Startup Wet Weather Water Quality Data for Selected Nutrients in the Santa Clara River during 2004 - 2006

Constituent	2-day Preceding Rainfall (in)	Sample Site	No. of Samples	No. of Detects	Minimum	Maximum	Average
Total Phosphorous (mg/L)	0.1 – < 1.0 inches	NR1	5	5	0.4	0.5	0.4
		NR3	5	5	0.3	0.7	0.4
	≥ 1.0 inches	NR3	1	1	-	-	13.4
Nitrate as N (mg/L)	0.1 – < 1.0 inches	NR1	5	5	1.9	4.8	3.2
		NR3	5	5	2.3	3.7	3.0
	≥ 1.0 inches	NR3	1	1	-	-	1.4
Nitrite as N (mg/L)	0.1 – < 1.0 inches	NR1	5	0	<0.005	<0.005	<0.005
		NR3	5	0	<0.005	<0.005	<0.005
	≥ 1.0 inches	NR3	1	0	-	-	<0.005
Ammonia as N (mg/L)	0.1 – < 1.0 inches	NR1	5	4	<0.005	0.3	0.2
		NR3	5	5	0.02	0.1	0.1
	≥ 1.0 inches	NR3	1	1	-	-	0.5
TKN as N (mg/L)	0.1 – < 1.0 inches	NR1	5	4	<0.04	0.7	0.3
		NR3	5	4	<0.04	0.6	0.4
	≥ 1.0 inches	NR3	1	1	-	-	46.0

- = no or insufficient data

Table 2-13: LACDPW Stormwater Monitoring of Nutrients at the SCR Mass Emission Station (S29) during 2002-2005

Constituent	2-day Preceding Rainfall (in)	No. of Samples	No. of Detects	Minimum	Maximum	Average
Dissolved phosphorous (mg/L)	0.1 – < 1.0 inches	3	3	0.18	0.43	0.28
	≥ 1.0 inches	7	7	0.10	0.45	0.27
Total phosphorous (mg/L)	0.1 – < 1.0 inches	3	3	0.41	0.83	0.60
	≥ 1.0 inches	7	7	0.18	0.84	0.41
Nitrate-N (mg/L)	0.1 – < 1.0 inches	3	3	0.69	1.85	1.17
	≥ 1.0 inches	7	6	<0.03	1.36	0.78
Nitrite-N (mg/L)	0.1 – < 1.0 inches	3	3	0.15	1.0	0.53
	≥ 1.0 inches	7	3	<0.03	0.87	0.19
Ammonia-N (mg/L)	0.1 – < 1.0 inches	3	0	<0.08	<0.08	<0.08
	≥ 1.0 inches	7	5	<0.08	1.09	0.30
TKN as N (mg/L)	0.1 – < 1.0 inches	3	3	2.94	8.7	4.95
	≥ 1.0 inches	7	7	0.66	3.32	1.85

Table 2-14: USGS Water Quality Data for Selected Nutrients in the Santa Clara River at the County Line during 1951 to 1995

Constituent	2-day Preceding Rainfall (in)	No. of Samples	No. of Detects	Minimum	Maximum	Average
Dissolved phosphorous (mg/L)	0.1 – < 1.0 inches	3	3	0.35	0.66	0.46
	≥ 1.0 inches	1	1	-	-	0.01
Total phosphorous (mg/L)	0.1 – < 1.0 inches	5	5	0.81	1.8	1.28
	≥ 1.0 inches	2	2	0.63	1.4	1.02
Ammonia as N (mg/L)	0.1 – < 1.0 inches	3	3	0.03	0.39	0.16
	≥ 1.0 inches	0	0	-	-	
Nitrate + Nitrite as N (mg/L)	0.1 – < 1.0 inches	7	7	0.87	4	2.1
	≥ 1.0 inches	4	4	1.2	2	1.7
TKN as N (mg/L)	0.1 – < 1.0 inches	1	1	-	-	0.64
	≥ 1.0 inches	1	1	-	-	0.69
Total Nitrogen (mg/L)	0.1 – < 1.0 inches	2	2	0.6	2.2	1.4
	≥ 1.0 inches	2	2	3.5	4.4	4.0

- = no or insufficient data

Phosphorous. Recent wet weather monitoring showed somewhat consistent total phosphorous levels, of a magnitude of about 0.4 to 0.6 mg/L. An exception was the large storm sample (>1.0

inch) collected at station NR-3, which measured 13.4 mg/L. This was likely due the high concentration of total suspended solids measured during the same storm event, because total phosphorous is predominately found in the particulate-phase in stormwater runoff. Historical average total phosphorous concentrations at the USGS station were somewhat higher than recent results at 1.0 to 1.3 mg/L and appeared to be somewhat independent of storm event size.

Nitrogen. Nitrate-nitrogen was the only nutrient measured in the NRSP tributary stormwater monitoring. As shown in Table 2-10, measured nitrate-nitrogen concentrations were generally low (less than 3 mg/L as N) at three of the sites, and were elevated at Sites A and D (17.5 mg/L and 15.3 mg/L, respectively). High nitrate levels can be associated with runoff from agricultural areas and nurseries, or associated with excessive fertilization of landscaping in residential areas; however, Station E, which is downstream of residential development, showed relatively low nitrate concentrations.

Most of the more recent nitrate monitoring data summarized in Tables 2-10, 2-11, and 2-12 were relatively low (1.1 mg/L to 3.2 mg/L). The average historical nitrate-N + nitrite-N concentrations at the USGS station were roughly similar, varying from 2.1 mg/L for lower storm flows to 1.7 mg/L for higher storm flows.

Average ammonia concentrations were low and ranged from 0.1 to 0.5 mg/L. Average TKN concentrations generally ranged between the concentrations found for ammonia and nitrate (about 0.4 to 2.8 mg/L). One exception was the concentration found in the large storm at NR-3, which measured 46 mg/L. As with total phosphorous, the organic forms of nitrogen in stormwater runoff are generally in the particulate-phase, and this result correlated with the high levels of total phosphorous and suspended solids measured during this same event as described above.

Selected Metals and Pesticides

The heavy metals Cadmium (Cd), Copper (Cu), Lead (Pb), and Zinc (Zn) can be toxic at high concentrations. They can occur naturally in soils and sediments, and can be present in urban runoff. Aluminum is one of the more abundant elements in the earth's crust. The organophosphorous pesticides chlorpyrifos and diazinon are especially toxic to a number of aquatic organisms and in the past have been frequently detected downstream from urban and agricultural land uses. Cyanide is a highly toxic substance and has a number of man-made and natural sources.

Tables 2-14 through 2-17 summarize the data for these metals and pesticides in the tributaries and the Santa Clara River. Cyanide was only measured at the LACDPW Mass Emission station. Available data for metals at the USGS station were very limited. For copper and lead, there were a considerable number of non-detects with very high detection limits. Therefore, comparison of the USGS data for copper, lead, and zinc with the recent monitoring information is considered inappropriate.

Table 2-15: Average Concentration of Heavy Metals from Newhall Ranch Tributary Stormwater Monitoring in March 2001

Constituent	Site A Mouth of Potrero	Site B Mouth of San Martinez Grande	Site C Long Canyon Upstream of Onion Field	Site D Mouth of Middle Cyn	Site E Middle of Chiquito
Total Copper (µg/L)	15	175	170	10	70
Total Lead (µg/L)	6.1	53.5	95.2	7.6	36.8
Total Zinc (µg/L)	40	330	330	30	225
Total Cadmium (µg/L)	0.3	11.2	2	0.4	1.9

Table 2-16: Newhall WRP Pre-Startup Wet Weather Water Quality Data for Selected Metals and Pesticides in the Santa Clara River during 2004 - 2006

Constituent	NR1	NR3
Dissolved Aluminum (µg/L)	27	19
Average Total Aluminum (µg/L)	740	770
Dissolved Copper (µg/L)	4.6	3.6
Average Total Copper (µg/L)	4.9	5.9
Dissolved Lead (µg/L)	<0.07	<0.07
Average Total Lead (µg/L)	1	0.8
Dissolved Zinc (µg/L)	12	8.7
Average Total Zinc (µg/L)	17.5	15
Diazinon (µg/L)	<0.01	<0.01
Chlorpyrifos (µg/L)	<0.6	<0.6

Table 2-17: LACDPW Stormwater Monitoring for Metals, Pesticides, and Cyanide at the SCR Mass Emission Station (S29) during 2002-2005

Constituent	2-day Preceding Rainfall (in)	No. of Samples	No. of Detects	Minimum	Maximum	Average
Dissolved aluminum (µg/L)	0.1 – < 1.0 inches	3	1	<100	1390	470
	≥ 1.0 inches	7	3	<100	3680	570
Total aluminum (µg/L)	0.1 – < 1.0 inches	3	3	450	1500	850
	≥ 1.0 inches	7	7	131	19650	6000
Dissolved copper (µg/L)	0.1 – < 1.0 inches	3	3	5.9	10.6	8.0
	≥ 1.0 inches	7	7	3.7	22.6	10.2
Total copper (µg/L)	0.1 – < 1.0 inches	3	3	10.2	30.4	18.8
	≥ 1.0 inches	7	7	9.4	53	23.6

Constituent	2-day Preceding Rainfall (in)	No. of Samples	No. of Detects	Minimum	Maximum	Average
Dissolved lead (µg/L)	0.1 – < 1.0 inches	3	1	<0.44	3.3	1.4
	≥ 1.0 inches	7	4	<0.44	12.5	2.65
Total lead (µg/L)	0.1 – < 1.0 inches	3	3	1.5	5.4	3.4
	≥ 1.0 inches	7	7	1.1	40	16
Dissolved zinc (µg/L)	0.1 – < 1.0 inches	3	3	10	27	19
	≥ 1.0 inches	7	7	12	37	26
Total zinc (µg/L)	0.1 – < 1.0 inches	3	3	11	60	41.5
	≥ 1.0 inches	7	7	42	353	105
Dissolved cadmium (µg/L)	0.1 – < 1.0 inches	3	0	<0.15	<0.1	<0.1
	≥ 1.0 inches	7	1	<0.15	0.74	0.11
Total cadmium (µg/L)	0.1 – < 1.0 inches	3	2	<0.05	0.29	0.22
	≥ 1.0 inches	7	5	<0.05	1.27	0.62
Chlorpyrifos (µg/L)	0.1 – < 1.0 inches	3	0	<0.05	<0.05	<0.05
	≥ 1.0 inches	7	0	<0.05	<0.05	<0.05
Diazinon (µg/L)	0.1 – < 1.0 inches	3	3	0.028	0.41	0.17
	≥ 1.0 inches	7	5	<0.01	0.43	0.11
Cyanide (µg/L)	0.1 – < 1.0 inches	3	3	0.007	0.01	0.008
	≥ 1.0 inches	7	2	<0.01	0.008	0.003

Table 2-18: USGS Water Quality Data for Selected Metals, Pesticides and Indicator Bacteria in the Santa Clara River at the County Line during 1951 to 1995

Constituent	2-day Preceding Rainfall (in)	No. of Samples	No. of Detects	Minimum	Maximum	Average
Dissolved Copper (µg/L)	0.1 – < 1.0 inches	4	0	-	-	-
	≥ 1.0 inches	0	0	-	-	-
Total Copper (µg/L)	0.1 – < 1.0 inches	1	1	-	-	30
	≥ 1.0 inches	0	0	-	-	-
Dissolved Lead (µg/L)	0.1 – < 1.0 inches	39	4	1	23	7.8
	≥ 1.0 inches	4	0	-	-	-
Total Lead (µg/L)	0.1 – < 1.0 inches	3	0	-	-	-
	≥ 1.0 inches	1	0	-	-	-
Dissolved Zinc (µg/L)	0.1 – < 1.0 inches	4	1	-	-	10
	≥ 1.0 inches	0	0	-	-	-

Constituent	2-day Preceding Rainfall (in)	No. of Samples	No. of Detects	Minimum	Maximum	Average
Total Zinc (µg/L)	0.1 – < 1.0 inches	1	1	-	-	150
	≥ 1.0 inches	0	0	-	-	-
Diazinon (µg/L)	0.1 – < 1.0 inches	1	1	-	-	0.02
	≥ 1.0 inches	0	0	-	-	-

- = no or insufficient data

Metals. Table 2-14 presents average total copper, lead, zinc, and cadmium concentrations measured in the NRSP tributary stormwater monitoring. High concentrations of total copper, lead, and zinc were measured at Sites B and C, and low to moderate concentrations were measured at Sites A and D. Concentrations at Site E fell in the middle of the measured range. Moderately high concentrations of total cadmium were also detected at Site B. Elevated total metal concentrations are often associated with elevated TSS levels. Such trends are evident in the monitoring data, which exhibited highest total metal concentrations at sites with the highest TSS concentrations (Sites B and C, see Table 2-6)). There were differences between Sites D and E, however, despite similar average TSS concentrations. This may be due to urban-related inputs in the Chiquito Canyon, enhancing concentrations at site E.

The data for the SCR is rather limited, with few data for the lower sites. Average concentrations of dissolved and total Cu, Pb and Zn appeared to be elevated at the upstream LACDPW station, which is located just below Santa Clarita and a WRP, compared with the lower site. However, data are too few at the lower sites to make this comparison with confidence
Measured aluminum concentrations showed a very wide range of concentrations at the mass emission station (Table 2-16).

Pesticides. Data for pesticides are very limited. Chlorpyrifos was not detected at LACDPW station, while Diazinon was frequently detected (8/10) and at sometimes relatively high concentrations (Table 2-16). Diazinon and Chlorpyrifos were not detected further downstream in the SCR during Newhall WRP wet weather sampling (Table 2-15) but were detected in the one wet weather sample taken in the historical USGS data (Table 2-17).

Cyanide. Cyanide concentrations observed at the LACDPW station were very low (Table 2-16).

Fecal Indicator Bacteria

Pathogens such as viruses, bacteria, and protozoa that cause illness in humans are difficult to measure. Fecal indicator bacteria (FIB) such as Total Coliform, Fecal Coliform and Enterococci are commonly measured instead, and their presence indicates the presence of fecal contamination and the potential presence of associated pathogenic organisms. However, it does not indicate the source of the contamination and there are numerous natural and anthropogenic sources of pathogen indicators. Table 2-18 through 2-21 summarize FIB data for the four datasets.

Table 2-19: Average Concentrations for Fecal Indicator Bacteria from Newhall Ranch Tributary Stormwater Monitoring in 2001

	Site A Mouth of Potrero	Site B Mouth of San Martinez Grande	Site C Long Canyon Upstream of Onion Field	Site D Mouth of Middle Cyn	Site E Middle of Chiquito
Total Coliform (MPN/100ml)	40,000	>160,000	125,000	>50,000	>81,200
Fecal Coliform (MPN/100ml)	4,300	953	6,300	>81,200	81,200

Table 2-20: Newhall WRP Startup Wet Weather Water Quality Data for Fecal Indicator Bacteria in the Santa Clara River during 2004 - 2006

Constituent	2-day Preceding Rainfall (in)	Sample Site	No. of Samples	No. of Detects	Minimum	Maximum	Average
Fecal Coliform (MPN/100mL, DL=1 MPN/100mL)	0.1 – < 1.0 inches	NR1	5	4	<1	900	87
		NR3	5	4	<1	5,000	258
	≥ 1.0 inches	NR3	1	1	≥1,600	≥1,600	≥1,600
Total Coliform (MPN/100mL, DL=1 MPN/100mL)	0.1 – < 1.0 inches	NR1	5	4	<1	1,600	284
		NR3	5	4	<1	13,000	549
	≥ 1.0 inches	NR3	1	1	≥1,600	≥1,600	≥1,600

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Table 2-21: LACDPW Stormwater Monitoring for Fecal Indicator Bacteria at the SCR Mass Emission Station during 2002-2005

Constituent	2-day Preceding Rainfall (in)	No. of Samples	No. of Detects	Minimum	Maximum	Average
Total coliform (MPN/100mL)	0.1 – < 1.0 inches	3	3	170,000	500,000	323,000
	≥ 1.0 inches	7	7	50,000	500,000	265,000
Fecal coliform (MPN/100mL)	0.1 – < 1.0 inches	3	3	50,000	300,000	143,000
	≥ 1.0 inches	7	7	9,000	240,000	97,000
Fecal Enterococci (MPN/100mL)	0.1 – < 1.0 inches	3	3	22,000	300,000	177,000
	≥ 1.0 inches	7	7	17,000	240,000	103,000

Table 2-22: USGS Water Quality Data for Fecal Indicator Bacteria in the Santa Clara River at the County Line during 1951 - 1995

Constituent	2-day Preceding Rainfall (in)	No. of Samples	No. of Detects	Minimum	Maximum	Average
Fecal Coliform (CFU/100mL)	0.1 – < 1.0 inches	3	3	80	720	427
	≥ 1.0 inches	1	1	-	-	2700

- = no or insufficient data

Concentrations of indicator bacteria in wet weather flows at all tributary monitoring stations and the LACDPW mass emission station were very high, consistent with other stormwater data throughout the region. Average bacteria concentrations at the lower stations were significantly lower, but still elevated, more so during larger storms.

Summary

Table 2-22 and 2-23 summarize the average values from wet weather monitoring data for all monitoring locations within the Newhall Ranch area.

Table 2-23: Summary of Average Wet Weather Monitoring Data for 2 Day Precedent Rainfall Between 0.1 and 1.0 Inches

	LACDPW Mass Emission Station	**NRSP Area Tributary Monitoring**					**Newhall WRP Startup Monitoring**		**USGS Wet Weather Monitoring**
Constituent	***S29***	***Site A***	***Site B***	***Site C***	***Site D***	***Site E***	***NR1***	***NR3***	***USGS***
TSS (mg/L)	1205	7380	2825	190	160	205	58	112	2291
Hardness (mg/L)	256	835	41100	36000	5650	6645	387	475	773
TDS (mg/L)	463	2225	1205	147	58.5	107	855	1076	≈1437[1]
Chloride (mg/L)	74	870	125	3	3	10.5	100	105	122
Total P (mg/L)	0.6	-	-	-	-	-	0.4	0.4	1.28
Nitrate-N (mg/L)	1.17	17.5[2]	3.0[2]	1.6[2]	15.3[2]	2.8[2]	3.2	3.0	2.1[2]
Nitrite-N (mg/L)	0.53	-	-	-	-	-	<0.005	<0.005	-
Ammonia-N (mg/L)	<0.08	-	-	-	-	-	0.2	0.1	0.16
TKN (mg/L)	4.95	-	-	-	-	-	0.3	0.4	0.64
Dissolved copper (µg/L)	8	-	-	-	-	-	4.6	3.6	ND
Total copper (µg/L)	18.8	15	175	170	10	70	4.9	5.9	30
Dissolved lead (µg/L)	1.4	-	-	-	-	-	<0.07	<0.07	7.8
Total lead (µg/L)	3.4	6.1	53.5	95.2	7.6	36.8	1	0.8	ND
Dissolved zinc (µg/L)	19	-	-	-	-	-	12	8.7	10

Constituent	LACDPW Mass Emission Station	NRSP Area Tributary Monitoring					Newhall WRP Startup Monitoring		USGS Wet Weather Monitoring
	S29	*Site A*	*Site B*	*Site C*	*Site D*	*Site E*	*NR1*	*NR3*	*USGS*
Total zinc (µg/L)	41.5	40	330	330	30	225	17.5	15	150
Dissolved aluminum (µg/L)	470	-	-	-	-	-	27	19	-
Total aluminum (µg/L)	850	-	-	-	-	-	740	770	-
Fecal Coliform MPN/100mL	143,000	4300	953	6300	>81200	81200	87	258	427
Total Coliform MPN/100mL	323,000	40000	>160000	125000	>50000	>81200	284	549	-

[1] Derived from Specific Conductance, [2] Nitrate + Nitrite-N, ND = non detected, - = no or insufficient data

Table 2-24: Summary of Average Wet Weather Monitoring Data for 2-Day Precedent Rainfall of > 1 inch.

Constituent	USGS Wet Weather Monitoring	LACDPW SCR Mass Emission Station	Newhall WRP Startup Monitoring
	11108500	*S29*	*NR3*
General and Conventional Parameters			
TSS (mg/L)	10711	606	43360
TDS (mg/L)	838[1]	213	2100
Hardness (mg/L)	546	105	832
Chloride (mg/L)	61	24	46
Nutrients			
Total P (mg/L)	1.02	0.41	13.4
Nitrate-N (mg/L)	1.7[2]	0.78	1.4
Nitrite-N (mg/L)		0.19	ND
Ammonia-N (mg/L)	-	0.3	0.5
TKN (mg/L)	0.69	1.85	46.0

Constituent	USGS Wet Weather Monitoring	LACDPW SCR Mass Emission Station	Newhall WRP Startup Monitoring
	11108500	*S29*	*NR3*
Metals			
Dissolved copper (µg/L)	-	10.2	-
Total copper (µg/L)	-	23.6	-
Dissolved lead (µg/L)	ND	2.65	-
Total lead (µg/L)	ND	16	-
Dissolved zinc (µg/L)	-	19	-
Total zinc (µg/L)	-	26	-
Dissolved aluminum (µg/L)	-	570	-
Total aluminum (µg/L)	-	6000	-
Indicator Bacteria			
Fecal Coliform (MPN/100 mL)	2700	97,000	>1600
Total Coliform (MPN/100 mL)	-	265,000	>1600

[1] Derived from Specific Conductance, [2] Nitrate + Nitrite-N, ND = Not Detected in Sample, - = no or insufficient data

Dry Weather Water Quality Monitoring

Dry season base flows in the SCR through the NRSP area are perennial. Dry season base flows include contributions from natural groundwater flows; however, discharges from the upstream Saugus and Valencia WRPs contribute the majority of base flow. Discharges from the WRPs during dry weather conditions are a source of impairing pollutants in downstream reaches, including chloride, TDS, and nitrogen compounds.

Dry weather water quality monitoring data in the SCR are available from three sources:

- LACDPW sampling at the SCR mass emission station
- USGS Water Quality Monitoring
- Newhall Ranch WRP pre-startup monitoring

These sites were described above under Wet Weather Monitoring (Section 2.3.1). The LACDPW station is on the SCR above Newhall Ranch, while the Newhall Ranch WRP pre-startup monitoring stations are at the western boundary and downstream of the NRSP area. The

USGS station is also below the NRSP area, and provides a historical perspective from samples collected between 1951 and 1995.

General Constituents

Tables 2-24 through 2-26 report summary statistics for dry weather monitoring of selected nutrients in the three datasets.

Table 2-25: LACDPW Dry Weather Monitoring for Selected General Constituents at the SCR Mass Emission Station (S29) during 2002-2003

Constituent	No. of Samples	No. of Detects	Minimum	Maximum	Average
TSS (mg/L)	2	2	8	11	9.5
Hardness (mg/L)	2	2	330	410	370
TDS (mg/L)	2	2	838	942	890

2.7.2 USGS Water Quality Monitoring Data

The US Geological Survey (USGS) has collected stream flow and water quality data at a number of locations in the SCR watershed (http://waterdata.usgs.gov/nwis). Among the largest data sets are flow and water quality data collected at USGS station 11108500 located on the Santa Clara River just downstream of the Los Angeles / Ventura County Line. This station is located approximately one mile downstream of the NRSP area (Figure 2-1).
The USGS collected water quality data at the Los Angeles / Ventura County Line station between April 1951 and October 1995. These data thus provide an historical perspective of water quality in the SCR within the NRSP area. To facilitate interpretation, the water quality data were grouped into two categories depending on the depth of 2-day antecedent rainfall measured at the Newhall rain gauge:

3. ***0.1 – 1 inches.*** Rainfall depths that would likely produce runoff volumes characteristic of more frequent, smaller storm events

4. ***> 1 inch.*** Rainfall depths that would likely produce runoff volumes characteristic of larger, less frequent storm events

Table 2-7 summarizes the USGS data for selected general constituents. Comparison of the historical water quality data at the USGS station (Table 2-7) with the more recent wet weather monitoring data summarized in Table 2-4 and Table 2-6 above indicates the following:

Hardness. The average hardness concentration decreased with larger antecedent rainfall depth. This trend was consistent with the more recent wet weather monitoring in or near the NRSP area; however, the magnitude of hardness concentrations was somewhat inconsistent. Average hardness concentrations at most of the stormwater monitoring stations upstream of the USGS station was about 100 mg/L as $CaCO_3$, which is lower than the average hardness concentration of 546 mg/L as $CaCO_3$ to 773 mg/L as $CaCO_3$ at the USGS station. Exceptions were the very high hardness concentrations detected at the Potrero Canyon and San Martinez Canyon monitoring stations, which are upstream of the USGS station. It is possible that average concentrations in storm flows at the USGS station reflected a combination of the lower concentrations measured at the upstream locations and the higher hardness concentrations measured in the two downstream tributary locations.

TSS. TSS concentrations at the USGS monitoring station increased substantially in storm flows and were generally in the range of 2,000 to 10,000 mg/L (Table 2-7). These values were consistent with the Newhall stormwater monitoring results in the NRSP area tributaries (Table 2-4).

TDS. Table 2-7 summarizes results for specific conductance (that is, the extent to which the sample conducts an electric current), which can be related to TDS concentration. As a rough rule-of-thumb, TDS concentration can be estimated as 0.64 times the specific conductance (USDI, 1998). Using this rule-of-thumb, the average TDS concentrations at the USGS station ranged from about 800 mg/L to 1,400 mg/L for storm flows. These average concentrations were greater than the recent monitoring information. Average TDS concentrations at most of the recent stormwater stations was about 200 mg/L, with the exception of the very high TDS concentrations at the Potrero Canyon and San Martinez Canyon monitoring stations.

Chloride. Average chloride concentrations at the USGS station were about 60 mg/L to 122 mg/L for storm flows. This is generally consistent with the recent monitoring data. Average chloride concentrations in recent monitoring ranged between 3 mg/L to 120 mg/L, with the exception of the very high chloride concentrations detected at the mouth of Potrero Canyon.

Table 2-26: USGS Water Quality Data for Selected General Constituents in the Santa Clara River at the County Line

Constituent & 2-day Preceding Rainfall (in)	Sample Dates	No. of Samples	Minimum	Maximum	Average	Median
Hardness (mg/L)						
0.1 – < 1.0 inches	5/51 – 12/85	27	270	1500	773	660
≥1.0 inches		37	250	1200	546	470
TSS (mg/L)						
0.1 – < 1.0 inches	11/70 – 9/88	10	248	4730	2291	2345
≥ 1.0 inches		41	107	51200	10711	5270
Specific Conductance (uS/cm)						
0.1 – < 1.0 inches	4/51 – 10/95	33	831	4220	2246	1720
≥ 1.0 inches		42	637	3240	1309	1100

Constituent & 2-day Preceding Rainfall (in)	Sample Dates	No. of Samples	Minimum	Maximum	Average	Median
Chloride (mg/L)						
0.1 – < 1.0 inches	4/51 – 4/92	34	21	290	122	111
≥ 1.0 inches		39	14	192	61	47

Table 2-8 summarizes the USGS data for selected nutrients. Comparison of the historical nutrient data at the USGS station (Table 2-8) with the recent nutrient monitoring data (Table 2-4 and Table 2-6) indicates the following:

Phosphorus. Average total phosphorus concentrations at the USGS station were about 1.0 to 1.3 mg/L and appear to be somewhat independent of storm event size. Recent wet weather monitoring also showed somewhat consistent total phosphorus levels, but at a slightly lower magnitude of about 0.4 to 0.6 mg/L.

Nitrogen. The average nitrate-N + nitrite-N concentration at the USGS station varied from 2.1 mg/L for lower storm flows to 1.7 mg/L for higher storm flows. Most of the more recent monitoring data summarized in Tables 2-4 and 2-6 above were similarly low (1.1 mg/L to 3.0 mg/L), except for Newhall tributary stations A and D, which had elevated average nitrate-N concentrations (17.5 mg/L and 15.3 mg/L, respectively).

Table 2-27: USGS Water Quality Data for Selected Nutrients in the Santa Clara River at the County Line

Constituent & 2-day Preceding Rainfall (in)	Sample Dates	No. of Samples	Minimum	Maximum	Average	Median
Dissolved phosphorus (mg/L)						
0.1 – < 1.0 inches	3/79 – 4/92	3	0.35	0.66	0.46	0.36
≥ 1.0 inches		1			0.01	
Total phosphorus (mg/L)						
0.1 – < 1.0 inches	8/74 – 9/88	5	0.81	1.8	1.28	1.10
≥ 1.0 inches		2	0.63	1.4	1.02	1.02
Ammonia as N (mg/L)						
0.1 – < 1.0 inches	10/79 – 4/92	3	0.03	0.39	0.16	0.07
≥ 1.0 inches		0				
Nitrate + Nitrite as N (mg/L)						
0.1 – < 1.0 inches	8/71 – 4/92	7	0.87	4	2.1	2.2
≥ 1.0 inches		4	1.2	2	1.7	1.8
TKN as N (mg/L)						
0.1 – < 1.0 inches	3/79 –	1			0.64	

Constituent & 2-day Preceding Rainfall (in)	Sample Dates	No. of Samples	Minimum	Maximum	Average	Median
≥ 1.0 inches	4/92	1			0.69	
Total Nitrogen (mg/L)						
0.1 – < 1.0 inches	8/74 – 9/81	2	0.6	2.2	1.4	
≥ 1.0 inches		2	3.5	4.4	4.0	

Table 2-9 summarizes the USGS data for selected metals, pesticides, and FIB constituents. Comparison of the historical water quality data at the USGS station (Table 2-9) with the recent wet weather monitoring data (Tables 2-4 and Table 2-6) indicates the following:

Metals. Available data for trace metals at the USGS station are limited. For copper and lead, there were a considerable number of non-detects with very high detection limits. Therefore, comparison of the USGS data for copper, lead, and zinc with the recent monitoring information is considered inappropriate.

FIB. There were only four measurements of fecal coliform concentration corresponding to storm flows at the USGS station, and the single measurement corresponding to large storm flows showed an elevation in fecal coliform levels.

Pesticides. Diazinon was detected in one wet weather sample in the historical data.

Table 2-28: USGS Water Quality Data for Selected Metals, Pesticides and Indicator Bacteria in the Santa Clara River at the County Line

Constituent & 2-day Preceding Rainfall (in)	Sample Dates	No. of Samples	No. > Detect Limit	Minimum	Maximum	Average	Median
Dissolved Copper (ug/L)							
0.1 – < 1.0 inches	6/73 – 9/88	4	0	-	-	-	-
Total Copper (ug/L)							
0.1 – < 1.0 inches	4/79 – 9/82	1	1	-	-	30	-
Dissolved Lead (ug/L)							
0 – < 0.1 inches	6/73 – 9/88	39	4	1	23	7.8	3.5
0.1 – < 1.0 inches		4	0				
Total Lead (ug/L)							
0.1 – < 1.0 inches	8/74 – 9/82	3	0	-	-	-	-
≥1.0 inches		1	0	-	-	-	-

Constituent & 2-day Preceding Rainfall (in)	Sample Dates	No. of Samples	No. > Detect Limit	Minimum	Maximum	Average	Median
Dissolved Zinc (ug/L)							
0.1 – < 1.0 inches	5/75 – 9/88	4	1	-	-	10	-
Total Zinc (ug/L)							
0.1 – < 1.0 inches	4/79 – 9/82	1	1	-	-	150	-
Fecal Coliform (CFU/100mL)							
0.1 – < 1.0 inches	3/79 – 9/88	3	3	80	720	427	480
≥1.0 inches		1	1	-	-	2700	-
Diazinon (ug/L)							
0.1 – < 1.0 inches	8/74 – 6/76	1	1	-	-	0.02	-

Chloride (mg/L)	2	2	106	125	116

Table 2-29: Newhall WRP Pre-Startup Dry Weather Monitoring for Selected General Constituents in the SCR during 2004-2006

Constituent	Location	No. of Samples	No. of Detects	Min	Max	Average
TSS (mg/L DL = 1 mg/L)	NR1	49	48	<1	342	66
	NR3	49	48	<1	676	128
Hardness (mg/L)	NR1	49	49	258	568	388
	NR3	49	49	324	684	458
TDS (mg/L)	NR1	49	49	504	1160	845
	NR3	49	49	576	1396	936
Chloride (mg/L)	NR1	24	24	66	145	120
	NR3	24	24	50	157	124

Table 2-30: USGS Dry Weather Water Quality Monitoring Data for Selected General Constituents in the SCR at the County Line during 1951-1995.

Constituent	No. of Samples	No. of Detects	Minimum	Maximum	Average
TSS (mg/L)	73	73	7	5980	349
Hardness (mg/L)	220	220	42	2400	881
Specific Conductance (uS/cm)	383	383	925	7620	2408
Chloride (mg/L)	355	355	30	585	140

TSS. Average concentrations of TSS appeared highly variable between the monitoring stations, but only two samples were collected at the County's mass emission station, and the low concentrations there may reflect that limitation. The two larger datasets showed relatively high average concentrations, especially the historical data from USGS station, which may have included samples taken during times of higher erosion or larger dry weather flows. Differences may also be due to physical factors such as substrate material, local flow regime, and tributary influences.

Hardness, TDS and Chloride. The average concentrations of dissolved constituents, hardness, TDS, and chloride were more similar between the monitoring locations and times. However, the USGS County Line station again consistently recorded higher averages (approximately double) than the other stations.
The data suggests that the water flowing in the SCR in the NRSP area during dry weather is hard and turbid, with moderate levels of other dissolved salts, including chloride.

Nutrients

Tables 2-27 through 2-29 report summary statistics for dry weather monitoring of selected nutrients in the three datasets.

Table 2-31: LACDPW Dry Weather Monitoring of Nutrients at the SCR Mass Emission Station (S29) during 2002-2003

Constituent	No. of Samples	No. of Detects	Minimum	Maximum	Average
Dissolved phosphorous (mg/L)	2	2	0.07	0.18	0.13
Total phosphorous (mg/L)	2	2	0.10	0.21	0.15
Nitrate-N (mg/L)	2	2	1.3	1.3	1.3
Nitrite-N (mg/L)	2	0	-	-	<0.03
Ammonia-N (mg/L)	2	0	-	-	<0.08
TKN (mg/L)	2	2	0.35	0.48	0.42

- = no or insufficient data

Table 2-32: Newhall WRP Pre-Startup Dry Weather Monitoring for Selected Nutrients in the SCR

Constituent	Location	No. of Samples	No. of Detects	Min	Max	Average
Total phosphorous (mg/L)	NR1	49	49	0.1	1.1	0.5
	NR3	49	48	<0.008	0.8	0.5
Nitrate-N (mg/L)	NR1	49	49	1.0	4.9	2.8
	NR3	49	49	1.1	5.1	2.9
Nitrite-N (mg/L)	NR1	49	6	<0.005	0.2	0.02
	NR3	49	5	<0.005	0.2	0.02
Ammonia-N (mg/)	NR1	49	34	<0.005	0.4	0.1
	NR3	49	39	<0.005	0.4	0.1
TKN (mg/L)	NR1	49	47	<0.04	1.0	0.4
	NR3	49	48	<0.04	1.3	0.5

Table 2-33: USGS Dry Weather Water Quality Monitoring Data for Selected Nutrients in the Santa Clara River at the County Line during 1951 - 1995

Constituent	No. of Samples	No. of Detects	Minimum	Maximum	Average
Dissolved phosphorous (mg/L)	48	48	0.12	2.4	1
Total phosphorous (mg/L)	64	64	0.23	5.9	1.13
Ammonia as N (mg/L)	41	41	0.01	0.62	0.18
Nitrate + Nitrite as N (mg/L)	47	47	1.8	7.5	4
TKN as N (mg/L)	20	20	0.08	1.3	0.83
Total Nitrogen (mg/L)	33	33	0.5	15	3.7

Phosphorous and Nitrogen. The average concentrations for all nutrients showed a very similar and simple pattern. Concentrations increased downstream and were higher in the historical dataset. Low average values at the mass emission station could reflect its location above the Valencia WRP, and/or the low number of dry weather samples at this station. Higher average concentrations at the USGS gauge (Table 2-29) compared with the Newhall WRP startup monitoring data (Table 2-28) could be due to greater nutrient loading over its period of record due to historically greater WRP discharge concentrations and/or less responsible use of fertilizers, as well as the higher TSS, and hence particulate nutrients, observed at this site.

Metals and Pesticides

Tables 2-30 through 2-32 report summary statistics for dry weather monitoring of selected metals and pesticides for the three datasets.

Table 2-34: LACDPW Dry Weather Monitoring for Metals and Pesticides at the SCR Mass Emission Station (S29) during 2002-2003

Constituent	No. of Samples	No. of Detects	Minimum	Maximum	Average
Dissolved copper (µg/L)	2	2	2.6	3.5	3.0
Total copper (µg/L)	2	2	7.0	7.4	7.2
Dissolved lead (µg/L)	2	0	-	-	<0.44
Total lead (µg/L)	2	2	0.6	0.6	0.6
Dissolved zinc (µg/L)	2	2	7.6	41	24
Total zinc (µg/L)	2	2	7.6	72	40
Dissolved cadmium (µg/L)	2	0	-	-	<0.15
Total cadmium (µg/L)	2	0	-	-	<0.05
Chlorpyrifos (µg/L)	2	0	-	-	<0.05
Diazinon (µg/L)	2	1	0.023	0.023	0.023

- = no or insufficient data

Table 2-35: Newhall WRP Pre-Startup Dry Weather Monitoring for Selected Metals, Pesticides in the SCR.

Constituent	Location	No. of Samples	No. of Detects	Min	Max	Average
Dissolved copper (µg/L)	NR1	10	10	3.2	4.8	4
	NR3	10	10	3	5.2	4.2
Total copper (µg/L)	NR1	21	21	2.3	11	5
	NR3	21	21	2.6	15	6.5
Dissolved lead (µg/L)	NR1	10	5	<0.07	0.7	0.2
	NR3	10	6	<0.07	0.6	0.2
Total lead (µg/L)	NR1	21	18	<0.07	4.6	0.9
	NR3	21	18	<0.07	5.8	1.4
Dissolved zinc (µg/L)	NR1	10	10	7.8	14	11
	NR3	10	10	6.2	16	10.7
Total zinc (µg/L)	NR1	21	21	8.5	30	15.4
	NR3	21	21	7.8	51	19.5
Dissolved aluminum (µg/L)	NR1	4	4	21	290	170
	NR3	4	4	14	750	289
Total aluminum (µg/L)	NR1	4	4	240	2100	1018
	NR3	4	4	330	3300	1685

Constituent	Location	No. of Samples	No. of Detects	Min	Max	Average
Diazinon (µg/L)	NR1	21	0	-	-	<0.01
	NR3	21	0	-	-	<0.01

- = no or insufficient data

Table 2-36: USGS Dry Weather Water Quality Monitoring Data for Selected Metals, Pesticides in the Santa Clara River at the County Line.

Constituent	No. of Samples	No. of Detects	Minimum	Maximum	Average
Dissolved copper (ug/L)	40	13	1	5	1.8
Total copper (ug/L)	12	6	10	40	20
Dissolved lead (ug/L)	39	4	1	23	7.8
Total lead (ug/L)	30	0	ND	ND	ND
Dissolved Zinc (ug/L)	39	29	5	50	15.8
Total zinc (ug/L)	12	12	20	110	45
Diazinon (ug/L)	6	4	0.01	0.05	0.03

ND = non detected

Metals. Concentrations of heavy metals in dry weather flows were generally low and, for the most part, reasonably similar. Total metal concentrations will be determined by TSS concentrations, and this is reflected in the difference between the historical data collected at the USGS site with high TSS and the more recent data with low TSS. Therefore the dissolved concentrations are more interesting to compare. Average dissolved copper concentrations were fairly similar and ranged from 1.8 – 4.2 µg/L. Average dissolved zinc concentrations were also fairly similar and ranged from 11 – 24 µg/L. Higher copper and zinc concentrations were observed at the upper SCR site, which may reflect its proximity to urban land uses; however, the data are too few to confidently assert a reason for these differences. Dissolved lead showed some large differences between the historical and more recent datasets, and this is likely due to difficulties in analyzing trace metals in the earlier dataset, and widespread use of leaded gasoline prior to 1995.

Pesticides. Diazinon was detected at the upstream LACDPW site and historically at the USGS site. The more extensive data set collected at NR-1 and NR-3 did not detect diazinon and this may be due to its recent phase-out by USEPA for residential uses.

Fecal Indicator Bacteria

Tables 2-33 through 2-35 report summary statistics for dry weather monitoring of FIB for the three datasets. The concentrations of indicator bacteria indicated highly variable but generally elevated FIB concentrations in the SCR. Average concentrations of total coliform and fecal coliform were similar between the USGS station and the WRP startup monitoring stations. The mass emission station recorded much greater average concentrations, which is likely an artifact of the small dataset.

Table 2-37: LACDPW Dry Weather Monitoring at the SCR Mass Emission Station (S29) during 2002-2003

Constituent	No. of Samples	No. of Detects	Minimum	Maximum	Average
Total coliform (MPN/100mL)	2	2	500	8000	4250
Fecal coliform (MPN/100mL)	2	2	170	5000	2585
Enterococci (MPN/100mL)	2	1	230	230	230

Table 2-38: Newhall WRP Pre-Startup Dry Weather Monitoring for Indicator Bacteria in the SCR during 2004 - 2006

Constituent	Location	No. of Samples	No. of Detects	Min	Max	Average
Fecal coliform (CFU/100mL)	NR1	49	49	23	2300	209
	NR3	49	49	23	3000	213
Total coliform (MPN/100mL)	NR1	49	49	23	24,000	961
	NR3	49	49	23	24,000	1207

Table 2-39: USGS Dry Weather Water Quality Monitoring Data for Indicator Bacteria in the Santa Clara River at the County Line during 1951-1995

Constituent	No. of Samples	No. of Detects	Minimum	Maximum	Average
Fecal coliform (CFU/100mL)	46	46	25	980	250

Summary

Table 2-36 summarizes of all dry weather monitoring data available for the Santa Clara River in the NRSP area.

Table 2-40: Summary of Average Dry Weather Monitoring Data in the Santa Clara River

Constituent	USGS Wet Weather Monitoring	SCR Mass Emission Station	Newhall WRP Startup Monitoring	
	11108500	*S29*	*NR1*	*NR3*
General and Conventional Parameters				
TSS (mg/L)	349	9.5	66	128
Hardness (mg/L)	881	370	388	458
TDS (mg/L)	1541[1]	890	845	936
Chloride (mg/L)	140	116	120	124
Nutrients				
Total P (mg/L)	1.13	0.15	0.5	0.5
Nitrate-N (mg/L)	4[2]	1.3	2.8	2.9
Nitrite-N (mg/L)	-	<0.03	0.02	0.02
Ammonia-N (mg/L)	0.18	<0.08	0.1	0.1
TKN (mg/L)	0.83	0.42	0.4	0.5
Metals				
Dissolved copper (µg/L)	1.8	3.0	4	4.2
Total copper (µg/L)	20	7.2	5	6.5
Dissolved lead (µg/L)	7.8	<0.44	0.2	0.2
Total lead (µg/L)	ND	0.6	0.9	1.4
Dissolved zinc (µg/L)	15.8	24	11	10.7
Total zinc (µg/L)	45	40	15.4	19.5
Dissolved aluminum (µg/L)	-	-	170	289
Total aluminum (µg/L)	-	-	1018	1685

ND = non detected, - = no or insufficient data

2.8 Groundwater

The geology within and adjacent to the Project area consists of relatively thin alluvial deposits (Alluvium) overlying a deeper, relatively thick Saugus Formation. Both the Alluvium and Saugus Formation contain water-bearing sediments capable of becoming saturated so as to provide water to wells. These water-bearing sediments constitute the local "groundwater reservoir" for the Santa Clarita Valley. The upper basin, called the Alluvium or Alluvial

Aquifer, generally underlies the Santa Clarita Valley and side canyons. The main river valley consists of medium-grained sand on the west to cobbly sand in the east. Due to the unconsolidated to poorly consolidated condition of the Alluvium, and its lack of cementation, the Alluvium has relatively high permeability and porosity.

The Project area is within the Basin Plan's Castaic Valley and Saugus Aquifer subbasin of the Santa Clarita Valley Groundwater Basin, East Subbasin. Beneficial uses for groundwaters for this subbasin are shown in Table 2-37.

Table 2-41: Beneficial Uses of Groundwaters

Groundwater Basin	MUN
DWR 4.07 - Eastern Santa Clara Sub-basin: Castaic Valley and Saugus Aquifer	E

E-Existing Beneficial Use
MUN: Community, military, or individual water supply systems including, but not limited to, drinking water supply
Source: Water Quality Control Plan for the Los Angeles Region (Basin Plan) (LARWQCB, 1994 as amended)

3 REGULATORY SETTING

3.1 <u>Clean Water Act</u>

In 1972, the Federal Water Pollution Control Act [later referred to as the Clean Water Act (CWA)] was amended to require National Pollutant Discharge Elimination System (NPDES) permits for the discharge of pollutants to waters of the United States from any point source. In 1987, the CWA was amended to require that the United States Environmental Protection Agency (USEPA) establish regulations for permitting of municipal and industrial stormwater discharges under the NPDES permit program. The USEPA published final regulations regarding stormwater discharges on November 16, 1990. The regulations require that municipal separate storm sewer system (MS4) discharges to surface waters be regulated by a NPDES permit.

In addition, the CWA requires the States to adopt water quality standards for receiving water bodies and to have those standards approved by the USEPA. Water quality standards consist of designated beneficial uses for a particular receiving water body (e.g. wildlife habitat, agricultural supply, fishing etc.), along with water quality criteria necessary to support those uses. Water quality criteria are prescribed concentrations or levels of constituents – such as lead, suspended sediment, and fecal coliform bacteria – or narrative statements which represent the quality of water that support a particular use. Because California had not established a complete list of acceptable water quality criteria, USEPA established numeric water quality criteria for certain toxic constituents in receiving waters with human health or aquatic life designated uses in the form of the California Toxics Rule ("CTR") (40 CFR 131.38).

3.2 CWA Section 303(d) - TMDLs

When designated beneficial uses of a particular receiving water body are being compromised by water quality, Section 303(d) of the CWA requires identifying and listing that water body as “impaired”. Once a water body has been deemed impaired, a Total Maximum Daily Load (TMDL) must be developed for the impairing pollutant(s). A TMDL is an estimate of the total load of pollutants from point, non-point, and natural sources that a water body may receive without exceeding applicable water quality standards (with a “factor of safety” included). Once established, the TMDL allocates the loads among current and future pollutant sources to the water body.

The Landmark Village Project will discharge stormwater and runoff to Santa Clara River Reach 5. Table 3-1 lists the water quality impairments for the Santa Clara River mainstem as reported on the 2002 CWA Section 303(d) List of Water Quality Limited Segments, at and downstream of the Project location. Reach 5 of the Santa Clara River is listed for chloride, coliform, and nitrate-nitrogen plus nitrite-nitrogen. Downstream segments of the river, below the Dry Gap, are listed for ammonia, chloride, coliform, historical pesticides, and Total Dissolved Solids (TDS).

The Regional Board has adopted TMDLs for nitrogen compounds, including nitrate plus nitrite-nitrogen and ammonia, and chloride into the Water Quality Control Plan for Los Angeles Region (Basin Plan). The waste load allocations for stormwater discharges into Reach 5 of the Santa Clara River are summarized in Table 3-2. Pollutant reductions are regulated through effluent limits prescribed in POTW and minor point source NPDES Permits, Best Management Practices (BMPs) required in NPDES MS4 Permits, and State Water Resource Control Board (SWRCB) Management Measures for nonpoint source discharges. The Regional Board has not yet adopted a TMDL for coliform in Reach 5.

Federal regulations require the Section 303(d) list to be updated every two years. In September 2005, the State Water Resources Control Board (SWRCB) proposed revisions to the 2002 CWA Section 303(d) List of Water Quality Limited Segments. The SWRCB received comments through January 31, 2006. The State Water Board will consider all comments received before considering adoption of a revised section 303(d) list. States are required to submit the Section 303(d) list and TMDL priorities to the USEPA for approval. The 2006 Section 303(d) list is due to USEPA by April 2006. Reach 5 of the Santa Clara River is proposed for additional listings for aluminum, ammonia, chloride, diazinon, and polychlorinated biphenyls (PCBs) on the draft revised list. Approximately 40 miles downstream and below the Dry Gap, Santa Clara River Reach 1 (between the estuary and the Highway 101 bridge) is proposed to be listed for toxicity. Newhall Land submitted comments to the SWRCB on the draft 2006 revision of the Section 303(d) List of Water Quality Limited Segments.

Table 3-1: 2002 CWA Section 303(d) Listings for the Santa Clara River Mainstem

SCR Reach or Tributary[1]	Geographic Description & Distance from Project to Upstream End of Reach	Pollutants	TMDL Priority	303(d) List Proposed TMDL Completion	Potential Sources	TMDL Status and Notes
5	Blue Cut Gaging Station to West Pier Hwy 99 (Project location)	1) Chloride 2) High coliform count 3) Nitrate and nitrite	1) High 2) Medium 3) Low	1) 2002 2) None listed 3) None listed	Nonpoint and point sources	The Regional Board has adopted a Nitrogen compound TMDL (including Ammonia) into the Basin Plan. The Regional Board has adopted a Chloride TMDL into the Basin Plan.
3	Freeman diversion dam to "A" street (25 miles) [2]	1) Ammonia 2) Chloride 3) Total Dissolved Solids	1) High 2) High 3) Low	1) 2003 2) 2002 3) None listed	Nonpoint and point sources	The Regional Board has adopted a Nitrogen compound TMDL (including Ammonia) into the Basin Plan. The USEPA promulgated Chloride TMDLs for Reach 3_R. The USEPA recommended that the State defer implementation of the TMDL until after adoption of a proposed Basin Plan amendment of the chloride objective for Reach 3_R. The Regional Board has developed a tentative Basin Plan amendment to revise the Reach 3_R chloride objective from 80 to 100 mg/L. The USEPA supports this increase in the water quality objective. The status of TMDL development for TDS is unknown.
--	Estuary (40 miles)	1) ChemA[3] 2) Coliform 3) Toxaphene	1) Medium 2) Medium 3) Medium	None listed	1) Unknown Source 2) Nonpoint source 3) Nonpoint source	Draft documents are available for the Total Maximum Daily Loads for Santa Clara River Estuary Beach/Surfers' Knoll, McGrath State Beach, and Mandalay Beach Coliform and Beach Closures (07/18/2003).

[1] SCR reaches upstream of the NRSP area have not been included.
[2] Reach 3 is downgradient of the "dry gap" in Reach 4.
[3] ChemA suite of chlorinated legacy pesticides include: Aldrin, chlordane, Dieldrin, Endosulfan I/II, Endrin, gamma-BHC, heptachlor, heptachlor epoxide, and Toxaphene.

Table 3-2: TMDL Waste Load Allocations for MS4 and Stormwater Sources to Santa Clara River Reach 5

Impairing Pollutant	Numeric Water Quality Objective	Waste Load Allocation
Chloride (Resolution No. 03-008)	100 mg/L.	Waste load allocations have been adopted for the Saugus WRP and the Valencia WRP. Other NPDES discharges contribute a minor chloride load. The waste load allocation for these point sources is **100 mg/L**. The source analysis indicates that nonpoint sources are not a major source of chloride. The load allocations for nonpoint sources is **100 mg/L**.
Nitrogen Compounds (Resolution No. 03-011)	The numeric target for NO_3-N + NO_2-N in the Nitrogen Compounds TMDL was based on achieving the existing water quality objective of 5 mg/L NO_3-N + NO_2-N. The numeric target that was used to calculate the waste load allocations included a 10% margin of safety; thus the numeric target is 4.5 mg/L NO_3-N + NO_2-N (30-day average). The water quality objectives for ammonia in Reach 5 used in the Nitrogen Compounds TMDL are: TMDL Ammonia Water Quality Objective (mg/L as N) 1-hr average / 30-day average Reach 5 at County Line: 3.4 / 1.2 Reach 5 below Valencia: 5.5 / 2.0 Reach 5 above Valencia: 4.8 / 2.0	Concentration-based waste loads are allocated to municipal, industrial, and construction stormwater sources regulated under NPDES permits. For stormwater Permittees discharging into Reach 5, the following waste load allocations apply: **30-day average nitrate plus nitrite = 6.8 mg/L (NO_3-N + NO_2-N)** **1-hour average ammonia = 5.2 mg/L (NH_3 as N)** **30-day average ammonia = 1.75 mg/l (NH_3 as N)**

3.3 California Toxics Rule

The California Toxics Rule (CTR) is a federal regulation issued by the USEPA providing water quality criteria for potentially toxic constituents in receiving waters with human health or aquatic life designated uses in the State of California. CTR criteria are applicable to the receiving water body and therefore must be calculated based upon the probable hardness values of the receiving waters for evaluation of acute (and chronic) toxicity criteria. At higher hardness values for the receiving water, copper, lead, and zinc are more likely to be complexed (bound with) components in the water column. This in turn reduces the bioavailability and resulting potential toxicity of these metals.

Due to the intermittent nature of stormwater runoff (especially in Southern California), the acute criteria are considered to be more applicable to stormwater conditions than chronic criteria and therefore are used in assessing Project impacts. For example, the average storm duration in the 34-year Newhall gage rainfall record is 12 hours. Acute criteria represent the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time without deleterious effects; chronic criteria equal the highest concentration to which aquatic life can be exposed for an extended period of time (four days) without deleterious effects.

The minimum wet-weather hardness value of 250 mg/L as $CaCO_3$ from USGS station 11108500 was used to approximate CTR criteria for metals. This value is likely to be more representative of conditions in the Santa Clara River below Castaic Creek than the SCR Station 29 based on the water quality data summarized in Section 2.7 above. As per requirements of their discharge permit, the Valencia Water Reclamation Plant has a monitoring station just upstream of the Project area. Monthly hardness values for the Santa Clara River at this station ranged from 326 to 360 mg/L as $CaCO_3$ in 2004. Other water quality comparisons to this station were not made due to lack of wet weather monitoring. The hardness value of 250 mg/L is a conservative estimate of wet-weather hardness values that should occur in the Project area, although higher values are likely to occur.

In this document, the CTR criteria are used as one type of benchmark to evaluate the potential ecological impacts of Project runoff on the receiving waters.

3.4 California Porter-Cologne Act

The federal CWA places the primary responsibly for the control of surface water pollution and for planning the development and use of water resources with the states, although it does establish certain guidelines for the states to follow in developing their programs and allows USEPA to withdraw control from states with inadequate implementation mechanisms.

California's primary statute governing water quality and water pollution issues with respect to both surface waters and groundwater is the Porter-Cologne Water Quality Control Act of 1970 (Porter-Cologne Act). The Porter-Cologne Act grants the State Water Resource Control Board

(SWRCB) and the Regional Water Quality Control Boards (RWQCBs) power to protect water quality and is the primary vehicle for implementation of California's responsibilities under the federal Clean Water Act. The Porter-Cologne Act grants the SWRCB and the RWQCBs authority and responsibility to adopt plans and policies, to regulate discharges of waste to surface and groundwater, to regulate waste disposal sites and to require cleanup of discharges of hazardous materials and other pollutants. The Porter-Cologne Act also establishes reporting requirements for unintended discharges of any hazardous substance, sewage, or oil or petroleum product.

Each RWQCB must formulate and adopt a water quality control plan (Basin Plan) for its region. The Basin Plan must conform to the policies set forth in the Porter-Cologne Act and established by the SWRCB in its state water policy. To implement State and Federal law, the Basin Plan establishes beneficial uses for surface and groundwaters in the region, and sets forth narrative and numeric water quality standards to protect those beneficial uses. The Porter-Cologne Act also provides that a RWQCB may include within its regional plan water discharge prohibitions applicable to particular conditions, areas, or types of waste.

3.5 Basin Plan

The applicable Basin Plan (LARWQCB, 1994, as amended) provides quantitative and narrative criteria for a range of water quality constituents applicable to certain receiving water bodies and groundwater basins within the Los Angeles Region. Specific criteria are provided for the larger, designated water bodies within the region, as well as general criteria or guidelines for ocean waters, bays and estuaries, inland surface waters, and groundwaters. In general, the narrative criteria require that degradation of water quality does not occur due to increases in pollutant loads that will adversely impact the designated beneficial uses of a water body. For example, the Los Angeles Basin Plan requires that "Inland surface waters shall not contain suspended or settleable solids in amounts which cause a nuisance or adversely affect beneficial uses as a result of controllable water quality factors." Water quality criteria apply within receiving waters as opposed to applying directly to runoff; therefore, water quality criteria from the Basin Plan are utilized as benchmarks as one method to evaluate the potential ecological impacts of Project runoff on the receiving waters of the proposed Project. Table 2-2 above lists the beneficial uses of applicable receiving waters.

The Basin Plan also contains water quality criteria for groundwater basins. For example, the Basin Plan requires that "Ground waters shall not contain taste or odor producing substances in concentrations that cause nuisance or adversely affect beneficial uses." Table 2-37 above lists the beneficial uses of the applicable groundwater basin.

3.6 MS4 Permit

In 2001, the Los Angeles Regional Water Quality Control Board (LARWQCB, 2001) issued an NPDES Permit and Waste Discharge Requirements (Order No. 01-182) under the CWA and the

Porter-Cologne Act for discharges of urban runoff in public storm drains in Los Angeles County. The Permittees are the Los Angeles County cities and the County (collectively "the Co-Permittees"). This permit regulates stormwater discharges from MS4s in the Project area. The NPDES permit details requirements for new development and significant redevelopment, including specific sizing criteria for treatment BMPs and flow control requirements.

To implement the requirements of the NPDES permit, the Co-permittees have developed development planning guidance and control measures that control and mitigate stormwater quality and quantity impacts to receiving waters as a result of new development and redevelopment. They are also required to implement other municipal source detection and elimination programs, as well as maintenance measures.

3.6.1 Stormwater Quality Management Program

The MS4 Permit contains the following provisions for implementation of the Stormwater Quality Management Program (SQMP) by the Co-permittees:

- General Requirements – Each Permittee is required to implement the SQMP to comply with applicable storm water program requirements and implement additional controls where necessary to reduce the discharge of pollutants in stormwater to the maximum extent practicable (MEP).
- BMP Implementation – Permittees are required to implement the most effective combination of BMPs for stormwater/urban runoff pollution control.
- SQMP Revision – Permittees are required to revise the SQMP to comply with regional, watershed specific requirements, and/or waste load allocations for implementation of TMDLs for impaired waterbodies.
- Responsibilities of the Principal Permittee – The responsibilities of the Los Angeles County Department of Public Works (as the Principal Permittee) include, but are not limited to, coordinating activities necessary to comply with the NPDES permit, providing personnel and fiscal resources for SQMP updates and annual reports and summaries of reports required under the SQMP, and implementing a County-wide Monitoring Program and evaluating results of the monitoring program.
- Responsibilities of Permittees – Each Permittee is required to comply with the requirements of the SQMP applicable to the discharges within its boundaries.
- Watershed Management Committees (WMCs) – WMCs are comprised of a voting representative from each Permittee within the Watershed Management Areas (WMAs). WMCs are required to facilitate efforts and exchange of information between Permittees, establish additional goals for WMAs, prioritize pollution control efforts, monitor implementation of tasks designated for the WMA, and assess the effectiveness of and recommend revisions to the SQMP.

- Legal Authority – Permittees are granted the necessary legal authority to prohibit non-storm water discharges to the storm drain system.

The objective of the SQMP is to reduce pollutants in urban stormwater discharges to the "maximum extent practicable" in order to attain water quality objectives and to protect the beneficial uses of receiving waters in Los Angeles County. Special provisions are provided in the MS4 permit to facilitate implementation of the SQMP. These provisions include:

- BMP substitution – Substitution of site-specific BMPs is allowed provided the alternative BMP will meet or exceed pollutant reduction of the original BMP, the fiscal burden of the original BMP is substantially greater than the proposed alternative, and the alternative BMP will be implemented within a similar time period.
- Public Information and Participation Program (PIPP) – This requires the Permittee to identify how public education needs were determined, who is responsible for developing and implementing the program, and the method used to determine its effectiveness.
- Industrial/Commercial Facilities Control Program – This requires the Permittee to develop a plan for managing stormwater runoff from industrial and commercial facilities. This program will track, inspect, and ensure compliance at industrial and commercial facilities that are sources of pollutants in storm water.
- Development Planning Program – This requires the Permittee to implement a development-planning program that requires new development and redevelopment projects to minimize impacts from stormwater and urban runoff.
- Development Construction Program – This requires the Permittee to implement a program to control runoff from construction activity to minimize erosion and transportation of sediment and prevent non-stormwater discharges from equipment and vehicle washing.
- Public Agency Activities Program – This requires municipalities to evaluate existing public agency activities that have an impact on stormwater quality (such as vehicle maintenance, landscape maintenance and weed control, and construction and maintenance of streets, roads, and flood control systems) and to develop a program to reduce stormwater impacts with a schedule for implementation.
- Illicit Connections and Illicit Discharges Elimination Program – This requires each Permittee to have a plan for finding and preventing illegal connections and discharges and a mechanism for enforcing against illegal connections and discharges.

3.6.2 Standard Urban Stormwater Mitigation Plan

On March 8, 2000, the development planning program requirements, including the Standard Urban Stormwater Mitigation Plan requirements (collectively, development planning program requirements, including Standard Urban Stormwater Mitigation Pan requirements, are referred to in this report as SUSMP requirements) were approved by the RWQCB as part of the MS4 program to address stormwater pollution from new construction and redevelopment. The SUSMP contains a list of minimum BMPs that must be employed to infiltrate or treat stormwater runoff, control peak flow discharge, and reduce the post-project discharge of pollutants from stormwater conveyance systems. The SUSMP defines, based upon land use type, the types of practices that must be included and issues that must be addressed as appropriate to the development type and size. Compliance with SUSMP requirements is used as one method to evaluate significance of project development impacts on surface water runoff.

Finalized in May 2000, the County of Los Angeles' "Manual for the Standard Urban Stormwater Mitigation Plan" details the requirements for new development and significant redevelopment BMPs (Los Angeles County, 2000) (the "Manual"). The Manual is a model guidance document for use by Permittees and individual project owners to select post-construction BMPs and otherwise comply with the SUSMP requirements. It addresses water quality and drainage issues by specifying design standards for structural or treatment control BMPs that infiltrate or treat stormwater runoff and control peak flow discharge. BMPs are defined in the Manual and SUSMP requirements as any program, technology, process, sizing criteria, operational methods or measures, or engineered systems, which, when implemented, prevent, control, remove, or reduce pollution. Treatment BMP design criteria and guidance are also contained in the MS4 Permit, the Manual, and in the Technical Manual for Stormwater Best Management Practices in the County of Los Angeles, issued by the Department of Public Works in February 2004 (LACDPW, 2004).

One of the most important requirements within the SUSMP is the specific sizing criteria for stormwater treatment BMPs for new development and significant redevelopment projects. The SUSMP includes sizing criteria for both volume-based and flow-based BMPs. The sizing criteria options for volume-based BMPs, such as extended detention basins, are as follows:

1. The 85th percentile 24-hour runoff event storm event determined as the maximized capture stormwater volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87 (WEF, 1998); or,

2. The volume of annual runoff based on unit basin storage volume, to achieve 80% or more volume treatment by the method recommended in California Stormwater Best Management Practices Handbook – Industrial/Commercial (1993); or,

3. The volume of runoff produced from a 0.75 inch storm event, prior to its discharge to a stormwater conveyance system; or,

4. The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" (0.75 inch average for the Los Angeles County Area) that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile, 24-hour runoff event.

Volume-based treatment control BMPs for the Project will be sized to capture and treat 80 percent of the annual runoff volume, with a drawdown time of 48 hours. This methodology utilizes historical rainfall data with continuous simulation modeling to calculate the treatment volume for each treatment control BMP and is consistent with criteria 2 above. The size of the treatment control facilities will be finalized during the design stage by the Project engineer with the final hydrology study, which will be prepared and approved to ensure consistency with this analysis prior to issuance of a grading permit.

Flow-based BMPs, such as vegetated swales, must be designed to infiltrate or treat the maximum flow rate generated from one of the following scenarios:

1. The flow of runoff produced from a rain event equal to at least 0.2 inches per hour intensity, or

2. The flow of runoff produced from a rain event equal to at least two times the 85th percentile hourly rainfall intensity for Los Angeles County, or

3. The flow of runoff produced from a rain event that will result in treatment of the same portion of runoff as treated using volumetric standards above.

Flow-based BMPs for the Project will be sized using a rainfall intensity of 0.3 inches per hour, which will result in treatment of the same portion of runoff as treated using volumetric standards above (criteria 3). BMP sizing for Landmark Village will be finalized during the design stage by the Project engineer with the final hydrology study, which will be prepared and approved to ensure consistency with this analysis prior to issuance of a grading permit.

Also, the SUSMP includes general design specifications for individual priority project categories. These include:

- Single-Family Hillside Home
- 100,000 square foot commercial developments
- Restaurants
- Retail gasoline outlets
- Automotive repair shops
- Parking lots

For example, commercial developments must have properly designed loading and unloading dock areas, repair and maintenance bays, and vehicle equipment wash areas. Restaurants need to have properly designed equipment and accessory wash areas. Parking lots have to be properly designed to limit oil contamination and have regular maintenance of parking lot stormwater treatment systems (e.g., storm drain filters and biofilters).

The proposed Project is required to incorporate appropriate SUSMP requirements into project plans as part of the development plan approval process for building and grading permits. This analysis will identify the general design specifications related to parking lots and other project features associated with Landmark Village. Design of these BMPs will be finalized by the Project engineer with the hydrology study to ensure consistency with this analysis prior to issuance of the grading permit.

3.6.3 Hydromodification and Peak Flow Control

Part 4. Section D.1. of the MS4 Permit notes that increased volume, velocity, and discharge duration of stormwater runoff from developed areas may potentially accelerate downstream erosion and impair habitat-related beneficial uses in Natural Drainage Systems. As a result, Section D.1. of the Permit stipulates that Permittees shall control post-development peak storm water runoff discharge rates, velocities and durations in Natural Drainage Systems to prevent accelerated stream erosion and to protect stream habitat. Natural Drainage Systems are defined by the Permit to include the Santa Clara River.

Further, under Part 4, § D.1 of the MS4 Permit, the County and its Co-permittees were required to develop and implement by February 1, 2005, numeric criteria for peak flow control in accordance with the findings of the Peak Discharge Impact Study analyzing the potential impacts on natural streams due to impervious development. The County of Los Angeles Department of Public Works and the Southern California Storm Water Monitoring Coalition had been conducting the study, but the study was not completed in time to meet the February 1st deadline. Therefore, on January 31, 2005, the County adopted and submitted to the LARWQCB an Interim Peak Flow Standard to be in effect until such time as a final standard can be adopted based on a completed study.

The adopted Los Angeles County Interim Peak Flow Standard was derived from a similar Interim Peak Flow Standard for Ventura County approved by the LARWQCB under the SUSMP requirements provisions of the MS4 Permit. The intent of the Interim Standard, as described by the County in the cover letter dated January 31, 2005, signed by Donald L. Wolfe transmitting the Interim Standard to Jonathan Bishop of the LARWQB, is to provide protection for natural streams to the extent supported by findings from the ongoing study, and consistent with practical construction practices.

The Interim Peak Flow Standard adopted by the County is:

> *The Peak Flow Standard shall require that all post-development runoff from a 2-year, 24-hour storm shall not exceed the predevelopment peak flow rate, burned, from a 2-year, 24-hour storm when the predevelopment peak flow rate equals or exceeds five cubic feet per*

second. Discharge flow rates shall be calculated using the County of Los Angeles Modified Rational Method. The Peak Flow Standard shall also require that post-development runoff from the 50-year capital storm shall not exceed the predevelopment peak flow rate, burned and bulked, from the 50-year capital storm.

In its cover letter dated January 31, 2005, signed by Donald L. Wolfe, transmitting the Peak Flow Interim Standard to Jonathan Bishop of the LARWQB, the County notes that upon completion of the Peak Discharge Impact Study, new peak flow standards may be determined to be appropriate.

Per §4.D(9) of the MS4 Permit, the NRSP Sub-Regional Stormwater Mitigation Plan (GeoSyntec Consultants, 2006) provides an alternative performance standard for the NRSP projects, including Landmark Village, to the Interim Peak Flow Standard. The Landmark Village Project will be conditioned to require, as a project design feature, sizing and design of hydraulic features as necessary to control hydromodification impacts in accordance with the NSRP Sub-Regional Stormwater Mitigation Plan. See further Section 5.3 below.

3.7 <u>Construction Permits</u>

Pursuant to the CWA Section 402(p), requiring regulations for permitting of certain stormwater discharges, the State Water Resources Control Board (SWRCB) has issued a statewide general NPDES Permit and Waste Discharge Requirements for stormwater discharges from construction sites ((NPDES No. CAS000002) California Water Resources Control Board Resolution No. 2001-046; Modification of Water Quality Order 99-08-DWQ State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction Activity (adopted by the SWRCB on April 26, 2001)).

Under this Construction General Permit, discharges of stormwater from construction sites with a disturbed area of one or more acres (effective March 2003) are required to either obtain individual NPDES permits for stormwater discharges or be covered by the Construction General Permit. Coverage under the Construction General Permit is accomplished by completing and filing a Notice of Intent with the SWRCB. Each applicant under the Construction General Permit must ensure that a Stormwater Pollution Prevention Plan (SWPPP) is prepared prior to grading and implemented during construction. The primary objective of the SWPPP is to identify, construct, implement, and maintain BMPs to reduce or eliminate pollutants in stormwater discharges and authorized non-stormwater discharges from the construction site during construction. Compliance with the requirements of the Construction General Permit is used as one method to evaluate Project construction-related impacts on surface water quality.

3.8 General Waste Discharge Requirements for Dischargers of Groundwater From Construction and Project Dewatering

The Los Angeles Regional Water Quality Control Board has issued a General NPDES Permit and General Waste Discharge Requirements (WDRs) (Order No. R4-2003-0111, NPDES No. CAG994004) governing construction-related dewatering discharges within the Project development areas (the "General Dewatering Permit.") This permit addresses discharges from temporary dewatering operations associated with construction and permanent dewatering operations associated with development. The discharge requirements include provisions mandating notification, sampling and analysis, and reporting of dewatering and testing-related discharges. The General Dewatering Permit authorizes such construction-related activities so long as all conditions of the permit are fulfilled. Compliance with the requirements of the General Dewatering Permit is used as one method to evaluate Project construction-related impacts on surface water quality.

3.9 Discharge of Fill or Dredge Materials

Hydrologic conditions of concern addressed in this report include instream changes in sediment transport, erosion, and sedimentation, and ultimately channel stability. There is a nexus between the these concerns and the stream, habitat, and species protection programs administered by the United States Army Corps of Engineers (ACOE), California Department of Fish and Game (CDFG) and the U.S. Fish and Wildlife Service.

Section 404 of the Clean Water Act is a program that regulates the discharge of dredged and fill material into waters of the United States, including wetlands. Activities in waters of the United States that are regulated under this program include fills for development (including physical alterations to drainages to accommodate storm drainage, stabilization, and flood control improvements), water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry. USEPA and the ACOE have issued Section 404(b)(1) Guidelines (40 CFR 230) that regulate dredge and fill activities, including water quality aspects of such activities. Subpart C at Sections 230.20 thru 230.25 contains water quality regulations applicable to dredge and fill activities. Among other topics, these guidelines address discharges which alter substrate elevation or contours, suspended particulates, water clarity, nutrients and chemical content, current patterns and water circulation, water fluctuations (including those that alter erosion or sediment rates), and salinity gradients.

Section 401 of the Clean Water Act requires that any person applying for a federal permit or license which may result in a discharge of pollutants into waters of the United States must obtain a state water quality certification that the activity complies with all applicable water quality standards, limitations, and restrictions. Subject to certain limitations, no license or permit may be issued by a federal agency until certification required by Section 401 has been granted. Further, no license or permit may be issued if certification has been denied. CWA Section 404 permits and authorizations are subject to section 401 certification by the Regional Water Quality Control Boards (RWQCBs).

This report does not analyze the habitat and wildlife impacts associated with physical alterations to waters of the United States proposed in conjunction with the Project, such as dredge, fill, or bed, bank or channel improvements or stabilization measures affecting waters of the U.S. The impacts associated with these physical alterations are analyzed in detail in the biota and floodplain modification sections of the Project EIR. As discussed in Section 4.4.2 below, this report does analyze the adverse impacts to natural drainage systems that may be caused by the Project's alteration of hydrologic conditions.

3.10 Lake or Streambed Alteration Agreement (LSAA)

The CDFG is responsible for conserving, protecting, and managing California's fish, wildlife, and native plant resources. To meet this responsibility, the law requires the proponent of a Project that may impact a river, stream, or lake to notify the CDFG before beginning the Project. This includes rivers or streams that flow at least periodically or permanently through a bed or channel with banks that support fish or other aquatic life and watercourses having a surface or subsurface flow that support or have supported riparian vegetation.

Section 1602 of the Fish and Game Code requires any person who proposes a Project that will substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake or use materials from a streambed to notify the CDFG before beginning the Project. Similarly, under section 1602 of the Fish and Game Code, before any State or local governmental agency or public utility begins a construction Project that will: 1) divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake; 2) use materials from a streambed; or 3) result in the disposal or deposition of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into any river, stream, or lake, it must first notify the CDFG of the proposed Project. If the CDFG determines that the Project may adversely affect existing fish and wildlife resources, a Lake or Streambed Alteration Agreement is required.

This report does not analyze the habitat and wildlife impacts associated with physical alterations to waters of the United States proposed in conjunction with the Project, such as dredge, fill, or bed, bank or channel improvements or stabilization measures affecting waters of the U.S. The impacts associated with these physical alterations are analyzed in detail in the biota and floodplain modification sections of the Project EIR. As discussed in Section 4.4.2 below, this report does analyze the adverse impacts to natural drainage systems that may be caused by the project's alteration of hydrologic conditions.

4 POLLUTANTS OF CONCERN AND SIGNIFICANCE CRITERIA

4.1 Surface Water Pollutants of Concern

4.1.1 Pollutants of Concern

Pollutants of concern consist of any pollutants that exhibit one or more of the following characteristics: current loadings or historic deposits of the pollutant are impacting the beneficial uses of a receiving water, elevated levels of the pollutant are found in sediments of a receiving water and/or have the potential to bioaccumulate in organisms therein, or the detectable inputs of the pollutant are at concentrations or loads considered potentially toxic to humans and/or flora and fauna. The pollutants of concern for the water quality analysis are those that are anticipated or potentially could be generated by the Project at concentrations, based on water quality data collected in Los Angeles County from land uses that are the same as those proposed by the Project, that exhibit these characteristics. Identification of the pollutants of concern also considered Basin Plan beneficial uses and water quality objectives, CTR criteria, and current 303(d) listings and TMDLs in the Santa Clara River, as well as pollutants that have the potential to cause toxicity or bioaccumulate in the receiving waters. Appendix A lists the pollutants of concern, the basis for their selection, and the significance criteria that will be applied for each.

The following pollutants were chosen as pollutants of concern for purposes of evaluating water based upon the above considerations:

***Sediments (TSS and Turbidity)*:** Excessive erosion, transport, and deposition of sediment in surface waters are a significant form of pollution resulting in major water quality problems. Sediment imbalances impair waters' designated uses. Excessive sediment can impair aquatic life by filling interstitial spaces of spawning gravels, impairing fish food sources, filling rearing pools, and reducing beneficial habitat structure in stream channels. In addition, excessive sediment can cause taste and odor problems in drinking water supplies and block water intake structures.

***Nutrients (Phosphorous and Nitrogen (Nitrate+Nitrite-N and Ammonia-N))*:** Nutrients are inorganic forms of nitrogen (nitrate, nitrite and ammonia) and phosphorous. Organic forms of nitrogen are associated with vegetative matter such as particulates from sticks and leaves. Inorganic forms of nitrogen include nitrate, nitrite and ammonia. Total Nitrogen (TN) is a measure of all nitrogen present, including inorganic and particulate forms. Phosphorous can be measured as total phosphorous (TP) or as dissolved phosphorous. Dissolved phosphorous is the more bioavailable form of phosphorous. TP is often composed mostly of soil-related particulate phosphorous. There are several sources of nutrients in urban areas, mainly fertilizers in runoff from lawns, pet wastes, failing septic systems, atmospheric deposition from industry and automobile emissions, and soil erosion. Nutrient over-enrichment is especially prevalent in agricultural areas where manure and fertilizer inputs to crops significantly contribute to nitrogen and phosphorous levels in streams and other receiving waters. Eutrophication due to excessive nutrient input can lead to changes in algae, benthic, and fish communities; extreme eutrophication can cause hypoxia or anoxia, resulting in fish kills. Surface algal scum, water discoloration, and the release of toxins from sediment can also occur.

Various downstream reaches of the Santa Clara River are identified as impaired by ammonia and nitrate- plus nitrite-nitrogen. Evidence of impairment includes low diversity of benthic macroinvertebrates and observations of excessive algae growth. A source analysis found that the majority of ammonia and nitrate/nitrite loads are from point sources; primarily water reclamation plants (WRPs) (LARWQCB, June 2003). Sources from municipal storm sewers are considered a minor source, but have a potential to cause significant local effects on water quality (LARWQCB, June 2003). TMDLs have been developed and adopted into the Basin Plan for nitrogen compounds, including nitrate/nitrite and ammonia.

***Trace Metals (Aluminum, Copper, Lead, and Zinc)*:** The primary sources of trace metals in stormwater are typically commercially available metals used in transportation (e.g. automobiles), buildings, and infrastructure. Metals are also found in fuels, adhesives, paints, and other coatings. Copper, lead, and zinc are the most prevalent metals typically found in urban runoff. Other trace metals, such as cadmium, chromium, and mercury, are typically not detected in urban runoff or are detected at very low levels (LACDPW, 2000). Metals are of concern because of the potential for toxic effects on aquatic life and the potential for ground water contamination. High metal concentrations can lead to bioaccumulation in fish and shellfish and affect beneficial uses of receiving waters.

Aluminum has been identified by the Los Angeles County Department of Public Works as a constituent of concern for the Santa Clara River based on monitoring conducted at mass emission Station S29 (see Section 2.7 above). In stormwater, the majority of aluminum is in the particulate phase. Its presence in stormwater is mainly due to aluminosilicate minerals found in soils, because stormwater particles are largely composed of eroded soils. Aluminum is a large component of soils and is the third most common element in the earth's crust. The average aluminum soil content is about eight percent (or 80,000 mg/kg) and suspended sediments in rivers have total aluminum contents of a similar order of magnitude. Aluminosilicates compose a wide range of minerals with varying properties; some are formed during the laying down of the earth's crust and some by weathering processes. They are highly insoluble and unreactive, although aluminum can be extracted and solubilized to some degree under acidic conditions. The amount of aluminum extracted will mainly depend on the type and particle size of aluminosilicates present in the soil matrix. A study by Kobayashi and Kizu (2001) showed that only eight percent of aluminum remained in waters after passing through a 0.22 micron filter, supporting the assertion that the majority of aluminum is found in the insoluble, suspended fraction. According to the USEPA, aluminum is not considered a contaminant of potential concern (COPC) to fish or aquatic organisms when surrounding soil pH is greater than 5.5 or when in solution of a pH above 5.5 (USEPA 2003) because aluminum solubility and resultant toxicity has been linked to pH values below this standard. In general, NRSP area soils are not expected to have a pH of less than 5.5. DeClerk and Singer (2003) compared historic (1945) pH levels of agricultural soils in Southern California to 2001 conditions and found that pH levels have actually risen, from approximately 7.2 in 1945 to nearly 8.0 in 2001. As the majority of the pre-development land use consists of agriculture or open space, it is safe to assume that soil pH levels within the NRSP area will be, for the most part, above 5.5. In addition, pH in stormwater runoff is not expected to be below 5.5, as mean runoff concentrations in the Los Angeles County stormwater monitoring data ranged from 6.5 for mixed and single-family residential land uses to 7.0 for commercial land uses. In urban areas, aluminum building materials are a minor source of aluminum, as the metal is coated in unreactive aluminum oxide.

***Pathogens (Bacteria, Viruses, and Protozoa)* –** Elevated pathogens are typically caused by the transport of domestic animal, wildlife, or human fecal wastes from the watershed. Runoff that flows over land such as urban runoff can mobilize pathogens, including bacteria and viruses. Even runoff from natural areas can contain pathogens (e.g., from wildlife). Other sources of pathogens in urban areas include pets, septic systems, and leaky sanitary sewer pipes. The presence of pathogens in runoff can impair receiving waters and contaminate drinking water sources. Elevated pathogens are typically caused by the transport of animal or human fecal wastes from the watershed. Historically an indicator organism such as fecal coliform has been used for pathogens due to the difficulty of monitoring for pathogens directly. More recently, the scientific community has questioned the use of indicator organisms, as scientific studies have shown no correlation between indictor and pathogen levels and therefore total and fecal coliform may not indicate a significant potential for causing human illness (Paulsen and List, 2005). Santa Clara River Reach 5 is identified as impaired by high fecal coliform counts from point and nonpoint sources. Coliform TMDLs have not yet been developed for this river reach.

***Petroleum Hydrocarbons (Oil and Grease and PAHs)*:** The sources of oil, grease, and other petroleum hydrocarbons in urban areas include spillage fuels and lubricants, discharge of domestic and industrial wastes, atmospheric deposition, and runoff. Runoff can be contaminated by leachate from asphalt roads, wearing of tires, and deposition from automobile exhaust. Also, do-it-yourself auto mechanics may dump used oil and other automobile-related fluids directly into storm drains. Petroleum hydrocarbons, such as polycyclic aromatic hydrocarbons (PAHs), can bioaccumulate in aquatic organisms from contaminated water, sediments, and food and are toxic to aquatic life at low concentrations. Hydrocarbons can persist in sediments for long periods of time and result in adverse impacts on the diversity and abundance of benthic communities. Hydrocarbons can be measured as total petroleum hydrocarbons (TPH), oil and grease, or as individual groups of hydrocarbons, such as PAHs.

***Pesticides*:** Pesticides (including herbicides, insecticides and fungicides) are chemical compounds commonly used to control insects, rodents, plant diseases, and weeds. Excessive application of a pesticide in connection with agriculture cultivation or landscaping may result in runoff containing toxic levels of its active component. Pesticides may be classified as organochlorine pesticides or organophosphorous pesticides, the former being associated with persistent bioaccumulative pesticides (e.g., DDT and other legacy pesticides) which have been banned. The Santa Clara River estuary is listed as impaired for legacy pesticides. Organophosphorous pesticides include diazinon and chlorpyrifos whose uses also are being restricted by USEPA.

***Trash & Debris*:** Trash (such as paper, plastic, polystyrene packing foam, and aluminum materials) and biodegradable organic debris (such as leaves, grass cuttings, and food waste) are general waste products on the landscape that can be entrained in urban runoff. The presence of trash & debris may have a significant impact on the recreational value of a water body and aquatic habitat. Excess organic matter can create a high biochemical oxygen demand in a water body and thereby lower its water quality. Also, in areas where stagnant water exists, the presence of excess organic matter can promote septic conditions resulting in the growth of undesirable organisms and the release of odorous and hazardous compounds such as hydrogen sulfide.

***Bioaccumulation*:** Certain pollutants, such as pesticides, selenium and mercury, have a tendency to bioaccumulate. The Basin Plan and the CTR criteria set forth toxicity objectives for receiving water levels of substances that bioaccumulate in aquatic resources to prohibit concentrations of toxic substances that are harmful to human health and adversely affect beneficial uses.

***Chloride*:** High levels of chloride in Santa Clara River Reaches 3_E, and 7_E are causing impairment of listed beneficial uses for agricultural irrigation. Irrigation of salt sensitive crops such as avocados and strawberries with water containing elevated levels of chloride potentially results in reduced crop yields. Chloride levels in some areas exceed water quality standards associated with groundwater recharge. Chloride TMDLs have been developed and adopted into the Basin Plan. The major sources of elevated chloride are dry-weather discharges from WRPs, contributing about 70% of the chloride load. Minor point sources are dewatering operations, and swimming pool and water ride discharges.

Methylene Blue Activated Substances (MBAS). MBAS are related to the presence of detergents in water. Positive results may indicate the presence of wastewater or be associated with urban runoff due to commercial and/or residential vehicle washing or other outdoor washing activities. Surfactants disturb the surface tension which affects insects and can affect gills in aquatic life.

Cyanide. Cyanide has been identified by the Los Angeles County Department of Public Works as a constituent of concern for the Santa Clara River based on monitoring conducted at mass emission Station S29 (LACDPW, 2005). The most common forms are hydrogen cyanide (HCN) and the sodium and potassium salts (NaCN and KCN) (ANL, 2005). Cyanide is used in electroplating, metallurgy, and mining. It is also used to make synthetic fibers, plastics, dyes, pharmaceuticals, and pesticides, including fumigants. In addition, cyanide serves as a chemical intermediate in various production processes. Natural cyanides are produced by certain bacteria, fungi, and algae, and they are present in a number of plants and foods as cyanogenic glycosides.

Man-made cyanides typically enter the environment from metal finishing and organic chemical industries. Other sources include iron and steel works, municipal waste burning, cyanide-containing pesticides, road deicers, and vehicle exhaust.

4.1.2 Other Constituents

This section discusses other constituents that are listed in the Basin Plan, but for reasons explained below, are not pollutants of concern for the Project.

BOD (Biochemical Oxygen Demand) and Dissolved Oxygen. Adequate levels of dissolved oxygen are necessary to support aquatic life. High levels of oxygen demanding substances discharged to receiving waters can depress oxygen levels to levels of concern. Oxygen demanding substances are compounds that can be biologically degraded through aerobic processes. The presence of oxygen demanding substances can deplete oxygen supplies in waters and can contribute to algae growth. Nutrients in fertilizers and food wastes in trash are examples of likely oxygen demanding compounds to be present on the Project site. Other biodegradable organic materials include human and animal waste and vegetative matter. Biodegradable pollutants are largely subsumed by the nutrients and trash and debris categories above, and therefore will not be discussed as a separate category.

Chemical Constituents. Chemical constituents in excessive amounts in drinking water are harmful to human health. The Basin Plan objectives for chemical constituents states: "Surface waters shall not contain concentrations of chemical constituents in amounts that adversely affect any designated beneficial use." As Santa Clara River Reach 5 is not designated with a municipal water supply designated use (see Section 2.5.1 above), chemical constituents are not a pollutant of concern for the Project.

Temperature. Increase in temperature can result in lower dissolved oxygen levels, impairing habitat and other beneficial uses of receiving waters. Discharges of wastewater can also cause unnatural and/or rapid changes in temperature of receiving waters, which can adversely affect aquatic life. Elevated temperatures are typically associated with discharges of process wastewaters or non-contact cooling waters. As the beneficial uses in the receiving waters for the Project include warm freshwater habitat to support warm water ecosystems, temperatures of stormwater runoff from the Project are not of concern.

Total Residual Chlorine. Total residual chlorine can be present in wastewater treatment plant discharges, or may be present in dry weather urban runoff from the emptying of swimming pools that have not been de-chlorinated. Chlorine is a strong oxidant and is therefore very toxic to aquatic life. Municipal pools and private pools in areas served by a municipal sanitary system are required to be discharged into the sanitary system, and therefore, total residual chlorine will not be present in runoff from the Project.

Color, Taste, and Odor. The Basin Plan contains narrative objectives for color, taste, or odor that causes a nuisance or adversely affects beneficial uses. Undesirable tastes and odors in water may be a nuisance and may indicate the presence of a pollutant(s). Odor associated with water can result from decomposition of organic matter or the reduction of inorganic compounds, such as sulfate. Other potential sources of odor causing substances, such as industrial processes, will not occur as part of the Project. Color in water may arise naturally, such as from minerals, plant matter, or algae, or may be caused by industrial pollutants. The Project will contain no industrial uses. Therefore, color-, taste-, or odor-producing substances are not pollutants of concern for the Project.

Exotic Vegetation. Non-native (exotic) vegetation typically provides little habitat value and can out compete native vegetation that is more suitable habitat for aquatic and terrestrial organisms. The Basin Plan objective for exotic vegetation states: "Exotic vegetation shall not be introduced around stream courses to the extent that such growth causes nuisance or adversely affects designated beneficial uses." The potential for non-native plant species to impact natural drainages is analyzed in the Landmark Village Biota Report (Impact Sciences, 2005).

Mineral Quality: TDS, Sulfate, Boron, and SAR. Mineral quality in natural waters is largely determined by the mineral assemblage of soils and rocks near the land surface. Elevated mineral concentrations could impact beneficial uses; however, the minerals listed in the Basin Plan, except chloride and nitrogen, are not believed to be constituents of concern due to the absence of river impairments and/or, as with TDS, anticipated post-development runoff concentrations well below the Basin Plan objectives (Table 4-1). Therefore, these constituents are not considered pollutants of concern for the Project.

Table 4-1: Comparison of Mineral Basin Plan Objectives with Mean Measured Values in LA County

Mineral	Los Angeles Basin Plan Water Quality Objective for SCR Reach 5 (mg/L)	Range of Mean Concentration in Urban Runoff[1] (mg/L)
Total Dissolved Solids	1000	53 - 226
Sulfate	400	7 - 35
Boron	1.5	0.16 – 0.25
Sodium Absorption Ratio[2]	10	0.4 – 1.9

[1]Source: LACDPW, 2000. Land uses include SFR, MFR, commercial, education, transportation, light industrial, and mixed residential.
[2]Sodium adsorption ratio (SAR) predicts the degree to which irrigation water tends to enter into cation-exchange reactions in soil.

pH. The hydrogen ion activity of water (pH) is measured on a logarithmic scale, ranging from 0 to 14. While the pH of "pure" water at 25 ºC is 7.0, the pH of natural waters is usually slightly basic due to the solubility of carbon dioxide from the atmosphere. Aquatic organisms can be highly sensitive to pH. The Basin Plan objective for pH is:

> "the pH of inland surface waters shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharges. Ambient pH levels shall not be changed more than 0.5 units from natural conditions as a result of waste discharge."

Mean runoff concentrations in the Los Angeles County stormwater monitoring data ranged from 6.5 for mixed- and single-family residential land uses to 7.0 for commercial land use. Therefore, pH in the Santa Clara River is not expected to be affected by runoff discharges from the Project.

PCBs. PCBs are highly toxic persistent chemicals that have been historically released into the environment from industrial uses, such as transformers, but are no longer produced in the United States. Due to their persistence, PCBs can still be detected in urban runoff due to historic industrial sources of these chemicals. The Project area did not historically include PCB-producing land uses. Therefore, PCBs are not a pollutant of concern for the Project.

Radioactive Substances. Radioactive substances typically occur at very low concentrations in natural waters. Some activities such as mining or certain industrial activities (e.g., energy production, fuel reprocessing) can increase the amount of radioactive substances impairing beneficial uses. The Project will not have industrial or other activities that would be a source of any radioactive substances, and development will stabilize any naturally radioactive soils, though unlikely to be present in the Project area. Therefore, radioactive substances are not a pollutant of concern for the Project.

Toxicity. Certain pollutants in stormwater runoff have the potential to be highly toxic to aquatic organisms resulting in effects such as impaired reproduction or mortality. The Basin Plan water quality objective for toxicity is:

> "All surface waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life."

Toxicity in urban runoff could be caused by ammonia, trace metals, PAHs, or pesticides. These constituents are subsumed by the pollutant of concern categories above.

4.2 <u>Groundwater Pollutants of Concern</u>

The Project will allow for incidental infiltration of urban runoff to groundwater after receiving treatment in the Project PDFs, as well as incidental infiltration of irrigation water. Research conducted on the effects on groundwater from stormwater infiltration by Pitt et al. (1994)

indicate that the potential for contamination is dependent on a number of factors including the local hydrogeology and the chemical characteristics of the pollutants of concern.

Chemical characteristics that influence the potential for groundwater impacts include high mobility (low absorption potential), high solubility fractions, and abundance in runoff, including dry weather flows. As a class of constituents, trace metals tend to adsorb onto soil particles and are filtered out by the soils. This has been confirmed by extensive data collected beneath stormwater detention/retention ponds in Fresno (conducted as part of the Nationwide Urban Runoff Program) that showed that trace metals tended to be adsorbed in the upper few feet in the bottom sediments. Bacteria are also filtered out by soils. More mobile constituents such as chloride and nitrate would have a greater potential for infiltration.

4.2.1 Pollutants of Concern

The pollutants of concern for the groundwater quality analysis are those that are anticipated or potentially could be generated by the Project at concentrations, based on water quality data collected in Los Angeles County from land uses that are the same as those included in the Project, that exhibit these characteristics. Identification of the pollutants of concern for the Project considered proposed land uses as well as pollutants that have the potential to impair beneficial uses of the groundwaters below the Project. The Los Angeles Basin Plan contains numerical objectives for bacteria, mineral quality, nitrogen, and various toxic chemical compounds, and contains qualitative objectives for taste and odor.

Nitrate+nitrite-N was chosen as the pollutant of concern for purposes of evaluating groundwater quality impacts based upon the above considerations. High nitrate levels in drinking water can cause health problems in humans. Infants can develop methemoglobinemia (blue-baby syndrome). Human activities and land use practices can influence nitrogen concentrations in groundwaters. For example, irrigation water containing fertilizers can increase levels of nitrogen in groundwater.

4.2.2 Other Constituents

Bacteria: The Basin Plan contains numeric criteria for bacteria in drinking water sources. As bacteria are removed through straining in soils (for example, as with septic tank discharges), incidental infiltration of runoff in the Project treatment PDFs is not expected to affect bacteria levels in groundwater. The WRP will include a disinfection process to reduce bacteria below levels of concern, and therefore bacteria in irrigation water are not expected to impact groundwater.

Chemical Constituents and Radioactivity: Drinking water limits for inorganic and organic chemicals that can be toxic to human health in excessive amounts and radionuclides are contained in Title 22 of the California Code of Regulations. These chemicals and radionuclides are not expected to occur in the Project's runoff. Title 22 specifies California's Wastewater

Reclamation Criteria (WRC) and the NRSP WRP's reclaimed water must meet or exceed these criteria. These criteria apply to the treatment processes; treatment performance standards, such as removal efficiencies and effluent water quality; process monitoring programs, including type and frequency of monitoring; facility operation plans; and necessary reliability features.

Taste and Odor. The Basin Plan contains a narrative objective for taste and odor that cause a nuisance or adversely affect beneficial uses. Undesirable tastes and odors in groundwater may be a nuisance and may indicate the presence of a pollutant(s). Odor associated with water can result from natural processes, such as the decomposition of organic matter or the reduction of inorganic compounds, such as sulfate. Other potential sources of odor causing substances, such as industrial processes, will not occur as part of the Project. Therefore, taste and odor-producing substances are not pollutants of concern for the Project.

Mineral Quality: TDS, Sulfate, Chloride, and Boron. Mineral quality in groundwaters is largely influenced by the mineral assemblage of soils and rocks that it comes into contact with. Elevated mineral concentrations could impact beneficial uses; however, the minerals listed in the Basin Plan are not believed to be pollutants of concern due to the anticipated runoff concentrations and the expected mineral concentrations in Newhall Ranch WRP irrigation water, which are below the Basin Plan groundwater objectives (Table 4-2). Therefore, these constituents are not considered pollutants of concern for the Project.

Table 4-2: Comparison of Basin Plan Mineral Groundwater Objectives with Mean Measured Values in LA County As required by the CWA, the NRSP WRP discharge permit will include effluent limitations that will be protective of receiving water quality and designated beneficial uses. Effluent limits in the WDR will be developed based on the most stringent of applicable technology-based and water quality-based standards, including Basin Plan surface and groundwater objectives, CTR criteria, and applicable TMDL waste load allocations. Therefore, these constituents are not considered pollutants of concern for the NRSP projects.

Table 4-3: Comparison of Basin Plan Mineral Groundwater Objectives with Mean Measured Values in LA County Urban Runoff and Anticipated Irrigation Water Quality

Mineral	Los Angeles Basin Plan Groundwater Quality Objective[1] (mg/L)	Range of Mean Concentrations in Urban Runoff[2] (mg/L)	Anticipated Average Concentration in Effluent from the NRSP WRP[3] (mg/L)
Total Dissolved Solids	1,000	53 – 237	790
Sulfate	350	7 – 35	165
Chloride	150	4 – 50	<150
Boron	1.0	0.2 – 0.3	0.69

[1]Eastern Santa Clara-Castaic Valley
[2]Source: LACDPW, 2000. Includes all monitored land uses.
[3]Source: CH2M Hill, 2006.

4.3 Hydrologic Conditions of Concern (Hydromodification)

Urbanization modifies natural watershed and stream hydrologic and geomorphic processes by introducing increased volumes and duration of flow via increased runoff from impervious surfaces and drainage infrastructure. Several studies have evaluated affects of increased runoff associated with the introduction of impervious surfaces and drainage facilities on geomorphic processes (SCCWRP, 2005a; GeoSyntec, 2002; Bledsoe & Watson, 2001; Booth, 1990; Hollis, 1975; Hammer, 1972). Potential changes to the hydrologic regime may include increased runoff volumes, frequency of runoff events, long-term cumulative duration, as well as increased peak flows. Urbanization may also introduce dry weather flows where only wet weather flows existed prior to development. These changes are referred to as "hydromodification."

Hydromodification intensifies sediment transport and often leads to stream channel enlargement and loss of habitat and associated riparian species (SCCWRP, 2005a; GeoSyntec, 2002; Bledsoe & Watson, 2001; MacRae, 1992; Booth, 1990). Under certain circumstances, development can also cause a reduction in the amount of sediment supplied to the stream system, which can lead to stream channel incision and widening. These changes also have the potential to impact downstream channels and habitat integrity. A project that increases runoff due to impervious surfaces and traps sediment from upland watershed sources creates compounding effects.

A change to the Project site's hydrologic regime would be considered a condition of concern if the change could have a significant impact on downstream natural channels and habitat integrity, alone or in conjunction with impacts of other projects.

4.4 Significance Criteria and Thresholds for Significance

4.4.1 Surface Water Quality Significance Thresholds

Appendix A provides the criteria for evaluating the significance of a potential impact for each pollutant of concern. These criteria and the threshold for significance can be summarized as follows. The application of the criteria to a decision regarding significance requires an integrated or "weight of evidence" approach, rather than a decision based on any one of the individual criterion.

Thresholds of significance for surface water quality impacts have been developed based on a review of the MS4 Permit and the CEQA Guidelines, Appendix G. Significant adverse water quality impacts are presumed to occur if the proposed Project would:

- Create sizeable additional sources of polluted runoff to receiving waters that would result in exceedances of receiving water quality or substantially degrade water quality in receiving waters.

- Create sizeable additional sources of polluted runoff that would violate any water quality standards or waste discharge requirements for surface water runoff.
- Create sizeable additional sources of polluted construction site runoff (including polluted discharges associated with construction activities such as materials delivery, staging or storage, vehicle or equipment fueling, vehicle or equipment maintenance, waste handling, or hazardous materials handling or storage) that would violate any water quality standards or waste discharge requirements for surface water runoff or groundwater discharge.

This report analyzes whether sizeable additional sources of polluted runoff may result from the Project based on the results of water quality modeling and qualitative assessments that take into account water quality controls or BMPs that are considered Project Design Features (PDFs). Any increases in pollutant concentrations or loads in runoff resulting from the development of the Project site are considered an indication of a potentially significant adverse water quality impact. If loads and concentrations resulting from development are predicted to stay the same or to be reduced when compared with existing conditions, it is concluded that the Project will not cause a significant adverse impact to the ambient water quality of the receiving waters for that pollutant.

If pollutant loads or concentrations are expected to increase, then for both the post-development and construction phases, potential impacts are assessed by evaluating compliance of the Project, including PDFs, with applicable regulatory requirements of the MS4 Permit, including SQMP and SUSMP requirements, the Construction Permit, and the General Dewatering Permit. Further, post-development increases in pollutant loads and concentrations are evaluated by comparing the magnitude of the increase to relevant benchmarks, including receiving water TMDLs and receiving water quality objectives and criteria from the Basin Plan and CTR, as described below.

Receiving Water Benchmarks. Comparison of post-development water quality concentrations in the runoff discharge with benchmark TMDL waste load or load allocations for MS4 discharges establishes the likelihood that runoff would result in TMDL exceedances in receiving waters or would otherwise degrade receiving water quality.

Comparison of post-development water quality concentrations in the runoff discharge with benchmark numeric and narrative receiving water quality criteria as provided in the Basin Plan and the CTR facilitates analysis of the potential for runoff to result in exceedances of receiving water quality standards, adversely affect beneficial uses, or otherwise degrade receiving waters.

Water quality criteria are considered benchmarks for comparison purposes only, as such criteria apply within receiving waters as opposed to applying directly to runoff discharges. Narrative and numeric water quality objectives contained in the Basin Plan apply to the Project's receiving waters. Water quality criteria contained in the CTR provide concentrations that are not to be exceeded in receiving waters more than once in a three year period for those waters designated with aquatic life or human health related uses. Projections of runoff water quality are compared to the acute form of the CTR criteria (as discussed above), as stormwater runoff is associated with episodic events of limited duration, whereas chronic criteria apply to 4-day exposures which do not describe typical storm events in the Project area, which last seven hours on average. If pollutant levels in runoff are not predicted to exceed receiving water benchmarks, it is one indication that no significant impacts will result from project development.

As there is no water quality objective or criteria for total aluminum in the Basin Plan or the CTR, the national water quality criteria recommended by the USEPA will be used for comparison (USEPA, 1988).

MS4 Permit Requirements for New Development (SUSMP). Satisfaction of MS4 Permit requirements for new development, including SUSMP requirements and SQMP requirements, and satisfaction of construction-related requirements of the Construction Permit and General Dewatering Permit establish compliance with water quality regulatory requirements applicable to stormwater runoff.

The MS4 Permit requires that the SQMP specify BMPs that will be implemented to reduce the discharge of pollutants in stormwater to the Maximum Extent Practicable. MS4 requirements are met when new development complies with the SUSMP requirements set forth in the MS4 Permit. Under the SUSMP requirements, the effectiveness of stormwater treatment controls are primarily based on two factors - the amount of runoff that is captured by the controls and the selection of BMPs to address identified pollutants of concern. Selection and numerical sizing criteria for new development treatment controls are included in the MS4 Permit and the County SUSMP Manuals. If the Project PDFs meet these criteria, and other source control and site design BMPs consistent with the SUSMP requirements are implemented, it indicates that no significant impacts will occur as the result of insufficient capacity for stormwater treatment.

Construction General Permit and General Dewatering Permit. The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP) that describes erosion and sediment control BMPs as well as material management/ non-stormwater BMPs that will be used during the construction phase of development. The General Dewatering Permit addresses discharges from permanent or temporary dewatering operations associated with construction and development and includes provisions mandating notification, sampling and analysis, and reporting of dewatering and testing-related discharges. To evaluate significance of construction phase Project water quality impacts, we evaluate whether water quality control is achieved by implementation of BMPs consistent with Best Available Technology Economically Achievable and Best Conventional Pollutant Control Technology (BAT/BCT), as required by the Construction General Permit and the General Dewatering Permit.

4.4.2 Significance Thresholds for Hydrologic Conditions of Concern (Hydromodification Impacts)

Thresholds of significance for evaluating hydrologic impacts and conditions of concern have been developed based on a review of the MS4 Permit and the CEQA Guidelines, Appendix G. Significant adverse impacts to natural drainage systems created by altered hydrologic conditions of concern are presumed to occur if the proposed Project would:

- Substantially alter the existing drainage pattern of a natural drainage, stream, or river causing substantial erosion, siltation, or channel instability in a manner that substantially adversely affects beneficial uses; or
- Substantially increase the rates, velocities, frequencies, duration and/or seasonality of flows causing channel instability and harming sensitive habitats or species in natural drainages in a manner that substantially adversely affects beneficial uses.

4.4.3 Cumulative Impacts

CEQA requires the analysis of cumulative impacts of a project when the project’s incremental effects may be significant when assessed along with the effects of past projects and the effects of other current projects, and the reasonably foreseeable effects of probable future projects. The discussion of cumulative impacts must reflect the potential severity of the impacts and their likelihood of occurrence, but the discussion and analysis need not provide as great a detail as is provided for the direct effects attributable to the Project alone. This report therefore analyzes the potential for cumulative water quality impacts, cumulative groundwater quality impacts and cumulative hydrologic impacts generally in accordance with the thresholds for direct impacts discussed in Sections 4.4.1 and 4.4.2 above, and section 4.4.4 below. See Sections 7.7, 7.8, and 7.9 below.

The cumulative analysis of all surface water quality and hydrologic impacts in this report is based primarily on "adopted plans and projections" found in the Los Angeles County Department of Public Works adopted and approved Hydrology Manual, which have been verified by reference to approved plans, including the City of Santa Clarita and County of Los Angeles adopted General Plans, as well as available empirical data for the Santa Clara River. As required by CEQA, the focus of the cumulative impacts analysis for this Project will be on the Project's incremental contribution to significant adverse water quality and hydrologic impacts to the SCR, taking into account the reasonably foreseeable water quality and hydrologic impacts of other projects that may develop impervious surfaces and urban land uses within the SCR watershed in accordance with adopted general plans and related projections. The cumulative impacts analysis will consider the Project's incremental contribution to significant cumulative water quality and hydrologic impacts to the SCR in light of the water quality and hydrology impact mitigation achieved by certain of the Project Design Features (PDFs). The analysis will also consider whether the Project, including PDFs, and future projects will comply with specific requirements in a previously approved ordinance, plan, or mitigation program (such as the Basin Plan, the CTR, the MS4 Permit, the Construction General Permit and the General Dewatering Permit) that have been adopted for the purpose of avoiding or substantially lessening the cumulative water quality and hydrologic impact problems within the geographic area in which the Project is located.

4.4.4 Groundwater Quality Impacts

Thresholds of significance for evaluating the hydrologic and water quality impacts of the Project on groundwater have been developed based on CEQA Appendix G thresholds. Significant adverse impacts to groundwater are presumed to occur if the proposed Project would:

- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge so as to cause a net deficit in aquifer volume or a lowering of the local groundwater table.
- Through changes in surface water runoff quality and quantity (including Project treatment PDFs), and changes in groundwater recharge, result in a violation of any groundwater quality standards or waste discharge requirements or otherwise substantially degrade water quality.

Groundwater quality is addressed in Sections 7.8.1 and 7.8.2. Groundwater quality benchmarks were compared with post-development runoff water quality to establish the likelihood that runoff would result in a degradation of groundwater quality. Groundwater recharge is addressed in Section 7.8.3. The hydrologic effects of the Project on groundwater were examined by comparison of historical and present levels of the underlying aquifer to determine the impact of development on aquifer volume.

5 POST DEVELOPMENT SURFACE WATER QUALITY AND HYDROMODIFICATION CONTROL PROJECT DESIGN FEATURES

Project Design Features (PDFs) for surface water quality and hydrologic impacts include site design, source control, treatment control, and hydromodification control BMPs that will be incorporated into the Project and are considered a part of the Project for impact analysis. Effective management of wet and dry weather runoff water quality begins with limiting increases in runoff pollutants and flows at the source. Site design and source control BMPs are practices designed to minimize runoff and the introduction of pollutants into runoff. Treatment control BMPs are designed to remove pollutants once they have been mobilized by rainfall and runoff. Hydromodification control BMPs are designed to control increases in post-development runoff flows and/or volumes. This section describes the post-development site design, source control, treatment control, and hydromodification control PDFs for the Project.

5.1 SUSMP Requirements and Project Design Features

Table 5-1 summarizes the SUSMP requirements and the corresponding proposed PDFs that will be incorporated into the Project.

Table 5-1: SUSMP Requirements and Corresponding Project Design Features

SUSMP Requirement	Criteria/ Description	Corresponding Landmark Village PDFs
1. Runoff Flow Control	• Control post-development peak stormwater runoff discharge rates, velocities, and duration in Natural Drainage Systems to prevent accelerated downstream erosion and to protect habitat related beneficial uses.[3] • All post-development runoff from a 2-year, 24-hour storm shall not exceed the predevelopment peak flow rate, burned, from a 2-year, 24-hour storm when the predevelopment peak flow rate equals or exceeds five cfs. Discharge flow rates shall be calculated using the County of Los Angeles Modified Rational Method. • Post-development runoff from the 50-year capital storm shall not exceed the predevelopment peak flow rate, burned and bulked, from the 50-year capital storm. • Control peak flow discharge to provide stream channel and over bank flood protection, based on flow design criteria selected by the local agency.	• Hydromodification source controls include minimizing impervious surfaces through clustering development, disconnecting impervious surfaces, and using bioretention and other vegetated treatment control BMPs to reduce runoff volumes through evapotranspiration and infiltration. • 50-year capital storm peak flow rate analysis is contained in the “Landmark Village Tentative Tract Map 53108 Drainage Concept”, prepared by Psomas (Psomas, 2006)

[3] This requirement is from Part 4, § D.1 of the MS4 Permit.

SUSMP Requirement	Criteria/ Description	Corresponding Landmark Village PDFs
2. Conserve Natural Areas	• Concentrate or cluster development on portions of a site while leaving the remaining land in a natural undisturbed condition • Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection • Maximize trees and other vegetation at each site, planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants • Promote natural vegetation by using parking lot islands and other landscaped areas • Preserve riparian areas and wetlands	• The NRSP clusters development into villages, including Landmark Village. Approximately 70% (8,335 acres) of the NRSP subregion will remain undeveloped. • Approximately 55 acres of the 288 acre Landmark Village Project area will remain as open space or parks. • Existing site land use is agriculture, so little or no native vegetation is found in pre-development conditions. • Native and/or climate-appropriate vegetation will be utilized within the development. • The final Project stormwater system will include the use of the vegetated treatment BMPs, including bioretention (placed in common area landscaping in commercial and multi-family residential areas, roadway median strips, and parking lot islands (where applicable), vegetated swales, and an extended detention basin. • Riparian buffers will be preserved along the Santa Clara River corridor by clustering development upland and away from the river.
3. Minimize Stormwater Pollutants of Concern	• Minimize, to the maximum extent practicable, the introduction of pollutants of concern that may result in significant impacts generated from site runoff of directly connected impervious areas (DCIA) to the stormwater conveyance system as approved by the building official.	• Treatment control BMPs will be selected to address the pollutants of concern for the Project (see Section 5.2 below). These BMPs are designed to minimize introduction of pollutants to the Maximum Extent Practicable (MEP). • The Project will include numerous source controls, including education programs, animal waste bag stations, street sweeping and catch basin cleaning, an Integrated Pest Management (IPM) Program for common area landscaping in commercial areas and multi-family residential areas, use of native and/or non-invasive vegetation, and installation of a car wash pad in multi-family residential areas. • An education program will be implemented that includes both the education of residents and commercial businesses regarding water quality issues. Topics will include services that could affect water quality, such as carpet cleaners and others that may not properly dispose of cleaning wastes; community car washes; and residential car washing. The education program will emphasize animal waste management, such as the importance of cleaning up after pets and not feeding pigeons, seagulls, ducks, and geese. • Vegetated treatment control BMPs will allow for infiltration of treated stormwater.
4. Protect Slopes and	Project plans must include BMPs consistent	• There are no significant slopes or natural

SUSMP Requirement	Criteria/ Description	Corresponding Landmark Village PDFs
Channels	with local codes and ordinances and the SUSMP requirements to decrease the potential of slopes and/or channels from eroding and impacting stormwater runoff: • Convey runoff safely from the tops of slopes and stabilize disturbed slopes • Utilize natural drainage systems to the maximum extent practicable • Control or reduce or eliminate flow to natural drainage systems to the maximum extent practicable • Stabilize permanent channel crossings • Vegetate slopes with native or drought tolerant vegetation • Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion with the approval of all agencies with jurisdiction, e.g., the U.S. Army Corps of Engineers and the California Department of Fish and Game.	drainage channels within the developed portion of the Project in the post-developed condition. • Natural slopes and native vegetation on slopes adjacent to the SCR will be preserved and/or restored and enhanced. • Project PDFs, including swales, bioretention areas, and water quality basins (hydrologic source controls), will reduce flows to natural channels through infiltration and evapotranspiration. • The banks of the Santa Clara River at portions of this site will be stabilized primarily using buried bank stabilization. After the implementation of these measures and other flow control and volume reduction PDFs, the Santa Clara River will be capable of handling the expected flow regime with little or no erosion. For a detailed description of bank stabilization see Section 2.3.3. • Native vegetation will be used in all plant palettes placed on restored slopes. • All outlet points to the Santa Clara River will include energy dissipaters per the Newhall Ranch Resource Development and Management Plan. For a detailed description of energy dissipation see Section 2.3.2.
5. Provide Storm Drain System Stenciling and Signage	• All storm drain inlets and catch basins within the Project area must be stenciled with prohibitive language and/or graphical icons to discourage illegal dumping. • Signs and prohibitive language and/or graphical icons, which prohibit illegal dumping, must be posted at public access points along channels and creeks within the Project area. • Legibility of stencils and signs must be maintained.	• All storm drain inlets and water quality inlets will be stenciled or labeled. • Signs will be posted in areas where dumping could occur. • The Home Owners Associations will maintain stencils and signs.
6. Properly Design Outdoor Material Storage Areas	• Where proposed Project plans include outdoor areas for storage of materials that may contribute pollutants to the storm water conveyance system measures to mitigate impacts must be included.	• Pesticides, fertilizers, paints, and other hazardous materials used for maintenance of common areas, parks, commercial areas, and multifamily residential common areas will be kept in enclosed storage areas.

SUSMP Requirement	Criteria/ Description	Corresponding Landmark Village PDFs
7. Properly Design Trash Storage Areas	All trash containers must meet the following structural or treatment control BMP requirements: • Trash container areas must have drainage from adjoining roofs and pavement diverter around the areas. • Trash container areas must be screened or walled to prevent offsite transport of trash.	• All outdoor trash storage areas will be covered and isolated from stormwater runoff.
8. Provide Proof of Ongoing BMP Maintenance	• Applicant required to provide verification of maintenance provisions through such means as may be appropriate, including, but not limited to legal agreements, covenants, and/or Conditional Use Permits.	• The Home Owners Associations or Business Owners will be responsible for operation and maintenance of site-based BMPs (such as bioretention placed in common area landscaping in multi-family residential areas and commercial areas). • Los Angeles County Department of Public Works will be responsible for maintenance of village-level and sub-regional BMPs (vegetated swales and extended detention basins).

SUSMP Requirement	Criteria/ Description	Corresponding Landmark Village PDFs
9. Design Standards for Structural or Treatment Control BMPs	• Post-construction Structural or Treatment Control BMPs shall be designed to mitigate (infiltrate or treat) stormwater runoff using either volumetric treatment control BMPs or flow-based treatment control BMPs sized per listed criteria (see section 3.6.2 above).	• Stormwater treatment facilities will be designed to meet or exceed the sizing standards in the LA County SUSMP requirements. • Volume-based treatment control BMPs for the Project will be designed to capture 80 percent or more of the annual runoff volume per criteria 2 of the MS4 Permit. • Flow-based BMPs will be sized using criteria 3, which will provide 80 percent capture of annual runoff volume per criteria of the MS4 Permit. • The size of the facilities will be finalized during the design stage by the Project engineer with the final hydrology study, which will be prepared and approved to ensure consistency with this analysis prior to issuance of a final grading permit. • Types of treatment control BMPs that will be employed include vegetated swales, bioretention, and dry extended detention basins, and a combination thereof.
10.B.1 Properly Design Loading/ Unloading Dock Areas (100,000 ft^2 Commercial Developments)	• Cover loading dock areas or design drainage to minimize run-on and runoff of stormwater • Direct connections to storm drains from depressed loading docks (truck wells) are prohibited	• Loading dock areas will be covered or designed to preclude run-on and runoff. • Direct connections to storm drains from depressed loading docks (truck wells) will be prohibited. • Below grade loading docks for fresh food items will drain through a Treatment Control BMP applicable to the use, such as a catch basin insert. • Loading docks will be kept in a clean and orderly condition through weekly sweeping and litter control, at a minimum and immediate cleanup of spills and broken containers without the use of water.

SUSMP Requirement	Criteria/ Description	Corresponding Landmark Village PDFs
10B.2. Properly Design Repair/ Maintenance Bays (100,000 ft^2 Commercial Developments)	• Repair/ maintenance bays must be indoors or designed in such a way that does not allow stormwater run-on or contact with stormwater runoff. • Design a repair/maintenance bay drainage system to capture all wash water, leaks, and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/ maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.	• Commercial areas will not have repair/maintenance bays or the bays will comply with design requirements.
10B.3. Properly Design Vehicle/ Equipment Wash Areas (100,000 ft^2 Commercial Developments)	• Self-contained and /or covered, equipped with a clarifier, or other pretreatment facility, and properly connected to a sanitary sewer.	• Areas for washing/steam cleaning of vehicles will be self-contained or covered with a roof or overhang; will be equipped with a wash racks and with the prior approval of the sewering agency; will be equipped with a clarifier or other pretreatment facility: and will be properly connected to a sanitary sewer.
10.C. Properly Design Equipment/ Accessory Wash Areas (Restaurants)	• Self-contained, equipped with a grease trap, and properly connected to a sanitary sewer. • If the wash area is to be located outdoors, it must be covered, paved, have secondary containment, and be connected to the sanitary sewer.	• Food preparation areas shall have either contained areas or sinks, each with sanitary sewer connections for disposal of wash waters containing kitchen and food wastes. • If located outside, the containment areas or sinks shall also be structurally covered to prevent entry of storm water. Adequate signs shall be provided and appropriately placed stating the prohibition of discharging washwater to the storm drain system.
10.D. Properly design fueling area (Retail Gasoline Outlets)	• The fuel dispensing area must be covered with an overhanging roof structure or canopy. The cover’s minimum dimensions must be equal to or greater than the area within the grade break. The cover must not drain onto the fuel dispensing area and the downspouts must be routed to prevent drainage across the fueling area. • The fuel dispensing area must be paved with Portland cement concrete (or equivalent smooth impervious surface). The use of asphalt concrete shall be prohibited. • The fuel dispensing areas must have a 2% to 4% slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of urban runoff. • At a minimum, the concrete fuel	• Retail gasoline outlets will comply with design requirements.

SUSMP Requirement	Criteria/ Description	Corresponding Landmark Village PDFs
	dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.	
10.E.1. Properly design fueling area (Automotive Repair Shops)	• See requirement 10.D. above.	• Automotive repair shop fueling areas will comply with design requirements.
10.E.2. Properly design repair/ maintenance bays (Automotive Repair Shops)	• See requirement 10.B.2 above.	• Automotive repair shop repair/maintenance bays will comply with design requirements.
10.E.3. Properly design vehicle/equipment wash areas (Automotive Repair Shops)	• Self-contained and/or covered, equipped with a clarifier, or other pretreatment facility, and properly connected to a sanitary sewer or to a permitted disposal facility.	• Automotive repair shop vehicle/equipment wash areas will comply with design requirements.
10.E.4. Properly design loading/unloading dock areas (Automotive Repair Shops)	• See requirement 10.B.1. above.	• Automotive repair shop loading/unloading dock areas will comply with design requirements.
10.F.1. Properly Design Parking Area (Parking Lots)	• Reduce impervious land coverage of parking areas • Infiltrate runoff before it reaches the storm drain system • Treat runoff before it reaches storm drain system	• Commercial and multi-family parking lots will incorporate bioretention facilities located in islands to promote filtration and infiltration of runoff. • Stormwater runoff from parking lots will be directed to treatment control BMPs, including swales, water quality basins, bioretention areas, and/or catch basin media filters in compliance with SUSMP requirements.
10.F.2 Properly Design to Limit Oil Contamination and Perform Maintenance (Parking Lots)	• Treat to remove oil and petroleum hydrocarbons at parking lots that are heavily used. • Ensure adequate operation and maintenance of treatment systems particularly sludge and oil removal	• See above. • Treatment of runoff in detention basins, bioretention areas, or bioswales and catch basin inserts will be used to address oil and petroleum hydrocarbons from high-use parking lots. • The Home Owners Associations or Business Owners will be responsible for operation and maintenance of treatment control BMPs that serve private parking lots.

SUSMP Requirement	Criteria/ Description	Corresponding Landmark Village PDFs
13. Limitation of Use of Infiltration BMPs	• Infiltration is limited based on design of BMP, pollutant characteristics, land use, soil conditions, and traffic. • Appropriate conditions (groundwater >10 ft from grade) must exist to utilize infiltration to treat and reduce stormwater runoff for the Project.	• The proposed treatment control BMPs are not considered infiltration BMPS; they allow for infiltration of fully-treated runoff only.

5.2 Treatment BMPs

The SUSMP requirements mandate that treatment controls address the pollutants of concern, which are defined in the SUSMP Manual as consisting of any pollutants that exhibit one or more of the following characteristics: current loadings or historic deposits of the pollutant are impacting the beneficial uses of a receiving water, elevated levels of the pollutant are found in sediments of a receiving water and/or have the potential to bioaccumulate in organisms therein, or the detectable inputs of the pollutant are at concentrations or loads considered potentially toxic to humans and/or flora and fauna. These parameters were considered in defining pollutants of concern for analysis. See Section 4.1 of this report. Pollutants of concern for the Project include:

- Sediments (TSS and Turbidity)
- Nutrients (Total Phosphorous, Nitrate-N + Nitrite-N, and Ammonia-N)
- Trace Metals (Aluminum, Copper, Lead, and Zinc)
- Pathogens (Bacteria, Viruses, and Protozoa)
- Petroleum Hydrocarbons (Oil and Grease and PAHs)
- Pesticides
- Trash & Debris
- Chloride
- Methylene Blue Activated Substances (MBAS)
- Cyanide

Treatment BMPs to be used for the Project are listed in Table 5-2, along with the pollutants of concern addressed by each.

Table 5-2: Treatment Control BMP Selection Matrix

Pollutant of Concern[1]	Treatment Control BMP Categories		
	Vegetated Swale	Bioretention	Extended Detention Basins
Sediment	M	H	M
Nutrients	L	M	L
Trash	L	H	H
Trace Metals	M	H	M
Bacteria	L	H	M
Organics[2]	M	H	M

Source: California Stormwater Best Management Practices Handbook for New Development and Redevelopment (CASQA, 2003)
Note: H, M, L, indicates high, medium, and low removal efficiency.
[1]Chloride and MBAS are addressed with source control BMPs, as they are not treatable in typical stormwater treatment BMPs, aside through incidental infiltration.
[2]Includes pesticides and petroleum hydrocarbons.

As currently planned, stormwater runoff from all developed areas within the Project will be routed to bioretention areas, vegetated swales, and/or extended detention basin treatment control BMPs (Figure 5-1). Catch basin inserts will also be used in high use parking lots. Collectively, the water quality treatment control PDFs will treat the pollutants of concern in runoff from the approximately 292.6 gross acre Landmark Village development area. The off-site SR-126 expansion Project will provide vegetated swale treatment for both the new and existing untreated roadway area. The utility corridor maintenance access road and potential future trail, as well as the water tanks and access roads, will drain to biofiltration treatment (vegetated swale or filter strip) or bioretention treatment. The extended detention basin, vegetated swales, and bioretention areas will be designed to operate off-line, receiving dry weather flows, small storm flows, and the initial portion of large storm flows from a low-flow diversion structure in the storm drain. The proposed treatment control PDFs are illustrated in Figure 5-1, are summarized in Table 5-3, and are described below. These treatment BMPs, when combined with the site design and source control BMPs described above, will address all of the pollutants of concern. The effectiveness of the selected treatment BMPs is described in detail in Appendix B, Section B.2.5. The effectiveness of treatment BMPs is evaluated without taking site design and source control BMPs into account. Therefore, the analysis is conservative in that it understates water quality controls.

Bioretention: Bioretention areas are vegetated (i.e., landscaped) shallow depressions that provide storage, infiltration, and evapotranspiration, and also provide for pollutant removal (e.g. filtration, adsorption, nutrient uptake) by filtering stormwater through the vegetation and soils. In bioretention areas, as well as in vegetated swales, pore spaces and organic material in the soils help to retain water in the form of soil moisture and to promote the adsorption of pollutants (e.g., dissolved metals and petroleum hydrocarbons) into the soil matrix. Plants utilize soil moisture and promote the drying of the soil through transpiration. Due to the highly infiltrative soils on the Project site, an underdrain is not necessary for the biofiltration areas, although underdrains will be used where space is limited, as underdrains allow for a smaller bioretention area footprint. Treated flows from bioretention areas without underdrains will be fully infiltrated. For purposes of the impact analysis, underdrains have been assumed for all of the bioretention areas, which will conservatively underestimate the runoff volume reduction provided. A conceptual illustration of a biofiltration area is shown in Figure 5-2, and photographs of existing bioretention areas are provided in Figure 5-3.

Vegetated Swales: Vegetated swales are engineered, vegetation-lined channels that provide water quality treatment in addition to conveying stormwater runoff. Swales provide pollutant removal through settling and filtration in the vegetation (often grasses) lining the channels and also provide the opportunity for volume reduction through infiltration and evapotranspiration. Swales are most effective where longitudinal slopes are small (2 percent to 6 percent), thereby increasing the residence time for treatment, and where water depths are less than the vegetation height. A conceptual illustration of a vegetated swale is shown in Figure 5-4 and photographs of existing swales are provided in Figure 5-5. Check dams can be incorporated into a vegetated swale design to promote enhanced settling and infiltration through velocity reduction and ponding. The Project will incorporate vegetated swales with check dams wherever velocities or slopes are too high for vegetated swales alone. A conceptual illustration of a vegetated swale with check dams is shown in Figure 5-6.

Extended Detention Basins: The water quality basin will incorporate dry extended detention to provide water quality treatment for storm flows. Dry extended detention basins are designed with outlets that detain the runoff volume from the water quality design storm for some minimum time (in this case 48 hours) to allow particulates and associated pollutants (phosphorous, trace metals, some pesticides, and other pollutants) to settle out. The water quality basin will also incorporate wetland vegetation in a low-flow channel in the bottom of the basin for the treatment of dry weather flows and small storm events. Wetland vegetation provides one of the most effective methods for pollutant removal. As runoff flows through the wetland vegetation, pollutant removal is achieved through settling and biological uptake of nutrients and dissolved pollutants within the wetland. These basins are not designed or anticipated to contain ponded, standing water for periods in excess of 36 to 48 hours. A conceptual illustration of an extended detention basin is shown in Figure 5-7 and photographs of existing basins are provided in Figure 5-8.

Table 5-3: Landmark Village Drainage Areas and Treatment Control BMPs

Drainage Area	Area (acres)	Selected Treatment BMP(s) and Location[1]
RVE-8A	22.8	Bioretention within RVE-8A
RVE-9A	5.7	Bioretention within RVE-9A
RVE-11B	16.2	Swale in RVE-12C
RVE-12C	1.2	Swale BMP area
RVE-13C	16.5	Swale in RVE-16D

Drainage Area	Area (acres)	Selected Treatment BMP(s) and Location[1]
RVE-16D	2.1	Swale BMP area
RVE-17D	18.0	Swale in RVE-21F & RVE-24F
RVE-20E	18.3	Swale in RVE24F
RVE-21F	0.7	Swale BMP area
RVE-24F	1.5	Swale BMP area
RVE-25F	14.4	Swale in RVE-29B
RVE-27B	7.3	Bioretention in RVC-12C
RVE-28B	5.0	Bioretention in RVC-12C
RVE-29B	1.1	Swale BMP area
RVC-2A	10.9	Bioretention in RVC-12C
RVC-3A	11.9	Bioretention in RVC-12C
RVC-7A	10.2	Bioretention in RVC-12C
RVC-8A	5.1	Bioretention in RVC-12C
RVC-11B	16.4	Swale in RVC-17C
RVC-12C	3.4	Bioretention BMP area
RVC-13C	1.5	Swale BMP area
RVC-17C	2.1	Swale BMP area
RVC-18C	17.4	Swale in RVC-21D
RVC-21D	2.6	Water quality basin and swale BMP area
RVC-22D	2.5	Water quality basin in RVC-21D
RVC-23E	39.3	Water quality basin[2] in RVC-21D and treatment train (TBD in final design)
RVC-24E	7.4	Water quality basin in RVC-21D
RVW-1A	10.8	Swale within sub-basin RVW-2A
RVW-2A	14.7	Swale within sub-basin RVW-2A

[1] Swale BMP areas are either vegetated swales or vegetated swales with check dams which will be determined by slope of BMP location.
[2] Interim condition only. Additional BMPs will be added during final design according to 80% capture requirement.

Table 5-4: Off-site Project Feature - State Route 126 Drainage Areas and Treatment

Development Condition	Total Area (acres)	Treatment BMPs
Existing	95.6	none
Developed	95.6	Vegetated Swales

5.3 Hydromodification Control PDFs

A series of progressive hydromodification control measures will be used in the Project to prevent and control hydromodification impacts to the Santa Clara River:

- Avoid, to the extent possible, the need to mitigate for hydromodification impacts by preserving natural hydrologic conditions and protecting sensitive hydrologic features, sediment sources, and sensitive habitats.

- Minimize the effects of development through site design practices (e.g., reducing connected impervious surfaces), implementation of stormwater volume-reducing BMPs (project-based hydrologic source control), and incorporation of flow duration control into water quality treatment basins, as needed.

- Mitigate hydromodification impacts in-stream using geomorphically-based channel design.

5.3.1 Hydrologic Source Control

Disconnecting impervious areas from the drainage network and adjacent impervious areas is a key approach to protecting channel stability. Several hydrologic source controls will be included in the Project that will limit impervious area and disconnect imperviousness to avoid and minimize hydromodification impacts:

- Site Design. Site design PDFs that help to reduce the increase in runoff volume include the clustering of development into village areas, leaving large amounts of undeveloped open space within the NRSP subregion; routing of roof runoff to vegetated areas; use of native and drought tolerate plants in landscaped areas; and the use of efficient irrigation systems in common area landscaped areas.
- Treatment Controls. The Project's treatment control BMPs will also serve as hydromodification source control BMPs. Vegetated swales, bioretention areas, and extended detention basins can provide volume reduction on the order of 20 to 30 percent through infiltration and evaporation. Collectively these vegetated treatment facilities are expected to provide significant reduction in wet weather runoff. In addition these facilities will also receive and eliminate dry weather flows.

5.3.2 Geomorphically-Referenced Channel Design

The hydromodification management approach for the Santa Clara River will incorporate "geomorphically-referenced " channel design as described in SCCWRP Technical Report 450 (SCCWRP, 2005a). The goal of this approach is to preserve the appearance of the natural stream channel function to the maximum extent practicable while limiting instability in stream channel morphology.

The Project's development footprint will allow for the greatest freedom possible for "natural stream channel" activity. This includes establishing buffer zones and maintaining setbacks to allow for channel movement and adjustment to changes in energy associated with runoff.
The engineered structural elements that will be implemented where needed for the Santa Clara River include energy dissipation and bank stabilization.

- *Energy Dissipation*. Energy dissipation at storm drain outfalls provides erosion protection in areas where discharges have the potential to cause localized stream erosion. Erosion protection will be provided at all storm drain outlets to the Santa Clara River.

- *Bank Stabilization*. The Project will include buried soil cement along the Santa Clara River and Castaic Creek adjacent to and downstream of the Project site. In total, approximately 18,600 linear feet (LF) of bank would be provided with buried soil cement protection. This would include approximately 11,000 feet fronting the tract map site and approximately 6,400 LF on the south bank downstream (west) of the Long Canyon Road Bridge. Additional buried bank stabilization would be constructed as part of the approved Newhall Ranch WRP and between The Old Road and the Santa Clara River to protect the utility corridor. The bank protection between The Old Road and the Santa Clara River was approved as part of the Santa Clara River Natural River Management Plan (NRMP).

  Most of the proposed bank protection would consist of buried soil cement to provide scour and freeboard flood control protection. Soil cement is a modern flood control technique used to protect against erosion while maintaining natural vegetation and soft banks. Soil cement will be buried below the existing banks of the Santa Clara River. Disturbed areas will then re-vegetated with native plant species, maintaining the natural habitat presently found along the River.

  Approximately 6,600 LF of Turf Reinforcement Mat (TRM) or similar bank stability protection would be provide along the southern edge of the utility corridor downstream or west of the tract map site. TRMs are designed to reinforce vegetation at the root and stem allowing vegetation to be used as erosion control in areas where flow conditions exceed the ability of natural vegetation to remain rooted. This includes applications with high slopes or stream banks where grouted rip-rap and concrete channels are aesthetically undesirable.

5.4 Operation and Maintenance

Depending on the type and location of the BMP, either the County, a Landscape or Local Maintenance District (LMD), or Home Owners Association (HOA) will be responsible for maintenance. The County will have the right, but not the duty, to inspect and maintain the BMPs that are maintained by the HOA or LMD, at the expense of the HOA or LMD, if they are not being properly maintained.

Table 5-5 lists the operation and maintenance (O&M) activities for the primary treatment control PDFs and the frequencies at which O&M activities will be conducted.

Table 5-5: Water Quality BMP Operation and Maintenance Activities

Treatment Control BMP	Operation & Maintenance Category	Activities	Frequency	Typical Maintenance Equipment
Dry Extended Detention Basin	Routine Facility Maintenance	• Facility inspection • Trash and debris removal • Minor sediment removal • Vector Control	• Annually prior to wet season. • After major storm events (>0.75 in/24 hrs) if spot checks of some basins indicate widespread damage/ maintenance needs. • Remove minor sediment accumulation from inlet or outlet when affecting inlet/outlet conditions.	• Pickup truck • Stakebed truck • Backhoe/ dump truck
	Vegetation/ Landscape Maintenance	• Integrated Pest/Plant Management • Minor Vegetation Removal/ Thinning • Irrigation System Adjustment	• Monthly (or as dictated by agreement between County/HOA/LMD and landscape contractor)	• Pickup truck • Stakebed truck
	Major Maintenance	• Structural repairs • Major vegetation removal/ planting • Major sediment removal	• As needed (infrequently) • Major sediment removal as needed; approx. every 10 years for basins not preceded by HSS unit, every 20 years for basins preceded by HSS unit.	• Pickup truck • Backhoe/ dump truck • Crane/crew truck
Vegetated Swales	Routine Facility Maintenance	• Facility inspection • Trash and debris removal • Minor sediment removal • Vector Control	• Annually prior to wet season. • After major storm events if spot checks of some basins indicate widespread damage/ maintenance needs. • Remove minor sediment accumulation from inlet or outlet when affecting inlet/outlet conditions. •	• Pickup truck
	Vegetation/ Landscape Maintenance	• Integrated Pest/Plant Management • Minor Vegetation Removal/ Thinning	• Monthly (or as dictated by agreement between County/HOA/LMD and landscape contractor)	• Pickup truck • Stakebed truck
	Major Maintenance	• Major vegetation removal/ planting • Major sediment removal	• As required (annually or less frequently)	• Pickup truck • Stakebed truck

Treatment Control BMP	Operation & Maintenance Category	Activities	Frequency	Typical Maintenance Equipment
Bioretention	Routine Facility Maintenance	• Facility inspection • Trash and debris removal • Minor sediment removal	• Annually prior to wet season. • After major storm events if spot checks of some basins indicate widespread damage/ maintenance needs. • Remove minor sediment accumulation from inlet or outlet when affecting inlet/outlet conditions.	• Pickup truck
	Vegetation/ Landscape Maintenance	• Integrated Pest/Plant Management • Minor Vegetation Removal/ Thinning • Irrigation System Adjustment • Mulching	• Monthly (or as dictated by agreement between County/HOA/LMD and landscape contractor)	• Pickup truck • Stakebed truck
	Major Maintenance	• Major vegetation removal/ planting	• As needed (infrequently)	• Pickup truck • Stakebed truck

6 WATER QUALITY ANALYSIS APPROACH

6.1 <u>Model Description</u>

A water quality model was used to estimate pollutant loads and concentrations in Project stormwater runoff for certain pollutants of concern for pre-development conditions, post-development conditions, and post-development conditions with PDFs for the tentative map portion of the Project. The water quality model is one of the few models that takes into account the observed variability in stormwater hydrology and water quality. This is accomplished by characterizing the probability distribution of observed rainfall event depths, the probability distribution of event mean concentrations, and the probability distribution of the number of storm events per year. These distributions are then sampled randomly using a Monte Carlo Approach to develop estimates of mean annual loads and concentrations.

A detailed description of the water quality model is presented in Appendix B. The following summarizes major features of the water quality model:

- *Rainfall Data*: The water quality model estimates the volume of runoff from storm events. The storm events were determined from 32 years (1969 - 2002) of hourly rainfall data measured at the National Climatic Data Center (NCDC) Newhall rain gage that incorporates a wide range of storm events. The rainfall analysis that is incorporated in the water quality model requires rainfall measurements at one hour intervals and a long period of record that is at least 20 to 30 years in length.

- *Land Use Runoff Water Quality*: The water quality model estimates the concentration of pollutants in runoff from storm events based on existing and proposed land uses. The pollutant concentrations for various land uses, in the form of Event Mean Concentrations (EMCs), were estimated from data collected in Los Angeles County. The Los Angeles County database was chosen for use in the model because: (1) it is an extensive database that is quite comprehensive, (2) it contains monitoring data from land use specific drainage areas, and (3) the data is representative of the semi-arid conditions in southern California.

- *Pollutant Load*: The pollutant load associated with each storm is estimated as the product of the storm event runoff times the event mean concentration. For each year in the simulation, the individual storm event loads are summed to estimate the annual load. The mean annual load is then the average of all the annual loads.

- *PDFs Modeled*: The modeling only considers certain structural treatment PDFs and does not take into account the source control PDFs (e.g., street sweeping and catch basin inserts) that would also improve water quality. In this respect, the modeling results are conservative, i.e., tend to overestimate pollutant loads and concentrations.

- *Treatment Effectiveness*: The water quality model estimates mean pollutant concentrations and loads in stormwater following treatment. The amount of stormwater runoff that is captured by the treatment BMPs was calculated for each storm event, taking into consideration the intensity of rainfall, duration of the storm, and duration between storm events. The mean effluent water quality for treatment BMPs was based on the International Stormwater BMP Database (ASCE/EPA, 2004). The International Stormwater BMP Database was used because it is a robust, peer reviewed database that contains a wide range of BMP effectiveness studies that are reflective of diverse land uses. An analysis of the monitored inflow and outflow data contained in the International Stormwater BMP Database showed a volume reduction on the order of 38 percent for biofilters. Based on this analysis, a conservative estimate of 25 percent of the Project's inflow to the vegetated swales and bioretention areas was assumed to infiltrate and/or evapotranspire in the water quality model. The extended detention basin was assumed to remove 20 percent of volume due to evapotranspiration and infiltration. These assumptions regarding volumetric losses were also used to assess the quantity of dry weather flows that would be captured in the treatment BMPs (see Section 7.8.2).

BMP effectiveness studies in the International Stormwater BMP database infrequently monitor aluminum; therefore, insufficient effluent data were available to model the removal effectiveness of treatment control BMPs for this water quality constituent. The total aluminum content of a water sample will be directly related to the concentrations of the suspended particulate matter. The aluminum content of the suspended solids is likely to directly reflect the composition of the source materials (e.g., the catchment soils). Therefore, it would be expected and is assumed that total aluminum concentrations and loads would be reduced proportionally to removal of suspended solids by project BMPs. In order to estimate the reduction in total aluminum load and concentration (dissolved aluminum was assumed to pass through BMPs without removal), TSS removal was used as a surrogate.

- *Bypass Flows*: The water quality model takes into account conditions when the treatment facility is full and flows are bypassed.

- *Representativeness to Local Conditions*: The water quality model utilizes runoff water quality data obtained from tributary areas that have a predominant land use, and as measured prior to discharge into a receiving water body. Currently such data are available from stormwater programs in LA County, San Diego County, and Ventura County, although the amount of data available from San Diego County and Ventura County is small in comparison with the LA County database. Such data is often referred to as “end-of-pipe” data to distinguish it from data obtained in urban streams, for example.

6.2 Pollutants Modeled

The appropriate form of data used to address water quality are flow composite storm event samples, which are a measure of the average water quality during the event. To obtain such data usually requires automatic samplers that collect data at a frequency that is proportionate to flow rate. The pollutants of concern for which there are sufficient flow composite sampling data in the Los Angeles County database are:

- Total Suspended Solids (sediment)
- Total Phosphorus
- Nitrate-Nitrogen, Nitrite-Nitrogen, Ammonia-Nitrogen, and Total Nitrogen
- Total Aluminum
- Dissolved Copper
- Total Lead

- Dissolved Zinc
- Chloride

The other pollutants of concern, such as pathogens, hydrocarbons, pesticides, and trash and debris, are not amenable to this type of sampling either because of short holding times (e.g., pathogens), difficulties in obtaining a representative sample (e.g., hydrocarbons), or low detection levels (e.g., pesticides). These pollutants were addressed qualitatively using literature information and best professional judgment due to the lack of statistically reliable monitoring data for these pollutants (see Section 6.3 below).

6.3 Qualitative Impact Analysis

Post development stormwater runoff water quality impacts associated with the following pollutants of concern were addressed based on literature information and professional judgment because available data were not deemed sufficient for modeling:

- Turbidity
- Pathogens (Bacteria, Viruses, and Protozoa)
- Hydrocarbons (Oil and Grease, Polycyclic Aromatic Hydrocarbons)
- Pesticides
- Trash and Debris
- Methylene Blue Activated Substances (MBAS)
- Cyanide

Human pathogens are usually not directly measured in stormwater monitoring programs because of the difficulty and expense involved; rather, indicator bacteria such as fecal coliform or certain strains of *E. Coli* are measured. Unfortunately, these indicators are not very reliable measures of the presence of pathogens in stormwater, in part because stormwater tends to mobilize pollutants from many sources, some of which contain non-pathogenic bacteria. For this reason, and because holding times for bacterial samples are necessarily short, most stormwater programs do not collect flow-weighted composite samples that potentially could produce more reliable statistical estimates of concentrations. Fecal coliform or *E. Coli* are typically measured with grab samples, making it difficult to develop reliable EMCs. Total coliform and fecal bacteria (fecal coliform, fecal streptococcus, and fecal enterococci) were detected in stormwater samples tested in Los Angeles County at highly variable densities (or most probable number, MPN) ranging between several hundred to several million cells per 100 ml (LACDPW, 2000).

Hydrocarbons are difficult to measure because of laboratory interference effects and sample collection issues (hydrocarbons tend to coat sample bottles). Hydrocarbons are typically measured with single grab samples, making it difficult to develop reliable EMCs.

Pesticides in urban runoff are often at concentrations that are below detection limits for most commercial laboratories and therefore there are limited statistically reliable data available on pesticides in urban runoff. Pesticides were not detected in Los Angeles County monitoring data for land use-based samples, except for diazinon and glyphosate which were detected in less than 15 percent and 7 percent of samples, respectively (LACDPW, 2000).

Trash and debris, MBAS, and cyanide are not typically included in routine urban stormwater monitoring programs. Several studies conducted in the Los Angeles River basin have attempted to quantify trash generated from discrete areas, but the data represent relatively small areas or relatively short periods, or both. MBAS was included in the land use-based monitoring data, but not enough data is available for modeling purposes. Cyanide was not included in the Los Angeles County land use-based monitoring program.

Also addressed qualitatively are potential water quality impacts from runoff and dewatering discharges during construction (Section 7.4), potential water quality impacts due to pollutant bioaccumulation (Section 7.5), and dry weather runoff water quality impacts (Section 7.6).

7 IMPACT ASSESSMENT

The modeled pollutant impact assessment is presented in Section 7.1 and the quantitative analyses of the remaining pollutants of concern follow in Section 7.2. Analyses of dry weather impacts and compliance with NPDES Permit requirements and construction-related requirements of the Construction General Permit and Dewatering General Permit follow the pollutant-by-pollutant impact assessment. Also included is a discussion of other considerations, including operation and maintenance, vector control, bioaccumulation, and hydrologic impacts. The analysis of cumulative impacts to surface water, groundwater, and hydromodification is also provided. A weight of evidence approach is employed using the various thresholds and significance criteria discussed in Section 4.4

7.1 Post Development Stormwater Runoff Impact Assessment for Modeled Pollutants of Concern

In this section, model results for each pollutant are evaluated in relation to the following significance criteria: (1) comparison of post-development versus pre-development stormwater quality concentrations and loads; (2) comparison with MS4 Permit, Construction General Permit, and General Dewatering Permit requirements for new development; and (3) evaluation in light of receiving water benchmarks. Pursuant to the third criterion, predicted runoff pollutant concentrations in the post-development with PDFs condition are compared with benchmark receiving water quality criteria as provided in the Basin Plan and the CTR and TMDL waste load allocations. The water quality criteria and waste load allocations are considered benchmarks for comparison purposes only, since they do not apply directly to runoff from the Project, but the comparison provides useful information to evaluate potential impacts. A weight of evidence approach is employed in this analysis considering the various significance criteria.

Results from the water quality model for significance criterion 1 are reported in a series of tables, organized by constituent, showing predicted mean annual pollutant loads (lbs/yr) and mean annual concentrations. Projections are made for two conditions: (1) existing condition, and (2) developed condition with Project design features (PDFs).

Note that the modeling results account for pollutant reductions in the extended detention basin, bioretention areas, and vegetated swales only and do not account for the pollutant reductions that will occur due to source control PDFs. Because not all BMPs are modeled, the model results predict greater water quality impacts than are likely to occur from the Project.

Following the tables comparing post-development and pre-development water quality loads and concentrations for each constituent (except runoff volume) is a table comparing the post-development with PDFs runoff quality to the benchmark water quality objectives and criteria and TMDL waste load allocations for downstream reaches of the Santa Clara River. Water quality observed in the Santa Clara River is also included on these tables to provide comparison to the modeled developed condition with PDFs runoff quality.

The area of the Project included in the model was limited to the developed portion of the Project. As no impervious surfaces will be added in the borrow areas and the utility corridor and therefore there will be no change in runoff volume or pollutant loads and concentrations in the post-developed condition, these areas were not included in the model, but are included in the qualitative construction impact assessment.

7.1.1 Stormwater Runoff Volume

Table 7-1 shows the predicted changes in stormwater runoff mean annual volumes. Mean annual runoff volumes are expected to increase substantially with development. The increase can be explained by the change in percent imperviousness associated with urbanization. For modeling purposes, the existing site was assumed to have an imperviousness of 15 percent to account for compaction by machinery and soil saturation due to irrigation. In contrast, single family residential land use is assumed to have an imperviousness of 42 percent, multi-family residential land use is assumed to have an imperviousness of 68 percent, and commercial land use is assumed to have an imperviousness of 92 percent. Runoff volume is directly proportional to percent imperviousness.

Project PDFs include site design, source control, and treatment control BMPs in compliance with the SUSMP requirements. Most of the site design PDFs, especially the minimization of impervious area and the conservation of approximately 55 acres of open space areas within the Project, reduce the impacts of the proposed development on increases in stormwater runoff volume. The treatment control BMPs will allow for some runoff volume reduction as well.

Based on BMP monitoring data in the International Stormwater BMP Database, a 25 percent reduction in stormwater runoff volume was assumed to occur in the vegetated swales and bioretention PDFs. Water quality basins were modeled with a 20 percent volume reduction.

Table 7-1: Predicted Average Annual Stormwater Runoff Volumes

Site Conditions	Average Annual Stormwater Runoff Volume (acre-ft)
Existing	183
Developed with PDFs	331
Change	148

7.1.2 TSS

Comparison of Pre- and Post-Project Conditions: Table 7-2 shows the predicted average annual TSS concentration and loads. Conversion from the predominately pre-development agricultural land use to the post-development urban land use (with treatment) will reduce the average TSS concentration and loads in stormwater runoff from the Project site.

Table 7-2: Predicted Average Annual TSS Concentration and Load

Site Conditions	Average Annual TSS Concentration (mg/L)	Average Annual TSS Load (tons/yr)
Existing	459	114
Developed with PDFs	37	17
Change	-422	-97

Comparison with Water Quality Criteria: The predicted average annual TSS concentration in stormwater runoff from the total modeled area with PDFs is compared to water quality criteria and the range of observed concentrations in the Santa Clara River in Table 7-3. Predicted TSS load and concentration declines with development and is at the low end of the range of observed concentrations in Santa Clara River Reach 5. Based on the comprehensive site design, source control, and treatment control strategy, and the comparison with available in-stream data and basin plan benchmark objectives, the TSS in stormwater runoff from the Project will not cause a nuisance or adversely affect beneficial uses in the receiving waters.

Table 7-3: Comparison of Predicted TSS Concentrations with Water Quality Criteria and Observed Concentrations in Santa Clara River Reach 5

Predicted Average Annual TSS Concentration (mg/L)	LA Basin Plan Water Quality Objectives	California Toxics Rule Criteria	Range of Observed[1] Concentrations in Santa Clara River Reach 5 (mg/L)
37	Water shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses	NA	32 – 51,200

[1] Range of concentrations observed in the Santa Clara River during wet weather (see Section 2.7).
NA – not applicable

7.1.3 Total Phosphorus

Comparison of Pre- and Post-Project Conditions: Table 7-4 shows the predicted average total phosphorous (TP) concentration and annual loads. TP concentration and load are predicted to decrease post-development. Because much of the total phosphorous load is associated with sediments and the sediment load and concentrations are predicted to decrease with development, the TP concentration and annual TP load are also predicted to decrease.

Table 7-4: Predicted Average Annual Total Phosphorus Concentration and Annual Load

Site Conditions	Average Annual Total Phosphorous Concentration (mg/L)	Average Annual Total Phosphorous Load (lbs/yr)
Existing	1.5	759
Developed with PDFs	0.3	239
Change	-1.2	-520

Comparison with Water Quality Criteria: There are no numeric objectives for TP in the LA Basin Plan. A narrative objective for biostimulatory substances in the LA Basin Plan states: "waters shall not contain biostimulatory substances in concentrations that promote algal growth to the extent that such growth causes nuisance or adversely affects beneficial uses." The low predicted TP concentrations in Project stormwater discharges will not promote (i.e., increase) algae growth and therefore comply with the narrative objective for biostimulatory substances in the LA County Basin Plan. As shown in Table 7-5, the predicted total phosphorous concentration is at the low end of the range of observed concentrations in Santa Clara River Reach 5.

Table 7-5: Comparison of Predicted Total Phosphorus Concentration with Water Quality Criteria and Observed Concentrations in Santa Clara River Reach 5

Predicted Average Annual Total Phosphorus Concentration (mg/L)	LA Basin Plan Water Quality Objectives	California Toxics Rule Criteria	Range of Observed[1] Concentrations in Santa Clara River Reaches 5 (mg/L)
0.3	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses	NA	0.18 – 1.8

[1] Range of concentrations observed in the Santa Clara River during wet weather (see Section 2.7).
NA – not applicable

Based on the comprehensive site design, source control, and treatment control strategy and the comparison with available in-stream monitoring data and Basin Plan benchmark objectives, potential impacts associated with total phosphorous are predicted to be less than significant.

7.1.4 Nitrogen Compounds

Comparison of Pre- and Post-Project Conditions: The predicted average nitrate-nitrogen plus nitrite-nitrogen, ammonia, and total nitrogen concentrations and annual loads are summarized in Table 7-6, Table 7-7, and Table 7-8, respectively. Average concentrations and loads of nitrate-nitrogen plus nitrite nitrogen, ammonia-nitrogen, and total nitrogen are predicted to decrease. The decrease in nitrogen loads and concentrations can be attributed to higher nitrite-, nitrate-, and ammonia-nitrogen EMCs observed in monitoring data from agricultural land uses versus urbanized land uses, along with nitrogen reductions in the treatment control PDFs.

Table 7-6: Predicted Average Annual Nitrate-N + Nitrite-N Concentration and Load

Site Conditions	Average Annual Nitrate+Nitrite-Nitrogen Concentration (mg/L)	Average Annual Nitrate+Nitrite-Nitrogen Load (lbs/yr)
Existing	6.3	3,107
Developed with PDFs	0.5	420
Change	-5.8	-2687

Table 7-7: Predicted Average Annual Ammonia-N Concentration and Load

Site Conditions	Average Annual Ammonia-N Concentration (mg/L)	Average Annual Ammonia-N Load (lbs/yr)
Existing	1.0	473
Developed with PDFs	0.2	145
Change	-0.8	-328

Table 7-8: Predicted Average Annual Total Nitrogen-N Concentration and Load

Site Conditions	Average Annual Total Nitrogen Concentration (mg/L)	Average Annual Total Nitrogen Load (lbs/yr)
Existing	10	5,150
Developed with PDFs	1.9	1,703
Change	-8.1	-3,447

Comparison with Water Quality Criteria: Predicted nitrogen compound concentrations are compared to Basin Plan objectives and observed concentrations in Table 7-8. Average annual stormwater concentration of ammonia is predicted to be considerably less than the waste load allocation for Santa Clara River Reach 5 and the Basin Plan objective, and within the range of observed concentrations. Likewise, the average annual stormwater concentration of nitrate-N plus nitrite-N is predicted to be considerably less than the TMDL waste load allocation or the Basin Plan water quality objective and below the range of observed concentrations for this reach of the Santa Clara River.

There are no numeric objectives for Total Nitrogen in the LA Basin Plan. A narrative objective for biostimulatory substances in the LA Basin Plan states: “waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses.” The low predicted Total Nitrogen concentrations in project stormwater discharges will not promote (i.e., increase) aquatic growth and therefore comply with the narrative objective for biostimulatory substances in the LA County Basin Plan. As shown in Table 7-9, the predicted total nitrogen concentration is in the range of observed concentrations in Santa Clara River Reach 5.

Table 7-9: Comparison of Predicted Nitrogen Compound Concentrations with Water Quality Objectives, TMDLs, and Observed Concentrations in Santa Clara River Reach 5

Nutrient	Predicted Average Annual Concentration (mg/L)	TMDL Water Quality Objectives[1] (mg/L)	TMDL Waste Load Allocation for Santa Clara River Reach 5 (mg/L)	Range of Observed[2] Concentrations in Santa Clara River Reach 5 (mg/L)
Nitrate-N + Nitrite-N	0.5	5	6.8[3]	0.2 – 4.0
Ammonia-N	0.2	2.2[4]	1.75[5]	0.02 – 1.1

Nutrient	Predicted Average Annual Concentration (mg/L)	TMDL Water Quality Objectives[1] (mg/L)	TMDL Waste Load Allocation for Santa Clara River Reach 5 (mg/L)	Range of Observed[2] Concentrations in Santa Clara River Reach 5 (mg/L)
Total Nitrogen	1.9	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses	NA	0.6 – 10.4

[1] There are no CTR criteria for nitrogen compounds. The biostimulatory substances water quality objective is included because excessive nutrients can contribute to excessive aquatic growth.
[2] Range of concentrations observed in the Santa Clara River during wet weather (see Section 2.3.1).
[3] 30-day average.
[4] 4-day average, ELS present, 90th percentile pH and temperature pairing observed at USGS Monitoring Station 11108500.
[5] 30-day average in Reach 5 below Valencia.

Based on the comprehensive site design, source control, and treatment control strategy, and the comparison with available in-stream monitoring data and benchmark Basin Plan objectives and waste load allocations, potential impacts associated with nitrogen compounds are predicted to be less than significant.

7.1.5 Metals

Comparison of Pre- and Post-Project Conditions: Projected loads and concentrations for the trace metals copper, lead, zinc, and total aluminum are presented in through Tables 7-10 through 7-13. Except for aluminum and lead, the projections are for the dissolved form of the metal, as it is the dissolved form to which the CTR criteria apply. Due to consistently low concentrations of dissolved lead in the available stormwater runoff data, it was not possible to develop reliable EMC parameters for most land uses for modeling the dissolved fraction of lead. This constituent was therefore modeled as the total recoverable metal. Copper, lead, and zinc are the most prevalent metals typically found in urban runoff. Other trace metals, such as cadmium, chromium, and mercury, are typically not detected in urban runoff or are detected at very low levels (LACDPW, 2000).

Post-development dissolved copper, total lead, and dissolved zinc loads and concentrations and total aluminum concentrations are projected to decrease compared to pre-development conditions. These results can be explained by the difference in EMC values observed in representative monitoring data from the pre-developed agriculture and open space condition and the post-developed urban condition (see Appendix B, Table B-12). Total aluminum loads are predicted to increase. Although runoff volumes will increase with development, the change in land use will decrease the runoff metals for most proposed land uses.

Project PDFs include site design, source control, and treatment control BMPs in compliance with the SUSMP requirements. Specific site design PDFs that will be implemented to minimize increases in trace metals include directing drainage from impervious areas to bioretention areas and the selection of building material for roof gutters and downspouts that do not include copper or zinc. Source control PDFs that target metals include education for property owners, BMP maintenance, and street sweeping private streets and parking lots. The treatment control BMPs will also reduce trace metals in the runoff from the proposed development. Only the effects of the treatment control PDFs are reflected in the model results.

Table 7-10: Predicted Average Annual Dissolved Copper Concentration and Load

Site Conditions	Average Annual Dissolved Copper Concentration (μg/L)	Average Annual Dissolved Copper Load (lbs/yr)
Existing	26	13
Developed with PDFs	9.9	8.9
Change	-16.1	-4.1

Table 7-11: Predicted Average Total Lead Concentration and Annual Load

Site Conditions	Average Annual Total Lead Concentration (μg/L)	Average Annual Total Lead Load (lbs/yr)
Existing	16	8.0
Developed with PDFs	5.2	4.7
Change	-10.8	-3.3

Table 7-12: Predicted Average Annual Dissolved Zinc Concentration and Load

Site Conditions	Average Annual Dissolved Zinc Concentration (μg/L)	Average Annual Dissolved Zinc Load (lbs/yr)
Existing	132	66
Developed with PDFs	60	54
Change	-72	-12

Table 7-13: Predicted Average Annual Total Aluminum Concentration and Load

Site Conditions	Average Annual Total Aluminum Concentration (μg/L)	Average Annual Total Aluminum Load (lbs/yr)
Existing	631	313
Developed with PDFs	480	432
Change	-151	119

Comparison with Water Quality Criteria: A narrative objective for toxic substances in the LA Basin Plan states: “all waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life."

The CTR criteria are the applicable water quality objectives for protection of aquatic life. The CTR criteria are expressed for acute and chronic (4-day average) conditions; however, only acute conditions were considered to be applicable for stormwater discharges because the duration of stormwater discharge is consistently less than 4 days. The CTR criteria are calculated on the basis of the hardness of the receiving waters. Lower hardness concentrations result in lower, more stringent CTR criteria. The minimum hardness value (250 mg/L as $CaCO_3$) observed in the Santa Clara River at the USGS Station 11108500 during wet weather was used as a conservative estimate; the mean observed hardness value was 660 mg/L as $CaCO_3$.

Comparison of the estimated runoff concentrations and the acute CTR criteria are shown in Table 7-14. The comparison of the post-developed with PDFs condition to the benchmark CTR values shows that all of the trace metal concentrations are well below the water quality criteria (Table 7-12). Predicted trace metal concentrations are slightly above the range of observed concentrations For aluminum, the National Ambient Water Quality Criteria (NAWQC) acute criterion (750 μg/L for a pH range of 6.5 to 9.0) was used as a benchmark, as the CTR does not include aluminum. Although the NAWQC criterion is in the form of acid soluble aluminum (USEPA, 1988), the available monitoring data are for either dissolved aluminum or total aluminum. Acid soluble aluminum (which is operationally defined as the aluminum that passes through a 0.45 µm membrane filter after the sample has been acidified to a pH between 1.5 and 2.0 with nitric acid) represents the forms of aluminum toxic to aquatic life or that can be readily converted to toxic forms under natural conditions. The acid soluble measurement does not measure forms of aluminum, such as aluminum that is occluded in minerals, clays, and or is strongly sorbed to particulate matter, that are not toxic and are not likely to become toxic under natural conditions. As acid soluble aluminum data is not available, total aluminum has been used in order to be conservative.

Comparison of the predicted runoff metal concentrations and the acute CTR criteria for dissolved copper, total lead, and dissolved zinc and the NAWQC criterion for aluminum are shown in Table 7-14, along with the range of observed concentrations in Santa Clara River Reach 5. The comparison of the post-developed with PDFs condition to the benchmark CTR and NAWQC values shows that all of the trace metal concentrations are below the benchmark water quality criteria.

Table 7-14: Comparison of Predicted Trace Metal Concentrations with Water Quality Criteria and Observed Concentrations in Santa Clara River Reach 5

Metal	Predicted Average Annual Concentration (µg/L)	California Toxics Rule Criteria[1] (µg/L)	Range of Observed[2] Concentrations in Santa Clara River Reach 5 (µg/L)
Dissolved Copper (µg/L)	9.9	32	3.8 – 8.4
Total Lead (µg/L)	5.2	260	1.1 – 14.5
Dissolved Zinc (µg/L)	60	250	27 – 37
Total Aluminum	480	750	131 – 19,650

[1] Hardness = 250 mg/L, based on minimum observed value at USGS Station 11108500. Lead criteria is for total recoverable lead. NAWQC aluminum criteria for pH 6.5 – 9.0.
[2] Range of concentrations observed in the Santa Clara River during wet weather (see Section 2.7).

Based on the comprehensive site design, source control, and treatment strategy and the comparison with the instream water quality monitoring data and benchmark water quality criteria, the Project will not have significant impacts resulting from trace metals.

7.1.6 Chloride

Comparison of Pre- and Post-Project Conditions: Table 7-15Table 7-15 shows the predicted average annual chloride concentration and load. Due to the conversion from agricultural to urban land-uses and the associated EMCs, annual chloride concentration is predicted to decrease when compared to the existing conditions, although the average annual chloride load is predicted to increase slightly due to increased runoff volume.

Table 7-15: Predicted Average Annual Chloride Concentration and Load

Site Conditions	Average Annual Chloride Concentration (mg/L)	Average Annual Chloride Load (lbs/yr)
Existing	24	6.0
Developed with PDFs	14	6.2
Change	-10	0.2

Comparison with Water Quality Criteria: The predicted chloride concentration in post-development Project runoff is compared to the LA Basin Plan water quality objective and the range of observed concentrations in Santa Clara River Reach 5 in Table 7-14. The predicted average annual chloride concentration in stormwater runoff from the Project area is at the low end of the range of observed concentrations for this pollutant and is well below the Santa Clara River Reach 5 Basin Plan water quality objective and the TMDL waste load allocation for Santa Clara River Reach 5 (100 mg/L for both). Based on the comprehensive site design, source control, and treatment control strategy, and comparison with benchmark receiving water criteria and instream monitoring data, the Project is not expected to have significant water quality impacts resulting from chloride.

Table 7-16: Comparison of Predicted Chloride Concentrations with Water Quality Criteria and Observed Concentrations in Santa Clara River Reach 5

Pollutant	Predicted Average Annual Concentration (mg/L)	SCR Reach 5 TMDL Waste Load Allocation & Basin Plan Water Quality Objective[1] (mg/L)	Range of Observed[2] Concentrations in Santa Clara River Reach 5 (mg/L)
Chloride	14	100	2.6 – 290[3]

[1] There are no CTR criteria for chloride.
[2]Range of concentrations observed in the Santa Clara River during wet weather at USGS Station 11108500 (see Section 2.7).
[3]This value was observed in 1965.

7.2 Post Development Impact Assessment for Pollutants and Basin Plan Criteria Addressed Without Modeling

7.2.1 Turbidity

Turbidity is a measure of suspended matter that interferes with the passage of light through the water or in which visual depth is restricted (Sawyer et al, 1994). Turbidity may be caused by a wide variety of suspended materials, which range in size from colloidal to coarse dispersions, depending upon the degree of turbulence. In lakes or other waters existing under relatively quiescent conditions, most of the turbidity will be due to colloidal and extremely fine dispersions. In rivers under flood conditions, most of the turbidity will be due to relatively coarse dispersions. Erosion of clay and silt soils may contribute to in-stream turbidity (see discussion of hydromodification impacts in Section 7.8 below). Organic materials reaching rivers serve as food for bacteria, and the resulting bacterial growth and other microorganisms that feed upon the bacteria produce additional turbidity. Nutrients in runoff may stimulate the growth of algae, which also contribute to turbidity.

Discharges of turbid runoff are primarily of concern during the construction phase of development. Construction-related impacts are addressed in Section 7.4 below. The Construction Stormwater Pollution Prevention Plan must contain sediment and erosion control BMPs pursuant to the Construction General Permit, and those BMPs must effectively control erosion and discharge of sediment, along with other pollutants, per the Best Available Technology Economically Achievable and Best Conventional Pollutant Control Technology (BAT/BCT) standards[4]. Additionally, fertilizer control and non-visible pollutant monitoring and

[4] BAT/BCT are Clean Water Act technology-based standards that are applicable to construction site stormwater discharges. Federal law specifies factors relating to the assessment of BAT including: age of the equipment and facilities involved; the process employed; the engineering aspects of the application of various types of control techniques; process changes; the cost of achieving effluent reduction; non-water quality environmental impacts (including energy requirements); and other factors as the Administrator deems appropriate. Clean Water Act

trash control BMPs in the SWPPP will combine to help control turbidity during the construction phase.

In the post-development condition, placement of impervious surfaces will serve to stabilize soils and to reduce the amount of erosion that may occur from the Project area during storm events, and will therefore decrease turbidity in the runoff from the Project area (see also hydromodification impacts discussed in section 7.8 below). Project PDFs, including source controls (such as common area landscape management and common area litter control) and treatment control BMPs in compliance with the SUSMP requirements, will prevent or reduce the release of organic materials and nutrients (which might contribute to algal blooms) to receiving waters. As shown in Section 7.1 above, post-development nutrients in runoff are not expected to cause significant water quality impacts. Based on implementation of the Project PDFs and the construction-related controls outlined in Section 7.4, runoff discharges from the Project will not cause increases in turbidity which would result in adverse affects to beneficial uses in the receiving waters. Based on these considerations, the water quality impacts of the Project on turbidity are considered less than significant.

7.2.2 Pesticides

Pesticides can be of concern where past farming practices involved the application of persistent organochlorine pesticides. Legacy pesticides Chlordane, Dieldrin, DDT, and Toxaphene are of particular concern, as TMDLs have been established for these pesticides in the Santa Clara River estuary, approximately 40 miles downstream of the Project and this reach of the river. Historical pesticides should no longer be discharged in the watershed except in association with erosion of sediments to which these pollutants may have adhered in the past. Site development involves the import of nearly 6,000,000 cubic yards of dirt from non-agricultural areas, as well as required remedial grading which will stabilize soils and prevent their transport from the Project site, actually reducing the potential for discharge of sediments to which historical pesticides may have adsorbed in pre-development conditions.

In the post-developed condition, pesticides will be applied to common landscaped areas and residential lawns and gardens. Pesticides that have been commonly found in urban streams include the organophosphate pesticides chlorpyrifos and diazinon (Katznelson and Mumley, 1997). However, only 0 to 13% of the samples in the LA County database had detectable levels of diazinon (depending on the land use) while levels of chlorpyrifos were below detection limits

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§304(b)(2)(B). Factors relating to the assessment of BCT include: reasonableness of the relationship between the costs of attaining a reduction in effluent and the effluent reduction benefits derived; comparison of the cost and level of reduction of such pollutants from the discharge from publicly owned treatment works to the cost and level of reduction of such pollutants from a class or category of industrial sources; the age of the equipment and facilities involved; the process employed; the engineering aspects of the application of various types of control techniques; process changes; non-water quality environmental impact (including energy requirements); and other factors as the Administrator deems appropriate. Clean Water Act §304(b)(4)(B). The Administrator of U.S. EPA has not issued regulations specifying BAT or BCT for construction site discharges.

for all land uses in all samples taken between 1994 and 2000 (LA County, 2000). Other pesticides presented in the database were seldom measured above detection limits. Furthermore, these data represent flows from areas without treatment controls, unlike the proposed Project, which does incorporate treatment control PDFs.

Diazinon and chlorpyrifos are two pesticides of concern due to their potential toxicity in receiving waters. The USEPA has banned all indoor uses of diazinon in 2002 and stopped all sales for all outdoor non-agricultural use in 2003 (USEPA, June, 2002)[5]. With no agricultural uses planned for the proposed Project, diazinon would not be used at the proposed Project site. The USEPA is also phasing out all indoor and outdoor residential uses of chlorpyrifos and has stopped all non-residential uses where children may be exposed. Use of chlorpyrifos in the proposed Project area is not expected, with the possible exception of emergency fire ant eradications until such time as reasonable alternative products are available and only with appropriate application practices in accordance with the golf course and landscape pesticide management program.

Source control measures such as education programs for owners, occupants, and employees in the proper application, storage, and disposal of pesticides are the most promising strategies for controlling the pesticides that will be used post-development. Structural treatment controls are less practical because of the variety of pesticides and wide range of chemical properties that affect their ability to treat these compounds. However, most pesticides, including historical pesticides that may be present at the site, are relatively insoluble in water and therefore tend to adsorb to the surfaces of sediment, which will be stabilized with development, or if eroded, will be settled or filtered out of the water column in the water quality treatment PDFs. Thus, treatment in the bioretention, vegetated swales, and extended detention basin should achieve some removal of pesticides from stormwater as TSS is reduced.

For common area landscaping in commercial areas, multi-family residential areas, and parks, an Integrated Pest Management (IPM) Program will be incorporated. The goal of an IPM is to keep pest levels at or below threshold levels, reducing risk and damage from pest presence, while eliminating the risk from the pest control methods used. IPM programs achieve these goals

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[5] Changes to the use of chlorpyrifos include reductions in the residue tolerances for agricultural use, phases out nearly all indoor and outdoor residential uses, and also stops non-residential uses where children may be exposed. In Orange County, residential use accounts for around 90% of total chlorpyrifos (USEPA, June 2002). Retail sales of chlorpyrifos were stopped by December 31, 2001, and structural (e.g. construction) uses will be phased out by December 31, 2005. Some continued uses will be allowed, for example public health use for fire ant eradication and mosquito control will be permitted by professionals.

Permissible uses of diazinon will also be restricted. All indoor uses are prohibited (as of 12/2002) and retailers were required to end sales for indoor use on December, 2002. All outdoor non-agricultural uses were phased out by December 31, 2004. Therefore it is likely that the USEPA agreement will eliminate most of the use of diazinon within the NRSP area. The use of diazinon for many agricultural crops has been eliminated (USEPA 2001), while some use of this chemical will continue to be permitted for some agricultural activities.

through the use of low risk management options by emphasizing use of natural biological methods and the appropriate use of selective pesticides. IPM programs also incorporate environmental consideration by implementing procedures that minimize intrusion and alteration of biodiversity in ecosystems.

While pesticides are subject to degradation, they vary in how long they maintain their ability to eradicate pests. Some break down almost immediately into nontoxic byproducts, while others can remain active for longer periods of time. While pesticides that degrade rapidly are less likely to adversely affect non-targeted organisms, in some instances it may be more advantageous to apply longer-lasting pesticides if it results in fewer applications or smaller amounts of pesticide use. As part of the Integrated Pest Management program, careful consideration will be made as to the appropriate type of pesticides for use on the Project site. While pesticide use is likely to occur due to maintenance of landscaped areas, particularly in the residential portions of the development, careful selection, storage and application of these chemicals for use in common areas per the IPM Program will help prevent adverse water quality impacts from occurring. Additionally, as discussed above, removal of sediments in the PDFs will also remove sediment-adsorbed pesticides.

Based on the incorporation of site design, source control, and treatment control BMPs pursuant to SUSMP requirements and the use of an Integrated Pest Management Program, potential post-development impacts associated with pesticides are expected to be less than significant.

Transport of legacy pesticides adsorbed to existing site sediments may be a concern during the construction phase of development. Construction-related impacts are addressed in Section 7.4 below. The Construction Stormwater Pollution Prevention Plan must contain sediment and erosion control BMPs pursuant to the Construction General Permit, and those BMPs must effectively control erosion and the discharge of sediment along with other pollutants per the BAT/BCT standards. Based on these sediment controls, construction-related impacts associated with pesticides are expected to be less than significant.

7.2.3 Pathogens

Pathogens are viruses, bacteria, and protozoa that can cause illness in humans. Identifying pathogens in water is difficult as the number of pathogens is exceedingly small requiring sampling and filtering large volumes of water. Traditionally water managers have relied on measuring “pathogen indicators”, such as total and fecal coliform, as an indirect measure of the presence of pathogens. Although such indicators were considered reliable for sewage samples, indicator organisms are not necessarily reliable indicators of viable pathogenic viruses, bacteria, or protozoa in stormwater because coliform bacteria, in addition to being found in the digestive systems of warm-blooded animals, are also found in plants and soil. Certain pathogen indicators can multiply in the field if the substrate, temperature, moisture, and nutrient conditions are suitable. Paulsen and List summarize the debate over the use of pathogenic indicators and point out that scientific studies show no correlation between pathogens and therefore may not indicate a significant potential for causing human illness (Paulsen and List, 2005, provided in Appendix D). In a recent field study conducted by Schroeder et. al., pathogens (in the form of viruses, bacteria, or protozoa) were found to occur in 12 of 97 samples taken, but the samples that contained pathogens did not correlate with the concentrations of indicator organisms (Schroeder et. al. 2002).

There are numerous sources of pathogen indicators, including birds and other wildlife, as well as domesticated animals and pets, soils, and plant matter. Anthropogenic sources, which are the focus of the Project PDFs, may include poorly functioning septic systems, cross-connections between sewer and storm drains, and the utilization of outdoor areas for human waste disposal by people without access to indoor sanitary facilities.

It is recognized that natural levels of bacteria are present in the Project's receiving waters and that control of such natural sources is not required nor desired by regulatory agencies. For example, the LARWQCB TMDL for Bacteria in the Malibu Creek Watershed makes provisions for background levels of bacteria associated with natural sources (LARWQCB, 2004).

Data collected from undeveloped watersheds or watersheds with little development indicate that bacterial standards are often exceeded. For example, monitoring data obtained by LACDPW (LACDPW, 2000) for the vacant land use showed a mean fecal coliform concentration of 1,397 MPN/100 mL in 21 samples (compared to the REC1 water quality criteria of 400 MPN/100 mL). USEPA has recognized that routine exceedances of ambient water quality criteria due to natural sources of pollution occur. In response, USEPA has recommended changes to designated uses as the most appropriate way to address these situations (Paulsen and List, 2005).

USEPA has compiled an extensive database on stormwater data collected as part of its program to regulate stormwater (Pitt et al, 2003). These data were drawn from 65 programs in 17 states throughout the United States. The data indicate that median fecal concentrations range from about 4,500 to 7,700 MPN/100 mL for a range of commercial and residential land uses, compared to a median value of around 3,000 MPN/100 mL for open space and vacant land. These data represent urban areas that in general do not have source and treatment controls, and therefore are not indicative of runoff from the proposed development.

Runoff from agricultural watersheds involving horticulture and row cropping is known to similarly contain relatively high levels of indicator bacteria. Data from a stormwater drain serving an agricultural watershed with predominantly row crops in Ventura County showed similar median fecal coliform levels (~ 7,000 MPN/100 mL) to that found for general urban runoff (Ventura County, 2005). Agricultural land and open space areas likely share some of same wildlife sources, but farm animals may be present as well. These data indicate that wildlife, farm animals, plants and/or soils can be a very important source of pathogens and/or pathogen indicators such as fecal coliform. The Project, by converting open space and agricultural land to urban land uses, may not necessarily increase the pathogen concentrations in stormwater discharges.

Additionally, a study conducted by PBS&J in coastal watersheds near Laguna Beach in Orange County (PBS&J, 1999) found that indicator bacteria concentrations in receiving waters downstream from the developed/urban watersheds were not significantly different than concentrations in receiving waters downstream from undeveloped watersheds. Additional analysis conducted by Paulsen and List (Paulsen and List, 2005) further supported these findings. These studies suggest that the development of the proposed Project would not result in appreciable changes in pathogen levels in the receiving waters compared to existing conditions.

The primary sources of fecal coliform from the Project would likely be sediment, pet wastes, wildlife, and regrowth in the storm drain itself. Other sources of pathogens and pathogen indicators, such as cross connections between sanitary and storm sewers, are unlikely given modern sanitary sewer installation methods and inspection and maintenance practices.

The levels of bacteria in runoff from the proposed project will be reduced by virtue of the following:

- Source controls, and
- Treatment controls.

The most effective means of controlling pet wastes and wastes from human interaction with wildlife is through source control, specifically education of pet owners, education regarding feeding of waterfowl near waterbodies, providing products and disposal containers that encourage and facilitate cleaning up after pets, and storm drain cleaning practices. These BMPs are described in Section 5 Project Design Features.

Although, there are limited data on the effectiveness of extended detention basins to treat pathogen indicators, the treatment processes known to be occurring in extended detention basins involve sunlight (ultraviolet light) degradation, sedimentation, and infiltration, all of which can reduce pathogen concentrations and loads. Many of the proposed detention basins are to be located on relatively infiltrative soils and pathogen removal by filtration is a common and effective practice in wastewater treatment. The Center for Watershed Protection maintains a National Pollutant Removal Performance Database that indicates that removal performance for various types of extended detention basins ranges between 70 to 80 percent (CWP, 2000).

In addition to treatment by extended detention, bioretention areas and vegetated swales are proposed. Bioretention relies filtration through the soil column for water quality treatment, while vegetated swales provide sediment removal through settling and allow for infiltration of low flows. Again, filtration is one of the more effective means of treating pathogen indicators.

The City of Austin, Texas conducted a number of studies on the effectiveness of sedimentation/ filtration treatment systems for treating stormwater runoff (City of Austin, 1990; CWP, 1996). Most of the structures were designed to treat ½ inch of runoff. Data from four sand filters indicated a range of removals from 37 percent to 83 percent for fecal coliform, and 25 percent to 81 percent for fecal streptococci. Research on the use of filtration to remove bacteria also has been conducted in Florida by the Southwest Florida Water Management District (Kurz, 1999). Significant ($p<0.05$) reductions in total and fecal coliform bacteria and the other indicators were observed between inflow and outflow samples for sand filtration. Percent reductions were measured using flow-weighted sampling techniques. Total coliform bacteria removals were less than 70 percent, and fecal coliform bacteria reduction varied from 65 percent to 100 percent. In a literature summary, USEPA reported typical pathogen removal for infiltration basins and trenches as 65 to 100 percent (USEPA, 1993).

In summary, the proposed project, consistent with the MS4 Permit requirements, includes a comprehensive set of source and treatment control PDFs selected to manage pathogen indicators. With this series of PDFs, the Project would not result in appreciable changes in pathogen levels in the receiving waters compared to existing conditions, and potential water quality impacts related to pathogens are considered less than significant.

7.2.4 Hydrocarbons

Various forms of hydrocarbons (oil and grease) are common constituents associated with urban runoff; however, these constituents are difficult to measure and are typically measured with grab samples, making it difficult to develop reliable EMCs for modeling. Based on this consideration, hydrocarbons were not modeled but are addressed qualitatively.

Hydrocarbons are a broad class of compounds, most of which are non-toxic. Hydrocarbons are hydrophobic (low solubility in water), have the potential to volatilize, and most forms are biodegradable. A subset of hydrocarbons, Polynuclear Aromatic Hydrocarbons (PAHs) can be toxic depending on the concentration levels, exposure history, and sensitivity of the receptor organisms. Of particular concern are those PAH compounds associated with transportation-related sources.

Although the concentration of hydrocarbons in runoff is expected to increase slightly under post-development Project conditions due to the increase in roadways, driveways, parking areas, and vehicle use, the Project PDFs are expected to prevent appreciable increases in hydrocarbon concentrations from leaving the Project site. Source control PDFs that address petroleum hydrocarbons include educational materials on used oil programs, carpooling, and public transportation alternatives to driving; BMP maintenance; and street sweeping private streets. Although vehicle emissions and leaks are the primary source of hydrocarbons in urban areas, it is anticipated that vehicles in the proposed development will in general be well maintained and newer models which will help to limit emissions and leaks. Lastly, the parking lot site design, source controls, treatment BMPs and vegetation and soils within the treatment control PDFs will adsorb the low levels of emulsified oils in stormwater runoff, preventing discharge of hydrocarbons and visible film in the discharge or the coating of objects in the receiving water.

The majority of PAHs in stormwater adsorb to the organic carbon fraction of particulates in the runoff, including soot carbon generated from vehicle exhaust (Ribes et al, 2003). For example, a stormwater runoff study by Marslek et. al. (1997) found that the dissolved-phase PAHs represented less than 11 percent of the total concentration of PAHs. Consequently, the extended detention basins, bioretention areas, and vegetated swales proposed as PDFs, which are designed to treat pollutants through settling, filtration, and infiltration, will be effective at treating PAHs.

Los Angeles County conducted PAH analyses on 27 stormwater samples from a variety of land uses in the period 1994-2000 (Los Angeles County, 2000). For those land uses where sufficient samples were taken and were above detection levels to estimate statistics, the mean concentrations of individual PAH compounds ranged from 0.04 to 0.83 µg/L. The reported means were less than acute toxicity criteria available from the literature (Suter and Tsao, 1996). Moreover, the Los Angeles County data do not account for any treatment, whereas the treatment in the Project's PDFs should result in a reduction in hydrocarbon concentrations inclusive of PAHs. This makes it very unlikely that impacts will occur to the receiving water due to hydrocarbon loads or concentrations. On this basis, the effect of the Project on petroleum hydrocarbon levels in the receiving waters post-development is considered less than significant.

During the construction phase of the Project, hydrocarbons in site runoff could result from construction equipment/vehicle fueling or spills. Construction related impacts are addressed in Section 7.4 below. However, pursuant to the Construction General Permit, the Construction Stormwater Pollution Prevention Plan must include BMPs that address proper handling of petroleum products on the construction site, such as proper petroleum product storage and spill response practices, and those BMPs must effectively prevent the release of hydrocarbons to runoff per the Best Available Technology Economically Achievable and Best Conventional Pollutant Control Technology standards. PAH that are adsorbed to sediment during the construction phase would be effectively controlled via the erosion and sediment control BMPs. For these reasons, construction-related impacts related to hydrocarbons on water quality are considered less than significant.

7.2.5 Trash and Debris

Urban development tends to generate significant amounts of trash and debris. Trash refers to any human-derived materials including paper, plastics, metals, glass and cloth. Debris is defined as any organic material transported by stormwater, including leaves, twigs, and grass clippings (DLWC, 1996). Debris can be associated with the natural condition. Trash and debris is often characterized as material retained on a 5-mm mesh screen. It contributes to the degradation of receiving waters by imposing an oxygen demand, attracting pests, disturbing physical habitats, clogging storm drains and conveyance culverts and mobilizing nutrients, pathogens, metals, and other pollutants that may be attached to the surface. Sources of trash in developed areas can be both accidental and intentional. During wet weather events, gross debris deposited on paved surfaces can be transported to storm drains, where it can be eventually discharged to receiving waters. Trash and debris can also be mobilized by wind and transported directly into waterways. Trash and debris can impose an oxygen demand on the water body as organic matter decomposes.

Urbanization could significantly increase trash and debris loads if left unchecked. However, the Project PDFs, including source control and treatment BMPs, will minimize the adverse impacts of trash and debris. Source controls such as street sweeping, public education, fines for littering, and storm drain stenciling can be effective in reducing the amount of trash and debris that is available for mobilization during wet and dry weather events. Common area litter control will include a litter patrol, covered trash receptacles, emptying of trash receptacles in a timely fashion, and noting trash violations by tenants/homeowners or businesses and reporting the violations to the owner/HOA for investigation. Catch basin inserts will be provided for parking lots. The Project's PDFs will remove or prevent the release of floating materials, including solids, liquids, foam, or scum, from runoff discharges and will prevent impacts on dissolved oxygen in the receiving water due to decomposing debris. Based on these considerations, post-development trash and debris is not expected to significantly impact the receiving waters of the Project.

During the construction phase of the Project, there is potential for an increase trash and debris loads due to lack of proper contractor good housekeeping practices at the construction site. Per the Construction General Permit, the SWPPP for the site will include BMPs for trash control (catch basin inserts, good housekeeping practices, etc.). Compliance with the Permit Requirements and inclusion of these BMPs, meeting BAT/BCT, included in the SWPPP will mitigate impacts from trash and debris to a level less than significant. See Section 7.4 below for a full discussion of Construction Related Impacts.

7.2.6 Methylene Blue Activated Substances (MBAS)

MBAS, which is related to the presence of detergents in runoff, may be incidentally associated with urban development due to commercial and/or residential vehicle washing or other outdoor washing activities. Surfactants disturb the surface tension which affects insects and can affect gills in aquatic life.

The presence of soap in runoff from the Project will be controlled through the source control PDFs, including a public education program on residential and charity car washing, and the provision of a car wash pad connected to sanitary sewer in the multi-family residential areas. Other sources of MBAS, such as cross connections between sanitary and storm sewers, are unlikely given modern sanitary sewer installation methods and inspection and maintenance practices. Therefore, MBAS are not expected to significantly impact the receiving waters of the proposed Project.

7.2.7 Cyanide

The information on cyanide levels in urban stormwater is relatively sparse. The incidence of detection of cyanide in urban stormwater is relatively low, except in some special cases. In the Nationwide Urban Runoff Project (NURP), cyanide was detected in runoff from four cities out of a total of 15 cities that participated in the monitoring program (USEPA 1983). Overall, cyanide was detected in 23 percent of the urban runoff samples collected (16 out of a total of 71 samples), at concentrations ranging from 2 to 33 µg/L (Cole et al. 1984). Of the 71 samples, only 3 percent (i.e., 2) exceeded the freshwater acute guideline of 22 µg/L (USEPA 1983). The predominant sources of cyanides found in urban runoff samples were reported to be products of gasoline combustion and anti-caking ingredients in road salts (Cole et al. 1984).

A review of highway runoff (Colman 2001) suggested that deicing salts are the main source of cyanide in highway runoff. It has been estimated that approximately two million pounds of sodium ferrocyanide, which is used as an anticaking agent in road salts during the winter in the northeastern United States, are washed off from roads into streams and storm sewers (USEPA 1981; Gaffney et al. 1987). Information on the quality of snow packs and snow melt support the premise that deicing salts are the major source of cyanide in stormwater. For example, concentrations of cyanide in snow packs ranged up to 314 µg/L in Milwaukee and Syracuse (Novotny et al. 1999). An urban stream receiving snow melt in Milwaukee had an average cyanide concentration of 31 µg/L (<2 – 45 µg/L). Two urban streams in Syracuse had average cyanide concentrations of 8 µg/L (<2 – 27 µg/L) and 48 µg/L (<2 – 167 µg/L), respectively. Reconsidering the NURP findings, three of the four cities which detected cyanide are within the snowbelt, and may have used deicing salts containing anti-caking agents. One (Austin, Texas) presumably does not.

In contrast to these relatively high concentrations associated with deicing salts, runoff from cities which do not use deicing salts or from northern cities outside the snow season has lower concentrations of cyanides. The City of Fresno NURP study (Brown & Caldwell, 1984) found undetectable cyanide (< 10 µg/L) in 19 grab samples of stormwater runoff from four watersheds with different land uses. Highway runoff from three urban sites in Michigan had average cyanide concentrations ranging from 5.8 – 9.3 µg/L. Samples were collected from June through October, which was outside the season where deicing salts might be used. Traffic volumes were high and ranged from 40,000 to 120,000 vehicles per day.

It is highly probable that the reported concentrations which exceed the freshwater acute guideline in urban stormwater are associated with the use of deicing salts containing the de-caking agent ferrocyanide. In situations where deicing salts are not being used, and where vehicle exhaust may be the dominant source, concentrations are much less (e.g., typically < 10 µg/L), even with high traffic volumes. Anti-caking agents will not be a source of cyanide in urban stormwater in the NRSP subregion, and the forgoing discussion suggests that concentrations in stormwater runoff from the NRSP projects may reach concentrations of magnitude of approximately 10 µg/L, but are highly unlikely to exceed the acute CTR criteria of 22 µg/L.

The detectable concentrations observed in the Santa Clarita River at the mass emission station S29 (average of 10 µg/L) may be in part due to untreated urban stormwater runoff from the City of Santa Clarita. However, other sources are likely to be more significant. A potential source is cyanide from burnt catchments. For example, cyanide concentrations in run-off obtained from an area that had been burned in a wildfire that occurred in Tennessee and North Carolina averaged 49 µg/L (Barber et al. 2003). Higher cyanide concentrations were reported in run off from a wild fire that occurred in New Mexico, with an average value of 80 µg/L.

In addition to the expected relatively low level of cyanide in untreated stormwater, cyanide in runoff from the NRSP projects would be readily removed by biological uptake, degradation by microorganisms, and by volatilization in the treatment PDFs, especially the dry extended detention basins. Therefore cyanide is not expected to significantly impact the receiving waters of the NRSP projects.

7.3 MS4 Permit Requirements for New Development as Defined in the SUSMP

Project Design Features (PDFs) include site design, source control, and treatment control BMPs in compliance with the SUSMP requirements, as described in Section 5.1 and summarized in Table 5-1. Treatment control PDFs will treat runoff from the entire urban portion of the Project area. Sizing criteria contained in the MS4 Permit and the SUSMP requirements will be met for all treatment control BMPs.

In summary, the proposed site design, source control, and treatment control PDFs have been selected for the Project based on:

- effectiveness for addressing pollutants of concern in runoff from the Project, resulting in insignificant water quality impacts;
- sizing and outlet design consistent with the MS4 Permit and SUSMP requirements;
- additional design guidance consistent with the California BMP Handbook: New Development and Redevelopment, other literature, and best professional judgment;
- hydrologic and water quality modeling to verify performance;
- meeting mean annual percent capture criteria contained in the California BMP New Development Manual; and
- providing specific O&M requirements to inspect and maintain the facilities.

On this basis, the proposed PDFs meet the MS4 Permit requirements for new development.

7.4 Construction-Related Impacts

The potential impacts of construction activities, construction materials, and non-stormwater runoff on water quality during the construction phase focus primarily on sediment (TSS and turbidity) and certain non-sediment related pollutants. Construction-related activities that are primarily responsible for sediment releases are related to exposing soils to potential mobilization by rainfall/runoff and wind. Such activities include removal of vegetation from the site, grading of the site, and trenching for infrastructure improvements. Environmental factors that affect erosion include topographic, soil, and rainfall characteristics. Non sediment-related pollutants that are also of concern during construction relate to construction materials and non-stormwater flows and include construction materials (e.g., paint, stucco, etc); chemicals, liquid products, and petroleum products used in building construction or the maintenance of heavy equipment; and concrete-related pollutants.

Construction impacts due to Project development, including the borrow source activities and in-stream construction elements, will be minimized through compliance with the Construction General Permit. This permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP), which must include erosion and sediment control BMPs that will meet or exceed measures required by the Construction General Permit, as well as BMPs that control the other potential construction-related pollutants. Erosion control BMPs are designed to prevent erosion, whereas sediment controls are designed to trap sediment once it has been mobilized. A SWPPP will be developed as required by, and in compliance with, the Construction General Permit and the County of Los Angeles Standard Conditions. The General Permit requires the SWPPP to include a menu of BMPs to be selected and implemented based on the phase of construction and the weather conditions to effectively control erosion and sediment to the BAT/BCT. The following types of BMPs will be implemented during construction:

- Erosion Control (BMPs numbered EC-3 through EC-7 and WE-1 in the Stormwater Best Management Practice Handbook - Construction (CASQA 2003))
  - Physical stabilization through hydraulic mulch, soil binders, straw mulch, bonded fiber matrices, and erosion control blankets (i.e., rolled erosion control products).
  - Limiting the area and duration of exposure of disturbed soils.
  - Soil roughening of graded areas (through track walking, scarifying, sheepsfoot rolling, or imprinting) to slow runoff, enhance infiltration, and reduce erosion.
  - Vegetation stabilization through temporary seeding to establish interim vegetation.
  - Wind erosion (dust) control through the application of water or other dust palliatives as necessary to prevent and alleviate dust nuisance.

- Sediment Control
  - Perimeter protection to prevent discharges through silt fences, fiber rolls, gravel bag berms, sand bag barriers, and straw bale barriers (SE-1, 5, 6, 8 and 9).
  - Storm drain inlet protection (SE-10).
  - Resource (Environmentally Sensitive Area) protection through silt fences, fiber rolls, gravel bag berms, sand bag barriers, and straw bale barriers (SE-1, 5, 6, 8, and 9).
  - Sediment capture through sediment traps, storm drain inlet protection, and sediment basins (SE-3, 10, and 2).
  - Velocity reduction through check dams, sediment basins, and outlet protection/velocity dissipation devices (SE-2, 4, and 10).
  - Reduction in off-site sediment tracking through stabilized construction entrance/exit, construction road stabilization, and entrance /exit tire wash (TE-1, 2 and 3).
- Waste and Materials Management
  - Management of the following types of materials, products, and wastes: solid, sanitary, concrete, hazardous and equipment-related wastes (MW-1, 2, and 4 through 10 and NS-8 through 10).
  - Protection of soil stockpiles through covers, the application of water or soil binders, and perimeter control measures (MW-3).
- Non-stormwater Management
  - BMPs or good housekeeping practices to reduce or limit pollutants at their source before they are exposed to stormwater, including such measures as: water conservation practices, vehicle and equipment cleaning and fueling practices (NS-1 through 16).
- Training and Education
  - Training of individuals responsible for SWPPP preparation, implementation, and permit compliance, including contractors and subcontractors.
  - Signage (bilingual, if appropriate) to address SWPPP-related issues (such as site clean up policies, BMP protection, washout locations, etc).
- Maintenance, Monitoring and Inspections
  - Performing routine site inspections and inspections before, during (for storm events > 24 hours), and after storm events.
  - Implementing maintenance and repairs of BMPs as indicated by routine and storm-event inspections.
  - Preparation and implementation of a Sampling and Analysis Plan for non-visible pollutants.

These construction site management BMPs will be implemented for the Project during the dry season and wet season as follows:

Dry Season Construction Phase BMPs

a. Wind erosion BMPs (dust control).

b. Soil roughening of graded areas (track walking, scarifying, sheepsfoot rolling, or imprinting)

c. Sediment control BMPs at the down gradient site perimeter and all operational storm drain inlets internal to the planning area.

d. Off-site tracking BMPs.

e. Appropriate waste management and materials pollution BMPs.

f. Appropriate non-storm water BMPs to prevent or reduce the contamination of stormwater by construction activities and materials.

g. A "weather triggered" action plan to deploy standby erosion and sediment control BMPs to protect exposed portions of the site within 48 hours of a predicted storm event.

h. Sufficient standby BMP materials to implement the above action plan.

i. Deployment of post-construction erosion control BMPs as soon as practicable.

Wet Season Construction Phase BMPs

In addition to the dry season BMPs noted above:

a. Limiting the area and duration of exposure of disturbed soil areas. This may be accomplished by retention of natural vegetation in areas not scheduled for immediate grading, phasing the grading, and stabilizing disturbed areas quickly.

b. Implementation of an effective combination of erosion and sediment control measures on all disturbed areas.

c. Sufficient standby BMP materials to implement the above weather triggered action plan.

The Construction General Permit does not recognize a wet season by dates; therefore, the wet season requirements will be implemented year round if there is a storm event predicted.

The significance criteria for the project construction phase is implementation of BMPs consistent with Best Available Technology Economically Achievable and Best Conventional Pollutant Control Technology (BAT/BCT), as required by the Construction General Permit and the general waste discharge requirements in the Dewatering General Permit. The projects will reduce or prevent erosion and sediment transport and transport of other potential pollutants from the project site during the construction phase through implementation of BMPs meeting BAT/BCT in order to prevent or minimize environmental impacts and to ensure that discharges during the project construction phase will not cause or contribute to any exceedance of water quality standards in the receiving waters. These BMPs will assure effective control of not only sediment discharge, but also of pollutants associated with sediments, such as and not limited to nutrients, heavy metals, and certain pesticides, including legacy pesticides. In addition, compliance with BAT/BCT requires that BMPs used to control construction water quality are updated over time as new water quality control technologies are developed and become available for use. Therefore, compliance with the BAT/BCT performance standard ensures mitigation of construction water quality impacts over time.

Construction on the project sites may require dewatering and non-stormwater related discharges. For example, dewatering may be necessary for the construction of bridge abutments, bank stabilization, and outfall protection; if groundwater is encountered during grading; or to allow discharges associated with testing of water lines, sprinkler systems and other facilities.
In general, the Construction General Permit authorizes construction dewatering activities and other construction related non-stormwater discharges as long as they (a) comply with Section A.9 of the General Permit; (b) do not cause or contribute to violation of any water quality standards, (c) do not violate any other provisions of the General Permit, (d) do not require a non-stormwater permit as issued by some RWQCBs, and (e) are not prohibited by a Basin Plan provision. Full compliance with applicable local, state and federal water quality standards by the applicant would assure that potential impacts from dewatering discharges are not significant.

An additional Project Design Feature will be implemented to protect receiving waters from dewatering and construction related non-stormwater discharges. Such discharges will be implemented in compliance with the Los Angeles RWQCB’s General Waste Discharge Requirements (WDRs) under Order No. R4-2003-0111, NPDES No. CAG994004 governing construction-related dewatering discharges within the Project development areas. Typical BMPs for construction dewatering include infiltration of clean groundwater; on-site treatment using suitable treatment technologies; on-site or transport offsite for sanitary sewer discharge with local sewer district approval; or use of a sedimentation bag for small volumes of localized dewatering. Compliance with these WDRs constitutes a PDF, further assuring that the impacts of these discharges are not significant.

On this basis, the impact of Project construction-related runoff is considered less than significant.

7.5 <u>Pollutant Bioaccumulation</u>

Certain pollutants have the potential to accumulate in treatment BMP vegetation and soils, potentially increasing the risk of exposure to wildlife and the food chain. Factors that could affect the extent of potential bioaccumulation, include:

- The bioavailability of the pollutant
- Conditions in the soils (e.g., pH, acid-volatile sulfide concentration, organic content) that affect the form and bioavailability of the pollutant;
- The efficiency by which pollutants in the soils enter the plant community, the storage of these pollutants in plant tissues that are edible, and the utilization of the plants as a food source by animals;
- The type of habitats, organisms attracted to these habitats, and their feeding habits; and
- System design and maintenance

The potential for bioaccumulation impacts from the proposed bioretention and vegetated swale facilities will be minimal. Since the site is largely impervious, very little coarse solids and associated pollutants are expected to be generated. The vegetation in the facilities will trap sediments and pollutants in the soils, which contain bacteria that metabolize and transform trace metals, therefore reducing the potential for these pollutants to enter the food chain. The facilities do not provide open water areas and are not likely to attract waterfowl.

In the literature, the primary pollutants that are of concern with regard to bioaccumulation are mercury and selenium. However, selenium and mercury are not naturally present at levels of concern in this watershed and will not be introduced by the Project. Therefore, bioaccumulation of selenium and mercury is not expected.

Bioaccumulation of pollutants in the Santa Clara River is not of concern due to the low concentrations of pollutants, below the benchmark Basin Plan objectives and CTR criteria, predicted in the treated runoff. Also, sediments in the Santa Clara River are transported downstream in the wet season by storm flows, and therefore do not accumulate.

On this basis, the potential for bioaccumulation and adverse effects on waterfowl and other species is considered less than significant.

7.6 Dry Weather Runoff

While there are no specific requirements in the MS4 Permit and the SUSMP requirements to treat dry-weather discharges from the Project area, pollutants in dry weather flows could also be of concern because dry weather flow conditions occur throughout a large majority of the year, and because some of the TMDLs in downstream reaches of the Santa Clara River are applicable for dry weather conditions (e.g., nutrients and chloride).

Dry weather flows are typically low in sediment because the flows are relatively low and coarse suspended sediment tends to settle out or is filtered out by vegetation. As a consequence, pollutants that tend to be associated with suspended solids (e.g., phosphorous, some bacteria, some trace metals, and some pesticides) are typically found in very low concentrations in dry weather flows. The focus of the following discussion is therefore on constituents that tend to be dissolved, e.g., nitrate and trace metals, or constituents that are so small as to be effectively transported, e.g., pathogens and oil and grease.

In order to minimize the potential generation and transport of dissolved constituents, landscaping in public and common areas will utilize drought tolerant vegetation that requires little watering and chemical application. Landscape watering in common areas, commercial areas, multiple family residential areas, and in parks will use efficient irrigation technology utilizing evapotranspiration sensors to minimize excess watering.

In addition, educational programs and distribution of materials (source controls) will emphasize appropriate car washing locations (at commercial car washing facilities or the car wash pad in the multi-family residential areas) and techniques (minimizing usage of soap and water), encourage low impact landscaping and appropriate watering techniques, appropriate swimming pool dechlorination and discharge procedures, and discourage driveway and sidewalk washing. Illegal dumping will be discouraged by stenciling storm drain inlets and posting signs that illustrate the connection between the storm drain system and the receiving waters and natural systems downstream.

The bioretention areas, vegetated swales, and the extended detention basin will provide treatment for and infiltrate dry weather flows and small storm events. Water cleansing is a natural function of vegetation, offering a range of treatment mechanisms. Sedimentation of particulates is the major removal mechanism. However the performance is enhanced as plant materials allow pollutants to come in contact with vegetation and soils containing bacteria that metabolize and transform pollutants, especially nutrients and trace metals. Plants also take up nutrients in their root system. Some pathogens would be removed through ultraviolet light degradation. Any oil and grease will be effectively adsorbed by the vegetation and soil within the low flow wetland vegetation. Dry weather flows and small storm flows will infiltrate into the bottom of the basin after receiving treatment in the low flow wetland vegetation.

The treatment control PDFs will infiltrate or evapotranspire all expected dry weather runoff from the Project (see Section 7.9.2 below). It is expected that no dry weather discharge will occur to the Santa Clara River from the Project. Based on source control PDFs reducing the amount of dry weather runoff and treatment control PDFs capturing and treating the dry weather runoff that does occur, the impact from dry weather flows is considered less than significant.

7.7 Summary of Surface Water Quality Impacts

7.7.1 Direct Impacts

With the exception of runoff volume, total aluminum, and chloride loads, concentrations and loads of modeled constituents are predicted to decrease under proposed conditions when compared to existing conditions. The modeled concentrations in runoff from developed areas with PDFs are below all benchmark water quality objectives and criteria and TMDL waste load allocations for the Santa Clara River and are addressed by a comprehensive site design, source control, and treatment control strategy, and compliance with SUSMP, Construction General Permit, and General De-Watering Permit requirements.

Concentrations of hydrocarbons are expected to increase, while concentrations of pathogens, pesticides, and trash and debris may or may not increase under proposed conditions when compared to existing conditions, but none of the qualitatively assessed constituents are expected to significantly impact receiving waters due to the implementation of a comprehensive site design, source control, and treatment control strategy in compliance with the MS4 Permit requirements, Construction General Permit, and General De-Watering Permit requirements. Therefore potential impacts from the Project on receiving water quality are not expected to be significant.

7.7.2 Cumulative Impacts

This section defines the geographic area of potential impact for the cumulative impacts analysis, and evaluates impacts from probable future projects together with the incremental effects of the proposed Project to determine effects on water quality and hydromodification within this geographic area. The model results presented below are used in addition to consideration of the other projects reflected in adopted plans and projections for areas tributary to Santa Clara River Reach 5 to get a better overall assessment of cumulative water quality effects on the Santa Clara River.

The geographic area for evaluating cumulative impacts includes the unincorporated area of Los Angeles County west of I-5 to the Ventura County line, excluding the Six Flags Magic Mountain area (see Figure 1). This geographic area includes the Newhall Ranch Sub-region, the Entrada Sub-region, the Legacy Village Sub-region, and the Valencia Commerce Center.

The proposed Entrada Project site is located directly east of the NRSP area and west of the Santa Clara River (Figure 1). Entrada is bounded by the Santa Clara River to the east and north, the Mission Village Project within the NRSP to the west, and the Westridge Project to the south. The existing Six Flags Magic Mountain Theme Park is located adjacent to the NRSP and Entrada, but is not included in the project site. The Entrada Project proposes development of single and multi-family residential units, commercial/retail uses, and a hotel on 813 acres. The project also includes private recreational facilities and various trail and road improvements.

The proposed Legacy Village Project is located south of the NRSP area, bordering the Mission Village and Homestead Projects, and north of Stevenson Ranch. The 1,750 acre Legacy Project proposes construction of residential areas and commercial space. Over 1,000 acres of open space will be incorporated into the Legacy Village Project, including 50 acres of parks and trails.

The remaining unbuilt portions of the Valencia Commerce Center are located approximately one-half mile upstream of the confluence of Castaic Creek and the Santa Clara River. Approximately 4 million square feet of building floor area will be developed over the next five to ten years. Additionally, bank stabilization improvements to Castaic Creek and Hasley Creek would be constructed in conjunction with these remaining phases of the Commerce Center.

Urban runoff from the NRSP, Entrada, Legacy Village, and the Valencia Commerce Center project areas will discharge to the Santa Clara River after treatment. Each of the projects will utilize vegetated swales, bioretention areas, and/or dry extended detention basins, as well as a full suite of site design and source control BMPs, to address pollutants of concern in stormwater runoff and dry weather discharges from the proposed projects.

The combined effect on modeled pollutant loads and concentrations of the NRSP, Entrada, Legacy Village, and the Valencia Commerce Center proposed projects are summarized in Tables 7-17 and 7-18 below, respectively. As shown in Table 7-17, when considered cumulatively, runoff volumes and loads of TKN, metals, and chloride are predicted to increase from the NRSP, Entrada, Legacy Village, and TPM 26363 projects, while pollutant loads are expected to decrease for TSS, nitrate-N + nitrite-N, total nitrogen, and total phosphorous. Pollutant concentrations from the combined projects are predicted to decrease for all modeled parameters (Table 7-18). Increases in pollutant loadings are not anticipated to be significant based on the fact that predicted pollutant concentrations are well below benchmark water quality standards and TMDL wasteload allocations and are primarily within the range of observed concentrations in Santa Clara River Reach 5 (Table 7-19).

Table 7-17: Predicted Average Annual Combined Runoff Volume and Pollutant Loads for the NRSP, Legacy Village, Entrada, and Valencia Commerce Center TPM 26363 Projects

Modeled Parameter	Units	Development Condition		Change
		Existing	Developed w/ PDFs	
Volume	acre-ft	1,056	3,314	2,258
Total Suspended Solids	tons	781	219	-562
Nitrate-N + Nitrite-N	tons	10	2.8	-7.2
Total Kjeldahl Nitrogen	tons	5.9	7.4	1.5
Total Nitrogen	tons	16	10	-6
Total Phosphorous	tons	2.1	1.2	-0.9
Total Aluminum	lbs	2,072	5,691	3,619

Modeled Parameter	Units	Development Condition		Change
		Existing	Developed w/ PDFs	
Dissolved Aluminum	lbs	467	1,262	795
Dissolved Copper	lbs	35	73	38
Total Lead	lbs	42	60	18
Dissolved Zinc	lbs	164	494	330
Chloride	tons	39	80	41

7-18: Predicted Average Annual Combined Pollutant Concentrations for the NRSP, Legacy Village, Entrada, and Valencia Commerce Center 26363 Projects

Modeled Parameter	Units	Development Condition		Change
		Existing	Developed w/ PDFs	
Total Suspended Solids	mg/L	544	49	-495
Nitrate-N + Nitrite-N	mg/L	7	0.6	-6.4
Total Kjeldahl Nitrogen	mg/L	4.1	1.6	-2.5
Total Nitrogen	mg/L	11.1	2.3	-8.8
Total Phosphorous	mg/L	1.5	0.3	-1.2
Total Aluminum	ug/L	722	632	-90
Dissolved Aluminum	ug/L	163	140	-23
Dissolved Copper	ug/L	12	8	-4
Total Lead	ug/L	15	7	-8
Dissolved Zinc	ug/L	57	55	-2
Chloride	mg/L	27	18	-9

Table 7-19: Comparison of Predicted Pollutant Concentrations for the NRSP, Entrada, Legacy Village, and Commerce Center 26363 Projects with Water Quality Criteria and Observed Concentrations in Santa Clara River Reach 5

Modeled Parameter	Units	Predicted Average Annual Concentration	TMDL/ LA Basin Plan Water Quality Objectives	California Toxics Rule Criteria[1]	Wasteload Allocations for MS4 Discharges into the Santa Clara River Reach 5	Range of Observed[2] Concentrations in Santa Clara River Reach 5
Total Suspended Solids	mg/L	49	Water shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses	NA	NA	32 – 51,200
Nitrate-N + Nitrite-N	mg/L	0.6	5	NA	6.8[3]	0.2 – 4.0

Modeled Parameter	Units	Predicted Average Annual Concentration	TMDL/ LA Basin Plan Water Quality Objectives	California Toxics Rule Criteria[1]	Wasteload Allocations for MS4 Discharges into the Santa Clara River Reach 5	Range of Observed[2] Concentrations in Santa Clara River Reach 5
Total Ammonia	mg/L	0.4	2.0[4]	NA	1.75[4]	0.02 – 1.1
Total Nitrogen	mg/L	2.3	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses	NA	NA	0.6 – 10.4
Total Phosphorous	mg/L	0.3		NA	NA	0.18 – 1.8
Dissolved Copper	µg/L	8	NA	32	NA	3.6 – 22.6
Total Lead	µg/L	7	NA	260	NA	1.1 – 40
Dissolved Zinc	µg/L	53	NA	250	NA	8.7 – 37
Total Aluminum	µg/L	588	NA	750	NA	131 – 19,650
Chloride	mg/L	16	100	NA	100	2.6 - 290[5]

[1] Hardness = 250 mg/L, based on minimum observed value at USGS Station 11108500. Lead criteria is for total recoverable lead. NAWQC aluminum criteria for pH 6.5 – 9.0.
[2] Range of concentrations observed in the Santa Clara River during wet weather (see Section 2.3.1).
[3] 30-day average.
[4] 30-day average in Reach 5 below Valencia.
[5] This value was observed in 1965.
NA – not applicable

As discussed above, the anticipated quality of effluent expected from the Landmark Village Projects' PDFs will not contribute concentrations of pollutants of concern that would be expected to cause or contribute to a violation of the water quality standards in the Project's receiving waters. Therefore, the Project's incremental effects on surface water quality are not expected to be significant.

The Landmark Village Project's surface runoff water quality, after PDFs, both during construction and post-development, is predicted to comply with adopted regulatory requirements that are designed by the LARWQCB to assure that regional development does not adversely affect water quality, including MS4 Permit and SUSMP requirements; Construction General Permit requirements; General Dewatering Permit requirements; and benchmark Basin Plan water quality objectives, CTR criteria, and TMDLs. Any future urban development occurring in the Santa Clara River watershed must also comply with these requirements. By extrapolating the results of the direct and cumulative impact analysis modeling done for this Water Quality Technical Report, it can be predicted that analysis of other proposed development combined with existing conditions would have similar water quality results. Therefore, cumulative impacts on surface water quality of receiving waters from the Project and future urban development in the Santa Clara Watershed are addressed through compliance with the MS4 Permit and SUSMP requirements; Construction General Permit requirements; General Dewatering Permit requirements; and benchmark Basin Plan water quality objectives, CTR criteria, and TMDLs, which are intended to be protective of beneficial uses of the receiving waters. Based on compliance with these requirements designed to protect beneficial uses, cumulative water quality impacts are mitigated to a level that is less than significant.

7.8 Groundwater Impacts

7.8.1 Direct Groundwater Quality Impacts

Discharge from the Project's developed areas to groundwater will occur in three ways: (1) through general infiltration of irrigation water, (2) through incidental infiltration of urban runoff in the proposed treatment control PDFs after treatment, and (3) infiltration of urban runoff, after treatment in the Project PDFs, in the Santa Clara River, which is the primary recharge zone for groundwater in the Santa Clara Valley. Groundwater quality will be fully protected through implement of the Project's site design, source control, and treatment control PDFs prior to discharge of Project runoff to groundwater.

The pollutant of concern with respect to groundwater is nitrate-N plus nitrite-N. The Basin Plan groundwater quality objective for nitrate-nitrogen plus nitrite-nitrogen is 10 mg/L (which is more stringent than the objective for nitrate-nitrogen alone (10 mg/L) and for nitrite-nitrogen alone (1 mg/L)). The predicted nitrate-nitrogen plus nitrite-nitrogen concentration in runoff after treatment in the Project PDFs is 0.5 mg/L, which is well below the groundwater quality objective.

As required by the CWA, the NRSP WRP discharge permit will include effluent limitations that will be protective of receiving water quality and designated beneficial uses. Effluent limits in the WDR will be developed based on the most stringent of applicable technology-based and water quality-based standards, including Basin Plan objectives, CTR criteria, and applicable TMDL waste load allocations. As the surface water quality objective for nitrate-nitrogen plus nitrite-nitrogen is 5 mg/L and the WRP discharge permit will be conditioned to meet this criteria, the NRSP WRP irrigation water supply will be well below the groundwater quality objective of 10 mg/L.

On this basis, the potential for adversely affecting groundwater quality is considered less than significant.

7.8.2 Cumulative Groundwater Quality Impacts

As discussed above, the anticipated quality of stormwater runoff discharges from the Project's developed areas and irrigation to groundwater will not contribute loads or concentrations of pollutants of concern that would be expected to cause or contribute to a violation of the groundwater quality standards. By extrapolating these results to existing and proposed development throughout the watershed and based on a review of adapted plans and projections, it is concluded that no adverse cumulative effects would occur to groundwaters. Therefore, the Project's incremental effects on groundwater quality are not expected to be significant.

The Project's discharges to groundwater, after PDFs, both during construction and post-development, is predicted to comply with adopted regulatory requirements that are designed by the LARWQCB to assure that regional development does not adversely affect water quality, including MS4 Permit and SUSMP requirements; Construction General Permit requirements; General Dewatering Permit requirements; and benchmark Basin Plan groundwater quality objectives. Any future urban development occurring in the Santa Clara River watershed must also comply with these requirements. Therefore, cumulative impacts on groundwater quality from the proposed Project and future urban development in the Santa Clara Watershed are addressed through compliance with the MS4 Permit and SUSMP requirements, Construction General Permit requirements, General Dewatering Permit requirements, and benchmark Basin Plan groundwater quality objectives, which are intended to be protective of beneficial uses of the groundwater. Based on compliance with these requirements designed to protect beneficial uses, cumulative groundwater quality impacts are mitigated to a level that is less than significant.

7.8.3 Groundwater Recharge Impacts

Direct Project Impacts

In a groundwater basin, the effect of urbanization on recharge to underlying groundwater is dependent on land uses, water uses, vegetative cover, and geologic conditions. Groundwater recharge from undeveloped lands occurs from precipitation alone, whereas areas that are developed for agricultural or urban land uses receive both precipitation and irrigation of vegetative cover. In an urban area, groundwater recharge occurs directly beneath irrigated lands and in drainages whose bottoms are not paved or cemented. A memorandum prepared by CH2M Hill entitled "Effect of Urbanization on Aquifer Recharge in the Santa Clarita Valley" (Appendix E) discusses the general effects of urbanization on groundwater recharge and the specific effects in the Santa Clarita Valley.

Currently the site is irrigated agricultural land. As a result, in the existing condition recharge occurs within the Project site from irrigation and precipitation. On one hand, development of the site will introduce impervious surface over approximately 70 percent of the Project site, which will tend to reduce recharge. In addition, development of agricultural lands will eliminate irrigation as a source of recharge. On the other hand, development of the site will increase runoff volume discharged after treatment to the Santa Clara River, whose channel is predominantly natural and consists of vegetation and coarse-grained sediments (rather than concrete). The porous nature of the sands and gravels forming the streambed will allow for significant infiltration to occur to the underlying groundwater. Also, the Project will introduce landscaping, irrigation, and PDFs designed to infiltrate runoff. These project effects will increase groundwater recharge from the Project. On balance, it is unlikely that the Project will result in a significant change in groundwater recharge in the project vicinity. Based on the above discussion, the Project's impact on groundwater recharge is considered less than significant.

Cumulative Impacts

Increased urbanization in the Valley has resulted in the irrigation of previously undeveloped lands. The effect of irrigation is to maintain higher soil moisture levels during the summer than would exist if no irrigation were occurring. Consequently, a greater percentage of the fall/winter precipitation recharges groundwater beneath irrigated land parcels than beneath undeveloped land parcels. In addition, urbanization in the Santa Clarita Valley has occurred in part because of the importation of State Water Project (SWP) water, which began in 1980. SWP water use has increased steadily, reaching nearly 44,500 acre-feet (AF) in 2003. Two-thirds of this water is used outdoors, and a portion of this water eventually infiltrates to groundwater. The other one-third is used indoors and is subsequently routed to local water reclamation plants (WRPs) and then to the Santa Clara River (after treatment). A portion of this water flows downstream out of the basin, and a portion infiltrates to groundwater.

Records show that groundwater levels and the amount of groundwater in storage were similar in both the late 1990s and the early 1980s, despite a significant increase in the urbanized area during these two decades. This long-term stability of groundwater levels is attributed in part to the significant volume of natural recharge that occurs in the streambeds, which do not contain paved, urban land areas. On a long term historical basis, groundwater pumping volumes have not increased due to urbanization, compared with pumping volumes during the 1950s and 1960s when water was used primarily for agriculture. Also, the importation of SWP water is another process that contributes to recharge in the Valley. In summary, urbanization has been accompanied by long-term stability in pumping and groundwater levels, plus the addition of imported SWP water to the Valley, which together have not reduced recharge to groundwater, nor depleted the amount of groundwater that is in storage within the Valley.

Based on the above discussion, the cumulative impact on groundwater recharge is considered less than significant.

7.9 Hydromodification Impacts

Development typically increases impervious surfaces on formerly undeveloped (or less developed) landscapes, reducing the capture and infiltration of rainfall. The result is that, as a watershed develops, a larger percentage of rainfall becomes runoff during any given storm. In addition, runoff reaches the stream channel more efficiently due to the development of storm drain systems, so that the peak discharge rates for rainfall events and floods are higher for an equivalent event than they were prior to development. Further, the introduction of irrigation and other dry weather flows can change the seasonality of runoff reaching natural receiving waters. These changes, in turn, affect the stability and habitat of natural drainages, including the physical and biological character of these drainages. This process, termed “hydromodification” (SCCWRP, 2005a) is addressed in this section.

Significant adverse hydromodification impacts are presumed to occur if the proposed Project would:

- Substantially alter the existing drainage pattern of a natural drainage, stream, or river causing substantial erosion, siltation, or channel instability; or
- Substantially increase the rates, velocities, frequencies, duration and/or seasonality of flows causing channel instability and harming sensitive habitats or species in natural drainages in a manner that substantially adversely affects beneficial uses.

All flows from those areas of the Project that will be developed with impervious surface with potential for altering drainage patterns will be discharged directly to the Santa Clara River. Therefore, this analysis addresses the potential for hydromodification impacts to the Santa Clara River as a result of the proposed Project. The impervious surfaces associated with the proposed water tanks are very minor and will not alter drainage patterns, and therefore no potential for hydromodification impacts exists from these areas of the Project.

The physical alteration of natural drainages, such as bank protection, energy dissipaters, and bridge abutments, are not impacts created by changes in runoff volume, duration, or flow associated with development. Instead, these types of alterations are physical alterations to the stream bed and bank, with associated effects on stream habitat and species. These types of effects are analyzed in the Landmark Village Draft EIR and more specifically the biological chapter of the EIR for this Project.

7.9.1 Wet Weather Flows

Direct Impacts to the Santa Clara River

The Project proposes development that would create impervious surface over approximately 19 percent or 189 acres of the 972 acre total project area. The size of the Project in comparison to both the 1,618 square mile total watershed area and the expected total impervious area in the watershed in the existing conditions and at build-out is small. It is estimated, based on the land use data provided by LACDPW, that the proposed Project will comprise 0.5 percent of the total impervious area in the watershed encompassing the Project location at ultimate planned build-out for the watershed. See Section 4.4.3 above for information regarding adopted plans and projection used to derive build-out assumptions for the watershed.

A series of progressive hydromodification control measures will be used in the Project to prevent and control hydromodification impacts to the Santa Clara River:

- Avoid, to the extent possible, the need to mitigate for hydromodification impacts by preserving natural hydrologic conditions and protecting sensitive hydrologic features, sediment sources, and sensitive habitats.

- Minimize the effects of development through site design practices (e.g., reducing connected impervious surfaces), implementation of stormwater volume-reducing BMPs (project-based hydrologic source control), and incorporation of flow duration control into water quality treatment basins, as needed.

- Mitigate hydromodification impacts in-stream using geomorphically-based channel design.

Project-based Hydrologic Source Control

Disconnecting impervious areas from the drainage network and adjacent impervious areas is a key approach to protecting channel stability. Several hydrologic source controls will be included in the Project that will limit impervious area and disconnect imperviousness:

Site Design. Site design PDFs will help to reduce the increase in runoff volume, including the clustering of development into village areas, including the Landmark Village, the preservation of 70 percent of the NRSP area in open space, and 55 acres (19 percent) of the Project in open space; use of native and drought tolerate plants in landscaped areas; and the use of efficient irrigation systems in common area landscaped areas. The reduction in runoff volume attributable to the site design BMPs were not quantified in the runoff modeling, so these BMPs will reduce the predicted increase in runoff volumes discussed below. These measures will help to protect the stability of the Santa Clara River and to avoid and minimize direct impacts to those drainages.

Treatment Controls. The Project's treatment control BMPs will also serve as hydromodification source control BMPs. Vegetated swales, bioretention areas, and extended detention basins can provide volume reduction on the order of 20 to 30 percent through infiltration and evaporation. Collectively these vegetated treatment facilities are expected to provide significant reduction in wet weather runoff. In addition these facilities will also receive and eliminate dry weather flows.

The increase in impervious surface within the project area is predicted to increase the average annual stormwater runoff volume from the project area by approximately 148 acre-feet per year, after accounting for the estimated volume reductions in the proposed treatment control PDFs (see Section 7.1 above). Using conservative values for volume reduction, the treatment control PDFs are estimated to reduce the increase in average annual stormwater runoff volume by approximately 57 acre-feet per year, which is a 19 percent reduction of the predicted average post-development stormwater runoff volume without the treatment control PDFs. In addition, these facilities will also receive and eliminate dry weather flows.

Geomorphically-Referenced Channel Design

The hydromodification management approach for the Santa Clara River will incorporate "geomorphically-referenced " channel design as described in SCCWRP Technical Report 450 (SCCWRP, 2005a). The goal of this approach is to preserve the appearance of the natural stream channel function to the maximum extent practicable while limiting instability in stream channel morphology. The Project's development footprint will allow for the greatest freedom possible for "natural stream channel" activity. This includes establishing buffer zones and maintaining setbacks to allow for channel movement and adjustment to changes in energy associated with runoff. The engineered structural elements that will be implemented where needed for the Santa Clara River include energy dissipation and bank stabilization.

Energy Dissipation. Energy dissipation at storm drain outfalls provides erosion protection in areas where discharges have the potential to cause localized stream erosion. Erosion protection will be provided at all storm drain outlets to the Santa Clara River.

Bank Stabilization. The Project will include buried soil cement along the Santa Clara River and Castaic Creek adjacent to and downstream of the Project site. In total, approximately 18,600 LF of bank would be provided with buried soil cement protection. This would include approximately 11,000 feet fronting the tract map site and approximately 6,400 LF on the south bank downstream (west) of the Long Canyon Road Bridge. The alignment was selected so that bank protection along the river would generally be excavated from non-jurisdictional upland areas adjacent to the river. Installing bank protection in non-jurisdictional areas reduces and/or avoids impacts to the river and has the potential to create new riverbed areas, allows for channel movement and adjustment to changes in energy associated with runoff, and increases riparian habitat.

Additional buried bank stabilization would be constructed as part of the approved Newhall Ranch Water Reclamation Plant (WRP) and between the Old Road and the Santa Clara River (protecting the utility corridor). The bank protection between the Old Road and the Santa Clara River was approved as part of the Santa Clara River Natural River Management Plan (NRMP).

Approximately 6,600 LF of Turf Reinforcement Mat (TRM) or similar bank stability protection would be provide along the southern edge of the utility corridor downstream or west of the tract map site. TRMs are designed to reinforce vegetation at the root and stem allowing vegetation to be used as erosion control in areas where flow conditions exceed the ability of natural vegetation to remain rooted. This includes applications with high slopes or stream banks where grouted rip-rap and concrete channels are aesthetically undesirable.

In summary, although Project runoff volumes, flow rates, and durations will increase, potential impacts of hydromodification (i.e., the potential to cause erosion, siltation, or channel instability) will be minimized by the Project PDFs. The Project's site design and treatment controls PDFs will minimize increases in runoff volume from the development area, the preferred method for controlling hydromodification impacts from new development (SCCWRP, 2005a).

Potential instream impacts of increased volumes, rates, and flow durations will be managed and mitigated with energy dissipaters at the discharge points to the Santa Clara River and the River banks will be protected with vegetated buried bank stabilization in non-jurisdictional upland areas adjacent to the river. This type of biostabilization technique is the preferred approach for bank stabilization (SCCWRP, 2005a).

For these reasons, the hydromodification impacts of the Project with PDFs on the Santa Clara River are considered less than significant.

Cumulative Impacts

As identified in the MS4 Permit, the increased volume, increased velocity, and discharge duration of stormwater runoff from the cumulative existing and future developed areas in watersheds of natural drainages, including the Santa Clara River, has the potential to accelerate downstream erosion and impair stream habitat. Given the size of the watershed, the contribution of the NRSP projects to cumulative hydromodification impacts to the Santa Clara River is difficult to assess quantitatively. Therefore, a qualitative assessment that references total predicted development per adopted General Plans and projections for the Santa Clara River watershed is provided below.

Effect of Watershed Impervious Area

The limited hydromodification impact research to date has focused on empirical evidence of channel failures in relationship to directly connected impervious area (DCIA) or total impervious area. However, more recent research has established the importance of size of watershed, channel slope and materials, and climatic and precipitation patterns (SCCWRP 2005a, Balance Hydrologics 2005 (provided in Appendix F)). Impervious area that drains directly to a storm drain system and then to the receiving water is considered "directly connected," whereas impervious area that drains through vegetation or to infiltration facilities is considered "disconnected."

Booth et al. (1997) reported finding a correlation between loss of channel stability and increases in DCIA. In Washington State, streams were found to display the onset of degradation when the DCIA increases to ten percent or more, and a lower imperviousness of five percent was found to cause significant degradation in sensitive watersheds (Booth 1997). The Center for Watershed Protection (Schuler and Holland, 2000) described the impacts of urbanization on stream channels and established thresholds based on total imperviousness within the tributary drainage area. It states “a threshold for urban stream stability exists at about 10 percent imperviousness.” It further states that a “sharp threshold in habitat quality exists at approximately 10 percent to 15 percent imperviousness.” These studies, however, addressed changes in a very different climatic region than Southern California.

GeoSyntec’s work in the San Francisco Bay area’s Santa Clara Valley (GeoSyntec 2004) also evaluated the relationship between imperviousness and stream channel degradation in an area that had predominately directly connected impervious areas. GeoSyntec found similar results to those published by Booth and Schuler, where channel erosion was observed at approximately six to nine percent imperviousness for two separate watershed systems. More recent studies conducted by GeoSyntec in this same watershed area showed that levels as low as two to three percent total imperviousness could lead to stream channel degradation, depending on channel characteristics. This region also has different climatic characteristics than Southern California.

Although physical degradation of stream channels in semi-arid climates of California may be detectable when watershed imperviousness is between three and five percent, not all streams will respond in the same manner (SCCWRP, 2005b). Management strategies need to account for differences in stream type, stage of channel adjustment, current and expected amount of basin imperviousness, and existing or planned hydromodification control strategies.

The absolute measure of watershed imperviousness that could cause stream instability in the Santa Clara River depends on many factors, including watershed area, land cover, and soil type; development impervious area and connectedness; longitudinal slope of the river; channel geometry; and local boundary materials, such as bed and bank material properties and vegetation characteristics. Based on land use data provided by the County of Los Angeles (see Section 4.4.3 above), the estimated cumulative level of percent impervious area at build-out in the Santa Clara River watershed upstream from the NRSP area is nine percent.

Effect of Catchment Drainage Area

The Southern California Coastal Water Research Project (SCCWRP) found signs of hydromodification impacts in Southern California streams when watershed percent imperviousness was around two to three percent for streams with a catchment drainage area of less than five square miles (mi^2) (SCCWRP, 2005a). Recognizing that their findings were based on the type and size of catchments that were measured, the researchers in the SCCWRP study attempted to develop a framework by which their results could be extended to other stream types. They developed a classification system based on watershed characteristics, stream channel characteristics (including level of vegetative development), and stream channel resistance, and suggested these features could be important in selecting management strategies and approaches to control hydromodification impacts. The Level 1 classification is based on watershed characteristics that include the size, shape, and topography of the watershed.

The catchment drainage area (CDA) is stated to be the most obvious differentiator among watersheds, as this is likely to have the greatest effect on runoff. The SCCWRP study focused on small watersheds (< 5 mi^2), whereas the CDA of the Santa Clara River at the Los Angeles County line, near the western edge of the NRSP area, is about 625 mi^2. Based on the differences in CDA, the SCCWRP findings with respect to CDA would not be applicable to the Santa Clara River. Information in the SCCWRP report, based in part on the work of Zielinski (2002), suggests that smaller watersheds are more responsive and sensitive to changes in land use, whereas larger watersheds (> 30 mi^2) were said to be less responsive to land use changes. GeoSyntec's work in the San Francisco Bay area found significant hydromodification impacts on streams of watersheds that were 40 mi^2 in size; however, this is still substantially smaller than the Santa Clara River watershed at the Los Angeles County line. Given the large CDA for the Santa Clara River, the river is likely less responsive to potential hydromodification effects, but channel morphology must still be examined to determine the level and potential significance of Santa Clara River response.

Application to the Santa Clara River

Balance Hydrologics assessed the potential effects of the planned cumulative urbanization within the Santa Clara River upstream of the County line (the upper watershed) on channel morphology by examining historical changes in the Santa Clara River channel pattern in response to different types of major disturbance using historical rainfall and other relevant records and aerial channel photography (Balance Hydrologics, 2005 (provided in Appendix F)). The findings of this analysis are summarized below.

The Santa Clara River is a dynamic, episodic system. Understanding the magnitude of geomorphic change over the course of recent history in response to natural and human disturbances in the watershed is a key factor in assessing the potential response to future urbanization within the watershed.

For example, the report examines the construction of Castaic Dam in the 1974 (affecting approximately 30 percent of the Santa Clara River watershed above Castaic Creek), which cut off a significant supply of sediment to the Santa Clara River. This change, however, does not appear to have had an effect on the channel dimensions of the Santa Clara River mainstem. The width of the active corridor as well as the general form of the channel are generally consistent before and after construction of the dam. It appears that the Santa Clara River had enough buffering capacity to absorb this change. The report finds that the depletion of sediment supply to the mainstem, which would typically be expected to cause erosive effects, did not, in fact, result in those effects, perhaps because reductions in sediment were offset by additional available sediment stored in the basin in the upper watershed as a result of movement along the San Gabriel fault.

Similarly, the report examines the amount of vegetation within the Santa Clara River corridor, which appears to have generally increased since the 1960s, likely due to the increase in available summer flows due to the Valencia and Saugus Water Reclamation Plants' discharges. However, this vegetation does not seem to provide enough erosion resistance to maintain a "stable" channel capable of withstanding regular 're-sets', large events that completely alter the form of the Santa Clara River channel which occur at intervals averaging about a decade, or much less than the expected lifetime of the riparian woodlands which do get established. Despite heavy vegetation on the channel banks near the NRSP area and in areas of ground-water upwelling, the stream still responds to large events by a general widening and/or shift of the active channel within the River corridor.

After studying the response of the river to several different anthropogenic and natural disturbances, the report concludes that the Santa Clara River, as with many streams in semi-arid southern California, is highly episodic. Concepts of "normal" or "average" sediment-supply and flow conditions have limited value in this "flashy" environment, where episodic storm and wildfire events have enormous influence on sediment and storm flow conditions. In these streams, a large portion of the sediment movement events can occur in a matter of hours or days. Other perturbations which can potentially affect channel geometry appear to have transitory or minor manifestations. For example, effects on the channel width of 1980s levee construction is barely discernible by the first few years of the 21st century, probably mostly due to morphologic compensation associated with the storm events in the mid- to late-1990s. As a result, channel morphology, stability, and character of the Santa Clara River is almost entirely determined by the "reset" events that occur within the watershed.

Fluvial Study

Additional study of the Santa Clara River has been performed by Pacific Advanced Civil Engineering, Inc., who prepared a comprehensive fluvial analysis for Santa Clara River through the NRSP area (PACE, 2006) for LACDPW. A river fluvial analysis is the study of the river bed and bank sediment movement over time and as a result of flow in the river and changes in the tributary watershed.

The fluvial analysis had three distinct components:

1. Analysis of long term trends of river bed and bank sediment build-up (aggregation) or removal (degradation) was performed. More than 80 years of available historic topographic mapping of the river indicated no real trend of aggredation or degradation in the study reach.

2. General (capital storm event) aggredation/degradation calculations were performed to determine the expected fluvial response of the river to the LACDPW design storm event (>140,000 cfs). US Army Corps of Engineers computer modeling software (SAM) was

used to evaluate existing and proposed project conditions. Only minor variations in the fluvial response were shown in the modeling.

3. Local aggredation/degradation resulting from river curvature, bridges, river bed material, and various other components were considered and estimates of aggredation and degradation were calculated.

To complete the fluvial analysis, long term, general, and local aggredation/degradation components were added together to obtain the total aggredation/degradation for each river section within the study reach.

One of the purposes for the fluvial analysis, which has been approved by LACDPW, was to provide a level of understanding of the Santa Clara River Newhall Ranch reach fluvial mechanics related to existing conditions and proposed NRSP development conditions to identify any potential project impacts. The fluvial analysis showed very little change in the pre- and post-development conditions and therefore concluded that there is no potential adverse impact to the fluvial mechanics of the river.

Conclusion

As discussed above, the Project will include a number of hydrologic source control PDFs that will substantially lessen any potential contribution to cumulative hydromodification impacts to the Santa Clara River. In addition, it is presumed that all future development within the watershed will implement hydromodification controls to meet flow criteria that will be adopted by the LACDPW under Part 4, § D.1 of the MS4 Permit. These measures are designed to mitigate and prevent direct and cumulative hydromodification impacts.

Within the Santa Clara River watershed, major perturbations (urbanization, dam construction, levee construction, decadal changes in climate, and increases in woody vegetation) do not appear to have had a significant impact on the geomorphic expression of the Santa Clara River. Large “re-set” events (those which are typically not as affected by increases in impervious area) have episodically completely altered the form of the Santa Clara River channel. These events, occurring on average once every ten years, are a dominant force in defining channel characteristics. The geomorphic dominance of “re-set” events determines the geomorphic character of the Santa Clara River and the Santa Clara River’s response to anthropogenic perturbations, including hydromodification impacts associated with development, is expected to be minimal in light of the “reset” driven nature of the Santa Clara River channel. Due to these episodic “re-sets,” “unraveling” of the Santa Clara River mainstem due to hydromodification associated with cumulative urban development within the watershed, as is seen in many smaller southern California watersheds, is not expected to occur. The “re-set” events appear to adequately buffer changes that may occur in short-term sediment transport.

Based upon the above discussion, that the Project includes hydromodification controls as Project Design Features, that future development projects within the watershed will control flow in compliance with the regional program, and that large-scale changes naturally occur in the Santa Clara River in response to major episodic events, the Project's contribution to cumulative hydromodification impacts to the Santa Clara River will be less than significant and consistent with the requirements of the MS4 permit.

7.9.2 Dry Weather Runoff

Direct Impacts

In order to quantitatively address dry weather impacts, a dry weather water balance was performed. The quantity of dry weather flows from urban sources is variable and not easily quantified. Information available from the Irvine Ranch Water District suggests an average dry weather flow from urban areas of 2.9×10^{-4} cfs per urbanized acre (IRWD, 2003). Dry weather flow estimates in Santa Monica, used to design a dry weather flow recycling facility, indicate a range of dry weather flows between 8.3×10^{-5} to 1.8×10^{-4} cfs per urbanized acre (Antich et al., 2003). For purposes of conservatively estimating the impacts of dry weather flows, a dry weather discharge of 3.0×10^{-4} cfs per urbanized acre was used in this report. Table 7-20 presents a monthly dry weather flow balance for the proposed Project. Swales were assumed to infiltrate at 0.1 in/hr, bioretention areas were assumed to infiltrate at 0.2 in/hr, and water quality basins were assumed to infiltrate at 0.05 in/hr. Evapotranspiration rates were conservatively assumed to be 60% of reference rates from CIMIS Zone 14, in which the Project is located. It was assumed that open space in the Project area would result in no dry weather runoff discharged to the Santa Clara River.

It is predicted that all dry weather flows will be infiltrated or removed by evapotranspiration in the treatment control PDFs, which also provide hydrologic source control. As a result, no appreciable change in seasonality of flows is anticipated to result from development.

Based on comprehensive site planning, source control, and treatment control strategy and the above water balance analysis, the potential for dry weather flows to result in hydromodification or associated habitat or water quality impacts is considered less than significant.

Table 7-20: Predicted Dry Weather Water Balance

Month	Dry Weather Flow (af)[1]	ETo (af)[2]	Infiltration (af)[3]	Outflow (af)
January	5.89	0.80	5.09	0.00
February	5.32	1.16	4.16	0.00
March	5.89	1.92	3.97	0.00
April	5.70	2.64	3.06	0.00
May	5.89	3.53	2.36	0.00
June	5.70	4.04	1.66	0.00
July	5.89	4.49	1.40	0.00
August	5.89	4.01	1.88	0.00

Month	Dry Weather Flow (af)[1]	ETo (af)[2]	Infiltration (af)[3]	Outflow (af)
September	5.70	2.95	2.75	0.00
October	5.89	2.09	3.80	0.00
November	5.70	1.09	4.61	0.00
December	5.89	0.80	5.09	0.00

[1] Based on dry weather flow of 0.0003 cfs/acre from a range of researched values.
[2] 60% of Reference ETo from CIMIS Zone 14.
[3] Equal to dry weather runoff up to maximum of .2 in/hr for bioretention, .1 in/hr for swales and .05 in/hr for water quality basins.

8 CONCLUSIONS

This section summarizes the potential effects, if any, of the proposed Landmark Village Project on water quality and hydromodification in Santa Clara River Reach 5.

8.1 Water Quality Impacts

The following are the conclusions regarding the significance of impacts for the pollutants of concern under wet and dry weather conditions:

- ***Sediments*****:** MS4 Permit, Construction General Permit, Dewatering General Permit, and SUSMP-compliant BMPs will be incorporated into the Project to address sediment in both the construction phase and post-development. Mean total suspended solids concentration and load are predicted to be less in the post-development condition than in the existing conditions. Turbidity in stormwater runoff will be controlled through implementation of a Construction SWPPP and will be permanently reduced through the stabilization of erodible soils with development. On this basis, the impact of the Project on sediments is considered less than significant.
- ***Nutrients (Phosphorous and Nitrogen (Nitrate+Nitrite-N and Ammonia-N))***: MS4 Permit, Construction General Permit, Dewatering General Permit, and SUSMP-compliant BMPs will be incorporated into the Project to address nutrients in both the construction phase and post-development. Nitrate-nitrogen plus nitrite-nitrogen concentrations and loads are predicted to decrease in the post-developed condition. Total phosphorous concentration is predicted to decrease in post-development conditions and to be below the minimum observed value in the Santa Clara River. Nitrate-N plus nitrite-N and ammonia-N concentrations are predicted to decrease with development to a point well below LA Basin Plan objectives and below or in the low range of observed values in the Santa Clara River Reach 5. The predicted nutrient concentrations are not expected to cause increased algae growth. On this basis, the impact of the Project on nutrients is considered less than significant.
- ***Trace Metals*****:** MS4 Permit, Construction General Permit, General Dewatering Permit, and SUSMP-compliant BMPs will be incorporated into the Project to address trace

metals in both the construction phase and post-development. The mean loads and concentrations of dissolved copper, total lead, and dissolved zinc, and total aluminum concentration are predicted to decrease with Project development. Although total aluminum loads are predicted to increase with development, mean concentrations of dissolved copper, total lead, dissolved zinc, and total aluminum are predicted to be benchmark Basin Plan objectives, CTR criteria, and the NAWQC criterion for aluminum. Cadmium is not expected to be present in runoff discharges from the Project. On this basis, the impact of the Project on trace metals is considered less than significant.

- ***Chloride*:** MS4 Permit, Construction General Permit, Dewatering General Permit, and SUSMP-compliant BMPs will be incorporated into the Project to address chloride in both the construction phase and post-development. The mean concentration of chloride is predicted to decrease with development, while the average annual load is predicted to increase slightly. The predicted concentration is well below the LA Basin Plan objective and is near the low range of observed values in the Santa Clara River Reach 5. On this basis, the impact of the Project on chloride is considered less than significant.
- ***Pesticides*:** Pesticides in runoff may or may not increase in the post-development phase as a result of landscape applications. Proposed pesticide management practices, including source control, removal with sediments in treatment control PDFs, and advanced irrigation controls, in compliance with the requirements of the MS4 Permit and the SUSMP will minimize the presence of pesticides in runoff. During the Construction phase of the Project, erosion and sediment control BMPs implemented per General Permit and General De-Watering Permit requirements will prevent pesticides associated with sediment from being discharged. Final site stabilization will limit mobility of legacy pesticides that may be present in pre-development conditions. On this basis, the impact of the Project on pesticides is considered less than significant.
- ***Pathogens*:** Post-development pathogen sources include both natural and anthropogenic sources. The natural sources include bird and mammal excrement. Anthropogenic sources include leaking septic and sewer systems and pet wastes. A reduction in agriculture and open space within the Project area will reduce the bacteria produced by wildlife. The Project will not include septic systems and the sewer system will be designed to current standards which minimizes the potential for leaks. Thus pet wastes are the primary source of concern. The PDFs will include source controls and treatment controls which in combination should help to reduce pathogen indicator levels in post-construction stormwater runoff. Pathogens are not expected to occur at elevated levels during the construction-phase of the Project. On this basis, the Projects impact on pathogen and pathogen indicators is considered less than significant.
- ***Hydrocarbons*:** Hydrocarbon concentrations will likely increase in post-development because of vehicular emissions and leaks. In stormwater runoff hydrocarbons are often associated with soot particles that can combine with other solids in the runoff. Such materials are subject to treatment in the proposed extended detention basins, bioretention

areas, and vegetated swales. Source control BMPs incorporated in compliance with the MS4 Permit and the SUSMP requirements will also minimize the presence of hydrocarbons in runoff. During the construction phase of the Project, pursuant to the Construction General Permit, the Construction Stormwater Pollution Prevention Plan must include BMPs that address proper handling of petroleum products on the construction site, such as proper petroleum product storage and spill response practices, and those BMPs must effectively prevent the release of hydrocarbons to runoff per the Best Available Technology Economically Achievable and Best Conventional Pollutant Control Technology standards. On this basis, the impact of the Project on hydrocarbons is considered less than significant.

- ***Trash and debris*:** Trash and debris in runoff are likely to increase in post-development if left unchecked. However, the Project PDFs, including source control and treatment BMPs incorporated in compliance with the MS4 Permit and the SUSMP requirements, will minimize the adverse impacts of trash and debris. Source controls such as street sweeping, public education, fines for littering, covered trash receptacles, and storm drain stenciling are effective in reducing the amount of trash and debris that is available for mobilization during wet weather. Trash and debris will be captured in catch basin inserts in the commercial area parking lots and in the treatment control PDFs. During the construction phase of the Project, PDFs implemented per General Permit and General De-Watering Permit requirements will remove trash and debris through the use of BMPs such as catch basin inserts and by general good housekeeping practices. Trash and debris are not expected to significantly impact receiving waters due to the implementation of the Project PDFs.

- ***Methylene Blue Activated Substances (MBAS):*** In the post-development phase, the presence of soap in runoff from the Project will be controlled through the source control PDFs, including a public education program on residential and charity car washing and the provision of a centralized car wash area directed to sanitary sewer in the multi-family residential areas. Other sources of MBAS, such as cross connections between sanitary and storm sewers, are unlikely given modern sanitary sewer installation methods and inspection and maintenance practices. During the construction phase of the Project, equipment and vehicle washing will not use soaps or any other MBAS sources. Therefore, MBAS are not expected to significantly impact the receiving waters of the proposed Project.

- ***Cyanide:*** In addition to the expected relatively low level of cyanide in untreated stormwater, cyanide in runoff from the NRSP projects would be readily removed by biological uptake, degradation by microorganisms, and by volatilization in the treatment PDFs, especially the dry extended detention basins. Therefore cyanide is not expected to significantly impact the receiving waters of the NRSP projects.

- ***Bioaccumulation*:** In the literature, the primary pollutants that are of concern with regard to bioaccumulation are mercury and selenium. However, selenium and mercury are not of concern in this watershed, so bioaccumulation of selenium and mercury is also not expected to result either during the construction or post-development Project phases. On this basis, the potential for bioaccumulation in the Project PDFs or in the Santa Clara River and adverse effects on waterfowl and other species is considered less than significant.

- ***Construction Impacts:*** Construction impacts on water quality are generally caused by soil disturbance and subsequent suspended solids discharge. These impacts will be minimized through implementation of construction BMPs that will meet or exceed measures required by the Construction General Permit, as well as BMPs that control the other potential construction-related pollutants (PAHs, metals). A SWPPP will be developed as required by, and in compliance with, the Construction General Permit and City of Santa Clarita Standard Conditions. Erosion control BMPs, including but not limited to hydro-mulch, erosion control blankets, and energy dissipaters will be implemented to prevent erosion, whereas sediment controls, including but not limited to silt fence, sedimentation ponds, and secondary containment on stockpiles will be implemented to trap sediment once it has been mobilized. On this basis, the construction-related impact of the Project on water quality is considered less than significant.

- ***Regulatory Requirements:*** The proposed Project satisfies MS4 Permit requirements for new development, including SUSMP requirements and SQMP requirements, and satisfies construction-related requirements of the Construction General Permit and General Dewatering Permit, and therefore complies with water quality regulatory requirements applicable to stormwater runoff.

8.2 Groundwater Impacts

- ***Groundwater Quality Impacts (Nitrate+Nitrite-N)***: MS4 Permit, Construction General Permit, Dewatering General Permit, and SUSMP-compliant BMPs will be incorporated into the Project to address nutrients in both the construction phase and post-development. Nitrate-nitrogen plus nitrite-nitrogen concentrations are predicted to decrease in the post-developed condition. The predicted nitrate-nitrogen plus nitrite-nitrogen concentration in stormwater runoff after treatment in the Project PDFs and in irrigation water is well below the groundwater quality objective. On this basis, the potential for adversely affecting groundwater quality is considered less than significant.

- ***Groundwater Recharge Impacts***: Project stormwater runoff will be discharged to the Santa Clara River after treatment, whose channel is predominantly natural and consists of vegetation and coarse-grained sediments (rather than concrete). The porous nature of the sands and gravels forming the streambed will allow for significant infiltration to occur to the underlying groundwater. Also, irrigation water is predicted to be fully infiltrated during dry weather, which will increase groundwater recharge from the Project. On this basis, the Project's impact on groundwater recharge is considered less than significant

8.3 Hydromodification Impacts

The following are the conclusions regarding the significance of impacts for hydromodification impacts under wet- and dry-weather conditions:

- Wet Weather Project Impacts: Although the Project's runoff volumes, flow rates, and durations will increase, potential impacts of hydromodification (i.e., the potential to cause erosion, siltation, or channel instability) will be avoided, minimized, and mitigated by the Project PDFs in the following ways:
    - Project site design and on-site treatment PDFs, especially open space retention, efficient irrigation, and treatment control PDFs will avoid and/or minimize increases in runoff volume from the development area, the preferred method for controlling hydromodification impacts from new development (SCCWRP, 2005a).
    - Concentrated flows will be mitigated with energy dissipaters at the discharge points to the Santa Clara River and the Santa Clara River banks will be protected primarily with vegetated buried bank stabilization in non-jurisdictional upland areas adjacent to the river. This type of biostabilization technique is the preferred approach for bank stabilization (SCCWRP, 2005a).

  For these reasons, direct hydromodification impacts of the NRSP projects on the Santa Clara River and Tributaries are considered less than significant.

- Cumulative Hydromodification Impacts: The NRSP projects contribute only 5% of total potential impervious surface at build out within the watershed, the NRSP projects include hydromodification controls as Project Design Features, the NRSP projects will be conditioned to include Project Design Features to meet the performance standard established in this Report to protect the Tributaries from hydromodification impacts, future development projects within the watershed will control flow in compliance with the regional program, and large-scale changes naturally occur in the Santa Clara River in response to major episodic events, therefore, the NRSP projects' contribution to cumulative hydromodification impacts to the Santa Clara River and the Tributaries will be less than significant and consistent with the requirements of the MS4 permit.
- Dry Weather Hydromodification Impacts: It is predicted that all dry weather flows will be removed in the treatment control PDFs, which also provide hydrologic source control. As a result, no appreciable change in seasonality of flows is anticipated to result from development. Based on the comprehensive site planning, source control, and treatment control strategy and that no dry weather flows are predicted to be discharges to the Santa Clara River, the impact of the Project on dry weather water quality and seasonality of flow in the Santa Clara River is considered less than significant.

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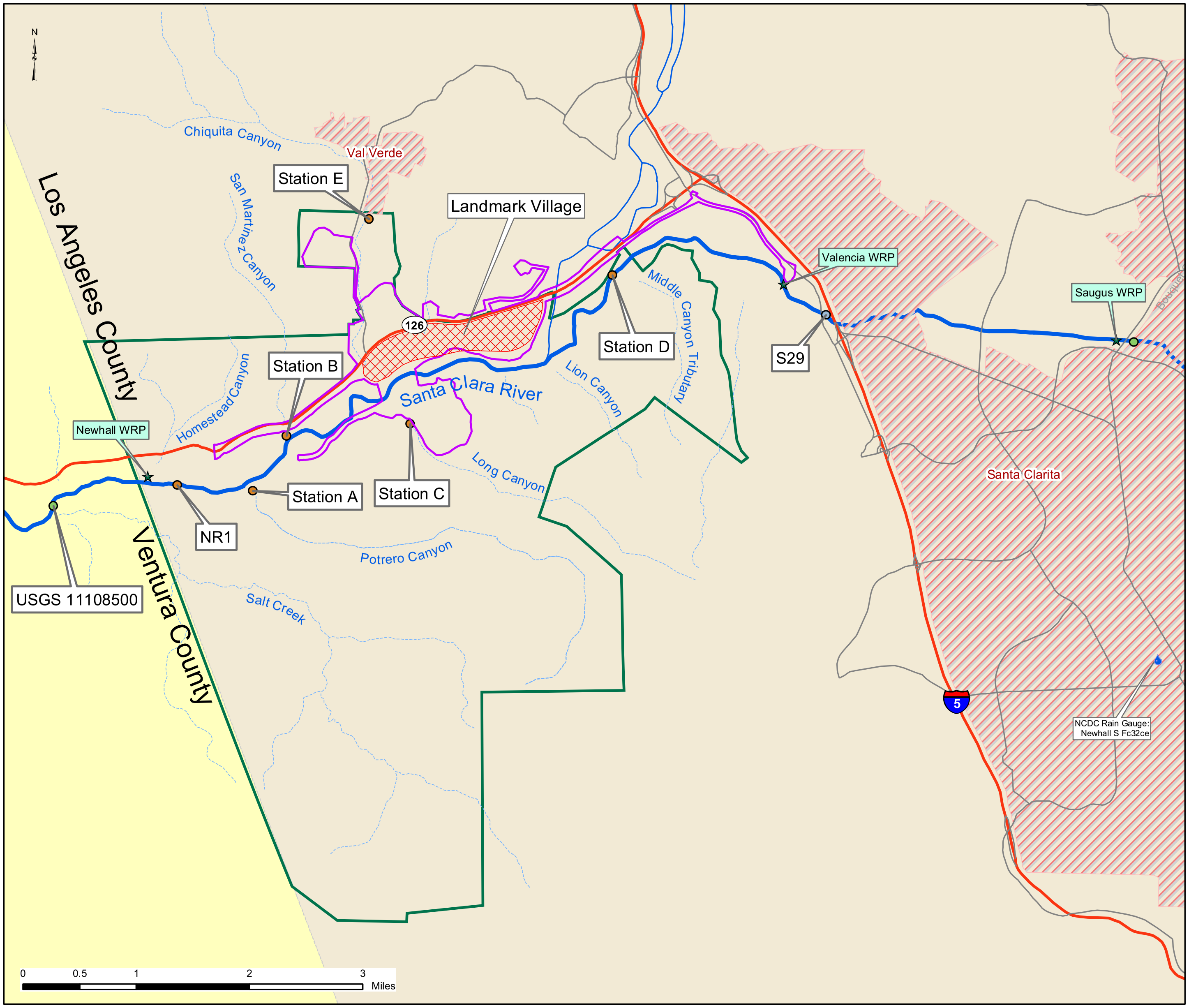

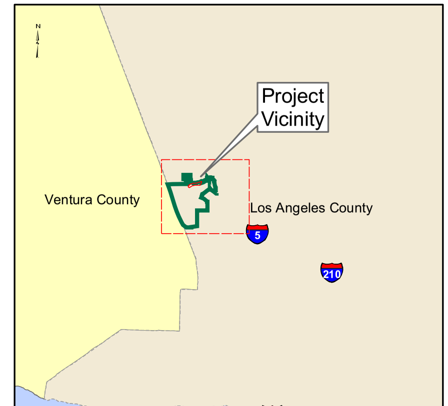

Legend

Monitoring Stations

- LACDPW Mass Emissions Station
- Newhall Ranch Sampling Site
- USGS Station
- Water Reclamation Plant
- Rain Gage
- Major Basin Tributaries
- Rivers and Streams
- Highways
- Local Roads
- Landmark Village
- Impact Boundary
- Newhall Ranch Specific Plan
- City Boundaries
- Los Angeles County
- Ventura County

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Figure 2-1: Project Location Map

Water Quality Technical Report
Landmark Village

August 2006

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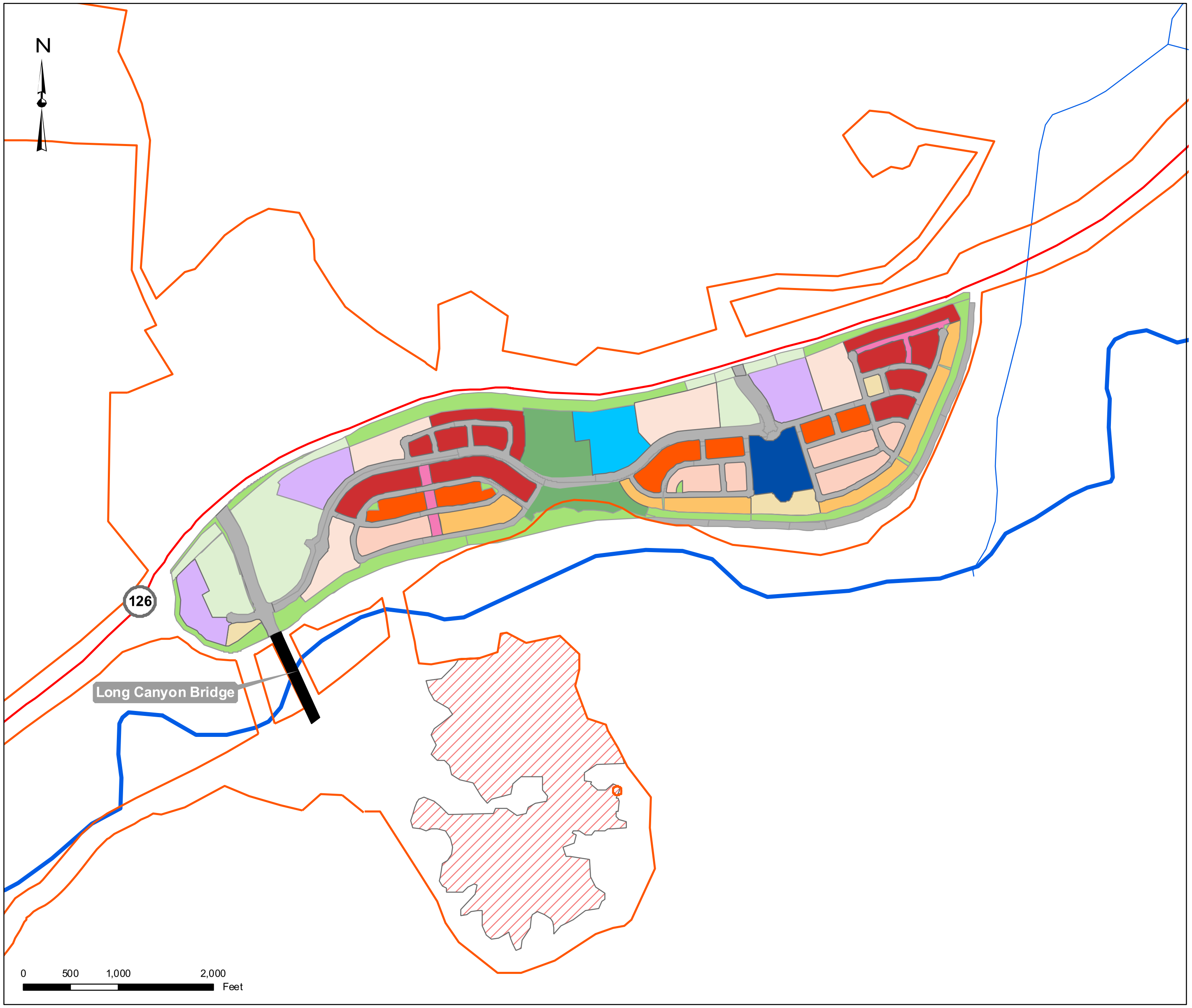
Prepared By:
M. Leisenring



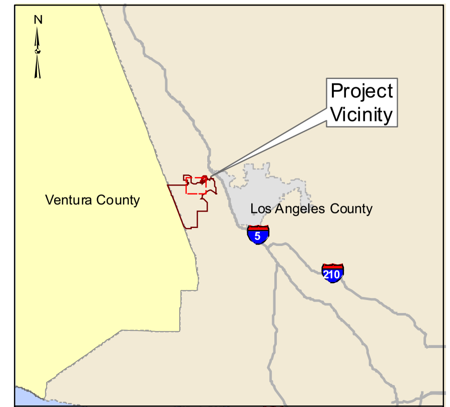


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Figure 2-2:
Project Land Uses

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Landmark Village

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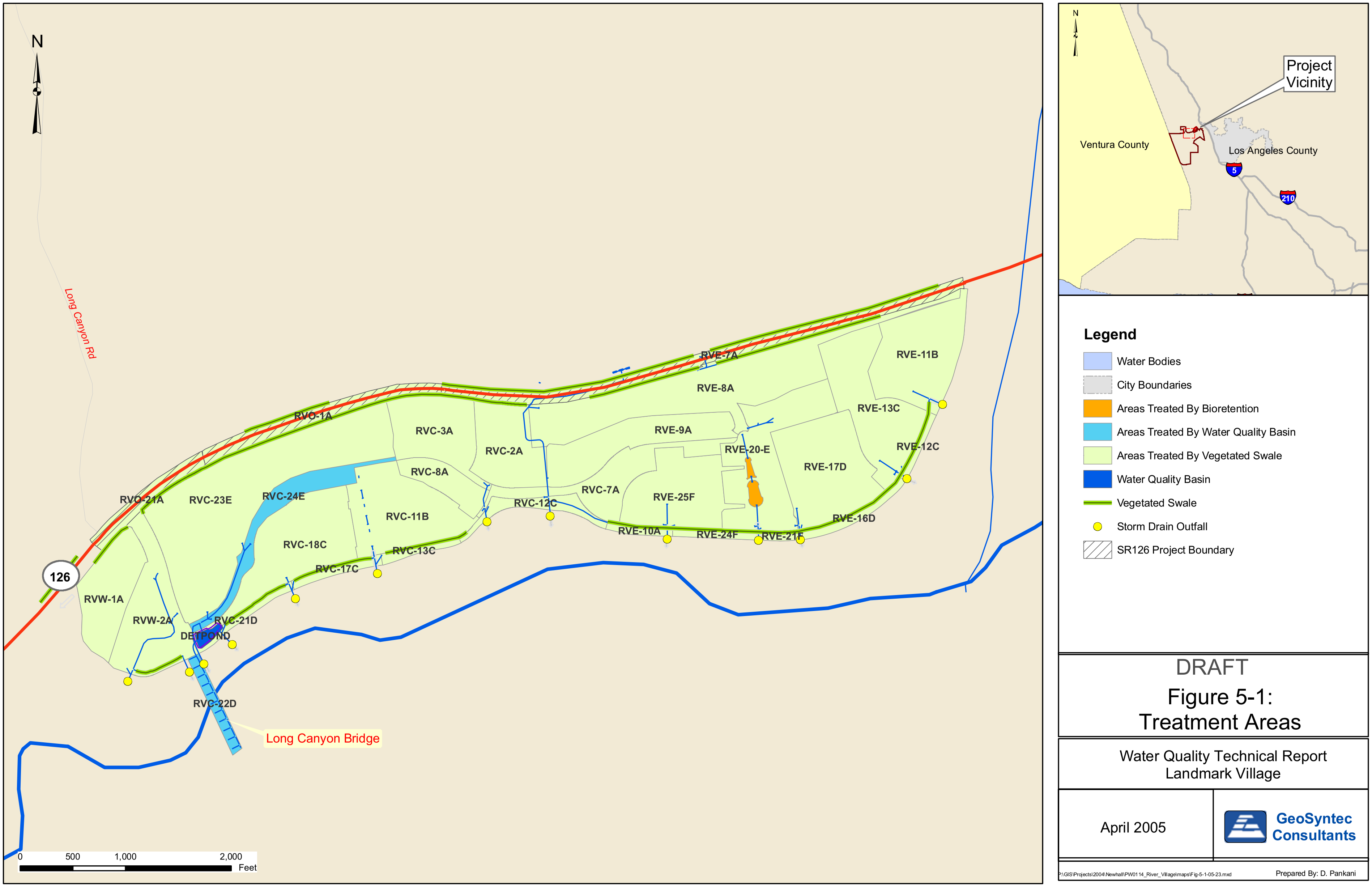
Prepared By: D. Pankani



Legend

- Water Bodies
- City Boundaries
- Areas Treated By Bioretention
- Areas Treated By Water Quality Basin
- Areas Treated By Vegetated Swale
- Water Quality Basin
- Vegetated Swale
- Storm Drain Outfall
- SR126 Project Boundary

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Figure 5-1: Treatment Areas

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Landmark Village

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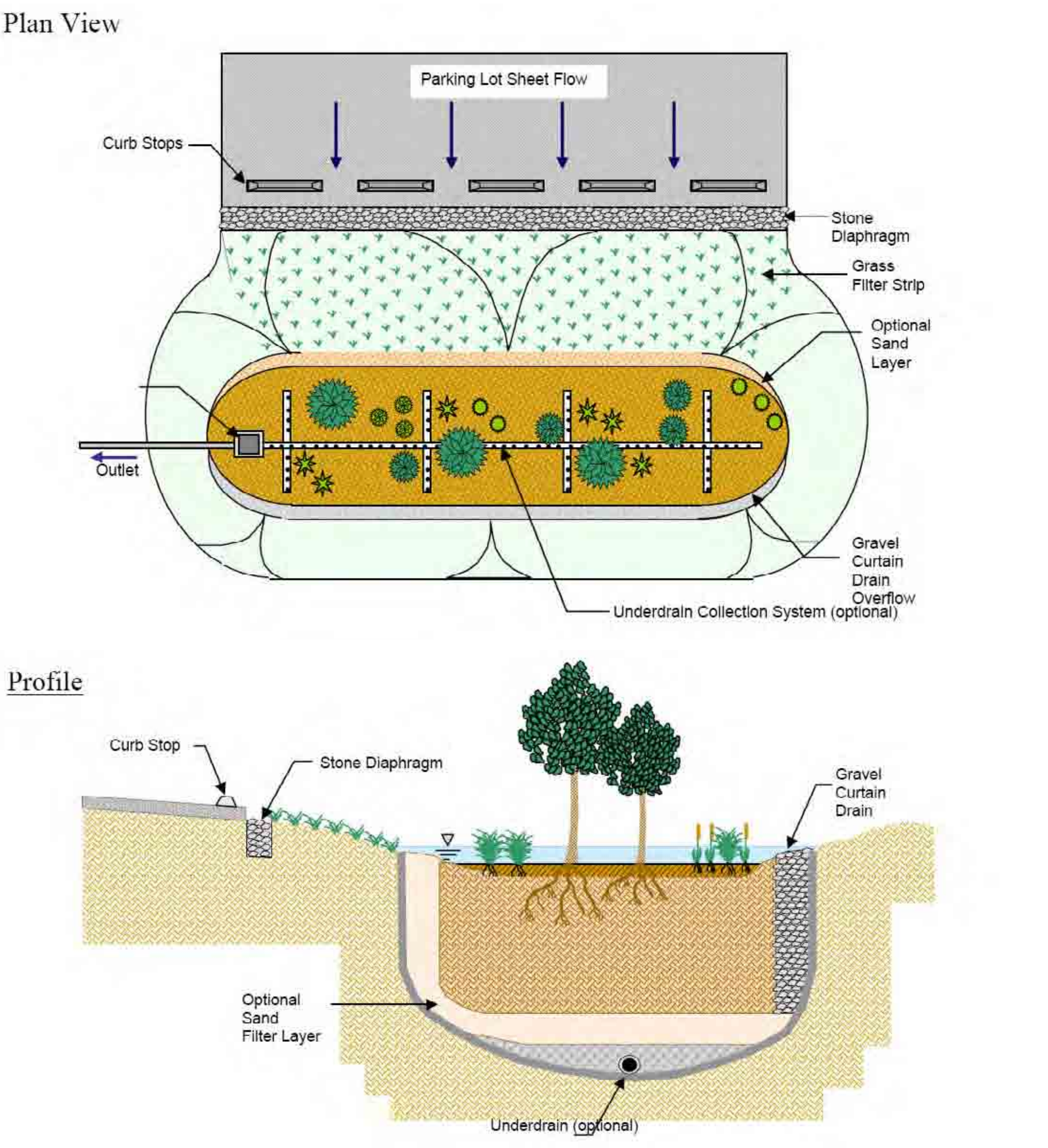
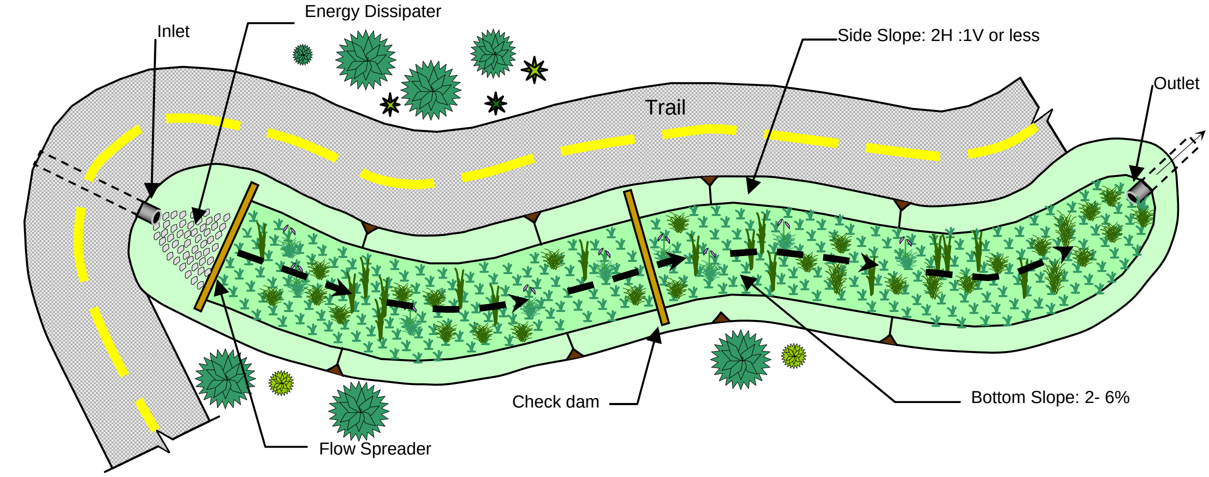


Figure 5-2
Conceptual Illustration of a Bioretention Facility

Figure 5-3
Examples of Bioretention Facilities

Plan View



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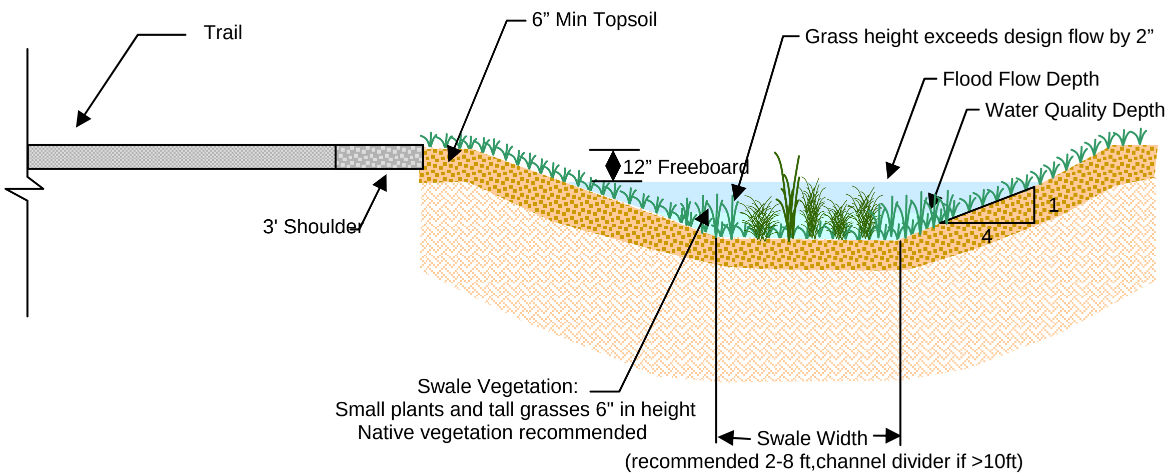

Figure 5- 4
Conceptual Illustration of a Vegetated Swale

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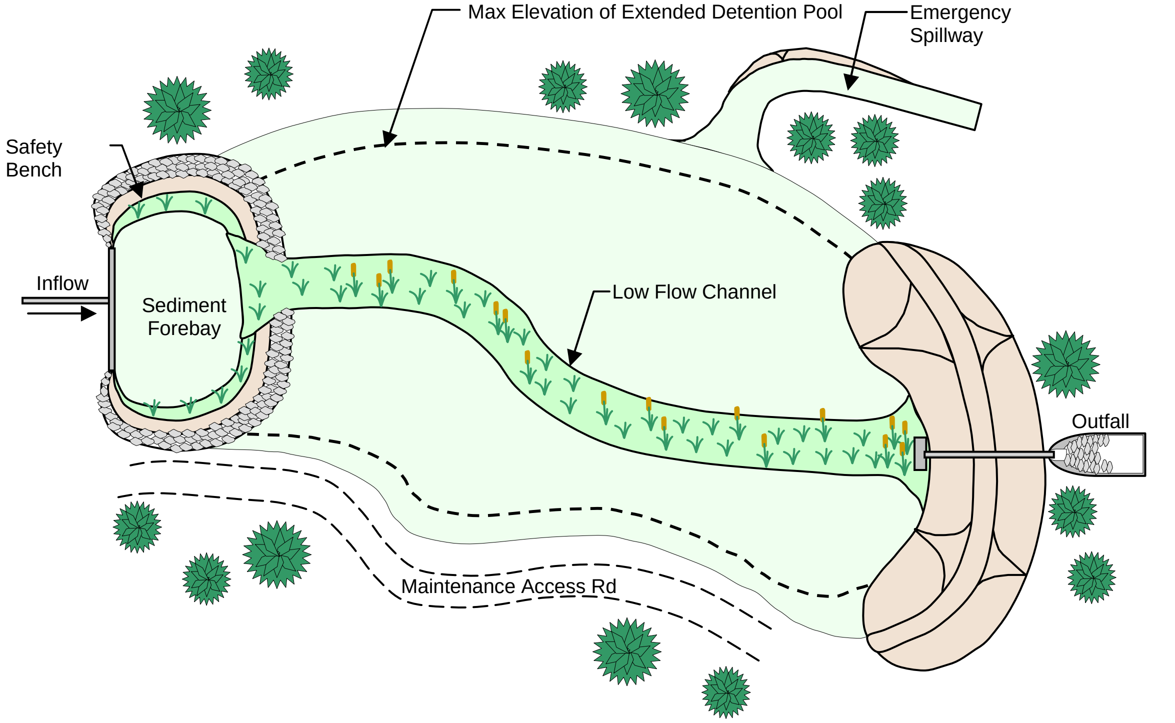
Figure 5-5
Examples of Vegetated Swales

Plan View



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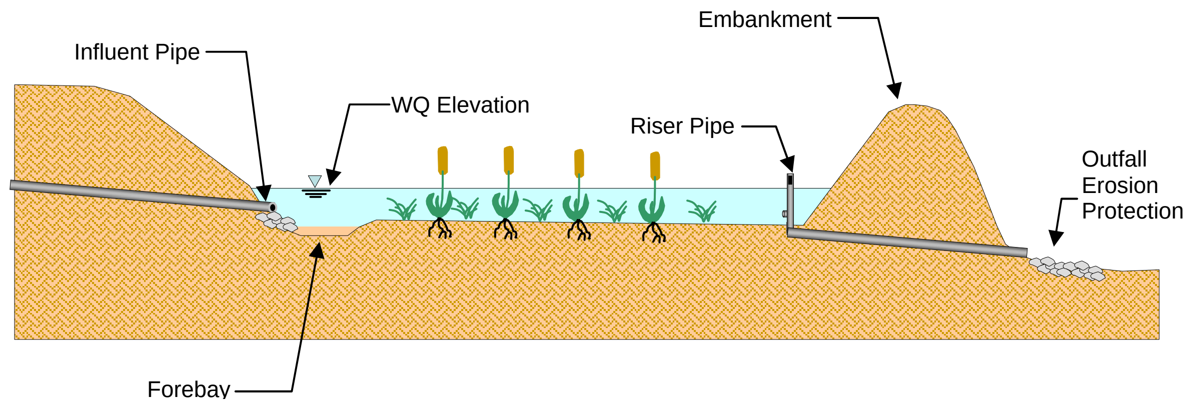

Figure 5-6
Conceptual Illustration of a Water Quality Basin

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Figure 5-7
Examples of Water Quality Basins

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Landmark Village Water Quality Technical Report Appendices

(A) Pollutants of Concern

(B) Modeling Parameters & Methodology

(C) Newhall Ranch Stormwater Monitoring Data

(D) Review of Bacteria Data from Southern California Watersheds

(E) Effect of Urbanization on Groundwater Recharge in the Santa Clarita Valley

(F) Assessment of Potential Impacts Resulting from Cumulative Hydromodification Effects, Selected Reaches of the Santa Clara River, Los Angeles County, California

A. POLLUTANTS OF CONCERN

A.1. Pollutants of Concern

Pollutant of Concern [1]	**Rationale for Selection/Exclusion as Pollutant of Concern**	**Significance Criteria**
Sediment: Total Suspended Solids (TSS) & Turbidity	1. "Sediment is a common component of stormwater, and can be a pollutant. Sediment can be detrimental to aquatic life (primary producers, benthic invertebrates, and fish) by interfering with photosynthesis, respiration, growth, reproduction, and oxygen exchange in water bodies. Sediment can transport other pollutants that are attached to it including nutrients, trace metals, and hydrocarbons. Sediment is the primary component of total suspended solids (TSS), a common water quality analytical parameter." (CASQA, 2003)	1. Narrative objective in the LA Basin Plan: "Water shall not contain suspended or settleable material in concentrations that cause nuisance or adversely affect beneficial uses." 2. LA Basin Plan objective for turbidity: "Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in natural turbidity attributable to controllable water quality factors shall not exceed the following limits: Natural Turbidity — Max Increase 0-50 NTU — 20% > 50 NTU — 10% Allowable zones of dilution within which higher concentrations may be tolerated may be defined for each discharge in specific Water Discharge Requirements."
Nutrients: Ammonia, Nitrite, Nitrate, Total Nitrogen, and Total Phosphorus	1. "Nutrients including nitrogen and phosphorous are the major plant nutrients used for fertilizing landscapes, and are often found in stormwater. These nutrients can result in excessive or accelerated growth of vegetation, such as algae, resulting in impaired use of water in lakes and other sources of water supply. For example, nutrients have led to a loss of water clarity in Lake Tahoe. In addition, un-ionized ammonia (one of the nitrogen forms) can be toxic to fish." (CASQA, 2003). 2. Nutrients are a biostimulatory substance.	1. LA Basin Plan standards for ammonia: "In order to protect aquatic life, ammonia concentrations in receiving waters shall not exceed the values listed for the corresponding in-stream conditions in Tables 3-1 to 3-4." The criterion for ammonia varies with pH and temperature; the criterion is lower for lower pH and temperature. The basin plan amendment for updated ammonia standards (dated 04/02, effective July 15, 2003) will be used. 2. LA Basin Plan standards for nitrogen: "Waters shall not exceed 10 mg/L nitrogen as nitrate-nitrogen plus nitrite-nitrogen (NO_3-N + NO_2-N), 45 mg/L as nitrate (NO_3), 10 mg/L as

Pollutant of Concern [1]	Rationale for Selection/Exclusion as Pollutant of Concern	Significance Criteria
		nitrate-nitrogen (NO_3-N), or 1 mg/L as nitrite-nitrogen (NO_2-N) or as otherwise designated in Table 3-8." Table 3-8 lists Reach 5 of the Santa Clara River Reach 5 with a water quality objective of 5 mg/L nitrate-N + nitrite-N. 3. Reaches 5 and 7 (EPA Reaches 7 and 9) of the Santa Clara River is listed as having ground water recharge as a beneficial use in the LA Basin Plan. LA Basin Plan standards for nitrogen: "Ground waters shall not exceed 10 mg/L nitrogen as nitrate-nitrogen plus nitrite-nitrogen (NO_3-N + NO_2-N), 45 mg/L as nitrate (NO_3), 10 mg/L as nitrate-nitrogen (NO_3-N), or 1 mg/L as nitrite-nitrogen (NO_2-N)." 4. Resolution 03-011 (LARWQCB, 08/2003) promulgates water quality objectives (TMDLs) for Reach 5 (EPA Reach 7) of the Santa Clara River of 2.0 mg/L ammonia-N (1.2 mg/L at County line) and 4.5 mg/L as NO_3-N + NO_2-N. 5. Narrative objective for biostimulatory substances in the LA Basin Plan: "Waters shall not contain biostimulatory substances in concentrations that promote algal growth to the extent that such growth causes nuisance or adversely affects beneficial uses."
Trace metals: Copper, Lead, Zinc, Arsenic, Cadmium, Chromium, Mercury, and Nickel	1. "Metals including lead, zinc, cadmium, copper, chromium, and nickel are commonly found in stormwater. Many of the artificial surfaces of the urban environment (e.g., galvanized metal, paint, automobiles, or preserved wood) contain metals, which enter stormwater as the surfaces corrode, flake, dissolve, decay, or leach. Over half the trace metal load carried in stormwater is associated with sediments. Metals are of concern	1. Narrative objective in the LA Basin Plan: "All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. …" 2. The CTR criteria are the applicable water quality objectives for protection of aquatic life (40 CFR 131.38). The CTR criteria are expressed for acute and chronic (4-

Pollutant of Concern [1]	Rationale for Selection/Exclusion as Pollutant of Concern	Significance Criteria
	because they are toxic to aquatic organisms, can bioaccumulate (accumulate to toxic levels in aquatic animals such as fish), and have the potential to contaminate drinking water supplies." (CSQA, 2003) 2. LA Basin Plan requires that discharges into receiving waters shall not cause or contribute to toxicity. 3. Urban development can increase potential sources of these metals due to sources from vehicles and building materials.	day average) conditions; however, only acute conditions are applicable for stormwater discharges because the duration of stormwater discharge is typically less than 4 days. 3. CTR criteria are expressed for dissolved metal concentrations and are determined on the basis of hardness in the receiving water. In application of criteria to the Project, local hardness data will be used to determine most appropriate criteria.
Chloride	1. Resolution R03-008 Amendment to the Water Quality Control Plan (Basin Plan) for the Los Angeles Region to Incorporate a Total Maximum Daily Load for Chloride in the Upper Santa Clara River (07/03) states "Elevated chloride concentrations are causing impairments of the water quality objective in Reach 5 (EPA 303(d) list Reach 7) and Reach 6 (EPA 303(d) list Reach 8) of the Santa Clara River. This objective was set to protect all beneficial uses; agricultural beneficial uses have been determined to be most sensitive, and not currently attained at the downstream end of Reach 5 (EPA 303(d) list Reach 7) and Reach 6 (EPA 303(d) list Reach 8) in the Upper Santa Clara River. Irrigation of salt sensitive crops such as avocados and strawberries with water containing elevated levels of chloride results in reduced crop yields. Chloride levels in groundwater are also rising."	1. LA Basin Plan contains mineral objectives for individual inland surface waters. Reach 5 of the Santa Clara River has a chloride objective of 100 mg/L. 2. Resolution R03-008 states "The numeric target for this TMDL pertains to Reaches 5 and 6 of the Santa Clara River and is based on achieving the existing water quality objective of 100 mg/L, measured instantaneously, throughout the impaired reaches."

Pollutant of Concern [1]	Rationale for Selection/Exclusion as Pollutant of Concern	Significance Criteria
Pathogens (Fecal Coliform, Viruses, and Protozoa)	1. "Bacteria and viruses are common contaminants of stormwater. For separate storm drain systems, sources of these contaminants include animal excrement and sanitary sewer overflow. High levels of indicator bacteria in stormwater have led to the closure of beaches, lakes, and rivers to contact recreation such as swimming." (CASQA, 2003) 2. Fecal coliform is a frequently monitored indicator organism of human pathogens. 3. Human related activities can increase fecal coliform concentrations. 4. Concentrations of fecal coliform in stormwater can be elevated, often due in part to the presence of coliform bacteria from natural sources.	1. LA Basin Plan objectives are based on the designated uses of the water body. The Santa Clara River Reach 5 is listed with a REC1 beneficial use. Resolution # 01-018 (LARWQCB, 2001) amended the LA Basin Plan standards for bacteria in waters with a contact recreation beneficial use. These standards for freshwaters are Geometric Mean — Single Sample E. coli: ≤ 126/100 ml — ≤ 235/100 ml fecal coliform: ≤ 200/100 ml — ≤ 400/100 ml
Pesticides	1. "Pesticides (including herbicides, fungicides, rodenticides, and insecticides) have been repeatedly detected in stormwater at toxic levels, even when pesticides have been applied in accordance with label instructions. As pesticide use has increased, so too have concerns about adverse effects of pesticides on the environment and human health. Accumulation of these compounds in simple aquatic organisms, such as plankton, provides an avenue for biomagnification through the food web, potentially resulting in elevated levels of toxins in organisms that feed on them, such as fish and birds." (CASQA, 2003) 2. Pesticides loads may be present in runoff from developed areas due to pesticide use for urban landscaping.	1. Narrative objective in the LA Basin Plan: "Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of pesticides in excess of the limiting concentrations specified in … Title 22 of the California Code of Regulations …." The LA Basin Plan contains maximum contaminant levels for a range of pesticides. 2. CTR lists numeric objectives for some, but not all pesticides. There are no CTR criteria for diazinon and chlorpyrifos, but these substances are now banned from most urban uses.

Pollutant of Concern (1)	**Rationale for Selection/Exclusion as Pollutant of Concern**	**Significance Criteria**
Petroleum Hydrocarbons: Oil & Grease and Polycyclic Aromatic Hydrocarbons (PAHs)	1. "Oil and grease includes a wide array of hydrocarbon compounds, some of which are toxic to aquatic organisms at low concentrations. Sources of oil and grease include leakage, spills, cleaning and sloughing associated with vehicle and equipment engines and suspensions, leaking and breaks in hydraulic systems, restaurants, and waste oil disposal." (CASQA, 2003) 2. Petroleum hydrocarbons are ubiquitous, and used in a wide variety of applications. Potential sources are generally expected to increase with urban development. 3. A source of PAHs is automobile exhaust. Therefore, development would generally be expected to increase levels of PAHs.	1. Narrative objective in the LA Basin Plan for oil & grease: "Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance or that otherwise adversely affect beneficial uses." 2. PAHs are a class of compounds. CTR values for individual PAHs are available for protection of human health only. There are no regulatory standards for the protection of aquatic health.
Bioaccumulation & Toxicity	1. Some Pollutant of concern in stormwater runoff such as metals or pesticides have the potential to bioaccumulate in aquatic organisms potentially affecting the health of those organism or other species higher up the food chain. 2. Certain pollutants in stormwater runoff have the potential to be highly toxic to aquatic organisms resulting in effects such as impaired reproduction or mortality.	1. Toxic pollutants shall not be present at levels that will bioaccumulate in aquatic life to levels which are harmful to aquatic life or human health. 2. LA Basin Plan objectives for toxicity: "All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life."

Pollutant of Concern [1]	Rationale for Selection/Exclusion as Pollutant of Concern	Significance Criteria
Trash and Debris	1. "Gross Pollutants (trash, debris, and floatables) may include heavy metals, pesticides, and bacteria in stormwater. Typically resulting from an urban environment, industrial sites and construction sites, trash and floatables may create an aesthetic "eye sore" in waterways. Gross pollutants also include plant debris (such as leaves and lawn-clippings from landscape maintenance), animal excrement, street litter, and other organic matter. Such substances may harbor bacteria, viruses, vectors, and depress the dissolved oxygen levels in streams, lakes, and estuaries sometimes causing fish kills." (CASQA, 2003)	1. LA Basin Plan narrative floating material objective: "Waters shall not contain floating materials, including solids, liquids, foams, and scum, in concentrations that cause a nuisance or adversely affect beneficial uses."
Oxygen, Dissolved & BOD (Biochemical oxygen demand)	1. Adequate DO levels are required to support aquatic life. Depressed levels may lead to anaerobic conditions. 2. BOD can result in decreased dissolved oxygen levels affecting beneficial uses such as habitat designations. 3. DO & BOD are correlated to nutrients and other organic compounds and are subsumed by those categories.	1. LA Basin Plan objective for dissolved oxygen: "The dissolved oxygen content of all surface waters designated as WARM shall not be depressed below 5 mg/L as a result of waste discharges." 2. LA Basin Plan objective for BOD: "Waters shall be free of substances that result in increases in the BOD which adversely affect beneficial uses."
Biostimulatory substances	1. Biostimulatory substances include excess nutrients and other compounds that stimulate aquatic growth resulting in impaired aesthetics and water quality impairments such as lowered dissolved oxygen values. 2. Biostimulatory substances are correlated to nutrients and other organic compounds and are subsumed by those categories.	1. LA Basin Plan objectives for biostimulatory substances: "Waters shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growth causes nuisance of adversely affects beneficial uses."

Pollutant of Concern [1]	Rationale for Selection/Exclusion as Pollutant of Concern	Significance Criteria
Chemical Pollutants	3. Chemical pollutants in excessive amounts in drinking water are harmful to human health. 4. The chemical pollutants referenced under this water quality objective, such as trace metals and nitrate are either subsumed by the categories above, or are not found in urban runoff (e.g., fluoride).	2. LA Basin Plan objectives for chemical Pollutants: "Surface waters shall not contain concentrations of chemical Pollutants in amounts that adversely affect any designated beneficial use."
Temperature	1. Elevated temperatures are typically associated with discharges of process wastewaters or non-contact cooling waters. Increase in temperature can result in lower dissolved oxygen levels impairing habitat and other beneficial uses of receiving waters. Stormwater runoff from the Project site is expected to cool somewhat during treatment in structural BMPs and will be diluted in the receiving water. As the beneficial uses in the receiving waters for the Project include warm freshwater habitat to support warm water ecosystems, any increase in temperature resulting from stormwater runoff from the project is expected to be less than significant.	1. LA Basin Plan objectives for temperature: "For waters designated WARM, water temperature shall not be altered by more than 5º F above the natural temperature. At no time shall these WARM-designated waters be raised above 80 º F as a result of waste discharges".
Total Residual Chlorine	1. Municipal pools and private pools in areas served by a municipal sanitary system are required to be discharged into the sanitary system. Chlorine disinfection will not take place on the project site and there will not be any sources of elemental chlorine. Chloride sources (e.g. fertilizers or other compounds with salts) are evaluated separately. Therefore, total residual chlorine will not be present in runoff from the project.	1. LA Basin Plan objectives for total residual chlorine: "Chlorine residual shall not be present in surface water discharges at concentrations that exceed 0.1 mg/L and shall not persist in receiving waters at any concentration that causes impairment for beneficial uses".

Pollutant of Concern [1]	**Rationale for Selection/Exclusion as Pollutant of Concern**	**Significance Criteria**
Color, Taste, and Odor	1. Undesirable tastes and odors in water may be a nuisance and may indicate the presence of a pollutant(s). Odor associated with water can result from decomposition of organic matter or the reduction of inorganic compounds, such as sulfate. Other potential sources of odor causing substances, such as industrial processes, will not occur as part of the project. Color in water may arise naturally, such as from minerals, plant matter, or algae, or may be caused by industrial pollutants. 2. The Project will contain no industrial uses. Commercial areas of the project are not expected to be a significant source of Pollutants that might impart color or odor to stormwater flows from the project area. Source controls are expected to reduce the amount of plant material and BMPs will reduce sediment which could contribute to color or odor nuisances. Therefore, color-, taste-, or odor-producing substances are not pollutants of concern for the project.	1. LA Basin Plan objective for color: “Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses”. 2. LA Basin Plan objectives for taste and odor: “Ground waters shall not contain taste or odor-producing substances in concentration that cause nuisance or adversely affect beneficial uses”.
Exotic Vegetation	1. Exotic vegetation typically provides little habitat value and can out compete native vegetation that is more suitable habitat for aquatic and terrestrial organisms. 2. The landscape management plan will not use exotic vegetation, and undesirable invasive vegetation will be eradicated to the extent possible. Therefore, exotic vegetation is not a pollutant of concern for the Project.	1. LA Basin Plan objective for exotic vegetation: “Exotic vegetation shall not be introduced around stream courses to the extent that such growth causes nuisance or adversely affects designated beneficial uses.”

Pollutant of Concern [1]	Rationale for Selection/Exclusion as Pollutant of Concern	Significance Criteria
Mineral Quality (TDS, Boron, Sulfate, Sodium Absorption Ratio - SAR)	1. LADPW stormwater monitoring data arithmetic mean concentrations for TDS, sulfate, and boron for urban land uses are below the water quality objectives for minerals. Calculated SAR values are 0.6 for SF residential and 1.9 for commercial based on LADPW data. The minerals listed in the Basin Plan, except chloride and nitrogen, are not believed to be Pollutants of concern due to the absence of river impairments and /or anticipated runoff concentrations below the Basin Plan objectives	1. LA Basin Plan objectives for minerals: Reach 5 / Reach 7 TDS (mg/L): 1000 / 800 Sulfate (mg/L): 400 / 150 Boron (mg/L): 1.5 / 1.0 SAR (mg/L): 10 / 5.0
MBAS (Methylene blue activated substances)	1. MBAS are related to presence of detergents in runoff, may be incidentally associated with new urban development, but more commonly with point sources such as treatment plants. The project will have no planned illicit sewer connections or septic tanks, eliminating domestic sources. Further, the project will employ source controls such as educational materials for homeowners regarding elimination of discharges from car washing to the storm drain system, control of construction vehicle wash water, control of construction, street, and pavement washing activities to control wash water. LADPW stormwater monitoring found MBAS concentrations below the water quality criteria for all urban land use except transportation; therefore this Pollutant is not anticipated to be a pollutant of concern for the project.	1. LA Basin Plan objective for MBAS: “Waters shall not have MBAS concentrations greater than 0.5 mg/L in water designated (MUN).”
pH	1. Mean runoff concentrations in the Los Angeles County stormwater monitoring data ranged from 6.5 for mixed- and single-family residential land uses to 7.0 for commercial land use. Therefore, pH in the Santa Clara River is not expected to be affected by runoff discharges from the project.	1. LA Basin Plan objective for pH: “the pH of inland waters shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharges. Ambient pH levels shall not be changed more than 0.5 units from natural conditions as a result of waste discharge.”

Pollutant of Concern [1]	**Rationale for Selection/Exclusion as Pollutant of Concern**	**Significance Criteria**
PCBs	1. PCBs are highly toxic persistent chemicals that have been historically released into the environment from industrial uses, such as transformers. Due to their persistence, PCBs can still be detected in urban runoff due to historic industrial sources of these chemicals. 2. The project area did not historically include PCB-producing land uses and industrial land uses are not included in the proposed project. Therefore, PCBs are not a pollutant of concern for the project.	1. LA Basin Plan narrative regarding PCBs: "The purposeful discharge of PCBs to waters of the Region, or at locations where the waste can subsequently reach waters of the Region, is Prohibited. Pass-through or uncontrollable discharges to waters of the Region, or at locations where the waste can subsequently reach waters of the Region, are limited to 70 pg/L (30 day average) for protection of human health and 14 ng/L and 30 ng/L (daily average) to protect aquatic life in inland fresh waters and estuarine waters respectively".
Radioactive Substances	1. Some activities such as mining or industrial activities can increase the amount of radioactive substances impairing beneficial uses. 2. The project will not have industrial or other activities that would be a source of any radioactive substances, and development will stabilize any naturally radioactive soils, though unlikely to be present in the project area. Therefore, radioactive substances are not a pollutant of concern for the project.	1. LA Basin Plan narrative objective for radioactive substances: "Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life or that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life".

1. Pollutants of concern are those pollutants that are anticipated or potentially could be generated by development that have been identified by regulatory agencies as potentially impairing beneficial uses in the receiving water bodies or that could adversely affect receiving water quality.

A.2. References

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Los Angeles Regional Water Quality Control Board, 1995. Water Quality Control Plan Los Angeles Region Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties.

APPENDIX A

Los Angeles Regional Water Quality Control Board, October, 25th, 2001. Resolution 01-018: Amendment to the Water Quality Control Plan for the Los Angeles Region to Update the Bacteria Objectives for Water Bodies Designated for Water Contact Recreation

Los Angeles Regional Water Quality Control Board, July, 10th, 2003. Resolution R03-008 Revision of interim waste load allocations for chloride in the Amendment to the Water Quality Control Plan for the Los Angeles Region to include a TMDL for Chloride in the Upper Santa Clara River.

Los Angeles Regional Water Quality Control Board, August, 7th, 2003. Resolution R03-011 Amendment to the Water Quality Control Plan for the Los Angeles Region to include a TMDL for Nitrogen Compounds in the Santa Clara River.

US Environmental Protection Agency California Toxics Rule (CTR), 40 C.F.R. §131.38.

B. APPENDIX B: WATER QUALITY MODEL METHODOLOGY

B.1. Model Description

B.1.1. Model Overview

The model used to assess stormwater quality impacts associated with the proposed Newhall Ranch Landmark Village sub-division is an empirical, volume-based pollutant loads model. This type of loadings model is generally applicable in the planning and evaluation stages of a project. The model was developed to assess the potential impact of development on water quality and to evaluate the effectiveness of the structural Best Management Practices (BMPs) that will treat stormwater runoff as part of the project stormwater treatment system. Two project conditions were evaluated with the water quality model:

1. Pre-development
2. Post-development with water quality treatment

Measured runoff volumes and water quality characteristics of stormwater are highly variable. To account for this variability, a statistical modeling approach was used to estimate the volume of stormwater, the concentration of pollutants in stormwater, and the overall pollutant load (total mass of pollutants) in stormwater runoff. A statistical description of stormwater provides an indication of the average characteristics and variability of the water quality parameters of stormwater, and the probability of compliance with regulatory criteria. It does not forecast runoff characteristics or regulatory compliance for specific storms or monitoring periods.

The statistical model is based on relatively simple expressions describing rainfall/runoff relationships and estimated concentrations in stormwater runoff. The volume of stormwater runoff is estimated using a modification to the Rational Formula, an empirical expression that relates runoff volume to the rainfall depth and the broad basin characteristics. The pollutant concentration in stormwater runoff is represented by an expected average pollutant concentration, called the event mean concentration (EMC). EMCs are estimated from available monitoring data from, and are strongly dependent on, the land-use type.

The model does not incorporate the hydraulics or hydrology of the site, which would be more appropriate for design stages and requires additional data and more sophisticated modeling. The model includes water quality benefits achieved by treatment control BMPs, but not source control BMPs because data is generally not available or inconclusive for the latter. Model results are presented for average annual runoff volumes, pollutant loads, and pollutant concentrations.

As with all environmental modeling, the precision of results is dependent on how well the hydrologic, water quality, and BMP effectiveness data describe the actual site characteristics. Local and regional data used to the fullest extent possible helps to minimize errors in predictions. It is important to remember that the predictions of relative differences are also of importance rather than just precision. The ability of errors to propagate and magnify is inherent with this type of model and must be considered when viewing results. An extensive sensitivity analysis is beyond the scope of this document and therefore errors will only be discussed qualitatively. However, it is important to point out that one of the most variable parameters is the runoff coefficient, which is a function of the percent imperviousness. Novotny and Olem (1994), when discussing the Rational Formula, state "...the runoff coefficient is the most important task of the entire calculation." It is difficult to accurately quantify imperviousness in the planning phase of a project.

B.1.2. Model Assumptions

The water quality modeling methodology requires that some assumptions be made for both the model input parameters and the way the modeling calculations are carried out. Section B.2.6 discusses the assumptions that were made in the development of the model parameters and Section B.3.4 discusses the assumptions of the modeling methodology. Section B.4 discusses the effects of the modeling assumptions on model accuracy.

B.2. Model Input Parameters

Many parameters that can affect pollutant loads and concentrations vary between locations where stormwater monitoring has been conducted. Examples include source concentrations, topography, soil type, and rainfall characteristics, all of which can influence the buildup and mobilization of pollutants. The following model parameters represent the best data currently available for representation of existing and developed project conditions in the water quality model.

B.2.1. Storm Events

Rainfall analysis was conducted with data from the National Climatic Data Center (NCDC) Newhall rain gauge (station number 046162), located in the town of Newhall, California. Figure B-1 shows the location of the Newhall gauge in relation to the Landmark Village Project area. This gauge is located approximately 7 miles from the project. The gauge elevation of 1,243 ft AMSL is comparable to the Landmark Village Project area elevation of approximately 1,000-1,200 ft AMSL.

While the period of record rainfall data collected at the Newhall rain gauge is quite good, there are still some gaps in the 35-year period of record. In order to improve the characterization of rainfall at the project site, estimates of the missing rainfall data were made through correlation of the Newhall rain gauge with the San Fernando rain gauge (NCDC station number 047762) which is located approximately 5 miles away (south and slightly east).

First a comparison of daily rainfall totals was made from the available data to assess the similarity in rainfall amounts between the two stations. Daily data from 1969 to 2003 was screened to keep the 24-hour totals with measured rainfall at both stations, which eliminated missing data at either station. Correlation of the 24-hour rainfall totals is shown in Figure B-2.

Figure B-1: Location of Newhall Rain Gauges in the Vicinity of the Project Area

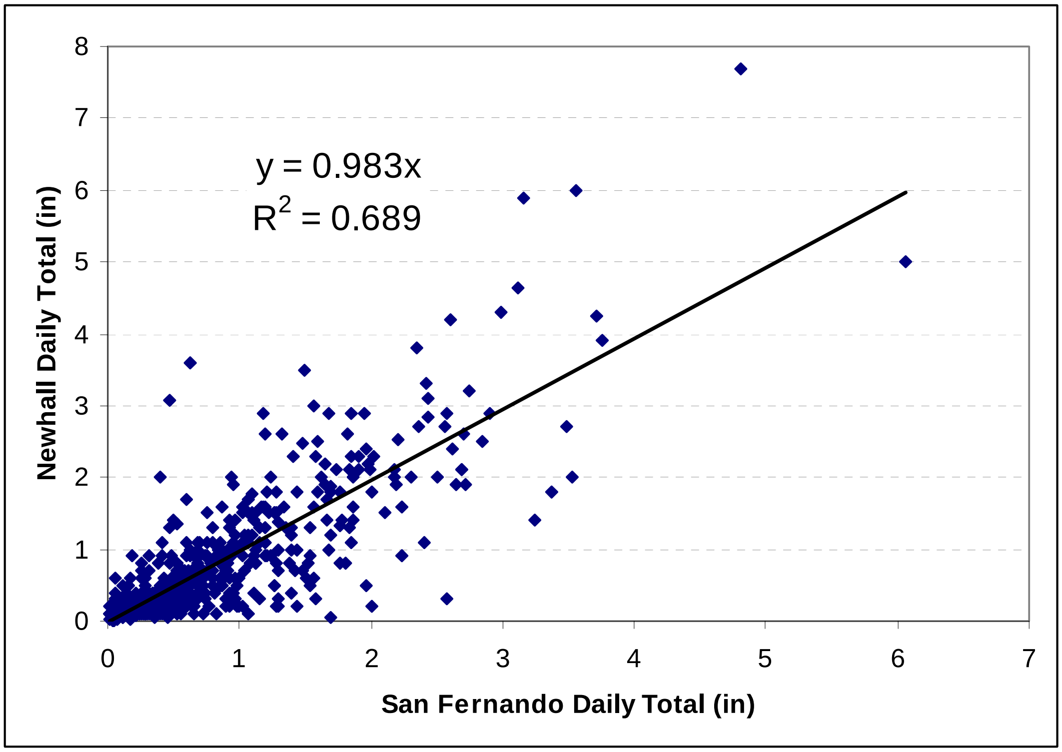

Figure B-2: Correlation of 24-hour Totals Newhall & San Fernando 3 Gauges

The correlation is reasonably strong considering that the comparison is between the daily accumulations, i.e. a storm could result in appreciable rainfall at one gauge and little rainfall at the other. This comparison indicates that precipitation depths are similar between the two gauges. Another comparison was made using only months with a complete rainfall record and measured rainfall at both stations. This correlation was much stronger due to the longer time period.

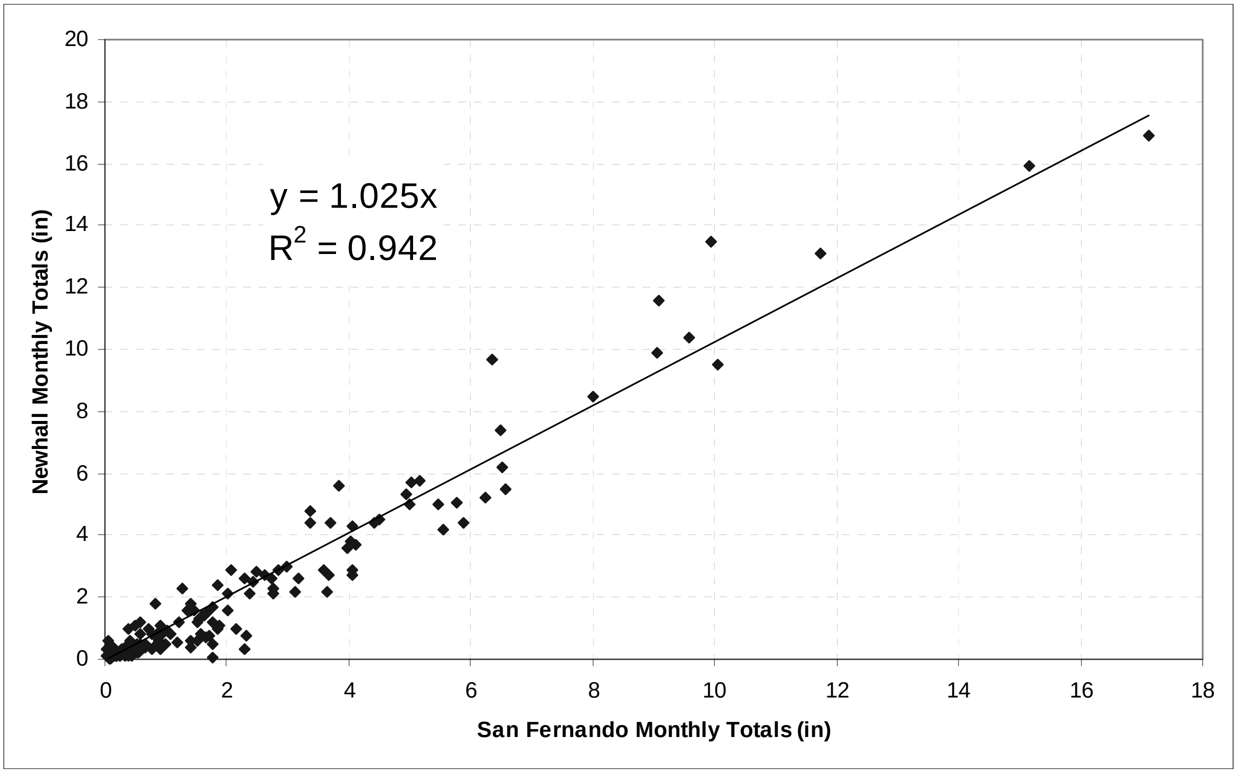

Figure B-3: Correlation of Monthly Totals Newhall & San Fernando 3 Gauges

The linear regression of daily rainfall totals (Figure B-2) has greater variability due to the shorter time period than regression of the monthly totals which indicates slightly higher rainfall amounts (Figure B-3) at the Newhall gauge compared to the San Fernando gauge. Hourly rainfall data from the San Fernando gauge were used to fill in the missing periods of rainfall data at the Newhall gauge using a multiplier of 1.025 and rounding to the nearest 1/100 inch after the adjustment.

Rainfall analysis was conducted for all storm events and for the storms that are expected to contribute to stormwater runoff (storms >0.1 inches). The rainfall data were analyzed using code similar in performance to EPA's Synoptic Rainfall Analysis Program (SYNOP). The customized code (GeoSYNOP) was used as it provide information on missing periods of data and is more robust when handling the date and time of storms. GeoSYNOP subdivides the rainfall record into discrete events separated by a dry inter-event period, which in this case was set to a minimum of 6 hours. Small rainfall events whose depth was less than or equal to 0.10

inches were deleted from the record as such events tend to produce little if any runoff (for the second analysis in Table B-1). For the Newhall gauge, a total of 538 storm events (>0.1 inches) were segregated from the continuous data.

Rainfall analysis was conducted with the original rainfall data and the augmented data in order to asses if the additional of data affected the storm statistics. Filling in the rainfall record should result in a small increase in the number of storms per year and the average annual rainfall, but should not substantially change the storm statistics.

Table B-1: Analysis Results for the Actual and Filled Newhall Rainfall Data

Storms	Newhall Gauge 1969 – 2003	Original Record	Augmented Record
	Total Missing Records (days):	427	52
All Storms	Average annual rainfall (in):	17.4	18.8
	Total number of storms:	840	890
	Average number of storms per year:	24.0	25.4
	Average storm volume (in):	0.72	0.74
	Average storm duration (hrs):	6.87	7.35
	Average storm intensity (in/hr):	0.103	0.101
Storms >0.1 inch	Average annual rainfall (in):	16.2	17.9
	Total number of storms:	493	538
	Average number of storms per year:	14.1	15.4
	Average storm volume (in):	1.15	1.16
	Average storm duration (hrs):	11.0	11.5
	Average storm intensity (in/hr):	0.107	0.105

Comparison of the results for the original and constructed records shows that the storm statistics do not change substantially, particularly for the second analysis using only storms greater than 0.1 inches depth which are used in the water quality model to predict stormwater runoff. Storms less than or equal to 0.1 inches depth were screened as these small storms typically do not contribute to runoff (USEPA, 1989; Schuler, 1987). The augmented record for the Newhall gauge was used for both hydrologic (e.g. estimating BMP percent capture) and water quality modeling.

B.2.2. Runoff Coefficients

B.2.2.1. SWMM Runoff Coefficient Modeling Parameters

The Monte-Carlo Water Quality model uses a linear equation to estimate a runoff coefficient for sub-basins as a function of the percent imperviousness. The runoff coefficient equation parameters (coefficient and intercept) were estimated with the SWMM model in an effort to more accurately reflect the Landmark Village Project site conditions. The majority of the SWMM modeling parameters are shown in Table B-2.

Table B-2: SWMM Runoff Module Parameters

SWMM Runoff Parameters	Units	Values
Wet time step	Seconds	600
Wet/dry time step	Seconds	600
Dry time step	Seconds	14,400
Impervious Manning's n		0.012
Pervious Manning's n		0.25
Drainage area modeled for Rv determination	acres	10
Shape		Rectangular, 500 ft flow path length for pervious areas, 250 ft flow path length for impervious area
Impervious Fractions Modeled		0%, 33.3%, and 100%. See Table B-3 for specific runoff block dimensions.
Slopes	Ft/ft	0.02, project area is relatively flat.
Evaporation	In / month	80% of reference ET values contained in Table B-5 were used for the existing site conditions to reflect agricultural uses and the post-development project condition.
Soil properties / infiltration		Green-Ampt soil parameters as contained in Table B-4.
Depression storage, impervious	Inches	0.02, based on Table 5-14 in SWMM manual
Depression storage, pervious	Inches	0.06, based on Table 5-14 in SWMM manual
Initial Soil moisture deficit		0.32 (porosity – moisture content)

Runoff path lengths will affect the ET that occurs and subsequent runoff volumes; the longer the runoff path length the greater the reduction in runoff volumes (evaporation losses from impervious surfaces, ET and infiltration losses from pervious surfaces). For consistency in model runs (e.g., flow path lengths), three scenarios were modeled as shown in the Table B-3. The modeled impervious fractions were chosen to result in consistent runoff path lengths and depths of runoff from pervious and impervious surfaces relative to the 659 inches of rainfall for the period of record that was simulated.

Table B-3: SWMM Runoff Block Modeled Percent Impervious Values

Area (ac)	% Impervious	SWMM Width (ft)	Pervious Flow Length (ft)	Pervious Flow Length (ft)
10	0	871	500	0
10	33.3	581	500	250
10	100	1742	0	250

Some soils in the vicinity of the project area have been classified as sandy-loam soils deposited by the Santa Clara River (R.T. Frankian & Associates, 2001). Soils in the Landmark Village Project area were conservatively modeled with infiltrative capacity comparable to silt-loam soils, resulting in little surface runoff for the existing condition and a conservative estimate for the developed condition when further reducing the hydraulic conductivity by 25 percent to account for compaction. The Green-Ampt soils properties used for the SWMM modeling are shown in Table B-4.

Table B-4: Green-Ampt Soil Parameters

Soil Texture Class	Suction Head (cm)	Ks (cm/hr)	Suction Head (in)	Ks (in/hr)
Silt Loam – Existing Condition	16.68	0.68	6.57	0.27
Silt Loam – Developed Condition	16.68	0.51	6.57	0.20

Soil properties estimated from information contained in Table 5.5.5 of the Handbook of Hydrology (Maidment, ed. 2003)

Reference ET values for estimating actual ET rates was taken from Figure B-4 produced by the California Department of Water Resources. The Landmark Village Project site is located in zone 14. Reference ET values for zone 14 are reproduced in Table B-5.

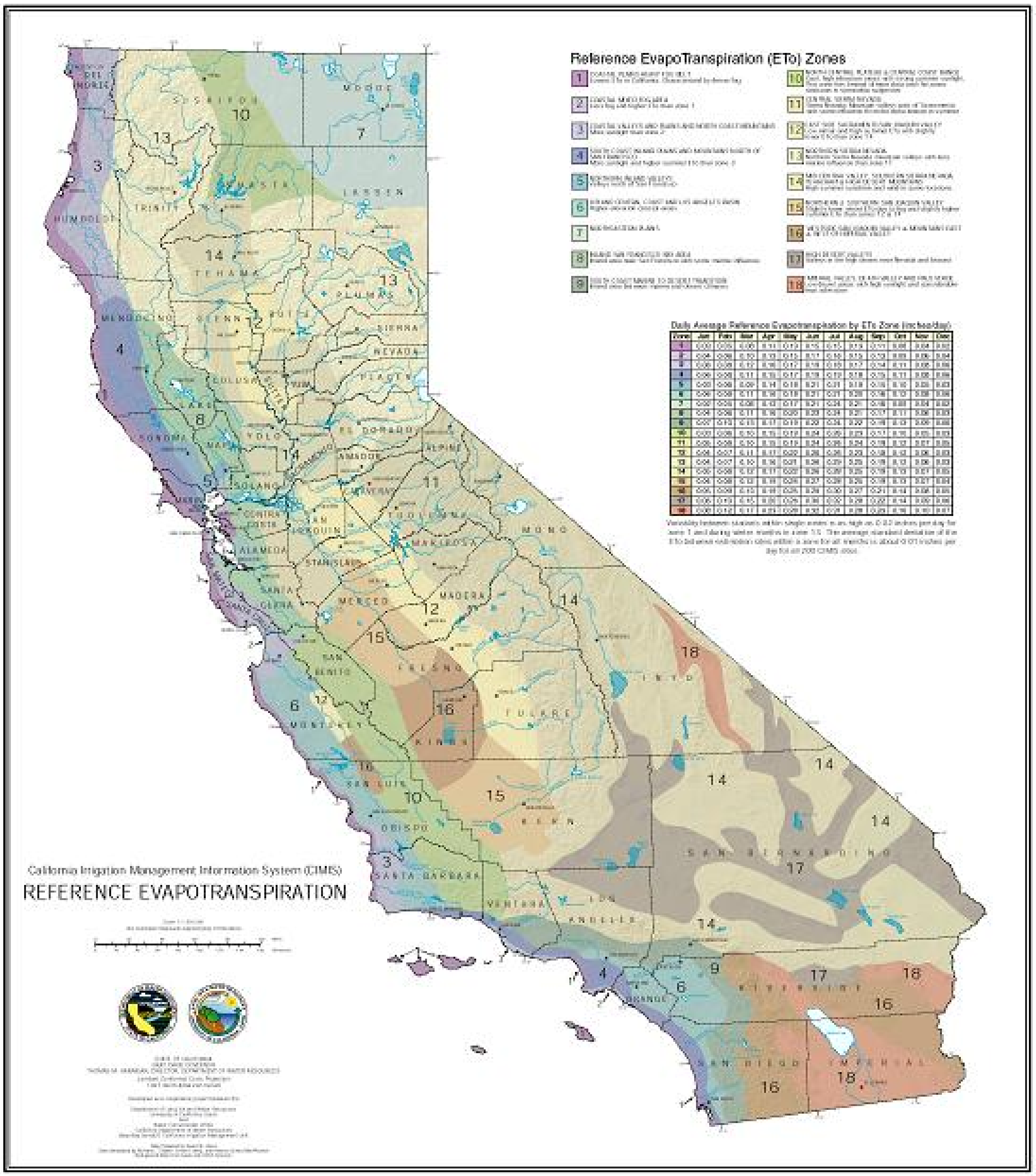

Figure B-4: Reference ET for CA Zones

Existing site conditions consist of agricultural row crops, both irrigated and dry farming. To represent average existing site conditions, 80% of the reference ET values were used to reflect dry farming crops with lower water requirements and irrigated farming with slightly higher evapotranspiration rates. Eighty percent of the reference ET values were also used to simulate the landscaped areas in the post-development condition.

Table B-5: Evaporation Parameters for Hydrology Model (from CA ETo map)

Month	Evapotranspiration Rates			80%
	Inch / day	Days / month	Inch / Month	Inch / Month
January	0.05	31	1.55	1.24
February	0.08	28	2.24	1.79
March	0.12	31	3.72	2.98
April	0.17	30	5.1	4.08
May	0.22	31	6.82	5.46
June	0.26	30	7.8	6.24
July	0.28	31	8.68	6.94
August	0.25	31	7.75	6.2
September	0.19	30	5.7	4.56
October	0.13	31	4.03	3.22
November	0.07	30	2.1	1.68
December	0.05	31	1.55	1.24
	Total	365	57.04	45.63

B.2.2.2. SWMM Runoff Coefficient Results

Figure B-5 displays the SWMM results for the existing conditions of the Project site and Figure B-6 displays the SWMM results for the developed project conditions.

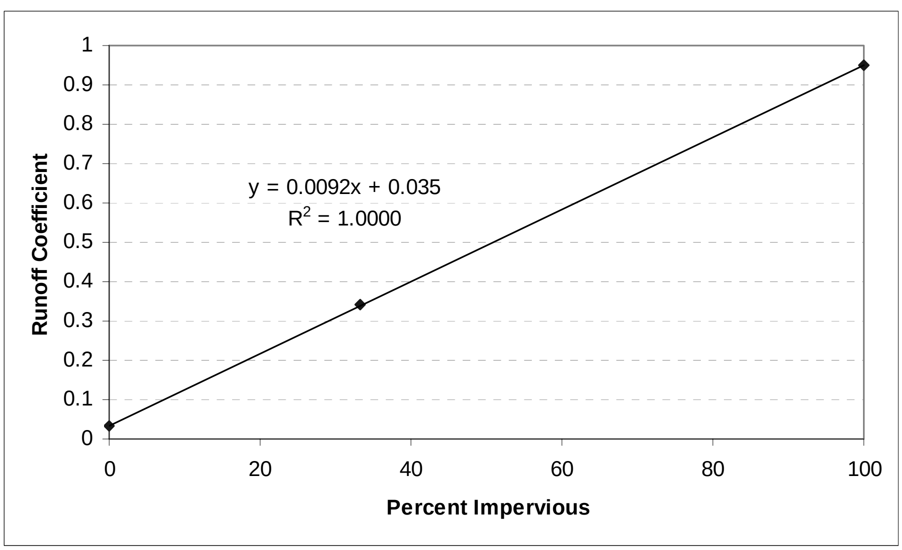

Figure B-5: Existing Conditions Runoff Coefficient Equation

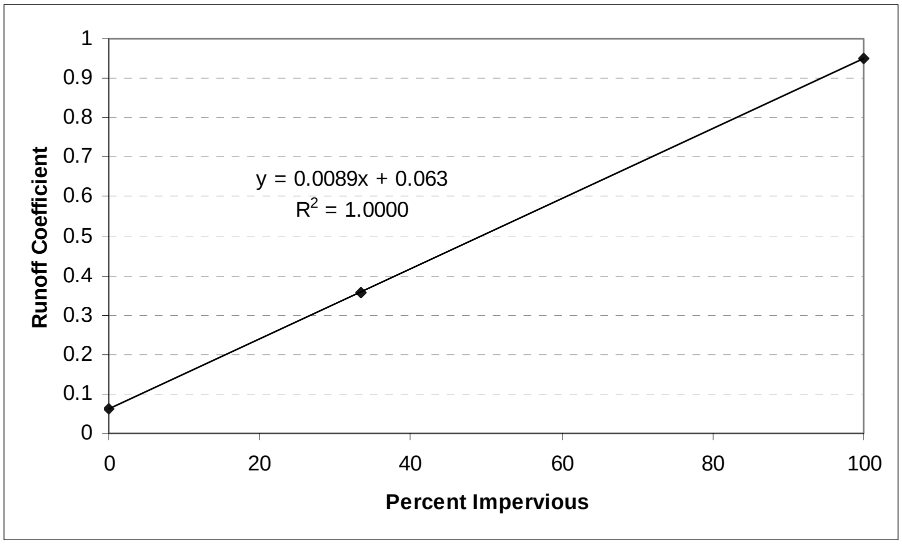

Figure B-6: Developed Conditions Runoff Coefficient Equation

The intercept was rounded to three decimal places resulting in the following equations used to estimate runoff coefficients in the water quality model as a function of imperviousness

- Existing Conditions: Runoff Coefficient = 0.0092 × % Impervious + 0.035
- Developed Conditions: Runoff Coefficient = 0.0089 × % Impervious + 0.063

B.2.3. Land Use

The delineation of land uses and areas within Landmark Village were determined from the Vesting Tentative Tract Map No. 53108 for the developed Project conditions. The existing and developed conditions of the Project and associated off-site areas are summarized in Table B-6 and Table B-7 respectively.

Included in the water quality analysis are 103.6 acres of off-site project areas. The section of State Route 126 (SR126) adjacent to the Landmark Village Project area will undergo widening, which will increase the area of this section of SR126 from 72.8 to 95.6 acres. Four water tanks and access roads will be located near the project. The required area for the water tanks was conservatively estimated at 2 acres per tank and access road, as detailed information is not yet available. Modeled areas for SR126 are shown in Table B-6.

Table B-6: Existing Conditions Project & Off-site Areas

Land Use	Development Area		
	Project Site	Off-Site	
		SR126	Water Tanks
Row Crops	292.6		
Roads		72.8	
Open Space		22.8	8
Total	292.6	95.6	8

Table B-7: Developed Conditions Project & Off-site Areas

Land Use	Development Area		
	Project Site	Off-Site	
		SR126	Water Tanks
Single family	50		
Multi-family	60.7		
Apartments	21		
Commercial	36.5		8
Elementary School	9		
Parks	16.1		
Recreation Centers	5.2		
Trails & Misc.	38.3		
Roads	55.8	95.6	
Total	292.6	95.6	8

Error! Not a valid bookmark self-reference. provides the modeled land uses and percent impervious values used to represent the existing and developed project and off-site conditions. The modeled land uses were based on the most representative land use within the available data sets (see Section B.2.4). If a representative land use was not available from the monitored land uses (Section B.2.4), then a conservative land use was used. For example, the water tanks and associated access roads will have very low traffic and are not expected to result in appreciable pollutant loads in stormwater runoff. The commercial land use, while expected to be very conservative for representing the water tanks and access roads, is believed to most closely simulate these types of land uses and was therefore selected to represent runoff from these areas.

Table B-8: Modeled Land Uses, Percent Imperviousness, & Data Source

Land Use	Modeled Percent Impervious	Modeled Land Use
Row Crops	15%	Agriculture
Single family	42%	Single Family Residential
Multi-family	68%	Multi-family Residential
Apartments	68%	Multi-family Residential
Commercial	92%	Commercial
Elementary School	82%	Education
Parks	15%	Open Space
Recreation Centers	15%	Open Space
Trails & Misc.	5%	Open Space
Roads	100%	Transportation

[1] Percent impervious values are based on the LA County Hydrology Manual.

B.2.4. Stormwater Runoff Pollutant Concentrations

Stormwater monitoring data collected by the Los Angeles Department of Public Works was used to estimate pollutant concentrations for urban land uses. The existing conditions of the Landmark Village Project site contain agricultural uses. Stormwater monitoring data collected by Ventura County was used to estimate stormwater pollutant concentrations for agricultural land use.

B.2.4.1. Los Angeles County Monitoring Data

More recent and more regional land-use based stormwater quality monitoring data was collected through the LA County Stormwater Monitoring Program. This program was initiated with the goal of providing technical data and information to support effective watershed stormwater quality management programs in Los Angeles County. Specific objectives of this project included monitoring and assessing pollutant concentrations from specific land uses and watershed areas. In order to achieve this objective, the County undertook an extensive stormwater sampling project that included eight land use stations and five mass emission stations, which were tested for 82 water quality parameters. These data are presented in *Los Angeles County 1994-2000 Integrated Receiving Water Impacts Report, 2000* and *Los Angeles County 2000-2001 Stormwater Monitoring Report, 2001*.

Stormwater quality was estimated with the recent EMC data collected by LA County (LA County, 2000) in the water quality models for Newhall Ranch and the Landmark Village sub-division. These data were used because of the relatively close location to the project site and because the monitored land uses were representative of the proposed land uses for the Newhall

Ranch Project. The land uses stations available through monitoring conducted by LA County used to develop stormwater quality parameters for the modeling are listed in Table B-9 with a brief description of the site and the years monitoring data have been collected.

Table B-9: LA County Land Use Monitoring Stations Available for Water Quality Modeling

Station Name	#	Modeled Land Use	Site Description[1]	Years Monitoring Conducted
Santa Monica Pier	S08	Commercial	The monitoring site is located near intersection of Appian Way and Moss Avenue in Santa Monica. The storm drain discharges below the Santa Monica Pier. Drainage area is approximately 81 acres. The Santa Monica Mall and Third St. Promenade dominate the watershed with remaining land uses consisting of office buildings, small shops, restaurants, hotels and high-density apartments.	1995-1999
Sawpit Creek	S11	Open Space (& Parks)	Located in Los Angeles River watershed in City of Monrovia. The monitoring station is Sawpit Creek, downstream of Monrovia Creek. Sawpit Creek is a natural watercourse at this location. Drainage area is approximately 3300 acres.	1995-2001
Project 620	S18	Single Family Residential	Located in the Los Angeles River watershed in the City of Glendale. The monitoring station is at the intersection of Glenwood Road and Cleveland Avenue. Land use is predominantly high-density, single-family residential. Drainage area is approximately 120 acres.	1995-2001
Dominguez Channel	S23	Freeway (Roadways)	Located within the Dominguez Channel/Los Angeles Harbor watershed in Lennox, near LAX. The monitoring station is near the intersection of 116th Street and Isis Avenue. Land use is predominantly transportation and includes areas of LAX and Interstate 105.	1995-2001
Project 474	S25	Education (Schools)	Located in Los Angeles River watershed in the Northridge section of the City of Los Angeles. The monitoring station is located along Lindley Avenue, one block south of Nordoff Street. The station monitors runoff from the California State University of Northridge. Drainage area is approximately 262 acres.	1997-2001
Project 404	S26	Multi-Family Residential	Located in Los Angeles River watershed in City of Arcadia. The monitoring station is located along Duarte Road, between Holly Ave and La Cadena Ave. Drainage area is approximately 214 acres.	1997-2001

1) Los Angeles County 1999-2000 Draft Stormwater Monitoring Report (Los Angeles County, 2000)

B.2.4.2. Ventura County Monitoring Data

As part of its NPDES permit, the Ventura County Flood Control District conducts stormwater monitoring to determine water quality of stormwater runoff from areas with specific land uses. Land use monitoring is designed to capture stormwater discharge from a specific type of land use. The usefulness of the urban runoff data collected by Ventura County was limited as the monitoring only included industrial and residential land uses and did not specify between types of residential development (i.e. single- or multi-family and housing density). One monitoring station, Wood Road at Revolon Slough (site A-1), drains the approximately 350 acre Oxnard Agricultural Plain, which is comprised almost entirely of agricultural land (primarily row crops), including a small number of farm residences and ancillary farm facilities for equipment maintenance and storage. Data from the Wood Road station was used to estimate pollutant concentrations in stormwater runoff for agricultural land use.

Land use runoff sampling for the Ventura County stormwater monitoring program originally began during the 1992/93 monitoring season, with up to several samples collected at each site during each storm season to support the monitoring and reporting program required by their MS4 permit. For the A-1 site, the period of record begins during the 1996/97 storm season, and continues through the 2003/04 season. All land use monitoring sites are equipped with automated monitoring equipment, including flowmeters (with area-velocity probes and level sensors) and refrigerated auto-samplers which enable the collection of flow-weighted composite samples. Stormwater quality monitoring data for the agricultural land use site was provided by the Ventura County Watershed Protection District. This information was extracted from their water quality database, which contains monitoring data for their land use, mass emission, and receiving water monitoring sites.

B.2.4.3. Data Analysis for Derivation of Land Use EMCs

The County of Los Angeles Department of Public Works (LADPW) has monitored stormwater runoff quality from various land uses throughout the County on an annual basis beginning in 1995 through 2001. For each year of monitoring several storm EMCs are reported and included in the County's annual water quality report to the Los Angeles Regional Water Quality Control Board. The convention for dealing with the censored data (e.g., data only known to be below the analytical detection limit) is to substitute ½ of the detection limit for all non-detects. L.A. County has followed this convention when providing summary arithmetic statistics of the stormwater monitoring data. This method tends to introduce bias into the estimate of the mean and standard deviation and the summary statistics are not believed to be robust or adequately account for non-detects. To further complicate matters, the detection limit for dissolved copper and total lead has changed during the period stormwater monitoring was conducted by LADPW.

In an effort to provide more reliable and accurate estimates of land use EMCs for the Landmark Village water quality modeling, a robust method of estimating descriptive statistics for censored data with multiple detection limits was employed. The plotting position method described in Helsel and Cohn (1988) was used to estimate censored values using the distribution of uncensored values. Descriptive statistics were then estimated using the parametric bootstrap method suggested by Singh, Singh, and Engelhardt (1997).

Example Data Set

To illustrate the statistical methods used to obtain land use EMCs, the LADPW stormwater monitoring data collected for total lead from the transportation land use station is used. The data were collected from 01/1996 to 04/2001. At the beginning of March 1997 the detection limit for total lead changed from 10 to 5 µg/L. Table B-10 describes the data according to the number of censored and uncensored values in the example data set.

Table B-10. Number of Censored and Uncensored Data Points in the Total Lead Transportation Land Use Data Set

Total Lead EMC Data for Transportation Land Use	
Uncensored	37
Censored < 10 µg/L	2
Censored < 5 µg/L	38
Total Data Count	77

Prior to applying the plotting position method, it is necessary to check the normality of the data. Figure B-7shows histograms and probability plots of the transportation land use total lead data above detection limits in normal and lognormal space. The lognormal distribution fits the data set more closely than the normal distribution.

To verify the visual check that the data are lognormally distributed, the Shapiro-Wilk goodness-of-fit test was used (Royston 1992). In this test, if $p > 0.1$, the null hypothesis that the log data follow a normal distribution cannot be rejected. For this example data set, the p-value of the log-transformed uncensored data is 0.293, which indicates that lognormal distribution is a good approximation of the distribution of the data set.

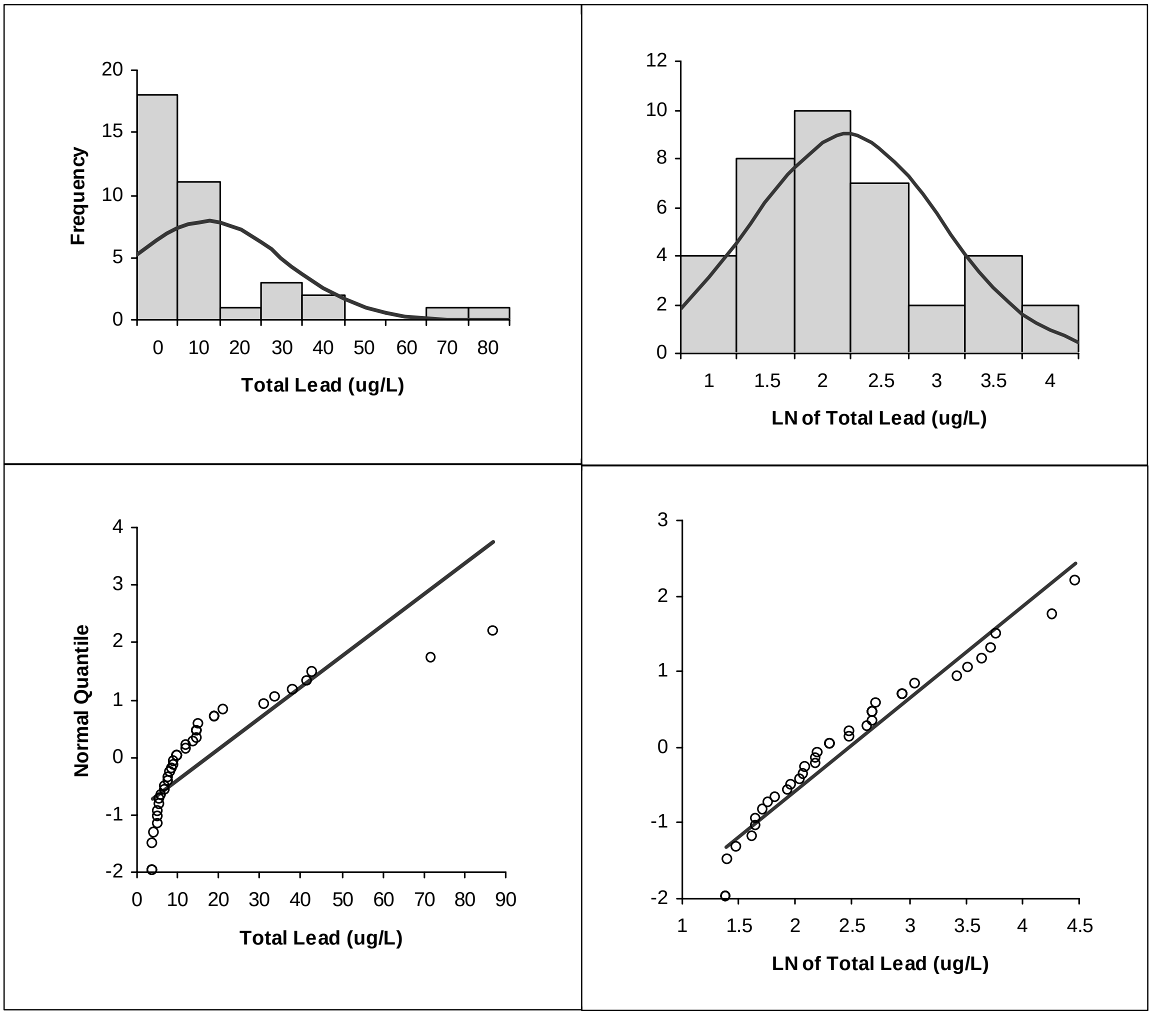

Figure B-7: Histograms and Probability Plots of Transportation Total Lead Data in Arithmetic and Lognormal Space.

Method for Dealing with Multiple Detection Limits

To account for the multiple detection limits in the censored data sets, a regression on order statistics (ROS) method was employed. ROS is a category of robust methods for estimating descriptive statistics of censored data sets that utilize the normal scores for the order statistics (Shumway et al. 2002). The plotting position method by Hirsch and Stendinger (1987) (summarized by Helsel and Cohn, 1988) was the ROS method used. In this method, plotting positions are based on conditional probabilities and ranks, where the ranks of the censored (below detection) and uncensored data (above detection) related to each detection limit are ranked independently. The method is summarized in the equations below.

After plotting positions for the censored and uncensored values have been calculated, the uncensored values are plotted against the z-statistic corresponding to the plotting position and the best-fit line of the known data points is derived. Using this line and the plotting positions for the uncensored data, the values for the uncensored data are extrapolated. Figure B-8 illustrates the results the application of the plotting position method on the total lead data for transportation land use.

$$pe_j = pe_{j+1} + \frac{A_j}{(A_j + B_j)} \times (1 - pe_{j+1}) \qquad (1)$$

Where:

A_j = the number of uncensored observations above the j detection limit and below the j +1 detection limit.

B_j = the number of censored and uncensored observations less than or equal to the j detection limit.

pe_j = the probability of exceeding the j threshold for j = m, m -1, … 2, 1 where m is the number of thresholds; by convention pe_{m+1} = 0.

Equation 2 was used for plotting the uncensored data and equation 3 was used for the plotting censored data; the plotting positions of the data were calculated using the Weibull plotting position formula.

$$p(i) = (1 - pe_j) + \frac{(pe_j - pe_{j+1}) \times r}{(A_j + 1)} \qquad (2)$$

Where:

p(i) = the plotting position of the uncensored i data point.

r = the rank of the i observation of the A_j observations above the j detection limit.

$$pc(i) = \frac{(1 - pe_j) \times r}{(n_j + 1)} \qquad (3)$$

Where:

pc(i) = the plotting position of the censored i data point.

r = the rank of the i observation of the n_j censored values below the j detection limit.

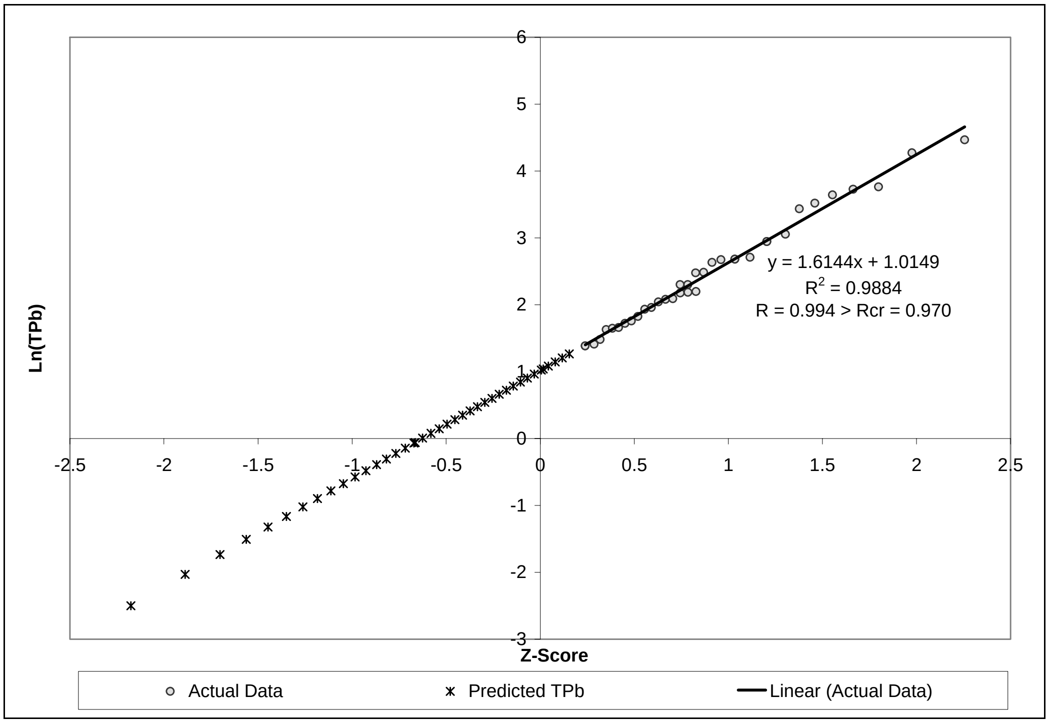

Figure B-8: Probability Plot of the Uncensored and Predicted (Censored) Total Lead Transportation EMCs

Method for Calculating Descriptive Statistics

After the censored data are estimated (or for datasets without non-detects), descriptive statistics were computed using the bootstrap method (Singh et al. 1997). The bootstrap method samples from the data set with replacement several thousand times and calculates the desired descriptive statistics from the sampled data. The steps of the bootstrap estimation method are described below.

1. Take a sample of size *n* with replacement (the sampled data point remains in the data set for subsequent sampling) from the existing data set (Singh et al. recommends n be the same size as the original data set, this recommendation was followed for the analysis) and compute the descriptive statistic, θ_i, from the sampled data.
2. Repeat Step 1 independently N times (10,000 for this analysis) each time calculating a new estimate for θ_i.
3. Calculate the bootstrap estimate θ_B by averaging the θ_i's for i=1 to N

Fundamentally, the bootstrap procedure is based on the Central Limit Theorem (CLT), which suggests that even when the underlying population distribution is non-normal, averaging produces a distribution more closely approximated with normal distribution than the sampled distribution (Devore 1995). Figure B-9 compares the total lead data after estimating censored values using the ROS method described prior to applying the bootstrap method with bootstrapped means of the ROS data. Note the bootstrap means are more normally distributed than the original data and the central tendency of the data is centered near 8 ug/L.

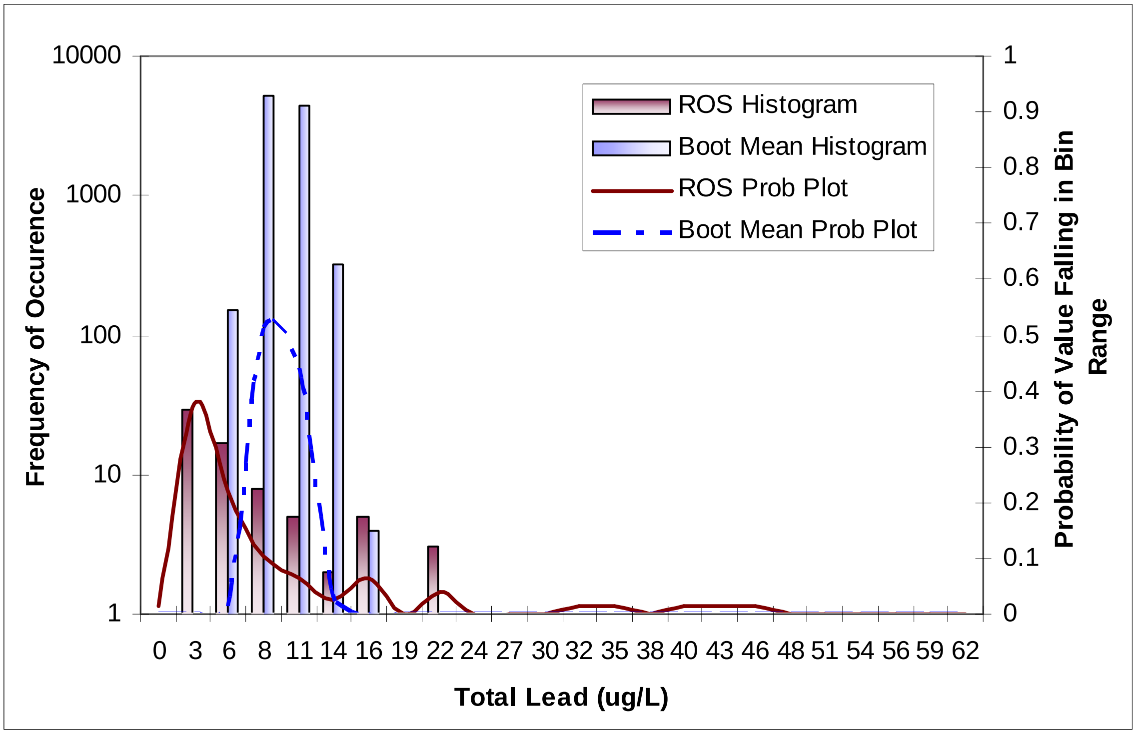

Figure B-9: Comparison of the Distribution of ROS Method Total Lead Data and the Bootstrap Means of the ROS Data.

The majority of the LADPW stormwater monitoring for the pollutant land use combinations analyzed fit a lognormal distribution. The data that did not statistically fit the lognormal distribution were more closely approximated with a lognormal distribution than a normal distribution. The bootstrap method was applied differently depending on the distributional fit of the data. If the pollutant EMC data for a particular land use fit a lognormal distribution according to the Shapiro-Wilk goodness-of-fit test, the log-transformed data were bootstrapped and an estimate of the mean and standard deviation were obtained in log space and then converted to arithmetic space. The assumption of lognormality was more stringently applied than normal by using an alpha significance value of 0.1. This was done to improve the estimate of the standard deviation when the hypothesis of lognormality is rejected. When analyzing data in log space there is a tendency to overestimate the standard deviation for relatively symmetric data and underestimate the standard deviation for severely skewed data. For datasets that did not fit the lognormal distribution, the raw data were bootstrapped to obtain the mean and standard deviation statistics. Bootstrapping the data in arithmetic space assumes no distribution in those instances when a distribution could not be confirmed through goodness-of-fit testing.

Conclusions

The plotting position method for multiple detection limits has been used in conjunction with the bootstrap procedure for calculating the descriptive statistics used to represent pollutant EMC distributions in the water quality model. If the uncensored data were determined to be lognormally distributed with less than 50% of the data below the detection limit (censored), the bootstrap procedure was coupled with lognormal theory (i.e. data were log transformed prior to the bootstrap analysis). Otherwise, the original data plus the estimates of the censored data were analyzed in arithmetic space to calculate the arithmetic mean and standard deviation. Table B-11 summarizes the lognormal descriptive statistics of the modeled pollutants and land uses that are used directly by the Monte Carlo water quality model for estimating land use specific pollutant EMCs.

Table B-11: Lognormal Statistics for Modeling Pollutants Concentrations from Land Uses.

Land Use		TSS	TP	NH3	NO3	NO2	TKN	Diss Cu	Tot Pb	Diss Zn	Cl
Commercial	Mean	3.966	-1.242	-0.832	-0.884	-2.721	0.711	2.210	1.292	4.778	3.043
	St. Dev	0.609	0.680	1.218	0.635	1.060	0.804	0.685	1.389	0.703	1.226
Education	Mean	4.097	-1.375	-1.838	-0.750	-3.127	0.296	2.163	0.777	4.121	2.380
	St. Dev	0.923	0.515	1.111	0.626	1.177	0.604	0.733	0.891	0.531	1.264
Transportation	Mean	3.935	-1.229	-1.271	-0.687	-3.011	0.345	2.806	1.902	4.783	1.261
	St. Dev	0.834	0.992	0.608	0.749	1.056	0.654	1.116	0.631	1.040	0.998
Multi-Family Residential	Mean	3.144	-1.788	-1.208	-0.180	-2.932	0.346	1.768	0.812	3.965	2.124
	St. Dev	0.920	0.728	0.886	0.930	1.102	0.556	0.576	0.985	0.707	1.119
Single Family Residential	Mean	4.178	-1.170	-1.248	-1.219	-3.198	0.734	1.869	1.762	2.392	1.440
	St. Dev	1.026	0.640	0.964	1.274	1.191	0.747	0.783	0.997	1.085	0.570
Agriculture (Ventura County)	Mean	6.754	0.990	0.338	2.519	-2.120	1.948	2.839	3.015	3.252	3.666
	St. Dev	0.551	0.469	0.712	0.460	0.000	0.380	0.536	0.763	0.847	0.689
Vacant / Open Space	Mean	3.342	-3.060	-3.075	-0.033	-3.976	-0.458	-2.573	-1.246	1.293 [1]	1.864
	St. Dev	1.859	1.064	0.811	0.548	0.459	0.784	1.505	1.616	1.312	0.226

1 – Dissolved zinc for open space was estimated from the total zinc analysis of LADPW monitoring data. Four data points for dissolved and total zinc from the National Stormwater Quality Database gave an average ration of dissolved to total zinc of 50 percent. For the open space land uses the variation of dissolved zinc was assumed to equal that of total zinc (i.e. same standard deviation) and the lognormal mean was set to give an average concentration of 8.6 ug/L for the open space land use, half of the average total zinc concentration of 17.2 ug/L.

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Table B-12: Resulting Arithmetic Means from Lognormal Statistics for Modeling Pollutant Concentrations

Land Use	TSS	TP	NH3	NO3	NO2	TKN	Diss Cu	Tot Pb	Diss Zn	Cl
Commercial	63.5	0.364	0.913	0.505	0.115	2.81	11.5	9.55	152	44.5
Education	92.1	0.289	0.295	0.575	0.088	1.61	11.4	3.23	70.9	24.0
Transportation	72.4	0.478	0.338	0.666	0.086	1.75	30.8	8.17	205	5.80
Multi-Family Residential	35.4	0.218	0.442	1.29	0.098	1.65	6.92	3.66	67.7	15.6
Single Family Residential	110	0.381	0.457	0.665	0.083	2.75	8.81	9.57	19.7	4.97
Agriculture (Ventura County)	998	3.00	1.81	13.8	0.120	7.54	19.7	27.3	37.0	49.6
Vacant / Open Space	159	0.083	0.064	1.12	0.021	0.860	0.237	1.06	8.61	6.62

B.2.5. Treatment System & Estimate of Treatment BMP Performance Parameters

The majority of the Landmark Village Project and the associated off-site areas will be treated with biofiltration BMPs consisting of vegetated swales or bioretention areas. A smaller portion of the Project area will be treated in an extended detention basin.

Vegetated swales are flow-based BMPs, which do not require as much space as volume-based bioretention areas, which are designed to store and infiltrate a volume of runoff. Bioretention BMPs will be used where sufficient space is available as this type of BMP will achieve higher pollutant removal rates than vegetated swales due to the filtration of stormwater runoff through vegetation and the underlying soil, rather than the vegetation alone. The International BMP Database (ASCE, 2003) combines data from biofiltration BMPs, therefore the bioretention BMPs were conservatively modeled with the same effluent concentrations as the vegetated swales (see Section B.2.5.2) although expected performance would be higher. Due to the available BMP data resulting in analogous performance parameters for bioretention and vegetated swale BMPs, the majority of the Project area and all of the associated off-site areas were modeled as receiving the equivalent of vegetated swale treatment.

BMP performance is a function of the fraction of stormwater runoff receiving treatment (percent capture) and the effectiveness of removing pollutants from the treated stormwater. Capture efficiency calculations are discussed in Section B.2.5.1, and pollutant removal estimates are described in Section B.2.5.2.

B.2.5.1. BMP Capture Efficiency

The modeled treatment BMPs were analyzed as flow or volume-based. Different methods were used to calculate the capture efficiency of each type of BMP as discussed below.

B.2.5.1.1. Volume-based BMP Capture Efficiency

The GeoSYNOP program has the ability to provide descriptive statistics of storm events, based upon analysis of hourly rainfall records. Included in these statistics is the dry time between storms. This information, along with the storm depths and drainage rates of the volume-based BMP (water quality basin), was used to estimate the capture efficiency (the fraction of stormwater receiving treatment) of the water quality extended detention basin for each storm in the period of record for use as inputs in the water quality model. The percent capture calculations for the water quality basins were made with the following steps.

Step 1 – Estimate Runoff Volumes for Each Storm in the Period of Record Modeled

The runoff volume for each storm in the period of record (538 storms) was calculated for the tributary area draining to the water quality basin. The augmented Newhall gauge data was used in order to provide a conservative estimate which accounts for all (probable) storms and results in slightly lower capture efficiency than the Newhall data alone. This is due to the addition of some fairly large storms through correlation with the San Fernando gauge and a few more storms with short inter-event times.

Step 2 – Determine the BMP Storage Capacity

Next, the available storage capacity of the water quality basin was calculated for each storm. If the time from the preceding storm was equal to or larger than 48 hours, the draw down time for the water quality basin, then the BMP was considered empty at the time of the storm.

If the time between storms was less than 48 hours, then the capture volume was calculated to account for the size of the previous storm and the dry period between storms. This is done to account for insufficient time for the water quality basins to completely empty before the next storm arrived. If the volume of stormwater runoff to the water quality basin from the previous storm was larger than the storage capacity of the water quality basin, then the basin was assumed to have filled completely and the initial storage capacity (*ISC*) in equation 4 was zero.

If the runoff volume (for a storm occurring less than 48 hours prior to the storm of interest) was less than the storage capacity of the BMP, then the difference between the storage capacity of the BMP and the runoff volume from the previous storm was considered available to capture runoff from the next storm. This volume was then added to the storage capacity created from outflow from the basin during the time of the storms as shown in equation 4.

$$TC = ISC + [BV \times DD \times T] \qquad (4)$$

Where:

- TC = the treatment capacity (ft^3) of a water quality basin available to capture runoff over the duration of a storm
- ISC = the remaining storage volume after previous event (ft^3), initial storage capacity for storm of interest
- BV = the water quality basin volume (ft^3)
- D = the draw down rate of water quality basin in percent per hour (hr^{-1}), 2.08% per hour for a 48 hour draw down time.
- T = the storm duration (hr)

The above equation accounts for storage capacity that is created during emptying of the water quality basin while a storm occurs. That is, during long duration storms more runoff can be processed through the water quality basin than for a short storm of comparable rainfall intensities and runoff rates. This method has produced percent capture results that consistently are in close agreement with the overall results from EPA's Stormwater Management Model (SWMM), which are used to verify the results from this method.

Step 3 – Determine Water Quality Basin Percent Captures for Storms

The storage capacity estimated from step 2 is compared to the runoff volume estimate from step 1. If the storage capacity exceeds the storm runoff volume then the storm is considered to be completely (100%) captured. If the storage capacity is less than the runoff volume a volume of runoff equal to the storage capacity is considered treated by the water quality basin. The percent capture for each storm estimated for each water quality basin is used in the Monte-Carlo model to calculate pollutant removals in the modeled BMPs.

Step 4 – Verify Percent Capture Estimates with SWMM

The above method is used as it provides an efficient method for estimating percent capture for each storm in the period of record, which is an input to the water quality model. SWMM is used to verify the results as it is considered to be more accurate than the above method due to the continuous simulation capability and the use of more detailed input parameters.

A SWMM run is conducted to simulate the drainage area (as described in Section B.2.2) tributary to the modeled BMP. The storage treatment block in SWMM is used to simulate the dry-extended detention basin through input of stage-discharge curve information. The SWMM results are then compared to the average annual results derived from the method above to verify that they are reasonably accurate, e.g. within a percentage point or two. Table B-17 demonstrates that the two methods provide comparable results. If the results from the above method do not agree closely with SWMM then the results can be calibrated. For example, the storage volume can be adjusted to derive results that closely match the SWMM results on an average annual basis.

B.2.5.1.2. Flow-based BMP Capture Efficiency

The flow based BMPs (swales) are sized to treat a flow capacity exceeding the LA County SUSMP sizing requirements in order to achieve treatment of approximately 80% of the stormwater runoff. Off-line swales (swales with a diversion structure for flows up to the swale treatment capacity) that provide treatment even when a fraction of the runoff is bypassed achieve higher capture efficiency than in-line swales (swales that also act as a stormwater conveyance and receive all runoff from their tributary area).

High-intensity rainfall events can produce runoff rates that are in excess of the BMP design capacity. When the design flow rate for the swales is exceeded it was assumed that runoff depths exceed the design flow depth of the swale which limits treatment effectiveness. For this situation, reductions in pollutant loads were not modeled, although some limited removal likely occurs, in order to provide a conservative estimate of the BMP performance. Only when the flow rate in the swales was less than the design flow rates (and therefore flow depth) was treatment modeled by estimating the fraction of flows that meet this condition. The percent capture calculations for flow based BMPs used the following steps.

Step 1 – Estimate the Depth of Runoff Captured on an Hourly Basis

The percent capture estimate for each storm is made through comparison of the hourly rainfall data comprising the storm event to the design rainfall intensity of the flow-based BMP. For BMPs without bypass capacity (e.g. in-line swales) if the depth of rainfall for a given hour exceeds the design rainfall intensity (the flow rate resulting from the rainfall intensity in inches per hour) then no treatment is credited for that hour of rainfall. If the design capacity (in inches per hour) of the BMP meets or exceeds the depth of rainfall occurring in a given hour then the resulting runoff during that hour is considered capture by the BMP.

For off-line BMPs or other BMPs with bypass capability (e.g. hydrodynamic devices) the fraction of runoff captured during a given hour of rainfall is the minimum of the rainfall depth for the hour of the design capacity of the BMP. For example an off-line swale with a flow capacity equal to runoff generated from a rainfall intensity of 0.3 inches per hour would capture 100 percent of the runoff during a hour of precipitation data with a depth of 0.2 inches, but would only capture 50 percent of the runoff during an hour of precipitation data in which 0.6 inches of rain occurred.

Step 2 – Sum the Depth of Rainfall Capture for Each Storm Event

The depth of rainfall captured for each of during the storm event is then summed to give the total depth of rainfall considered captured by the BMP for the storm of interest.

Step 3 – Calculate the Percent Capture for Each Storm Event

The depth of rainfall captured during a given storm event is divided by the total depth of the storm to give the percent capture for the storm event that is used in the water quality model input.

Figure B-10 shows the percent capture estimates for a range of design rainfall intensities for in-line and off-line (or BMPs with bypass capability) swales.

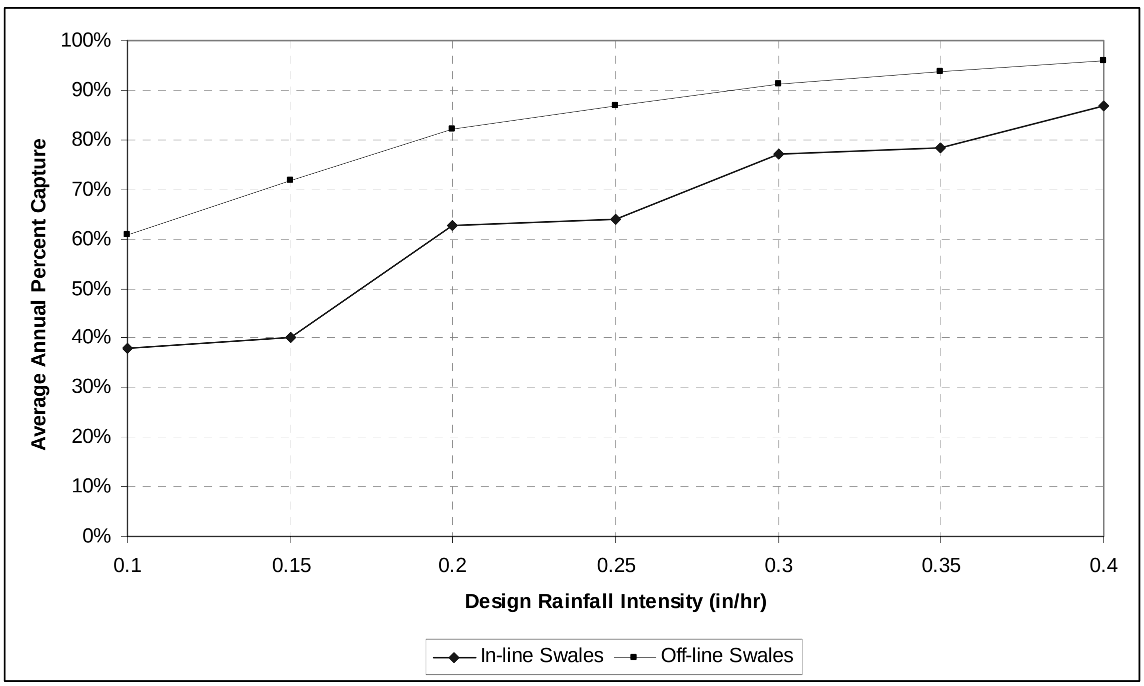

Figure B-10: Estimated Average Percent Capture for Swales as a Function of Design Rainfall Intensity

The percent capture results in the figure for the in-line swales are very conservative as the results assume no treatment of any flows when the design flow rate (resulting from the design rainfall intensity) is exceeded. In a real-world situation, treatment would still be effective when the design flow rate is minimally exceeded and some water quality improvements would be achieved even if the design flow rate were exceeded by a moderate amount. The net results is in-line swales design to provide water quality improvements for flow rates resulting from a rainfall intensity of 0.3 inches per hour is expected to provide effective treatment to nearly 80 percent or greater of the stormwater runoff volumes. Off-line swales will be utilized in the Landmark Development and will meet and likely exceed 80 percent capture of stormwater runoff.

Step 4 – Verify Percent Capture Estimates with SWMM

The above method is used as it provides an efficient method for estimating percent capture for each storm in the period of record, which is an input to the water quality model. SWMM is used to verify the results as it is considered to be more accurate than the above method due to the continuous simulation capability and the use of more detailed input parameters.

A SWMM run is conducted to simulate the drainage area (as described in Section B.2.2) tributary to the modeled BMP. The storage treatment block in SWMM is used to simulate the water quality flow rate in the swale by sizing the inflow pipe to the SWMM storage-treatment block. The SWMM results are then compared to the average annual capture results derived from the method above to verify that they are reasonably accurate, e.g. within a percentage point or two. Table B-17 demonstrates that the two methods provide comparable results. If the results from the above method do not agree closely with SWMM then the results can be calibrated. For example the flow capacity in the above method can be adjusted to derive results that closely match the SWMM results on an average annual basis.

B.2.5.1.3. BMP Capture Efficiency Results

The estimated capture efficiencies for the structural BMP in the Landmark Village treatment system are shown in

Table B-13 for the in-line swales, Table B-14 for bioretention BMPs, and Table B-15 for the water quality basin. The capture efficiency methods described above were used to estimate the fraction of runoff captured by each type of BMP for each storm in the period of record.

BMP specifically designed to infiltrate stormwater runoff are not included in the stormwater management system. However, data in the International BMP Database have shown that as much as 30 percent of stormwater volume captured by dry extended detention basins and 35 percent captured by swales can be lost to infiltration (Strecker et al., 2004). Volume reductions achieved were conservatively modeled as 10 percent for the by the detention basin[1] and 25 percent for swale and bioretention BMPs.

[1] The average volume reduction was modeled as 10 percent as the basin will be lined to reduce infiltration and protect bank stability at the edge of the project in turn limiting the volumetric reduction of stormwater runoff.

Table B-13: BMP Percent Capture Estimate for Swales

Sizing Method	Design Precipitation Intensity (in/hr)	Capture Efficiency (%)[1]	Modeled Volume Reduction (%)
flow	0.30	80	25

1 – Capture efficiency was calculated with hourly rainfall data for each storm as described above and reported as an annual average.

Bioretention areas for the Landmark Village Project will use underdrains to minimize the required footprint area to allow the used of this type of BMP where sufficient space is available. Bioretention treatment is expected to result in higher rates of pollutant removal due to infiltration through the vegetation and soils, although the bioretention areas are conservatively modeled with the same effluent concentrations as the vegetated swales.

Table B-14: BMP Percent Capture Estimate for Bioretention Areas

Sizing Method	Design Depth (in)	Capture Efficiency (%)[1]	Modeled Volume Reduction (%)
volume	Varies with imperviousness	80	25

1 – The bioretention BMPs will be sized to capture and treat 80 percent of the stormwater runoff on an average annual basis. The volume reduction, on an average annual basis, was modeled as equivalent to swales.

Table B-15: BP Percent Capture Estimate for the Water Quality Basin

BMP	Tributary Area (ac)[1]	% Impervious	Runoff Coefficient	Estimated Capture Efficiency (%) [1]	Modeled Volume Reduction (%)
WQ Basin	10.9	84	0.90	80	15

1 – The basin will be sized to capture and treat 80 percent of the stormwater runoff on an average annual basis. Continuous simulation modeling indicated a storage volume of approximately 1.1 acre-feet would be required for a maximum emptying time of 48 hours. If additional storage capacity is available in the water quality basin above that required for the current tributary area, additional areas may be routed to the basin to utilize the treatment capacity.

Treatment BMPs will be sized such that overall a capture efficiency of 80 percent or greater is achieved for the treatment of stormwater runoff from the Landmark Village Project on an average annual basis. Capture efficiency in the water quality analysis was conservatively modeled as 80 percent on an average annual basis although off-line swales are expected to exceed this value. In areas where sufficient space is available bioretention BMPs may be ‘oversized’ and also exceed the treatment goal of 80 percent capture.

B.2.5.2. BMP Pollutant Removal

Various data sources were examined to estimate the anticipated performance of the treatment BMPs. A comprehensive source of BMP performance information is the American Society of Civil Engineers (ASCE) International Stormwater BMP Database (ASCE, 2003, Strecker et al., 2001). The ASCE BMP database is comprised of carefully examined data from a peer-reviewed collection of studies that have monitored the effectiveness of a variety of BMPs in treating water quality pollutants for a variety of land use types. The mean effluent water quality for treatment BMPs used for modeling purposes was based on values found in the International Stormwater BMP Database (ASCE/EPA, 2003). Recent work in characterizing BMP performance suggests that effluent quality rather than percent removal is more reliable in modeling stormwater treatment (Strecker et al. 2001).

To match site conditions, the BMP database studies were screened to exclude studies where BMP design or function was believed to result in significantly lower performance than the BMP design criteria that will be met for the Landmark Village BMPs. For example some of the detention basins studies had significantly lower maximum detention times than the 48 hour criteria for the water quality basins. The water quality data for detention basins with a drawdown time of less than 9 hours were excluded from the data set used to predict detention basin performance. Certain studies in the detention basins category were not considered comparable in function to the dry-extended detention basin that will be incorporated into the Landmark Village treatment system. Detention basins that were listed as either underground vaults or settling chambers were also excluded. All biofiltration (i.e. vegetated swales and filter strips) studies in the BMP database were deemed valid and were used in statistical analysis.

As with the estimation of land use EMCs, final effluent values to be used in modeling analysis were determined using a combination of regression on order statistics and the "bootstrap" method (see Section B.2.4.3).

Once the data had been screened for design criteria, the normality and lognormality of all BMP effluent sample data sets were tested using the Shapiro-Wilk goodness-of-fit test (Royston 1992). The majority of the pollutant data fit a lognormal distribution. The data that did not statistically fit the lognormal distribution were more closely approximated with a lognormal distribution than a normal distribution. The bootstrap method was applied differently depending on the distributional fit of the data. If the data fit a lognormal distribution, the log-transformed data were bootstrapped and an estimate of the mean and standard deviation were obtained in log space and then converted to arithmetic space. The assumption of lognormality was more stringently applied than normal by using an alpha significance value of 0.1. This was done to improve the estimate of the standard deviation when the assumption of lognormality fails. When analyzing data in log space there is a tendency to overestimate the standard deviation for relatively symmetric data and underestimate the standard deviation for severely skewed data. For datasets that did not fit the lognormal distribution, the raw data were bootstrapped to obtain the mean and standard deviation values. Bootstrapping the data in arithmetic space assumes no distribution in those instances when a distribution could not be confirmed through goodness-of-fit testing.

Table B-16 shows the lognormal effluent quality descriptive statistics for detention basins and swales. These values were estimated using the above procedure on the ASCE/USEPA International BMP Database data (ASCE, 2003). Note that data were not available for nitrite or ammonia for detention basins. Removal was not simulated for these pollutants in the detention basin. Chloride removal was not simulated in the treatment BMPs as chloride is highly water soluble and is not a nutrient given to uptake by vegetation.

Table B-16: Summary of Lognormal Effluent Quality Statistics & Arithmetic Mean Effluent Quality for Modeled BMPs.

	Lognormal Modeling Parameters				Arithmetic Means	
	Detention Basins		Swales & Bioretention		Detention Basins	Swales & Bioretention
Pollutant	Mean	St Dev	Mean	St. Dev		
TSS	3.503	0.709	3.089	0.821	42.7	30.7
Total P	-1.262	0.553	-1.340	1.051	0.330	0.455
NH_3	NA	NA	-3.363	1.064	NA	0.061
NO_3	-0.346	0.671	-1.394	1.108	0.886	0.459
NO_2	NA	NA	-5.028	1.311	NA	0.015
TKN	0.460	0.522	0.336	0.593	1.81	1.67
Dissolved Cu	2.427	0.501	1.756	0.776	12.8	7.82
Total Pb	3.000	0.931	1.402	1.314	31.0	9.64
Dissolved Zn	3.786	0.705	3.231	0.714	56.5	32.6

NA - not available

B.2.6. Model Parameter Reliability & Assumptions

The input parameters for the water quality model fall into five main categories shown below. Each of the categories of input data is evaluated for accuracy reflecting the project site conditions:

- Rainfall data;
- Runoff Coefficients;
- Land Use data;
- Stormwater pollutant EMCs; and
- BMP performance estimates.

<u>Rainfall Data:</u> A limited period of record (about 12 years of hourly data) is available from the Castaic Junction gauge monitored by the LADPW. The Castaic Junction gauge is nearer to the project site and consistently measures precipitation amounts lower than recorded at the Newhall gauge. However, the limited period of hourly data the data collected at the Castaic Gauge is insufficient for water quality modeling and the rainfall data collected at the Newhall gauge was used. The rainfall data from the Newhall gauge are believed to overestimate the average annual

rainfall by about 3 inches per year resulting in a conservative estimate of stormwater runoff volumes and changes in average annual volumes resulting from development.

Runoff Coefficients: The estimation of runoff coefficients, described in Section B.2.2, is highly dependant on soil properties (i.e. infiltration potential) and less dependant on parameters such as ET rates, slopes, and depression storage. Soil properties are estimated as accurately as possible from available data such as soil surveys and site specific geomorphology studies. The result is estimates for runoff coefficients that may somewhat overestimate or underestimate stormwater runoff. The net result on the water quality model is that this parameter is not conservatively estimated; however, it is estimated as accurately as the available information permits. When combined with the overestimate of average annual rainfall and land use percent impervious values (discussed below), stormwater runoff volumes are somewhat conservatively predicted.

Land Use Data: Land use data is the most accurately quantified input parameter. The data for the existing and developed conditions has a high level of accuracy for classifying land use type and area. The percent impervious values used in the water quality model for the urban land uses in the developed project condition are based upon the values listed in the LA County Hydrology Manual. These percent impervious values assigned to types of urban land uses are somewhat conservative to provide a margin of safety when estimating flow rates for flood control analysis. These same percent impervious values are used for calculating runoff coefficients estimates which results in a conservative estimate of stormwater runoff volumes.

Stormwater Pollutant EMCs: Stormwater pollutant EMCs are estimated from monitoring data collected by the LADPW from land use characterization stations that do not have the same level (if any) of site design and source control BMPs that will be implemented for the Landmark Village Project. Therefore the stormwater pollutant EMCs estimated from the LADPW data are probably somewhat conservative compared to the pollutant concentrations in stormwater runoff that will occur from the developed conditions of the project site.

BMP Capture Efficiency & Effluent Concentrations: Stormwater capture efficiency estimates are calculated in Excel spreadsheets to provide results on a storm-by-storm basis for input into the water quality model. The method employed in the Excel calculations has been compared to percent capture estimate from SWMM modeling results which are believed to have a higher level of accuracy due to the continuous modeling approach. Table B-17 contains percent capture results from the Excel calculations described in Section B.2.5.1 and SWMM modeling. The SWMM percent capture estimates for detention basins were obtained directly from the storage-treatment block, (James and James, 2000). Results for the in-line and off-line swales were calculated with the SWMM flow rate output at 10-minute intervals for the period of record (01/01/1969 – 12/31/2003). Percent capture results calculated with the Excel method compare favorably to the results obtained with SWMM modeling. Overall the percent capture estimates for the structural BMPs are though to provide an accurate estimate of the average annual capture efficiency they will achieve once constructed.

Table B-17: Comparison of Percent Capture Estimates from Excel Calculations & SWMM Results

BMP	Sizing Parameters	Percent Capture Result	
		SWMM	Excel
Detention	1.1” design depth, 36 hour drain time	86.4	84.8
	1.3” design depth, 36 hour drain time	90.5	89.6
	1.1” design depth, 48 hour drain time	80.6	80.4
	1.3” design depth, 48 hour drain time	85.2	85.6
Swale (off-line)	2.0 cfs, (runoff from 0.20“/hr)	83.2	82.2
	2.5 cfs, (runoff from 0.25“/hr)	87.8	86.9
	3.0 cfs, (runoff from 0.30“/hr)	91.9	91.3
Swale (in-line)	2.0 cfs, (runoff from 0.20“/hr)	62.1	62.7
	2.5 cfs, (runoff from 0.25“/hr)	66.0	64.1
	3.0 cfs, (runoff from 0.30“/hr)	77.2	77.1

BMP effluent concentrations are based on studies contained in the International BMP database. These studies are screened to remove data for undersized (i.e. inadequate design criteria) BMPs that are likely to have pollutant removal performance substantially less than the BMPs to be constructed for the Landmark Village Project. This screening is believed to improve the accuracy of BMP performance estimates; however, it is only intended to remove BMPs that are clearly under designed. The screening process is intended to include BMPs with adequate performance that may not be as well designed or maintained as the structural BMPs that will be part of the stormwater management system. It is anticipated that the BMPs for the Landmark Village project will perform as well, if not a little better than, the estimated BMP performance. BMP pollutant removal does not include the effects of site design or source control BMPs that will help the overall effectiveness of the stormwater management system that will be incorporated into the Landmark Village Project site.

Conclusions: The runoff coefficient, land use type & area, and BMP performance model input parameters are thought to be reasonably accurate representations of the real world conditions and do not increase the conservativeness of the water quality model. The rainfall data, land use percent impervious values, and stormwater pollutant EMC estimates are believed to result in conservative estimates of stormwater runoff volumes, pollutant concentrations and therefore pollutant loads. Overall the model input parameters likely result in conservative estimates of water quality. The water quality estimates for the developed project condition are believed to be a little more conservative due to the land use imperviousness values, pollutant concentration estimates, and BMP performance estimates that do not include the benefits of site design or source control BMPs.

B.3. Model Methodology

A Monte Carlo simulation method was used to develop the statistical description for water quality of stormwater. In this approach, the stormwater characteristics from a single arbitrary rainfall event are first estimated. The rainfall depth of an arbitrary event was determined by randomly sampling from the historical rainfall information. Similarly, an arbitrary EMC was determined by randomly sampling from the distribution of EMCs in a manner that preserves the mean and standard deviation of the monitoring information. The randomly determined rainfall volume and EMC were used to determine runoff volume, pollutant concentration, and pollutant load of a single arbitrary storm event. Finally the BMP performance (effluent quality) is randomly determined to calculate the pollutant removal resulting from treatment in the BMP system. This procedure was then repeated thousands of times (20,000), recording the volume, EMC and load from each random storm event, without and with treatment for the developed project condition. The statistics of these recorded results provides a description of the average characteristics and variability of the volume and water quality of stormwater runoff. The modeled Pollutants were:

- Total Suspended Solids (sediment)
- Total Phosphorus
- Ammonia
- Nitrate
- Nitrite
- Total Nitrogen[2]
- Dissolved Copper
- Total Lead
- Dissolved Zinc
- Chloride

The steps in the Monte Carlo Water Quality Model are as follows:

1. Develop a statistical description of storm events and pollutant concentration in storm runoff, as necessary.
2. Estimate the volume of storm runoff from a random storm event for each land use area.
3. Estimate a random pollutant concentration in storm runoff for each land-use area.
4. Calculate the total runoff volume, pollutant load, and concentration in runoff from the modeled portion of the project.
5. Calculate the water quality improvements achieved in the structural BMPs (usually developed conditions only).

[2] TKN is modeled, but the results are not reported. Total Nitrogen results are reported from the sum of nitrate, nitrite, and TKN.

6. Estimate a random number of storms per year based on available historical records. To estimate a single random annual load, repeat steps 2 - 5 by the random number of storms per year, summing the loads from each random storm event.
7. Repeat steps 2 - 6 a total of 20,000 times for each pollutant modeled, recording the estimated pollutant concentration and annual load for each iteration.
8. Develop a statistical representation of the recorded stormwater loads and concentrations.

Each of the eight steps is described below.

B.3.1. Storms & Stormwater Runoff (steps 1 & 2)

Step 1 – Statistical Representation of Storm Events

Storm Depth

An arbitrary storm depth was determined by randomly sampling from the population of 538 storms generated by the rainfall analysis. The historical record of storm depths was sampled such that each storm had an equal chance of being selected.

Number of Storms per Year

The number of storm events per year was calculated for the 35 complete years in the available period of record from 1969 – 2003. The modeled average number of storm events per year (> 0.1 inches) was 15.4, with a standard deviation of 6.2. Figure B-11 illustrates a frequency histogram of the number of storm events per year at the Newhall gauge. In the simulation, the number of storms per year was determined by randomly sampling from the normal distribution (~N (15.4, 6.2)) and rounding to the nearest whole number. If the arbitrary number of storms per year was zero or negative, then the normal distribution was re-sampled until a positive number was obtained.

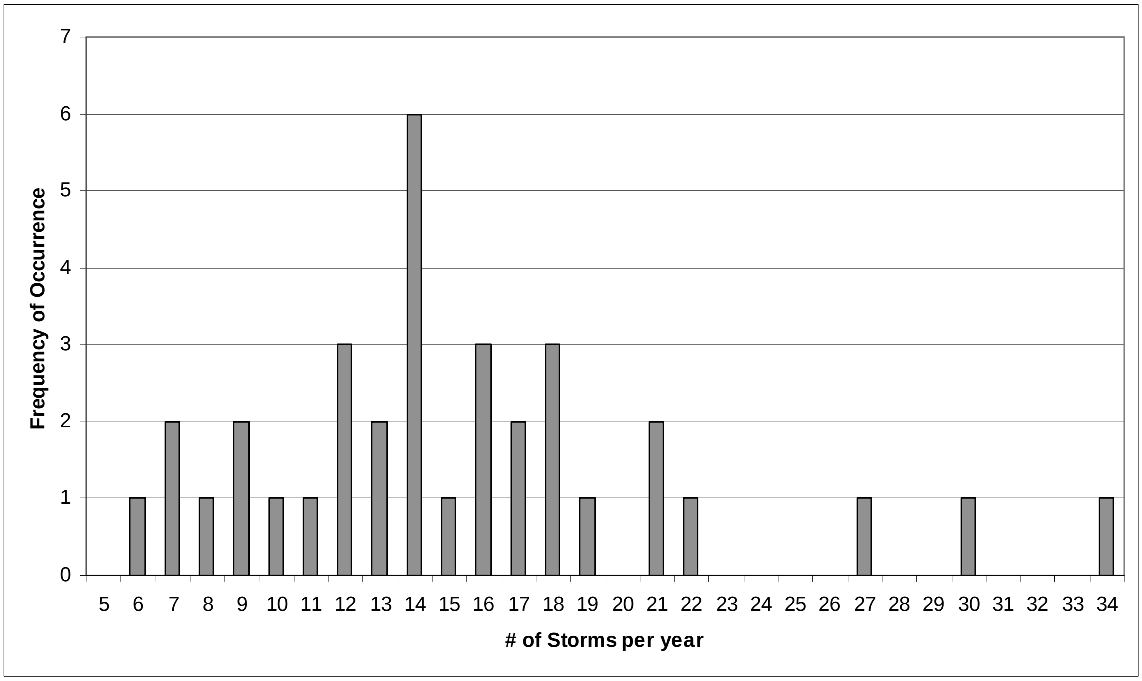

Figure B-11: Distribution of Storms per Year at the Newhall Gauge.

Step 2 – Estimate the Volume of Storm Runoff from a Random Storm Event.

The runoff volume from each storm was estimated with the following modification to the Rational Formula:

$$Q = R_v PA \tag{5}$$

where:

Q = the stormwater runoff volume (ft^3/year)

P = the rainfall depth of the storm (ft)

A = the drainage area (ft^2)

R_v = the mean volumetric runoff coefficient, a unit-less value that is a function of the imperviousness of the drainage.

- Existing Conditions: Runoff Coefficient = 0.0092 × % Impervious + 0.035
- Developed Conditions: Runoff Coefficient = 0.0089 × % Impervious + 0.063

For sub-basins that contain multiple land-use types, the total stormwater runoff volume is determined as the sum of runoff from each land-use type:

$$Q_{total} = \sum_{lu} Q_{lu} = R_{v\,lu} PA_{lu} \tag{6}$$

where *lu* designates the land-use type. It is assumed that rain falls uniformly over all land-uses in the sub-basin.

The steps used to calculate the volume of runoff from a random storm event were:

Step 2a Obtain a rainfall depth by randomly sampling from the 538 storm events.

Step 2b For each land-use area calculate a runoff volume using equation (5). The same rainfall depth is applied to each land-use area.

Step 2c Sum the runoff volumes from each land-use area to obtain the total runoff from the watershed for a particular storm event with equation (6).

B.3.2. Pollutant Loads & Concentrations (step 3 & 4)

Step 3 – Estimate a Pollutant Concentration in Storm Runoff from Each Land Use Area

Runoff Concentration

The distribution of land use-based pollutant concentration in storm runoff was obtained from targeted monitoring data collected in Los Angeles. Because only summary statistics were employed, it was assumed that the pollutant concentrations from all land-use areas are log-normally distributed. This assumption was evaluated by Los Angeles County using the Shapiro-Wilk Normality Test (LA County, 2000). For most cases the monitoring data were lognormally distributed, although in some instances the data were better fit with a normal distribution or were neither normally nor lognormally distributed. Stormwater EMCs were sampled randomly for each modeled land use and water quality parameter from the developed lognormal distribution parameters (see Section B.2.4) for each modeled storm event.

The pollutant concentration in storm runoff from each land-use area was estimated by randomly sampling from the associated concentration distribution (lognormal) estimated from the LA County monitoring data. The runoff concentration from each land-use area was evaluated with the expression:

$$C_{land-use} = \exp\left(\mu_{\ln x} + \sigma_{\ln x} R_N\right) \qquad (7)$$

where:

$\mu_{\ln x}$ = the log-normal mean

$\sigma_{\ln x}$ = the log-normal standard deviation

R_N = a standard normal random variable

Implicit in these calculations is the assumption that runoff concentration is independent of rainfall depth, and is also independent of runoff concentration in neighboring land-use areas. Environmental Defense Sciences (2002) examined the validity of the first assumption. They found that there was not a strong correlation between rainfall volume and event mean concentrations (EMCs) in the LA County data for education land-uses.

Step 4 – Calculate the Total Runoff Volume, Pollutant Load, and Pollutant Concentration in a Random Storm Event

Step 4A - The total runoff volume in the watershed was calculated with equation (6) as discussed in Step 2:

$$Q_{total} = Q_{land-use1} + Q_{land-use2} + \ldots + Q_{land-usei} \quad (8)$$

where the same random rainfall event was used to calculate runoff volume in each of the land-use areas.

Step 4B - The total pollutant load was calculated by:

$$L_{total} = Q_{land-use1} C_{land-use1} + \ldots + Q_{land-usei} C_{land-usei} \quad (9)$$

where the runoff from each individual land-use area was calculated with equation (5) discussed in step 2, and the concentration in each individual land-use area was calculated with equation (7) discussed in step 3.

The developed condition with treatment used additional calculations to determine the reduction in pollutant load and concentration achieved by treatment. The fraction of stormwater runoff receiving treatment was calculated for each storm event and runoff volume flowing to each BMP. That is, each storm event has an associated capture efficiency for the BMPs providing treatment. BMP performance was modeled with the randomly determined effluent concentration achieved within the BMP for each water quality pollutant.

$$L_{total} = \left[Cap_{\%} \times Q_{land-use} \times C_{eff} \times (1 - VR\%)\right] + \left[(1 - Cap_{\%}) \times Q_{land-use} \times C_{land-use}\right] \quad (10)$$

where:

$Cap_{\%}$ is the percent capture of the BMP. For the modeled BMPs the $Cap_{\%}$ is volume based.

C_{eff} is the randomly determined effluent concentration from the BMP. For the swales and water quality basins, C_{eff} was determined from sampling from the lognormal distribution described by the parameters contained in Table B-11.

VR% is the percent reduction in effluent volume achieved by the BMP (see Section B.2.5.1.3).

Step 4C - The average pollutant concentration in runoff from the entire watershed from a single storm event was calculated by dividing the total watershed load by the total watershed runoff volume:

$$C_{total} = L_{total} / Q_{total} \quad (11)$$

where the runoff from individual land-uses is calculated from step 2 and the concentration in individual land-uses in calculated by step 3.

B.3.3. Pollutant Loads & Concentrations Leaving Project Site (steps 5 to 8)

Step 5 – Calculate a Random Total Annual Pollutant Load

The annual pollutant load is simply the sum of pollutant loads generated from all storms in a given year. Thus, to compute an annual pollutant load, the number of storms in a random year must first be determined. This was accomplished by randomly sampling from the distribution using the expression:

$$\mathrm{N}_{\mathrm{storms}} = 15.4 + 6.2 R_N \quad (12)$$

where:

R_N = a standard normal variant with a mean of 0 and a standard deviation of 1

The number of storms was rounded to the nearest whole number, and in cases where zero or a negative number of storms was obtained, the distribution was re-sampled until a positive number was obtained (years without any storms did not occur in the available period of record so this situation was not simulated in the water quality model).

Next, steps 2-4 were repeated N_{storms} times, recording the total pollutant load from each random storm event. Finally, the individual storm loads were summed to obtain the total annual pollutant load.

Step 6 & 7 – Determine Distribution of Storm Concentration and Annual Loads

Steps 2-5 were repeated a total of 20,000 times, recording the pollutant concentration and annual load from each iteration. The resultant distributions can be used to present frequency distribution for pollutant concentrations or loads using statistics calculated from the 20,000 Monte-Carlo iterations.

Step 8 – Develop a statistical representation of the recorded stormwater loads and concentrations

Results from the 20,000 Monte-Carlo iterations are average to provide the average annual stormwater load and concentrations results presented in the water quality assessment report.

B.3.4. Model Methodology Assumptions

Five core assumptions are made for the Monte Carlo water quality modeling methodology:

1. The assumed probability distributions of model parameters;
2. The assumption of independence between model parameters (i.e. no correlation between randomly determined variables);
3. Assigning a lower limit to BMP effluent concentrations;
4. Limiting pollutant removals to pollutants with data; and
5. Modeling structural BMPs to removing pollutants only and not acting as a source.

Each of these assumptions is discussed in detail below.

1) Distribution Assumptions: Probability distributions are assumed to represent the number of storms per year, stormwater pollutant concentrations, and BMP effluent concentrations. Observed rainfall data (i.e. storm frequency) and stormwater monitoring data are fit with either a normal or lognormal distribution using standard statistical procedures. The distribution applied to the model parameters influences the sampling result (i.e. the frequency at which values within different magnitude ranges are selected). The type of distribution believed to best represent each model parameter was used in the model to determine random estimates of the input variables

such that a large sample of these estimated variables will have same mean and variance that was observed in the rainfall and monitoring data.

Storms per Year: Figure B-11 shows the number of storms per year occurring at the Newhall rain gauge (augmented with data from the San Fernando gauge). The number of storms occurring per year at the Newhall gauge appears to lie between the normal and lognormal distributions. The normal distribution was used to determine the number of storms per year simulated in the water quality model as use of the lognormal distribution would overestimate the average annual rainfall, as well as its variability, when the distribution of the data is not heavily skewed. As discussed in Section B.2.6, use of rainfall data collected at the Newhall gauge already tends to overestimate the average annual rainfall for the Project site. When using the normal distribution to randomly determine the number of storm per year, the resulting average annual rainfall output from the water quality model is typically in the range of 17.9 to 18.0 inches per year. This is in close agreement with the average annual rainfall from runoff producing storms of 17.9 inches determine directly from the rainfall data (see Table B-1).

Stormwater Pollutant Concentrations: The Shapiro-Wilk Test was used to determine the statistical distribution that best represents the raw stormwater monitoring data collected in Los Angeles and Ventura Counties. In most instances the data were found to be log-normally distributed at a confidence level of 0.10. In some instances, the data were not fit by either the normal or lognormal distributions, but were found to be more closely approximated by the log-normal distribution. For data sets with greater than 50 percent non-detects or that were not log-normally distributed according to the Shapiro-Wilk test, data were analyzed in arithmetic space as to not unreasonably overestimate the standard deviation of the data set. Since stormwater pollutant concentrations, in general, tend to be well approximated by the lognormal distribution (Helsel and Hirsh, 2002), the data sets that did not meet the lognormal criterion are still believed to belong to a log-normally distributed population, but the number of data points is too few to statistically confirm that this is the case. Therefore, simulations of stormwater concentrations in the water quality model were still conducted in lognormal space. This assumption is not believed to appreciably contribute to the conservativeness of the water quality model. Also the application of the lognormal distribution to determine all pollutant EMCs is believed to result in a more accurate prediction than would the application of the normal distribution.

BMP Effluent Concentrations: Goodness-of-fit tests conducted on the raw BMP effluent monitoring data from the International BMP Database with the Shapiro-Wilk Test either resulted in confirmation of the appropriateness of the lognormal distribution for the data or in the instances when the data did not meet the significance criteria of a p value > 0.1 the data were more closely approximated with the lognormal distribution than the normal. The use of the lognormal distribution to represent BMP effluent concentrations results in higher average estimates of BMP effluent concentration. This is believed to be a more accurate estimation of BMP performance than use of the normal distribution, and is considered to provide a conservative bias in the model results.

2) <u>Assumption of No Correlation between Model Parameters</u>: The water quality model randomly samples for stormwater pollutant concentrations independent of the storm depth or

antecedent dry period. The validity of this assumption is supported by analyses conducted by Environmental Defense Sciences (2002) who did not find a strong correlation between rainfall volume and event mean concentrations (EMCs) in the LA County data for education land-use. Data analyses for the single family residential land use were found to be weakly correlated (R^2 of 0.6 ± 0.1) for some pollutants with storm depth; however some pollutant showed little correlation between these variables. Where weak correlations were present, stormwater pollutant concentrations decreased with storm size which is a reasonable expectation as more rainfall would result in greater dilution of the pollutants available for wash-off.

Correlations between pollutant concentration and antecedent dry period were similarly variable. For the single family land use correlations between pollutant concentration and antecedent dry period were moderately significant for a few pollutants (R^2 of 0.8 ± 0.03), and weak for other pollutants. Correlations between pollutant concentration and antecedent dry period varied widely for the educational and multi-family land uses.

The results of these analyses indicated that no consistent level of correlation was determined between the stormwater EMCs and the rainfall depth or the antecedent dry period and weak or no correlation was found for most pollutants and land-use. On this basis, stormwater pollutant concentrations are sampled independent of storm depth and antecedent dry period in the water quality model. Consequently the mean and variance observed in the stormwater data will be preserved in the runoff concentrations that are estimated with the water quality model. In addition, this assumption results in conservative estimates of pollutant loads in the water quality model as pollutant concentrations are not constrained for the larger storm events or shorter antecedent dry periods.

Effluent concentrations are considered more reliable estimator of treatment performance than percent removal (Strecker et al. 2001). BMP effluent concentrations were sampled independently of stormwater concentrations (i.e. influent concentration to the BMP) in the water quality model. As with the pollutant EMCs, independent sampling of effluent concentrations preserves the mean and standard deviation in the monitoring data. The result of this assumption is that it does not limit the variability of pollutant concentrations and loads predicted by the model that would occur if the effluent concentration was correlated with the influent concentration. Due to the large number of iterations in the model and independent sampling for the EMC and BMP effluent distributions, this assumption is expected to result in a reasonable representation of average stormwater concentrations, BMP performance, and overall annual conditions in the model output.

3) <u>BMP Performance – Irreducible Pollutant Effluent Concentrations</u>: When sampling from the lognormal distribution to estimate BMP performance with an effluent concentration it is possible to select values approaching or equal to zero. While well functioning BMPs are capable of achieving high rates of pollutant removal, it is generally accepted that BMPs usually cannot completely remove pollutants from the water column. In effect, BMPs can achieve what is called an "irreducible pollutant concentration" (Schueler, 1996). In an effort to prevent the water quality model from overestimating BMP performance, lower limits were set for the effluent concentrations of each modeled pollutant and BMP. The lowest observed effluent value in each

pollutant data set was used as the irreducible pollutant effluent concentration in the water quality model. This assumption is expected to provide a more accurate representation of BMP performance, and to prevent the estimation of unrealistic effluent quality achieved in the modeled BMPs.

4) BMP Performance – Limiting Pollutant Removal Estimates to Available Data: Table B-16 presents model parameters for estimating BMP pollutant effluent concentrations. Pollutant removal is only simulated for those pollutants with available data from the International BMP Database. As data is not available for ammonia or nitrate effluent concentrations for dry-extended detention basins, removal of these pollutants is not modeled for this BMP. While chloride data is available for swales, because this pollutant is water soluble and is not a nutrient for plants (i.e. is not likely to exhibit significant uptake), no chloride removal is credited in the BMPs. Limiting the simulation of pollutant removal only to pollutant / BMP combinations with available data prevents overestimating BMP performance for those pollutants.

5) BMP Performance – BMPs are not a Source of Pollutants: In instances when the randomly determined BMP effluent concentration exceeds the modeled influent concentration, no pollutant removal occurs and the effluent concentration is modeled as equal to the influent. This prevents BMPs from acting as a source of pollutants in the water quality modeling. The commitment to regular and effective maintenance of the stormwater BMPs provides support for this assumption; however, it is not the primary reason for this function of the water quality model.

Stormwater pollutant concentrations and BMP effluent concentrations are randomly and independently determined in the model. The greater the overlap between the EMC distribution for a pollutant and the BMP effluent distribution, the closer the average values and the lower the overall pollutant removal simulated by the water quality model. The larger the overlap between these distributions also makes it more likely that sampled effluent concentration would be higher than the EMC (i.e. influent concentration). Therefore the less removal simulated for a given pollutant and less accumulation of that pollutant in a BMP the more likely it is that the BMP would act as a source of this pollutant in the model. This limitation of the water quality model tends to overestimate the pollutant loads for Pollutant that occur at low concentrations in stormwater runoff and / or are not effectively removed by stormwater BMPs. Preventing BMPs from acting as a source of pollutants in the modeling methodology is believed to more accurately estimate pollutant loads transported from the project site and prevents overestimation of some water quality pollutants such as total lead.

Conclusions: The assumptions for the water quality modeling methodology described above generally do not contribute to the conservativeness of the model as is the case for the estimation of model input parameters as described in Section B.2.6. Furthermore, the method assumptions are not believed to contribute to over-estimating BMP performance or under-estimating stormwater pollutant concentrations or loads leaving the project site. The above assumptions are expected to improve the accuracy of the water quality model estimates. The net result for the model outputs are somewhat conservative estimates of pollutant loads and concentrations due to estimation of model input parameters that are not compromised by the model methodology.

B.4. Model Reliability

Factors that affect model reliability include variability in environmental conditions and model error. To account for environmental variability, a statistical modeling approach was used that takes into account the observed variability in precipitation from storm to storm and from year to year. The model also takes into account the observed variability in water quality from storm to storm, and for different types of land uses. One way to express this variability is the coefficient of variation (COV) which is the ratio of the standard deviation of the variable to the mean value. Based on the statistical model, the range of COVs for pollutant loads ranged from around 0.5 to 0.7 on an average annual basis, depending on the pollutant. This variability, or greater, is expected in typical stormwater runoff.

Model error relates to the ability of the model to properly simulate the processes that affect stormwater runoff, concentrations, and loads. Ideally model error is measured through calibration, but calibration is not feasible when considering a future condition. We are confident that the model is a reasonable reflection of stormwater processes because the model relies largely on measured regional data. For example, the runoff water quality data are obtained from a comprehensive monitoring program conducted by LA County that has measured runoff concentrations from a variety of land use catchments and for a statistically reliable number of storm events. In addition, parameter estimation is fairly conservative resulting in moderately conservative estimates of pollutant concentrations and loads

B.5. References

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C. NEWHALL RANCH STORMWATER MONITORING DATA

March 6, 2000

Newhall Ranch Monitoring Station	Hardness mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Alkalinity mg/L	Sulfate mg/L	Chloride mg/L	Nitrate mg/L	E.Coli MPN/100 mL	TDS mg/L
A-Mouth of Potrero	2360	324	378	30	1360	400	3690	780	16.1	8160	7530
B-Mouth of San Martinez	1070	229	122	8	392	210	1520	130	2.8	3090	2690
D-Mouth of Middle Canyon	44	11	4	6	9	30	16	3	12.4	133	160
E-Top of Chiquito Canyon	61	18	4	8	13	40	37	9	2.6	213	150

	Boron mg/L	Copper ug/L	Iron ug/L	Manganese ug/L	Zinc ug/L	Aluminum ug/L	Arsenic ug/L	Barium ug/L	Berylium ug/L	Cadmium ug/L	Chromium ug/L
A-Mouth of Potrero	2.6	20	4770	880	50	4570	5	155	0.6	0.4	7
B-Mouth of San Martinez	0.8	150	51500	4230	300	44000	21	391	7	8.8	47
D-Mouth of Middle Canyon		10	1290	350	30	2230		136	0.4	0.4	2
E-Top of Chiquito Canyon		40	11700	970	150	6280	3	210	1.4	1	10

	Lead ug/L	Mercury ug/L	Nickel ug/L	Selenium ug/L	Total Coliform MPN/100ml	Fecal Coliform MPN/100ml	TSS mg/L	VS mg/L	pH
A-Mouth of Potrero	8	0.01	22	12	50000	1600	1180	32800	8.2
B-Mouth of San Martinez	47.7	0.06	180	11	160000	1700	28000	40000	8
C-1/2 Mile Upstream of Onion Field					90000	11000			
D-Mouth of Middle Canyon	7.7	6			>160000	>160000	600	4100	7.5
E-Top of Chiquito Canyon	19.1		25		2400	2400	3490	9300	7.1

SS = suspended solids
VS = volatile solids

March 8, 2000

Newhall Ranch Monitoring Station	Hardness mg/L	Calcium mg/L	Magnesium mg/L	Potassium mg/L	Sodium mg/L	Alkalinity mg/L	Sulfate mg/L	Chloride mg/L	Nitrate mg/L	E.Coli MPN/100 mL	TDS mg/L
A-Mouth of Potrero	2090	266	347	39	1470	360	3700	960	18.8	6470	7230
B-Mouth of San Martinez	1340	304	142	10	413	210	1900	120	3.1	2430	2960
C-1/2 Mile Upstream of Onion Field	147	44	9	3	10	80	87	3	1.6	323	190
D-Mouth of Middle Canyon	73	21	5	6	10	40	17	3	18.1	162	160
E-Top of Chiquito Canyon	153	43	11	11	18	70	119	12	2.9	420	260

	Boron mg/L	Copper ug/L	Iron ug/L	Manganese ug/L	Zinc ug/L	Aluminum ug/L	Arsenic ug/L	Barium ug/L	Berylium ug/L	Cadmium ug/L	Chromium ug/L
A-Mouth of Potrero	2.9	10	2460	510	30	1580	5	94.4	0.3	0.2	4
B-Mouth of San Martinez	0.8	200	47500	5210	360	69700	27	573	20	13.6	70
C-1/2 Mile Upstream of Onion Field		170	44600	6950	330	85100	13	2360	14	2	39
D-Mouth of Middle Canyon			1510	300	30	2300		132	0.5	0.4	2
E-Top of Chiquito Canyon		100	30700	2110	300	2360	6	470	4.4	2.7	27

	Lead ug/L	Mercury ug/L	Nickel ug/L	Selenium ug/L	Total Coliform MPN/100ml	Fecal Coliform MPN/100ml	TSS mg/L	VS mg/L	pH	TOC mg/L	Diazinon ug/L
A-Mouth of Potrero	4.2	0.03	15	12	30000	7000	490	850	8.2	21.2	ND
B-Mouth of San Martinez	59.2	0.24	330	11	>160000	205	54200	1840	7.8	11.6	ND
C-1/2 Mile Upstream of Onion Field	95.2	0.45	103	4	160000	1600	36000	1460	8.1	9.4	4
D-Mouth of Middle Canyon	7.6	0.02	6		50000	2400	10700	160	7.9	4	ND
E-Top of Chiquito Canyon	54.5	0.14	64	2	>160000	160000	9800	750	8	15.5	

SS = suspended solids
VS = volatile solids

D. REVIEW OF BACTERIA DATA FROM SOUTHERN CALIFORNIA WATERSHEDS

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FLOW SCIENCE®

REVIEW OF BACTERIA DATA FROM SOUTHERN CALIFORNIA WATERSHEDS

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SUMMARY

Available data from Southern California watersheds demonstrate that both existing and EPA-recommended bacteria water quality criteria are routinely exceeded in fresh water creek and river flows, often by one or more orders of magnitude. Exceedances of criteria occur even for flows from largely natural, undeveloped watersheds with little human influence. Even in urbanized watersheds, there is strong evidence that the predominant source of indicator bacteria may be natural (not anthropogenic) – including, for example, bacteria from wildlife, birds, and regrowth within the environment, including sediments. Both measurement data and numerous literature sources have shown that both wet and dry weather bacteria concentrations frequently exceed objectives in creeks and rivers, and that bacteria concentrations rise dramatically during wet-weather periods.

Data from Orange County coastal watersheds indicate that although bacteria in storm water runoff may be elevated within urban storm drain systems, the level of development within these watersheds has little if any effect on the concentrations of indicator bacteria in the receiving waters. These results are consistent with data from other watersheds within Orange County and in other parts of Southern California. No clear trend is evident in bacteria concentrations over time, with concentrations remaining relatively steady, even in areas where land use characteristics have changed over time. Both the concentrations of bacteria in runoff and the impacts of elevated bacteria concentrations on downstream water quality appear to vary by site and with the size of the contributing stream, and thus are likely a function of the dominant sources of bacteria, local hydrologic conditions and climate, and other site-specific factors.

INTRODUCTION

Flow Science was retained by The Irvine Company to review available data and information on the concentrations of indicator bacteria in storm water and dry weather runoff. The goals of this study were to evaluate variations in the concentrations of bacteria during both wet and dry conditions, variations in bacteria levels with the level of development in a watershed or drainage area, changes in bacteria levels over time or with changes in development or land use areas, and the sources of bacteria in runoff and in receiving waters.

In conducting the analysis, Flow Science utilized water quality criteria and thresholds to evaluate available data. These thresholds were obtained from the Water Quality Control Plan (Basin Plan) for the Santa Ana Region, which contains fecal coliform water quality objectives for inland surface waters that apply to the beneficial uses of water contact recreation (REC-1)[1] and non-water contact recreation (REC-2)[2], from proposed EPA water quality criteria, and from Title 17 "beach posting" thresholds. These thresholds are discussed in greater detail below.

Flow Science evaluated data on bacteria concentrations in Southern California. Data were available for watersheds along the Newport Coast, for inland watersheds, and from Los Angeles County. In addition, Flow Science reviewed literature and studies conducted by others.

BACKGROUND: BACTERIA WATER QUALITY STANDARDS

The Basin Plan bacteria objectives currently contained in the Santa Ana Basin Plan were originally developed by the National Technical Advisory Committee (NTAC) to the Federal Water Pollution Control Administration in 1968.[3] These recommendations were based upon prospective

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[1] See Basin Plan at p. 4-6: "REC-1 Fecal coliform: log mean less than 200 organisms/100 mL based on five or more samples/30 day period, and not more than 10% of the samples exceed 400 organisms/100 mL for any 30-day period."

[2] See Basin Plan at p. 4-6: "REC-2 Fecal coliform: average less than 2000 organisms/100 mL and not more than 10% of samples exceed 4000 organisms/100 mL for any 30-day period."

[3] See *Water Quality Criteria, a Report of the National Technical Advisory Committee to the Secretary of the Interior*, Federal Water Pollution Control Administration: Washington, D.C., April 1, 1968, at p. 8 and p. 12:

"Surface waters should be suitable for use in "secondary contact" recreation – activities not involving significant risks of ingestion – without reference to official designation of recreation as a water use. For this purpose, in addition to aesthetic criteria, surface waters should be maintained in a condition to minimize potential health hazards by utilizing fecal coliform criteria. In the absence of local epidemiological experience, the Subcommittee recommends an average not exceeding 2,000 fecal coliforms per 100 ml and a maximum of 4,000 per 100 ml, except in specified mixing zones adjacent to outfalls."

epidemiological studies conducted by the United States Public Health Service in 1948, 1949, and 1950. These studies found an "epidemiologically detectable health effect" at levels of 2300 to 2400 coliforms per 100 ml at bathing beaches on Lake Michigan (at Chicago) and in the Ohio River. Later work conducted in the mid-1960s showed that approximately 18% of the coliforms present in the mid-1960s at the Ohio location belonged to the fecal coliform subgroup. The recreational contact water quality criteria suggested by the committee were based upon the fraction of coliforms present as fecal coliforms and a factor of safety of two.

The fecal coliform standards recommended in 1968 were adopted by many states and municipalities and remain in use in many locations (including in the Santa Ana Region). Several studies conducted since 1968 have questioned these criteria and recommended use of alternatives.[4] As early as 1972, a Committee formed by the National Academy of Science-National Academy of Engineers noted the deficiencies in the study design and data used to establish the recreational fecal coliform criteria, and stated that it could not recommend a recreational water quality criterion because of a paucity of valid epidemiological data (Committee on Water Quality Criteria, 1972).

In response to these concerns, EPA in 1972 initiated studies at marine and freshwater bathing beaches that were designed to correct the deficiencies in the earlier studies and analyses. These studies were conducted at sites contaminated either with pollution from multiple point sources (usually treated effluents that had been disinfected) or by effluents discharged from single point sources. The studies examined three bacterial indicators of fecal pollution (*E. coli*, enterococci, and fecal coliforms) and found that fecal coliform densities showed "little or no correlation" to gastrointestinal illness rates in swimmers. In contrast, a good correlation was found between swimming-associated gastrointestinal symptoms and either *E. coli* or enterococci in swimming waters (Dufour, 1984). Based on these studies, EPA in 1986 proposed section 304(a) criteria for full body contact recreation based upon *E. coli* and/or enterococci but noted that "it is not until their adoption as part of the State water quality standards that the criteria become regulatory" (USEPA, 1986).

EPA's current recommendations for bacteria water quality objectives (USEPA, 2003) include the use of *E. coli* and/or enterococci as the basis for water quality criteria to protect fresh recreational waters and the use of enterococci as the basis for marine water quality criteria. The EPA recommends that the use of fecal coliform be discontinued for both freshwater and marine

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"Fecal coliforms should be used as the indicator organism for evaluating the microbiological suitability of recreation waters. As determined by multiple-tube fermentation or membrane filter procedures and based on a minimum of not less than five samples taken over not more than a 30-day period, the fecal coliform content of primary contact recreation waters shall not exceed a log mean of 200/100 ml, nor shall more than 10 percent of total samples during any 30-day period exceed 400/100 ml."

[4] For a summary of these studies, see the discussion provided on pages 1-3 of the *Ambient Water Quality Criteria for Bacteria – 1986*, USEPA 440/5-84-001, January 1986.

waters. EPA's recommendations recognize that bacteria concentrations are quite variable and are best characterized in terms of a probability distribution. Because bacteria concentrations tend to follow log-normal distributions, EPA's current recommendations specify that compliance should be based upon geometric means computed with data collected over a long-term (e.g., 30 days, or seasonally) and "upper percentile values," clarifying that compliance should not be determined using "single sample maximum" values. Upper percentile values are calculated bacteria densities that are intended to correspond to a known geometric mean-based risk level, and are intended to be used to interpret any single measurement. EPA recommends that states acquire enough sample data to calculate site-specific upper percentile values to characterize water quality for waters where exposure is greatest (e.g., bathing beaches). EPA's recommended water quality criteria for freshwater and marine waters are presented in Tables 1 and 2.

Table 1. Water quality criteria for bacteria recommended by EPA for fresh recreational waters

Risk level[a] [% of swimmers]	Geometric mean density [per 100 ml]	Upper Percentile Value Allowable Density [per 100 ml]			
		75th percentile	82nd percentile	90th percentile	95th percentile
Enterococci criteria					
0.8	33	62	79	107	151
0.9	42	79	100	137	193
1.0	54	101	128	175	247
E. coli criteria					
0.8	126	236	299	409	576
0.9	161	301	382	523	736
1.0	206	385	489	668	940

a) The risk level corresponds to the anticipated excess illness rate. For example, a risk level of 0.8% is believed to correspond to an illness rate of 8 gastrointestinal illnesses per 1,000 swimmers in excess of background illness rates.

Table 2. Water quality criteria for enterococci recommended by EPA for marine recreational waters

Risk level[a] [% of swimmers]	Geometric mean density [per 100 ml]	Upper Percentile Value Allowable Density [per 100 ml]			
		75th percentile	82nd percentile	90th percentile	95th percentile
0.8	4	13	20	35	63
0.9	5	16	24	42	76
1.0	6	19	29	50	91
1.1	8	23	35	61	110
1.2	9	28	42	73	133
1.3	11	34	51	89	161
1.4	14	41	62	107	195
1.5	17	49	75	130	235
1.6	20	60	91	157	284
1.7	24	72	109	189	344
1.8	29	87	132	229	415
1.9	35	105	160	276	502

a) The risk level corresponds to the anticipated excess illness rate. For example, a risk level of 0.8% is believed to correspond to an illness rate of 8 gastrointestinal illnesses per 1,000 swimmers in excess of background illness rates.

The Santa Ana Region currently continues to utilize fecal coliform bacteria to assess water quality applicable to recreational beneficial uses. However, the Santa Ana Regional Board is currently conducting a triennial review of its Basin Plan, and is including an evaluation of recreational beneficial use designations and water quality objectives as part of the Basin Plan update process. We currently anticipate that the Santa Ana Regional Board will likely update fresh water bacteria water quality objectives; updated objectives may be consistent with the recommendations contained in EPA's November 2003 Implementation Guidance (see Tables 1 and 2).

ADDITIONAL GUIDELINES FOR BACTERIA

Although not enforceable as water quality objectives, Orange County beaches and bays are "posted" and access may be restricted when exceedances of certain bacteria levels are observed. The "posting" levels are described in Title 17 of the California Code of Regulations, Section 7958 (Bacteriological Standards):

The minimum protective bacteriological standards for waters adjacent to public beaches and public water-contact sports areas shall be as follows:

(1) Based on a single sample, the density of bacteria in water from each sampling station at a public beach or public water contact sports area shall not exceed:

(A) 1,000 total coliform bacteria per 100 milliliters, if the ratio of fecal/total coliform

bacteria exceeds 0.1; or
(B) 10,000 total coliform bacteria per 100 milliliters; or
(C) 400 fecal coliform bacteria per 100 milliliters; or
(D) 104 enterococcus bacteria per 100 milliliters.

(2) Based on the mean of the logarithms of the results of at least five weekly samples during any 30-day sampling period, the density of bacteria in water from any sampling station at a public beach or public water contact sports area, shall not exceed:
(A) 1,000 total coliform bacteria per 100 milliliters; or
(B) 200 fecal coliform bacteria per 100 milliliters; or
(C) 35 enterococcus bacteria per 100 milliliters.

COMPARISON LEVELS USED IN THIS REPORT

Flow Science used the following numeric values in analyzing available bacteria data:

Fecal Coliform (from existing Santa Ana Basin Plan water quality standards and Title 17 beach "posting" requirements):
- Single Sample: 400 MPN (or CFU)/100mL[5].
- Geometric Mean: 200 MPN (or CFU)/100mL.

Enterococci (from EPA-recommended criteria):
- Single Sample: 247 MPN (or CFU)/100mL.
- Geometric Mean: 54 MPN (or CFU)/100mL.

Total Coliform (from Title 17 beach "posting" requirements):
- Single Sample: 10,000 MPN (or CFU)/100mL.
- Geometric mean: 1,000 MPN (or CFU)/100mL.

Enterococci criteria used by Flow Science in this report correspond to a proposed 1.0% acceptable risk level, 95th percentile, while fecal and total coliform criteria correspond to beach posting levels. Of course, the beach "posting" requirements apply at the beach, not in upstream freshwater flows, but the numeric values provide a useful threshold value against which data can be compared.

[5] Basin Plan specifies no more than 10% of single samples to exceed this value

MONITORING DATA AND RESULTS

Flow Science examined data on bacteria concentrations from a variety of sources in the Santa Ana Region, including streams in coastal watersheds, the Santa Ana River, and inland streams. Data sources included:

- Bacteria concentrations in stream flows from Orange County coastal watersheds
- Bacteria concentrations in freshwater bodies in the Santa Ana region
- Bacteria concentration in runoff samples collected by the Los Angeles County Department of Public Works

Data from each of these sources are examined in greater detail below.

Review of Data from Orange County Coastal Watersheds

Flow Science has reviewed data from Orange County samples collected between 1986 through 2004.[6] Figures for Orange County coastal watersheds are shown in Appendix A; watersheds and data collection locations are shown in Figures A1- 2. Figures A3, A4, and A5 present long-term geometric mean concentrations, calculated as the geometric mean concentration of all available samples (including both wet and dry weather samples) for the period of record, of enterococci, fecal coliforms, and total coliforms, respectively. As shown in Figure A3, long-term geometric mean concentrations of enterococci exceed EPA's proposed freshwater enterococci water quality criteria in all the coastal creeks for which data were available. Similarly, long-term geometric mean concentrations of fecal coliform in most Newport Coast creeks exceed existing Santa Ana Basin Plan REC-1 fecal coliform water quality criteria. Figures A6, A7, and A8 present long-term geometric mean concentrations of enterococci, fecal coliform, and total coliforms plotted against the percent of development within each watershed. There is no apparent correlation for any of the three indicator bacteria presented in these figures with amount of the watershed that has been developed. Note that Figures A6 through A8 utilize the current (2005) level of development for each watershed.[7]

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[6] Data were obtained from http://www.ocbeachinfo.com/downloads/data/index.htm on February 11 and March 22, 2005. For enterococci, data were available from March 30, 1999, through December 21, 2004. For fecal coliform and total coliform, data were available from January 7, 1986, through December 21, 2004. No data were available for *E. coli*.

[7] The area of watershed that was developed was initially established by PBS&J in 1999 (PBS&J, 1999). These values have been subsequently updated based on information received from The Irvine Company in 2005. Two watersheds experienced significant development between 1999 and 2005: the Crystal Cove Creek watershed increased from ~5% to ~70% developed, and the Muddy Creek watershed increased from ~1% to ~60% developed. The level of development within the other coastal watersheds remained approximately constant.

To facilitate analysis, individual samples were segregated as follows: wet-weather[8], summer dry-weather[9], and winter dry-weather.[10] As shown in Figure A9, wet weather samples exceed single sample threshold values most frequently, regardless of which indicator bacteria are sampled (72%, 61%, and 39% of wet-weather enterococci, fecal coliform, and total coliform samples, respectively, exceed single sample thresholds). Summer dry weather samples exceed thresholds less frequently than wet-weather samples, and winter-dry weather samples exceed thresholds least frequently. The single sample thresholds used to calculate the percent of samples in exceedance are 247, 400, and 10,000 MPN/100mL for enterococci, fecal coliform, and total coliform, respectively.

Figures A10 through A53 present the following information for each site: a) a time-series scatter plot of single sample concentrations of enterococci, fecal coliform, and total coliform for the wet and dry weather data, b) wet and dry weather cumulative distribution functions for each bacteria, and c) the percentage of individual samples that exceed corresponding thresholds in each month. From this analysis, the following conclusions may be reached:

1. Lowest geometric mean concentrations of each of the three bacteria (enterococci, fecal coliform, and total coliform) occurred at the Pelican Hill Waterfall station (watershed 95% developed, primarily golf course), and highest geometric mean concentrations of each bacteria occurred at the Emerald Bay Drain station (watershed 3% developed). In the Muddy Creek watershed, which experienced substantial development between 1999 and 2005 (see footnote 7), enterococci concentrations appear to have decreased as the watershed became more developed. Trends were less evident for fecal and total coliform levels. Similar patterns emerged in data from the Crystal Cove Creek watershed, the other watershed that experienced significant development between 1999 and 2005. Enterococci and fecal coliform concentrations appear to have decreased, while any trends in the total coliform record are unclear. These results indicate that bacteria concentrations in creeks may decline as the level of development increases, and bacteria concentrations in runoff from developed watersheds may be lower than runoff from creeks in less developed coastal areas.

2. No relationship was found between the percentage of the watershed developed and the long-term geometric mean bacteria concentrations (see Figures A6, A7 and A8).

3. The time series plots indicate that concentrations of indicator bacteria are not increasing over time. By visual inspection, bacteria concentrations may be

[8] "Wet-weather" samples are those samples that were collected within two days of a rainfall event greater than or equal to 0.1 inches as measured by the Newport Beach Harbor Station.

[9] "Summer dry-weather" samples are defined as samples collected from April-November, but not within two days of rainfall greater than or equal to 0.1 inches as measured by the Newport Beach Harbor Station.

[10] "Winter dry-weather" samples are defined as samples collected from December-March, but not within two days of rainfall greater than or equal to 0.1 inches as measured by the Newport Beach Harbor Station.

decreasing over the data record in five catchments (Pelican Point Creek, Muddy Creek, Emerald Bay Drain, El Morro Creek upstream station, and Crystal Cove Creek). At the remaining six stations, no apparent long-term trend in bacteria concentration is observed. Very little if any correlation is evident between long-term trends and percentage of watershed developed, as the apparent slight decrease in bacteria concentrations was observed in watersheds that range from 1-95% developed.

4. Although Figure A9 shows that taken as a whole, wet-weather samples have higher concentrations than dry-weather samples, data from some locations show the opposite trend. At Pelican Point Creek (95% developed), dry weather concentrations for enterococci and fecal coliform are higher than wet weather concentrations. At the Emerald Bay Drain (3% developed), fecal and total coliform dry weather concentrations are significantly greater than wet weather concentrations. At El Morro Creek (1% developed), Broadway Creek (25% developed), and Crystal Cove Creek upstream station (70% developed) there is no significant difference (by visual inspection of Figures A34-36, A50-52, and A38-40, respectively) between wet and dry weather bacteria concentration distributions.

5. The general observation that winter dry-weather samples on average contain fewer bacteria than summer dry-weather samples is evident in many of the scatter plots. Figures A10, A34, A38, A42, and A46 (presenting data from Pelican Point Creek, El Morro Creek, Crystal Cove Creek upstream, Crystal Cove Creek, and Buck Gully) illustrate this behavior most clearly.

These results are consistent with the results from an earlier study (PBS&J, 1999) in which long-term geometric mean concentrations of bacteriological data from November 1996-October 1999 were evaluated.

Bacteria Concentrations in Inland Waters in the Santa Ana Region

As part of the activities conducted by the Stormwater Quality Standards Task Force, CDM has compiled bacteriological data from several agencies within the Santa Ana Region (CDM, 2005). The CDM study included data collected and compiled by Orange County, the Regional Water Quality Control Board (Region 8), the Santa Ana Watershed Project Authority, the County of San Bernardino, the County of Riverside, the United States Environmental Protection Agency (EPA), the United States Geological Survey, and Orange County Coastkeeper. Select figures produced by CDM in this study are shown in Appendix B. CDM performed an overview analysis of all bacteria data collected, and reached the following broad-based and general conclusions:

1. Concentrations of indicator bacteria in samples collected from inland water bodies very frequently exceed existing Basin Plan fecal coliform water quality objectives and EPA-proposed *E. coli* criteria.

2. Bacteria concentrations in samples obtained from upstream, largely undisturbed areas are typically lower than those in samples from downstream areas affected by urbanized land uses. Concentrations in upstream samples are more frequently below water quality objectives and proposed criteria than downstream samples.

3. Winter dry-weather samples are more likely to meet objectives than summer dry-weather samples, consistent with results from the Orange County coastal watersheds.

CDM also conducted a detailed analysis of six sites[11] for which long-term data records were available. These six sites exhibited varying degrees of urbanization and channel modification. A map showing the locations of these six sites is shown in Appendix B as Figure B1. Detailed results from these stations are reproduced in Appendix B as Figures B2 through B13. Land use distributions for the areas tributary to the study sites are shown in Table 3.

Table 3. Approximate land use distributions in the watersheds of CDM's six detailed study sites

Site	% Vacant	% Residential	% Commercial	% Industrial	% Other
Chino Cr.[a]	3.2	61.3	16.7	9.7	9.1
Santa Ana Delhi Channel	0.9	52.4	26.0	9.2	11.5
Temescal Cr.	67.3	16.2	2.4	3.4	10.7
Santa Ana R. at Imperial Highway[b]	-	-	-	-	-
Santa Ana R. at MWD Crossing[c]	-	-	-	-	-
Icehouse Canyon Creek	100	0	0	0	0

a) Chino Creek land use data are for portion of watershed downstream of San Antonio Dam.
b) CDM concluded that any potential relationship between land use and bacteria concentrations in this reach of the Santa Ana River is likely masked by the interception of flows by Prado Dam; consequently, no data land use data were available in the CDM report for this site.
c) CDM did not include land use statistics for this station in its report. The report states that land use is "diverse…a combination of commercial, residential, industrial, and agricultural lands. The upper part of the watershed includes natural undeveloped lands…Residential land is dispersed throughout the contributing area."

11 The six sites examined by CDM include: Chino Creek at Schaeffer Avenue, the Santa Ana Delhi Channel, Temescal Creek at Lincoln Avenue, the Santa Ana River at Imperial Highway, the Santa Ana River at the Metropolitan Water District crossing, and Icehouse Canyon Creek in the Angeles National Forest.

By examining these sites in detail, CDM found the following:

1. In streams where flow rate data are available, high bacteria counts are in many cases but not always associated with high flow events (presumably caused by rainfall). Bacteria concentrations in samples collected from Chino Creek at Schaeffer Avenue (Figure B2) and the Santa Ana Delhi Channel (Figure B3) are frequently elevated and do not exhibit any apparent correlation with flow rate in the channel. In Temescal Creek (Figure B4) and the Santa Ana River at the MWD crossing (Figure B5), the data are widely scattered and patterns are difficult to detect. In the Santa Ana River at Imperial Highway (Figures B6-7), data show that bacteria levels are elevated during high flow events and the levels remain elevated for 1-2 days after the high flow has receded.

2. Bacteria concentrations appear to be decreasing over time at three locations (Chino Creek at Schaeffer Ave. (data record 2002-2004), Santa Ana River at MWD Crossing (data record 1984-2004), and Santa Ana River at Imperial Highway (data record 1981-2004)). At the other three locations, no long-term trends are apparent.

3. All sites except Icehouse Canyon Creek have regularly exceeded current or proposed water quality objectives. As mentioned previously, concentrations at the two Santa Ana River sites have shown a decreasing trend, and since 1998 most samples have been at or below objective levels. Icehouse Canyon Creek, at elevation 5,100 feet in the Angeles National Forest, has only one sample (of 40 total samples; a fecal coliform measurement of 9,400 MPN/100mL) in the data record that does not comply with existing or anticipated water quality objectives, indicating that runoff from remote, undeveloped, forested catchments at higher elevations may have significantly lower bacteria levels than runoff from lower elevation watersheds, including undeveloped watersheds at lower elevations. Figures B8-13 show, for each of the six sites, the percent of months in which single sample thresholds are exceeded when samples are classified as summer dry, winter dry, or wet-weather.

Los Angeles County Monitoring Data

Los Angeles County has prepared an Integrated Receiving Water Impacts Report (Los Angeles County, 2001), which includes bacteria concentrations measured in runoff collected downstream of catchments that exhibited primarily single land use types. Los Angeles County data for indicator bacteria for several major land use types are shown in Table 4 (adapted from Table 4-12 of the L.A. County report).

Table 4. Bacteria concentration means, medians and coefficients of variation (C.V.) from Los Angeles County Land Use Sites

	Total Coliform			Fecal Coliform			Enterococcus		
Land Use Type	**Mean**	**Median**	**CV[a]**	**Mean**	**Median**	**CV[a]**	**Mean**	**Median**	**CV[a]**
Commercial	1,140,000	1,250,000	0.71	528,750	90,000	1.35	86,250	40,000	1.18
Vacant	9,187	2,200	1.25	1,397	500	2.60	679	500	0.98
High density S.F. residential	1,366,667	1,600,000	0.30	933,333	900,000	0.70	610,000	140,000	1.41
Transportation	692,500	600,000	0.82	328,750	205,000	1.22	32,000	32,000	0.65
Light industry	454,000	160,000	1.42	338,220	30,000	2.09	98,200	130,000	0.73

a) "CV" refers to "Coefficient of Variation", calculated by dividing the standard deviation by the mean.

The data shown in Table 4 demonstrate that significantly lower bacteria concentrations were observed in runoff from vacant land areas than in other land use types. These data were collected by Los Angeles County in Sawpit Creek, downstream of Monrovia Creek, in the City of Monrovia; this catchment is in the San Gabriel Mountains in a very steep, sparsely vegetated area far from the ocean. Low concentrations of indicator bacteria from the Sawpit Creek watershed are consistent with low concentrations in samples collected from Icehouse Canyon Creek, both mountainous, high elevation watersheds. These results differ from observations from the Orange County coastal watersheds, which indicate no relationship between percentage development in a watershed and bacteria concentrations. The differences are most likely due to differences in catchment characteristics, local climate, the numbers and types of wildlife present, or to other factors. In any case, both the mean and median concentrations observed for each Los Angeles County land use type exceeded applicable water quality thresholds.

Los Angeles County also measured bacteria concentrations in several "mass emission" stations. These stations were sited to capture runoff from major Los Angeles County watersheds that generally have heterogeneous land use, with the objective of estimating pollutant loads to the ocean and of identifying long-term trends in pollutant concentrations, where possible. The mass emission stations include Malibu Creek (watershed 6% impervious; measurement station near Malibu Canyon Road), Ballona Creek (watershed 45% impervious; measurement station between Sawtelle Boulevard and Sepulveda Boulevard in Los Angeles), the Los Angeles River (watershed 35% impervious; measurement station between Willow Street and Wardlow Road in Long Beach), and the San Gabriel River (watershed 30% impervious; measurement station below the San Gabriel River Parkway in Pico Rivera).

In addition to the land use data reported in Table 4, Los Angeles County reached a number of conclusions using data collected at these mass emission stations. The following conclusions are cited directly from the Los Angeles County report (2001):

- The Malibu Creek station appears to have consistently lower [bacteria] counts than other mass emission stations.

- Every wet weather mass emission bacteria sample taken exceeded the public health criteria for indicator bacteria. All of the dry weather bacteria samples taken for the low flow diversion projects exceeded the public health criteria. Most of the dry weather mass emission bacteria samples taken exceeded the public health criteria. Wet weather flows contained bacteria densities at much higher levels (three to four orders of magnitude) than dry weather flows.

- Except for 1996-97, densities observed during the first storm of each rainy season were not necessarily higher than during consecutive storm events, suggesting that there was no consistent "first-flush" effect in these watersheds. Peak densities were observed at different times each year. In 1995-96, the peak density at all four mass emission stations and one land use station coincided with the peak storm of the season.

- Except for somewhat lower [bacteria] densities at Malibu Creek, there was no seasonal or regional consistency in cell densities. There was a very wide range of densities for all stations.

Consistent with data from Orange County coastal watersheds, the Los Angeles County data show that samples collected during wet-weather exhibit significantly higher bacteria concentrations than samples collected during dry weather.

ADDITIONAL DATA ON SOURCES AND CONCENTRATIONS OF BACTERIA IN RUNOFF

Numerous additional studies and data reports have shown a correlation between elevated bacteria concentrations and rainfall events in Southern California. This correlation is evident in data collected from a variety of environments. For example, elevated concentrations of indicator bacteria have been observed during wet weather conditions at Huntington Beach (Boehm et al.,2002; Kim et al., 2004; Reeves et al., 2004), and northern Orange County and Santa Cruz County (Dwight et al., 2004).

Several studies also indicate that runoff from undeveloped watersheds contains bacteria concentrations that exceed relevant water quality standards. For example, storm water runoff from the head of the Rose Creek watershed in the San Diego Region contains levels of indicator bacteria well in excess of water quality objectives, even though this area is non-urban, contains no sewer lines or lift stations, and is restricted from public access (Schiff and Kinney, 2001). Moore (2001) found that concentrations of indicator bacteria in San Juan Creek sampling stations reflecting rural land uses exceeded water quality criteria, and that rainfall events resulted in higher bacteria concentrations at both rural and urban sites than dry weather. (Moore (2001) also found that storm drains can be major sources of dry weather bacteria pollution.)

The level or type of development is not necessarily indicative of bacteria levels in runoff, or of the presence of human-derived bacteria. In Mission Bay, a highly urbanized watershed, extensive efforts have been made to eliminate human sources of bacteria by repairing the sanitary sewer system and diverting dry weather flows to a local waste water treatment plant. Source tracking studies suggest that human sources contribute a minor fraction of the total fecal inputs to the Bay, and yet violations of water quality standards continue to occur (see Colford et al., 2005, and references therein). Pednekar et al. (2005) also found that changes in land use associated with the development of agricultural lands[12] within watersheds tributary to Newport Bay did not have a significant impact on bacteria loads, stating "The storm loading rate of coliform…appears to be unaffected by the dramatic shift away from agricultural land-use."

A number of studies have indicated that runoff from urban areas may not be the sole or even the primary source of elevated bacteria concentrations in receiving waters, but that such elevated levels may be caused by non-human sources, such as terrestrial wildlife and birds or even local sediments. Studies conducted at Huntington Beach have indicated that there may be many sources of indicator bacteria to the surf zone, including urban runoff, flow from adjacent wetlands, birds, and sediments (Grant et al., 2001). A recent study by Noblet et al. (2004) indicates that birds may be the source of high concentrations of indicator bacteria at the mouth of the Santa Ana River and in the nearby surf zone, and suggested that local sediments may be the source of fecal steroids, indicating the presence of fecal-associated material in the sediments. Another study by the Los Angeles Regional Water Quality Control Board (2004) erected a bird exclusion structure on Cabrillo Beach, and found that bacteria levels below the structure were reduced up to 60% compared to levels measured outside the structure, while exceedances of water quality standards were reduced by 65% below the structure. The Los Angeles Regional Board also reported that "high bacterial densities may be largely from the beach itself."

Other studies have provided additional evidence that the bacteria found in creeks may result from natural, not urban, sources. Orange County recently studied the efficacy of several best management practices (BMPs) for reducing bacteria concentrations in Aliso Creek, Orange County, California. Results of this study have been summarized by GeoSyntec (2005) (attached as Appendix C). The BMPs that were evaluated include 1) a multimedia filtration and UV sterilization system, and 2) wetland ponds. The study, which was conducted during dry weather, found that both BMPs greatly reduced concentrations of indicator bacteria[13], but that bacteria levels rebounded within a short distance downstream of the BMPs. In the case of the filtration/sterilization, the geometric mean concentration of fecal coliform increased from 317 cfu/100mL at the outlet of the BMP to

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[12] Tributary creeks to Newport Bay studied by Pednekar et al. include the San Diego Creek (SDC) and the Santa Ana Delhi Channel (SAD). The SDC watershed remained between 52-60% developed over the study period. Agricultural land-use decreased from 34% to 2%, while commercial land-use increased from 1% to 10%, industrial land-use from 2% to 20%, and residential land-use from 11% to 25%. The SAD watershed remained between 88-92% developed over the study period. Agricultural and residential land-use decreased while commercial land-use increased from 3% to 15% and industrial land-use increased from 19% to 33%.

[13] In comparing influent and effluent, multimedia filtration/UV sterilization resulted in a 99.6% reduction in fecal coliform concentration; wetland ponds achieved a 90-99% reduction in fecal coliform concentrations.

2575 cfu/100mL in a natural channel at a distance of 35 feet downstream of the BMP. In the case of the wetland ponds, effluent was routed through a pipe approximately 200 feet long to the monitoring station, which recorded concentrations approximately two times greater than what could be accounted for based on mass-balance calculations. However, uncertainty in flow measurements, data variability, and the fact that ~37% of the flow is not intercepted by the wetlands indicate that regrowth is not the only possible explanation for the unexpectedly high bacteria concentrations at the pipe outlet.

The link between bacteria concentrations in rivers and streams and downstream water quality, including surf zone water quality, has been examined by a number of authors in addition to those cited above. PBS&J (1999) found that even though Newport coastal creek waters contained high concentrations of indicator bacteria, it did not appear that these waters had a significant impact on bacteria concentrations in the surf zone. Ahn et al. (2005) found that while storm water runoff from the Santa Ana River may lead to "very poor" surf zone water quality, the impact on the surf zone was generally confined to <5 km around the river outlet. Pednekar et al. (2005) studied bacteria concentrations in Newport Bay, California, and found that approximately 70% of the variability in the coliform record could be attributed to rainfall, implying that storm water runoff from the surrounding watershed is a primary source of coliform in Newport Bay. A difference in scale may account for the different conclusions reached by different studies – the Ahn et al. and Pednekar et al. studies found significant impacts on surf zone water quality by examining large creeks and rivers, while PBS&J's conclusion that creek water quality does not significantly affect surf zone water quality is based on a study of small to medium sized creeks – and clearly highlights the need for site-specific evaluations of bacterial water quality.

Presumably, the source of bacteria affects its pathogenicity and risk to human health, but data on human health risks from non-human source bacteria are scarce. Some studies (see, e.g., Schroeder et al., 2002) call into question whether the presence or concentration of indicator bacteria in urban runoff has any relationship with the possible presence of human pathogens. Schroeder et al. sampled paved and grass areas of parks, roofs, residential lawns, ponds, storm drains and similar surfaces to characterize the microbial community that may be present in urban water. Each sample was tested for indicator organisms (coliforms, fecal coliforms, *E. coli*, and enterococci), viruses (adenovirus, enterovirus, hepatitis A virus, and rotavirus), bacteria (enterohemorrhagic Escherichia coli, enterotoxigenic Escherichia coli, Shigella, Salmonella, and Staphylococcus aureus), and protozoa (Giardia lamblia and Cryptosporidium parvum). The study states found that although pathogens can be found in urban drainage, "there does not appear to be a relationship between the presence of pathogens and the concentration or presence of indicator organisms." Of particular note, a recent epidemiological study of health risks due to swimming in Mission Bay (Colford et al., 2005), where concentrations of indicator bacteria are believed to be predominantly from non-human sources, concluded that the risks of swimming-related illness were uncorrelated with exceedances of state water quality thresholds or with levels of indicator bacteria.

In conclusion, the available data from Southern California indicate that bacteria concentrations are often elevated in runoff from both urban and undeveloped watersheds, particularly during wet weather conditions. The level of development appears to have little effect on bacteria concentrations in storm flows. There is no clear trend in bacteria concentrations over time, with concentrations remaining relatively steady, even in areas where land use characteristics have changed over time. Available data also indicate that multiple sources may contribute to high concentrations of indicator bacteria, including natural sources such as wildlife, birds, and sediments. Regrowth within the environment also occurs, resulting in elevated bacteria concentrations even downstream of the point where relatively bacteria-free flows enter natural channels or man-made conveyances. Finally, the impact of high bacteria concentrations on downstream water quality appears to vary by location and conditions.

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APPENDIX A

DATA FROM ORANGE COUNTY COASTAL CREEKS

Figure A 1: Location of coastal catchments and surf zone areas along the Newport Coast.

Figure A 2: Additional detail on the catchment areas (information collated from the PBS&J report, 1999 and updated by The Irvine Company, 2005).

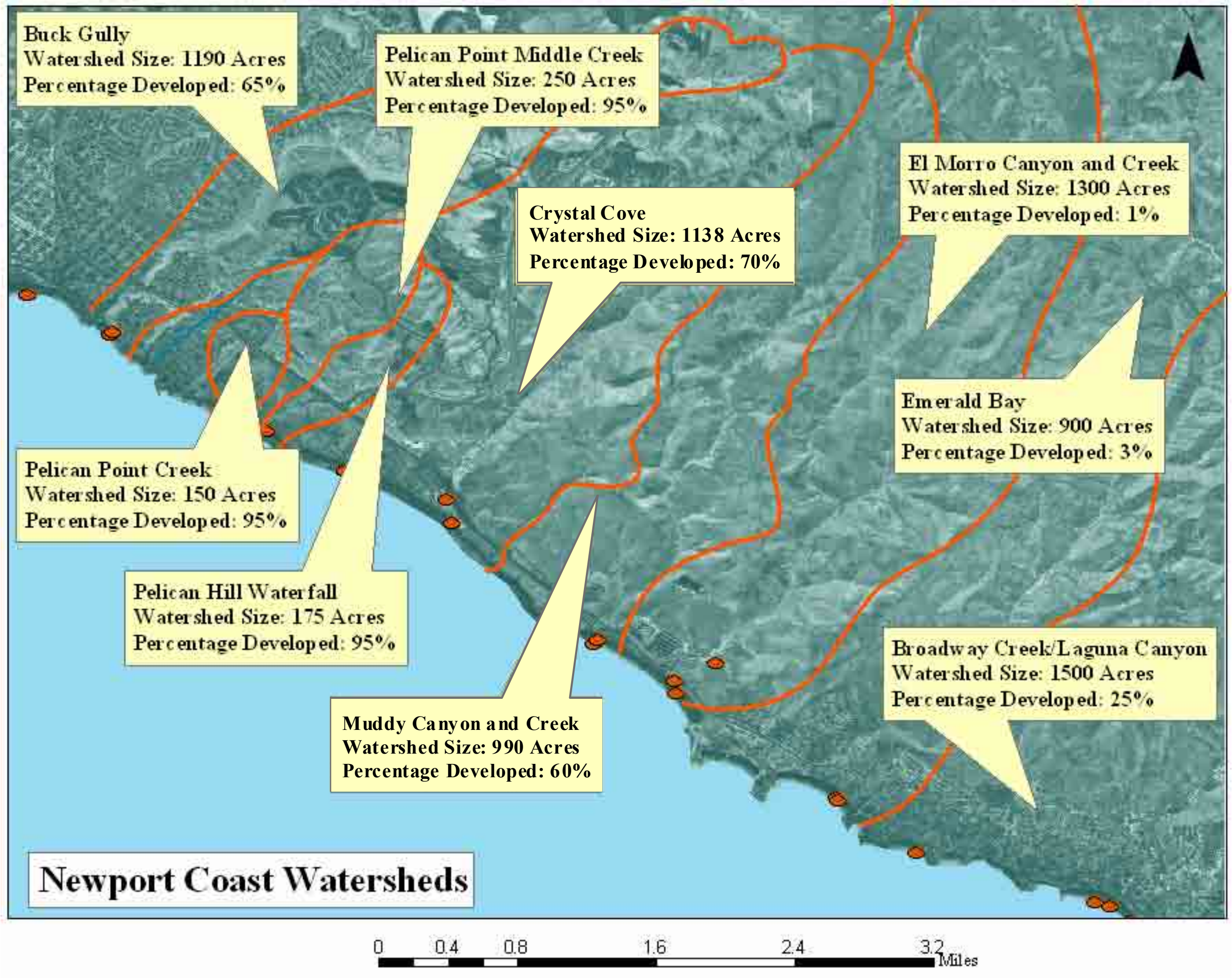


Figure A 3: Long-term geometric mean concentration for enterococci (data from 3/30/99 to 12/21/04). Dashed line represents EPA's suggested 30-day geometric mean water quality criterion for enterococci corresponding to a 1.0% risk level.

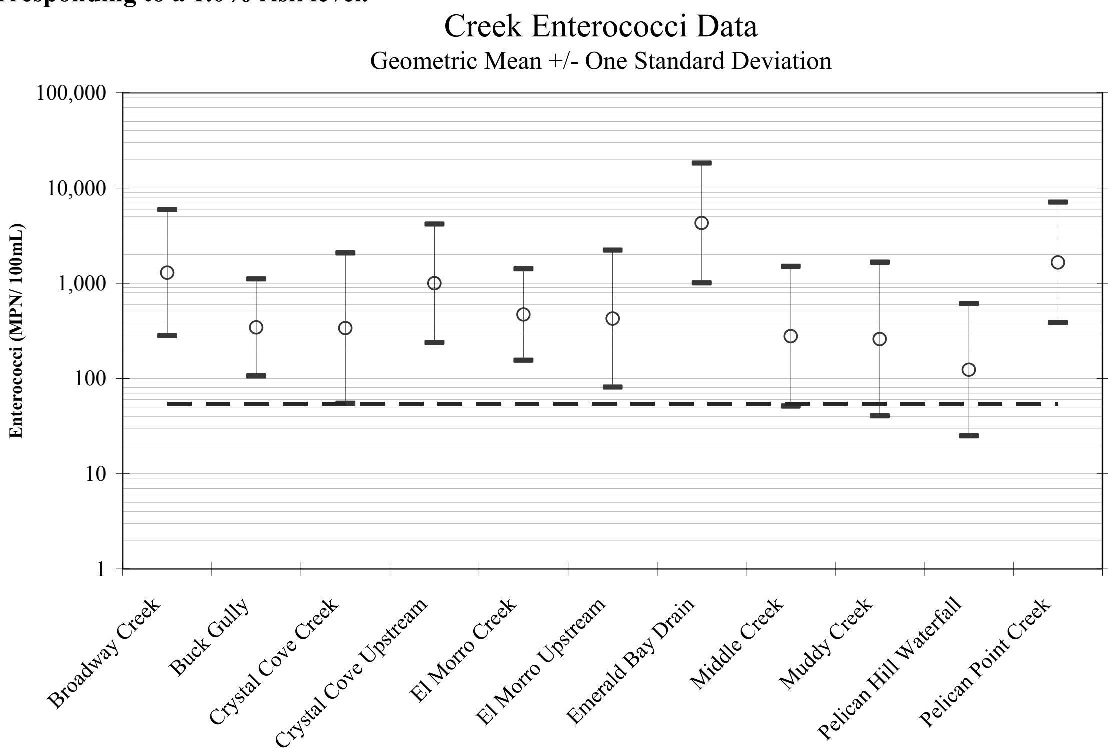


Figure A 4: Long-term geometric mean fecal coliform concentrations (data from 1/7/86 to 12/21/04). Dashed line corresponds to the current Santa Ana Basin Plan water quality criterion for 30-day log mean (geometric mean) fecal coliform concentrations.

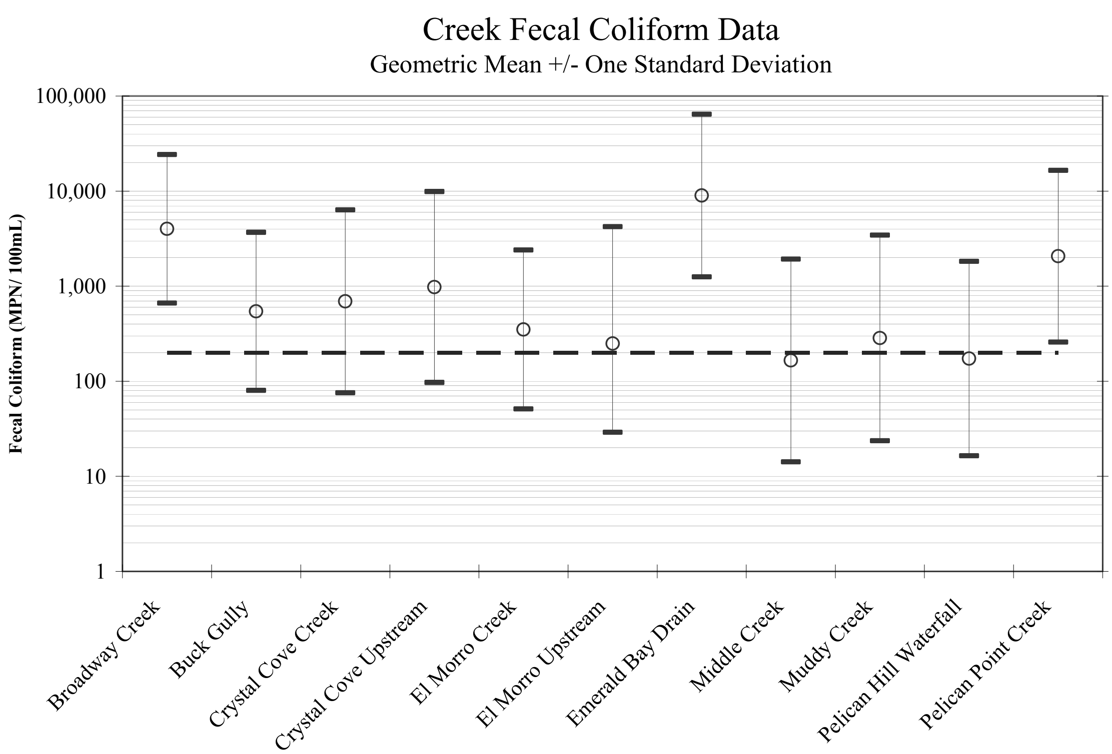


Figure A 5: Long-term geometric mean concentrations for total coliform (data from 1/7/86 to 12/21/04)

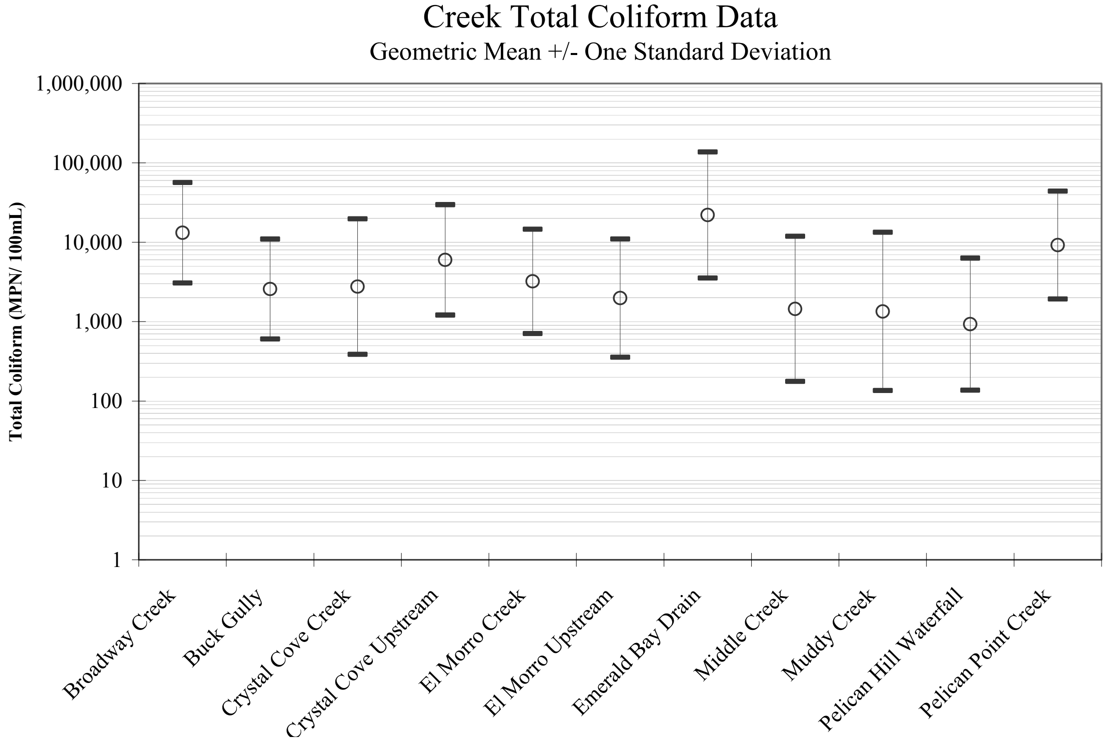


Figure A 6: Relationship between % developed and the long-term geometric mean enterococci concentration (data from 3/30/99 to 12/21/04). Dashed line represents EPA's suggested 30-day geometric mean water quality criterion for enterococci corresponding to a 1.0% risk level.

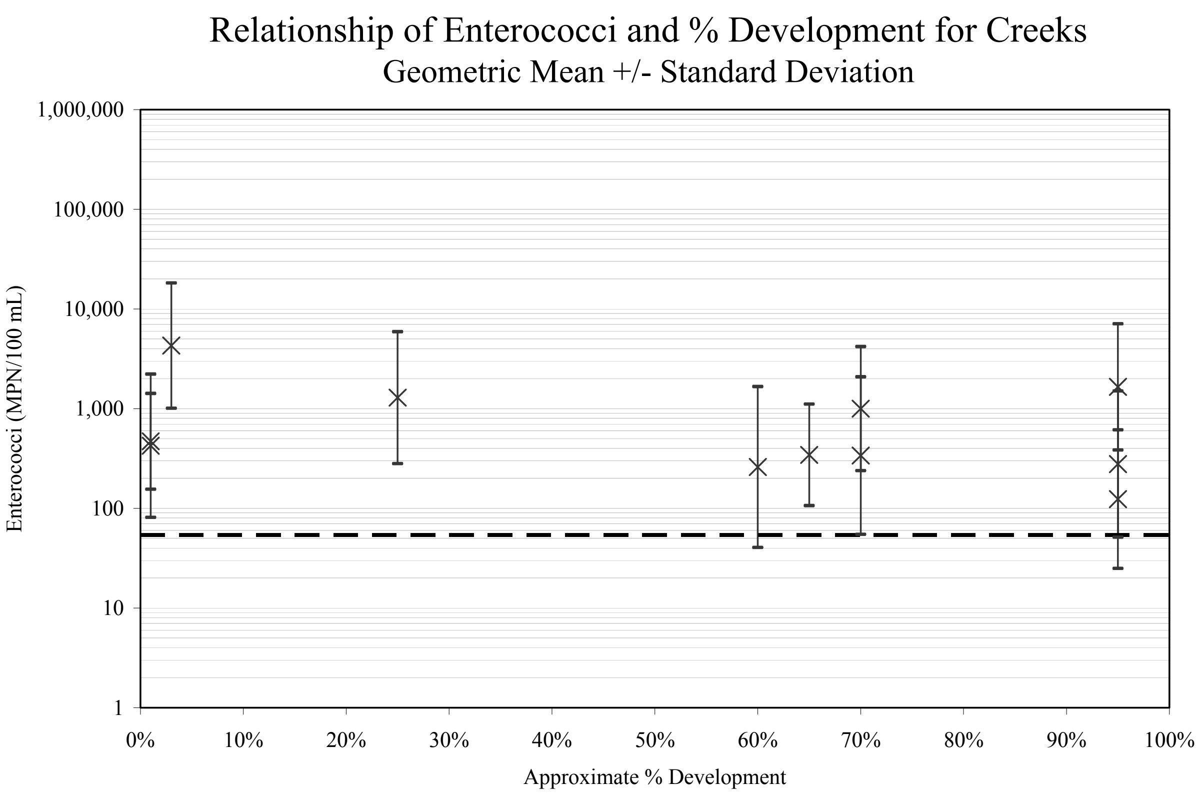


Figure A 7: Relationship between % developed and the long-term geometric mean fecal coliform concentration (data from 1/7/86 to 12/21/04). Dashed line corresponds to the current Santa Ana Basin Plan water quality criterion for 30-day log mean (geometric mean) fecal coliform concentrations.

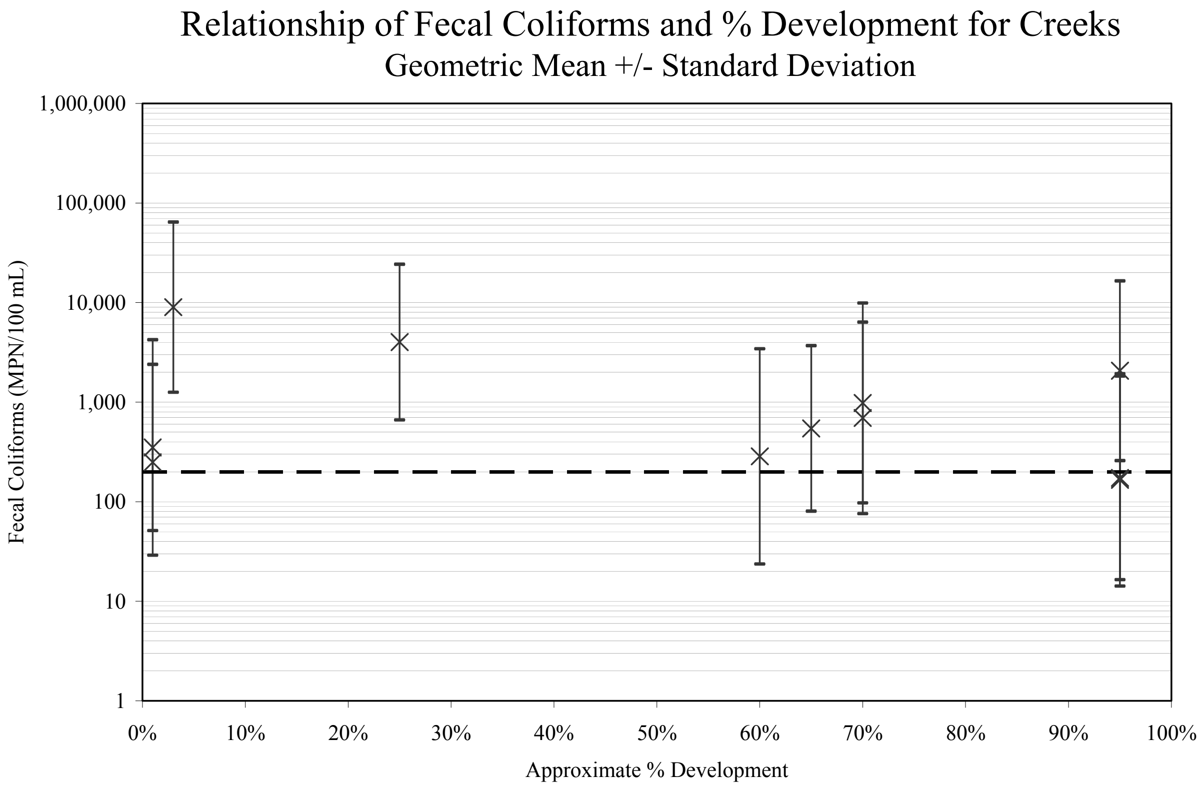


Figure A 8: Relationship between % developed and the long-term geometric mean total coliform concentration (data from 1/7/86 to 12/21/04).

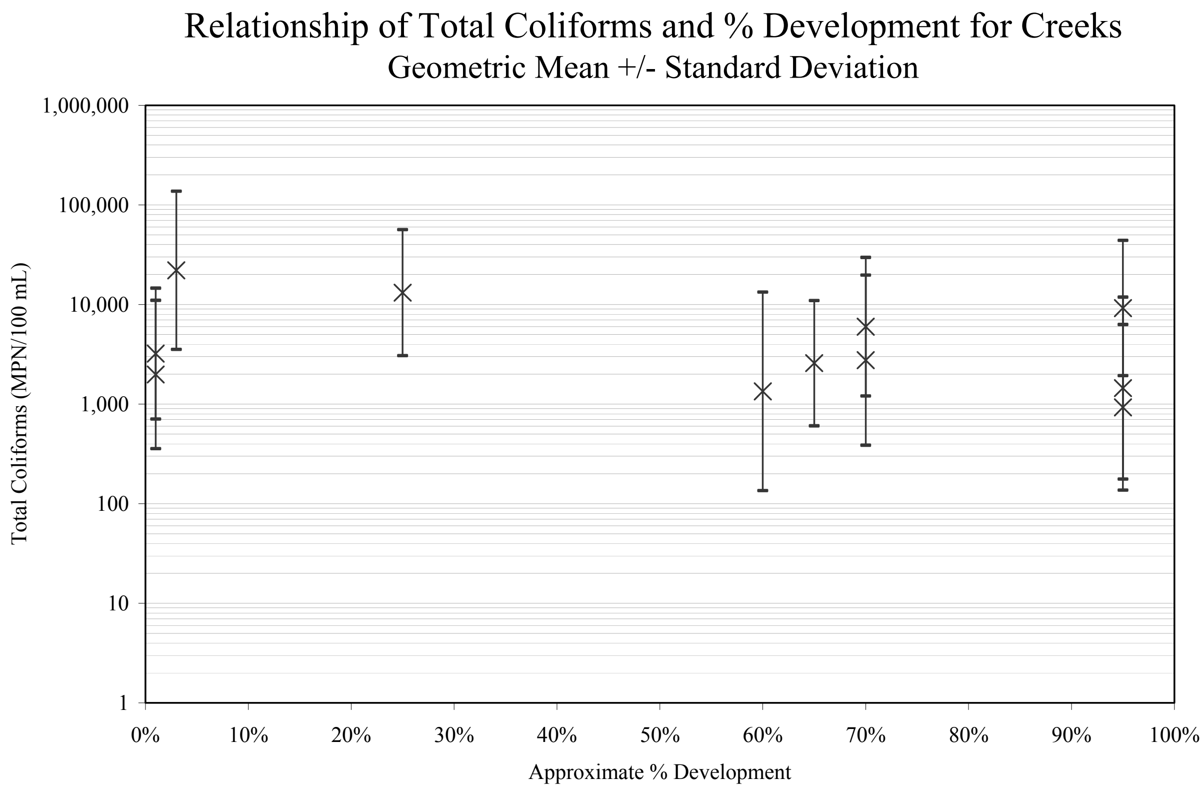


Figure A 9: Percent of samples in exceedance of thresholds by weather type (data from 1/7/86 to 12/21/04 for total and fecal coliform and from 3/30/1999 to 12/21/04 for enterococci). "Wet" data are those within two days of rainfall totaling 0.1" or greater at Newport Harbor. "Summer Dry" samples were collected from April-November, but not within two days of 0.1" or more of rain. "Winter Dry" samples were collected from December-March, but not within two days of 0.1" or more of rain. Threshold values against which data were compared are 247, 400, and 10,000 MPN/100mL, for enterococci, fecal coliform, and total coliform, respectively.

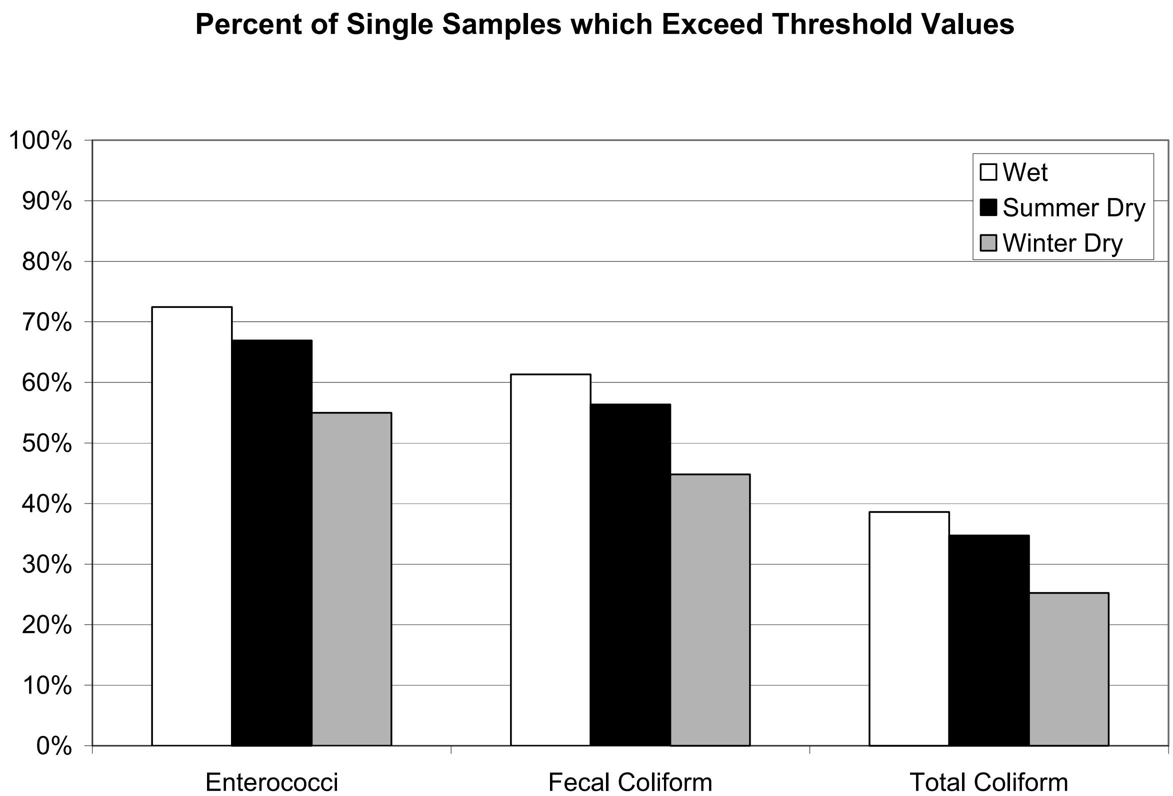
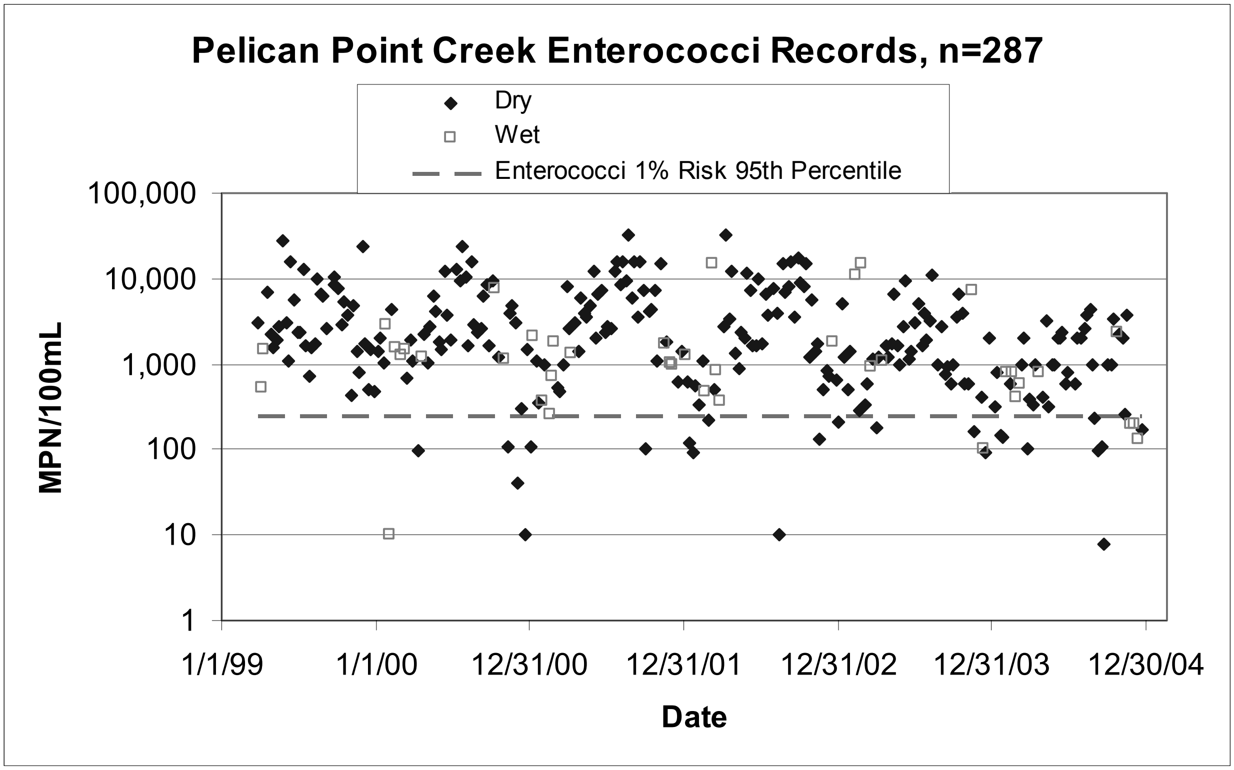


Figure A 10: Pelican Point Creek enterococci data and corresponding cumulative frequency distribution



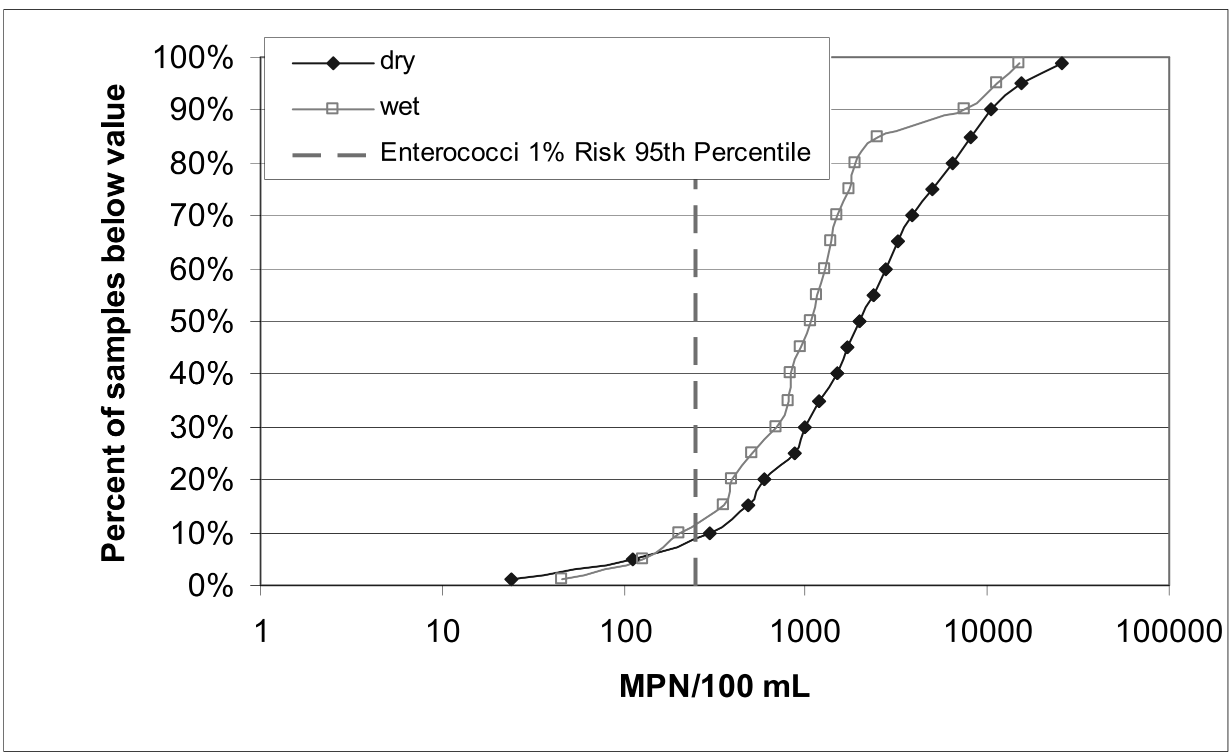
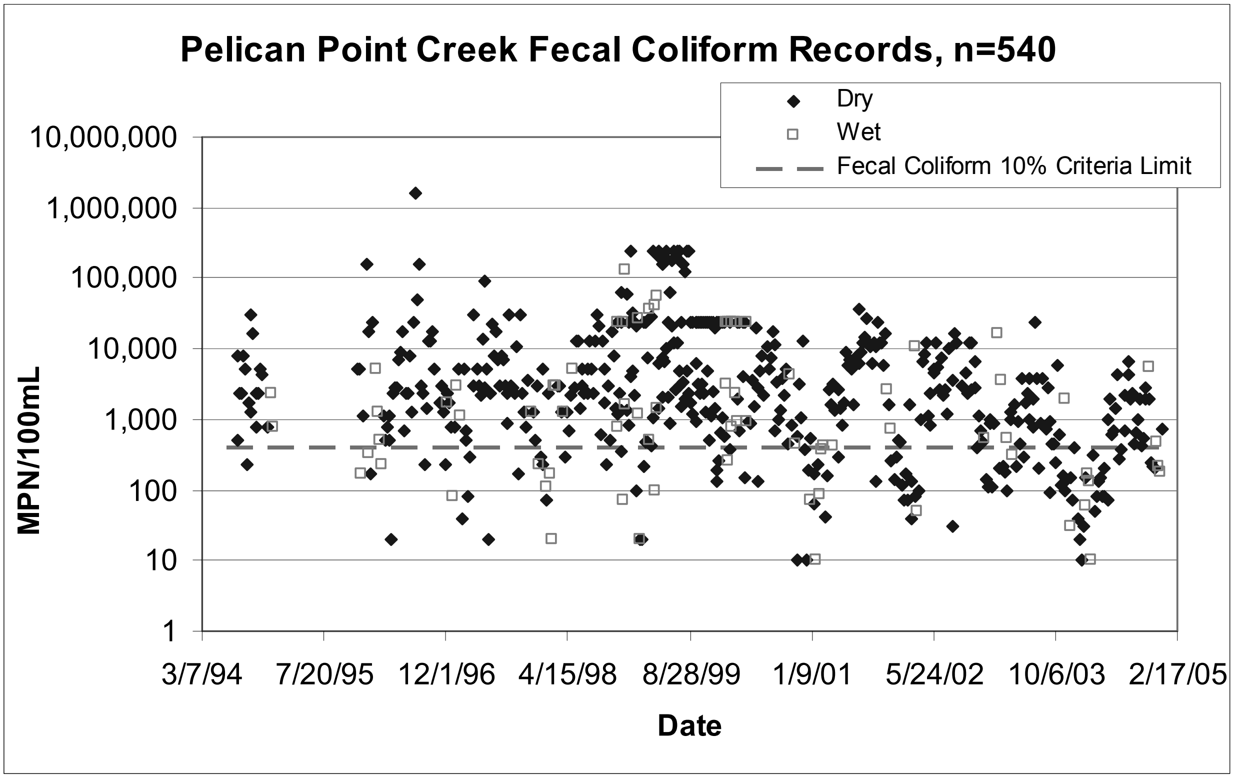


Figure A 11: Pelican Point Creek fecal coliform data and corresponding cumulative frequency distribution



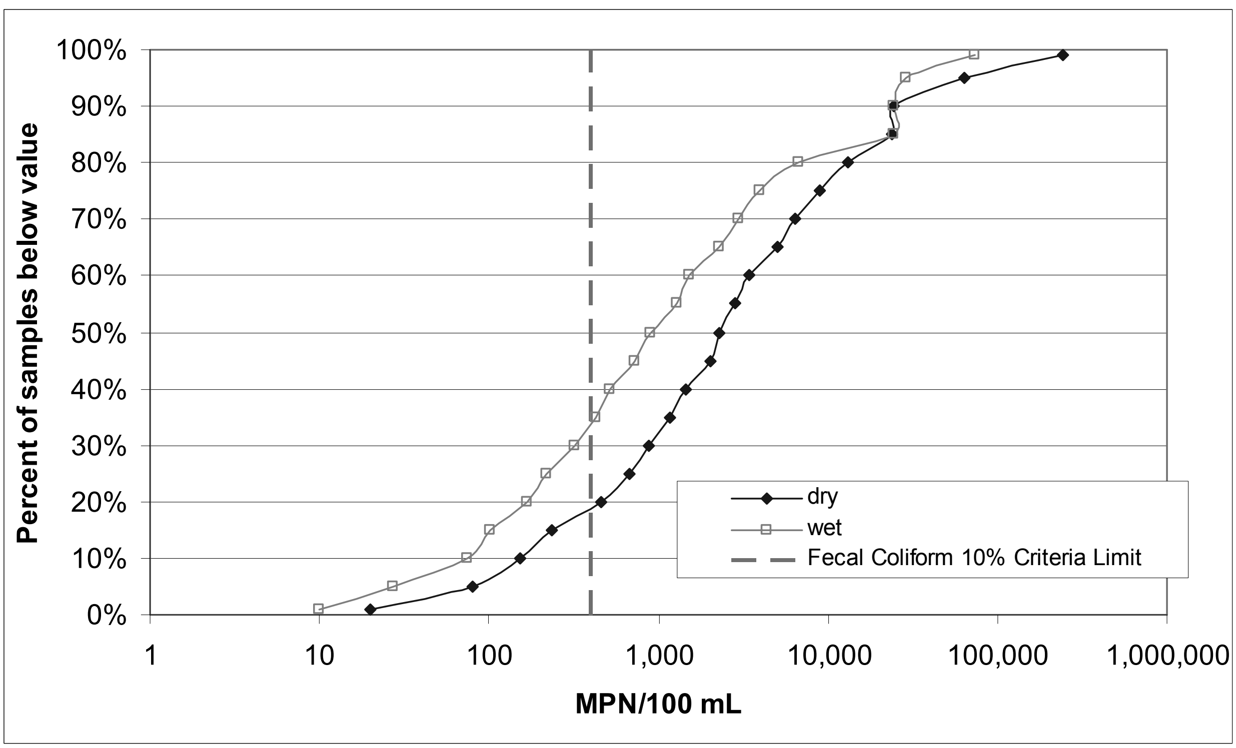
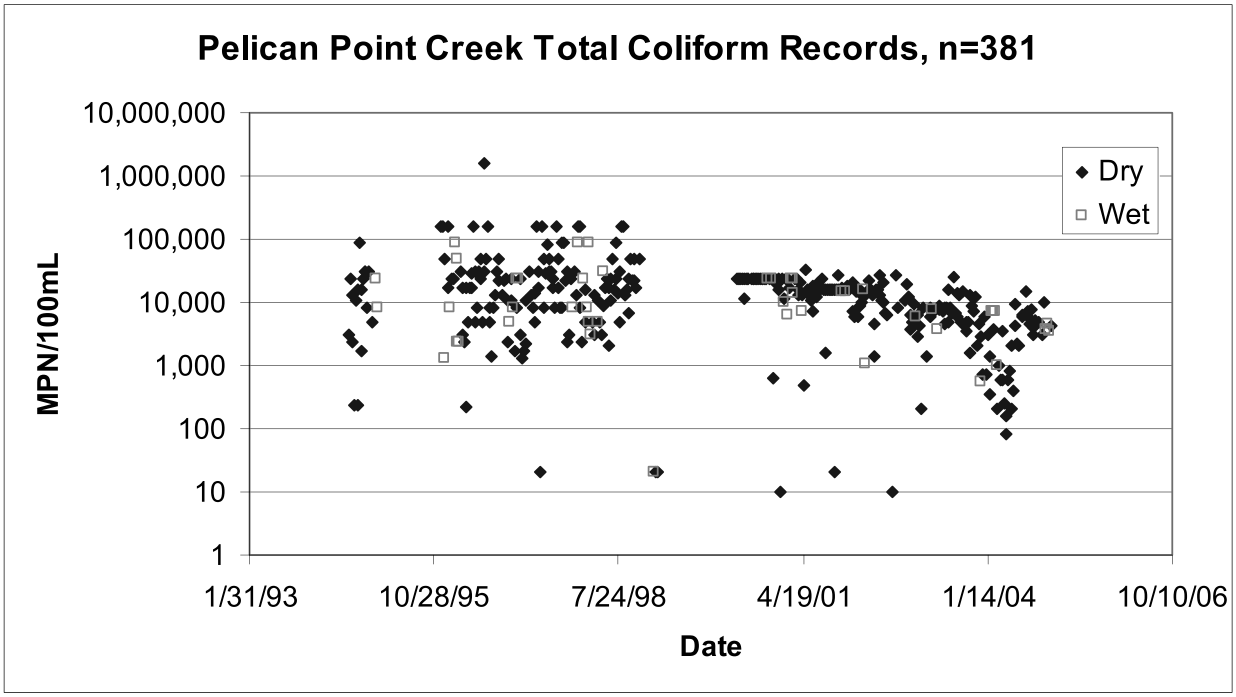


Figure A 12: Pelican Point Creek total coliform data and corresponding cumulative frequency distribution



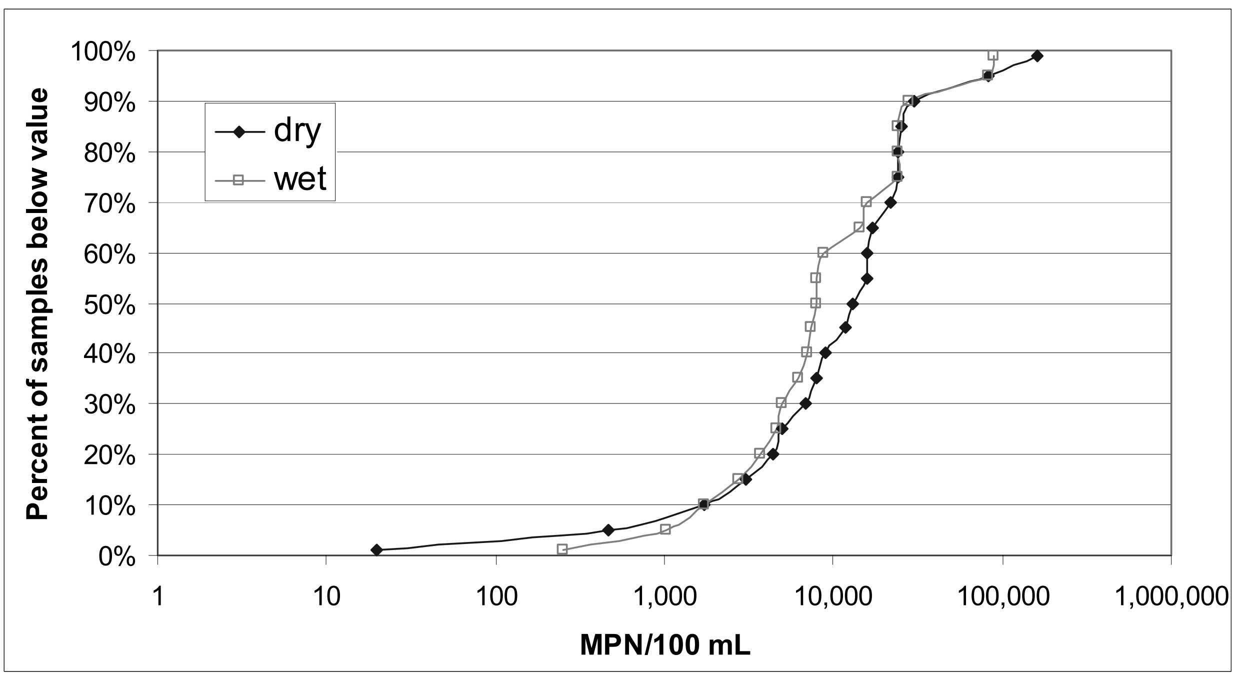


Figure A 13: Percentage of samples from Pelican Point Creek which exceed thresholds, by month

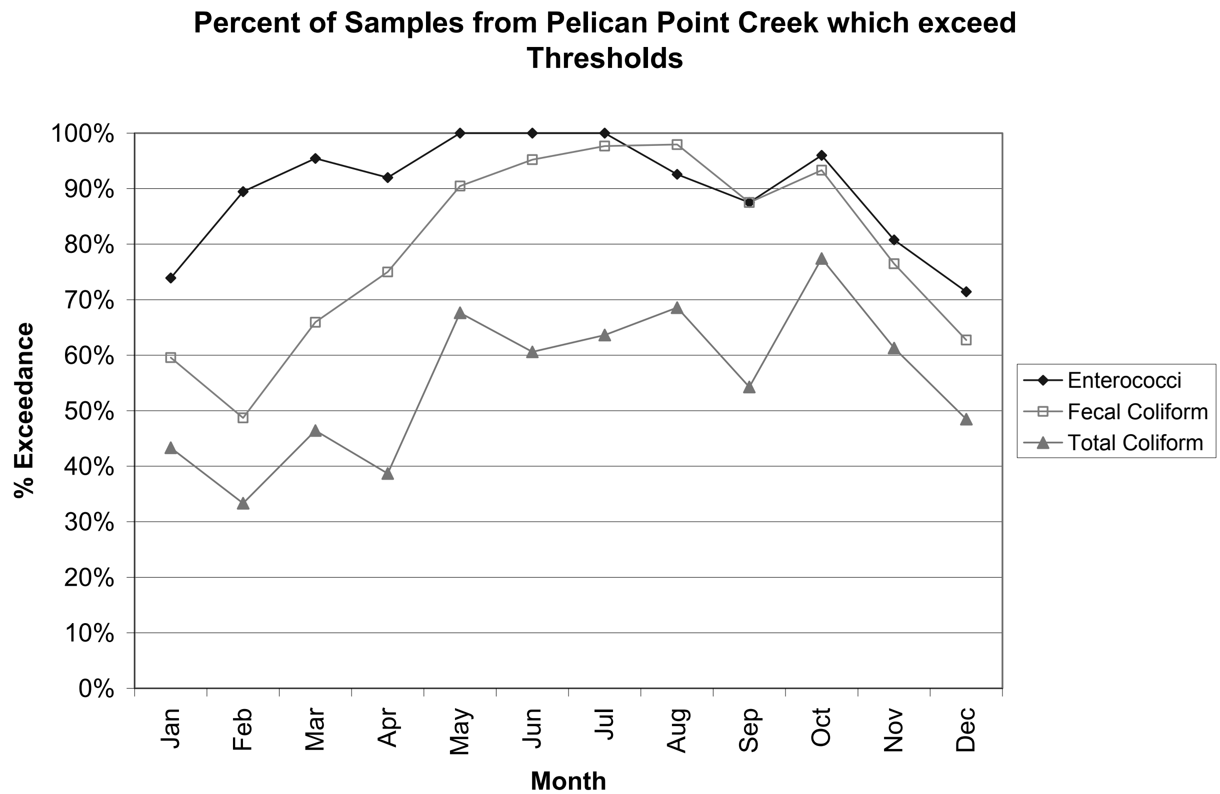
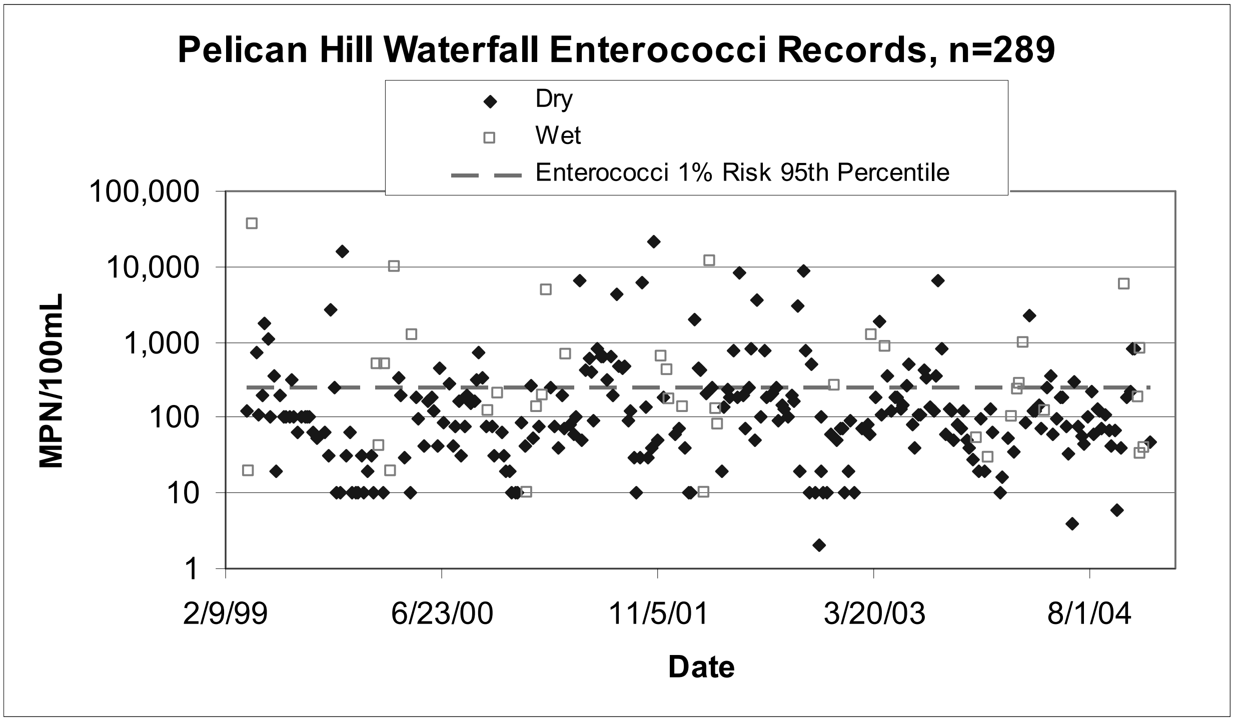


Figure A 14: Pelican Hill Waterfall enterococci data and corresponding cumulative frequency distribution



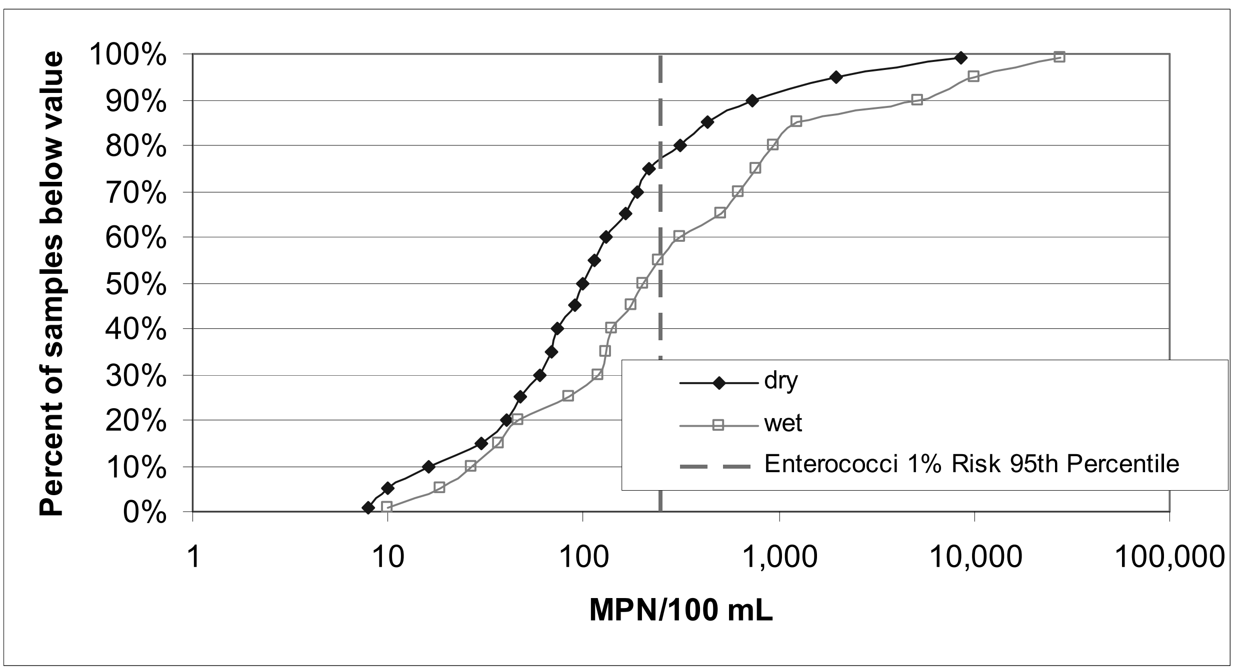
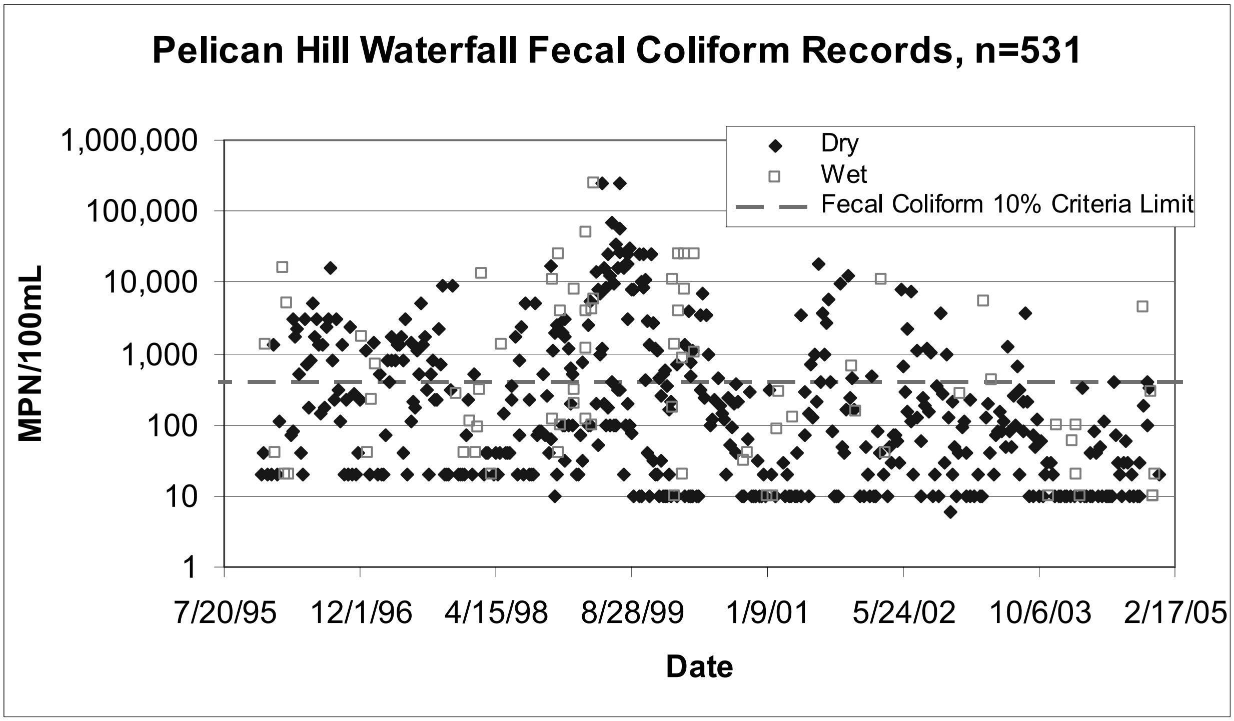


Figure A 15: Pelican Hill Waterfall fecal coliform data and corresponding cumulative frequency distribution



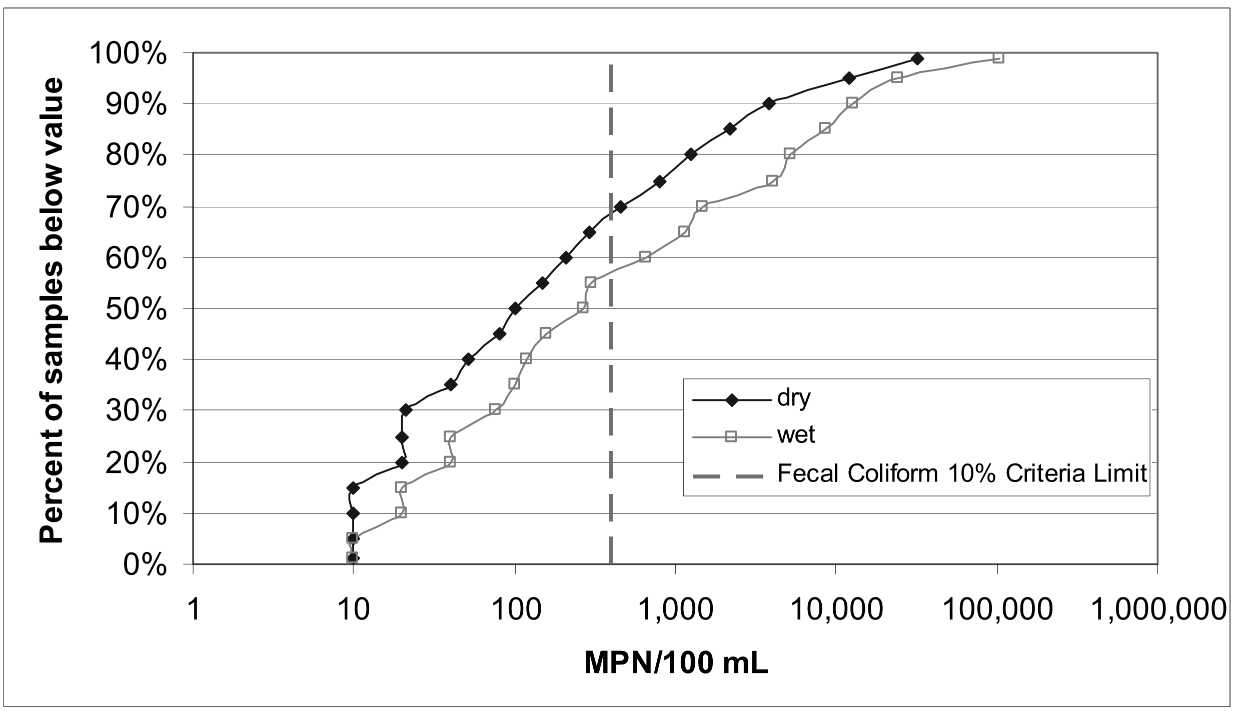
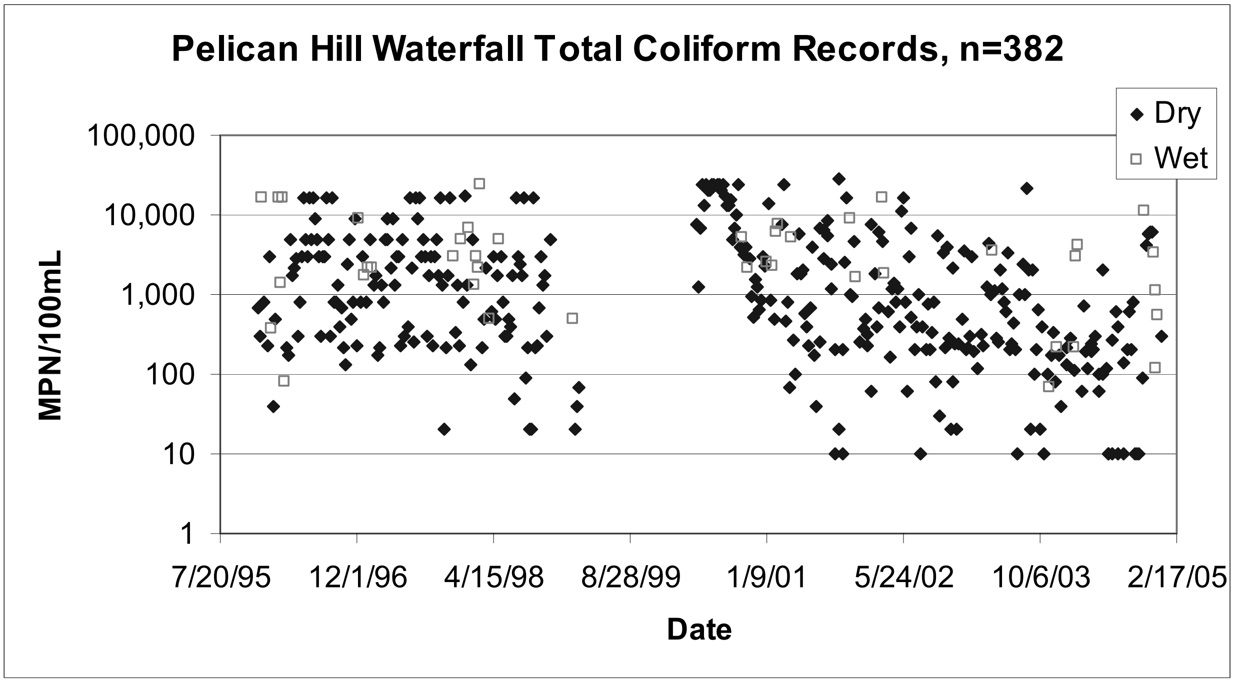


Figure A 16: Pelican Hill Waterfall total coliform data and corresponding cumulative frequency distribution



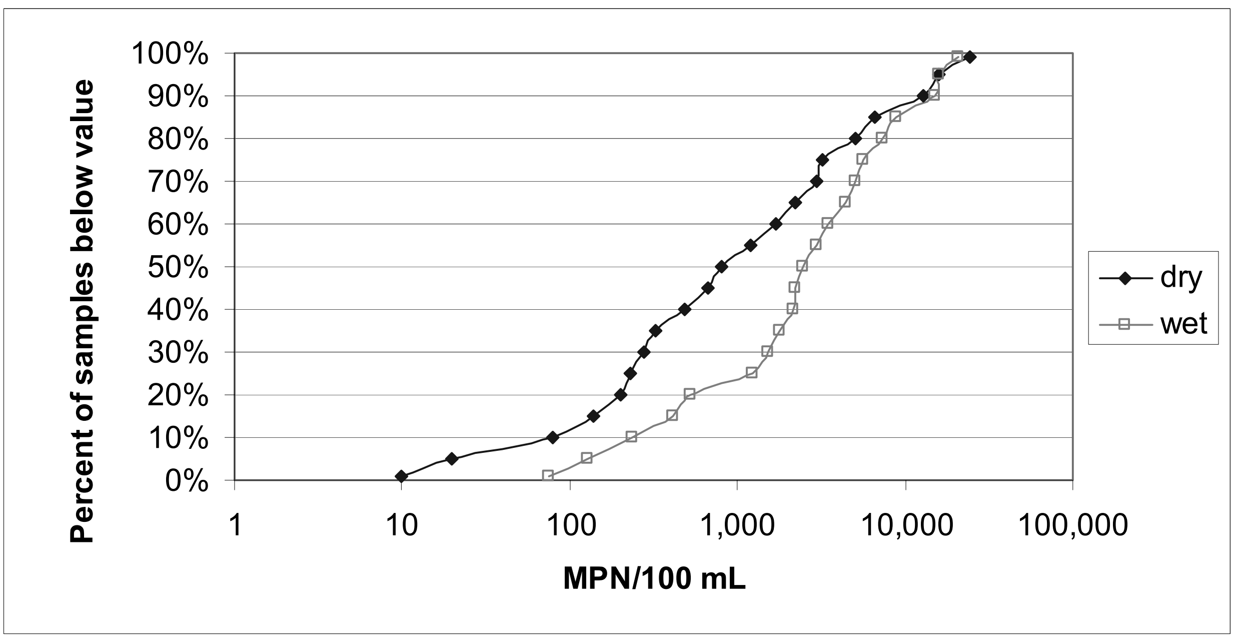


Figure A 17: Percentage of samples from Pelican Hill Waterfall which exceed thresholds, by month

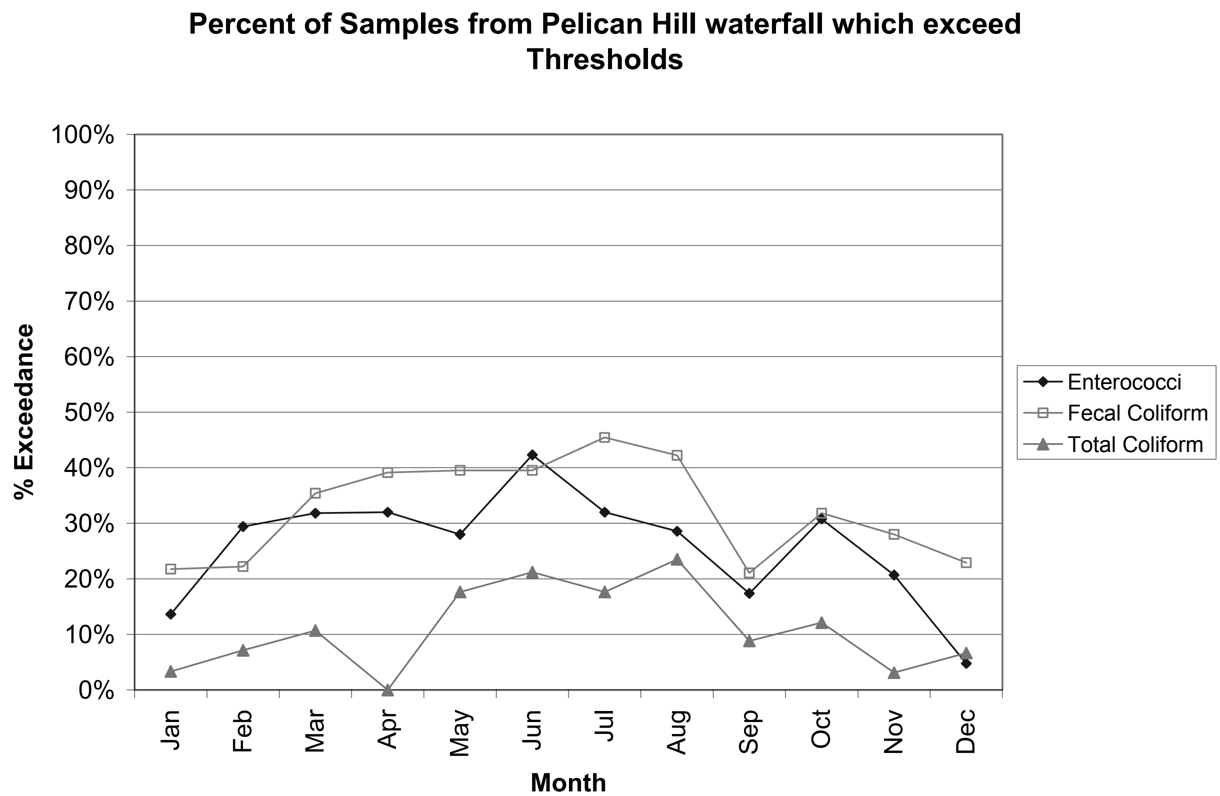
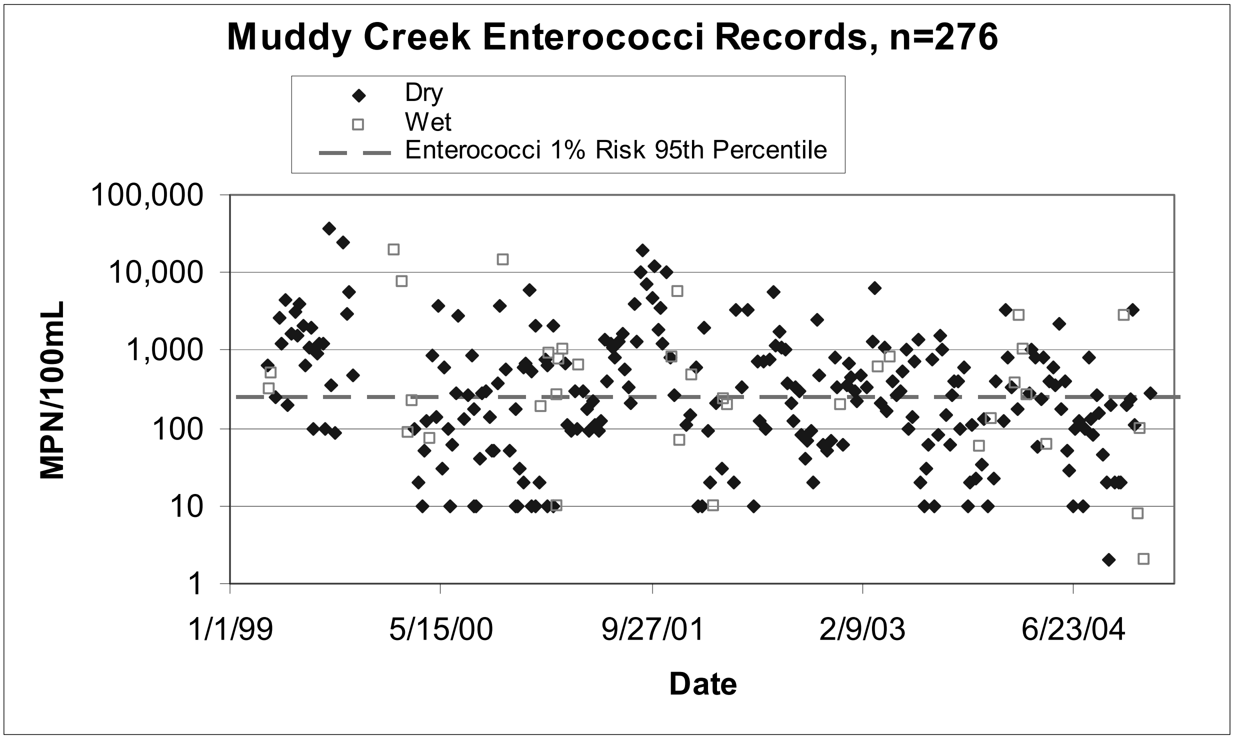


Figure A 18: Muddy Creek enterococci data and corresponding cumulative frequency distribution



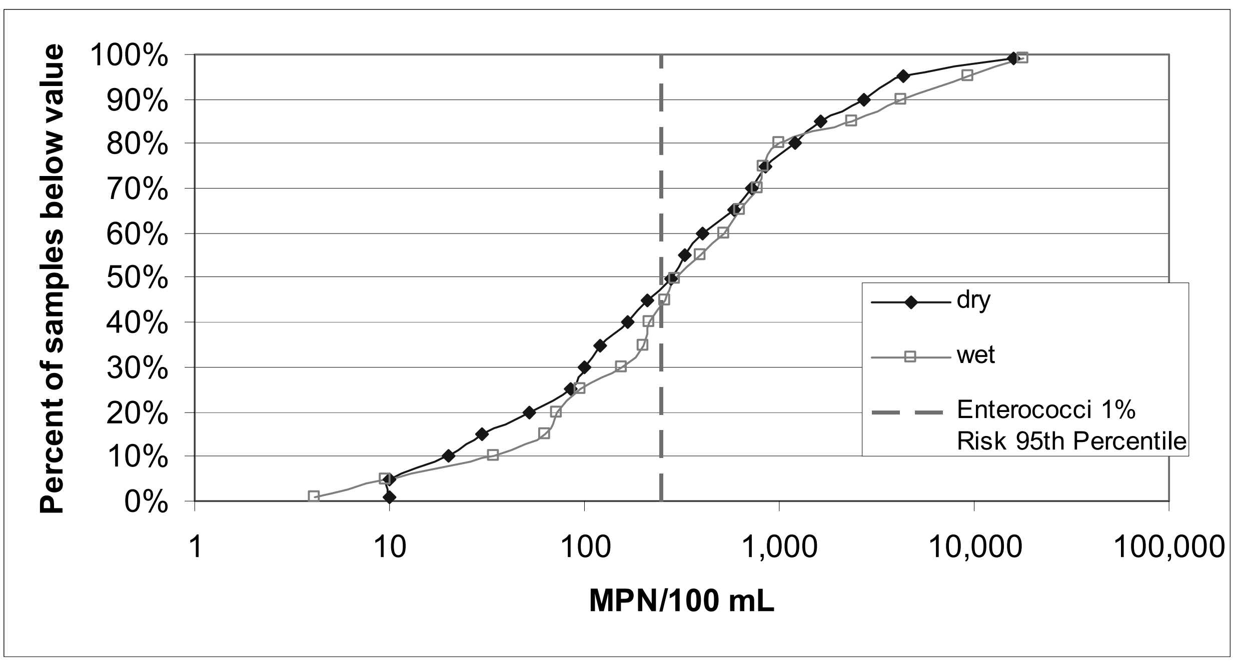
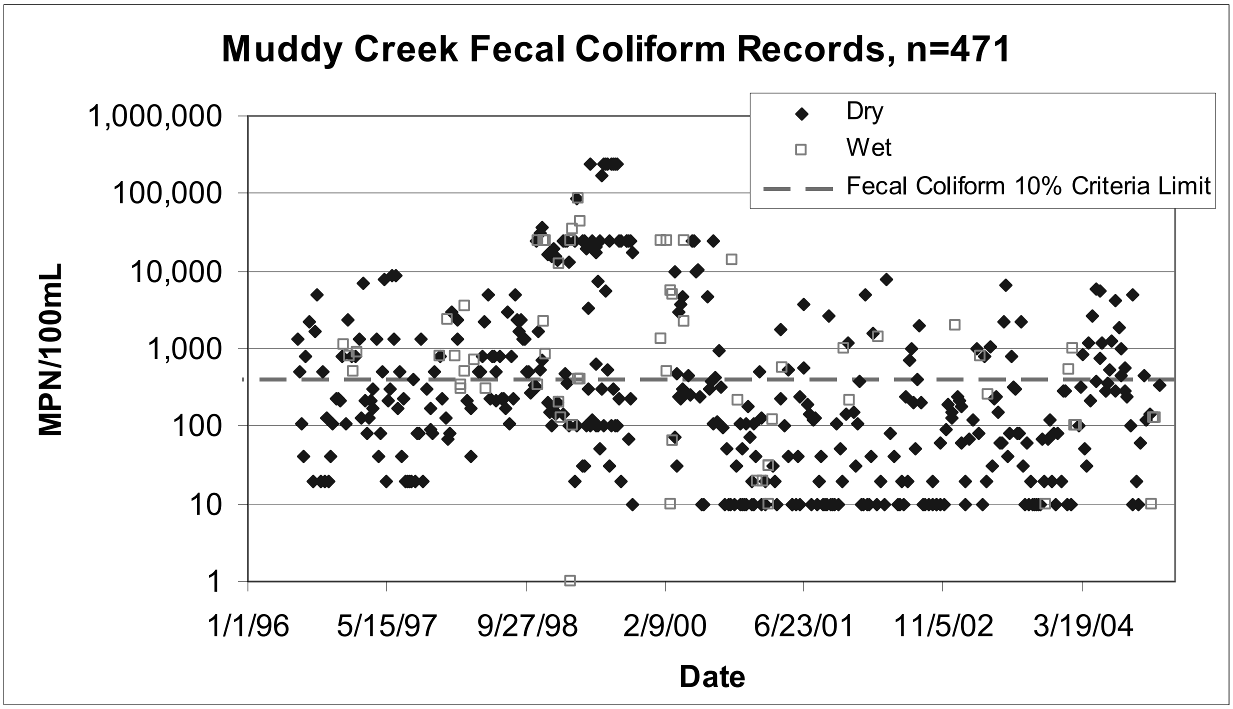


Figure A 19: Muddy Creek fecal coliform data and corresponding cumulative frequency distribution



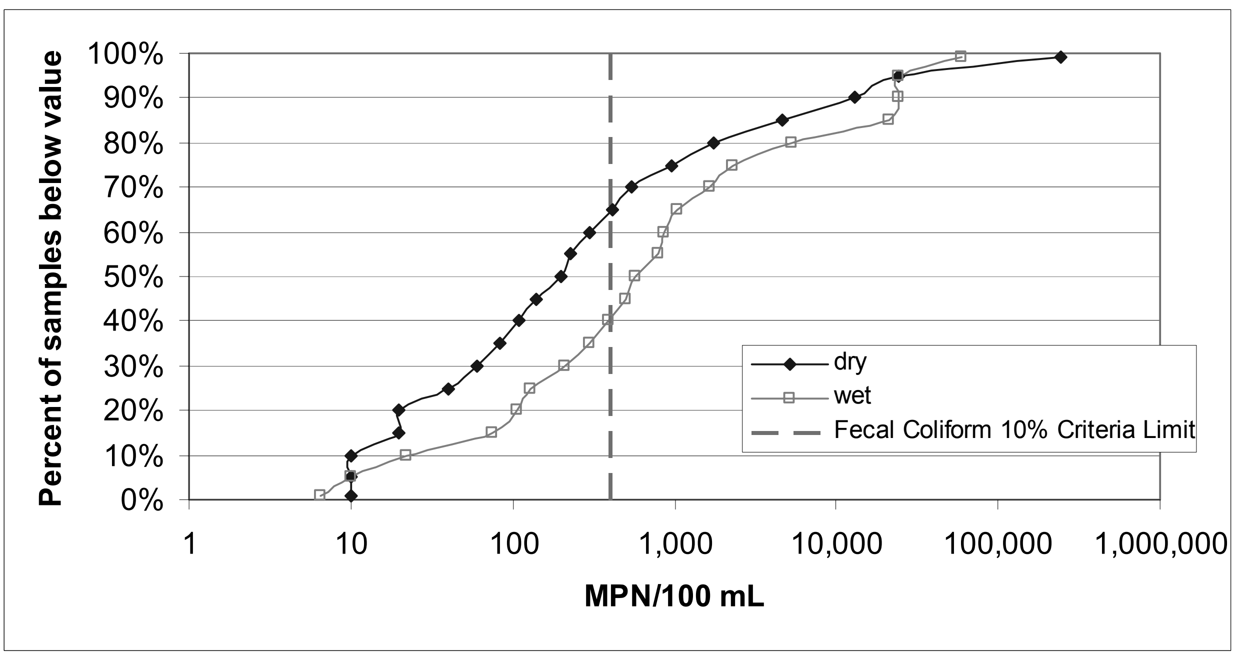
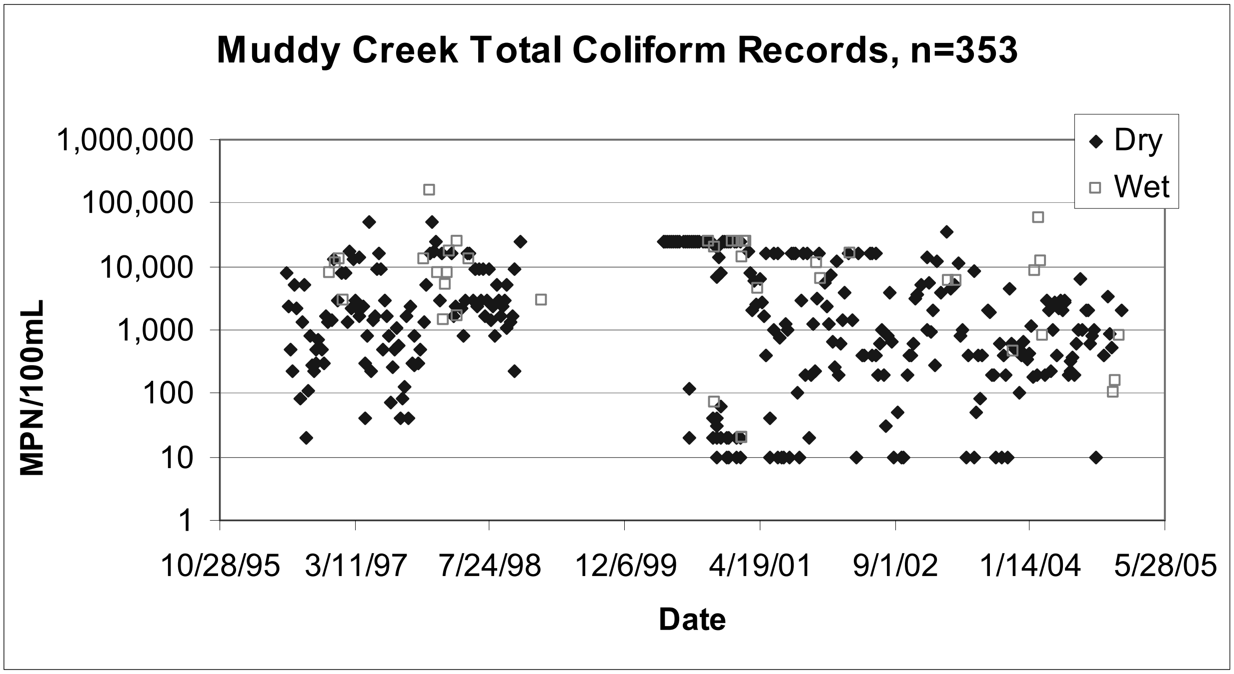


Figure A 20: Muddy Creek total coliform data and corresponding cumulative frequency distribution



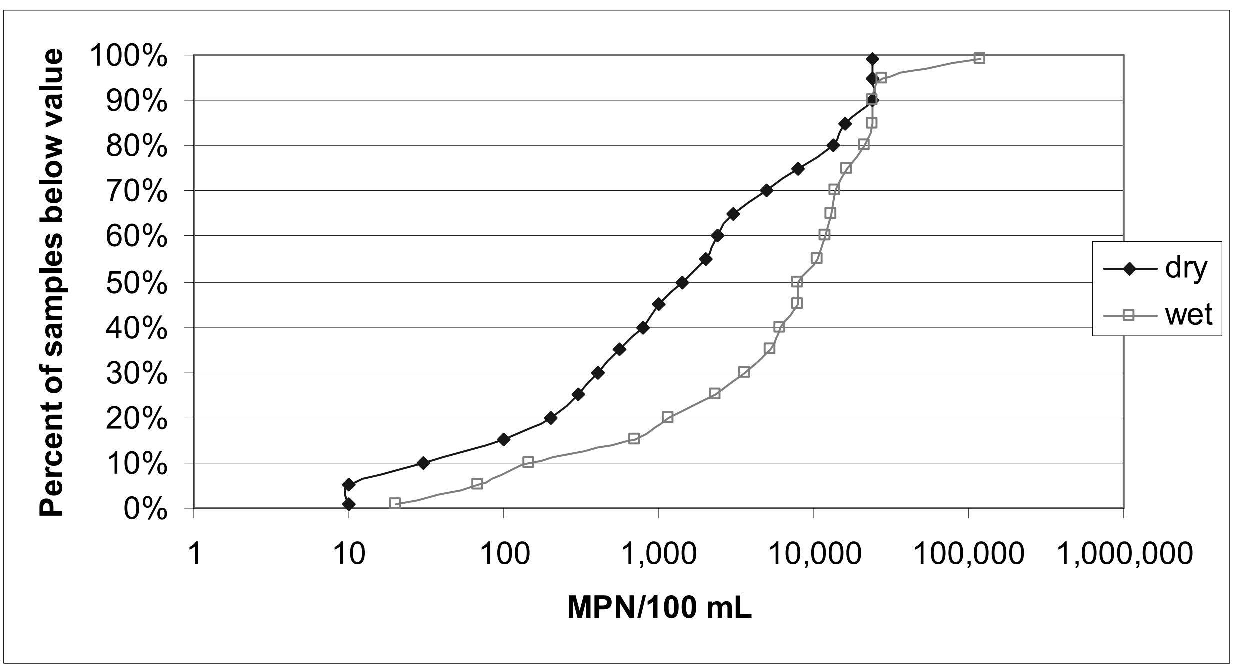


Figure A 21: Percentage of samples from Muddy Creek which exceed thresholds, by month

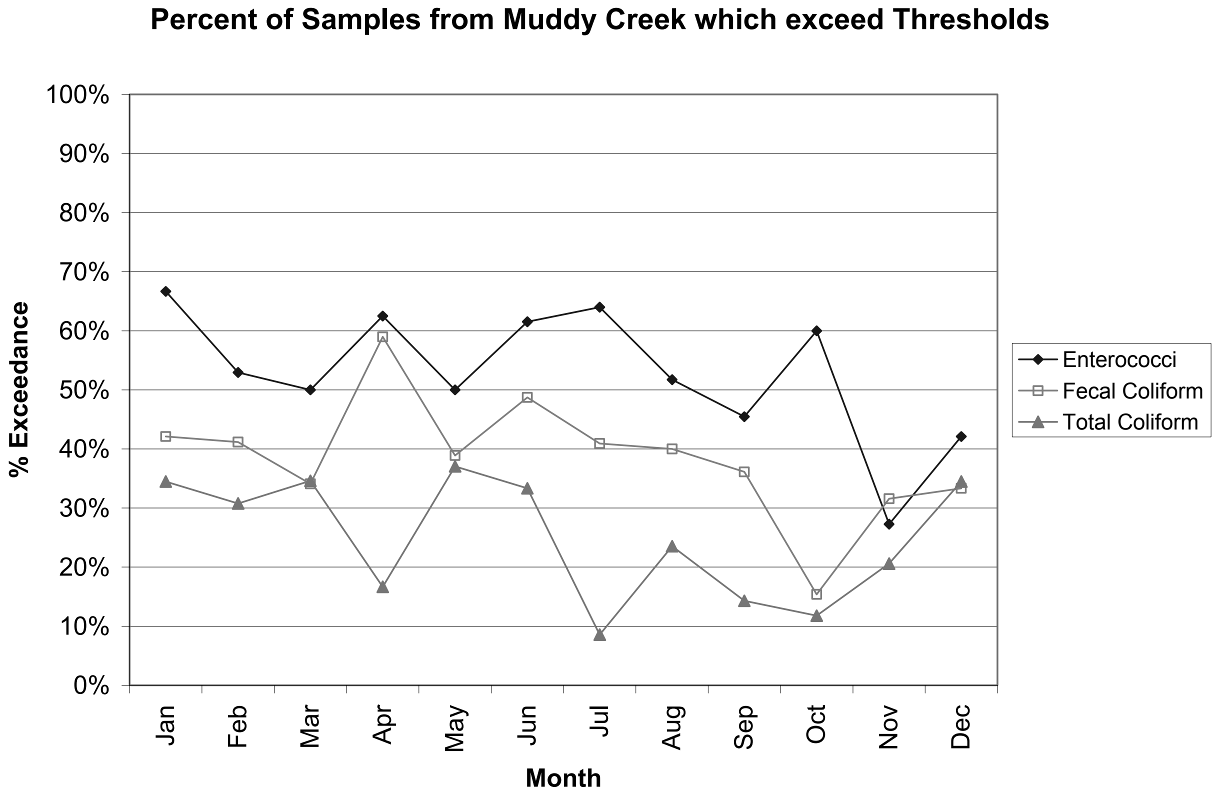
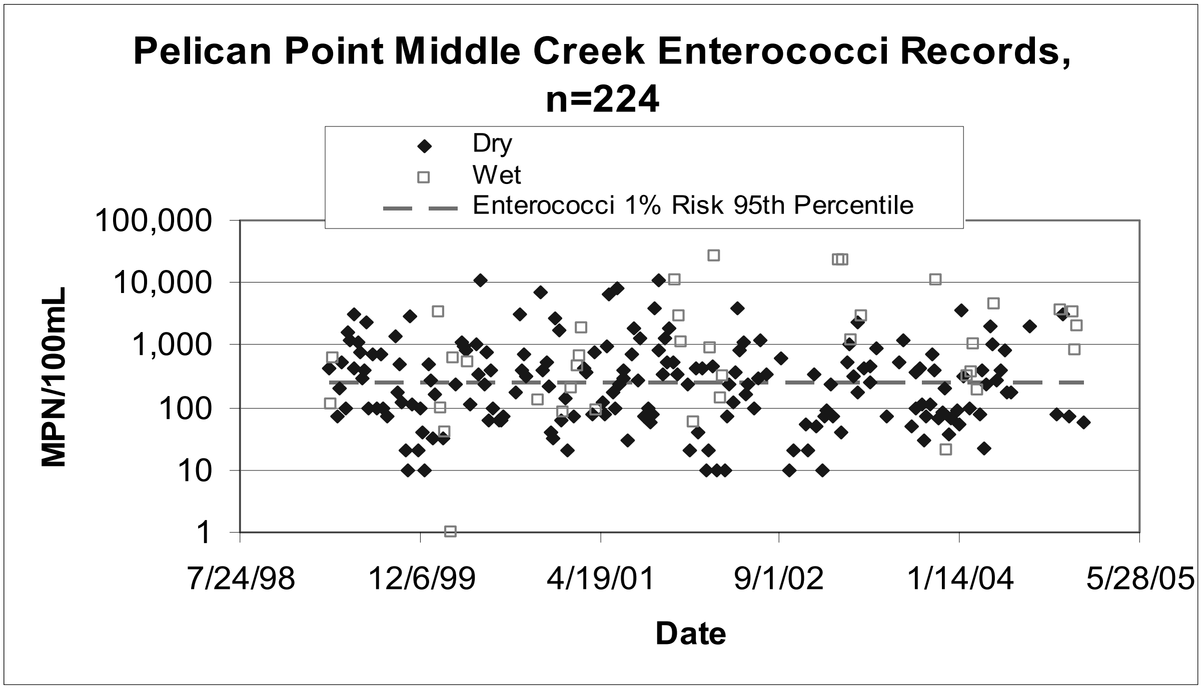


Figure A 22: Pelican Point Middle Creek enterococci data and corresponding cumulative frequency distribution



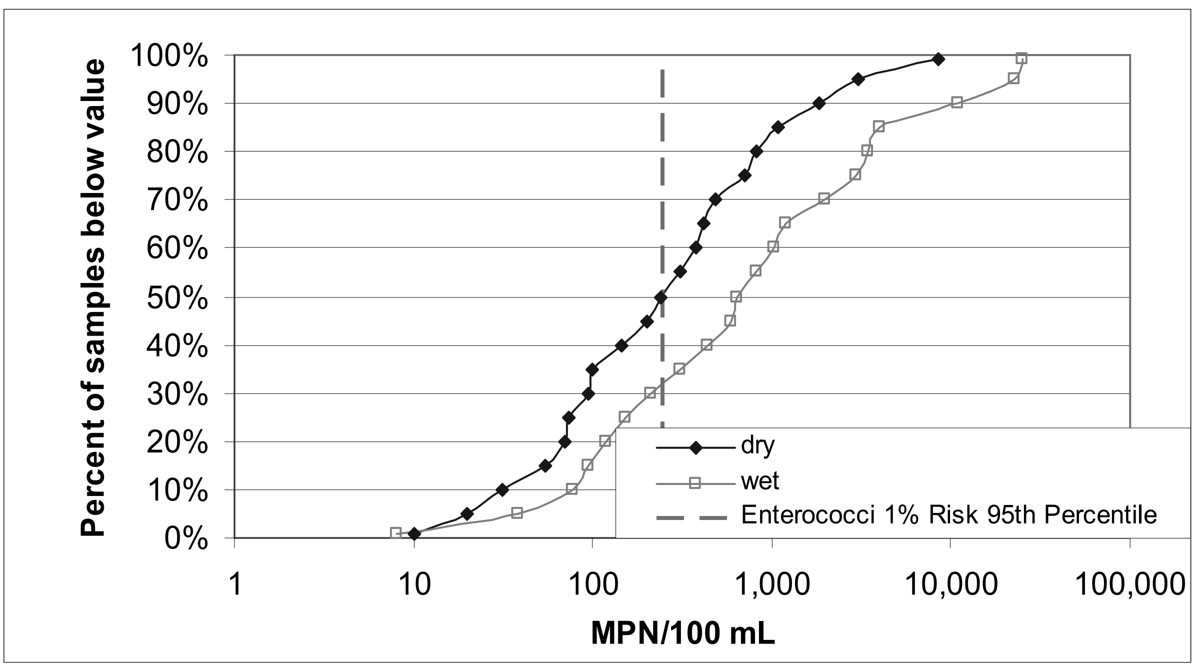
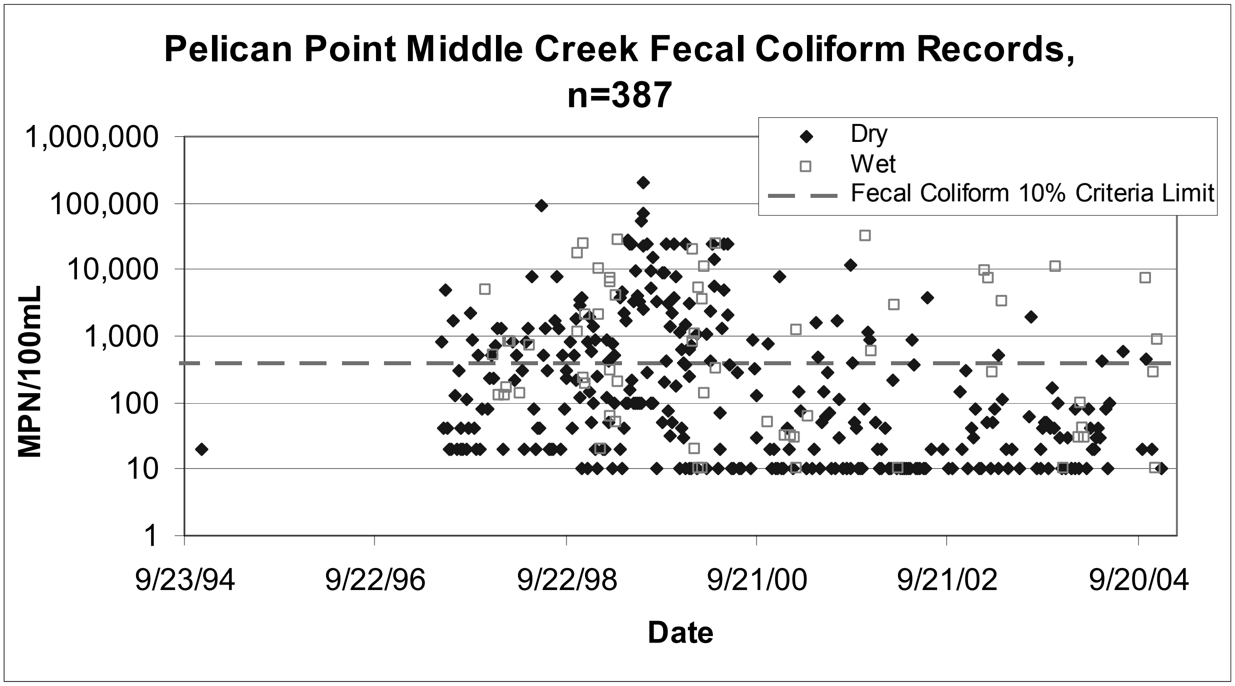


Figure A 23: Pelican Point Middle Creek fecal coliform data and corresponding cumulative frequency distribution



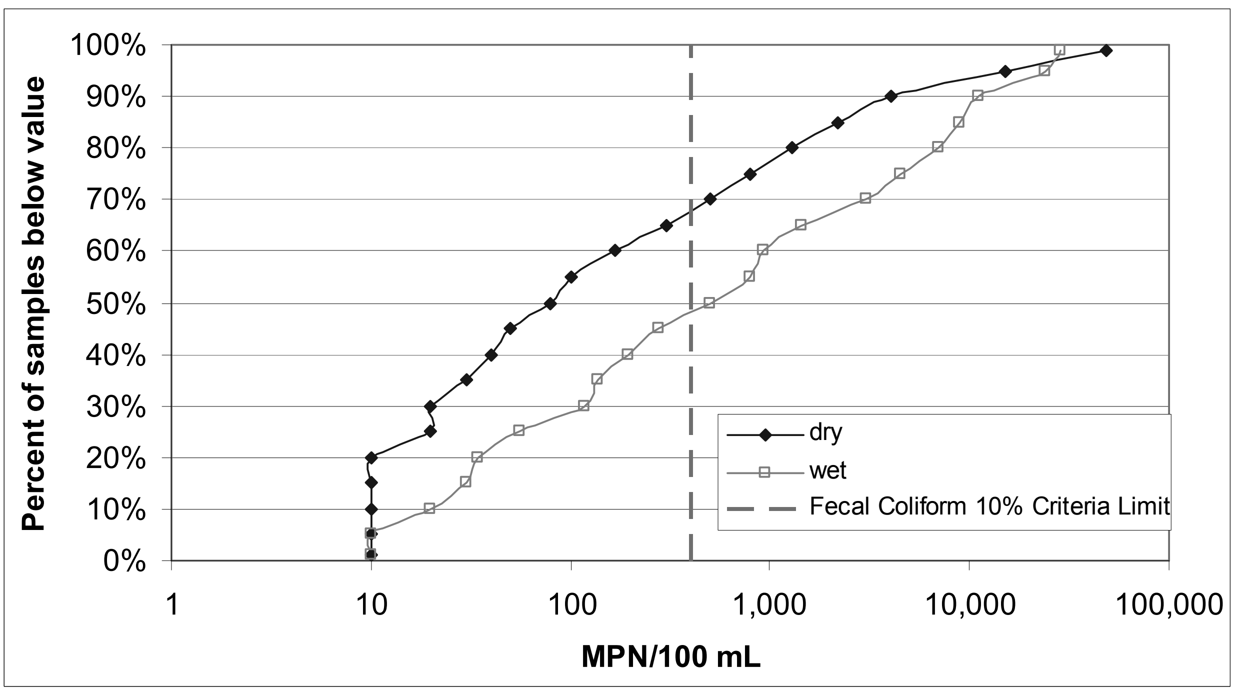
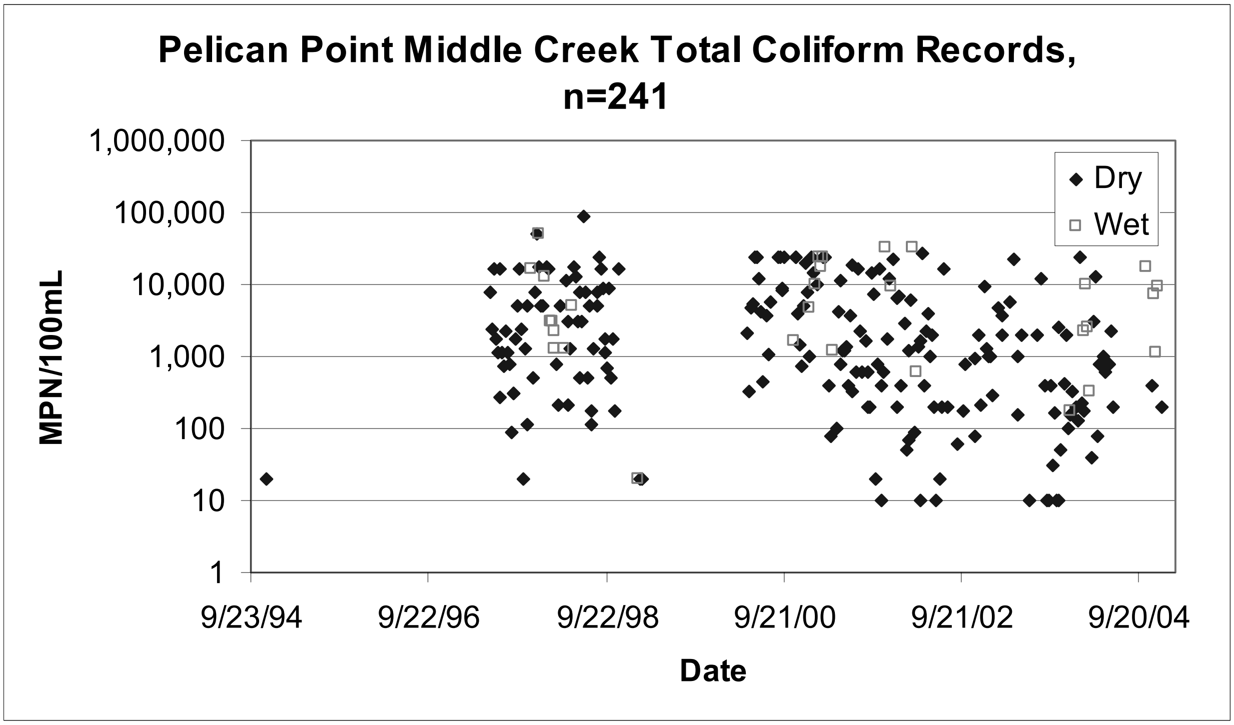


Figure A 24: Pelican Point Middle Creek total coliform data and corresponding cumulative frequency distribution



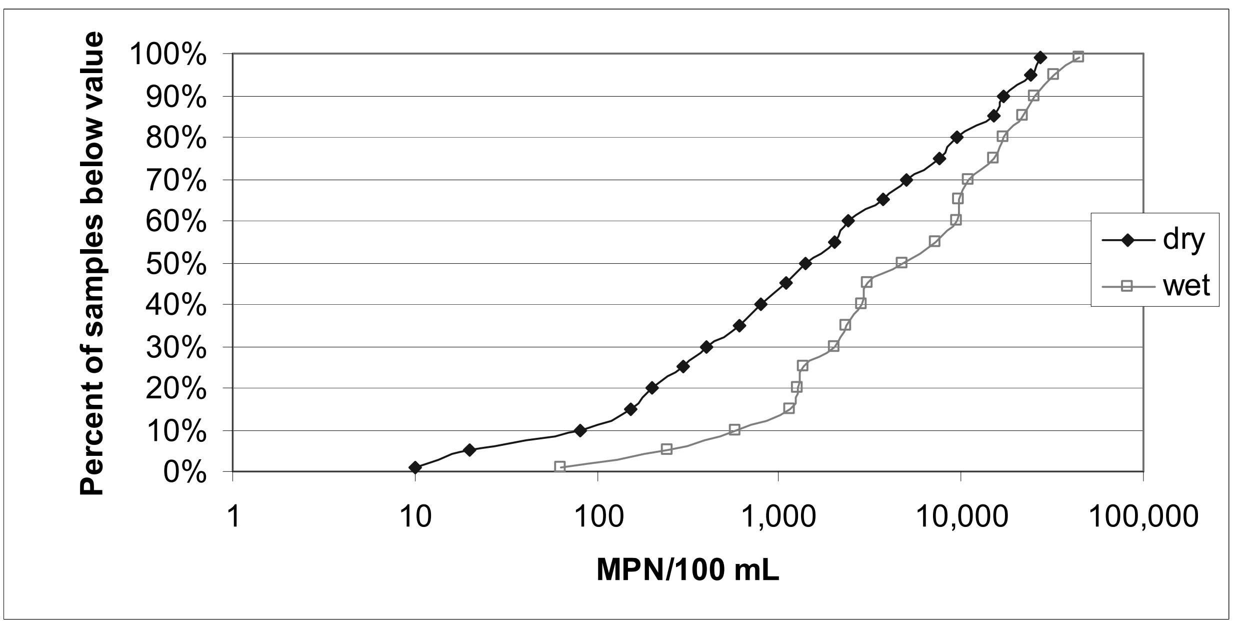


Figure A 25: Percentage of samples from Pelican Point Middle Creek which exceed thresholds, by month

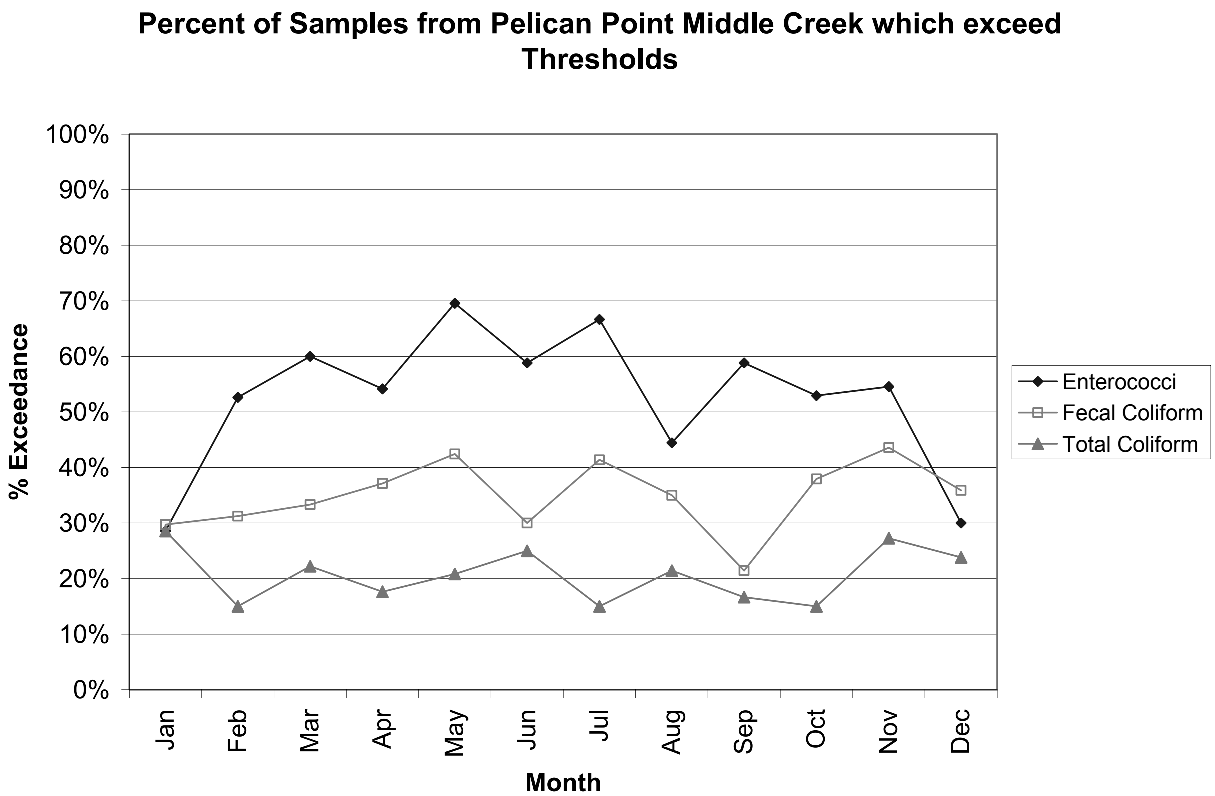
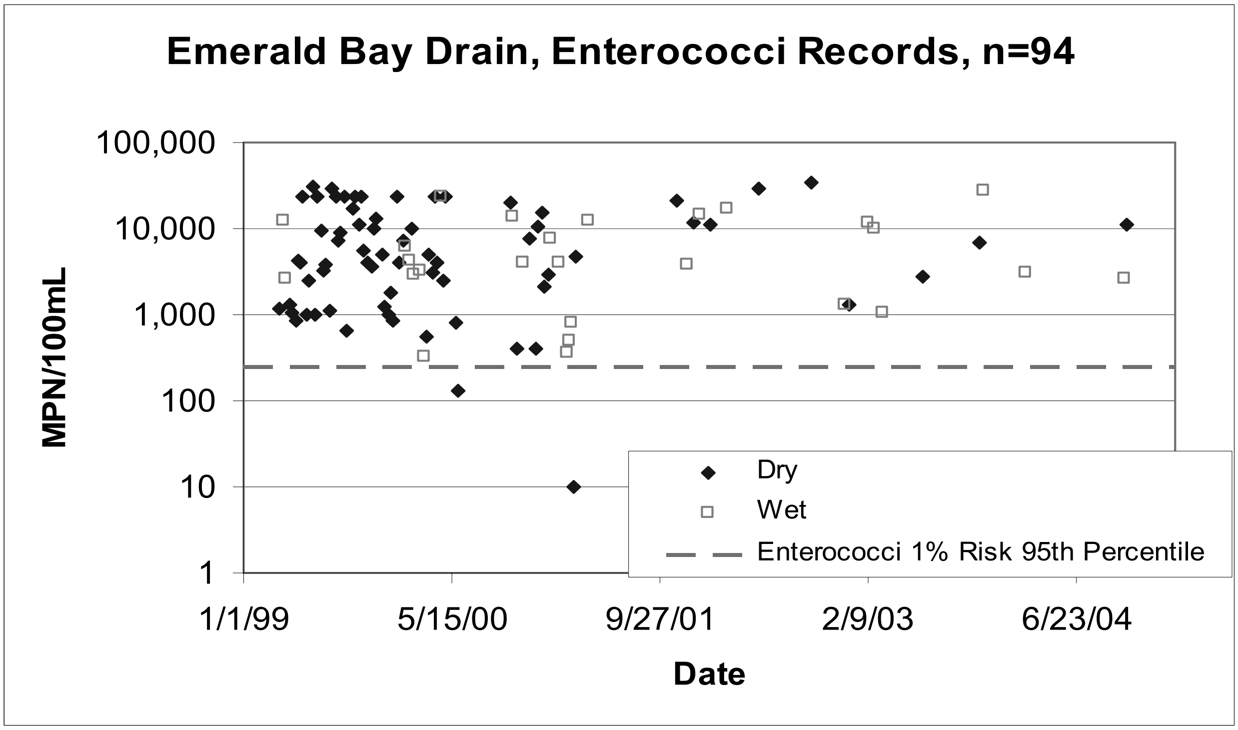


Figure A 26: Emerald Bay Drain enterococci data and corresponding cumulative frequency distribution



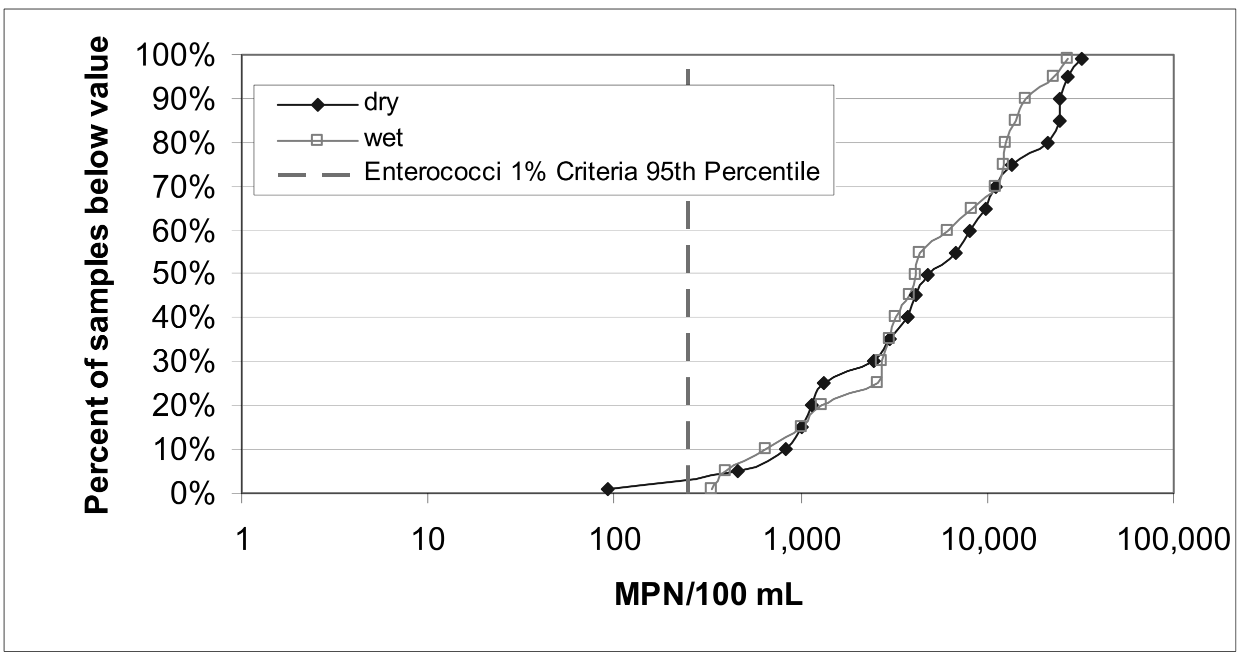
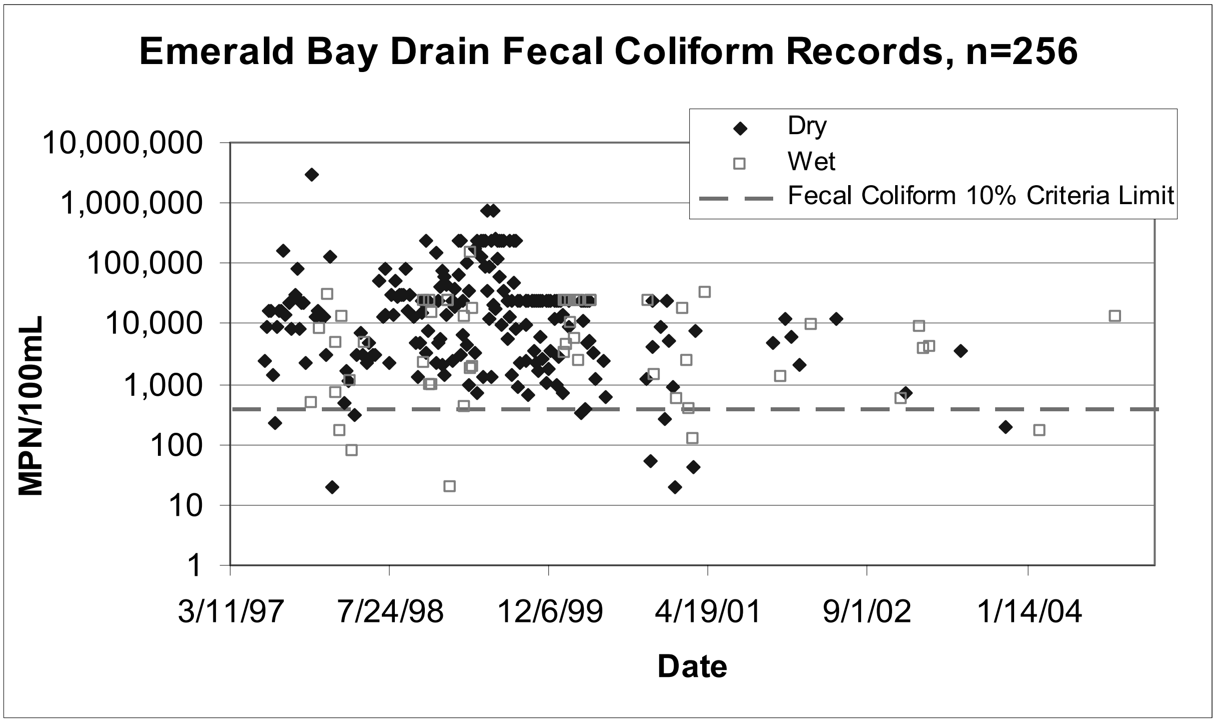


Figure A 27: Emerald Bay Drain fecal coliform data and corresponding cumulative frequency distribution



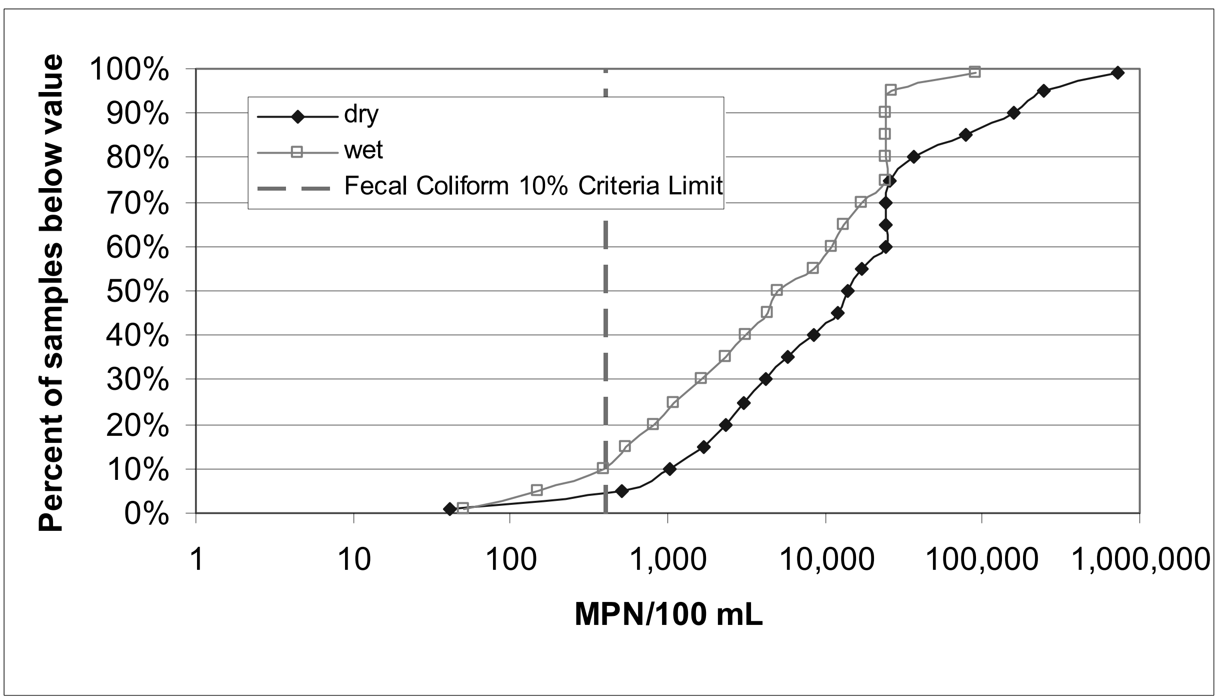


Figure A 28: Emerald Bay Drain total coliform data and corresponding cumulative frequency distribution

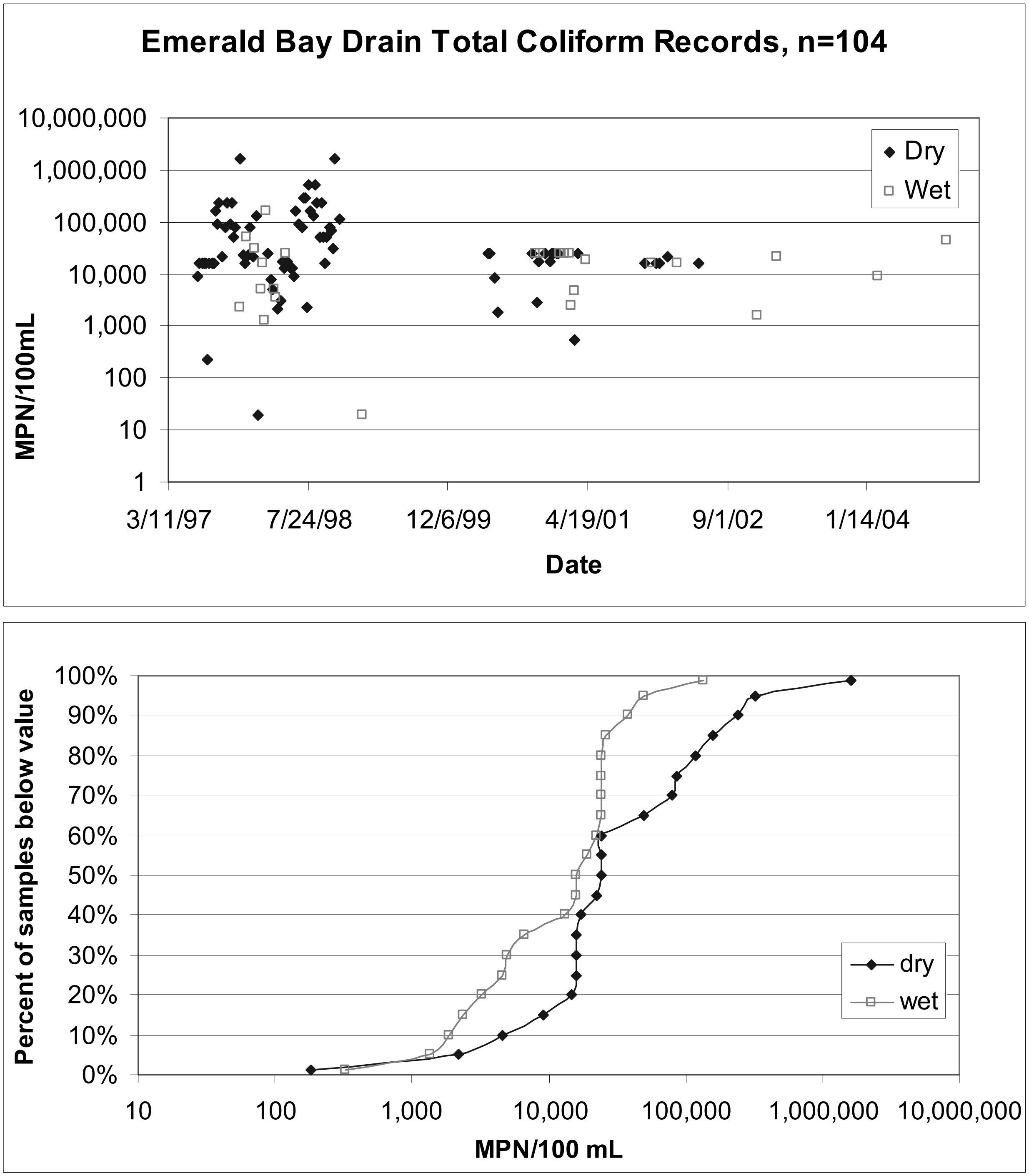


Figure A 29: Percentage of samples from the Emerald Bay Drain which exceed thresholds, by month

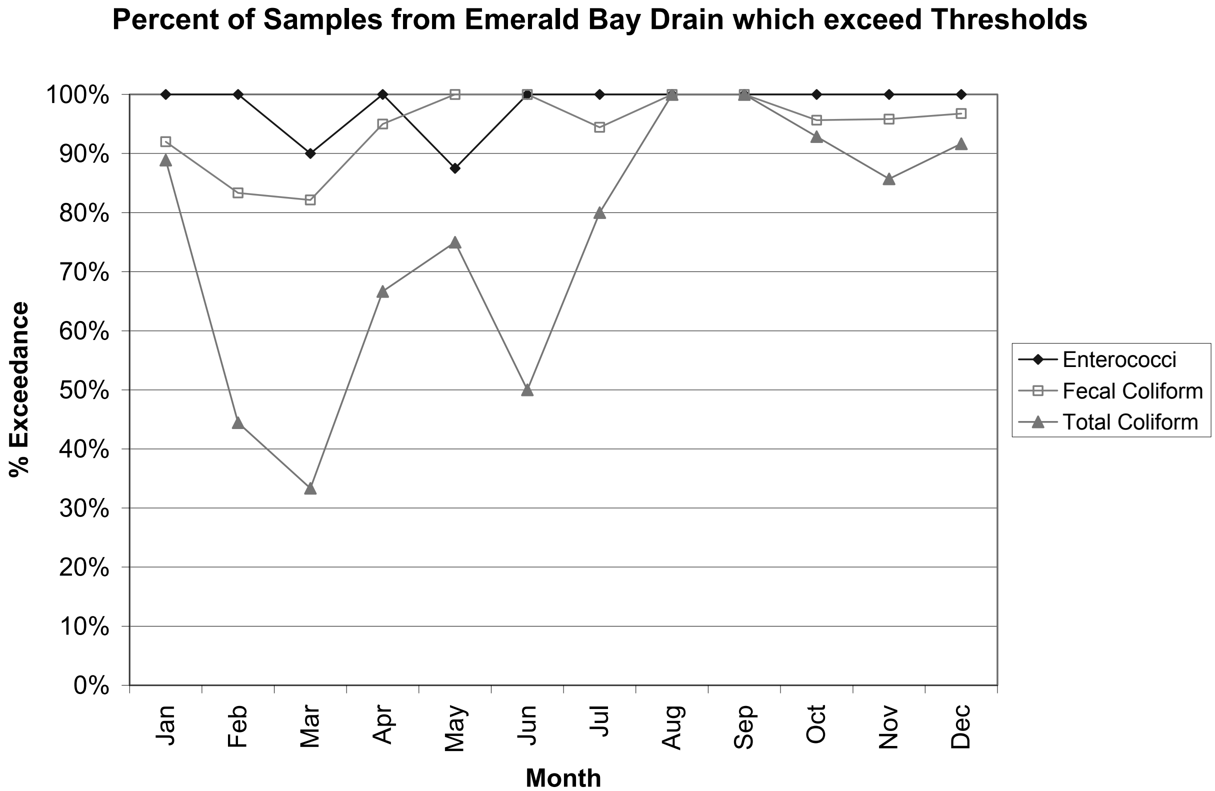
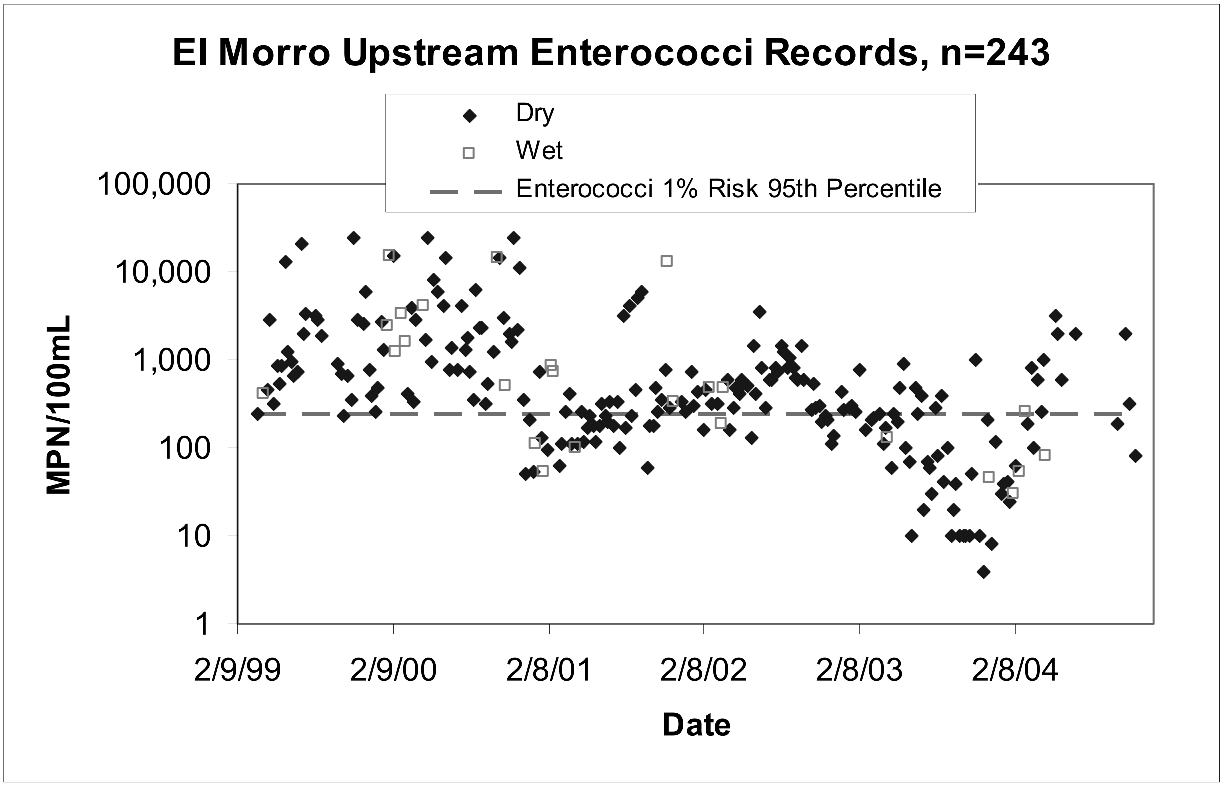


Figure A 30: El Morro Creek Upstream enterococci data and corresponding cumulative frequency distribution



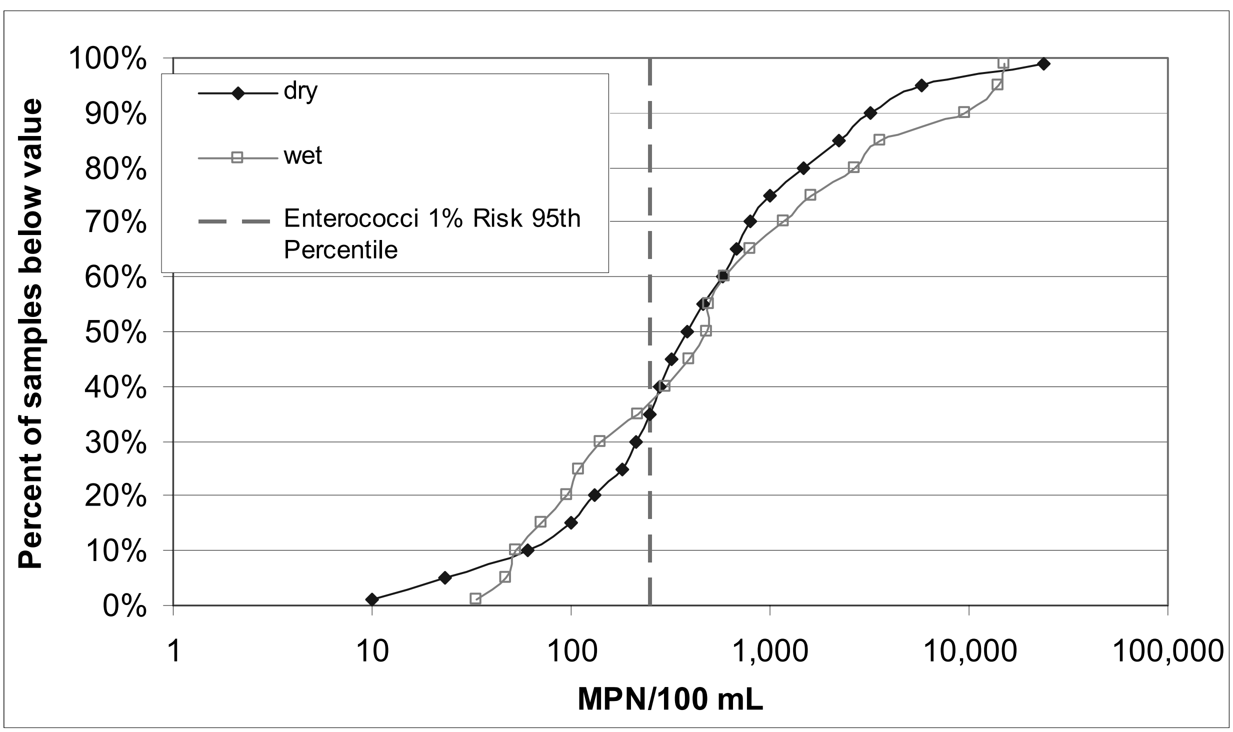
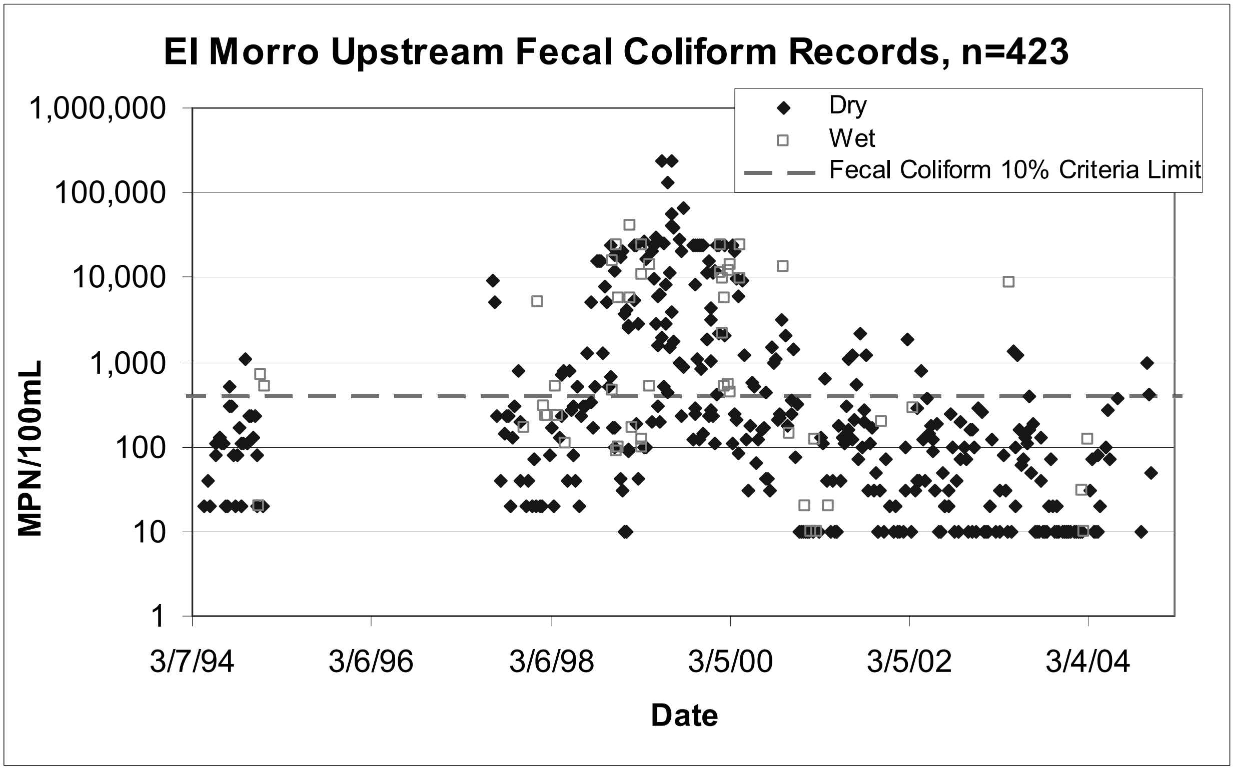


Figure A 31: El Morro Creek Upstream fecal coliform data and corresponding cumulative frequency distribution



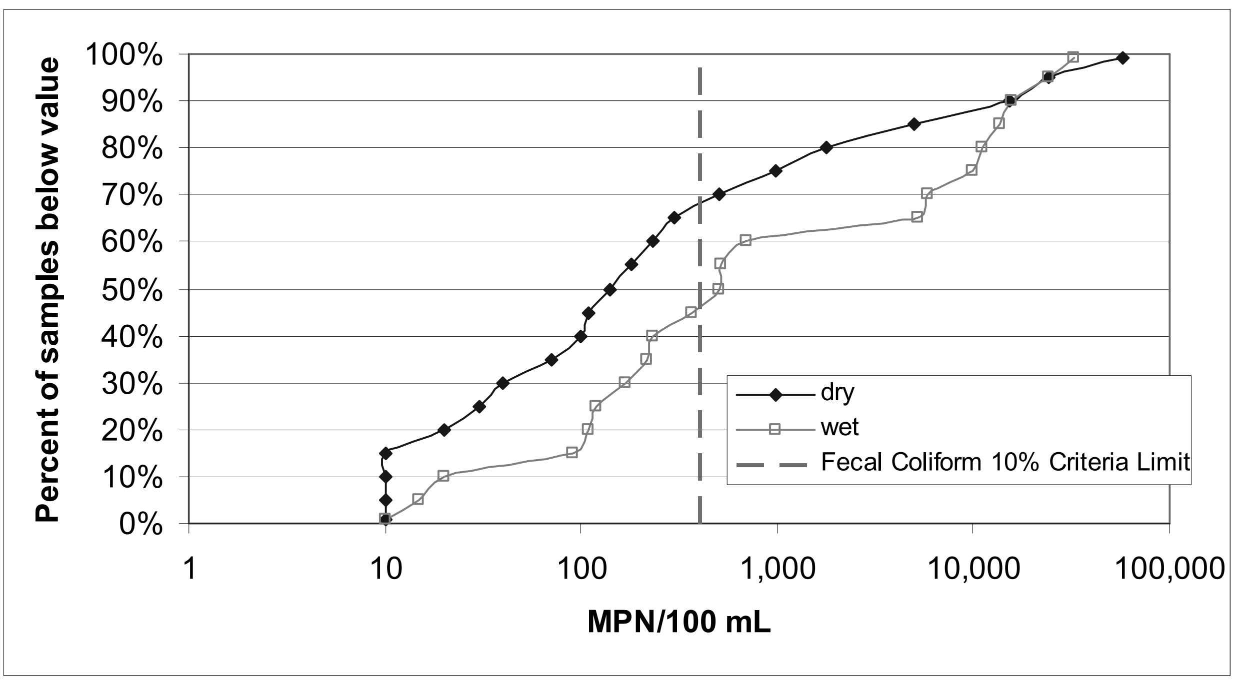
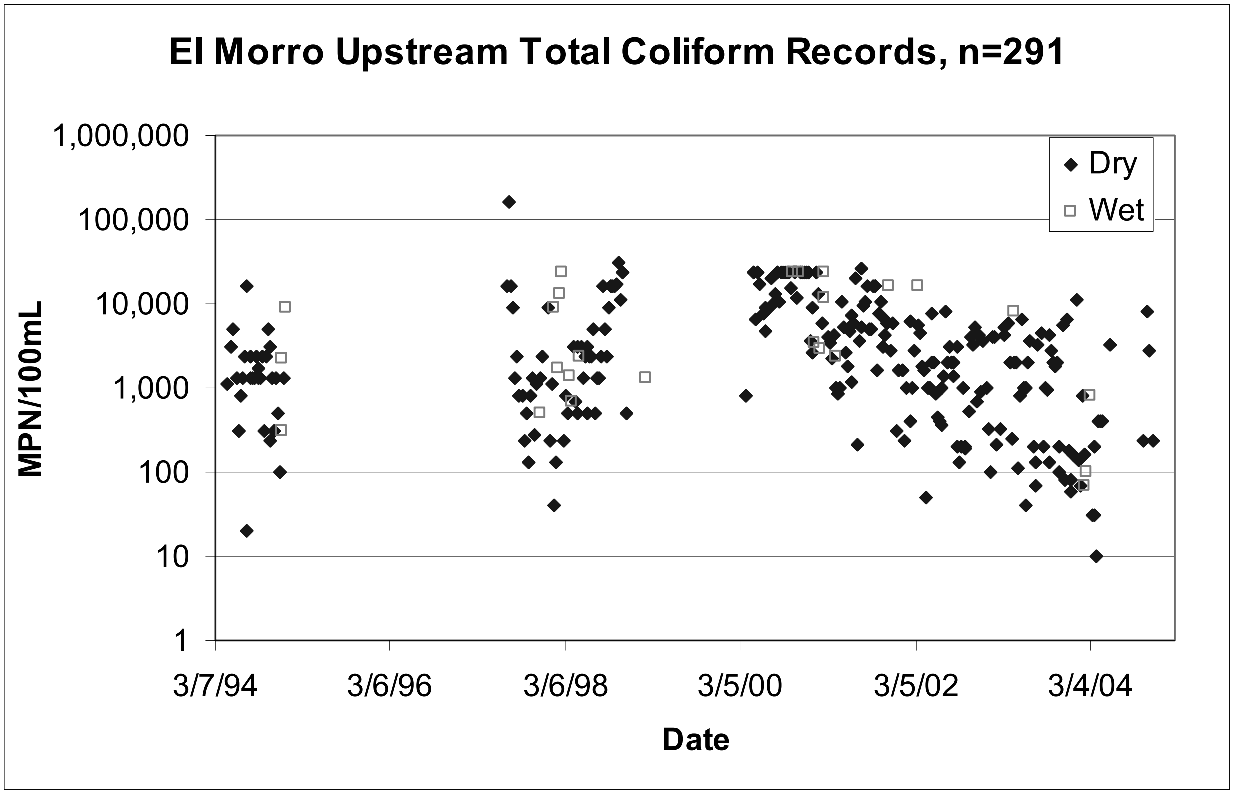


Figure A 32: El Morro Creek Upstream total coliform data and corresponding cumulative frequency distribution



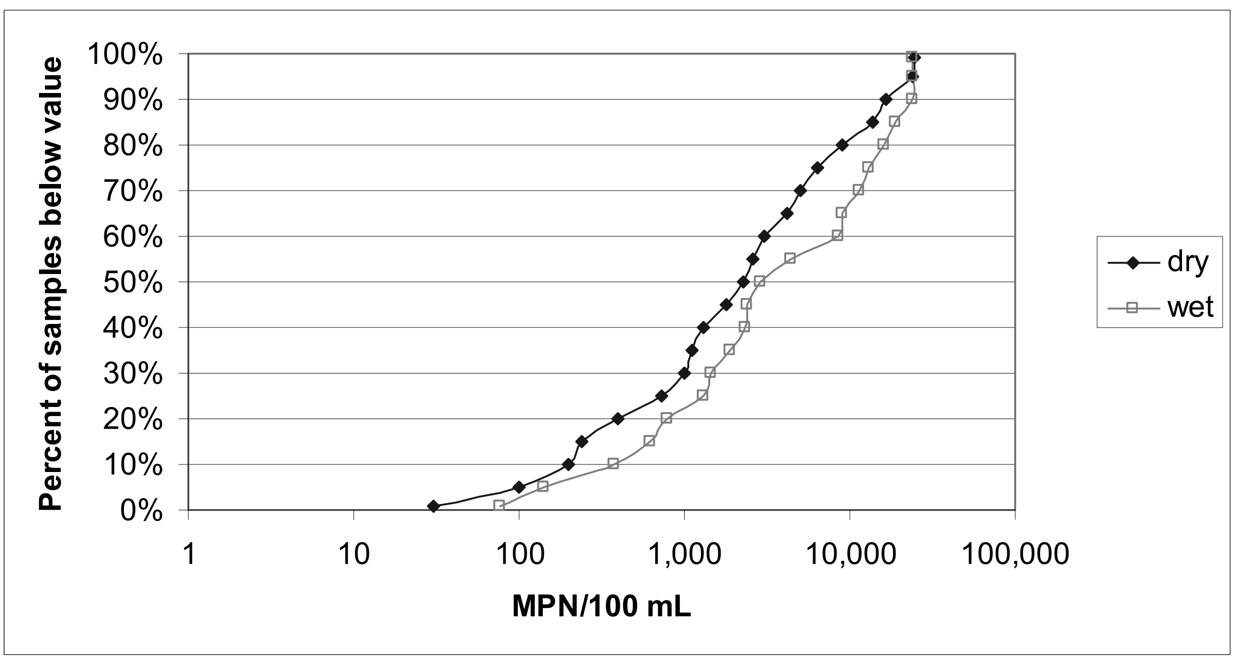


Figure A 33: Percentage of samples from El Morro Creek Upstream which exceed thresholds, by month

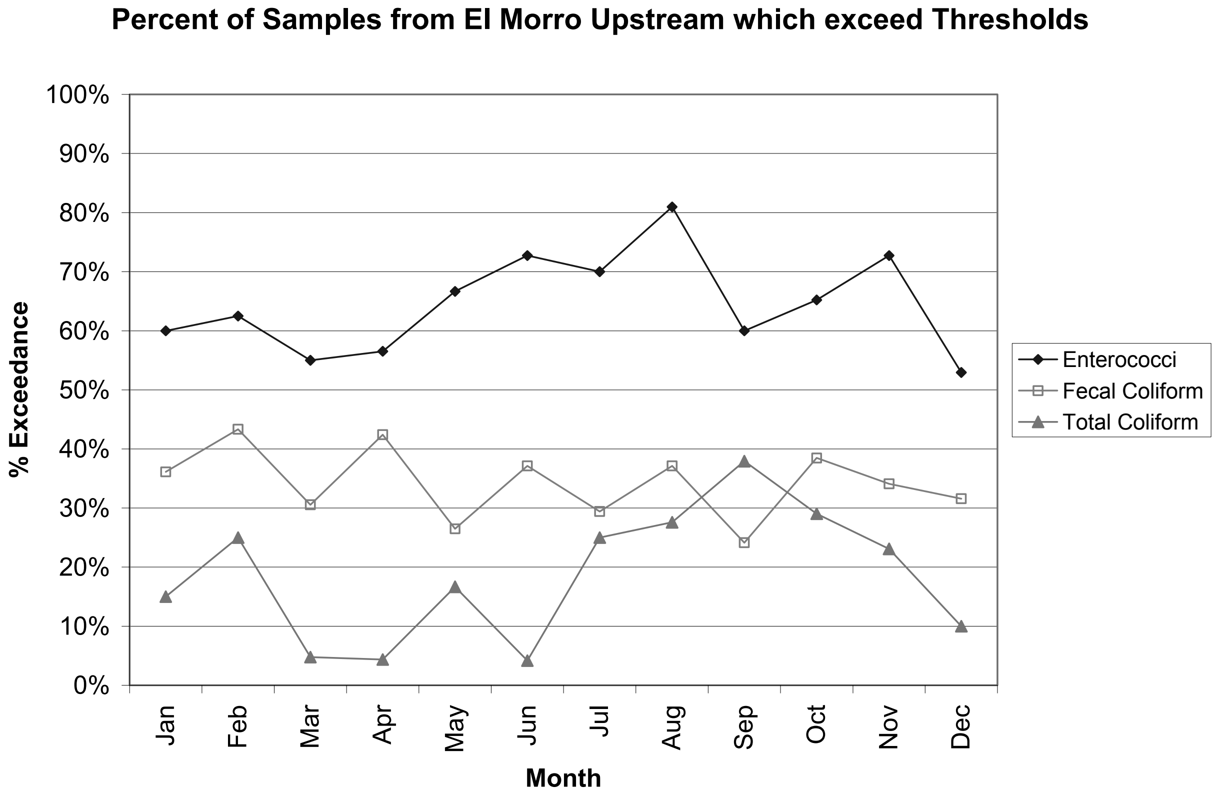
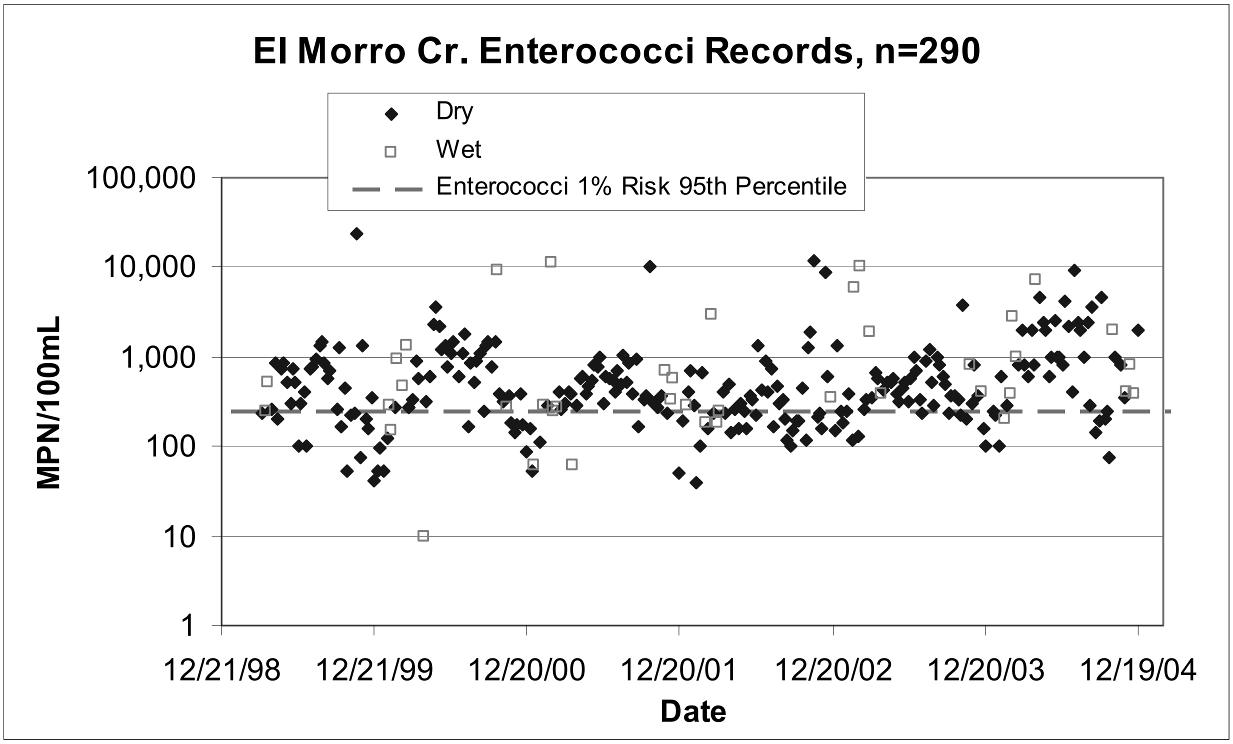


Figure A 34: El Morro Creek enterococci data and corresponding cumulative frequency distribution



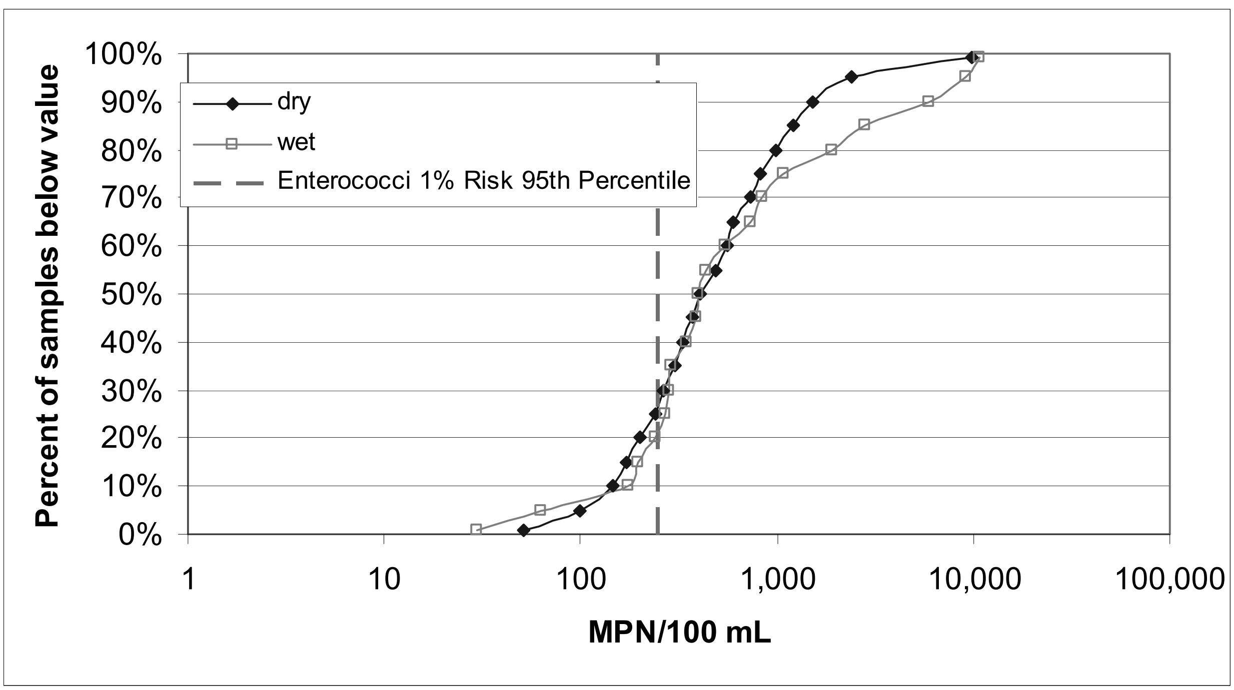
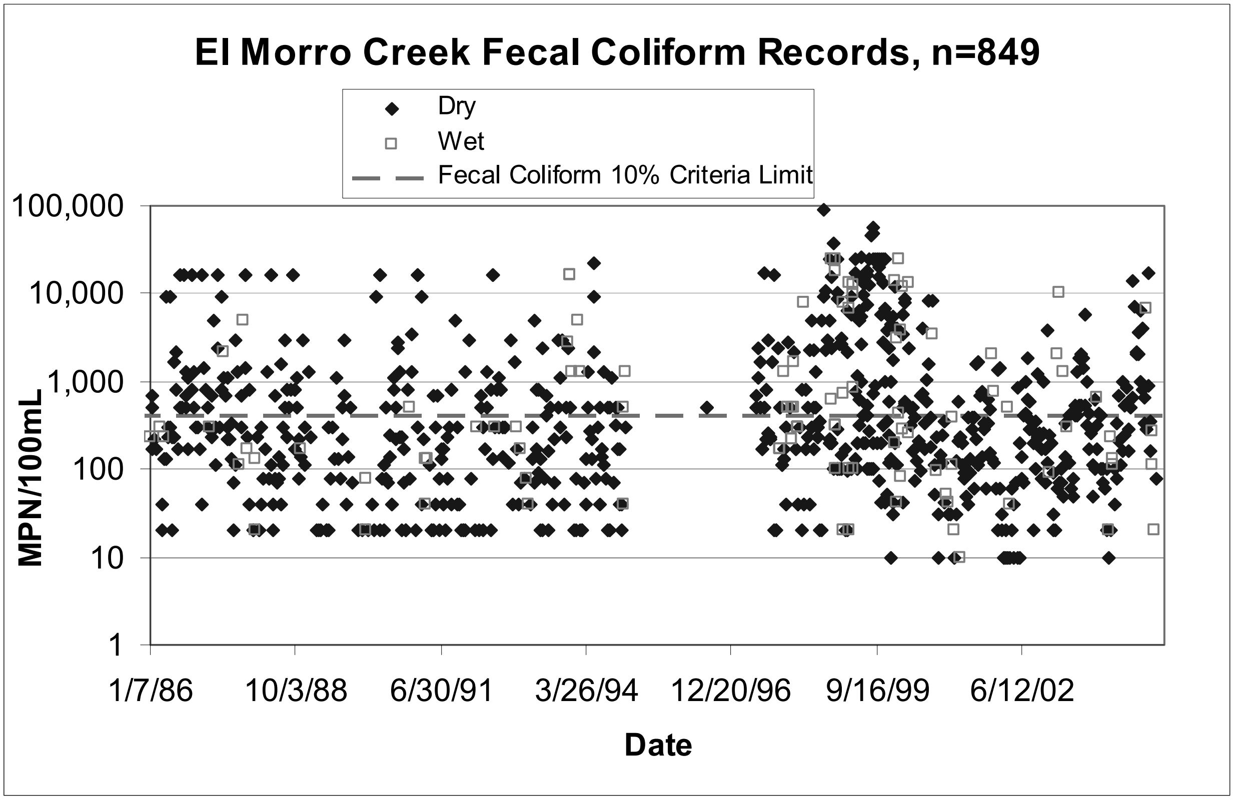


Figure A 35: El Morro Creek fecal coliform data and corresponding cumulative frequency distribution



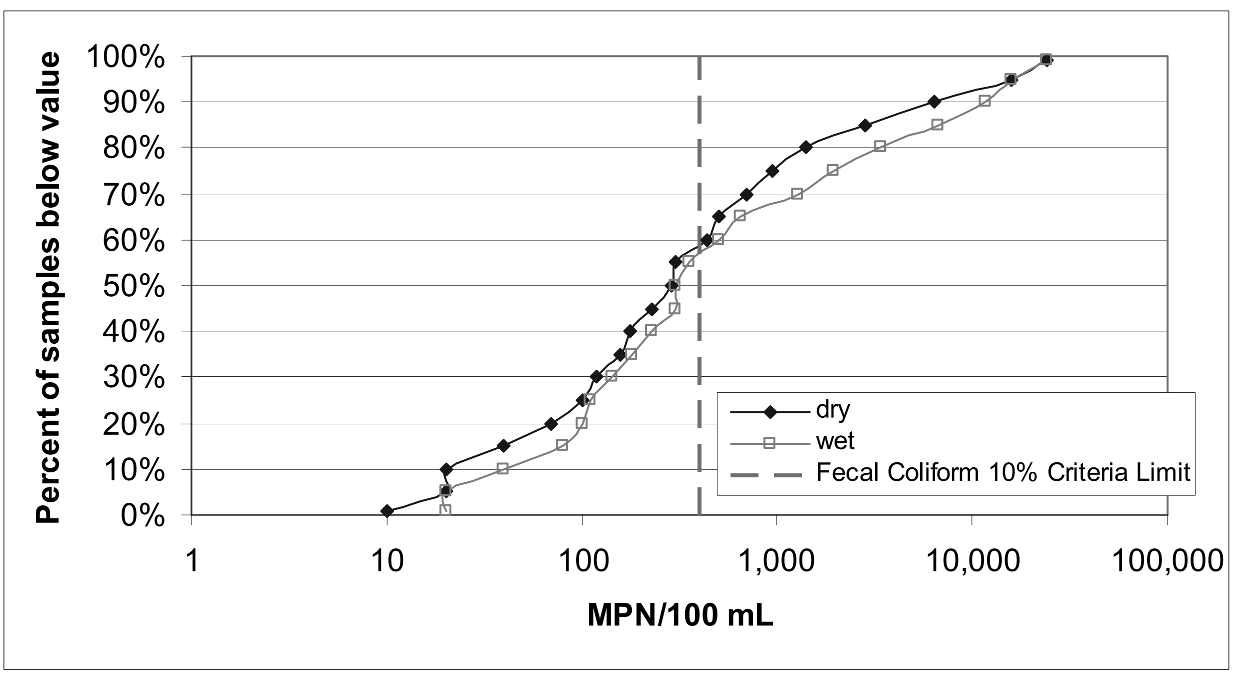
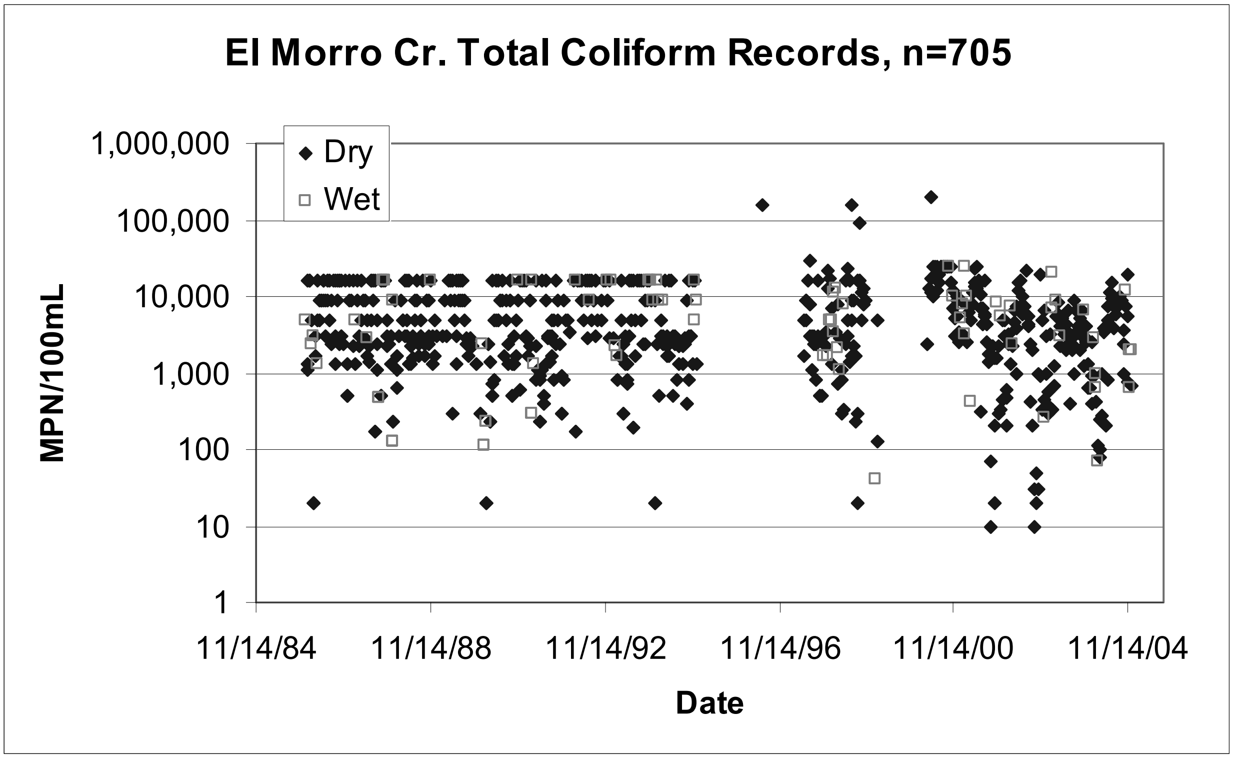


Figure A 36: El Morro Creek total coliform data and corresponding cumulative frequency distribution



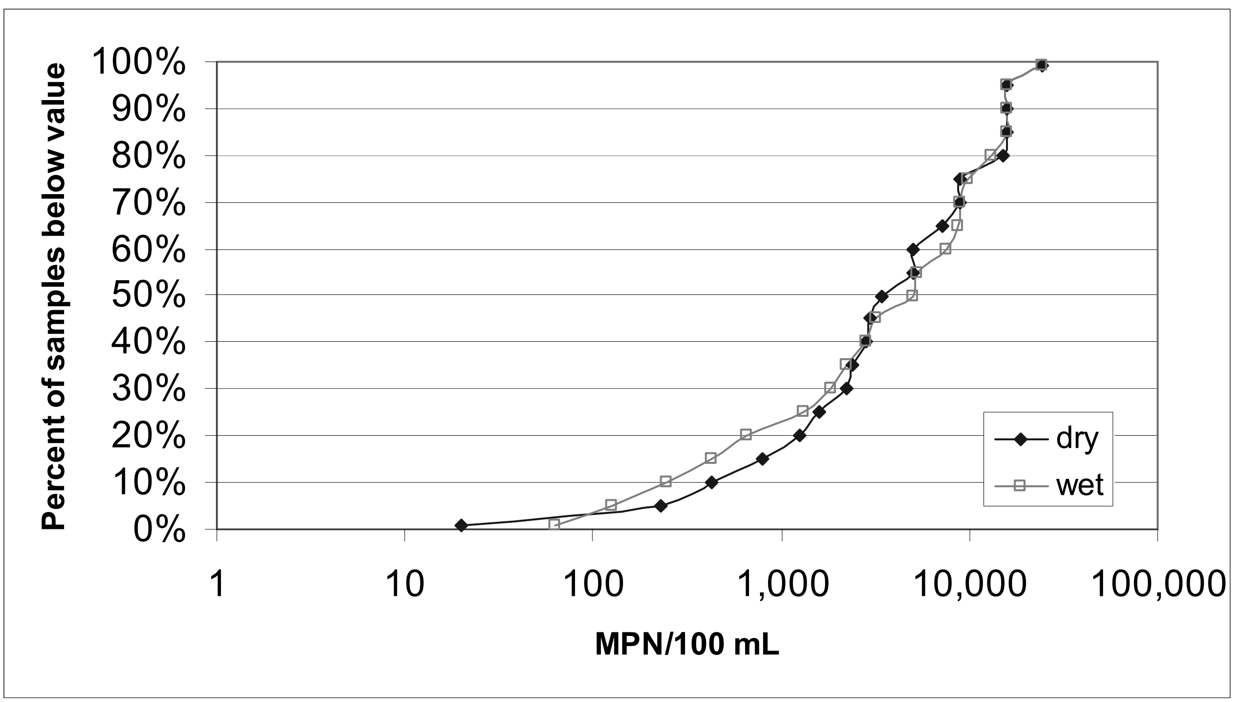


Figure A 37: Percentage of samples from El Morro Creek which exceed thresholds, by month

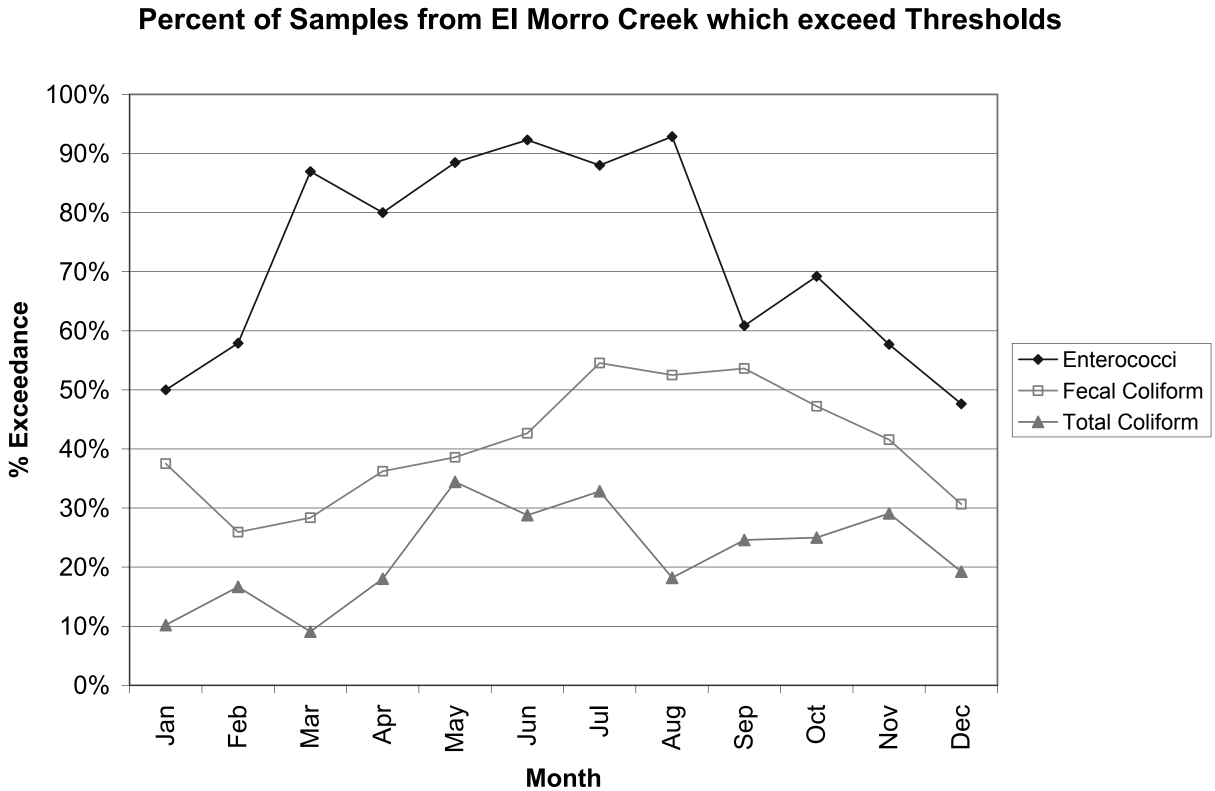
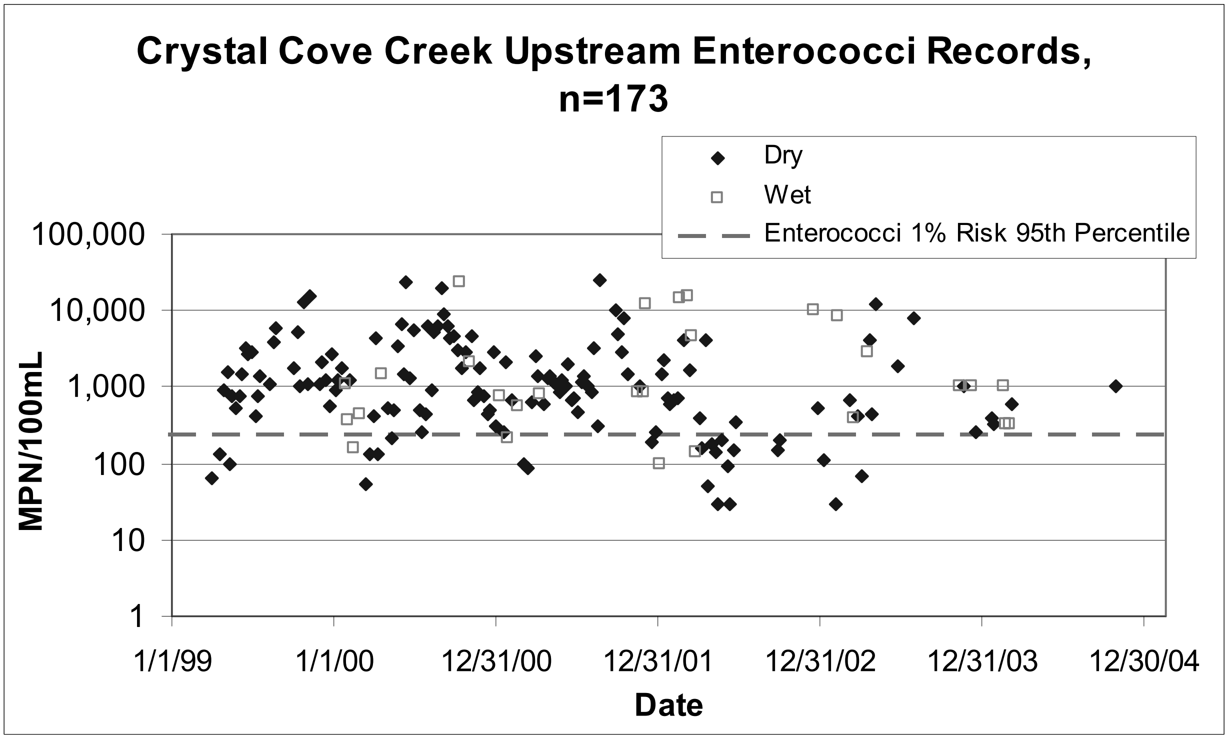


Figure A 38: Crystal Cove Creek Upstream enterococci data and corresponding cumulative frequency distribution



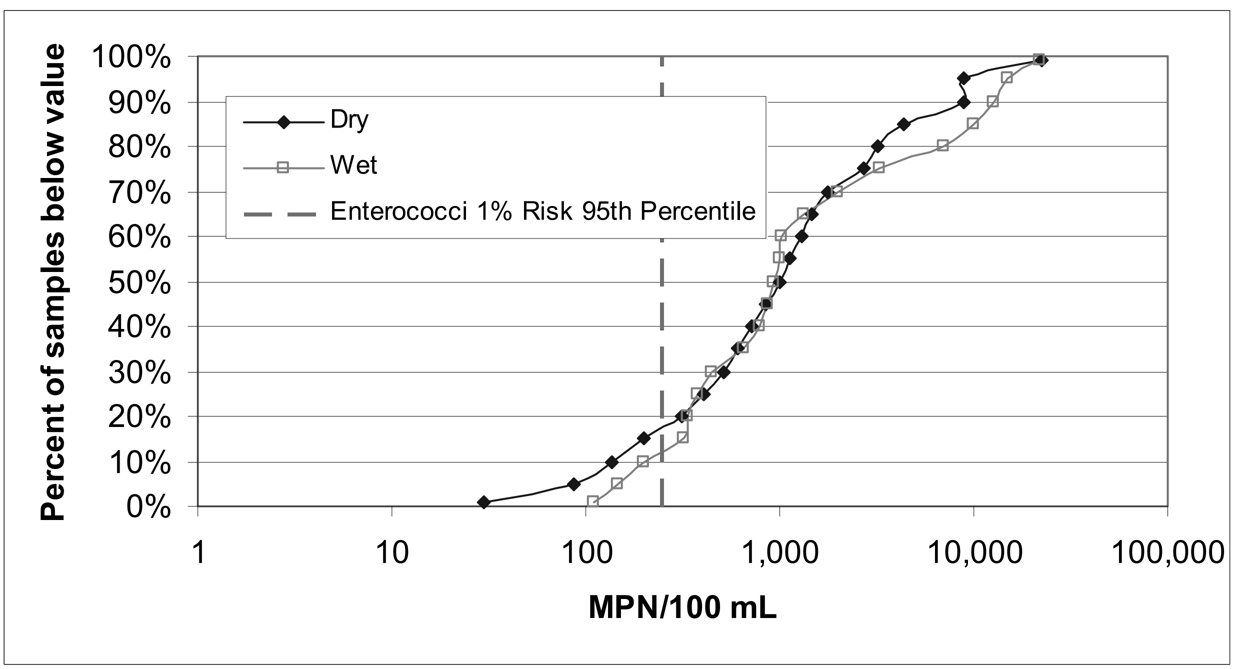
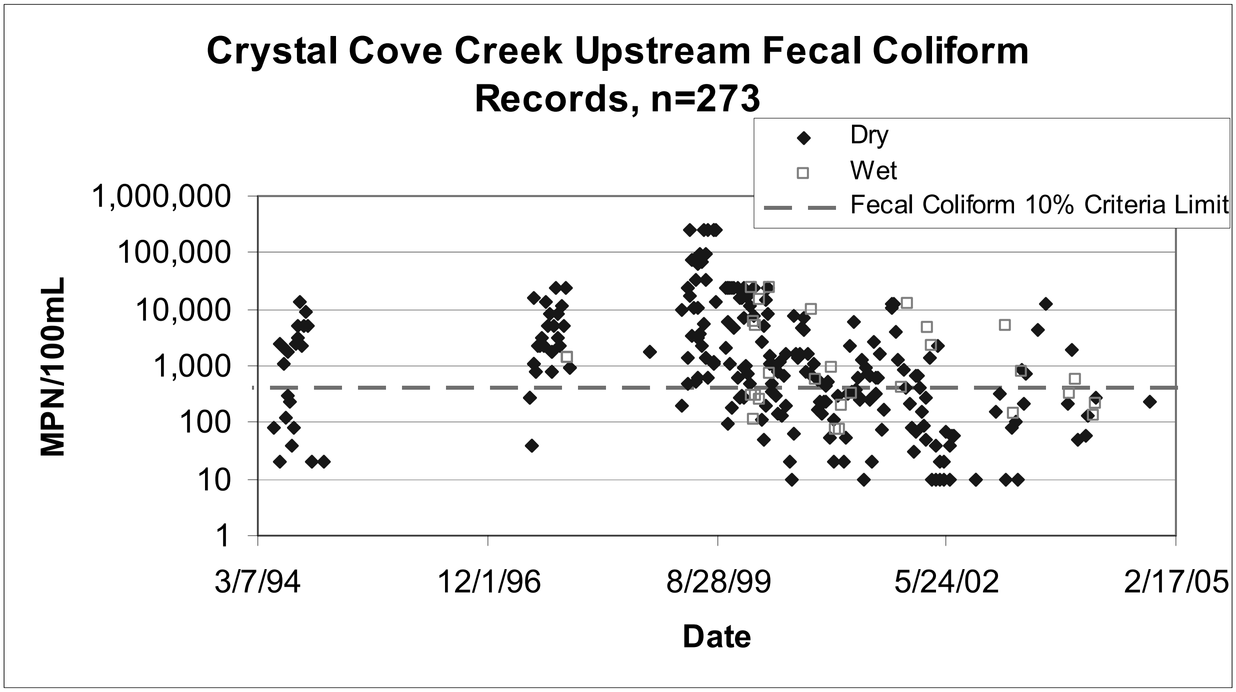


Figure A 39: Crystal Cove Creek Upstream fecal coliform data and corresponding cumulative frequency distribution



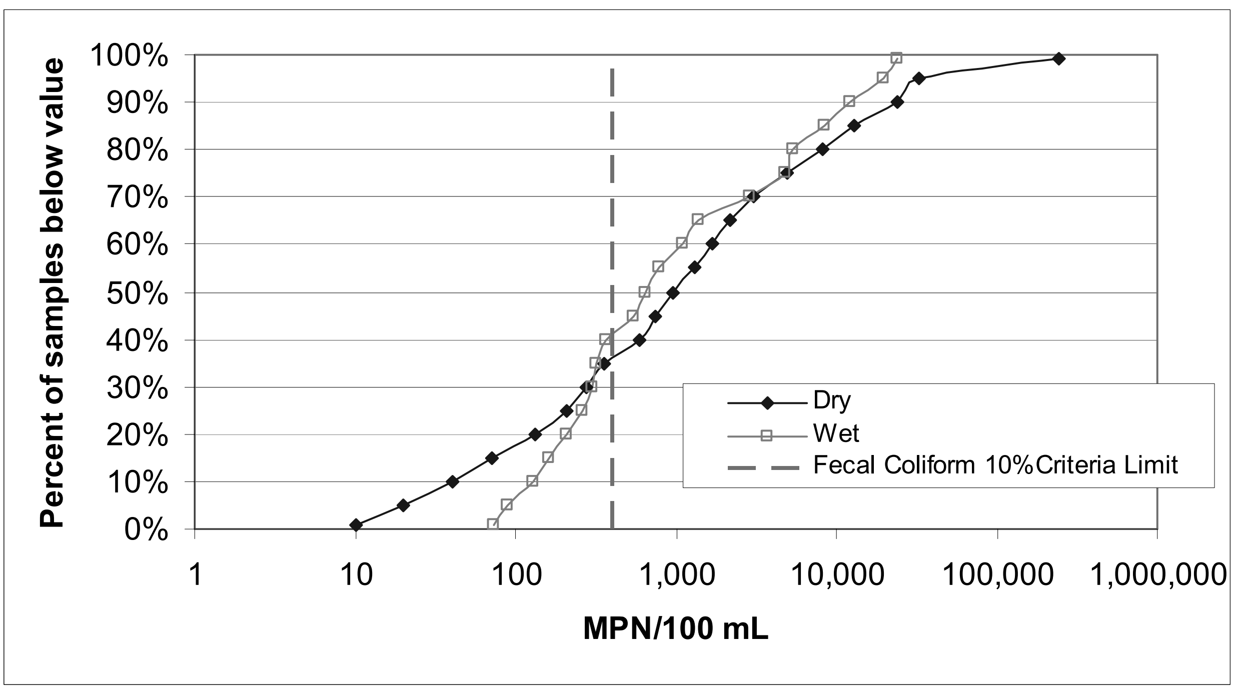
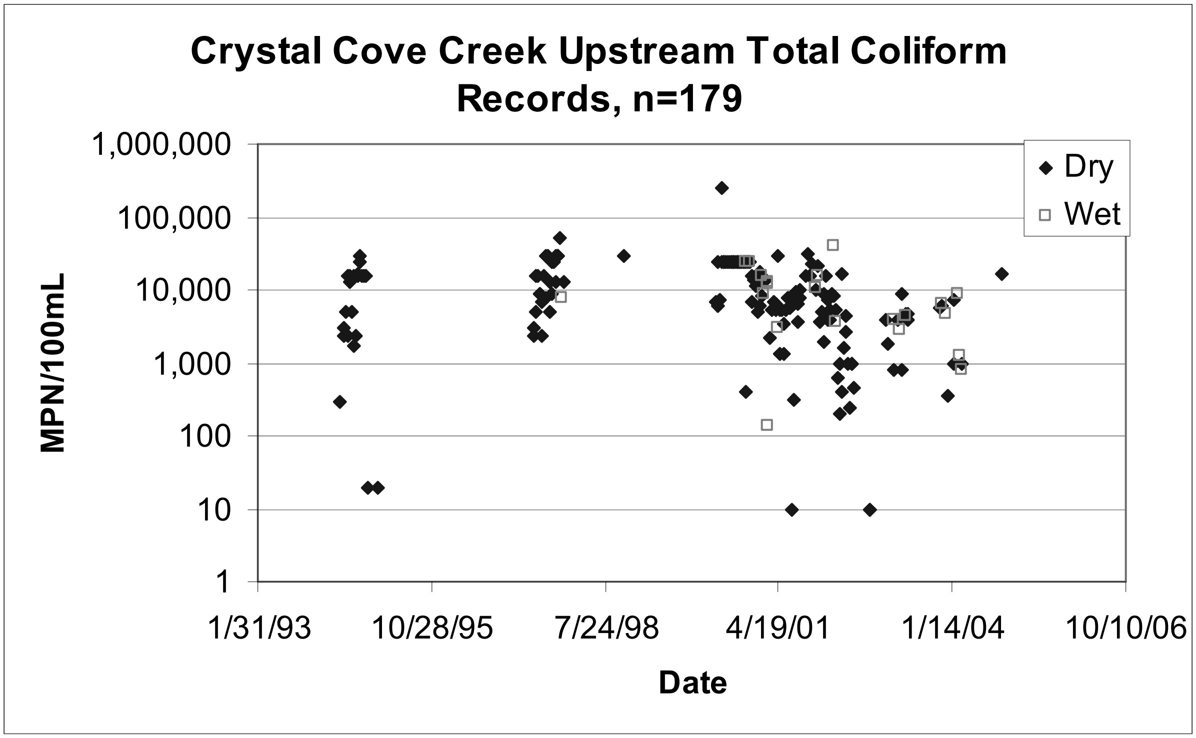


Figure A 40: Crystal Cove Creek Upstream total coliform data and corresponding cumulative frequency distribution



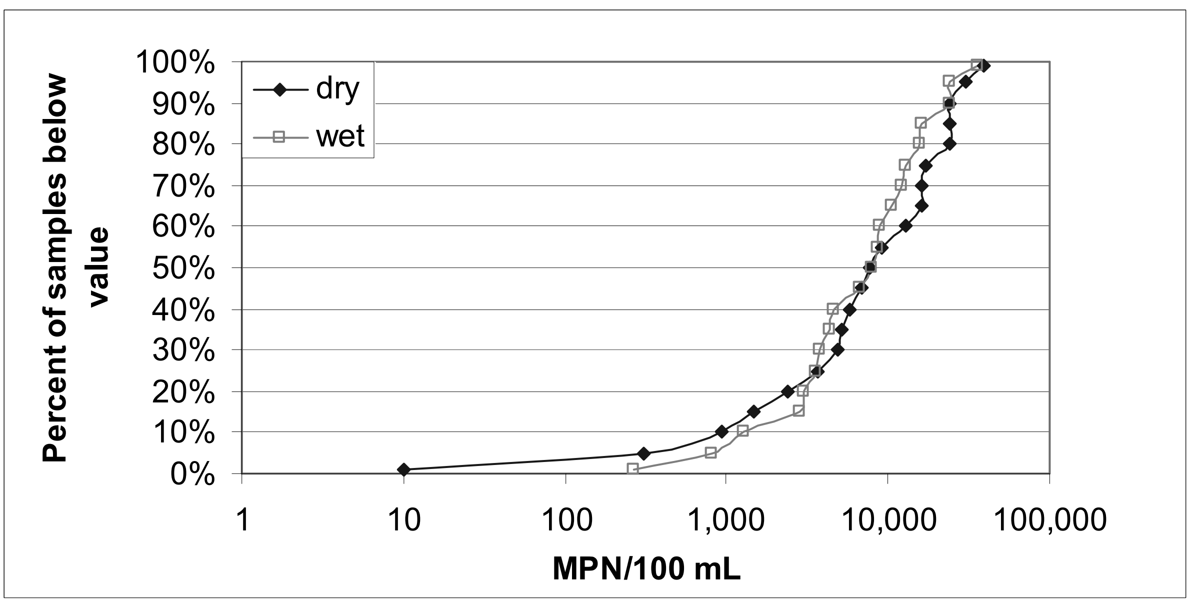


Figure A 41: Percentage of samples from Crystal Cove Creek Upstream which exceed thresholds, by month

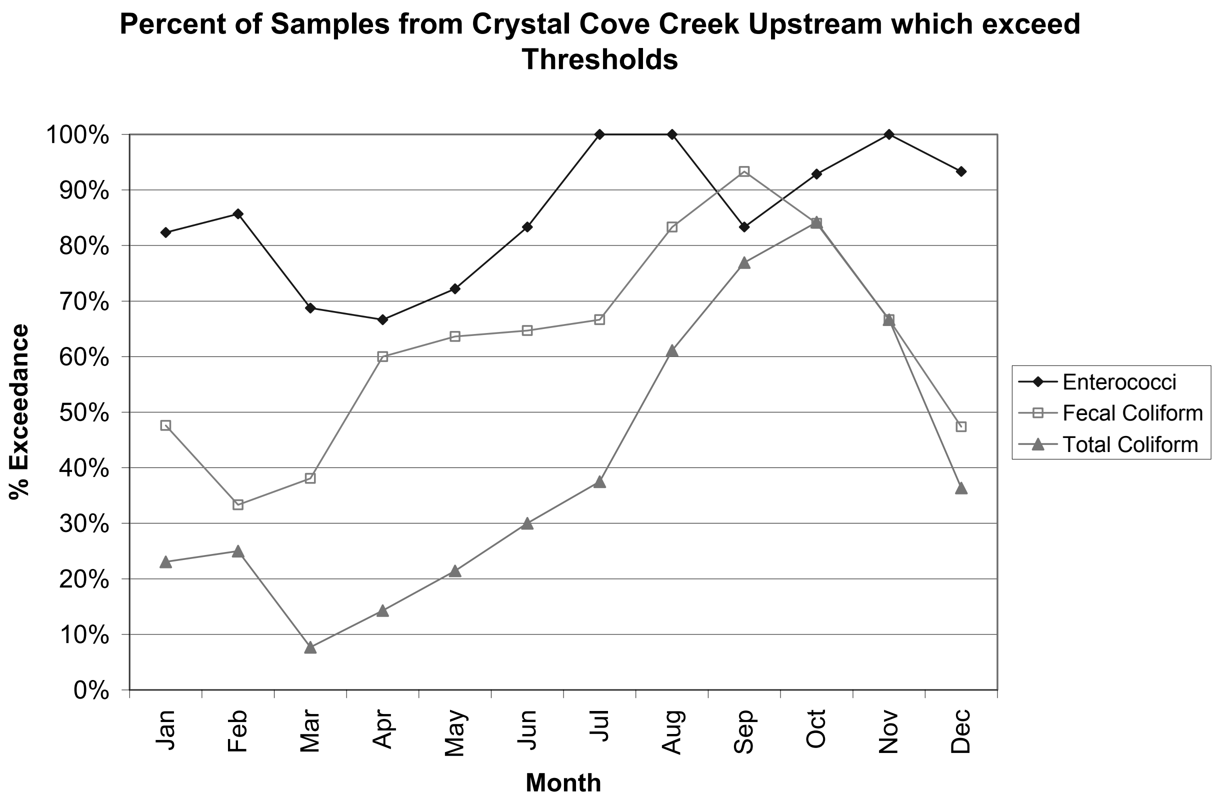
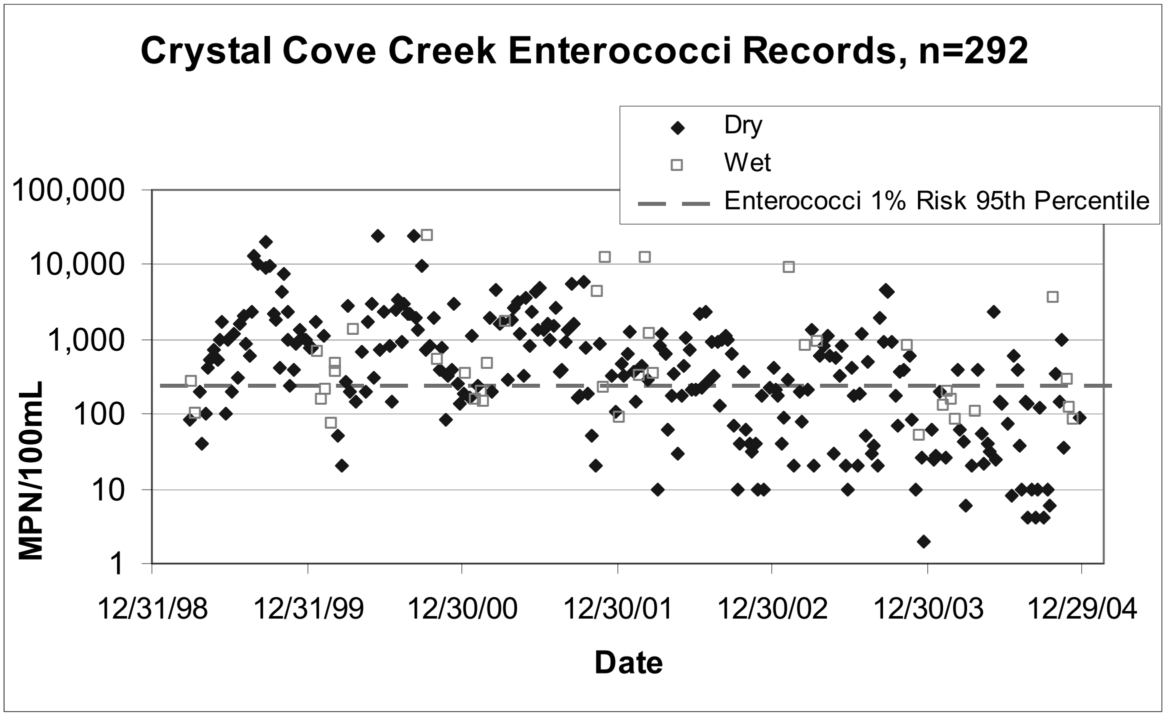


Figure A 42: Crystal Cove Creek enterococci data and corresponding cumulative frequency distribution



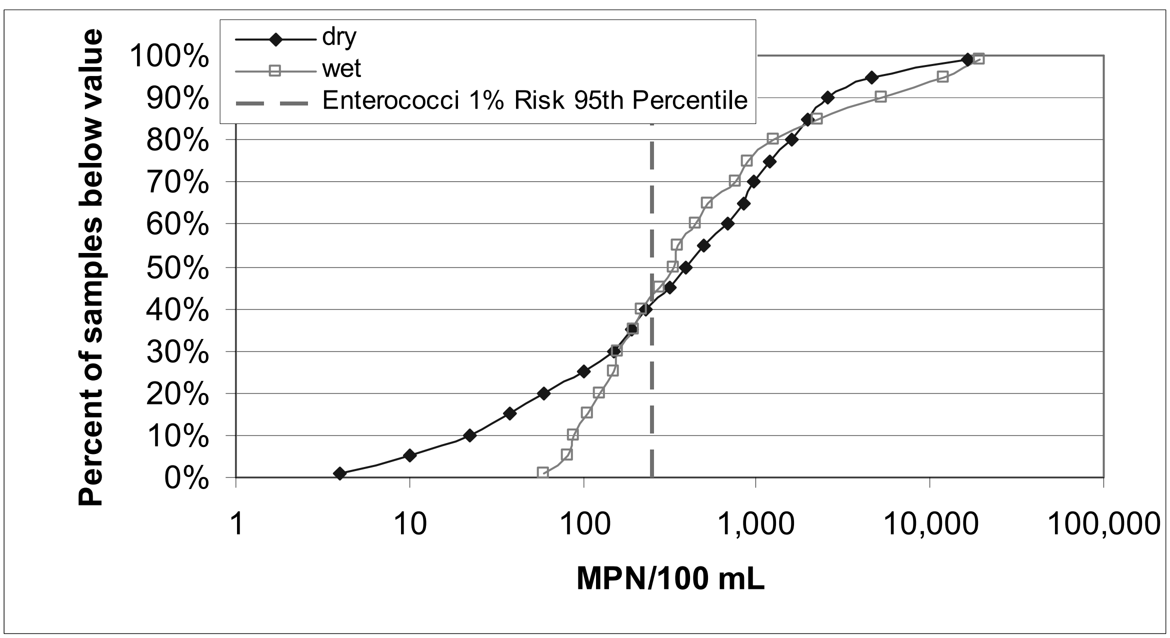
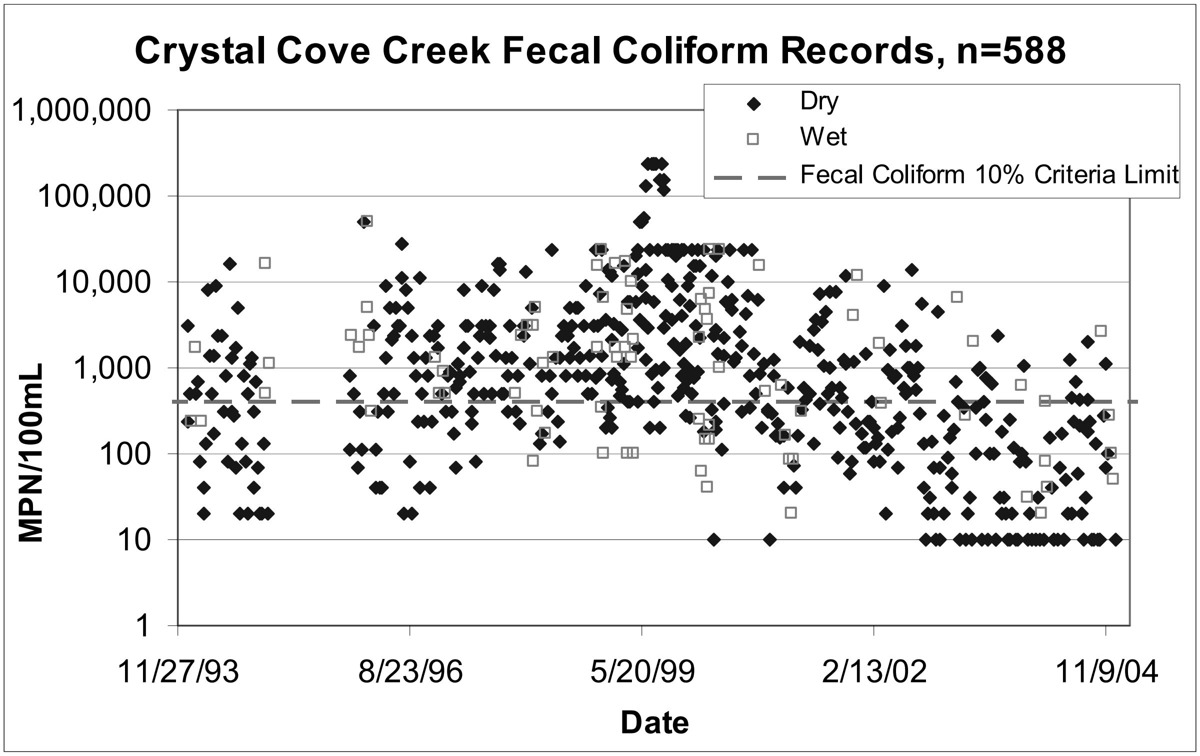


Figure A 43: Crystal Cove Creek fecal coliform data and corresponding cumulative frequency distribution



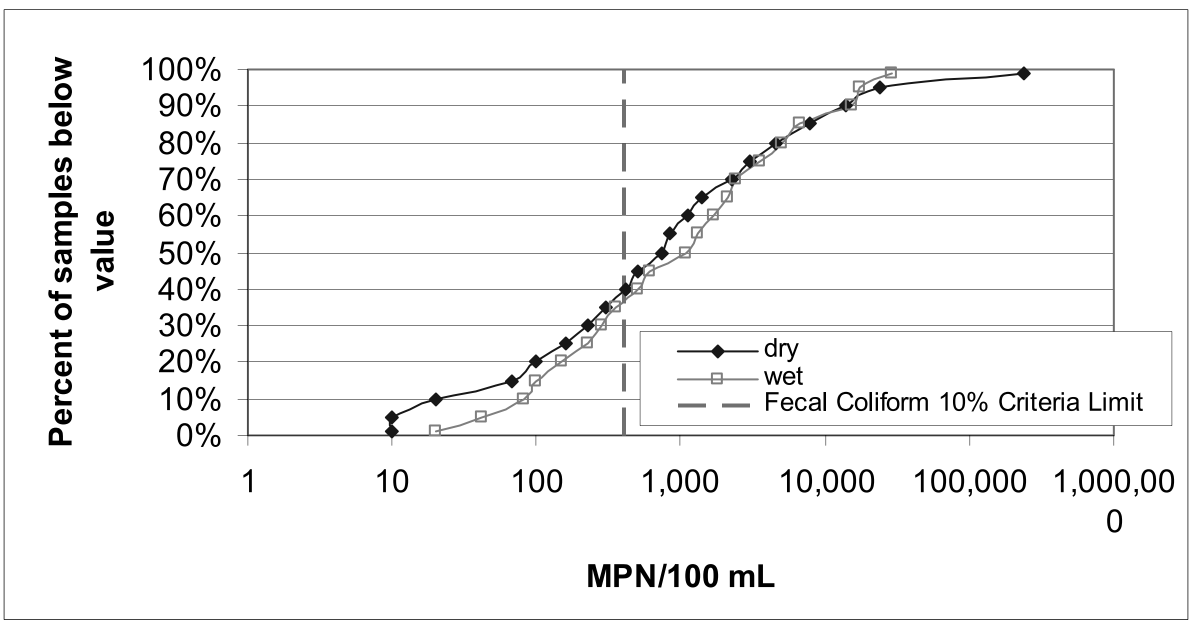
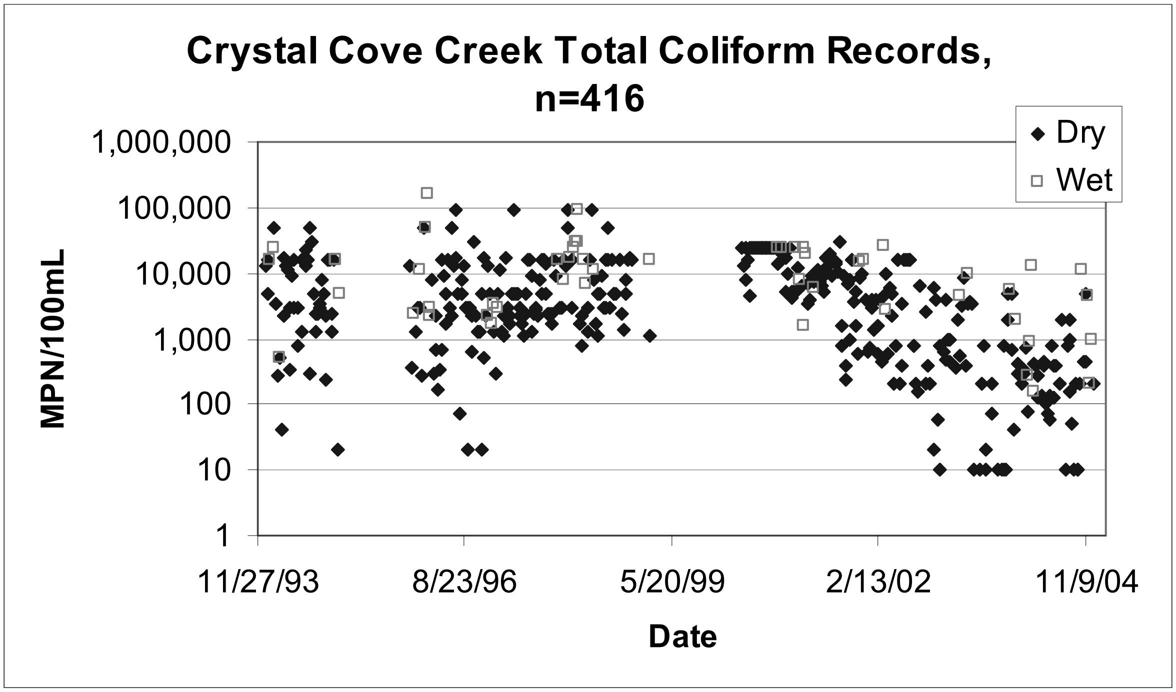


Figure A 44: Crystal Cove Creek total coliform data and corresponding cumulative frequency distribution



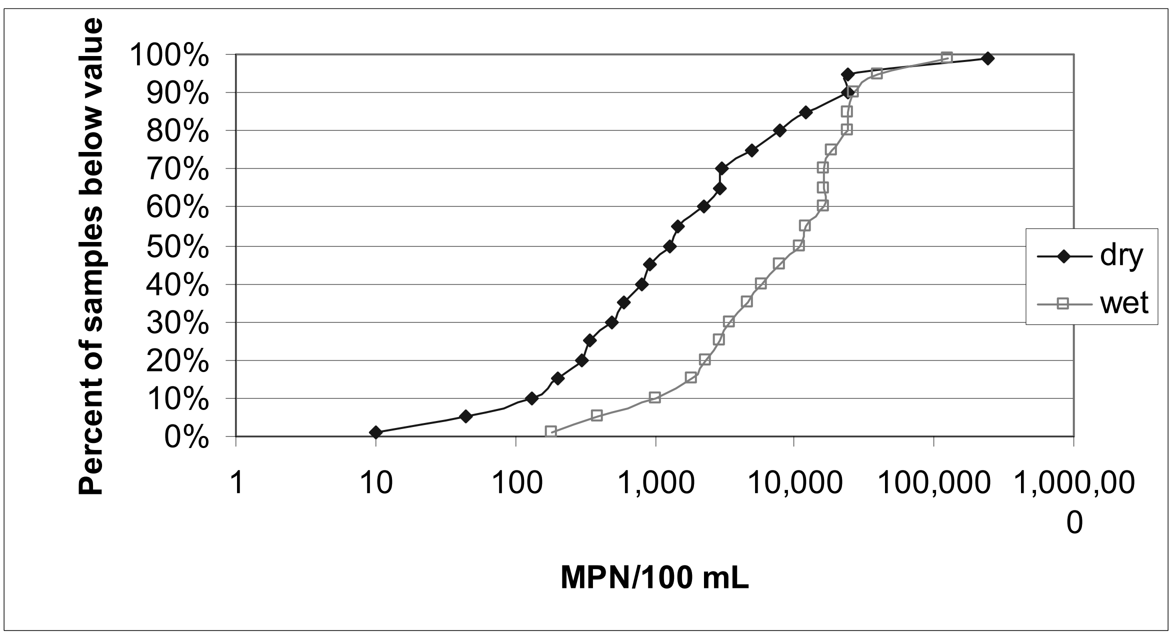


Figure A 45: Percentage of samples from Crystal Cove Creek which exceed thresholds, by month

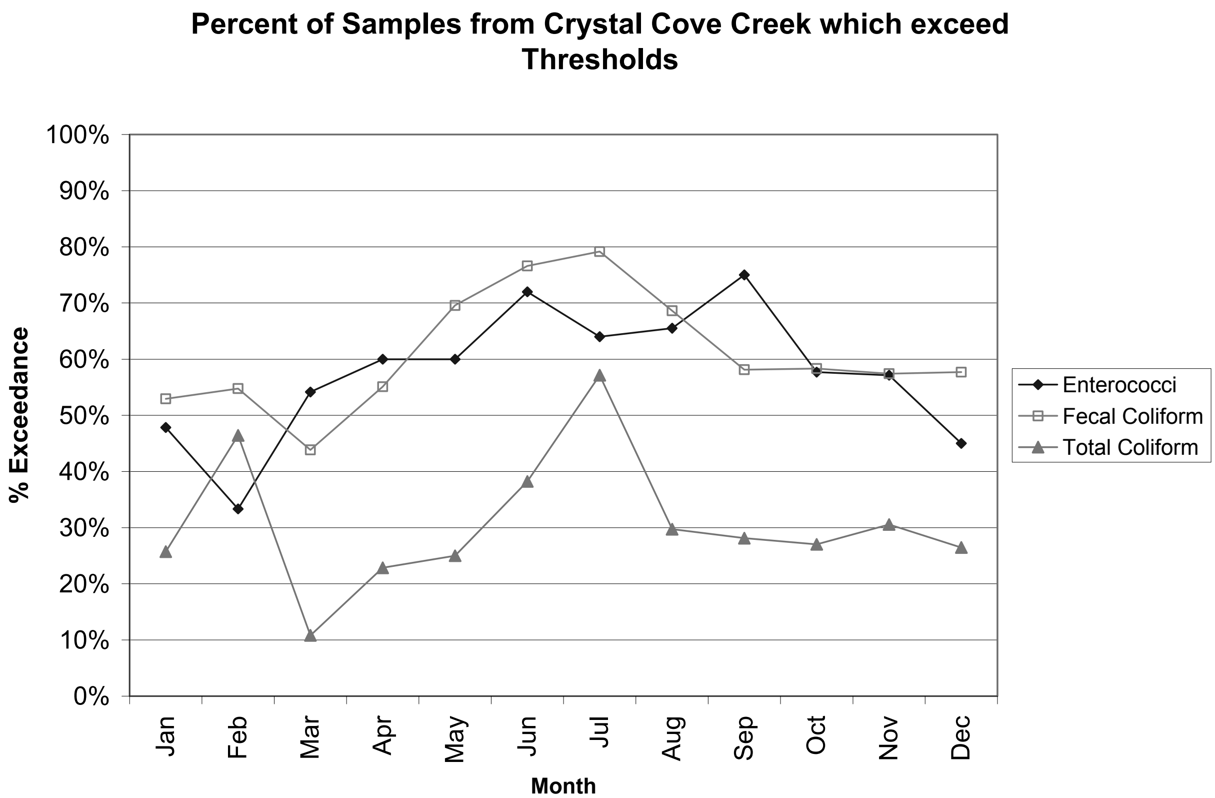
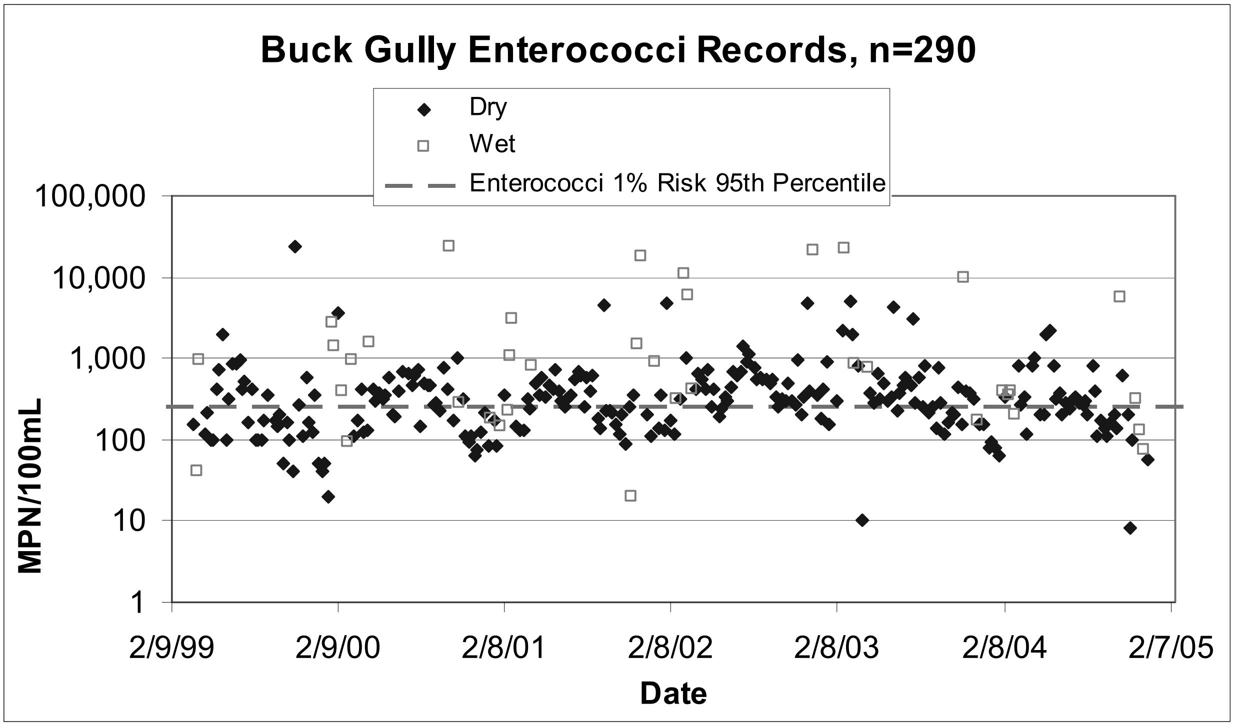


Figure A 46: Buck Gully enterococci data and corresponding cumulative frequency distribution



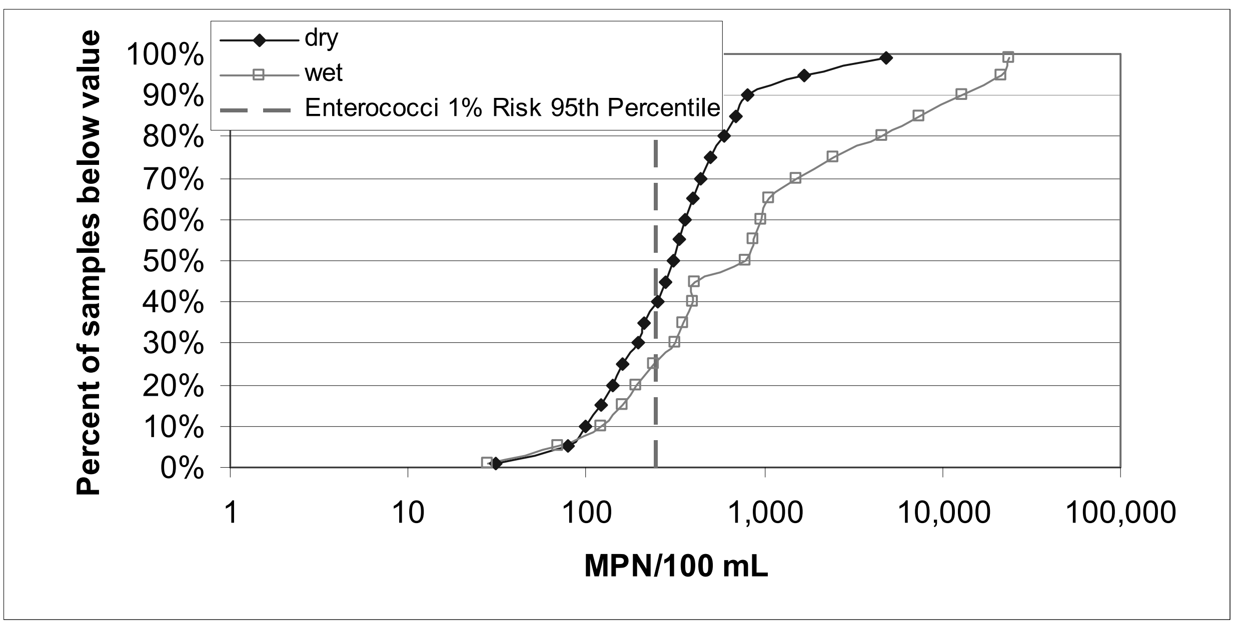
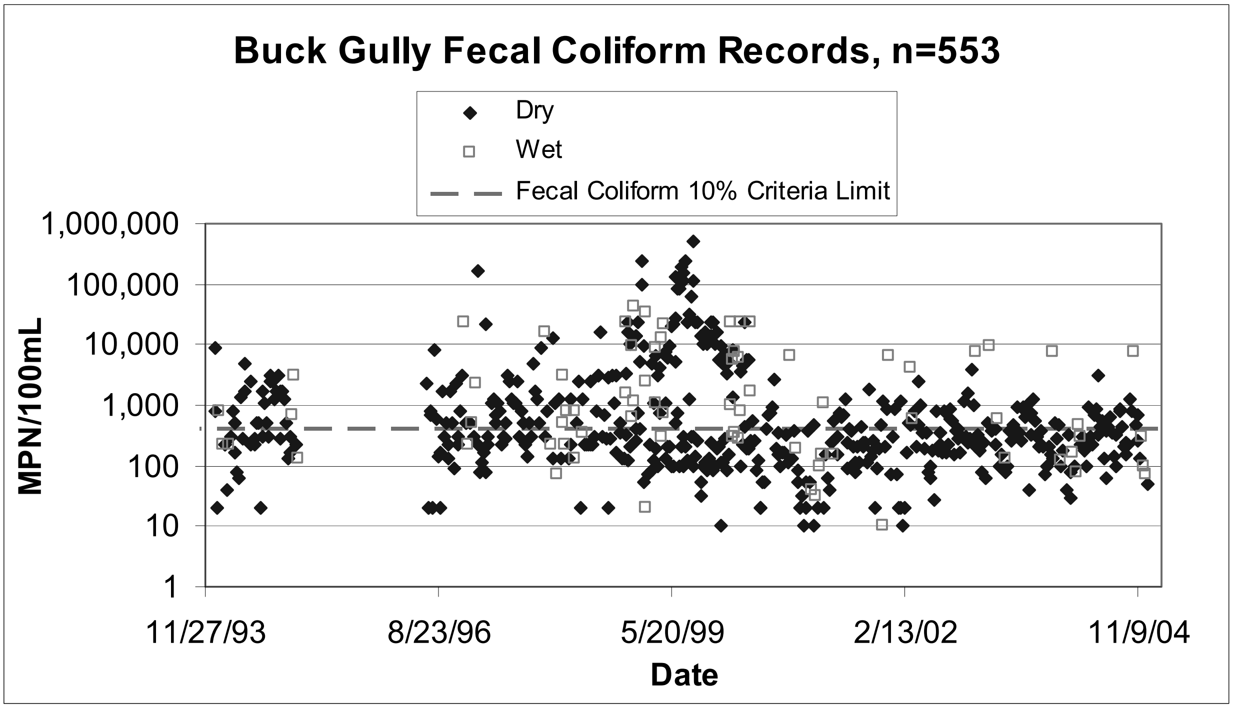


Figure A 47: Buck Gully fecal coliform data and corresponding cumulative frequency distribution



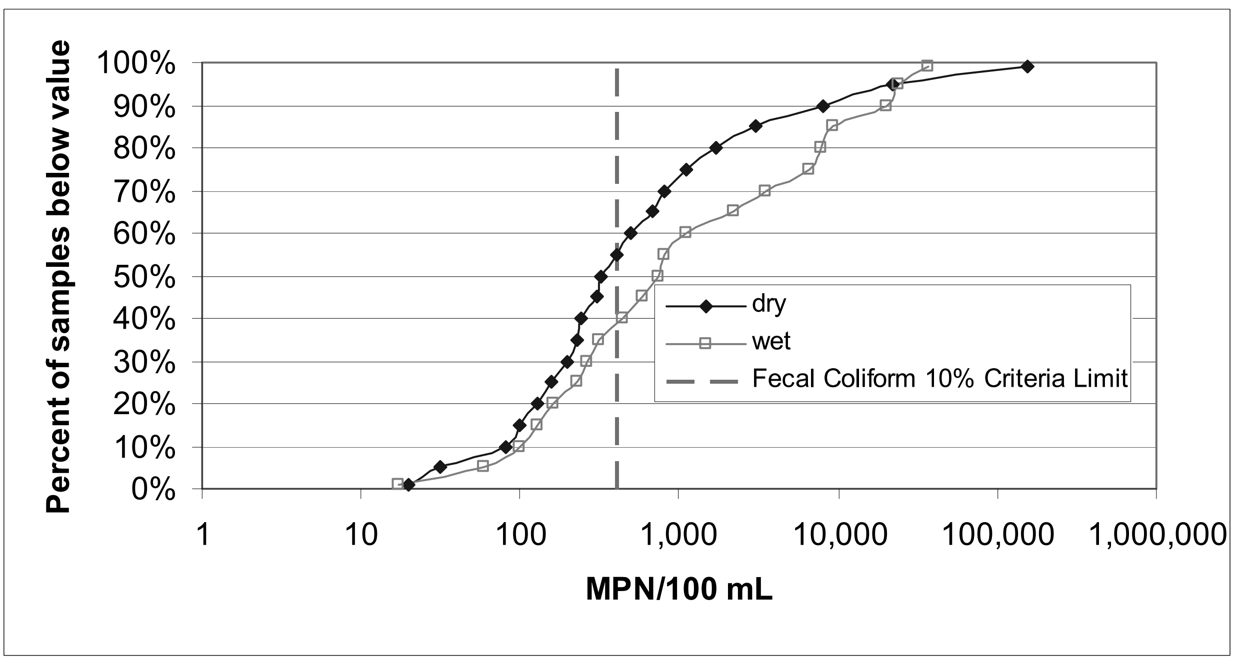
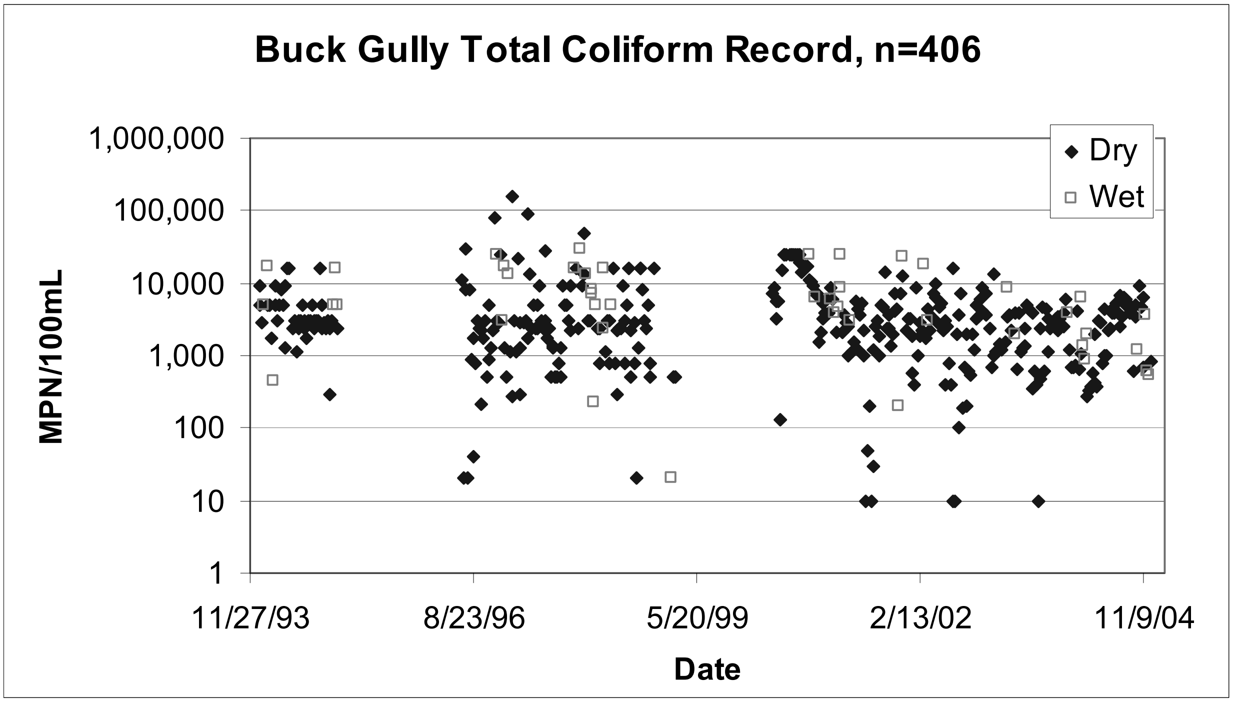


Figure A 48: Buck Gully total coliform data and corresponding cumulative frequency distribution



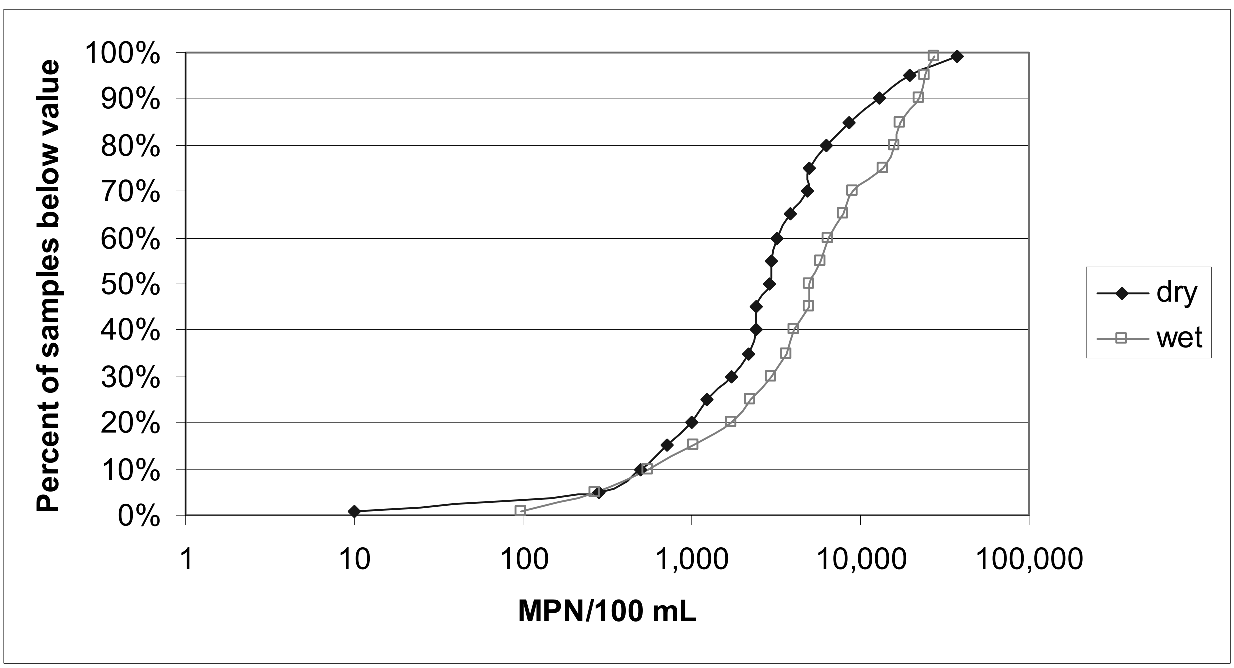


Figure A 49: Percentage of samples from Buck Gully which exceed thresholds, by month

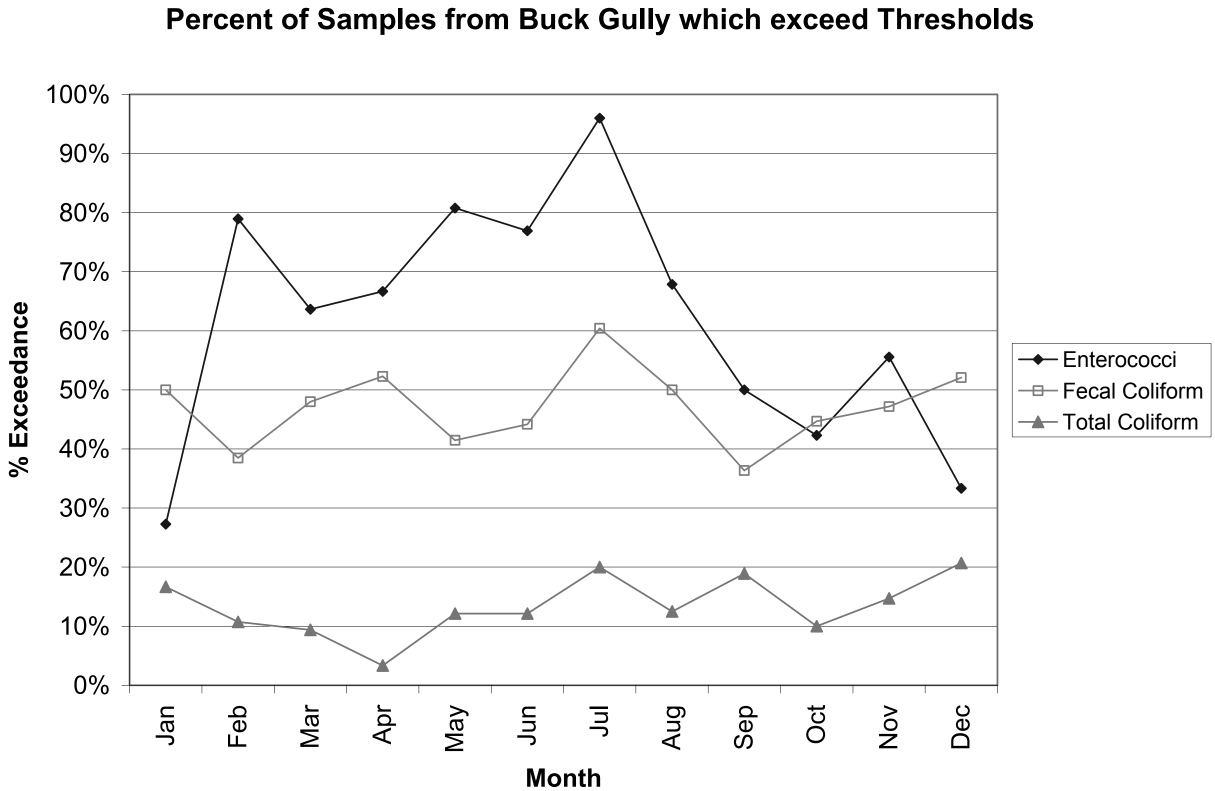
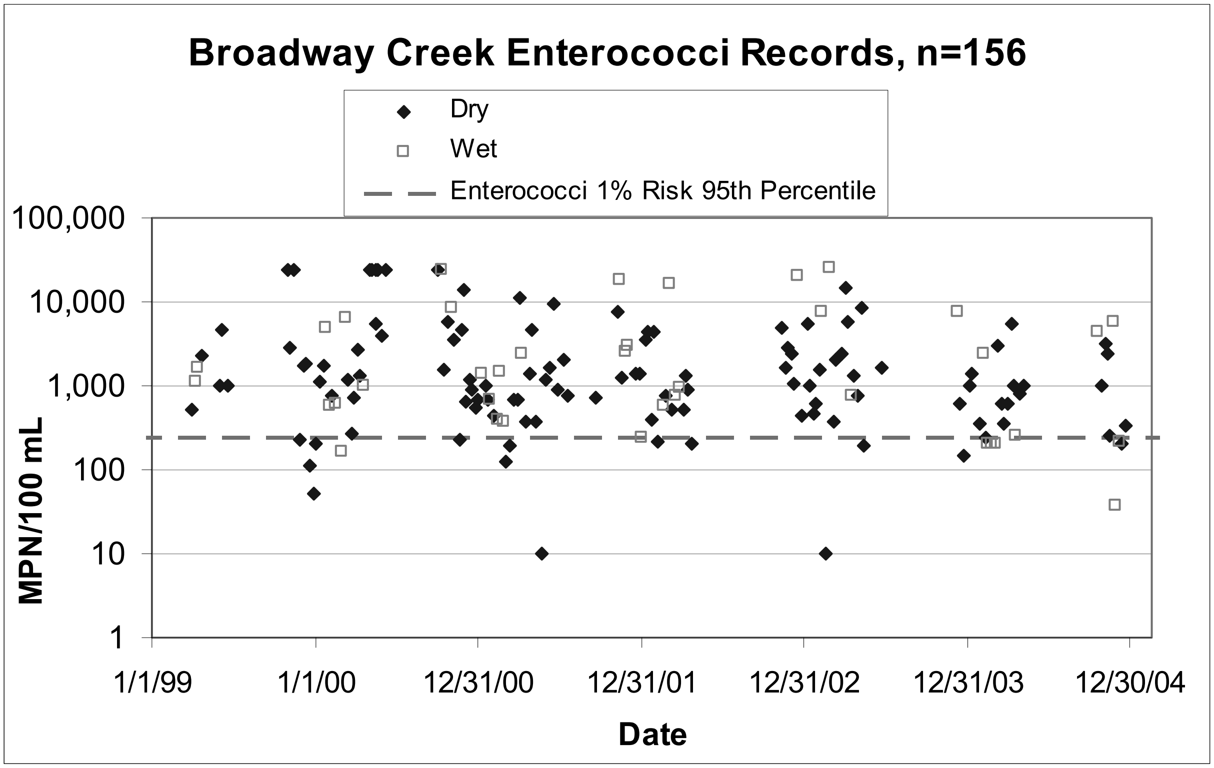


Figure A 50: Broadway Creek enterococci data and corresponding cumulative frequency distribution



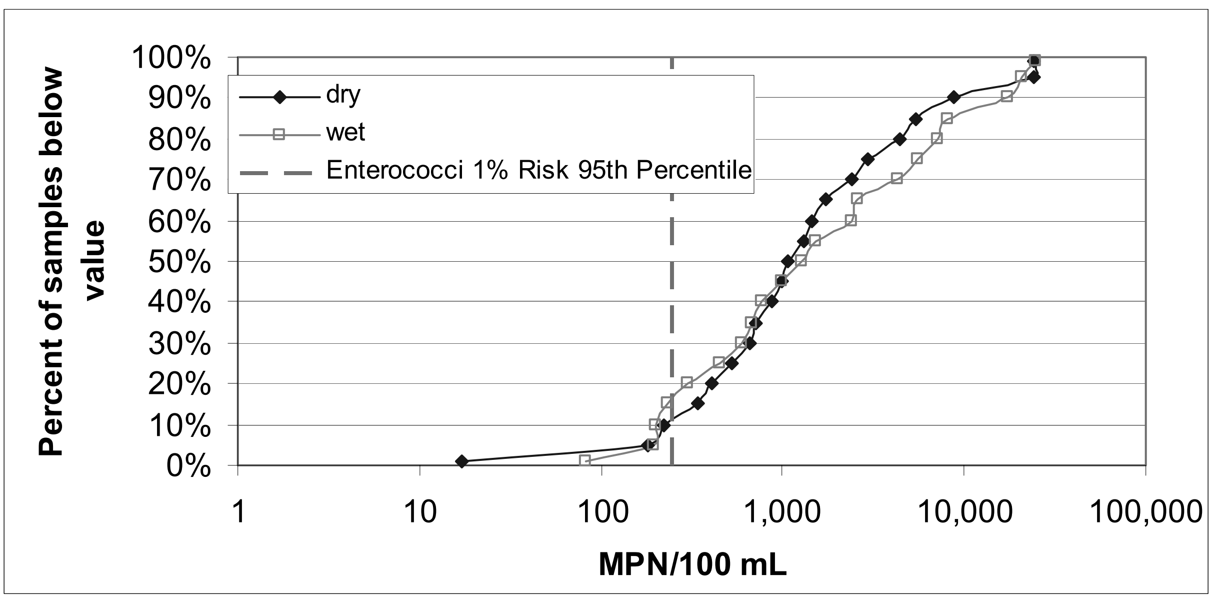
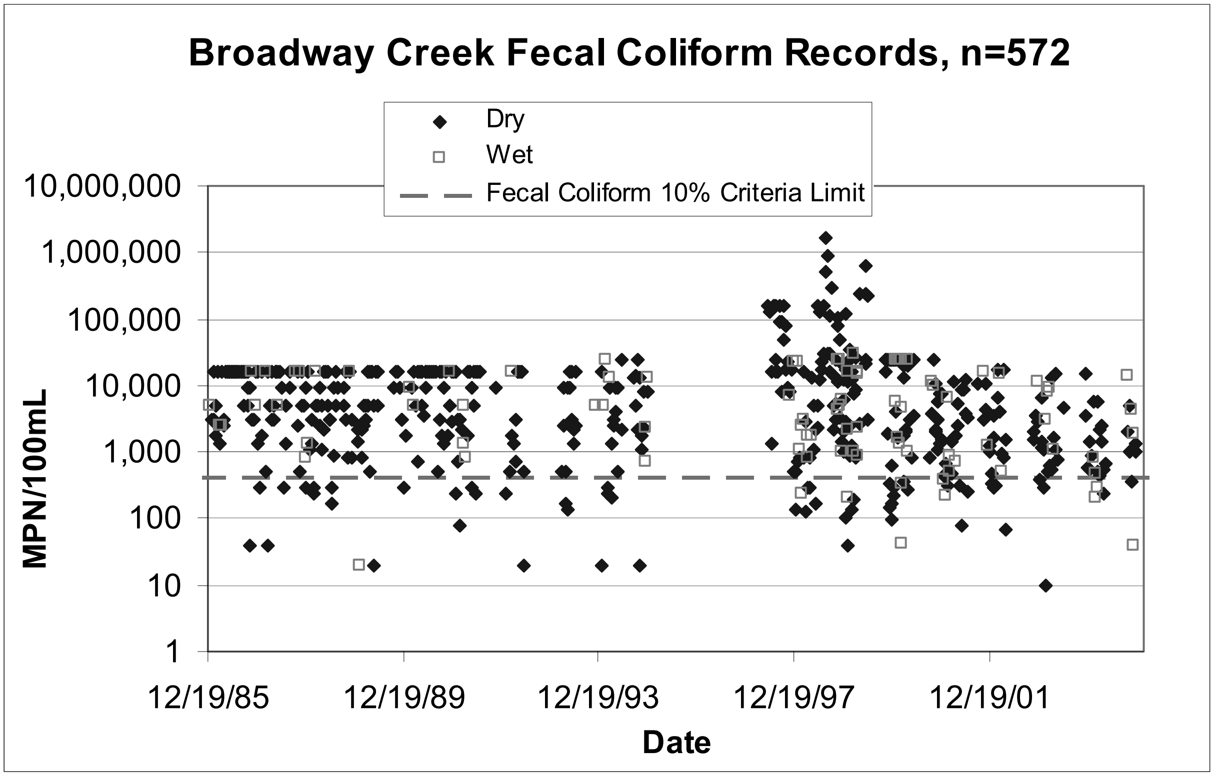


Figure A 51: Broadway Creek fecal coliform data and corresponding cumulative frequency distribution



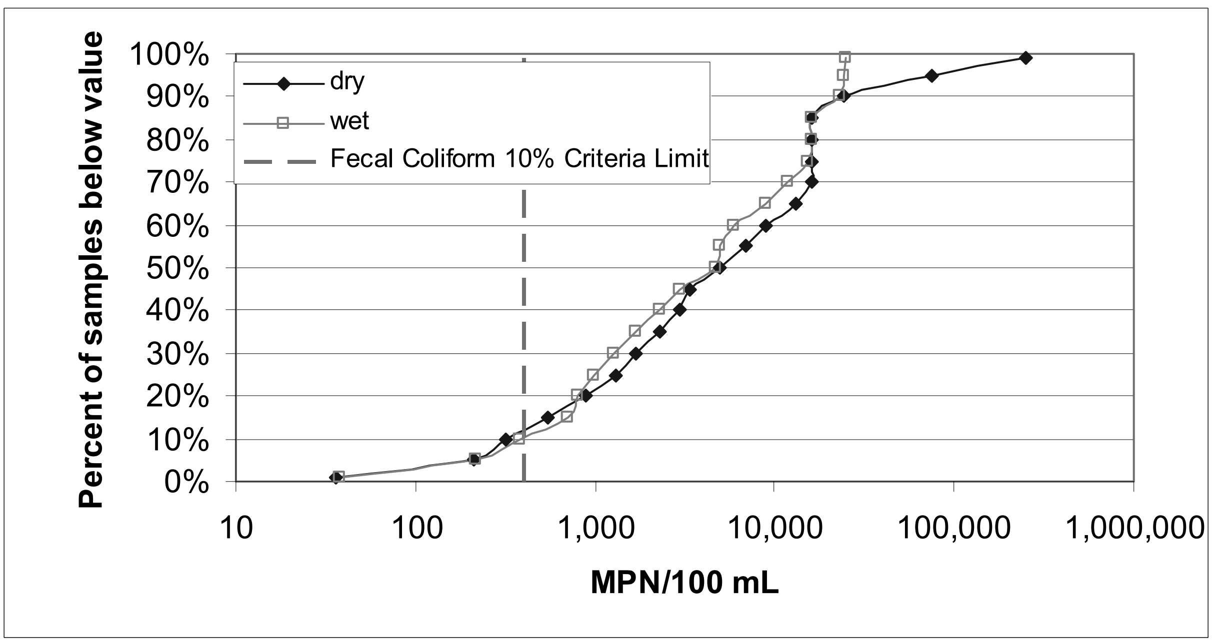
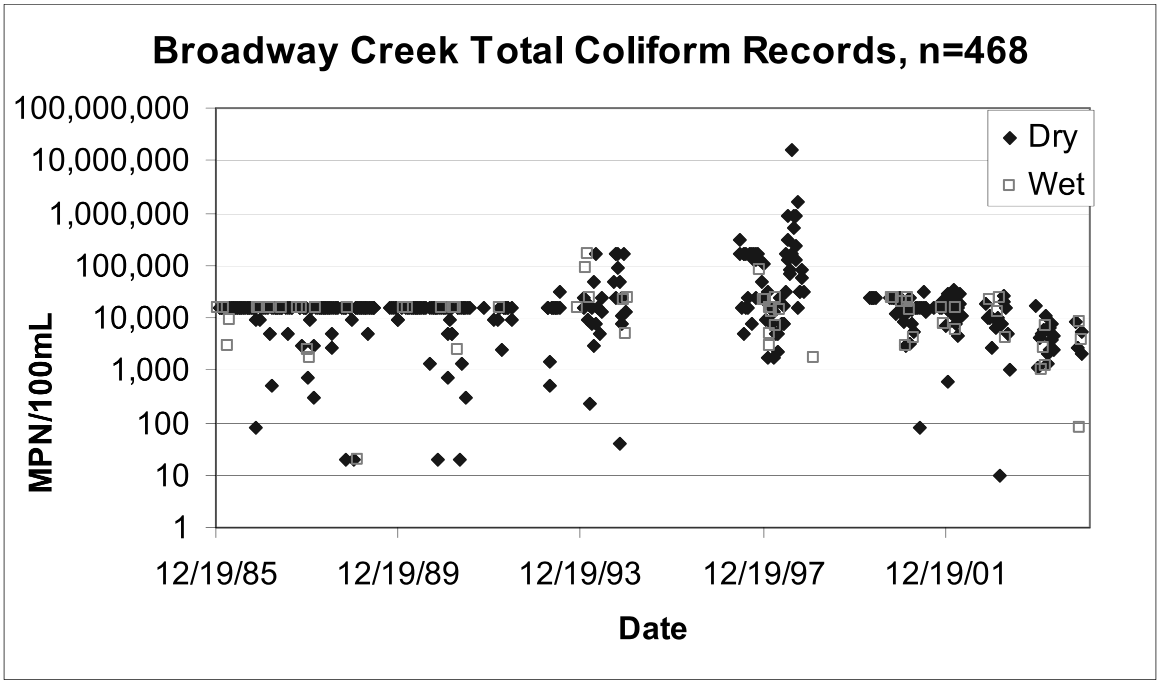


Figure A 52: Broadway Creek total coliform data and corresponding cumulative frequency distribution



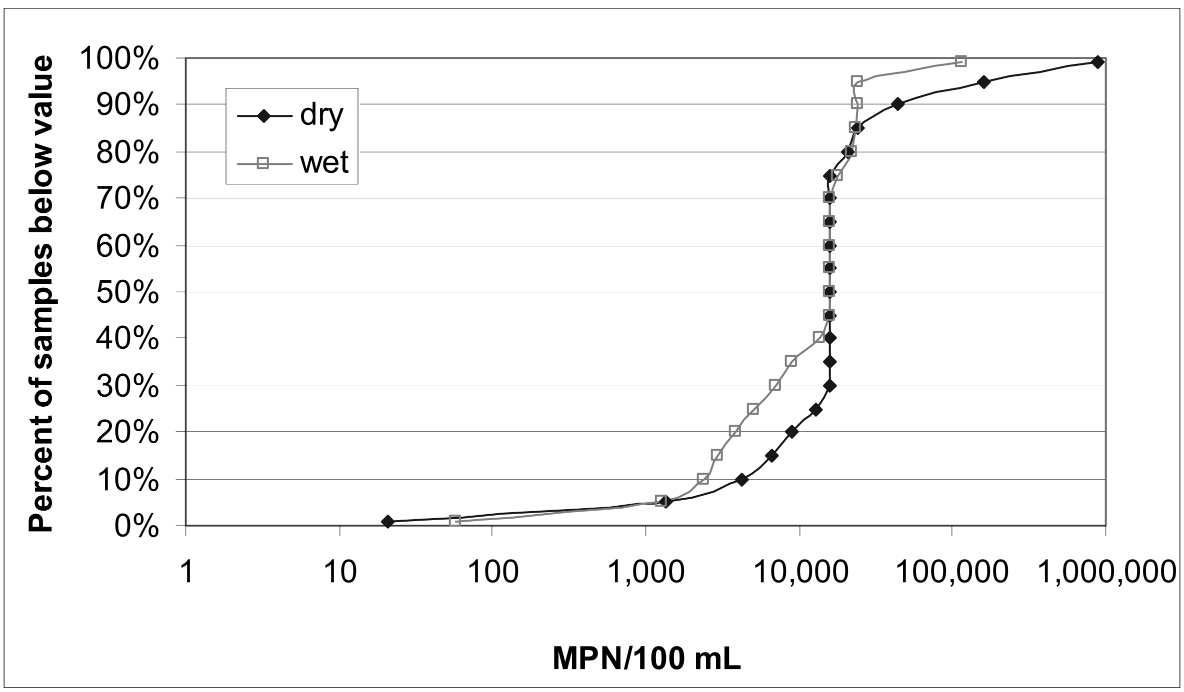
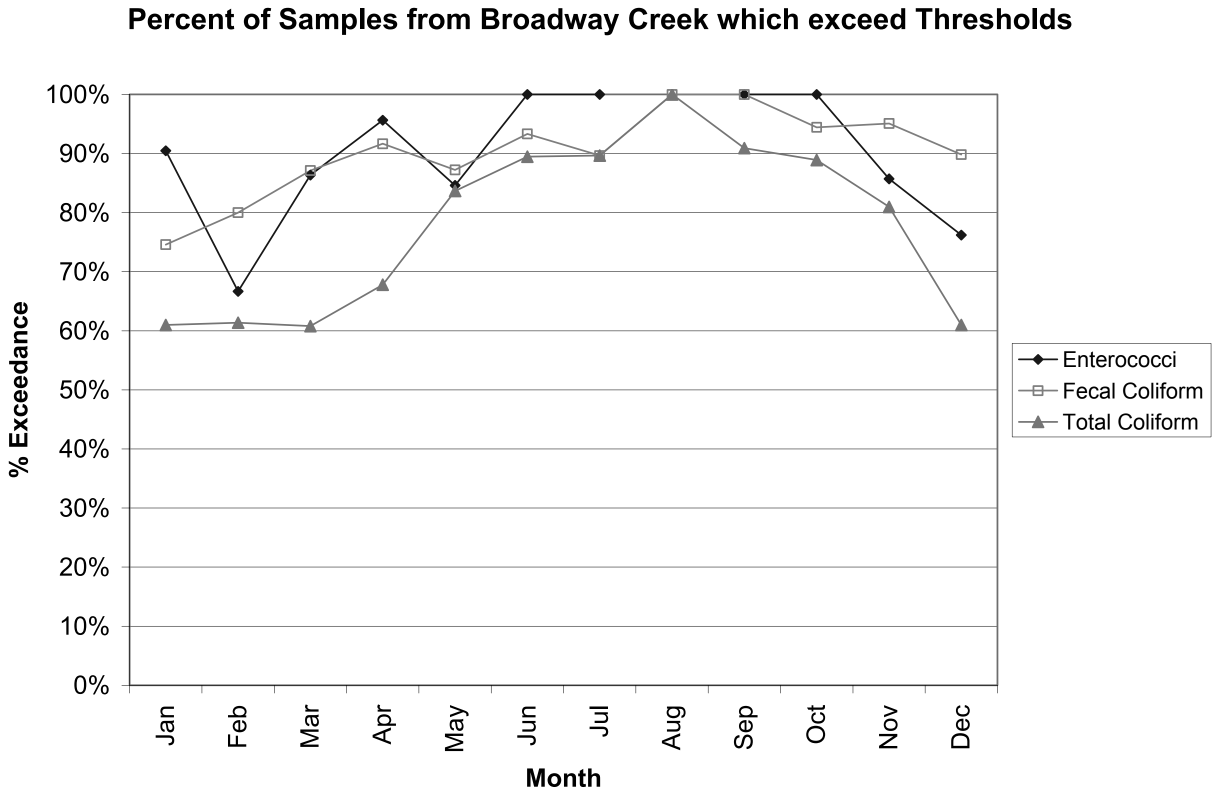


Figure A 53: Percentage of samples from Broadway Creek which exceed thresholds, by month



APPENDIX B

DATA FROM SANTA ANA REGION

FIGURES REPRODUCED FROM CDM 2005

Figure B 1: Santa Ana Watershed and sites selected by CDM for detailed bacteriological analysis (CDM 2005 Figure 19)

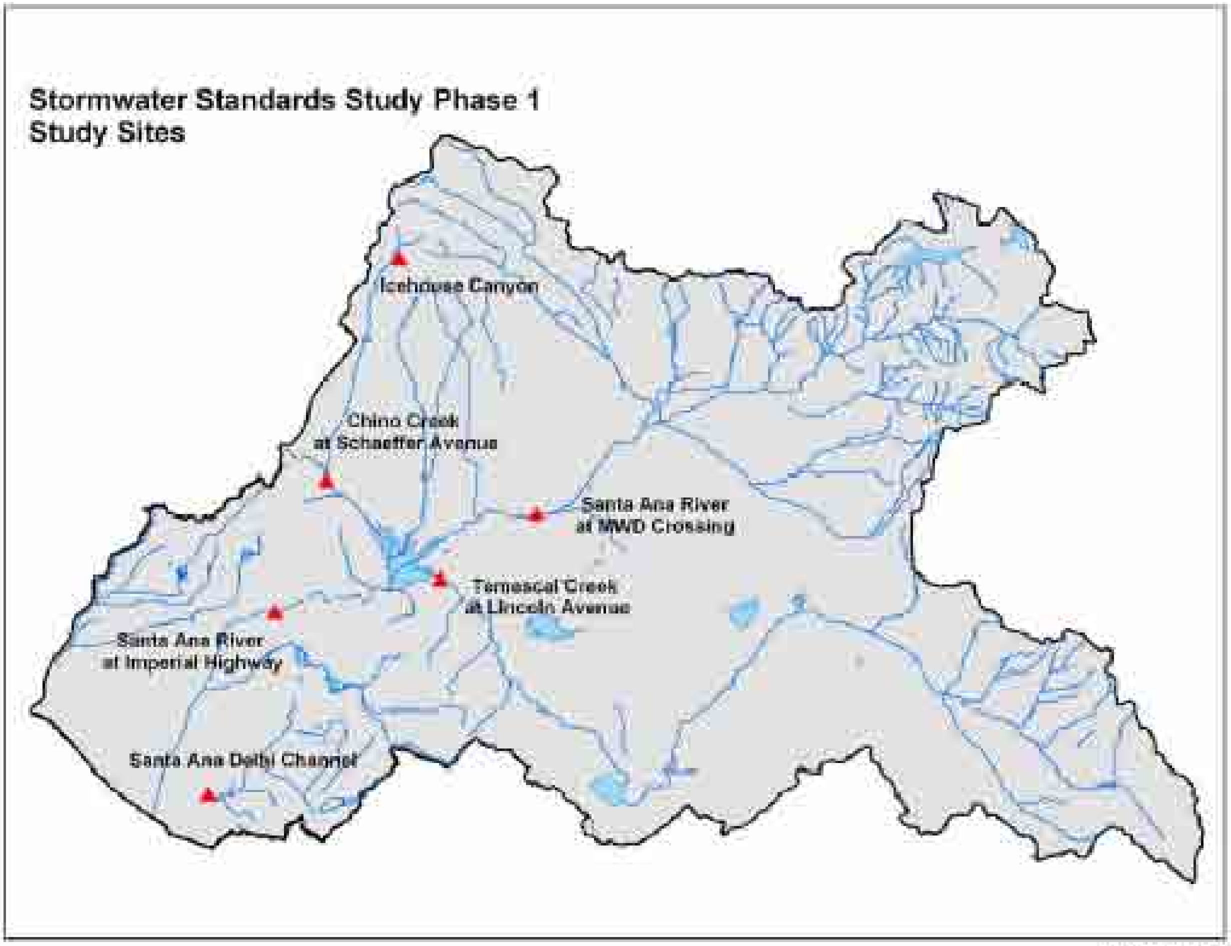


Figure 19
Study Sites Selected for Detailed Analysis

Figure B 2: Flow rate and bacteria concentration, Chino Creek (CDM 2005 Figure 35)

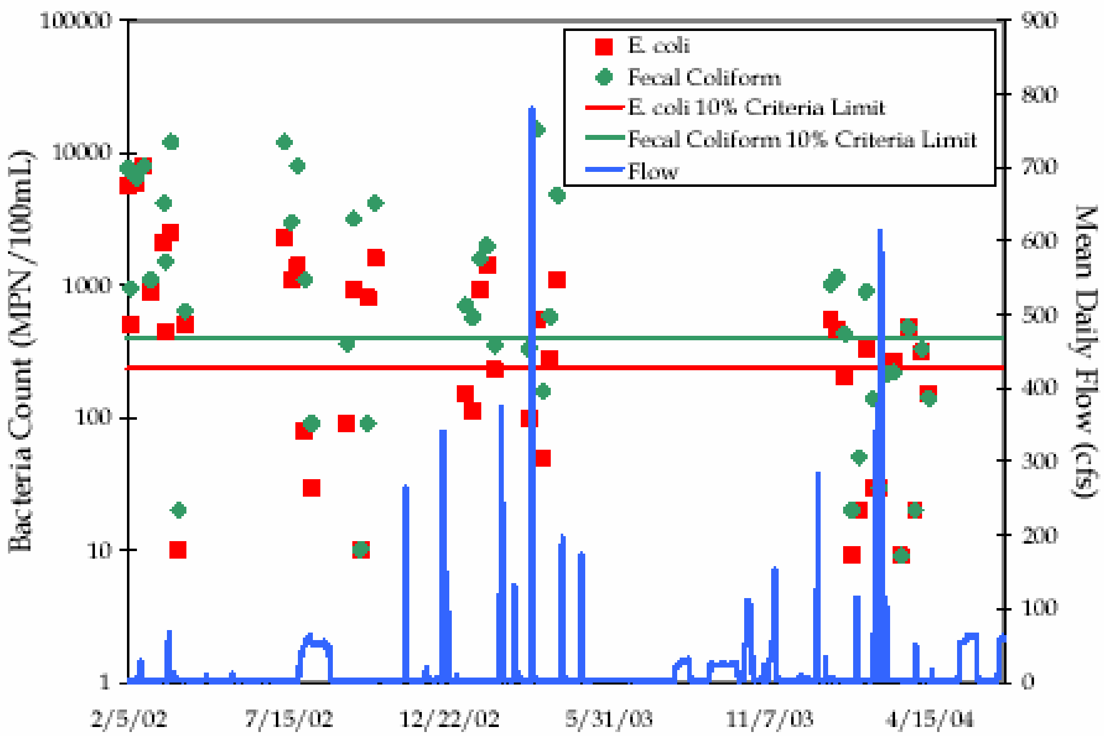


Figure 35
Time Series of Bacteria Counts and Flow at the Chino Creek at Schaeffer Avenue Study Site

Figure B 3: Flow rate and bacteria concentration, Santa Ana Delhi Channel (CDM 2005 Figure 53)

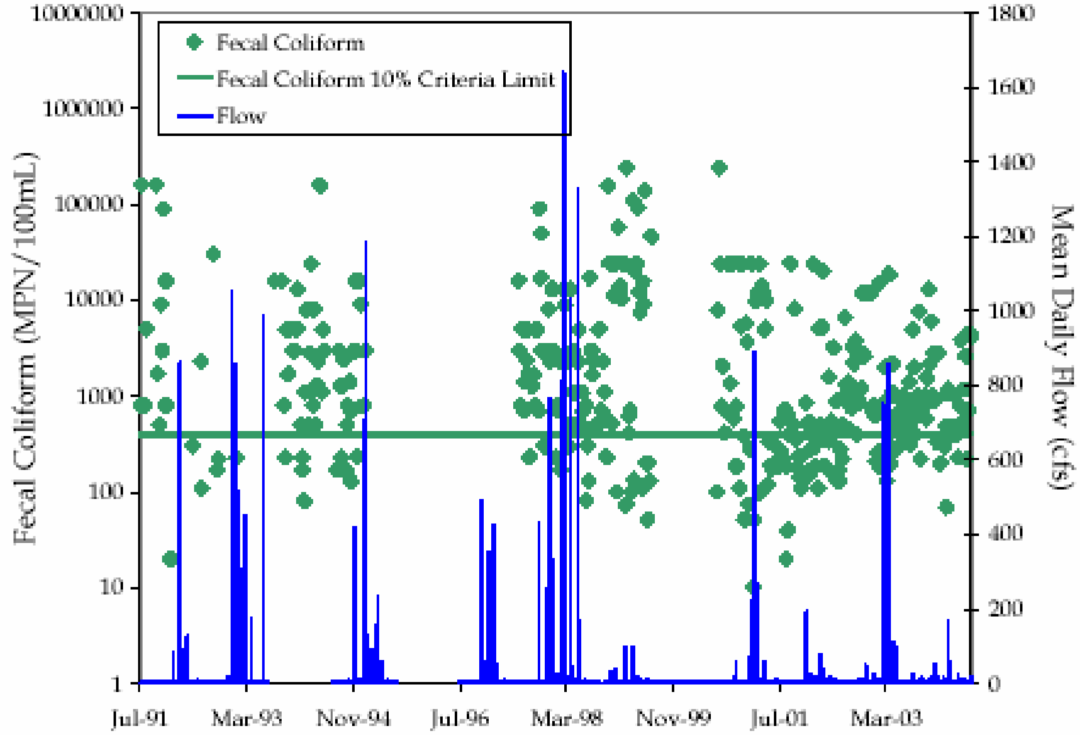


Figure 53
Time Series of Bacteria Concentrations and
Flow in the Santa Ana Delhi Channel - Backbay

Figure B 4: Flow rate and bacteria concentration, Temescal Creek (CDM 2005 Figure 72)

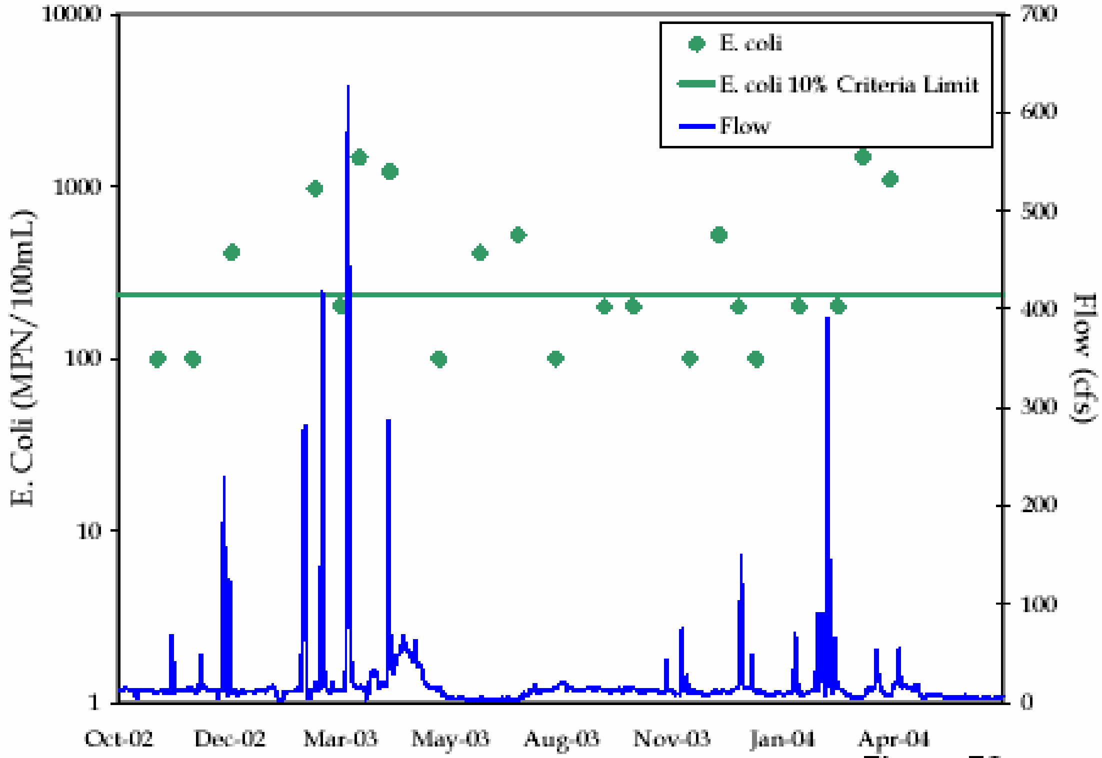


Figure 72
Time Series of Bacteria Concentrations and Flow in Temescal Creek from October 2002 to April 2004

Figure B 5: Flow rate and bacteria concentration, Santa Ana River at MWD Crossing (CDM 2005 Figures 98 and 99)

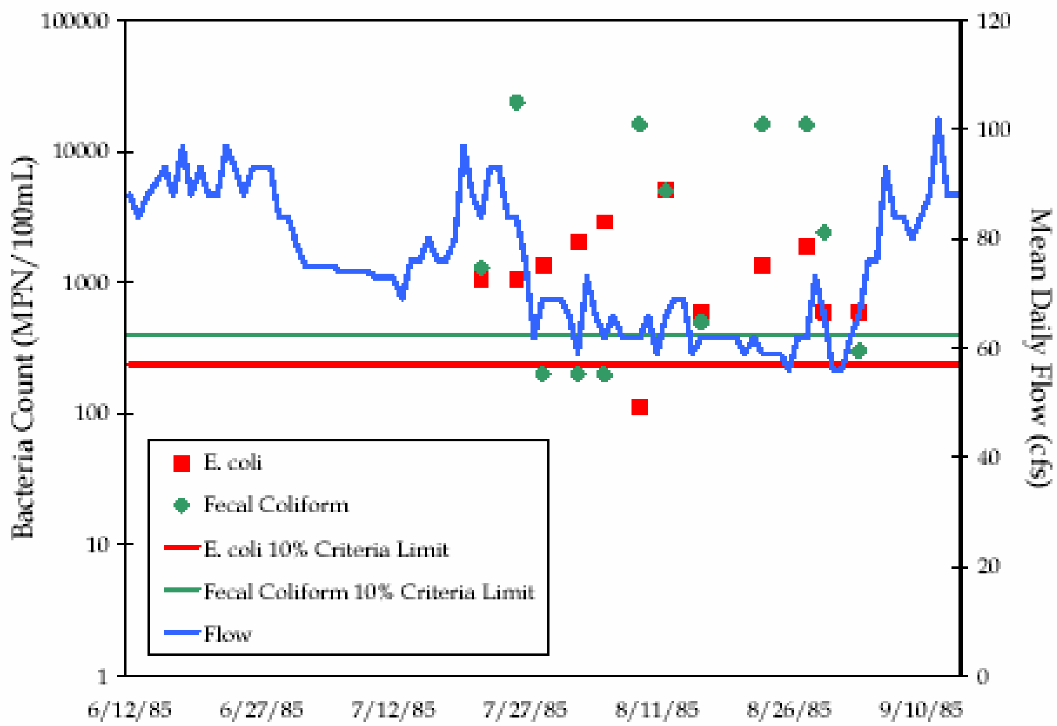


Figure 98
Time Series of Bacteria Concentrations and Flow in the Santa Ana River at the MWD Crossing Study Site

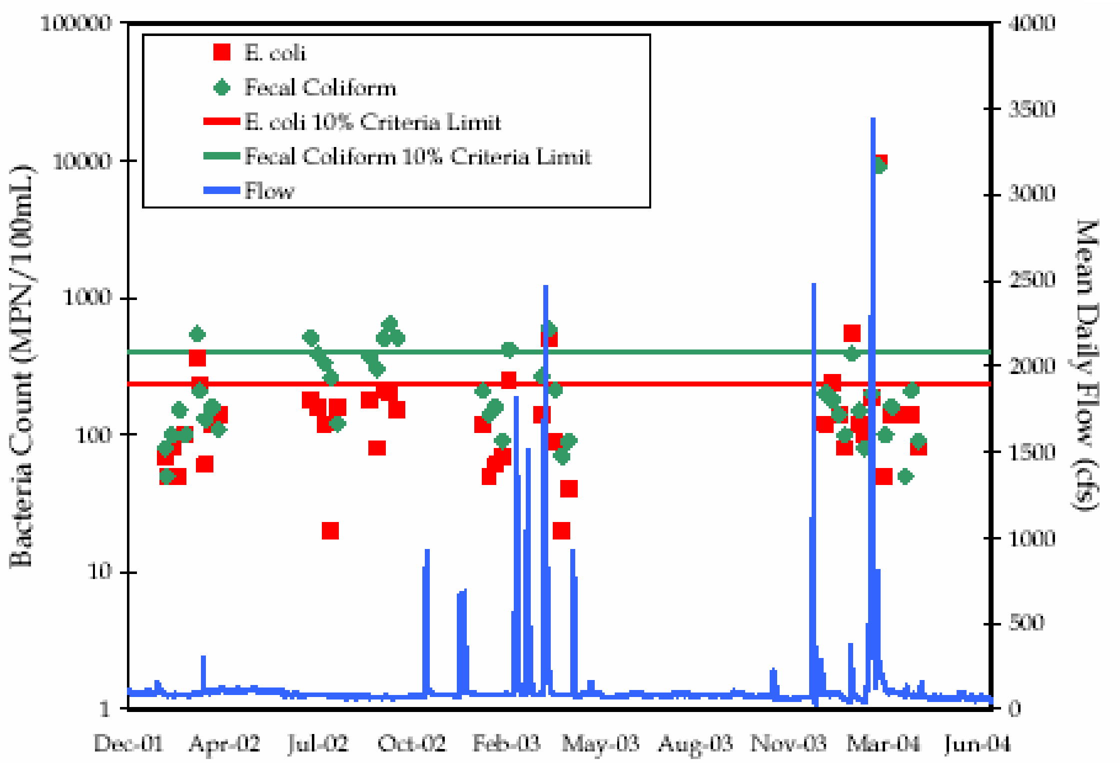


Figure 99
Time Series of Bacteria Concentrations and Flow in the Santa Ana River at the MWD Crossing Study Site

Figure B 6: Flow rate and bacteria concentration, Santa Ana River at Imperial Highway (CDM 2005 Figure 83)

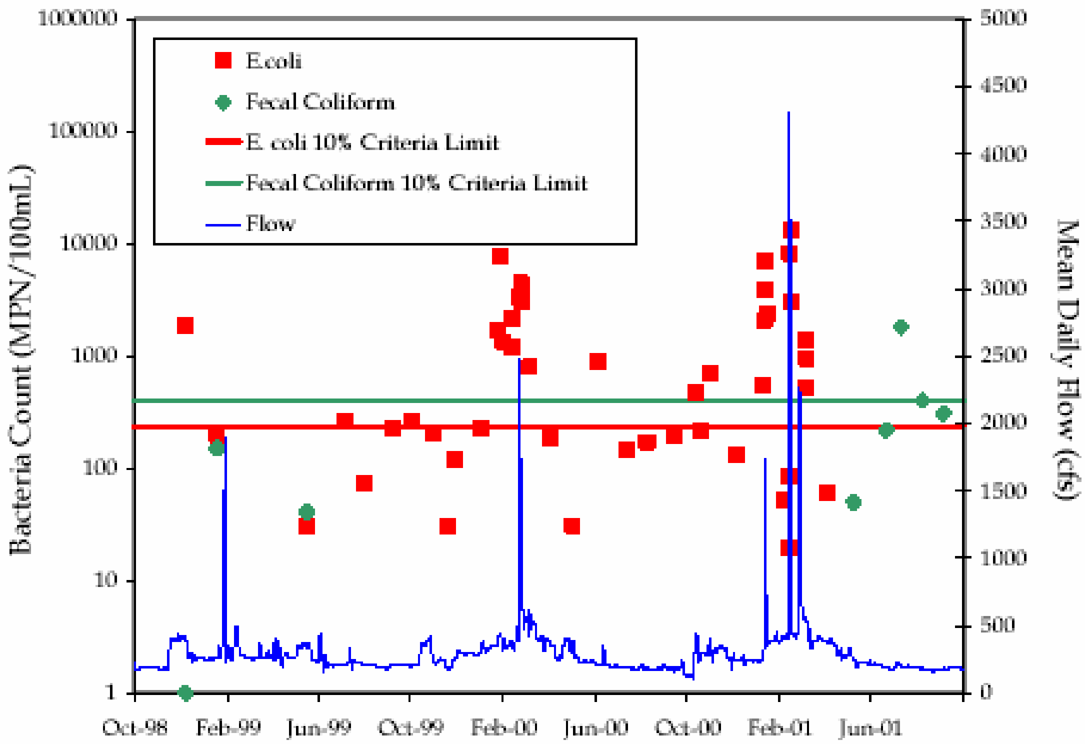


Figure 83
Time Series of Bacteria Concentrations and Flow in the Santa Ana River at the Imperial Highway Study Site

Figure B 7: Flow rate and bacteria concentration, Santa Ana River at Imperial Highway (CDM 2005 Figure s 84 and 85)

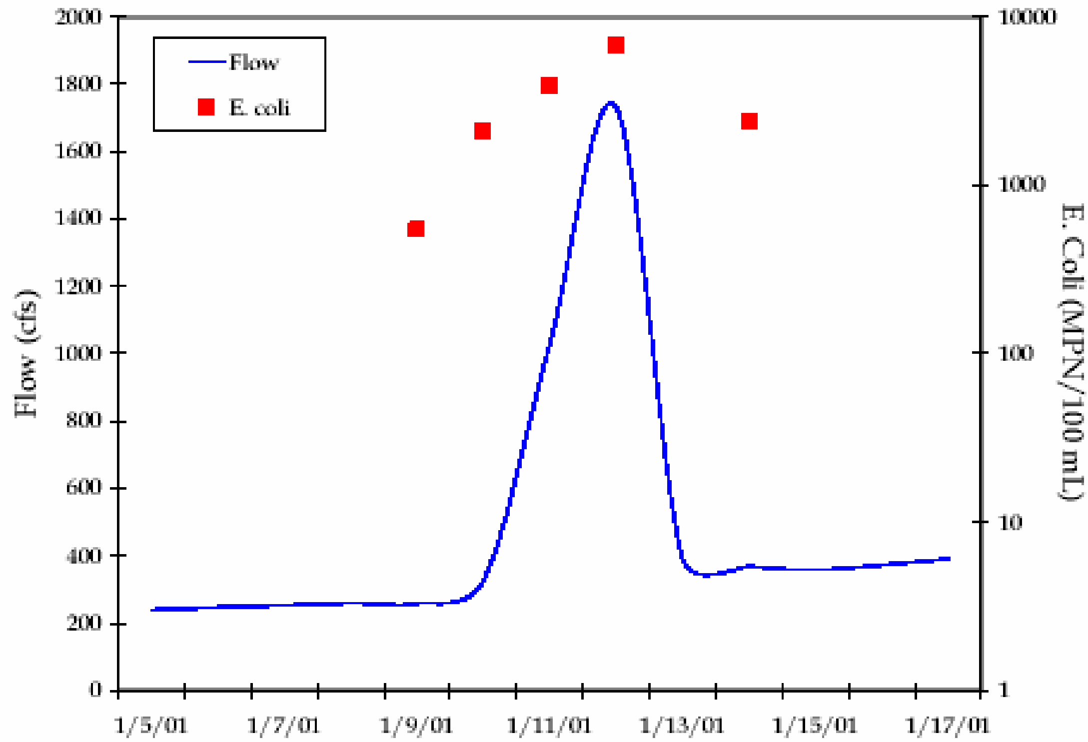


Figure 84
January 2001 Wet Weather E. coli Sampling Event

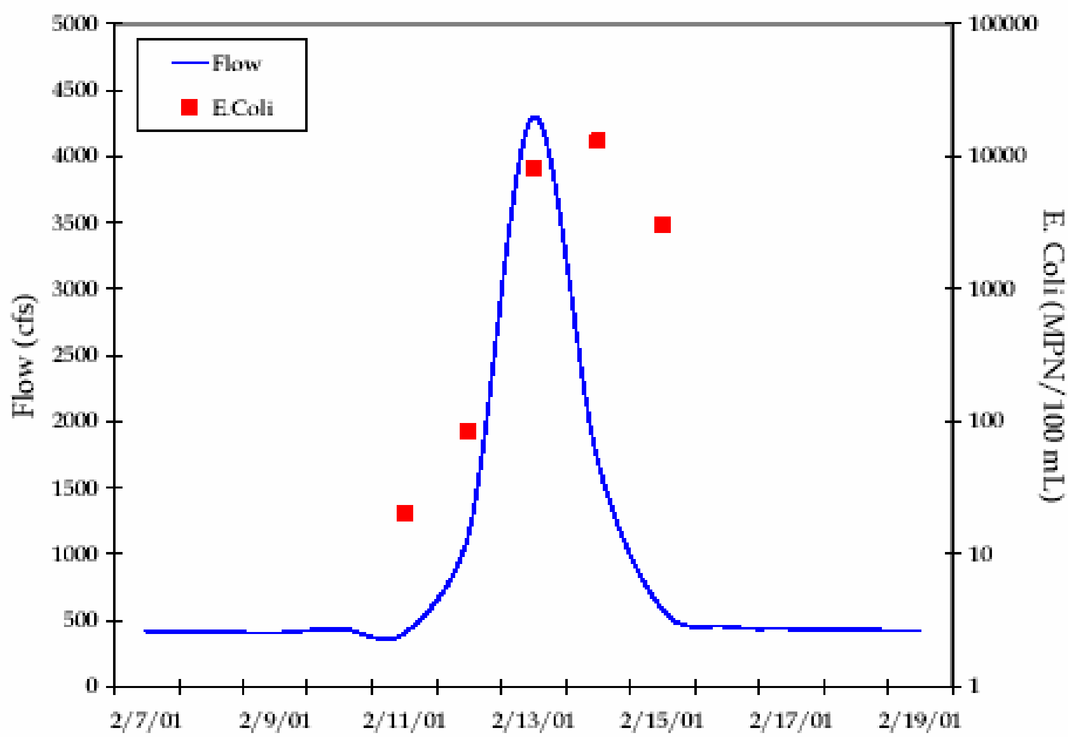


Figure 85
February 2001 Wet Weather E. coli Sampling Event

Figure B 8: Percent of months exceeding objectives (CDM 2005 Figure 102)

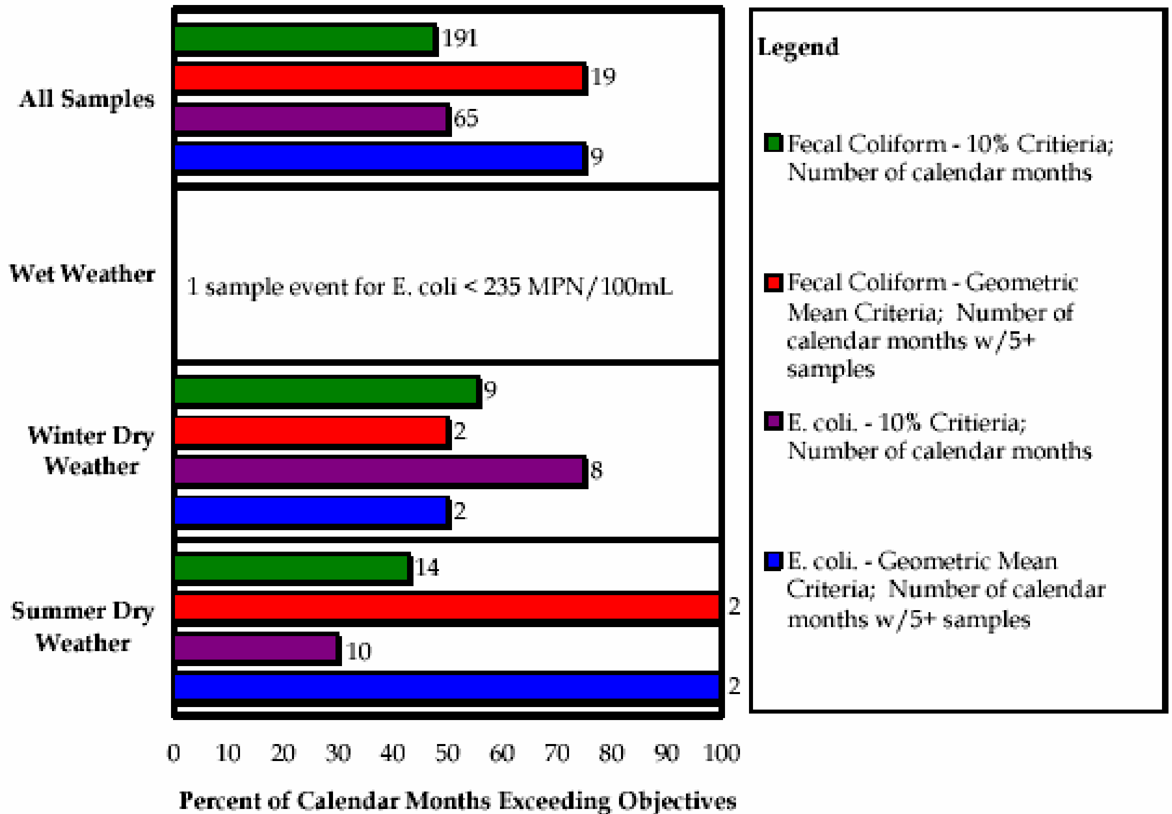


Figure 102
Comparison with Existing and Potential Bacteria Water Quality Objectives
Santa Ana River at MWD Crossing

Figure B 9: Percent of months exceeding objectives (CDM 2005 Figure 110)

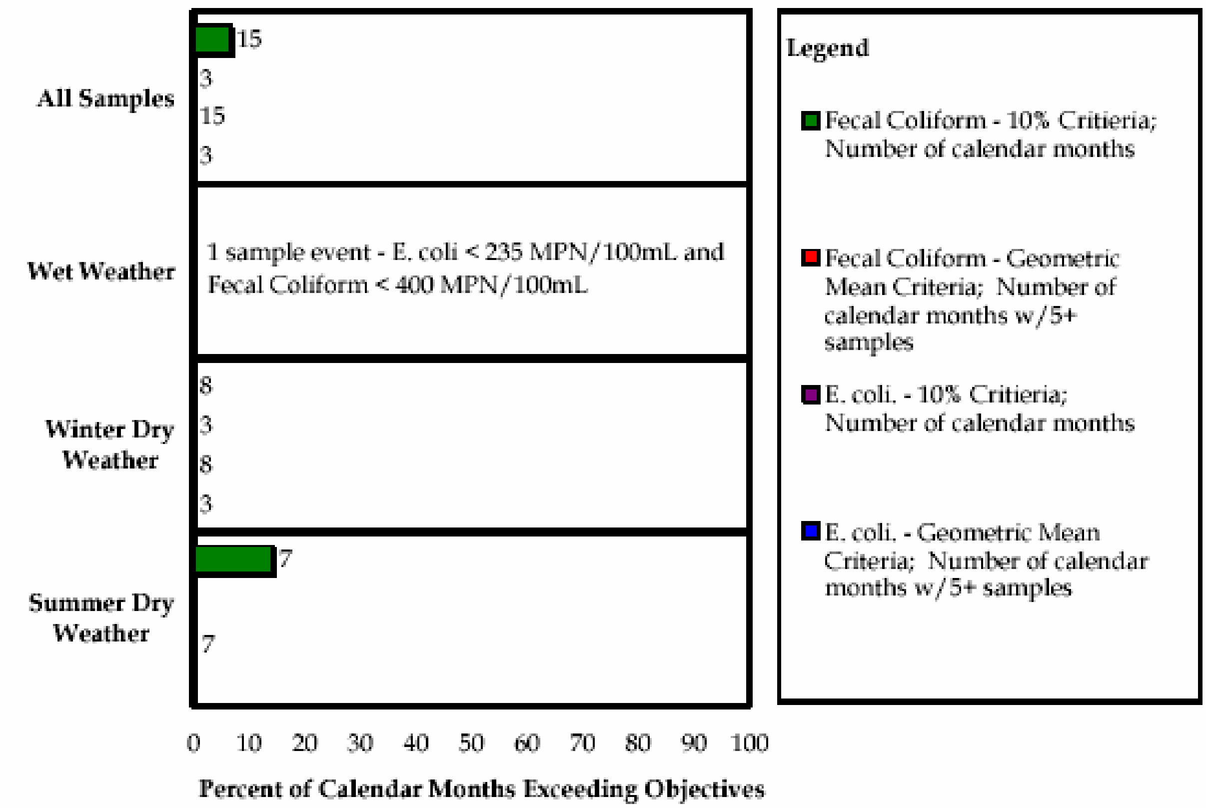


Figure 110
Comparison with Existing and Potential Bacteria Water Quality Objectives
Icehouse Canyon Creek

Figure B 10: Percent of months exceeding objectives (CDM 2005 Figure 88)

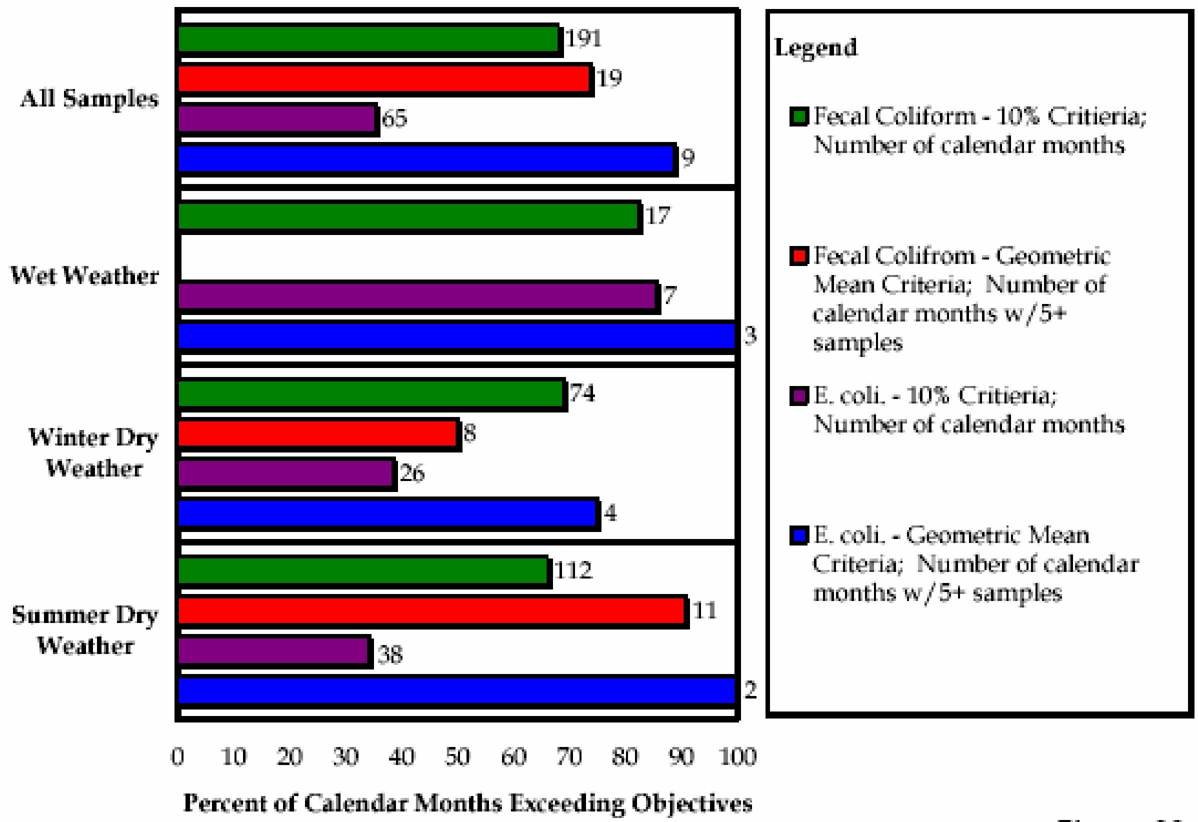


Figure 88
Comparison with Existing and Potential Bacteria Water Quality Objectives
Santa Ana River at Imperial Highway

Figure B 11: Percent of months exceeding objectives (CDM 2005 Figure 74)

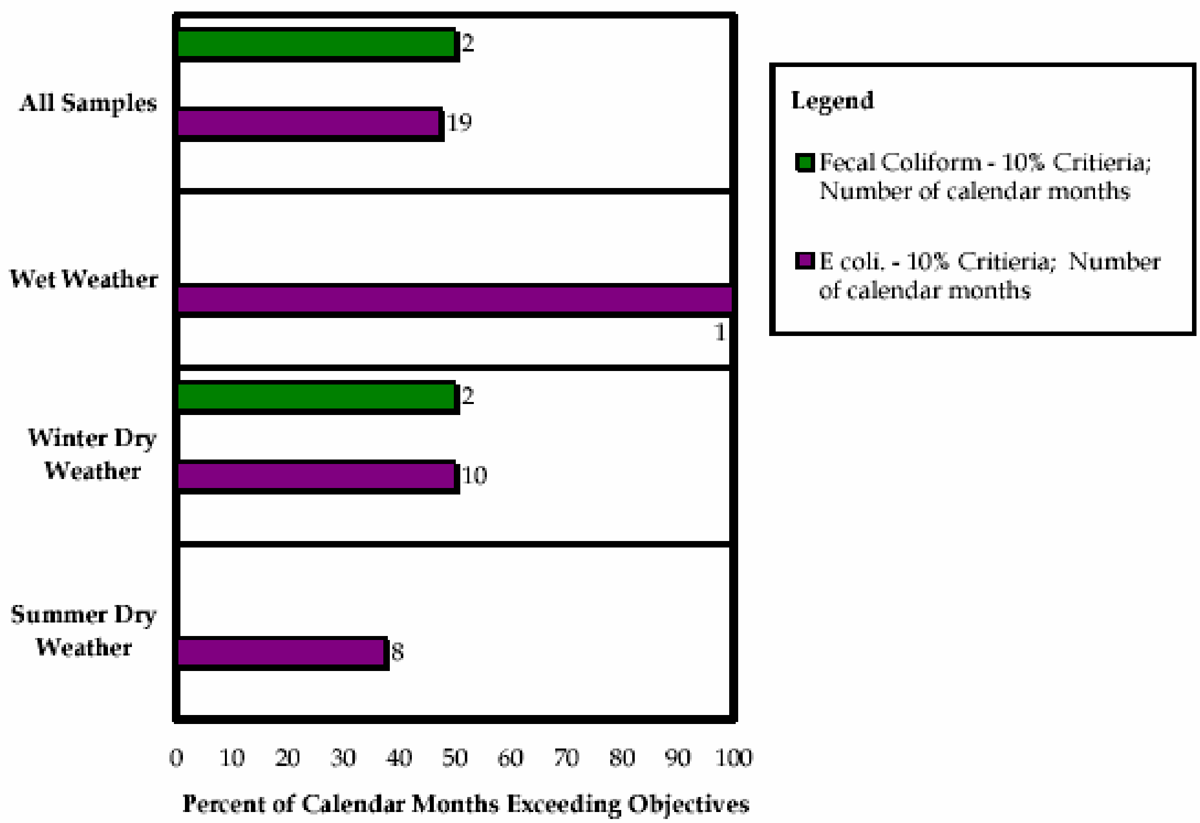


Figure 74
Comparison with Existing and Potential Bacteria Water Quality Objectives
Temescal Creek Near Lincoln Avenue

Figure B 12: Percent of months exceeding objectives (CDM 2005 Figure 38)

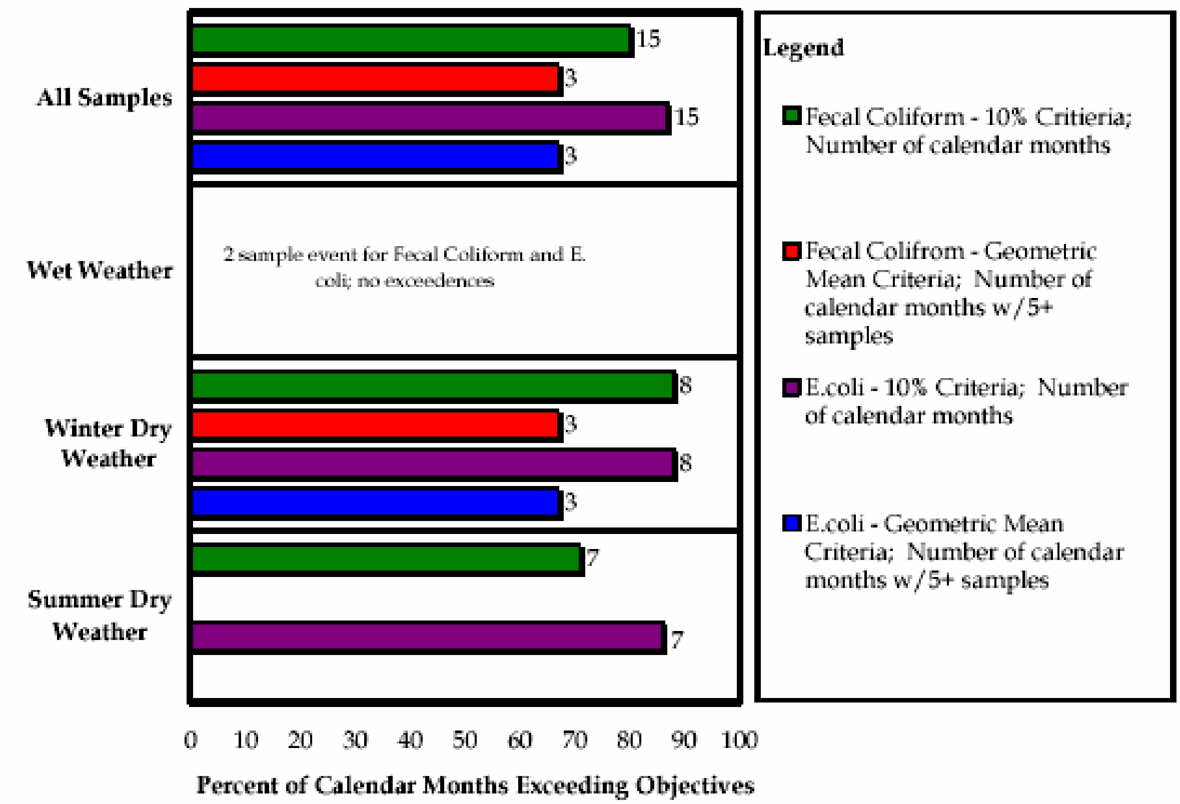


Figure 38
Comparison with Existing and Potential Bacteria Water Quality Objectives
Chino Creek At Schaeffer Ave.

Figure B 13: Percent of months exceeding objectives (CDM 2005 Figure 57)

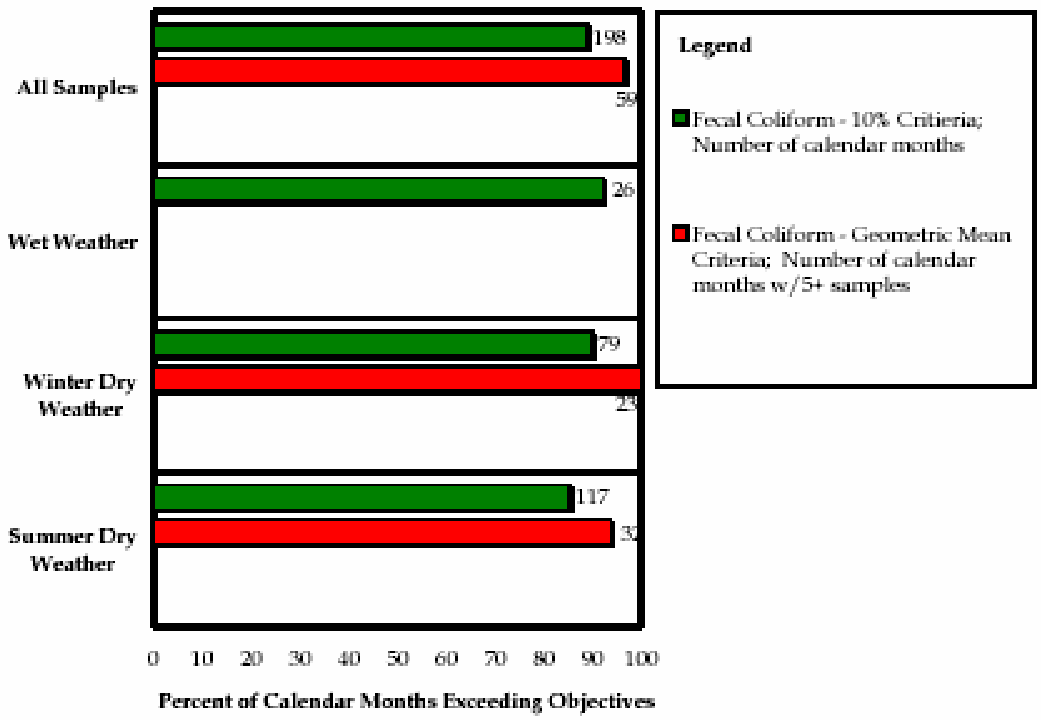


Figure 57
Comparison with Existing and Potential Bacteria Water Quality Objectives
Santa Ana Delhi Channel near Irvine Ave.

APPENDIX C

DATA FROM ALISO CREEK

GEOSYNTEC CONSULTANTS

838 SW First Avenue, Suite 530
Portland, Oregon 97204

(503) 222-9518
(503) 242-1416 Fax

MEMORANDUM

TO: SUSAN PAULSEN, FLOW SCIENCE

FROM: BRUCE WILLIAMSON, LISA AUSTIN, GEOSYNTEC CONSULTANTS

SUBJECT: ALISO CREEK BMP EFFECTIVENESS ANALYSIS

DATE: APRIL 13, 2005

CC: PETER MANGARELLA, GEOSYNTEC CONSULTANTS

Introduction

This purpose of this technical memorandum is to assess the efficacy of Best Management Practices (BMPs) installed in parts of Aliso Creek, Orange County, California (Figure 1) on the removal of pathogen indicators. Pathogen indicator data collected by Orange County Resources and Development Management Department in this watershed and on these BMPs has received increasing attention when project design features are evaluated by regulatory authorities. Therefore, it is important that we have a good understanding of these findings and their uncertainties.

The two BMPs assessed in this memo are:

1. Dry weather flows are passed through multimedia filtration/UV sterilization using a proprietary treatment unit 'Clear Creek Systems'. This treats low flow runoff from a two square mile catchment with mixed urban land use. The storm drain facility and catchment are designated as J01P28 in the watershed map and plans (Figure 1, 2B).

2. Wetland ponds to intercept watershed runoff and treat dry weather flow and first flush. These treat low flow and first flush runoff from a two square mile residential catchment. The storm drain facility and catchment are designated as J03P02 in the watershed map and plans (Figure 1, 2A).

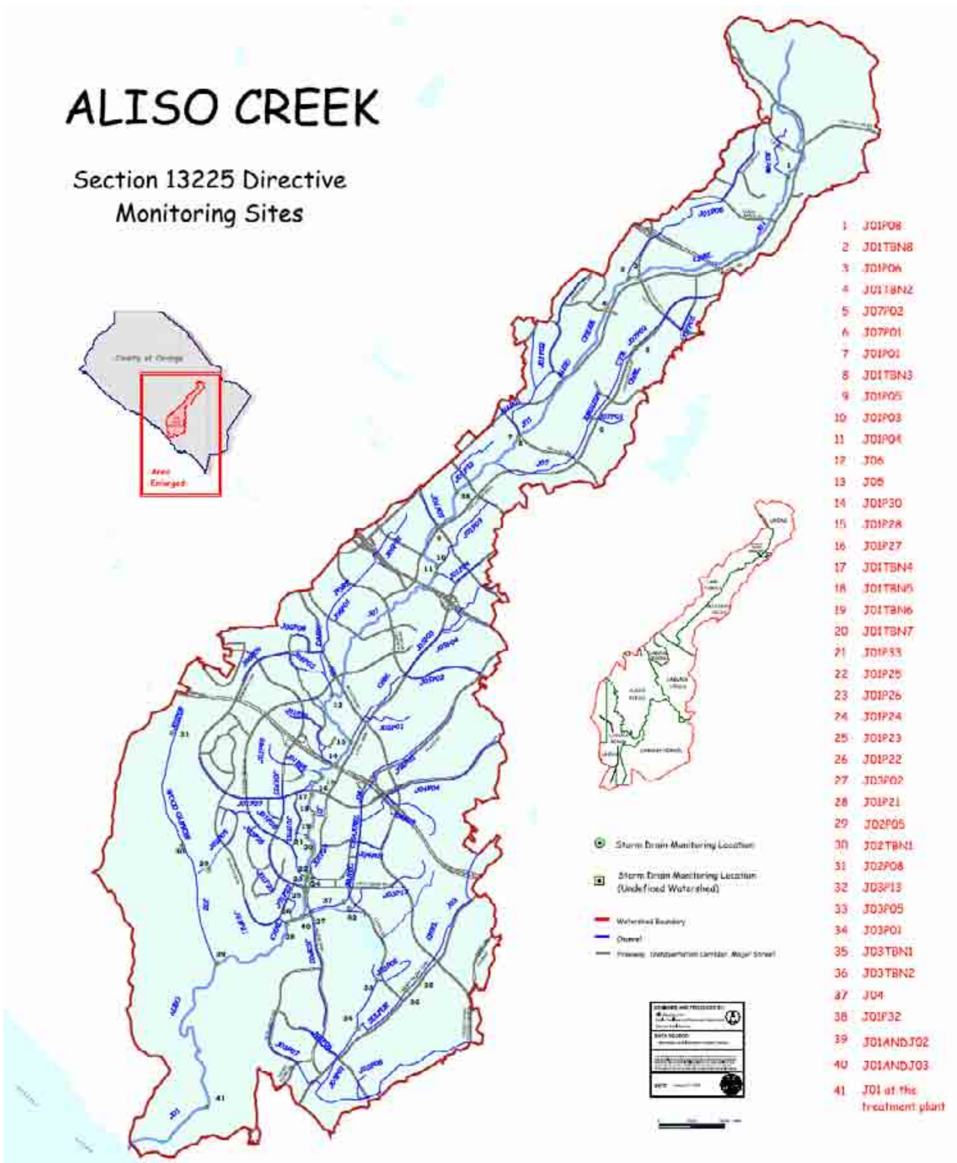
All monitoring of the BMPs and their receiving waters took place during dry weather. Consequently, low flows were mostly sampled, but during the wet season a proportion of these were probably elevated flows during storm recessions.

The data were collected by the County of Orange and its city partners and is available in reports listed at http://www.ocwatersheds.com/watersheds/Aliso_reports_studies.asp, and also in Evaluation Reports by the County of Orange.[1,2]

[1] County of Orange Resources and Development Management Department, Watershed and Coastal Resources Division. 'Aliso Creek Clean Beaches Initiative. Final Report for Agreement 01-227-550-0' submitted to Regional

Note that the Aliso Creek watershed Quarterly Progress Reports (QPR) refer to other BMPs installed in stormwater drains of urban watersheds at a number of locations in the Aliso Creek watershed. These include grassy swales for treating park runoff to Sulfur Creek in Laguna Niguel and a wetland biofilter in another branch of Sulfur Creek in Laguna Hills The status of the these BMPs is unclear, and no monitoring data for these BMPs were located in the QPR.

Figure 1



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and State Boards in January 2005 and 'Wetland Capture and Treatment Final Report for Agreement No. 01-122-259-0' submitted to Regional and State Boards in March 2004.

[2] "Wetland Capture and Treatment Final Report for Agreement No. 01-122-259-0" submitted to Regional and State Boards in March 2004.

Figure 2A: Location of J03P02

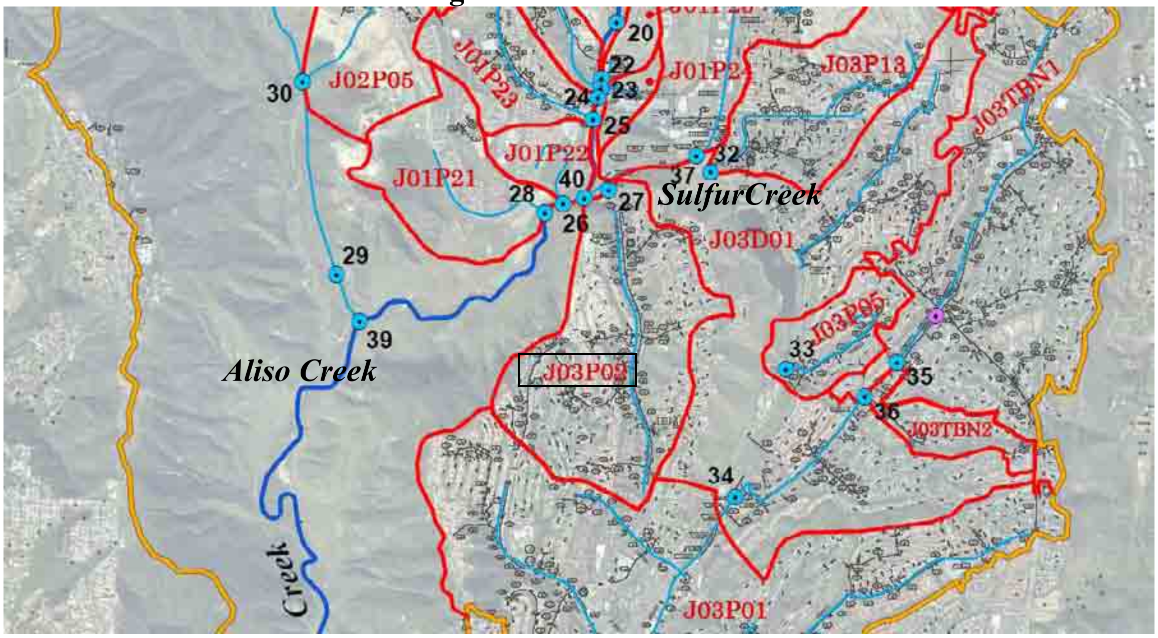
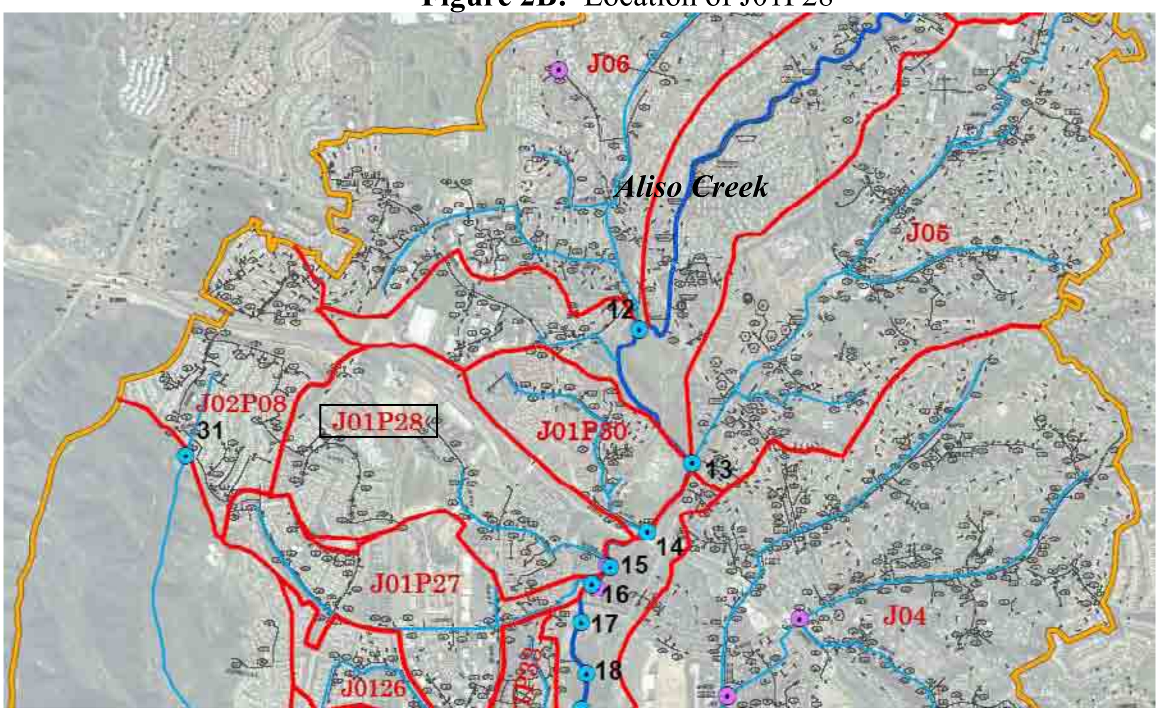


Figure 2B: Location of J01P28



Site Description

Aliso Creek Watershed

Aliso Creek watershed encompasses 30.4 square miles and includes portions of the cities of Aliso Viejo, Dana Point, Laguna Niguel, Laguna Woods, Laguna Beach, and Lake Forest. Its main tributary, Aliso Creek, originates in the Santa Ana Mountains inside the boundaries of the Cleveland National Forest. Smaller tributaries include Wood Canyon, Sulphur Creek, the Aliso Hills Channel, and English Channel (Figure 1).

Aliso Creek is the subject of a Directive issued by the San Diego Regional Water Quality Control Board (RWQCB) in 2001 for an investigation of urban runoff in the Aliso Creek watershed. The Directive found that the Permittees may be discharging waste with high bacteria levels from municipal storm drain outfalls into Aliso Creek and its tributaries. The Directive required the Permittees to begin a comprehensive monitoring program and undertake investigations within the storm drain system to identify the causes of the problem and the control actions needed to correct the problem. This has resulted in a comprehensive study involving weekly sampling of approximately 35 storm drains and their respective receiving waters, and numerous other initiatives in identifying sources and source control.

Part of the creek (J03P02) is subject to a Cleanup and Abatement Order (CAO) issued by the RWQCB in 1999. This was the result of a survey which showed that pathogen indicators (PI) in the drain were much higher than in Aliso Creek. Experience gained from the more comprehensive monitoring carried out since that time has shown that J03P02 is in the low to middle of the range of PI concentrations compared to the rest of the Aliso Creek watershed.

Sand Filtration/UV Sterilization

The J01P28 Interim Water Quality Improvement Package Plant BMP was executed in response to the San Diego RWQCB 13225 Directive to clean up Aliso Creek.

This treatment unit is located near the outlet of the J01P28 subcatchment (Figure 2). This subcatchment is a tributary to the main stem of Aliso Creek. The storm drain conveys runoff water from a fully developed area of approximately two square miles in the city of Aliso Viejo. Land uses in the catchment include residential, commercial, light industry, and parks. The BMP was installed in July 2003.

The CCS treatment system includes three multi media filters, two organo clay filters and two ultraviolet light disinfection chambers. The package plant treatment system has three main phases:

- Sediment and debris removal
- Oils, pesticides, and trace metals removal
- Disinfection

The larger debris and trash removal is performed at the inlet strainer that is located in an energy dissipation basin within the storm drain. Sediment removal is performed in the basin and in the multimedia filter. Oils, pesticides and trace metals are removed via adsorption onto the organo-clay media while the ultraviolet light chamber removes bacteria and viruses.

The package plant treatment system filters and disinfects approximately 100,000 gallons per day of urban dry weather runoff. The design capacity is 250,000 gallons per day. By October 2004, a total of 1.4 million gallons had been treated.

Monitoring results from the years 2001 through June 2003 were combined to form the "before" dataset, while results from August 2003 through December 2004 constituted the "after" dataset.

Once discharged from the unit, the water flows through a ponded area approximately 20 feet long, 6 feet wide and 1.5 feet deep, then 30 feet through a natural ditch to Aliso Creek. A monitoring site is located in the natural ditch 15 feet from Aliso Creek.

Wetlands

Wetlands have been installed near the outlet of subcatchment J03P28, which is a tributary to Sulfur Creek, itself a tributary to Aliso Creek (Figure 2A). The wetlands are positioned at the bottom of the catchment and designed to capture 100% of the low flows before they discharge to Aliso Creek. The catchment (538 acres) is entirely residential (1600 households, new to 30 years old). A number of structural BMPs have been implemented from 2000 to the present day.

1. From May 2000 to March 2001, dry weather flows were diverted to the AWMA Regional Sewage Treatment Plant.

2. From March 2001 to April 2003 (actually it is not clear when unit stopped operating), dry weather flows in the drain were treated by a mobile Clear Creek Systems filtration/UV treatment unit. The flow was diverted to the treatment plant (e.g., 15% of total flow in the July-September 2002 quarter) when the filter clogged or the UV malfunctioned.

3. The three wetlands were constructed progressively starting in about March 2001 and were completely online from April 2003[2].

J0302 has been subject to detailed studies because of the CAO. These include visual (video) inspection of sewer and storm drain pipes, field reconnaissance, resident surveys, flow monitoring, a wide range of upwatershed sampling and the identification the sources of the pathogenic indicator bacteria. Samples were examined for human enteroviruses, antibiotic resistance, and genotypes of E. coli. The researchers concluded that the primary sources of PI in J03P02 are not likely to be human, and are likely to be due to cows (soil fertilizer amendments), birds, rabbits, and some unidentified other animals. In the Aliso Creek QPRs, the Co-Permittees indicate that the following sources probably contribute to fecal coliform (FC) in J03P02:

- Organic soil amendments
- Turfgrass areas

- Wildlife
- Domestic pets
- Accumulated organic debris in the surface and subsurface storm drain system
- Street sweeping debris

The wetlands – called East, West and North, were positioned to capture 100% of catchment runoff during dry weather and first flush. Design features are summarized in Table 1. The hydrological network is outlined in Figure 3.

Wetland inflow is taken by intercepting flows in the stormwater pipes, including the 60-inch main pipe. After passing through the wetlands, some of the treated stormwater is routed back though the 60-inch pipe to an open channel just before its confluence with Sulfur Creek. Effluent from the West Wetland is discharged directly to this open channel, and does not pass through the pipe. Another untreated, unmonitored inflow also discharges to this point (Figure 2).

Table 1: Wetland design features (reference see footnote 2).

Wetland	**Total Catchment Area (acres)**	**Planned intercepted area (acres)**	**Wetland Area (acres)**	**Depth (ft)**
East	374	37	0.3	1
West	342	312	0.69	0.5
North	122	122	0.3	1

Sampling Procedures

All sampling was conducted during "dry weather," which is defined as no rain on the day of sampling. Sampling was conducted under strict protocols (see Aliso Creek 8th Quarterly Progress Report). Quality Assurance/Quality Control (QA/QC) sampling procedures were implemented that should have prevented contamination during sampling and significant changes to the sample during transport to the laboratory.

Directive Monitoring: Each location has three monitoring sites: two of these are on the main stem, 25 feet upstream and downstream of the storm drain discharge, the other is on the storm drain itself, approximately 15 feet above its confluence with the stream. These three sites were monitored weekly, so that at least five samples were collected each month, at random intervals. Some of these monitoring sites are shown in Figure 1.

BMP Monitoring: In addition to the directive sampling program, the influent and effluent to the BMPs were monitored.

Figure 2. Source: Wetland Capture and Treatment Final Report (2004)[2]. Note: untreated Surface Flow from North Wetland should probably be 0.0304 cfs.

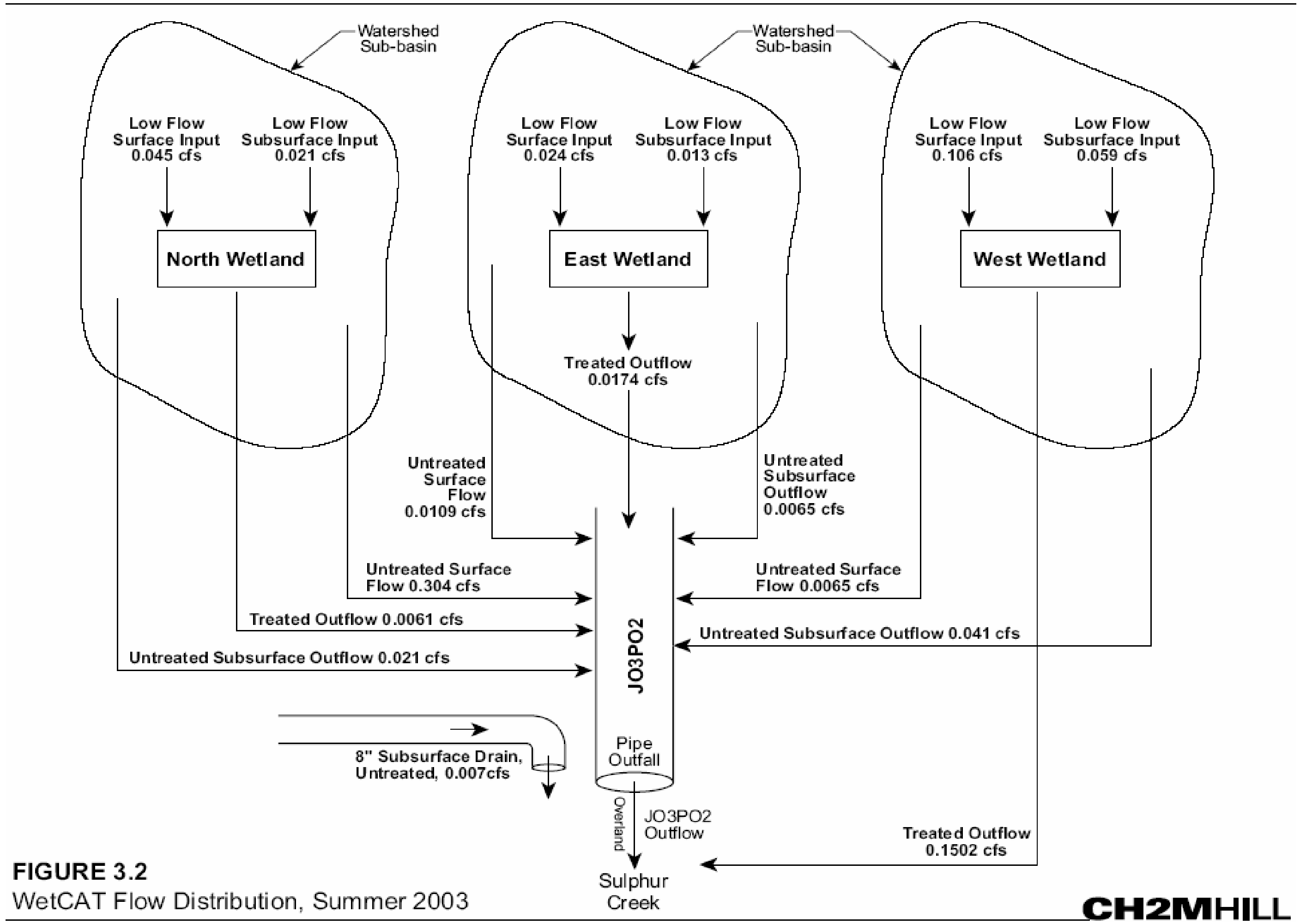


FIGURE 3.2
WetCAT Flow Distribution, Summer 2003

Summary of Monitoring Results

J01P28 - Multimedia Filtration/UV Digestion

Influent/effluent. Comparison of the influent and effluent concentrations demonstrates a 99.6% reduction in fecal coliform levels. The geometric mean decreases from 77,414 CFU/100mL to 317 CFU/100mL.

Stream and drain monitoring. A statistical analysis of the levels in the receiving water (the "directive" dataset) is summarized in Table 2 and as box plots in Figure 3-4. These refer to all data collected before BMP installation. The County monitoring reports summarize data for quarterly monitoring periods. In the QPR, quarterly monitoring data are compared between years to reduce variance from seasonality, and constitute a more powerful assessment of the data. However, for our purposes here, the lumped data is sufficient to demonstrate their findings.

Table 2: Comparison of geometric means (cfu/100 ml) before and after multimedia filtration/UV sterilization. The BMP is installed about 35 feet upstream of the storm drain monitoring site.

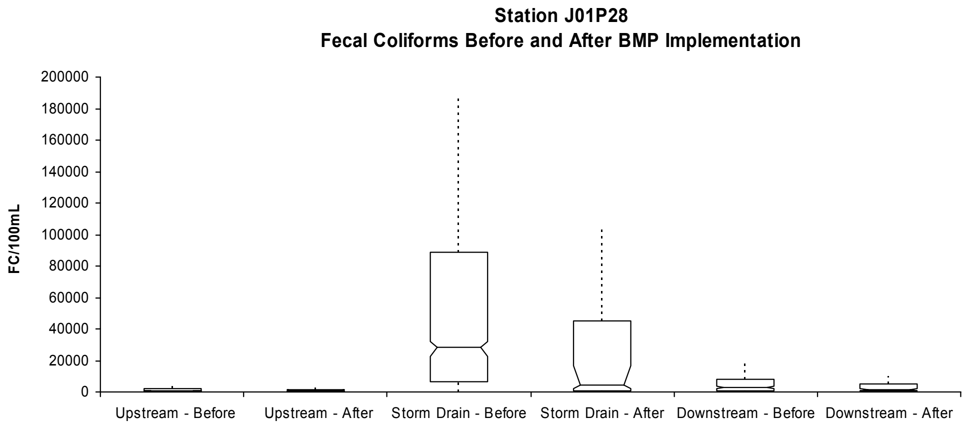
Locations	**TC**		**FC**		**ENT**	
	before	after	before	after	before	after
u/s	5353	2851	775	773	990	662
storm drain	52267	15232*	14633	5827*	9171	1401*
d/s	17248	5142*	2722	1696*	1791	839*

* = significant change (1-way ANOVA, α<0.05)

Regrowth. Comparison of effluent and the 'directive' storm drain monitoring site, show a large increase in FC levels in the approximately 35 feet between the unit discharge and the storm drain monitoring site. No other discharges were found, which suggest that rapid re-growth has taken place in the water column, or re-infection has occurred from sloughing or resuspension of bacteria from immersed channel-side vegetation, organic debris and/or sediments. The geometric mean increases in this short distance from 317 cfu/100mL to 2,575 cfu/100mL.

Further work is planned by the County on the re-growth issue. Permits have been requested to perform clean up work on the habitat and the storm drain outlet basin.

Figure 3: FC levels for J01P28 monitoring site.



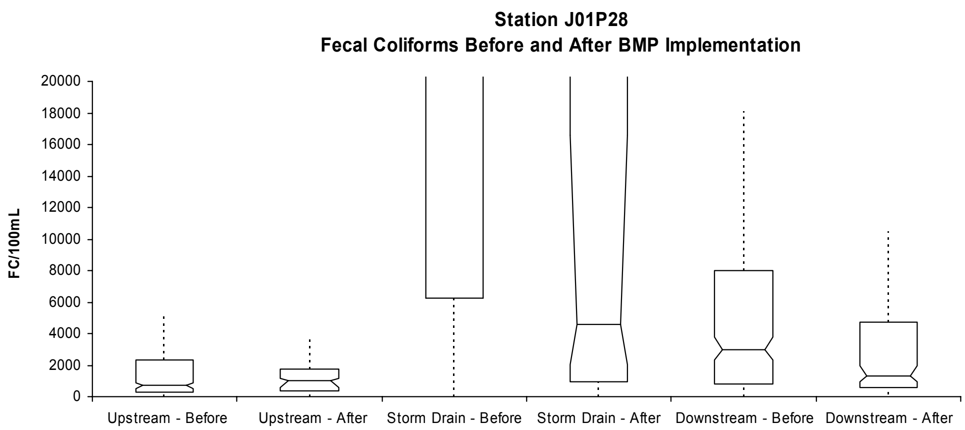


Figure 4: ENT levels for J01P28 monitoring site.

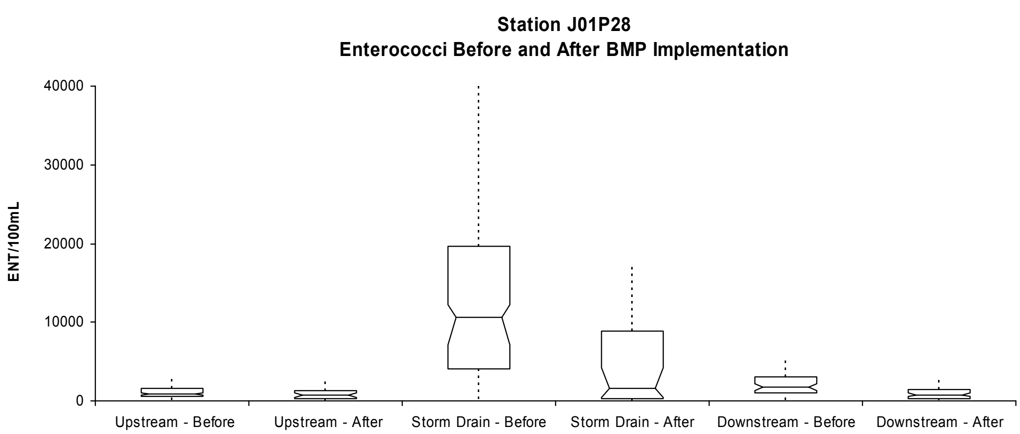
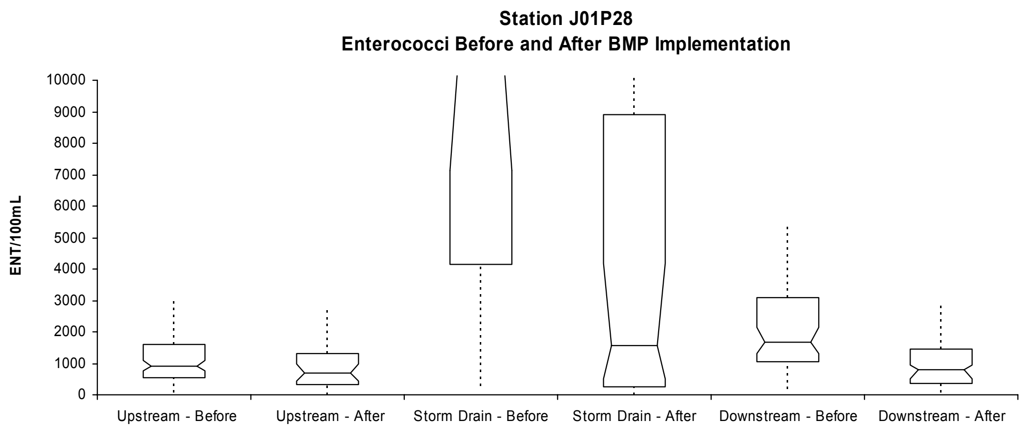


Figure 4 (continued)



J03P02 – Wetland BMPs

Influent/effluent. All monitoring took place during dry weather. Flows were measured, but only once per month and not for each sampling occasion. Most sampling took place at lows flows. The flow was typically 0.25 cfs with a range of 0.13-0.56 cfs.

Wetland monitoring in the three wetlands showed 90 to 99 percent reduction in FC levels from 2001 to present day (e.g. see Table 3). (Note that the three wetlands were installed and monitored progressively – results from 2001 were from one wetland only). Overall, 90 percent of treated effluent samples met the REC-1 objectives for FC. Although enterococci (ENT) levels dropped by 60 to 99 percent in wetlands, wetland effluent did not meet the steady state objective of 33 cfu/100ml during the period of monitoring (2001-2004). Few individual wetland samples met the single-sample objective.

Table 3: East Wetland fecal coliform (cfu/100mL) removal March 2001 – August 2002.

Parameter	Inflow	Outflow	Removal
Median	5000	50	99%
Mean	14900	150	99%
Geometric mean	2,800	35	99%

Overall there has been a progressive decline in FC and ENT since the wetlands have progressively come on line.

As well as the wetland monitoring, the effluent from the mobile UV sterilization unit was monitored when it was installed (between March 2001 to April 2003). The influent was not monitored directly. A cursory scan of the results suggests that the treatment unit effluent quality met REC-1 requirements on most months, but failed at times, which was attributed to the sand filter clogging.

Stream and drain monitoring. No "before BMP implementation" could be found because the 'directive' monitoring period encompassed either diversion to the sewage treatment plant, UV sterilization and/or wetland treatment. (However, some data is available somewhere, because it led to the CAO).

The dry weather discharge from the storm drain had little or no effect on the FC levels in Sulfur Creek. The flow from J03P02 is about 10 percent of the flow in Sulfur Creek.

The bacterial quality of the J03P02 storm drain discharge has steadily improved over the monitoring period. However, the improvement is quite complex, as described in the following section.

Re-growth. There is evidence that re-growth occurs between the wetlands and the storm drain monitoring sites. The concentrations in the open channel at the end of the pipe are about twice what is expected based on mass flow considerations.

However, there are some ambiguities in the various Quarterly Reports about the nature of the connection between the catchments, wetlands, and the J03P02 monitoring site[3]. This has been resolved in the detailed report on the BMP project for J03P02[2]. Measurements show that a high proportion of the flow is not intercepted (about 37 percent). Figure 2 also shows that the largest wetland ('West') bypasses and discharges downstream from the pipe.

Therefore, the apparent re-growth phenomenon could be wholly or partly due to the "recontamination" by the un-intercepted flows from the catchment. The project investigated this by carrying out a mass balance calculation. Unfortunately the report does not give any details on the calculations, but states that concentrations at the end of the pipe after discharge are about twice what is expected based on these mass flow considerations.

GeoSyntec confirmed that there was about this order of magnitude difference between observed and calculated mass flows using flows given in Figure 2 and using appropriate median FC numbers for the summer 2003 monitoring period. However, the proposition of re-growth, while plausible, is uncertain because:

- There is a significant input of untreated surface and subsurface flows into and at the end of the J03P02 pipe
- Most flows were estimated and not measured
- Many of the FC and ENT concentrations used in the mass flow calculations were not measured and assumed values were taken from the monthly monitoring data.
- There is a high degree of variability in monitored FC and ENT

The rates of this apparent re-growth appear to be seasonal and variable. As described above, usually observed levels at the J03P02 monitoring site are higher than the combined flows from the wetland. Fecal coliform and enterococci increase by about 100 percent in-pipe during spring, summer, and fall. However, this apparent re-growth does not occur during winter months and

[3] Most comments imply a 200 foot pipe, but 14th QPR refer to pipe outlet and 200 feet overland distance.

sometimes die-off can be observed. For example, the winter FC levels in 2004 were 1/8th of those predicted from the combined treated and untreated contributions, while ENT levels are about the same as predicted levels. The report suggests that die-off and re-growth (or re-contamination) of ENT and FC may be temperature and salinity dependent.

The overall findings of the BMP study to this particular watershed is that as the BMPs came on line, there was a steady improvement in the quality of the J03P02 discharge to Sulfur Creek during some seasons[4]. Results from monitoring the drain downstream of the BMPs show:

- Spring (Apr-Jun) geomeans for FC fell from 2001-2003. The 2004 geomean was similar to that for 2003.
- Summer (Jul-Sep) geomeans for FC have not fallen with statistical significance
- Winter (Jan-Mar) geomeans for FC fell from 2002 – 2004.

Discussion and Conclusions

Filtration coupled with UV sterilization reduced indicator bacteria to below the REC-1 standard. This was demonstrated at both sites. However, the benefits are compromised by what appears to be re-growth. At J01P28, the re-growth/re-inoculation occurred in a natural steam reach consisting of a pool and run, which was shaded with riparian vegetation dangling in the stream. It occurred within only 35 feet of the discharge point from the treatment unit.

Wetlands reduced fecal coliform (FC) levels by 90 to 99 percent to below the REC-1 guideline for 90 percent of the samples. They also reduced enterococci (ENT) levels by 60 to 99 percent, but the effluent from the three wetlands always exceeded the steady-state ENT objective, and usually exceeded the single sample objective. As with J01P28, the benefits of wetland treatment were compromised by the low-flow capture rate and what appears to be re-growth or re-contamination after discharge from the BMPs. Concentrations of FC and ENT increase between the wetland effluent and the J03P02 monitoring site 15 feet from its confluence with Sulfur Creek. The summary report proposed that most of the re-growth/re-inoculation occurred within a 200-foot pipe carrying wetland effluent to the confluence with Sulfur Creek.[2]

The study report proposed that re-growth was plausible because there was opportunity and time for re-growth to occur. The combined effluent from the East and North wetland is conveyed to Sulfur Creek through the pipe, which has a transit time during low flow of 15 minutes. As stated in the Wetland Capture and Treatment Final Report 2004[2] "Given ….. the microbiologists 'rule of thumb' that bacterial populations can double every 15 minutes under ideal conditions, rapid in-pipe propagation of FC and ENT in the dark pipe may be the main factor, or may be combined with recontamination from bioslimes or muck deposits" (Clean-Up & Abatement Order 99-211 17th QPR). Another possible reason is that the structures which divert low flow from the stormwater pipes to the wetland also trap and retain organic debris, which may act as substrates

[4] This is somewhat surprising given that the drain water was treated by multimedia filtration/UV disinfection or diverted to the sewer system while the wetlands were constructed.

for re-growth. However, re-contamination by unmonitored inflows may also be partly or wholly responsible for the observed increase between the BMPs and the confluence.

The results suggest that the benefits of BMPs may be compromised by re-growth, which occurred in both the natural channel and pipe downstream of the monitored BMPs. The various investigators have concluded that treatment systems would need to be positioned at the bottom of the watershed directly before discharge to the receiving water body – mainly to prevent regrowth during warm weather conditions.[1] Another important general conclusion in the study (see City of Laguna 6th QPR Aliso Creek 13225 Directive) states 'that "primary" bacteria concentrations (from direct deposits of bird droppings, for example) in runoff can be magnified by the "secondary" propagation of bacteria populations within the environment, so that *controlling propagation* may ultimately become as important as *source reduction* in reducing overall outfall concentrations. The research results also suggest that the presumption of a statistically valid relationship between certain concentrations of fecal coliform and an acceptable vs. unacceptable magnitude of public health risk (which is the basis for the REC-1 and REC-2 objectives) may be seriously flawed.'

The proposition that re-growth occurs after treatment has wide ranging implications for stormwater management. Given the uncertainties outlined above as to whether re-growth occurs after wetland treatment, the County study results should be confirmed by more detailed studies and sampling, such as:

- more frequent sampling of concentrations taking into account time of travel
- stormwater runoff monitoring (not just dry weather flows)
- measurement of flows where possible.

It is unknown whether the re-growth phenomenon apparent at the Aliso Creek sites would result in much higher concentrations over longer distances, but such an experiment cannot be conducted at the County-selected sites.

Finally, it is re-emphasized that monitoring was only conducted during dry weather conditions – mostly low flow and do not reflect storm runoff conditions, except for possibly occasionally during the storm regression phase. The impact of storm runoff on the treatment efficacy of the BMPs tested at Aliso Creek is unknown. Likewise, it is unknown what impact high flow may be on the mechanisms that lead to re-growth or re-inoculation; such flows may deliver organic debris and sediments and also slough off slimes and accumulations of organic detritus.

E. EFFECT OF URBANIZATION ON GROUNDWATER RECHARGE IN THE SANTA CLARITA VALLEY

Effect of Urbanization on Aquifer Recharge in the Santa Clarita Valley

TO: Tom Worthington/Impact Sciences, Inc.

FROM: John Porcello/CH2M HILL

DATE: February 22, 2004

Introduction

In a groundwater basin, the effect of urbanization on recharge to underlying groundwater is dependent on land uses, water uses, vegetative cover, and geologic conditions. Groundwater recharge from undeveloped lands occurs from precipitation alone, whereas areas that are developed for agricultural or urban land uses receive both precipitation and irrigation of vegetative cover. In an urban area, groundwater recharge occurs directly beneath irrigated lands and in drainages whose bottoms are not paved or cemented. This memorandum discusses the general effects of urbanization on groundwater recharge and the specific effects in the Santa Clarita Valley.

Summary of Findings

In the Santa Clarita Valley, stormwater runoff finds its way to the Santa Clara River and its tributaries, whose channels are predominantly natural and consist of vegetation and coarse-grained sediments (rather than concrete). The stormwater that flows across paved lands in the Santa Clarita Valley is routed to stormwater detention basins and to the river channels, where the porous nature of the sands and gravels forming the streambeds allow for significant infiltration to occur to the underlying groundwater.

Increased urbanization in the Valley has resulted in the irrigation of previously undeveloped lands. The effect of irrigation is to maintain higher soil moisture levels during the summer than would exist if no irrigation were occurring. Consequently, a greater percentage of the fall/winter precipitation recharges groundwater beneath irrigated land parcels than beneath undeveloped land parcels. In addition, urbanization in the Santa Clarita Valley has occurred in part because of the importation of State Water Project (SWP) water, which began in 1980. SWP water use has increased steadily, reaching nearly 44,500 acre-feet (AF) in 2003. Two-thirds of this water is used outdoors, and a portion of this water eventually infiltrates to groundwater. The other one-third is used indoors and is subsequently routed to local water reclamation plants (WRPs) and then to the Santa Clara River (after treatment). A portion of this water flows downstream out of the basin, and a portion infiltrates to groundwater.

Records show that groundwater levels and the amount of groundwater in storage were similar in both the late 1990s and the early 1980s, despite a significant increase in the urbanized area during these two decades. This long-term stability of groundwater levels is attributed in part to the significant volume of natural recharge that occurs in the streambeds, which do not contain paved, urban land areas. On a long-term historical basis, groundwater pumping volumes have not increased due to urbanization, compared with pumping volumes during the 1950s and 1960s when water was used primarily for agriculture. Also, the importation of SWP water is another process that contributes to recharge in the Valley. In summary, urbanization has been accompanied by long-term stability in pumping and groundwater levels, plus the addition of imported SWP water to the Valley, which together have not reduced recharge to groundwater, nor depleted the amount of groundwater that is in storage within the Valley.

Effect of Pavement on Recharge Beneath Specific Land Parcels

The amount of paved cover on the ground affects the degree to which rainfall and outdoor-applied urban water will be able to infiltrate to groundwater. In heavily industrialized areas with high percentages of paved cover, such as exist in portions of the Los Angeles Basin, less rainfall recharge will occur than if the land is in an undeveloped condition. Furthermore, if the bottoms of rivers and other drainages are paved, then the majority of stormwater generated during a rainfall event will be unable to infiltrate to groundwater. In contrast, the amount of recharge to groundwater will be greater in urbanized areas, such as the Santa Clarita Valley, that have natural soils in the bottoms of rivers and local drainages or that have lower percentages of paved cover on the developed areas lying outside the principal drainages. In these areas, the outdoor use of water for irrigation landscape vegetation or agricultural lands can notably increase the amount of groundwater recharge, particularly if the outdoor water is imported from outside the local groundwater basin. This is discussed further below.

Effect of Vegetative Cover and Water Use

From the 1930s through the 1960s, H.F. Blaney and other researchers at the U.S. Department of Agriculture performed numerous studies to measure the amount of infiltration to groundwater that occurs beneath undeveloped lands and irrigated farmlands, and the differences in recharge rates for different types of native vegetation and crops. In California, these studies included a 1933 study by Blaney in Ventura County, a 1963 study by Blaney and others in the Lompoc Uplands, studies by the U.S. Geological Survey and various consultants in the Montecito and Carpenteria groundwater basins, and a groundwater basin study by Santa Barbara County[1] that incorporated the results of these earlier studies.

Together, these studies concluded that deep percolation to groundwater from undeveloped lands occurs only during years of average or above-average precipitation. This occurs because:

1. Southern California's rainfall is highly seasonal in nature, whereupon most rainfall occurs during the relatively cool period November through March, when plant water

[1] See Santa Barbara County Water Agency, December 15, 1977. *Report on Adequacy of the Groundwater Basins of Santa Barbara County.*

requirements are low, and little, if any, rainfall occurs during the remaining (and warmer months) when plant water requirements increase.

2. During the summer, when little or no rainfall occurs, the native vegetation extracts the residual moisture that is present in the soil, which substantially decreases the soil moisture within the root zone of the vegetation. At the end of the dry season, soil moisture levels on undeveloped lands are below the soil's field capacity, which is the amount of moisture that must be present in the soil before free drainage of water can occur below the rooting zone of the native vegetation.

3. When the seasonal rains arrive, the incident rainfall that is not consumed by plants and does not become stormwater runoff must first raise the soil moisture level to the soil's field capacity before any groundwater recharge will occur. The various studies indicate that about 17 inches/year of rainfall is necessary to raise the soil moisture to the field capacity on an undeveloped parcel of land. This is similar to the average annual rainfall in the Santa Clarita Valley and in other lowland coastal and near-coastal valleys in southern California.

On irrigated lands, irrigation occurs during several months of the year, with the exact duration depending on the amount and timing of rainfall and also the crops or type of urban landscaping being irrigated. The principal effect of converting undeveloped land to land that receives agricultural or urban irrigation is to increase the amount of water that is applied to the land during the low-rainfall months. This application of water to the vegetative cover on the surface of the developed land parcel results in the maintenance of higher soil moisture levels during the warm, dry months than would occur without development. This has three effects:

1. Because irrigation will generally be performed in a manner that maintains the health of the vegetative cover, enough water will be applied to maintain the soil moisture at, or close to, the field capacity of the soil. This in turn will allow some deep percolation to occur from the irrigation water itself.

2. When the rainy season begins, because irrigation has maintained soil moisture at or near field capacity, less of the initial rainfall entering the root zone needs to be stored in the soil (to meet soil moisture deficits) beneath an irrigated parcel than in the case of an undeveloped parcel. Therefore, a greater percentage of the initial rainfall and annual rainfall will be able to infiltrate to groundwater. The southern California studies estimated that irrigated land parcels would allow rainfall infiltration to occur in years when annual rainfall is at least 10.5 inches/year. This threshold rainfall value is 6.5 inches less than the threshold rainfall value that the studies estimated to be necessary for generating groundwater recharge beneath undeveloped land parcels.

3. Because the majority of irrigation occurs during the dry (low-rainfall) months, the total annual recharge to groundwater from irrigated developed lands is the sum of: (a) the deep percolation arising from irrigation (during the low-rainfall months); and (b) rainfall (during the months when less irrigation is occurring). Therefore, groundwater recharge beneath developed lands is greater and occurs for a longer period of time each year than in the case of undeveloped lands where no irrigation is occurring.

Historical Observations of Groundwater Conditions in the Santa Clarita Valley

The findings of the studies described above for other groundwater basins in southern California are consistent with observations that have been made in the Santa Clarita Valley, which are based on long-term water level records, water budget analyses, and groundwater modeling. Based on a month-by-month calibration to a 20-year record of historical water level records (throughout the Valley) and stream gaging records (at the Los Angeles – Ventura County line), the model simulates 10 percent of the applied outdoor water as being available for recharge to groundwater in retail and residential areas, with greater percentages infiltrating beneath golf courses and agricultural lands. This is consistent with a 1980 study by DWR of the groundwater resources of the Santee and El Monte hydrologic subareas of San Diego County. In that study, which was performed to evaluate reclaimed water use plans, DWR concluded that approximately 20 percent of the applied outdoor water in municipal areas infiltrates to the water table, with the remaining 80 percent going to evapotranspiration and direct evaporation. DWR also concluded that there would likely be no significant change in these percentages as urbanization continues.[2]

In the Santa Clarita Valley, as in any urbanized area, urbanization increases the paved area and can increase the magnitude and intensity of stormwater runoff from paved land areas. In the Santa Clarita Valley, this stormwater runoff will find its way to the Santa Clara River and its tributaries, whose channels are predominantly natural and consist of vegetation and coarse-grained sediments (rather than concrete). The stormwater that flows across paved lands in the Santa Clarita Valley is routed to stormwater detention basins and to the river channels, where the porous nature of the sands and gravels forming the streambeds allow for significant infiltration to occur to the underlying groundwater. Consequently, for a developed land parcel, the water that runs off of the paved portion of the land parcel will infiltrate to groundwater from a detention basin or a riverbed, rather than infiltrating onsite.

Riverbed infiltration is a significant percentage of total recharge in the Santa Clarita Valley in any given year. Streamflow records and the model calibration process together demonstrate that year-to-year fluctuations in total recharge in the Valley arise not just from year-to-year variations in incident rainfall within the Valley, but also from year-to-year variations in streamflows in the Santa Clara River and its tributaries. Because the areas contributing flow to the rivers are located both within and outside of the Valley, the recharge that occurs from riverbeds is a significant source of groundwater recharge within the Valley.

Evidence that stormwater infiltration to groundwater is not significantly decreased by urbanization comes from long-term water level records at wells completed in the Alluvial aquifer. These records show that groundwater levels and the amount of groundwater in storage were similar in both the late 1990s and the early 1980s, despite a significant increase in the urbanized area during these two decades. This long-term stability is attributed in part to the significant volume of natural recharge that occurs in the streambeds, which do not contain paved, urban land areas. Also, groundwater pumping volumes have not increased

[2] See State of California, Department of Water Resources, Southern District. August 1984, *San Diego County Cooperative Ground Water Studies: Reclaimed Water Use, Phase II*. Pages 40-41.

due to urbanization, compared with pumping volumes during the 1950s and 1960s when water was used primarily for agriculture. Additionally, beginning in 1980, water was imported into the Santa Clarita Valley from the State Water Project (SWP) for urban use, with SWP water use reaching nearly 30,000 acre-feet per year (AF/yr) by the end of the 1990s, and progressively increasing from about 32,500 AF in 2000 to nearly 44,500 AF in 2003. Because two-thirds of the total urban water demand is used outdoors, a substantial portion of the imported SWP water has been and continues to be applied to urban landscaping, thereby increasing the amount of recharge to groundwater. The remaining urban water is used indoors, and is subsequently routed to local water reclamation plants (WRPs) and then to the Santa Clara River (after treatment). A portion of this water flows downstream out of the basin, and a portion infiltrates to groundwater.

In summary, urbanization has been accompanied by long-term stability in pumping and groundwater levels, plus the addition of imported SWP water to the Valley, which together have not reduced recharge to groundwater, nor depleted the amount of groundwater that is in storage within the Valley.

F. ASSESSMENT OF POTENTIAL IMPACTS RESULTING FROM CUMULATIVE HYDROMODIFICATION EFFECTS, SELECTED REACHES OF THE SANTA CLARA RIVER, LOS ANGELES COUNTY, CALIFORNIA

Assessment of potential impacts resulting from cumulative hydromodification effects, selected reaches of the Santa Clara River, Los Angeles County, California

Report prepared for:

GeoSyntec Consultants

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1. INTRODUCTION

1.1 Background and purpose

The Newhall Ranch Specific Plan projects will urbanize a portion of the Santa Clarita Valley in Los Angeles County during the coming decades. The project is an extension of prior community growth, which commenced in earnest during the 1960s, in accordance with the adopted General Plan and adopted growth projections. Concern has been expressed that future urbanization may result in changes in the Santa Clara River, a stream of regional scale draining westward from northern Los Angeles County through Ventura County, flowing into the Pacific Ocean near Oxnard. Prior analysis by Geosyntec Consultants (2005) indicates that cumulative future urbanization in the upper watershed of the Santa Clara River, of which Newhall ranch will contribute a portion, will reach approximately 9 percent at "built-out" conditions. A survey of the literature (reviewed in GeoSyntec, 2002) shows that many western-state streams begin to exhibit effects when impervious areas exceed a threshold of about 10 percent, with some considerable site-by-site variability. Additional studies by GeoSyntec in the San Francisco Bay area (2004) and a recent Southern California regional study (Coleman and others, 2005) indicate that, for watersheds smaller than about 25 square miles, channels in granular, non-cohesive sediments may become unstable downstream from urbanizing areas when impervious coverage reaches as little as 2 to 3 percent.

This report uses an empirical approach to assess the potential effects of urbanization on channel morphology associated with the implementation of the Newhall Ranch Specific Plan, combined with other existing and future development in the upper watershed of the Santa Clara River as described in the adopted General Plan. We use historical changes in the Santa Clara River channel pattern to help bracket potential morphological effects on the river of hydromodification due to accumulated urban development. We note that historical changes (both natural and human-induced) in the three factors most likely to affect the Santa Clara River stability (magnitude and frequency of stormflow events, sediment supply and caliber, and channel vegetation) are very large relative to the effects, if any, of the Newhall Ranch project and other planned future urban development. We hypothesize that it will prove useful to learn from history, and to assess the nature and general degree of change that may result from future urbanization by applying these insights.

Much of what is learned from this analysis may be applicable in other aspects of planning and managing the Santa Clara River in the Newhall Ranch reach and reaches downstream. It is not, however, an immediate objective of this report to develop management plans, to assess potential changes in tributary channels, or to explore how habitat conditions might be changed by potential hydromodification, beyond that which is related to the physical channel form and dynamics.

1.2 Technical approach

The history of the Santa Clara River in the Santa Clarita Valley and eastern Ventura County allows us to explore the three factors most likely to affect the stability and morphology of the river downstream from existing and future development in the Santa Clarita Valley (including Newhall Ranch):

- High streamflows, including increased peak flows, volumes, and/or durations of stormflows,
- Coarse-sediment supply, including sharp curtailment of sediment entering the river following completion of Castaic (1974) and Santa Felicia-Piru (1958) Dams.
- Mature riparian vegetation, with interpenetrating roots, which can stabilize the banks and maintain the channel pattern.

We consider the 'pre-urban' condition to be the form and functions of the river during the 1950s and 1960s, prior to significant urban growth and modification of the flow and sediment regimes due to the construction of the Castaic and Santa Felicia-Piru Dams. Historic deviations from the pre-urban condition can be evaluated using the geomorphic evidence left by a period of floods and high flows from 1938 to about 1945. The effects of sediment supply can be evaluated by quantifying effects of eliminating coarse-sediment delivery from Castaic Creek (with a drainage area of 155 square miles, approximately 25 percent of the Santa Clara watershed at the L.A./Ventura County line. Supporting evidence can also be obtained similarly at Piru Creek (approximately 40 percent of the watershed at its confluence with the Santa Clara River at Piru).

1.3 Report organization

The analysis begins with an overview of the factors affecting the form and geomorphic history of the Santa Clara River (Chapter 2). The larger events and fluctuations, and manner in which they may have affected the river, are considered in Chapter 3. The fourth chapter explains the source materials and methods used to quantify the river's response to these perturbations, which are summarized in Chapter 5. Chapter 6 is a discussion of what we have learned from this study, and Chapter 7 draws conclusions as to how these findings relate to potential hydromodification effects in response to anticipated future watershed urbanization.

2. GEOMORPHIC SETTING

2.1 Channel pattern influences

Several previous reports have described the overall and geomorphic histories of the Santa Clara River (c.f., Schwarzberg and Moore, 1995; SCREMP 2005). In each case, authors have noted that the forms and functions of the river have varied with climatic cycles and with episodes such as floods and fires. It is this variability that is characteristic of the river. In the this report, we utilize the study of historic influences of some of the more pronounced events and cycles to better understand the impacts of drainage changes, if any, that can be expected to result from the anticipated future development in the Santa Clarita Valley, including Newhall Ranch.

2.1.1 Physiography

The Santa Clara River flows through a complex, tectonically-active trough generally bounded by reverse faults on the San Cayetano Mountain and South Mountain fronts. Some of the most rapid rates of geologically-current uplift in the world are reported from the Ventura anticline and San Gabriel Mountains, just to the northwest and southeast, respectively, of the river. Slopes are very steep, with local relief of 3000 to 4000 feet being common. These faults bring harder, more resistant sedimentary rocks over softer and younger sedimentary formations, but all formations are fundamentally soft and erodible. On either side of the faults, sandstone (generally multi-cyclic and fine-grained) and mudstones prevail. The northeastern and southeastern corners of the watershed are underlain by deeply-weathered granitic and schistose rocks, which produce sands that are coarser than those of other rock units when they weather and erode. The San Gabriel fault crosses the valley near the county line, bringing slightly more resistant rock to the surface and creating a local base level reflected as a slight rise or 'bump' on the river's longitudinal profile.

Most geologic materials in the watershed decompose mainly to silts and clays and to sand, with some coarser materials. Rhea Williams and his colleagues at the U. S. Geological Survey found that most sediment moved by the Santa Clara River and its main tributaries are quite fine, with less than 5 percent bedload-sized material (>0.25 mm, or about 0.01 inches in diameter). Some gravels and cobbles do occur within the beds of the streams and in their alluvium. Nonetheless, both the bed and the sediment transported by the river tend to be finer than in most Southern California watersheds (c.f., Knudsen and others, 1992).

The Santa Clara River watershed drains a watershed of 1,600 square miles, of which 625 square miles are within Los Angeles County, upstream of the "county-line gage" (USGS No. 11108500), near the western edge of the Newhall Ranch Specific Plan area.

2.1.2 Climate

Much of the watershed upstream of the Newhall Ranch Specific Plan area receives rainfall averaging about 18 to 25 inches per year (NOAA). As throughout Southern California, rainfall in the Santa Clara watershed alternates between wet and dry periods, a variation that is central to understanding the cultural and geomorphic histories of the upper watershed (Schwarzberg and Moore, 1995; Lynch, 1931; Reichard, 1981). Wet cycles tend to persist for several years, sometimes for periods of 6 or 8 years, during which rainfall, although variable, may average about 140 to 150 percent of the long-term average. For the woody riparian vegetation along the banks and on islands in the braided channels, these are crucial periods for establishment and growth. During dry cycles, the roots of the riparian vegetation must grow downward to the water table or perched zones, and where it cannot do so, this band of vegetation will die back.

2.1.3 Flows

Flows in the Santa Clara River, as in most southern California streams, are highly episodic. For the gaged period between 1953 and 1996 annual flow at the Los Angeles/Ventura County line gage ranged between 253,000 acre-feet (1969) and 561 acre-feet (1961). In general, however, streamflow, and especially dry-season streamflow, has increased over the past few decades primarily due to discharges from two wastewater treatment plants. Mean annual flow at the County Line increased from 25,700 acre-feet in 1972 (averaged over a 20-year record) to 35,360 acre-feet in 1988 (36-year record), with a significant decrease in the number of very low years over that period (UWCD and CLWA, 1996). Downstream of the County line, however, the Santa Clara River flows through the Piru groundwater basin, which represents a "Dry Gap" where dry-season streamflow is lost to groundwater.

Annual peak flows at the County line between 1953 and 1996 ranged from 68,800 cfs (1969) to 109 cfs (1960). Of note is that the second highest annual peak, 32,000 cfs in 1966, was less than half of the highest peak (68,800 in 1969). Both of these events occurred in the late pre-urban to early-urbanization stages within the Santa Clarita Basin and no consistent increase in peak flow is evidence since this time. Flow data for the 2005 flood event are not yet available, however the peak flow at the County line may have approached the flow observed in 1969. As discussed below these large episodic events have a significant impact on the geomorphic characteristics of the Santa Clara River mainstem.

2.1.4 Ground-water supported riparian vegetation

The Santa Clara River is underlain by several distinct alluvial ground-water basins—the Piru, Fillmore, and Santa Paula Basins (Reichard and others, 1999; SCREMP 2005). These basins are divided longitudinally by sills or ridges of bedrock that support areas of locally-high ground water, including the area upstream from the County line (above the Piru Basin), and upstream from the mouth Sespe Creek (the transition between the Piru and Fillmore Basins). This locally-high ground water sustains summer baseflow and riparian vegetation within the Santa Clara River corridor even through relatively dry climatic cycles.

3. PERTURBATIONS

This section describes several major perturbations (those with the potential to affect channel- and floodplain-form) that occurred in the Santa Clara River watershed since the early 1900s (summarized in Figure 1). Aerial photographs were selected to bracket these events and analyzed, both qualitatively and quantitatively, to try to discern and quantify responses of the Santa Clara River channel to:

(1) changes in flow regime during wet and dry multi-year cycles,

(2) sediment supply, notably describing the channel's adjustments to construction of large dams, and

(3) development of mature riparian vegetation with interpenetrating roots.

3.1 Streamflow cycles and events

As described above, streamflow within the Santa Clara watershed is highly episodic, and can vary drastically from year to year. However, decade-scale patterns of wet and dry periods have been identified in the historic record—as early as the 1700s. Previous wet periods (with associated high flows) are reported from 1810 to 1817, 1831 to 1840, 1883 and 1893, and 1903 to 1916, during each of which periods the area received a total of an additional 60 to 80 inches above the mean annual rainfall over the duration of the wet cycle. Prolonged static or drying periods similar to that observed between 1945 and 1977 also occurred from 1780 to 1810, 1842 to 1882, and 1919 to 1935 (with associated reductions in streamflow). The river is likely to have remained most stable during the latter periods, with the notable exceptions of a few major storms of record, such as 1862 (c.f., Lynch, 1931; Reichard, 1981; Schwartzberg and Moore, 1995). The primary wet periods in this study occurred between 1938 and 1946, and 1978 to 1983 (Figures 1 and 2). Other large storm events occurred in 1966, 1969, 1972, 1983, 1998, and 2005. Notable dry periods occurred between 1946 and the late 1960s, and 1983 and 1991.

3.2 Dam construction

Castaic Dam was completed on Castaic Creek (a tributary of the Santa Clara River just upstream of the Newhall project) in 1974. The watershed area above the dam is approximately one-quarter of the watershed area of the Santa Clara River at the L.A./Ventura County line, downstream of the Castaic confluence, and therefore the dam effectively reduced the sediment contributing area by about 25 percent. For comparison purposes, we also considered the effects of the construction of the Santa Felicia Dam (Lake Piru), which resulted in an approximate 38 percent decrease in sediment contribution area below the confluence of Piru Creek and the Santa Clara River[1].

3.3 Urbanization

Settlement of the Los Angeles County portion of the watershed transitioned from rural to mixed-use suburban during the mid- to late-1960s. This change initiated a period of ongoing urban expansion, with associated increases in the area of impervious or compacted surfaces as homes, commercial and industrial centers, highways and diverse infrastructure have developed throughout the Santa Clarita Valley. Future General Plan urbanization within the upper watershed, inclusive of Newhall Ranch, will bring the percent of urban area west of the County line to about nine percent (GeoSyntec, 2005).

3.4 Treated effluent discharge

Since the 1960's, treated effluent from two water reclamation plants (Saugas and Valencia) has been released directly to the Santa Clara River. This, combined with an increase in applied, imported agricultural water, has led to increased summer baseflows in the Santa Clara River at the County line, which had only rarely occurred under pre-urban conditions. This led to an increase in available water to support woody riparian vegetation. The increase in baseflow is evident in the USGS gaging record at the county line (Figure 2). In some stream corridors, vegetation growth in response to increased baseflow can provide additional bank cohesiveness and reduce erosion; though in others heavy in-channel vegetation growth (riparian encroachment) can serve to destabilize the stream and induce lateral erosion by directing flows toward the banks.

Newhall Ranch has proposed an additional plant that would ultimately treat approximately 5.8 million gallons per day at project build-out. However discharge from the plant in the summer is not expected, as this water will be re-used for irrigation purposes, and we therefore do not expect further change in riparian vegetation growth as a result.

3.5 Saint Francis Dam Breach

On March 12, 1928 the Saint Francis Dam, located in San Francisquito Canyon upstream of the Newhall project, failed and released approximately 30,000 acre-feet of water over the course of a few hours, with an estimated peak discharge of up to 800,000 cubic feet per second (Newhall,

[1] Drainage area calculations were based on USGS gaging station watershed data at Piru and Castaic Dams, and gages on the Santa Clara River at the L.A./Ventura County line and near Piru.

1928; and SCREMP, 2005). This event had drastic effects on the stream reaches downstream, as the resulting flows were much higher than anticipated from any natural event. Aerial photograph coverage during this time period is limited, however, and therefore an assessment of this event was not feasible. In addition, because of the extreme size of the event, it is unlikely that an assessment would be beneficial for assessing hydromodification impacts.

4. METHODS

We analyzed aerial photographs from 1927, 1947, 1957, 1966/67, 1989, 2002, and 2005 to describe channel change in response to the major episodes described above. The main criteria described were the width of the active braiding area (or meander belt width if there was no braiding), bank vegetation, number of channels, and width of the active channel. Also described, where they could be identified, were the width and length of "islands" (vegetated mid-channel bars) within the stream. Islands were typically easier to identify where vegetation was heavy, as the color of the vegetation highlighted the differences between channel and meta-stable islands.

The aerial photographs were analyzed in two different ways. First, a qualitative comparison of the alluvial corridor shown in the different years' photos was made, describing general differences in channel pattern and vegetation on a reach-wide scale. Second, specific cross sections were defined and the above parameters measured for each year with photo coverage in that area to provide a quantitative comparison of channel change at these standard locations along the Santa Clara River (Figure 3).

4.1 Descriptions of analysis criteria

4.1.1 Width of active braiding corridor

For braided reaches, the active channel width was identified primarily by noting the extent of active channels or recent sediment deposition. In many cases the active corridor was bounded by a significant change in vegetation or sediment deposition characteristics.

4.1.2 Relict channel corridor

The relict channel corridor is the portion of the flood plain that does not appear to have been active in the recent past (within the last 5 years or so). Typically the relict corridor is identified by areas of heavy or scattered vegetation containing no or few distinct channels, or areas that do not appear to have experienced recent sediment deposition. Alternatively, identification was based on the width between farmed fields[2]. Measurements of this feature were made from outside bank to outside bank, and include the active corridor.

[2] The total width of the former channel migration corridor is difficult to identify in aerial photographs due to past and present agricultural field reclamation following major perturbations. Where necessary, we used the width between agricultural fields as a estimate of the relict corridor.

4.1.3 Channel width

Where a distinct channel or channels could be identified, the widths of the individual channels were measured. The number of individual channel threads was also recorded, where threads could be distinguished. In some cases, measurement of these features was complicated by poor photo resolution or contrast, and difficulty in distinguishing major channels from minor ones (where a full spectrum was present).

4.1.4 Vegetation

Vegetation was described qualitatively as bare, scattered, moderate, and heavy. The location of specific areas of vegetation, such as vegetated islands, vegetation within the relict corridor, or vegetation along banks, was also described. Where the resolution was adequate, the growth form of vegetation, or state of maturity, was also described (trees or shrubs).

4.1.5 Number of vegetated islands

The number of distinct vegetated islands (mid-channel bars) was also recorded at each cross-section, where the resolution of the photographs was adequate. Where islands could be identified, measurements of width and length were recorded.

5. RESULTS

5.1 Qualitative descriptions

Initial inspection of the series of aerial photographs showed that significant changes in channel planform have occurred throughout the 1900s, as would be expected in a large, braided stream in southern California. Vegetation within the relict corridor (see definition above) near the Newhall Ranch planning area appears to become progressively heavier through time, likely due to the increase in agricultural water and discharge of treated effluent to the channel through the summer months.

The photos show many areas of net deposition, and corresponding channel shifts in major depositional areas. Single-thread, dominant channel segments are rarely present, especially in years following large events. Even when there is one main channel, secondary channels are often present within the active channel corridor.

Portions of the stream have been altered for flood control purposes, including stabilization of banks bounded by orchards and fields, or construction of levees within the active corridor. These levees are most prominent in the 1989 photographs (upstream of the L.A./Ventura County line), where the substantial segments of the main channel are confined in a flood control channel approximately 225 feet wide. By 2002, however, little evidence can be discerned in the aerial photographs of these levees.

The 2005 flood events caused significant changes within the Santa Clara River. Vegetation within the channel was almost all completely washed out (compared to 2002 conditions), and many areas of significant bank-widening were identified, even in areas of heavy bank vegetation (Figure 4).

There appears to be little change in agricultural constriction of the Santa Clara River over the span of photographs reviewed. Through the Newhall reach, the agricultural areas appear to be well buffered by the relict channel and the vegetation supported there. There were only a few places identified where the active channel cut into agricultural areas rather than staying within the relict corridor. In contrast, within the Piru Basin (downstream of the Newhall reach), significant agricultural constriction and subsequent channel widening occurred over the time span of the photos reviewed.

Areas of shallow ground water between Piru and Sespe Canyon[3], which support denser riparian vegetation than typical for the river between Valencia and Fillmore, show little if any significant change for all years in the studied photo-sets. Both the density and extent of vegetation in these areas does not appear to change over time (despite significant differences in climate and other watershed factors) nor does the amount of vegetation appear to significantly affect channel planform, compared to upstream and downstream reaches (the braided channel does not shift to a single-threaded channel through the wetted reach).

5.2 Quantitative results

For the quantitative portion of the aerial photograph analysis we looked at four different types of criteria to identify physical changes to the Santa Clara River channel (Table 1; see also section 4.1.1 for descriptions of criteria). Because of difficulties in identifying and measuring the width/number of channels and number/dimensions of vegetated islands, because of the varying resolutions and contrasts of the photographs, we concluded that analysis of these two criteria were less meaningful for this study. In other words, there was more variation due to the ability to identify the features for the varying quality of the photos than there was actual variation in the system. While we believe that these criteria may be a valid indicator of channel change, more study would be needed to adequately quantify these features so they were used a supplementary qualitative metric.

For this study we found that measurement of the “active corridor” (see section 4.1.1) was the most useful and easiest to work with to identify channel changes. In most cases there is enough vegetation along the banks that the active braiding corridor is easily identified, and changes in the width of the corridor can be tracked from year-to-year.

Figure 5 summarizes the changes in active corridor width over the time span of the reviewed photos. Within the Newhall reach, the width of the “active corridor” at the four measured cross-sections varies from year-to-year by as much as 500 feet, though most of the variation is considerably less. One station, in the narrows above the Piru Basin, has a very consistent channel width, varying by less than about 50 feet from year to year.

To provide additional analysis, we looked at a series of recent photos (1994, 2000, and 2002-2005) at one cross section downstream of the Castaic confluence. For this photo set, the channel widened significantly between 1994 and 2000 (probably in response to the 1995 or 1998 large

[3] See Reichard and others (1999) for a discussion of the hydrogeology of these shallow ground water areas; although downstream from the Los Angeles County line, results are applicable to the upstream as well, as discussed later in this report.

storms), but showed almost no change between 2000 and 2004 (Figure 6). The channel then widened considerably again in response to the high-flow events in 2005.

As a secondary check of the numbers derived for the measured standardized cross sections, we also measured active channel widths at approximately twenty different locations through the Newhall Reach on three different photo sets—1967, 2004, and 2005. From these measurements an average active braiding corridor width was calculated and compared with the other years. In 1967, the average channel width was approximately 580 feet, which was significantly wider than the average width in 2002 (392 feet). However, after the 2005 storms, the active width was approximately 560 feet, similar to the 1967 conditions.

The "relict corridor" (see section 4.1.2 for definition) also proved useful as a secondary criterion, providing a measurement of potential changes due to agricultural encroachment or constriction of the flood corridor. Measurement of the "relict corridor" at the standard cross sections showed that while there was some variation between photos, there is no consistent trend of agricultural constriction to the Santa Clara River flood corridor. These measurements, along with qualitative observations that within the Newhall reach agricultural activities were generally restricted to outside the active corridor, suggest that agricultural encroachment has not historically affected the geomorphology of the Santa Clara River within the Newhall Reach.

6. DISCUSSION

The Santa Clara River is a dynamic, episodic system. The above analyses highlight the magnitude of geomorphic change over the course of recent history, in response to natural and human disturbances in the watershed. Understanding the magnitude of past response is a key factor in assessing the potential response to future urbanization within the watershed.

The construction of Castaic Dam in 1974, regulating approximately 25 percent of the watershed at the L.A./Ventura County line, cut off a significant supply of sediment to the Santa Clara River. This change, however, does not appear to have had an effect on the channel dimensions of the Santa Clara River mainstem. The width of the active corridor, as well as the general form of the channel, are generally consistent both before and after construction of the dam. It appears that the Santa Clara River adjusted without morphological expression to absorb this change. One factor contributing to the lack of change is the seemingly large volume of sediment stored in the tectonic basin above the county line—a result of bedrock control associated with movement along the San Gabriel fault, which supports the large extent of semi-consolidated and alluvial deposits adjoining the drainage net.

The amount of vegetation within the Santa Clara River corridor appears to have increased since the 1960s, likely due to the increased summer return flows from agricultural water and to year-round augmentation of baseflows due to treated effluent discharge to the river. However, this vegetation does not seem to provide enough erosion resistance to maintain a "stable" channel capable of withstanding regular 're-sets', which occur at intervals averaging about a decade – or much less than the expected lifetime of the riparian woodlands which do get established. Despite heavy vegetation on the active channel banks near Newhall ranch and in areas of shallow ground-water, the stream still responds to large events by a general widening and/or shift of the channel. The role of vegetation in large-channel stability and morphology in Southern and Central California does fundamentally differ from that of smaller streams and streams elsewhere in the country. The geomorophic and historical record shows that resets have been occurring throughout the recent geologic past in basins exceeding a certain size. One partial explanation may be that 're-set' flood events in these larger channels exert stresses beneath or around the riparian vegetation exceeding the vegetation's threshold of stability[4].

[4] Sedimentologists note that crossbeds in the alluvium of the Santa Clara River are often 8 to 12 feet high, equal or greater than the depth to which roots can interpenetrate in most riparian settings in the region.

As stated above, the Santa Clara River, as with many streams in semi-arid southern California, is highly episodic. Concepts of "normal" or "average" sediment-supply and flow conditions have limited value in this "flashy" environment where episodic storm and wildfire events have enormous influence on sediment and stormflow conditions. Many of these channels are actively adjusting to lower flows than the last major event, which may have occurred some years before[5] (Hecht, 1993). In these streams, a large portion of the sediment movement events can occur in a matter of hours or days. In many of these channels most sediment is moved—and most bed changes occur—during the large flow events resulting from storms that may be expected approximately every 5 to 15 years (c.f., Capelli and Keller, 1993; Hecht,1993; Inman and Jenkins, 1999; Knudsen and others, 1992; Kroll and Porterfield, 1969).

Evidence of episodic channel changes can be seen in the Newhall reach of the Santa Clara River. Based on aerial-photograph interpretation of a near-yearly sequence of aerial photographs from within the last decade, the channel appears to maintain a consistent planform during average or dry rainfall years (such as between 2000 and 2004). Large events, however, (such as that which occurred in February 1998 and January 2005) can significantly modify this channel form. This widened and/or shifted channel (like that which was present after the 1998 or 2005 stormflow events) then sets the geomorphic template for subsequent normal to dry years. This model, similar to that described for the Ventura River by Capelli and Keller (1993), suggests that the geomorphology of the Santa Clara River is primarily driven by these large events.

Other perturbations which potentially affect channel geometry appear to have transitory or minor manifestations. For example, effects on the channel width due to 1980s levee construction are barely discernible by the first few years of the 21st century, probably mostly due to morphologic compensation associated with the mid- to late-1990s storm events.

5 Actively adjusting channels may be aggrading, incising, expanding or otherwise changing channel dimensions, depending on the magnitude, type, and various effects of the episodic event.

7. CONCLUSIONS

Based on the study of historic aerial photographs described above we conclude that:

- Major perturbations within the Santa Clara River watershed (dam construction, levee construction, changes in flows in response to decadal-scale climatic patterns, and increases in woody vegetation) do not appear to have had a significant impact on the geomorphic expression of the Santa Clara River, as quantified from measurements made from a series of historical aerial photographs flown during the years 1927 through 2005.

- Large events (those which are typically not as affected by increases in impervious area and associated increases in stormwater peaks and runoff volume) can completely alter the form of the Santa Clara River channel. We call these events "re-set" events. These events, perhaps occurring on average once every ten years, are a dominant force in defining channel characteristics.

- The geomorphic dominance of "re-set" events overwhelms geomorphic effects of hydromodification on smaller events. Due to these episodic "re-sets" we do not expect hydromodification feedback "unraveling" of the Santa Clara River mainstem, as is seen in many smaller southern California watersheds[6]. The "re-set" events appear to adequately buffer changes that may occur in short-term sediment transport.

- While there is no expected increase in summer flows due to additional treated effluent discharge to the Santa Clara River, even if summer baseflow do increase we would not expect a significant change within the channel. Additional growth in the extent or density of vegetation is not anticipated, as the reach near Newhall already appears to have enough flow to support summer vegetation, and the existing vegetation does not appear to affect channel form for durations longer than the "re-set" interval. Further, re-sets occur at intervals significantly shorter than the period required for maturation of riparian vegetation, such that full development of bank-holding properties is frequently interrupted.

- Given that the channel morphology of the Santa Clara River mainstem has not adjusted significantly to much larger perturbations in flow, sediment yield, and riparian

[6] In many smaller streams, hydromodification of moderate events can induce incision of the stream bed, which reduces the connection of the stream to the floodplain. This disconnect, in turn, increases the erosive forces of the flows (concentrating more flow in the channel) and causing further erosion, and thus a positive feedback response.

vegetation growth factors, within the Newhall reach, we do not expect a significant geomorphic impact to the Santa Clara River mainstem due to the anticipated increase in 'urban area' from four to nine percent.

8. LIMITATIONS

The analyses in this report were designed to help bracket the range of likely effects on the geomorphology of the Santa Clara River due to proposed urban expansion under the General Plan, inclusive of the Newhall Ranch Specific Plan projects. It does not consider specific elements of the project or of evolving mitigation measures; rather, it focuses upon the susceptibility to perturbation of the Santa Clara River corridor as a whole. We believe that it conforms with the standard of care applicable to reconnaissance studies of this nature; no other warranty, expressed or implied, is made.

The above analyses and discussion were intended to assess the potential cumulative impacts to the Santa Clara River *mainstem* (not tributaries) due to the anticipated urban expansion in the watershed. While we conclude that urban expansion from approximately four- to nine-percent urbanized (not 'impervious') will not significantly affect the channel geomorphology of the Santa Clara River, we do expect that there might be a response to urbanization on a larger scale. However, further study would be required to define what the likely threshold and magnitude of response might be.

We ask readers to note that this is a reconnaissance report. It is intended to bracket likely future conditions, to identify factors which must be better known, and to help guide initial planning. This report should *not* be used to site or design individual facilities without further site-specific investigations. Similarly, it is *not* intended to serve as basis for flood management or detailed floodplain planning, both of which should be conducted by well-defined and site-specific procedures, and which frequently require multiple lines of evidence.

The application of geomorphic history to inferring future channel and corridor change has a long and respected record in the earth sciences. As with all history or archival analysis, the better the record is known and understood, the more relevant and predictive the analysis can be. We do encourage readers who have knowledge of other events or processes which may have affected the river to let the authors know at the first available opportunity. The authors and their contacts via several different media are given on the signature page of this report.

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TABLES

Table 1. Aerial photograph cross section data at selected locations near Newhall Ranch, Los Angeles County, CA. See text for explanation and interpretation of data. Locations of cross section are labeled on Figure 2. Photo sources are listed in Appendix A.

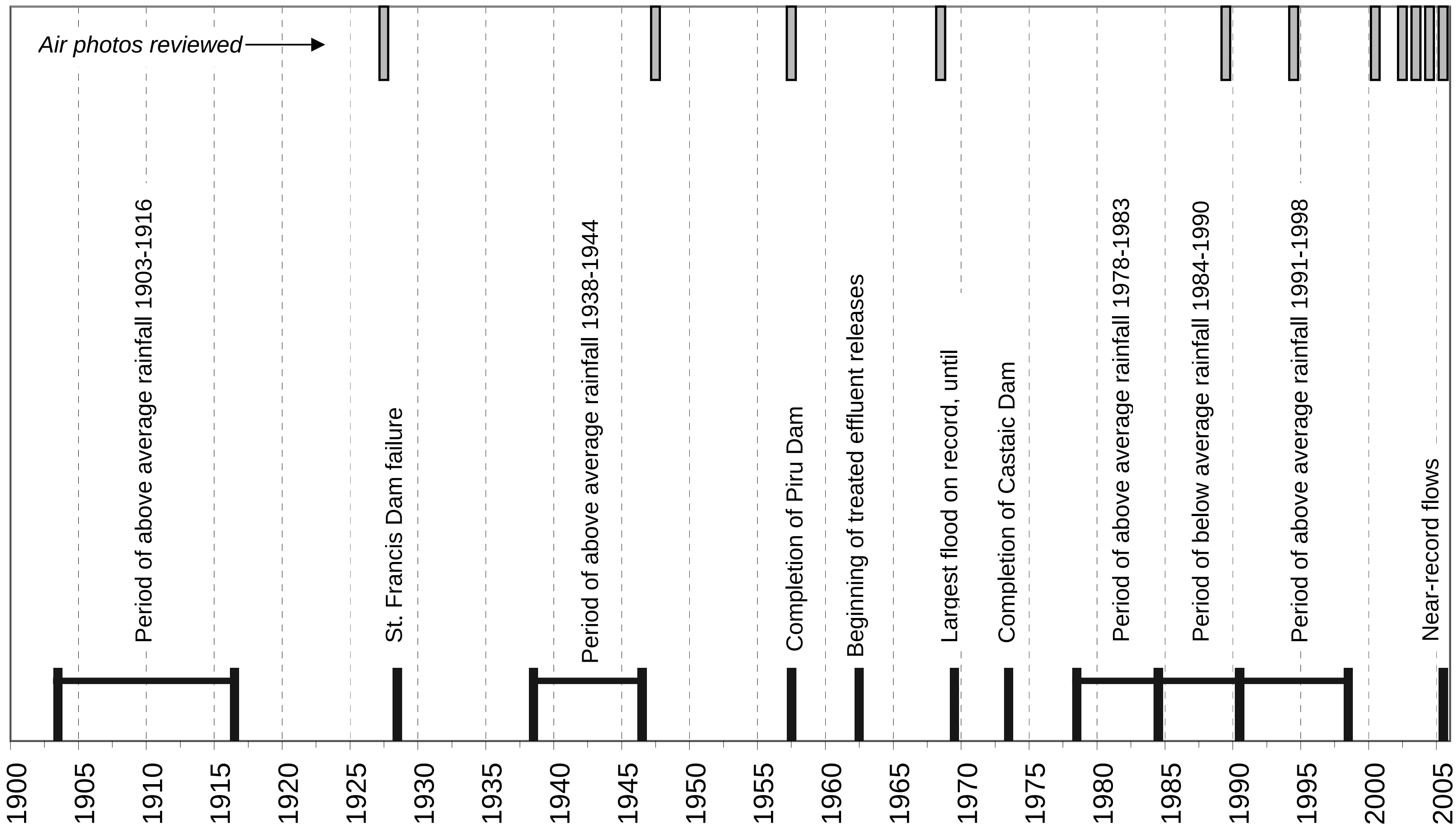
Cross section	location description	photo date	width of active braiding corridor (feet)	width of relict braiding corridor (feet)	is there one primary channel visible?	width of main channel (feet)	number of identifiable channels	total width of channels (including main) (feet)	number of islands	length of islands encountered (feet)	width of islands (feet)	vegetation	other descriptions
X1	downstream of Castaic	8/16/1947	570	1247	yes?	71	3?	107	can't define	n/a	n/a	moderately vegetated with some portions of relict corridor heavily vegetated	Just downstream a heavily vegetated bar is cut by a very distinct secondary channel
		7/20/1966	729	1173	yes	27	1	27	1	497	86	almost no vegetation within primary corridor except two areas near the primary channel and scattered small patches, only scattered vegetation on relict corridor	while there is only one main channel the rest of the primary corridor is section is almost deltaic in planform, spreading out from constriction upstream (possibly high sediment load coming in from Castaic)
		5/26/1989	173	1171	yes, but small	43	1	43	0	n/a	n/a	banks of meander corridor have scattered vegetation (less than 2000) with very little within braiding corridor	meander corridor is very distinct and straight, could be from flood control dredging;
		6/1/1994	337	1167	yes	72	2	97	1	551	171	light to moderate vegetation on braiding corridor banks	very little vegetation within braiding corridor
		2/1/2002	505	984	yes	42	2	50	poorly defined	n/a	n/a	relict braiding corridor is well-vegetated; meander belt/bar is lightly to moderately vegetated; at least one main channel bank is well-vegetated (alternates w/ meanders)	secondary channel essentially cuts off meander
		4/1/2004	505	978	no	n/a	3	87	2	929, 251	248, 56	heavy vegetation along former primary channel; relict corridor also heavily vegetated	there are two distinct channels, approximately the same size
		3/1/2003	510	965	yes	75	1	45	0	n/a	n/a	heavy vegetation on northern bank; some scattered vegetation within active corridor and surrounding low-flow channel	channel branches just downstream of cross section; very similar to 2002 and 2004 photos
		2/1/2005	601	999	no	n/a	3	106	poorly defined	n/a	n/a	no vegetation in main portion of channel; right bank has heavy tree cover, left bank has few trees	the main channel is about 340 feet wide with an obvious overbank deposition area (with very little vegetation)
X2	Upstream of County line	8/16/1947	532	1197	yes	89	2	133	1	355	133	vegetation is heavy (probably trees) on relict corridor; moderate (probably scrub) within active corridor (difficult to distinguish)	very distinguishable difference between active and relict corridor within this reach
		3/6/1963	491	1352	no	n/a	difficult to define	n/a	6	252, 283, 82, 441, 94, 410	44, 57, 52, 76, 38,63	several well-defined islands behind established vegetation (individual shrubs or small trees); relict corridor has moderate to heavy tree cover	very braided planform; switches to predominately single-thread channel just downstream
		5/26/1989	651	651	yes	43	3	108	1	2385	477	relict corridor has scattered trees with moderate to heavy shrub or grass cover; central island (along levee) has similar vegetation	well-defined flood control channel, but has been breached and there is a significant secondary channel to the north of the levees; included a portion of the island between the flood control channel and the secondary channel in the relict channel (no sign of recent deposition)

Cross section	location description	photo date	width of active braiding corridor	width of relict braiding corridor	is there one primary channel visible?	width of main channel	number of identifiable channels	total width of channels (including main)	number of islands	length of islands encountered	width of islands	vegetation	other descriptions
			(feet)	(feet)		(feet)		(feet)		(feet)	(feet)		
		6/1/2002	608	1258	yes	131	1	131	0	n/a	n/a	relict corridor on north bank has heavy tree cover; meander bends are eroding tree bank vegetation in places	stream has meandering planform, though meander belt (400' wide) has high sediment deposition and little vegetation; no evidence of flood control levees (meanders have widened to erode levees); active channel includes meander belt and area of significant recent sediment deposition to the north of the meander belt
		2/1/2005	674	1240	yes	97	3	192	1	475	155	almost no vegetation within active channel; relict corridor on both banks has moderate tree cover; much vegetation eroded away since 2002	numerous very small channels present as well
X3	downstream of county line	8/16/1947	362	805	yes, at this xs	80	2	121	can't define	n/a	n/a	outer banks of braiding corridor seem heavily vegetated	there seems to be one main channel through this reach, with extensive deposition of sediment outside of the channel
		7/20/1966	140	714	yes	51	2	77	0	n/a	n/a	banks of braiding corridor are heavily vegetated	
		5/26/1989	273	864	yes	91	2	114	1	136	23	only scattered vegetation on banks of braiding corridor	braiding corridor looks as though it may be a leveed flood control channel
		2/1/2002	249	1466	yes	41	3	79	2	344, 219	66, 36	scattered vegetation on u/s ends of islands; some recent deposition of sediment within relict braiding corridor (which is predominately heavily vegetated	
		2/1/2005	587	1472	yes	97	3	145	1	543	110	no vegetation in active corridor; right bank has heavy shrub cover with some trees, left bank has light shrub cover	
X4	upstream of Piru Basin	8/16/1947	282	885	yes	121	1	121	can't define	n/a	n/a	little to no vegetation within braiding corridor; relict braiding corridor has heavy tree/shrub cover	
		7/20/1966	281	383	no	n/a	3	26	poorly defined	n/a	n/a		
		5/26/1989	318	591	yes	68	1	68	1	91	23	meander belt banks lined with trees; meander belt itself covered with shrubs	"braiding corridor" is actually the meander belt; meander belt outside of channel is heavily vegetated
		2/1/2002	266	426	yes	35	3	45	1	340	36		secondary channels may be present in other photos, but resolution is poor, esp. 1948
		2/1/2005	281	495	yes	44	1	44	0	n/a	n/a	vegetation on right bank of main channel has diverted some flow over the relict corridor, though conditions are similar in 2002; moderate to heavy trees and shrubs on both banks	conditions are very similar to 2002, but with slightly wider and much clearer channel

Cross section	location description	photo date	width of active braiding corridor (feet)	width of relict braiding corridor (feet)	is there one primary channel visible?	width of main channel (feet)	number of identifiable channels	total width of channels (including main) (feet)	number of islands	length of islands encountered (feet)	width of islands (feet)	vegetation	other descriptions
X5	upstream of Piru confluence	4/1/1927	1834	3191	no	n/a	many	n/a	3	3060, 1170, 468	540, 450, 90	sparse scrub vegetation within active corridor, but enough to define the complex channel pattern; only slightly more vegetation (or possibly just less recent sediment deposition) in relict corridor	relict channel is mainly an artifact of flow deflection by several long levees just upstream; typical braided stream with channels of varying widths and scales (can not define number of channels due to complexity and scale variation of channels); only measured large islands
		8/16/1947	1449	3066	no	n/a	0	n/a	1	1282	279	island appears heavily vegetated; relict channel has moderate vegetation, possibly some farming	active channel is very burnt in; no evidence of levees, but would be difficult to see
		11/10/1966	957	3051	no	n/a	complex channel pattern	n/a	too complex to define	n/a	n/a	no vegetation within active corridor; sparse scrub vegetation within relict corridor, but very patchy (may be due to clearing)	flood control channel is present down middle of active corridor (196' wide); stream has complex braiding pattern, even with flood control channel present
		6/20/1989	1796	2993	no	n/a	complex channel pattern	n/a	too complex to define	n/a	n/a	light scrub vegetation within active corridor; vegetation is obviously stabilizing small islands, at least until the next big event; relict corridor is sparsely vegetated	little evidence of flood control channel but may have been some excavation in middle of active corridor (~300' wide);
		6/1/2002	1730	2452	no	n/a	5	1000	3	1200, 1085, 1520	384, 406, 400	moderate scrub vegetation on islands within active channel, similar to 1989 but slightly heavier	channels were relatively easy to pick out due to moderate scrub vegetation; channel width does not necessarily correlate to other measurements (where the only measurable parameter was wetted width)
X6	downstream of Piru confluence	4/1/1927	1713	1983	yes	18	1	18	0	n/a	n/a	no vegetation within braiding corridor; only scattered vegetation on relict corridor; heavy trees along portions of the south bank of relict corridor	very wide braided corridor with little definition (too burnt-in to define secondary channels)
		8/16/1947	1767	1983	no	n/a	0	n/a	0	n/a	n/a	looks similar to 1927 conditions	
		9/1/1957	1220	1449	yes	25	3	51	2	875, 1750	325, 425	very sparse scrub vegetation in active corridor; some small trees on relict corridor (where corridor is present)	well-defined flood control channel through this reach (136' wide), but there are several secondary channels outside the levees; diversion ponds present near the north bank; larger island cut by flood control channel
		11/10/1966	1132	1563	yes	32	4	388	2	2125, 750	850, 250	large island is moderately vegetated with scrub and one line of heavy vegetation; relict braiding corridor is similarly vegetated	braiding corridor has been confined on both sides by levees (especially on the northern portion); looks like the southern levee was recently overtopped (that area was included in the relict corridor); main channel divides in two in some areas
		6/20/1989	1082	1082	no	n/a	n/a	n/a	1	685	180	sparse scrub vegetation growing on poorly-defined islands within channel and near piers	lots of recent grading within the channel, several levees in the middle of the corridor and a series of piers on the southern bank
		6/1/2002	1050	1245	no	n/a	none	n/a	0	n/a	n/a	very little vegetation in this portion of the stream; some scattered scrub on relict corridor, even less within active channel	217-foot wide flood control channel begins just d/s of xs (poorly defined, though)

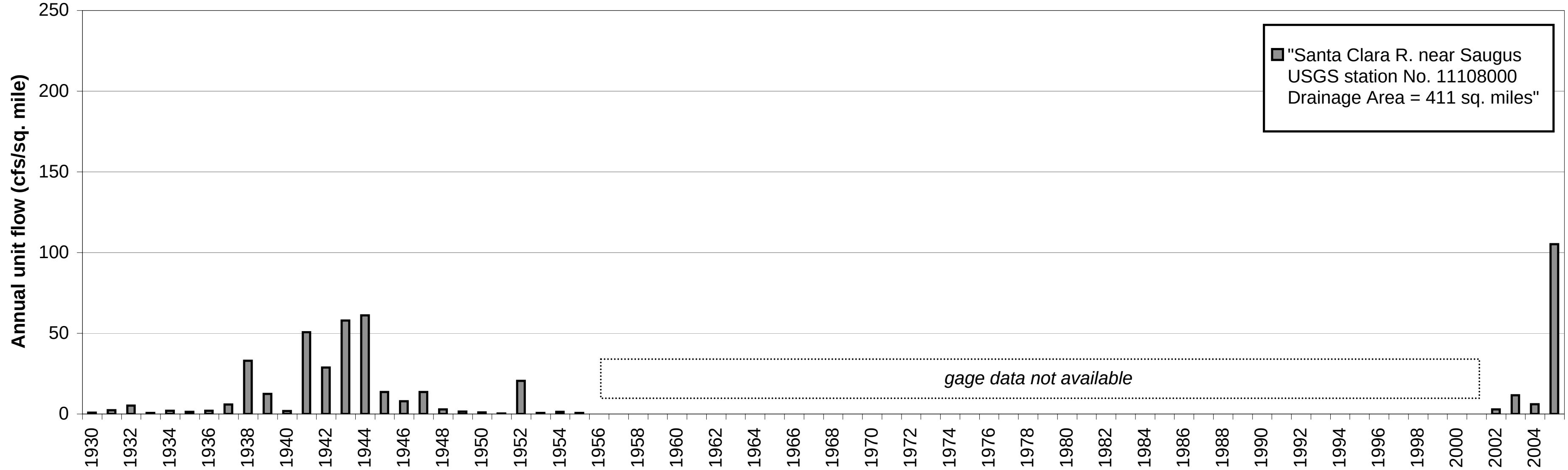
Cross section	location description	photo date	width of active braiding corridor (feet)	width of relict braiding corridor (feet)	is there one primary channel visible?	width of main channel (feet)	number of identifiable channels	total width of channels (including main) (feet)	number of islands	length of islands encountered (feet)	width of islands (feet)	vegetation	other descriptions
X7	between Piru and Sespe (ground-water upwelling)	8/16/1947	1694	2472	no	n/a	4	difficult to define the widths	can't define	n/a	n/a	this area is heavily vegetated; difficult to distinguish active braiding corridor from relict corridor	looks like there has been some flood control work in this area, two very straight channels through here, but masked some by vegetation
		9/1/1957	1446	2253	yes	168	4	370	2	4624, 8500	272, 408	northern portion of the corridor (including flood control channels) have heavy vegetation outside of the channels; the southern portion of the corridor has sparse vegetation	the main channel, and possibly the secondary channel, have been altered for flood control
		6/20/1989	749	2697	yes	37	2	150	1	1386	449	thick vegetation (with trees) along main channel; very little vegetation otherwise within active braiding corridor; moderate vegetation in northern portion of relict corridor, but only scattered brush in southern	no evidence of flood control alteration; downstream the corridor has been severely constrained by encroaching agriculture
		6/1/2002	551	2767	yes	42	2	65	1	396	108	heavy vegetation (trees) along secondary channel along north bank; scattered shrub (with some trees) vegetation within active corridor, some defining the edges of bars; heavy scrub vegetation on south relict corridor with scattered trees; heavy trees and scrub on northern relict corridor	just upstream there is a distinct main active corridor and an overbank area of deposition; the main active corridor has portions lined with heavy trees, but becomes less distinct further upstream (no vegetation)
X8	just downstream of Sespe Creek	8/20/1947	2003	2003	no	n/a	6	601	can't define	n/a	n/a	limited, if any	photo very burnt in, but channels less well-defined than in other photos
		8/13/1967	701	2203	yes	100	3	250	1	2804	401	limited, if any	one single-thread channel with one minor channel
		6/20/1989	1532	1723	yes, but less so than 1967	153	5	306	poorly defined; small and well-vegetated	n/a	n/a	islands are more heavily vegetated away from main channel; main channel bank is ~75 vegetated w/ thin vegetation line; more vegetation than in other photos	
		6/1/2002	670	1820	no	n/a	3	170	1	801	216	islands are moderately well-vegetated; relict corridor has scattered vegetation, Sespe mainstem has heavy vegetation along low-flow channels	interpretation complicated by Sespe confluence, but looks very similar to 1989 photo

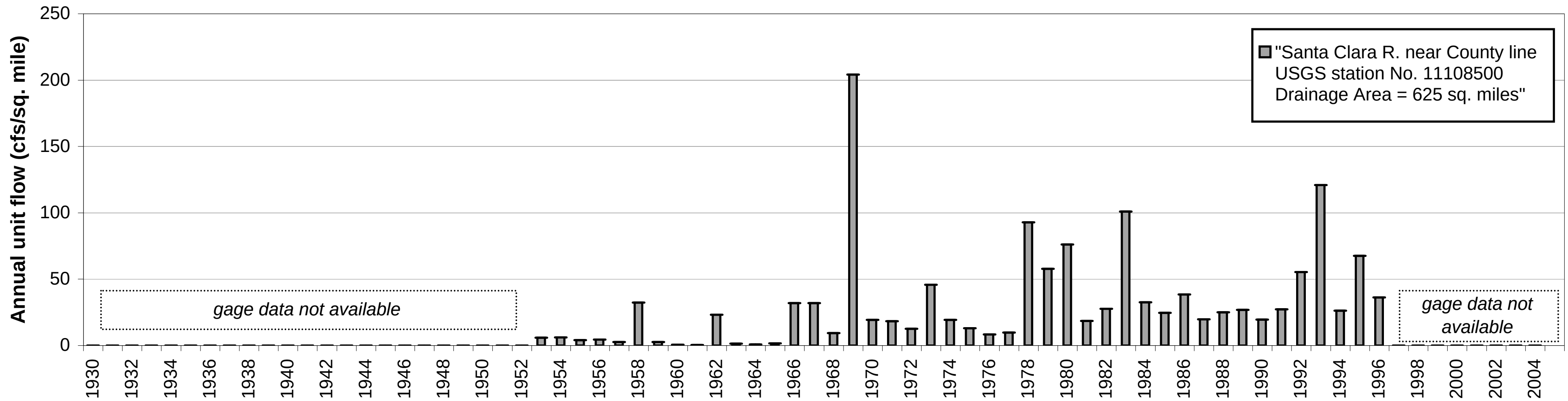
FIGURES



Balance Hydrologics, Inc.

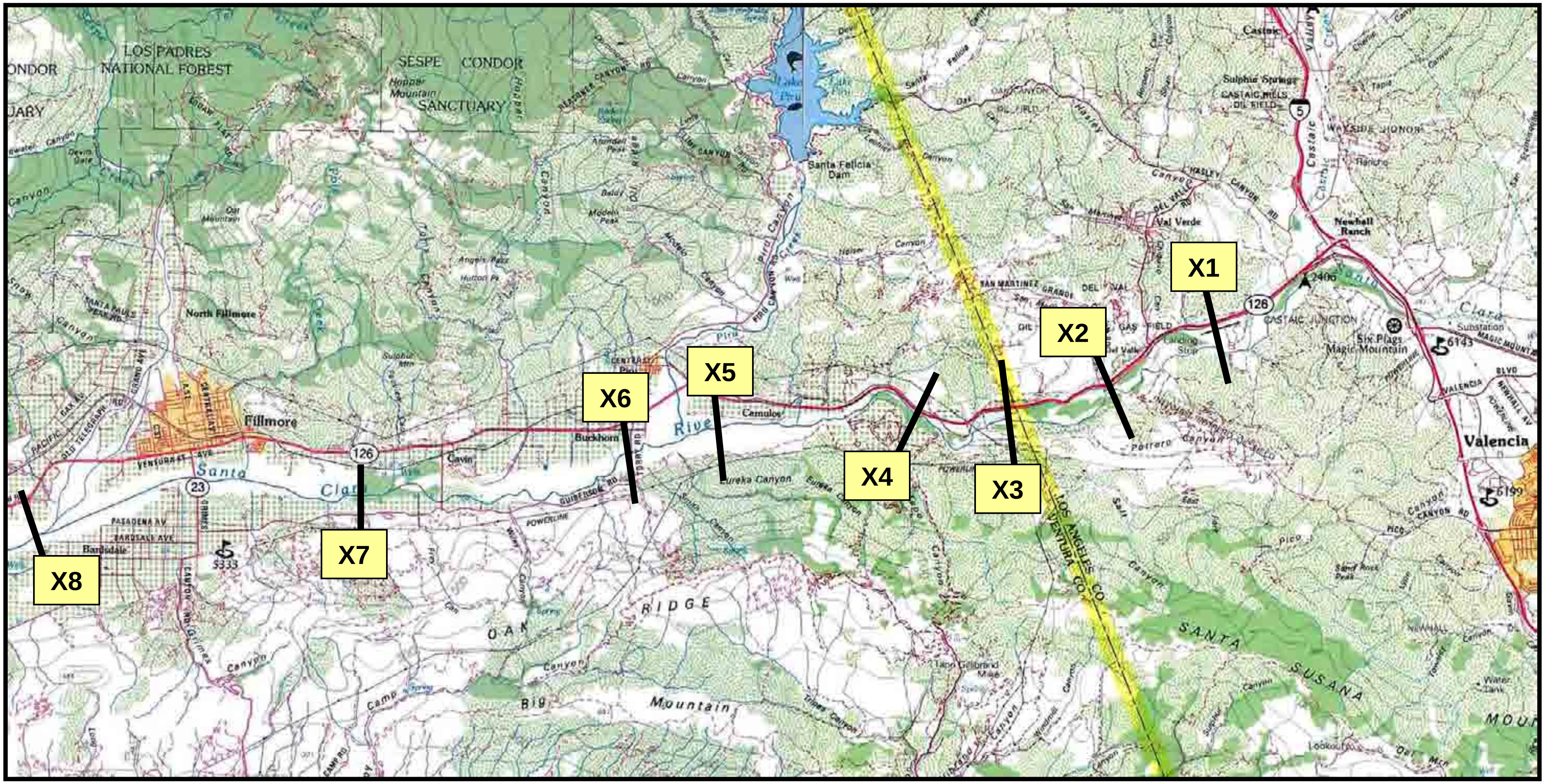
Figure 1. Timeline of selected major events in the upper Santa Clara River, California. Also shown (at top) are the years for which aerial photographs were analyzed.





Balance Hydrologics, Inc.

Figure 2. **Annual unit runoff (annual flow per square mile) for the Santa Clara River near Newhall at two separate gaging stations.** Note that flow in drier years has increased since the 1960s, most likely due to release of treated effluent to the River.

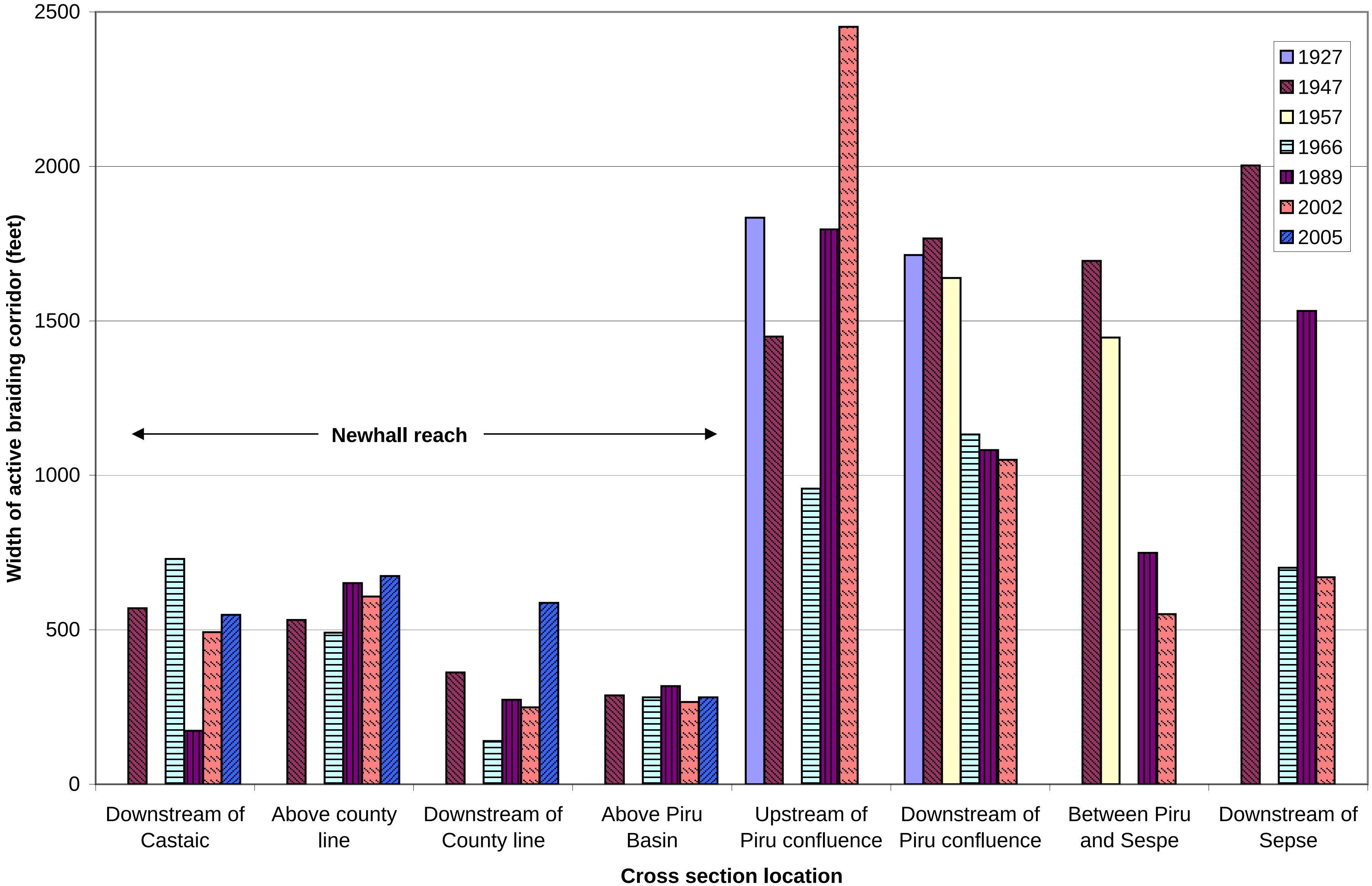


Balance Hydrologics, Inc.

Figure 3. Location of channel cross sections on the Santa Clara River, measured on aerial photographs.

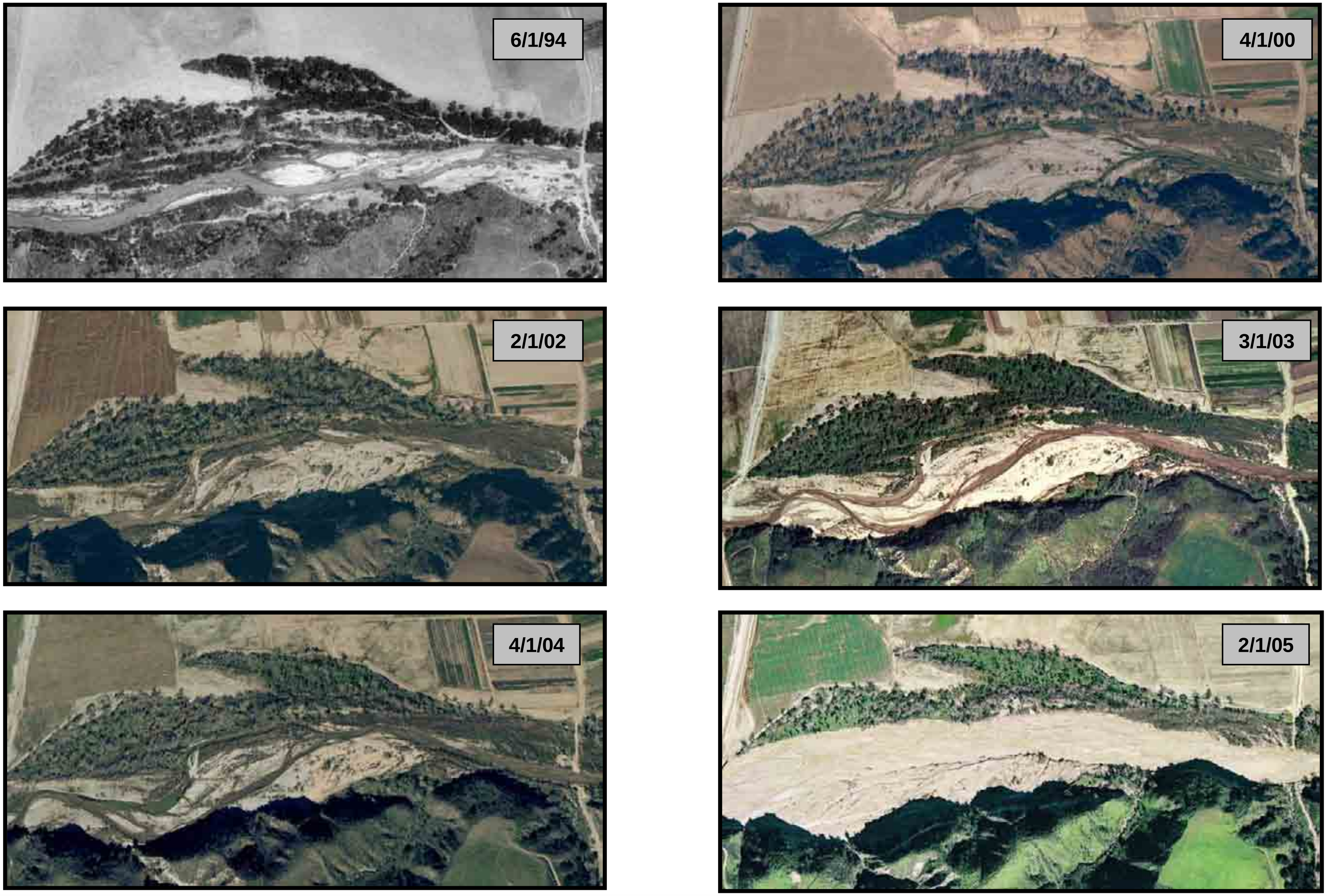
Balance Hydrologics, Inc.

Figure 4. Comparison of 2004 and 2005 conditions on the Santa Clara River, just downstream of the L.A./Ventura County line. Note that significant channel widening occurred in response to the 2005 events, even in heavily vegetated areas. See appendix A for photo sources.



Balance Hydrologics, Inc.

Figure 5. Measurements of active braiding corridor width from aerial photographs, for cross sections on the Santa Clara River.



Balance Hydrologics, Inc.

Figure 6. Progression of aerial photographs downstream of Castaic Canyon, showing channel change between 1993 and 2005. Note that there was little change between 2000 and 2004, but the active corridor widened significantly in response to the 2005 events, and that channel traces within the active corridor were effectively erased. See appendix A for photo sources.

APPENDICES

Appendix A: Summary of aerial photographs used for assessment of potential hydromodification effects on the Santa Clara River, Newhall, California.

Date	Number of photos	Nominal Scale	Hard Copy?	Electronic copy?	Image Type	Source/Vendor	Remarks
1927	6	2000	yes	yes	b/w	Whittier College: 80, 82, 84, F27, F28, F31	Only available photography prior to the March 1928 collapse of the Saint Francis Dam. Photos show area near Piru confluence
August 16, 1947	34	24000	no	yes	b/w - Vert Cart	USGS_GS-EM, Rolls 3, 5, 7	Previews downloaded already are sufficient.
1957	2	2000	yes	yes	b/w	Whittier College: 109, 123	1957 photos are for justdownstream of Piru Creek. Piru Dam was closed in 1957.
March 6, 1963	1 (2)	21670	no	yes	b/w - Vert Recon	USGS_ARMC630001L0049 a,b	high resolution scans
July 20, 1966	2 (4)	21670	no	yes	b/w - Vert Recon	USGS_ARM6625001L1362 a,b USGS_ARM6625001R1357 a,b	high resolution scans
August 19, 1966	1 (2)	21670	no	yes	b/w - Vert Recon	USGS_ARM6628502L1314 a,b	high resolution scans
September 13, 1966	1 (2)	21670	no	yes	b/w - Vert Recon	USGS_ARM6631405R1165 a,b	high resolution scans
November 10, 1966	2 (4)	21670	no	yes	b/w - Vert Recon	USGS_ARM6638605L1238 a,b USGS_ARM6638605L1242 a,b	high resolution scans
August 13, 1967	1	30000	no	yes	b/w - Vert Cart	USGS_AR1VBUK00010110	Preview already obtained. Downstream of Sespe Creek
May 26, 1989	5	31680	yes	yes	b/w	WAC-89CA, 27-42	LA County
						WAC-89CA, 27-62	LA County
						WAC-89CA, 27-84	LA County
						WAC-89CA, 27-109	LA County
						WAC-89CA, 27-135	LA County
May 1, 1989	6	2000	yes	yes	Color	PAS_89 06-20 PW VEN 7-229	Ventura County
						PAS_89 06-20 PW VEN 7-231	Ventura County
						PAS_89 06-20 PW VEN 7-233	Ventura County
						PAS_89 06-20 PW VEN 7-235	Ventura County
						PAS_89 06-20 PW VEN 7-269	Ventura County
						PAS_89 06-20 PW VEN 7-237	Ventura County
June 1, 1994	n/a	unknown			b/w, georeferenced	GlobeXplorer	downloaded select sections from LA and Ventura County
April 1, 2000	n/a	unknown	no	yes	color, georeferenced	GlobeXplorer	downloaded select sections from LA and Ventura County
February 1, 2002	4	Unknown	no	yes	Color, georeferenced	AirPhotoUSA (from GeoSyntec)	Covers all of Newhall project area

Date	Number of photos	Nominal Scale	Hard Copy?	Electronic copy?	Image Type	Source/Vendor	Remarks
July 23, 2002	n/a	unknown	no	yes	Color, georeferenced	GlobeXplorer	downloaded select sections from LA and Ventura County
March 1, 2003	n/a	unknown	no	yes	Color, georeferenced	GlobeXplorer	downloaded select sections from LA and Ventura County
April 1, 2004	n/a	unknown	no	yes	Color, georeferenced	GlobeXplorer	downloaded select sections from LA and Ventura County
October 13, 2004	n/a	unknown	no	yes	Color, georeferenced	GlobeXplorer	downloaded select sections from LA and Ventura County
February 1, 2005	n/a	unknown	no	yes	Color, georeferenced	GlobeXplorer	only avaialable for LA County

APPENDIX 4.4

Biological Resources

First Annual Western Spadefoot Toad Habitat Enhancement Monitoring Report Riverpark Project Site, City of Santa Clarita, California

Prepared for:

The Newhall Land and Farming Company
23823 Valencia Boulevard
Valencia, California 91355

Prepared by:

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July 2006

The following is the first annual monitoring report for a western spadefoot toad (*Spea hammondii*) habitat enhancement and monitoring plan implemented on the River Village (previously known as Riverpark) project site, located in the City of Santa Clarita, California (**Exhibit 1**). This report is intended to provide information to the City of Santa Clarita (City), The Newhall Land and Farming Company (Newhall Land), and the California Department of Fish and Game (CDFG) regarding status of breeding pools created as mitigation for impacts to western spadefoot toad associated with the River Village project.

PROJECT BACKGROUND

The project applicant, Newhall Land, has initiated development of the 695 acre project site with a mixed-use community consisting of 1,089 residential units, a 29-acre passive-active park, and a one-acre commercial parcel. An EIR was prepared for the project and approved.

Focused surveys were conducted on the site in 2003 and 2004. The 2004 focused survey resulted in the detection of the species on-site. A report was prepared on March 15, 2004 that described the results of those surveys (Compliance Biology). During site evaluations, three seasonal rainpools resulting from on-site human activities were discovered with actively breeding western spadefoot toads. Under the direction and with the assistance of CDFG, Compliance Biology, Inc. collected approximately 400 western spadefoot tadpoles were from the stockpile area. These toads were released in areas outside of the development footprint along the the Santa Clara River corridor, primarily in upland terrace habitat on both the west and east side of the Los Angeles Department of Water and Power Aqueduct bisecting the site. A more detailed discussion of the survey results and findings is included in the Riverpark FEIR.

The "Western Spadefoot Toad Habitat Enhancement and Monitoring Plan" (Plan) was prepared by Compliance Biology, Inc. in February 2005 and was subsequently approved by the City of Santa Clarita and the California Department of Fish and Game. The pond construction element of the Plan was completed in December 2005.

Construction of Rainpools

Exhibit 2 illustrates locations on the River Village project site selected for construction of the two seasonal rainpools. These locations were selected based on the availability of open space and the proximity of naturally occurring resources suitable to support western spadefoot toads. These locations were approved by CDFG. The pools were not placed in the path of any direct drainage as such placement would result in too much water entering the pools and/or damage to the pools by flowing water.

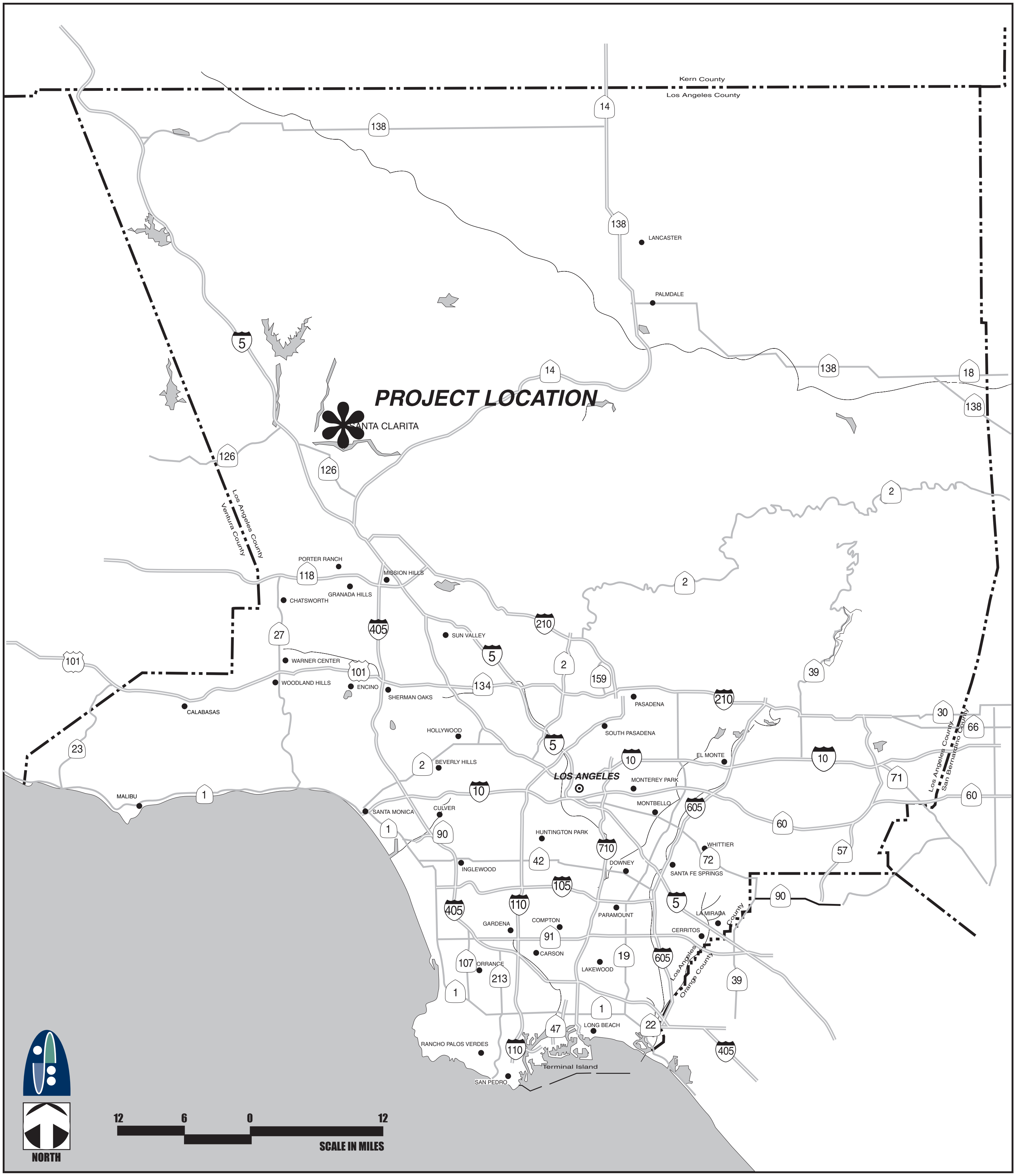
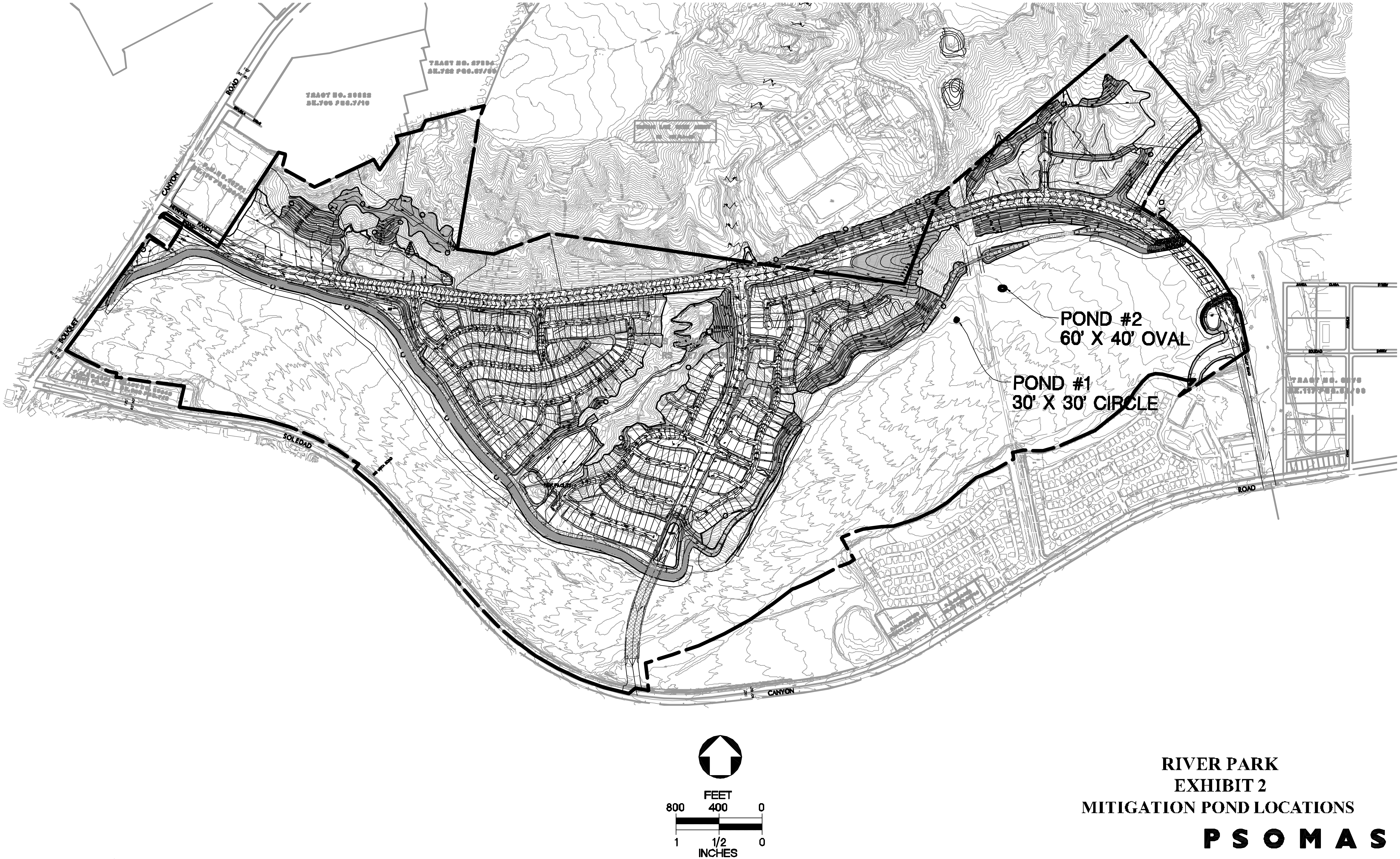


Exhibit 1

REGIONAL LOCATION



Note: For reduced size prints, original scale is in inches.

RIVER PARK
EXHIBIT 2
MITIGATION POND LOCATIONS

PSOMAS

NEWHALL LAND

DATE: 11/18/04 REVISED ON:
JOB No: 1VAL021504 SHEET NO. 1 OF 1
RP136-03

Nov. 19, 2004 – 11:00:06 DWG Name: M:\Northriv-mp\53425-mp\ENGR\EXHIB\RP136-03.dwg Updated By: MHeldeman

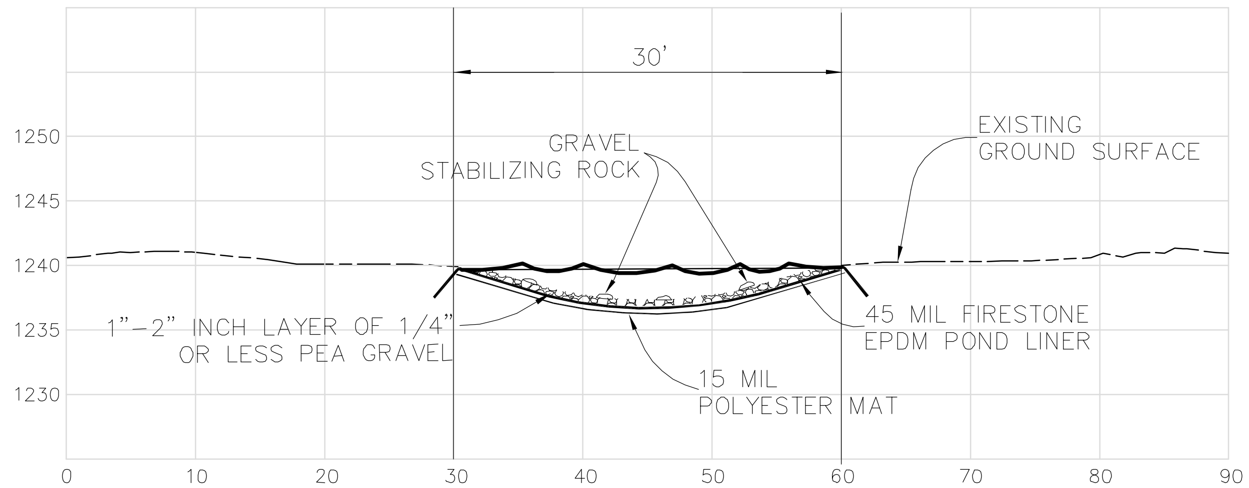
Pool 1 (**Exhibit 3a**) is an approximately 30-foot circle and Pool 2 (**Exhibit 3b**) turned out to be approximately 50 feet in length and 35 feet in width. Both pools are designed to be approximately 3 feet in depth, gradually and evenly sloping upward and outward from the center to the outer limits of the pool banks. The basic depth and shape of both pools were excavated using a backhoe or similar equipment. Hand tools were utilized to smooth out rough areas and perform final shaping.

Upon completion of excavation, each pool was lined with a 15mil polyester mat that protects the pond liner from puncture. A 45mil Firestone EPDM pond liner was then placed over the polyester mat and extend approximately two feet beyond the limits of the pond banks. The excess material was then buried around the perimeter of the pool.

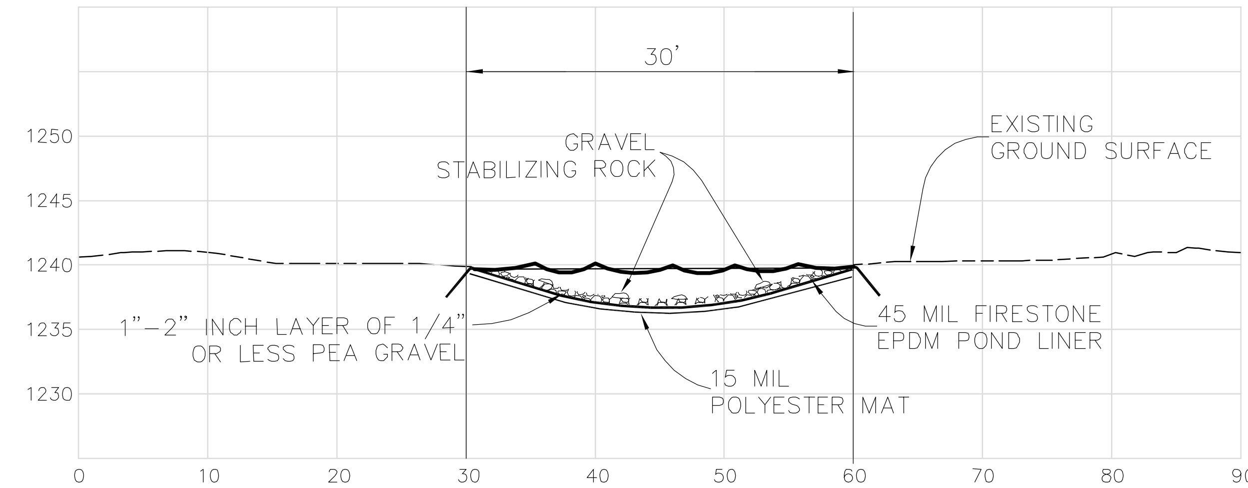
Upon completion of installation of the pond liner, a one to two inch layer of ¼-inch pea gravel was placed over the entire surface of the liner in an attempt to prevent exposure of the liner to direct sunlight. Larger rock was randomly placed throughout the pool and around its perimeter to serve as stabilizing points for the pea gravel to prevent it from sloughing down to the bottom. A few scattered twigs were placed within the pools to serve as substrate for oviposition. A smaller amount of large rock was utilized in Pond 2 to see if the presence of large rock made any difference on the selection of the site by breeding spadefoot toads, or on the success of the survival of tadpoles and young toads. Attached photos 1 and 2 illustrate the completed ponds.

Upland Habitat Enhancement

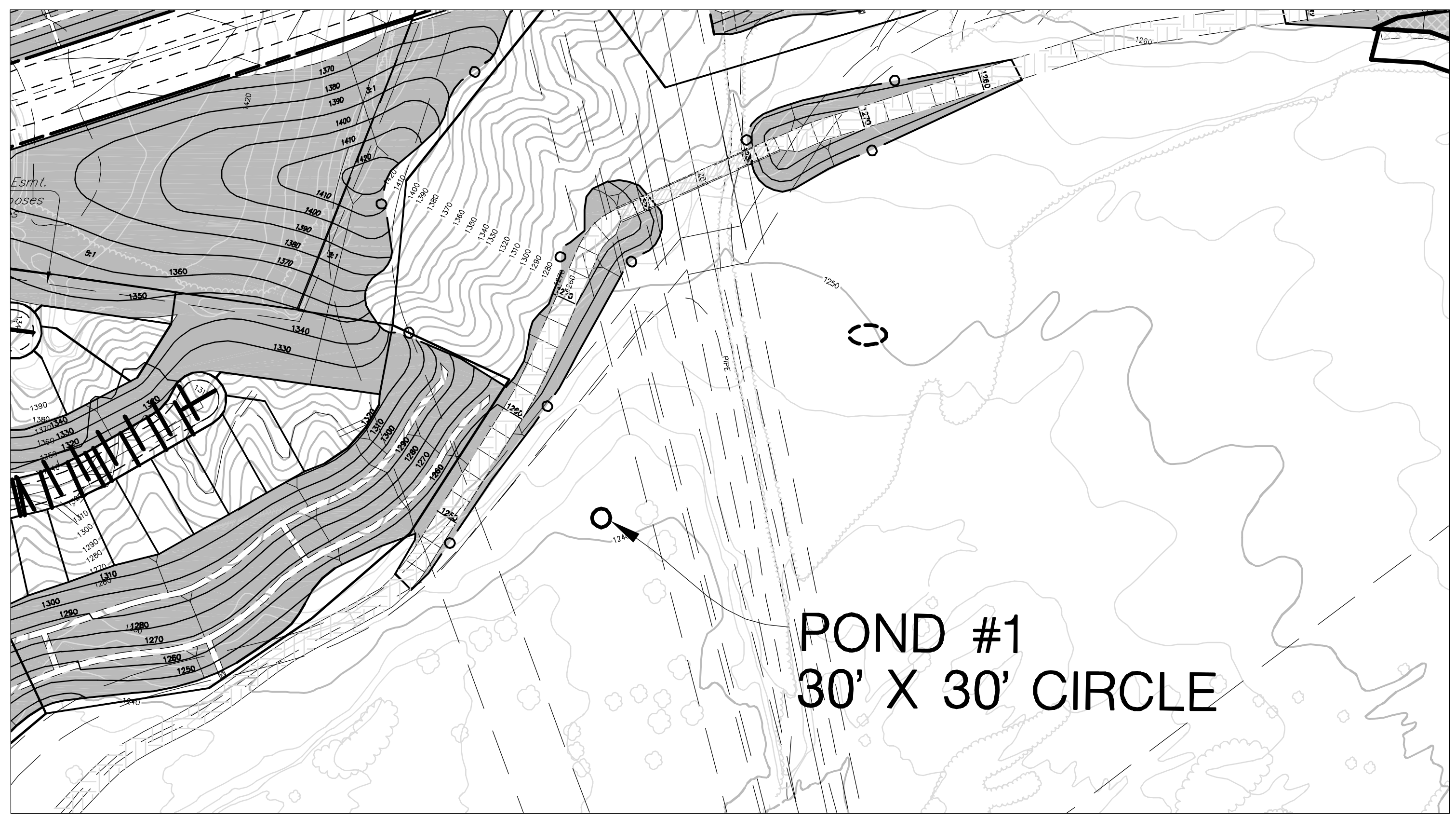
The original Plan included planting of native vegetation to further enhance the habitat around the constructed pools. After construction of both pools is complete an area of approximately 200 feet in diameter around the outer edge of each pool was to be enhanced to serve as suitable upland habitat for western spadefoot toad as it was expected much of this area would be disturbed by pond construction. It turned out that only a minimal area of about 10-20 feet beyond the limits of the ponds was disturbed. Therefore, to date the upland enhancement efforts have been limited to removal of non-native invasive materials in the vicinity of each pond. Because spadefoot toad typically burrow in more open scrub habitat, it was determined that further planting would not improve the upland habitat adjacent to either pool



VERTICAL SECTION (NORTH & SOUTH)
POND 1
HOR: 1"=15'
VER: 1"=15'



VERTICAL SECTION (EAST & WEST)
POND 1
HOR: 1"=15'
VER: 1"=15'



FEET
300 150 0
1 1/2 0
INCHES

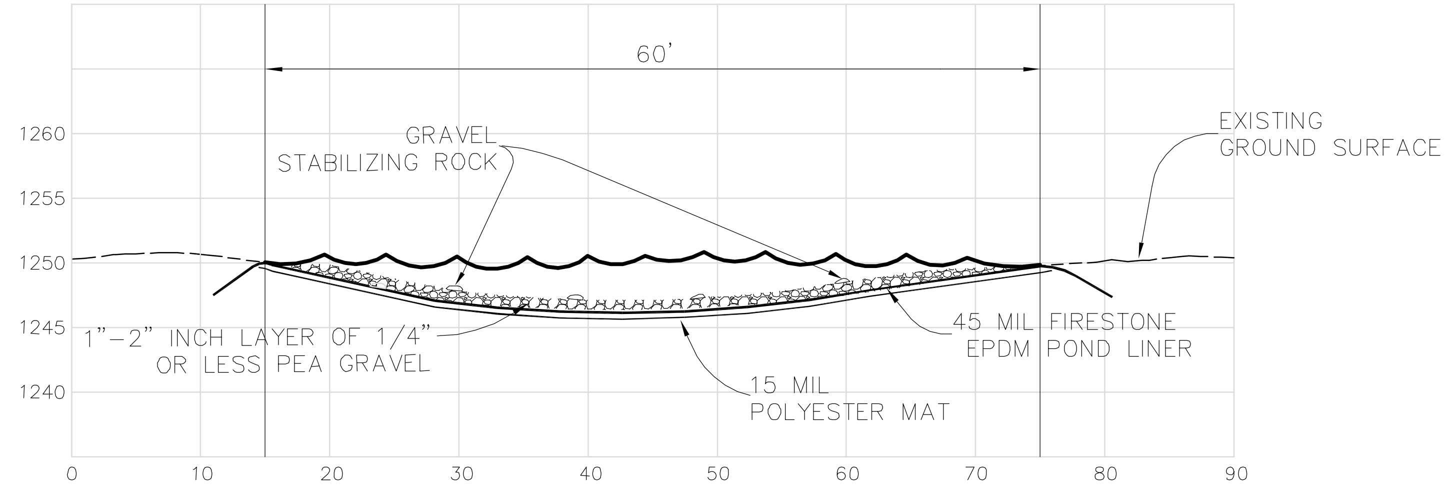
Note: For reduced size prints, original scale is in inches.

RIVER PARK
EXHIBIT 3a
MITIGATION POND #1

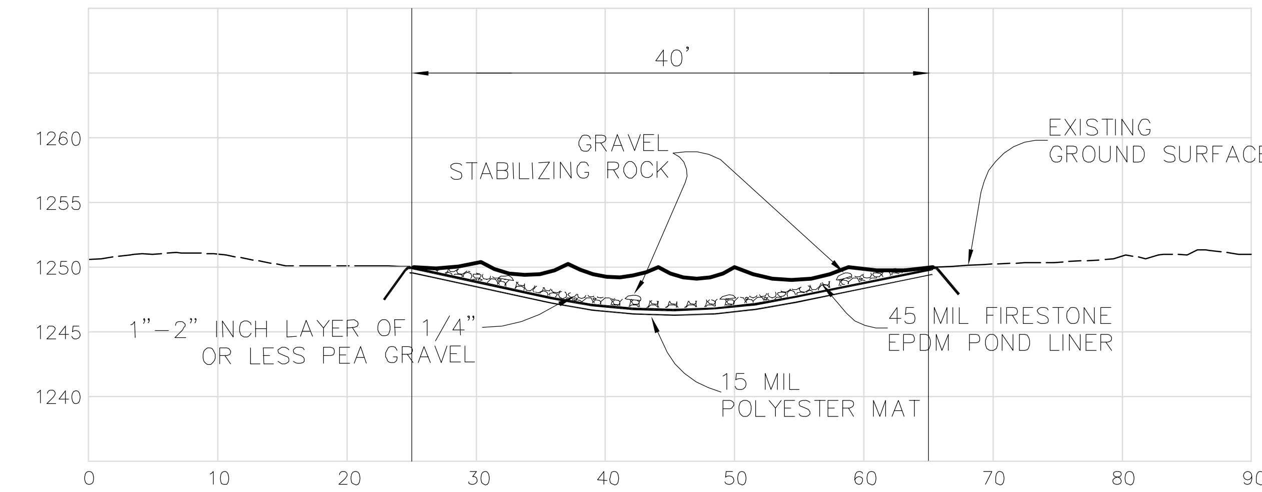
PSOMAS

NEWHALL LAND

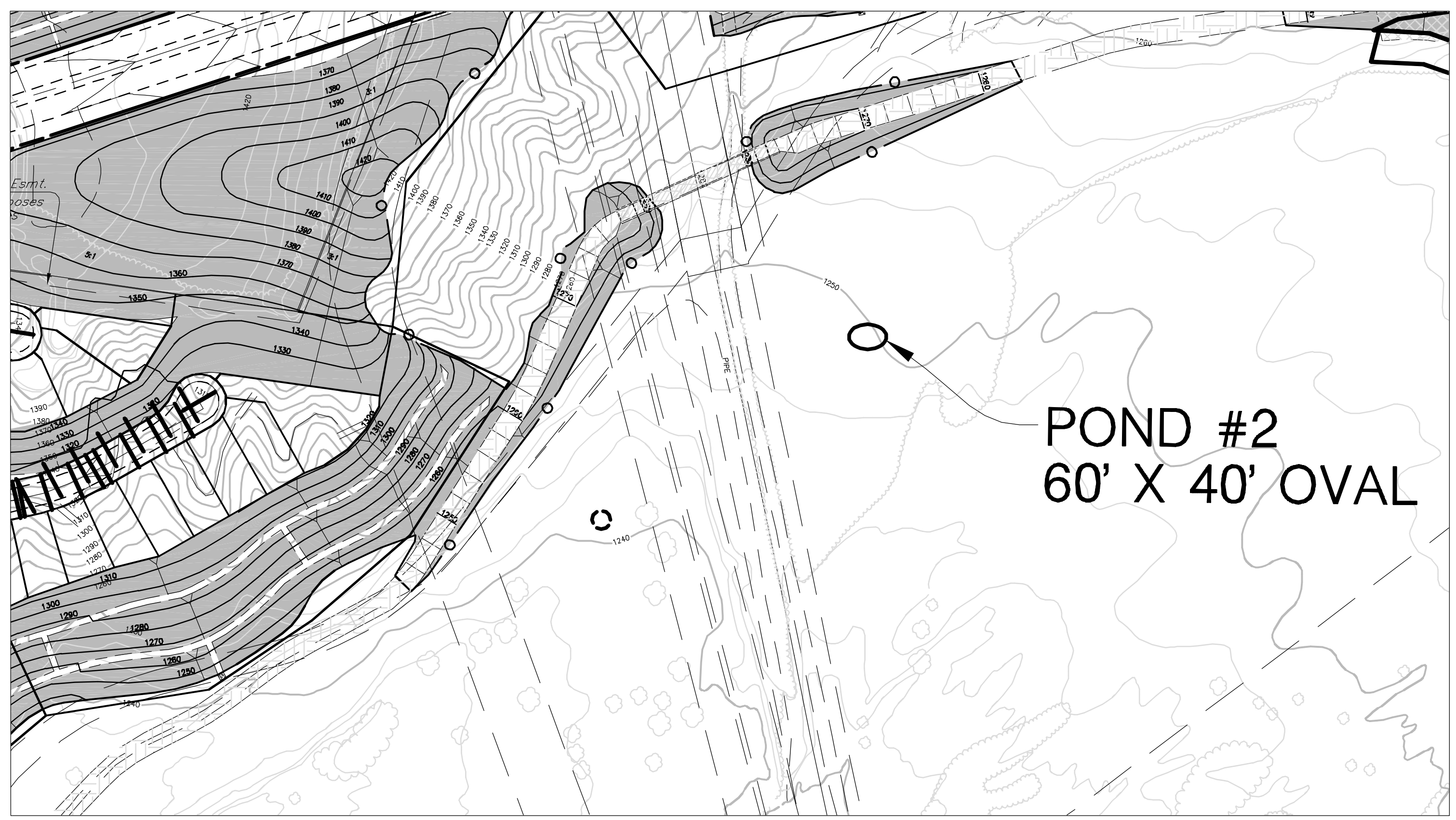
DATE: 11/12/04 REVISED ON:
JOB No: 1VAL021504 SHEET NO. 1 OF 2
RP136–01



VERTICAL SECTION (NORTH TO SOUTH)
POND 2
HOR: 1"=15'
VER: 1"=15'



VERTICAL SECTION (EAST TO WEST)
POND 2
HOR: 1"=15'
VER: 1"=15'



FEET
300 150 0
1 1/2 0
INCHES

Note: For reduced size prints, original scale is in inches.

RIVER PARK
EXHIBIT 3b
MITIGATION POND #2

PSOMAS

NEWHALL LAND

DATE: 11/12/04 REVISED ON:
JOB No: 1VAL021504 SHEET NO. 2 OF 2
RP136-02

MONITORING RESULTS

In order to ensure success of the habitat enhancement, monitoring of the enhanced habitat areas is to take place for a period of five years. The monitoring efforts included seasonal surveys for the presence/absence of western spadefoot toads and evaluation of the created breeding pools to determine if they needed any maintenance.

Beginning in early February 2006, Compliance Biology conducted the a series of surveys of the pools during and immediately following rain events. The first purpose of the intial surveys were conducted to ensure the pools held enough volume of rain to provide suitable breeding habitat for western spadefoot toad.

In mid-February, several spadefoot toad egg clusters were observed in Pond #1. The quantity of clusters suggested that three to four pairs bred in the pool. Subsequent visits in March resulted in the discovery of several additonal clusters, suggesting that at least three more pairs utlized the pond. Attached photos 3 and 4 are of clusters observed in Pond #1.

Additionaly, in early March 2006 three clusters were observed in Pond #2 (Attached Photo 5). Each of the clusters only included between 10 and 20 eggs, which indicated a single pair likely produced them.

During surveys of wet and ponded locations on the construction site during winter 2006, any observed spadefoot egg clusters were collected and re-located to Pond #2.

In addition to the spadefoot eggs, numerous egg strands from the common western toad (*Bufo boreas*) were also observed in both ponds (Attached photo 6).

Several subsequent visits were conducted over the course of the next three months to observe the status of the eggs and resulting tadpoles. At one point, Pond #1 supported several hundred spadefoot tadpoles (Attached photos 7 and 8). The tadpoles were observed to frequently hide under the larger rock and it also appeared that the rock provided suitable substrate for the growth of algae that the tadpoles were often observed grazing on.

The ultimate goal of the Plan is to provide suitable breeding habitat for western spadefoot toads relocated on the River Village project site. The first year monitoring indicates both ponds have been successful. Monitoring will continue for the next four years to ensure continued success.

REFERENCES

CDFG. 2003. Special Animals [species of special concern]. State of California, The Resources Agency, Department of Fish and Game, Natural Heritage Division, Natural Diversity Data Base, January 2003 update.

Compliance Biology, Inc. 2004. *Results of Focused Western Spadefoot Toad Surveys on the Riverpark Project Site.* Final report submitted to Newhall Land and Farming Company. March 15, 2004

Impact Sciences, Inc. 2004. *Final Environmental Impact Report for the Riverpark Project*.

Jennings, Mark R. and Marc P. Hayes. 1994. *Amphibian and Reptile Species of Special Concern in California.* Final report submitted to California Department of Fish and Game. Contract No. 8023.

Stebbins, R. C. 1985. *Western Reptiles and Amphibians*., 2nd ed. Houghton-Mifflin Company. Boston, Massachusetts.


Photo 1 – Completed Pond #1


Photo 2 – Completed Pond #2


Photo 3 – Spadefoot egg clusters in Pond #1


Photo 4 – Spadefoot egg clusters in Pond #1


Photo 5 – Spadefoot egg clusters in Pond #2


Photo 6 – Western toad egg strands in Pond #1


Photo 7 – Spadefoot tadpoles in Pond #1


Photo 8 – Spadefoot tadpoles in Pond #1

BIRD SURVEYS ALONG THE SANTA CLARA RIVER, 2003

MOUTH OF CASTIAC CREEK DOWNSTREAM TO

JUST BELOW LAS BRISAS CROSSING

Prepared for:

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July 28, 2003

REVISED

Bird Surveys along the Santa Clara River, 2003
Mouth of Castaic Creek Downstream to just below Las Brisas Crossing

Daniel A. Guthrie
W.M. Keck Science Center, Claremont Colleges
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Nature and Scope of Surveys

During the spring and early summer of 2003 surveys were conducted along the section of the Santa Clara River between its confluence with Castaic Creek and a point 1/4 mile below the Las Brisas bridge over the Santa Clara River. The total length of the section surveyed was 7.5 miles.

Each area was surveyed eight times, in accordance to the U.S. Fish and Wildlife Service Protocol for least Bell's vireo. Five of the surveys were conducted within the time frames recommended by the U.S. Fish and Wildlife Service Protocol for southwestern willow flycatcher. In order to follow least Bell's vireo protocol on kilometers covered per day, each portion (one in Los Angeles and one in Ventura County) was divided into two sections, each surveyed separately. However, observations from these two surveys are combined in data presentation (Tables 1-2).

Each survey was conducted on foot by observers well acquainted with both visual and auditory and behavioral characteristics of southern California birds. Surveys occurred approximately every other week between mid April and mid July (there was some variation in timing to avoid periods of poor weather) and occurred between 6:00 and 10:00 a.m. All birds sighted were counted, but special emphasis was placed on finding focus species, Species of Special Concern, and brown-headed cowbirds. If focus species (yellow-billed cuckoo, least Bell's vireo, southwestern willow flycatcher), were not visually observed, tapes of their calls were played in an attempt to elicit a response. Personnel for all surveys were Daniel A. Guthrie and Judith A. Sugden, both working under Federal Fish and Wildlife Service Permit number TE810394-1, issued under section 10(a)(1)(A) of the Endangered Species Act and permitted for both least Bell's vireo and southwestern willow flycatcher.

Habitat Condition and Bird Observations

Flooding during late winter and early spring of 2003 scoured many sections of the river bed, particularly in the portion in Los Angeles County. The result was extensive sandy areas and little wet riparian vegetation throughout the census period. Only along the narrower river section in Ventura County was the damage from flooding less severe. The flooding also resulted in a deepening of the river channel, leaving many sections adjacent to it dry. Annual vegetation, plentiful after the early rains, was mostly dead by early June.

Observations of all birds are shown in Tables 1-2. The numbers shown are of birds seen and heard, with heard individuals forming the majority of the observations. Numbers vary between censuses for several reasons. Bird activity varies with season. Different species breed at different times of the year. In general, species are most easily observed when they are actively defending territories by song during the establishment of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, numbers observed increase. Thus, for most resident species, numbers of adult birds are most accurately censused in April and May, when territorial activity is at a maximum. A few species such as Anna's hummingbird that nest early in the season may be underestimated. Numbers of nesting species observed may be higher than normal in May due to migratory birds passing through the area, then decrease slightly in June and early July when birds are less active during nesting, and increase in late June and July when young birds leave the nest.

Comments on Threatened and Endangered Species

Yellow-billed Cuckoo

The Yellow-billed Cuckoo is listed as a State Endangered Species. Despite playing taped calls of this species during June and July surveys, when this species might be present, no individuals of this species were observed in 2003.

Southwestern Willow Flycatcher

This subspecies is listed as Federally Endangered under the Federal Endangered Species Act. Willow flycatchers were once widespread in wet riparian woodland in southern California but now only a few individuals remain. Following the Revised Protocol (Fish And Wildlife Service, July 2000) five surveys (see tables 1-2 for dates) were conducted specifically for southwestern willow flycatcher. All surveys occurred between 6:00 and 10:00 am. and used taped calls to elicit a response if flycatchers were not first observed.

No willow flycatchers were observed during any surveys in 2003. The report forms required for this species are attached and will be forwarded to the Ventura Office of the U.S. Fish and Wildlife Service.

Least Bell's Vireo

Surveys of the wet riparian areas along the Santa Clara River followed U.S. Fish and Wildlife Service Guidelines for least Bell's vireo. Eight surveys were conducted between April 10 and July 31 (see tables 1-2 for dates). All surveys occurred between 6:00 and 10:00 am. and taped vireo calls were played if no vireos were heard or seen. In order to avoid disturbing vireos, no special efforts were made to determine nesting success or presence of leg bands once birds were observed. However, at each location where vireos were found, they were observed at least once, and no leg bands were observed.

Least Bell's vireos were regularly heard and seen in three major locations, one in Ventura County and two in Los Angeles County. Vireos have been seen in the Ventura area, (Figure 1) for several years prior to 2003. This year between there were up to 6 territorial males and 4-6 mated pair nesting along this section of the river. In July additional birds, probably young of the year, were also found as unmated territorial birds.

Least Bell's vireo were found in two locations along the Los Angeles County section of the Santa Clara River (Areas A and B, Figure 2). Sightings of vireos have occurred in both areas in previous years. Area A supported between 2 and 5 pair this year. Two of these pair disappeared after June 12 but the remaining three pair continued into July. The second area supporting vireos (B in figure 2) had two and possibly three singing males starting June 23 and continuing through July 4th. These birds may have been young of the year. They appeared young and no mates were observed.

Comments on Sensitive Species

Great Blue Heron

Great Blue Herons are listed on the California Natural Diversity Data Base as a species that warrants monitoring. Individuals of this species was observed sparingly along the river after the breeding season and along other sections of the river during winter and migration. No nesting was observed.

White-tailed Kite

This species is considered a Species of Management Concern by the U.S. Fish and Wildlife Service. A single kite was observed on June 23 and July 5 in riparian woodland near the Los Angeles/Ventura County line.

Cooper's Hawk

Cooper's hawk is considered a Species of Special Concern by the State of California. A single Cooper's hawk was observed hunting along the main river on June 25th.

Yellow Warbler

The yellow warbler is considered a Species of Special Concern by the State of California. Yellow warblers prefer wet riparian habitat but are also found in large cottonwoods in drier riparian areas. Singing yellow warblers were observed throughout the survey period in small numbers. Most sightings were in the areas where least Bell's vireos were present (Figures 1-2)

Yellow-breasted Chat

The yellow-breasted chat is considered a Species of Special Concern by the State of California. The numbers of chats calling from territories along this section of riparian woodland are about the same number as observed here in previous years. . Most sightings were in the areas where least Bell's vireos were present (Figures 1-2) . A few additional birds were regularly heard in a dry riparian woodland on the north side of the river (C in Figure 2).

Lawrence's Goldfinch

This species is a highest priority species on the Audubon Birds to Watch list for 1996 and is a Bird of Management Concern for the Fish and Wildlife Service. Although a species of the coastal sage, a few individuals of this species visited the riparian zone of the Santa Clara River after their nesting season.

Comments on Brown Headed Cowbird

Cowbirds were regularly observed in all sections of the study area and seemed to be attracted by tapes of least Bell's vireo calls. Numbers remained high along the river throughout the survey period.

Summary

No yellow billed-cuckoos or willow flycatchers were observed during 2003

About 10 pair of least Bell's vireos were observed along this section of the Santa Clara River during 2003, six in Ventura County and four in Los Angeles County. This is a slight increase from previous years. This greater success may reflect greater nesting success and population increase of this species statewide but also may be due to the presence of fewer cowbirds along the river due to cowbird trapping and a much reduced amount of cattle grazing.

Among species of concern, the riparian species; yellow warbler and yellow-breasted chat occurred in small numbers in riparian woodlands along the river. There were single observations of two raptors the white-tailed kite and Cooper's hawk. Both species nest in riparian woodlands, but the scarcity of observations indicates that nesting did not occur along this stretch of the Santa Clara River this year. One wintering and migrant species of concern, the great blue heron, was observed feeding in small numbers on the river, but did not nest in the area. Finally, one coastal sage species, Lawrence's goldfinch, was observed along the river in small numbers as visitors from nearby coastal sage habitat.

Table 1. BIRDS OF THE SANTA CLARA RIVER BASIN,2003: Santa Clara River from the mouth of Castaic Creek downstream to the Los Angeles/Ventura County Line.									
Endangered Species and Species of Concern Shaded									
				Dates of Surveys					
SPECIES	STATUS	4/20,24	5/1,4	5/16,18	5/31;6/2	6/11,12	6/23,25	7/4,5	7/14,15
Great Blue Heron	m,w	1	0	0	0	1	2	2	1
Green Heron	r	0	0	0	1	2	0	1	0
Black-cr. Night Heron	r,m	0	0	0	0	0	0	1	0
Turkey Vulture	r	0	1	0	0	0	0	0	0
Mallard	r	6	3	2	6	6	8	0	0
White-tailed Kite	r	0	0	0	0	0	1	0	0
Red-shouldered Hawk	r	4	0	1	0	0	0	0	1
Red-tailed Hawk	r	0	3	3	2	1	1	2	6
American Kestrel	r	0	2	1	0	2	0	0	0
California Quail	r	9	22	16	11	26	19	29	22
Killdeer	r	13	10	15	19	10	22	6	15
Spotted Sandpiper	s	1	0	6	4	3	2	0	3
Least Sandpiper	m	2	0	0	0	0	0	0	0
California Gull	v,m	0	0	30	0	0	0	0	0
Western Gull	v	0	0	0	0	12	0	4	0
Rock Dove	r	3	2	6	0	0	0	0	0
Common Ground Dove	r	0	0	1	0	0	0	0	0
Mourning Dove	r	16	25	17	8	26	11	25	12
Greater Roadrunner	r	1	0	0	0	0	0	0	1
Great Horned Owl	r	0	5	0	0	0	0	0	0
Vaux's Swift	m	0	34	0	0	0	0	0	0
Anna's Hummingbird	r	1	2	5	2	1	1	5	4
Nuttall's Woodpecker	r	3	8	6	5	13	7	12	9
Downy Woodpecker	r	2	0	2	0	3	2	2	2
Hairy Woodpecker	r	0	1	1	0	1	2	0	3
Northern Flicker	r	1	0	0	1	0	2	2	2
Pacific Slope Flycatcher	s	0	0	1	0	0	0	0	1
Black Phoebe	r	0	0	0	1	2	1	3	6
Ash-throated Flycatcher	s	8	19	15	12	11	14	9	11
Western Kingbird	s	0	6	4	2	6	0	2	0
Bell's Vireo	s	4	3	5	0	4	4	3	2
Warbling Vireo	s	0	1	1	0	0	0	0	0
Western Scrub Jay	r	11	10	8	5	6	10	15	10
American Crow	r	2	2	8	25	11	7	15	52
Common Raven	r	17	11	7	7	16	38	16	10
Tree Swallow	s	1	3	0	0	4	2	0	0
Violet-green Swallow	s	1	2	4	2	0	4	0	0
N. Rough-winged Swallow	s	2	10	0	5	0	18	2	0
Cliff Swallow	s	12	8	16	10	64	32	4	23
Barn Swallow	s	0	0	0	0	0	0	1	0
Oak Titmouse	r	11	18	12	3	11	11	15	10
Bushtit	r	2	0	8	0	23	6	19	5
Bewick's Wren	r	34	31	25	28	16	32	42	20
House Wren	r	13	30	40	6	18	8	6	8

Table 1 (cont.). BIRDS OF THE SANTA CLARA RIVER BASIN,2003: Santa Clara River from the mouth of Castaic Creek downstream to the Los Angeles/Ventura County Line.

Endangered Species and Species of Concern Shaded

		Dates of Surveys							
SPECIES	STATUS	4/20,24	5/1,4	5/16,18	5/31;6/2	6/11,12	6/23,25	7/4,5	7/14,15
Western Bluebird	r	2	12	8	5	10	7	5	16
American Robin	r	0	0	0	0	0	1	0	0
Wrentit	r	6	6	6	5	8	12	6	11
Northern Mockingbird	r	0	1	0	0	0	0	2	0
California Thrasher	r	0	0	2	1	1	0	0	2
European Starling	r	4	14	14	12	21	0	17	0
Phainopepla	r	0	0	0	0	2	0	3	1
Orange-crowned Warbler	w,m	2	0	0	0	0	0	0	0
Nashville Warbler	m	0	1	0	0	0	0	0	0
Yellow Warbler	s,m	9	8	6	2	5	1	2	1
Yellow-rumped Warbler	w,m	1	6	0	0	0	0	0	0
Townsend's Warbler	m	0	1	0	0	0	0	0	0
Common Yellowthroat	r	4	16	16	13	9	19	11	3
Wilson's Warbler	m	3	1	1	0	0	0	0	0
Yellow-breasted Chat	s	3	7	9	7	7	6	7	3
Western Tanager	m	0	5	0	0	0	0	0	0
Spotted Towhee	r	12	13	7	24	17	15	5	3
California Towhee	r	18	20	12	12	26	14	30	18
Lark Sparrow	r	0	0	0	0	0	0	0	1
Savannah Sparrow	w,m	0	1	0	0	0			
Song Sparrow	r	52	48	52	56	60	64	54	36
Black-headed Grosbeak	s	23	29	15	8	7	13	12	4
Blue Grosbeak	s	2	3	0	4	5	4	7	10
Lazuli Bunting	s	0	0	1	0	0	0	3	5
Painted Bunting	m	0	1	0	0	0	0	0	0
Red-winged Blackbird	s	4	30	12	14	18	35	23	2
Brewer's Blackbird	r	12	0	0	0	0	0	10	0
Brown-headed Cowbird	s	14	3	10	3	7	7	6	5
Bullock's Oriole	s	0	18	2	0	6	7	12	2
House Finch	r	10	29	21	20	32	21	44	76
Lesser Goldfinch	r	4	1	14	2	2	0	2	5
Lawrence's Goldfinch	r	0	0	0	0	0	3	0	0
American Goldfinch	w,m,r	24	17	0	0	0	0	0	0

Status: m, migrant; r, resident; s, summer only; w, winter

Table 2. Birds of the Santa Clara River Basin, 2003: Santa Clara River from Los Angeles/Ventura County line to 1/2 mile below Las Brisas Crossing.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	4/24	5/4	5/16	5/31	6/11	6/25	7/5	7/15
				Dates of Surveys					
Pied-billed Grebe	m	0	0	0	0	0	0	0	1
Great Blue Heron	m,w	0	0	0	0	0	2	0	0
Snowy Egret	m,w	4	0	0	0	0	0	0	0
Green Heron	r	1	0	2	0	1	4	0	1
Black-crowned Night-heron	m,w	0	1	1	0	5	2	2	0
Mallard	r	7	5	5	4	5	10	9	13
White-tailed Kite	r	0	0	0	0	0	0	1	0
Cooper's Hawk	r	0	0	0	0	0	1	0	0
Red-shouldered Hawk	r	2	0	1	1	1	1	0	1
Red-tailed Hawk	r	5	3	3	2	3	2	1	2
American Kestrel	r	0	0	0	0	1	0	0	0
California Quail	r	21	51	22	25	25	25	45	17
Killdeer	r	8	6	18	10	13	17	10	9
Spotted Sandpiper	s	0	0	0	2	4	4	4	6
Least Sandpiper	m	3	0	0	0	0	0	0	0
Wilson's Snipe	m,	0	0	0	0	0	0	0	1
Rock Dove	r	4	0	2	0	0	0	1	0
Mourning Dove	r	18	41	24	25	44	30	39	26
Vaux's Swift	m	0	42	0	0	0	0	0	0
White-th. Swift	r	0	0	3	0	0	0	0	0
Allen's Hummingbird	r,m	0	0	0	0	0	0	1	1
Black-chinned Hummingbird	s	2	0	1	0	0	0	2	6
Anna's Hummingbird	r	9	8	18	3	6	9	8	18
Belted Kingfisher	m	2	0	0	0	0	0	0	0
Acorn Woodpecker	r	2	0	0	2	0	0	0	0
Nuttall's Woodpecker	r	7	6	7	10	10	10	8	7
Downy Woodpecker	r	5	3	8	8	5	3	4	0
Hairy Woodpecker	r	1	2	0	0	4	2	0	0
Northern Flicker	r	1	0	0	1	0	0	0	0
Western Wood-Pewee	m	0	1	0	0	0	0	0	0
Pacific Slope Flycatcher	s	1	2	0	1	0	2	1	3
Black Phoebe	r	9	12	5	4	8	12	16	8
Say's Phoebe	r	0	0	0	0	0	0	1	0
Ash-throated Flycatcher	s	18	24	18	13	24	19	12	16
Cassin's Kingbird	s	0	0	0	0	1	0	0	0
Western Kingbird	s	0	0	1	1	2	2	4	3
Bell's Vireo	s	7	8	10	4	4	11	9	6
Warbling Vireo	m	0	1	2	0	0	0	1	0
Western Scrub Jay	r	23	15	20	19	13	8	14	4
American Crow	r	3	5	4	7	1	13	2	2
Common Raven	r	13	10	3	11	11	23	11	15
Violet-green Swallow	s	0	2	3	0	0	0	0	0
N. Rough-winged Swallow	s	0	15	3	3	0	12	0	2
Cliff Swallow	s	239	400	600	176	275	352	156	214

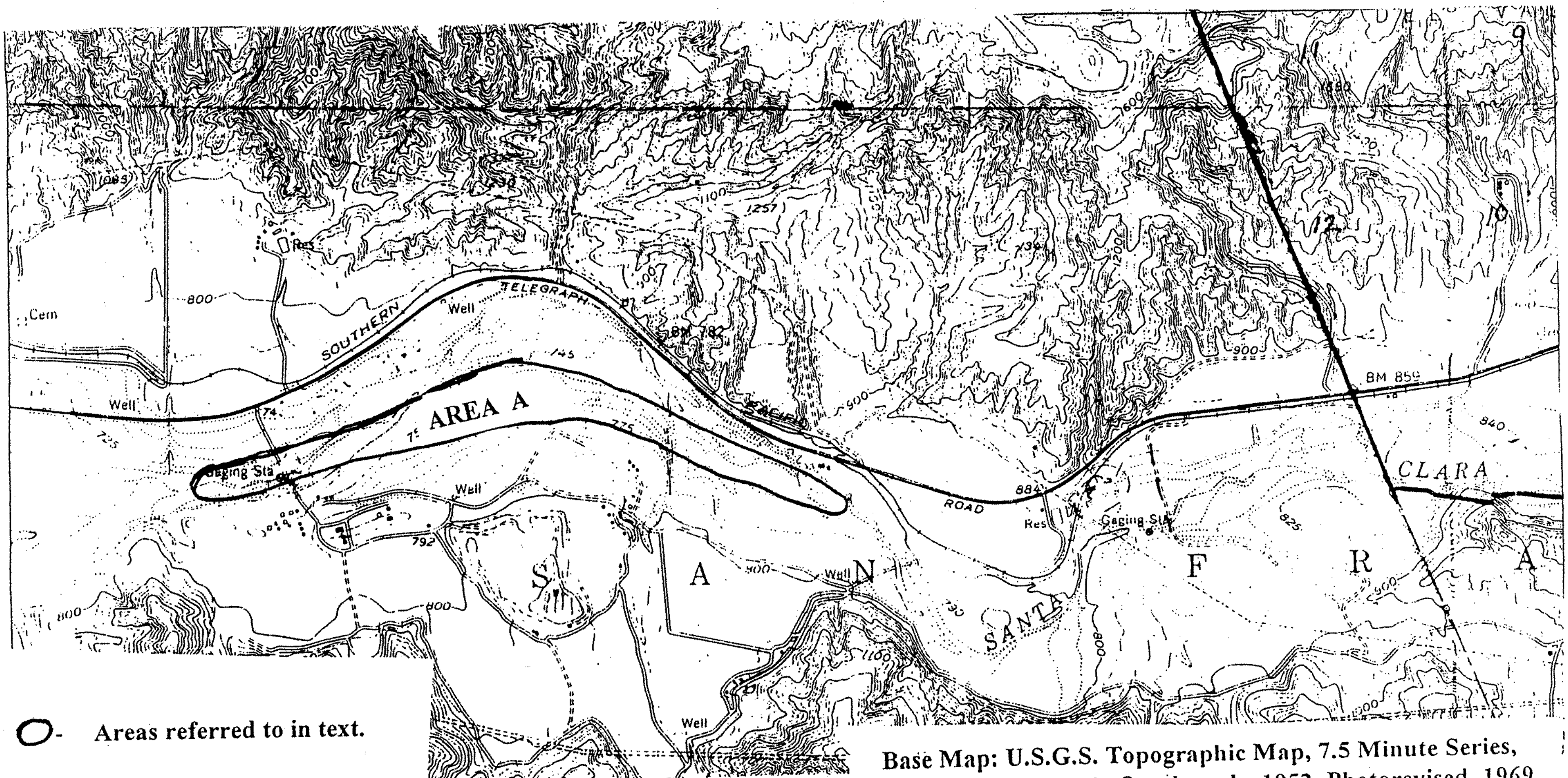
Table 2.(cont.) Birds of the Santa Clara River Basin, 2003: Santa Clara River from Los Angeles/Ventura County line to 1/2 mile below Las Brisas Crossing.

Endangered Species and Species of Concern Shaded

		Dates of Surveys							
SPECIES	**STATUS**	**4/24**	**5/4**	**5/16**	**5/31**	**6/11**	**6/25**	**7/5**	**7/15**
Barn Swallow	s	0	1	0	0	0	0	0	0
Violet-green Swallow	s	0	2	3	0	0	0	0	0
N. Rough-winged Swallow	s	0	15	3	3	0	12	0	2
Cliff Swallow	s	239	400	600	176	275	352	156	214
Barn Swallow	s	0	1	0	0	0	0	0	0
Oak Titmouse	r	13	7	0	6	12	13	4	4
Bushtit	r	12	10	31	20	26	35	3	6
White-breasted Nuthatch	r	1	0	0	0	0	0	0	0
Canyon Wren	r	1	0	0	0	0	0	0	0
Bewick's Wren	r	72	44	53	47	29	40	32	37
House Wren	r	13	30	40	6	18	0	0	2
Western Bluebird	r	3	4	2	1	2	0	9	1
American Robin	r	1	1	3	0	1	0	0	0
Wrentit	r	12	29	14	11	13	17	11	28
Northern Mockingbird	r	0	0	0	1	0	0	1	0
California Thrasher	r	3	6	2	1	2	8	2	3
European Starling	r	6	15	1	9	201	49	4	0
Cedar Waxwing	w,m	9	25	3	0	0	0	0	0
Phainopepla	r	2	2	5	4	6	1	4	3
Orange-crowned Warbler	w,m	3	0	1	0	0	0	0	0
Yellow Warbler	s,m	13	8	5	4	4	3	3	1
Yellow-rumped Warbler	w,m	8	6	0	0	0	0	0	0
Common Yellowthroat	r	46	25	24	23	28	62	68	24
Wilson's Warbler	m	1	22	7	0	0	0	0	0
Yellow-breasted Chat	s	6	9	2	7	3	3	1	2
Western Tanager	m	0	8	0	0	0	0	0	0
Spotted Towhee	r	29	82	34	27	53	23	16	32
California Towhee	r	52	78	56	46	39	43	44	32
Lark Sparrow	r	0	0	0	0	0	3	7	0
Song Sparrow	r	113	85	83	78	74	120	100	84
Black-headed Grosbeak	s	28	34	17	19	12	12	28	18
Blue Grosbeak	s	2	4	1	1	0	1	4	0
Lazuli Bunting	s	2	0	1	1	2	5	0	3
Red-winged Blackbird	s	4	6	10	10	254	9	17	37
Great-tailed Grackle	r	0	2	0	0	0	0	0	0
Brewer's Blackbird	r	3	3	0	0	0	9	16	4
Brown-headed Cowbird	s	30	26	9	12	19	20	26	23
Hooded Oriole	s	0	5	0	0	2	0	0	0
Bullock's Oriole	s	4	13	10	6	12	5	5	6
House Finch	r	33	41	19	30	38	35	37	68
Lesser Goldfinch	r	21	36	22	20	30	33	29	17
Lawrence's Goldfinch	r	0	0	0	0	0	0	4	2
American Goldfinch	w,m,r	23	10	2	3	9	3	0	3

Status: m, migrant; r, resident; s, summer only; w, winter

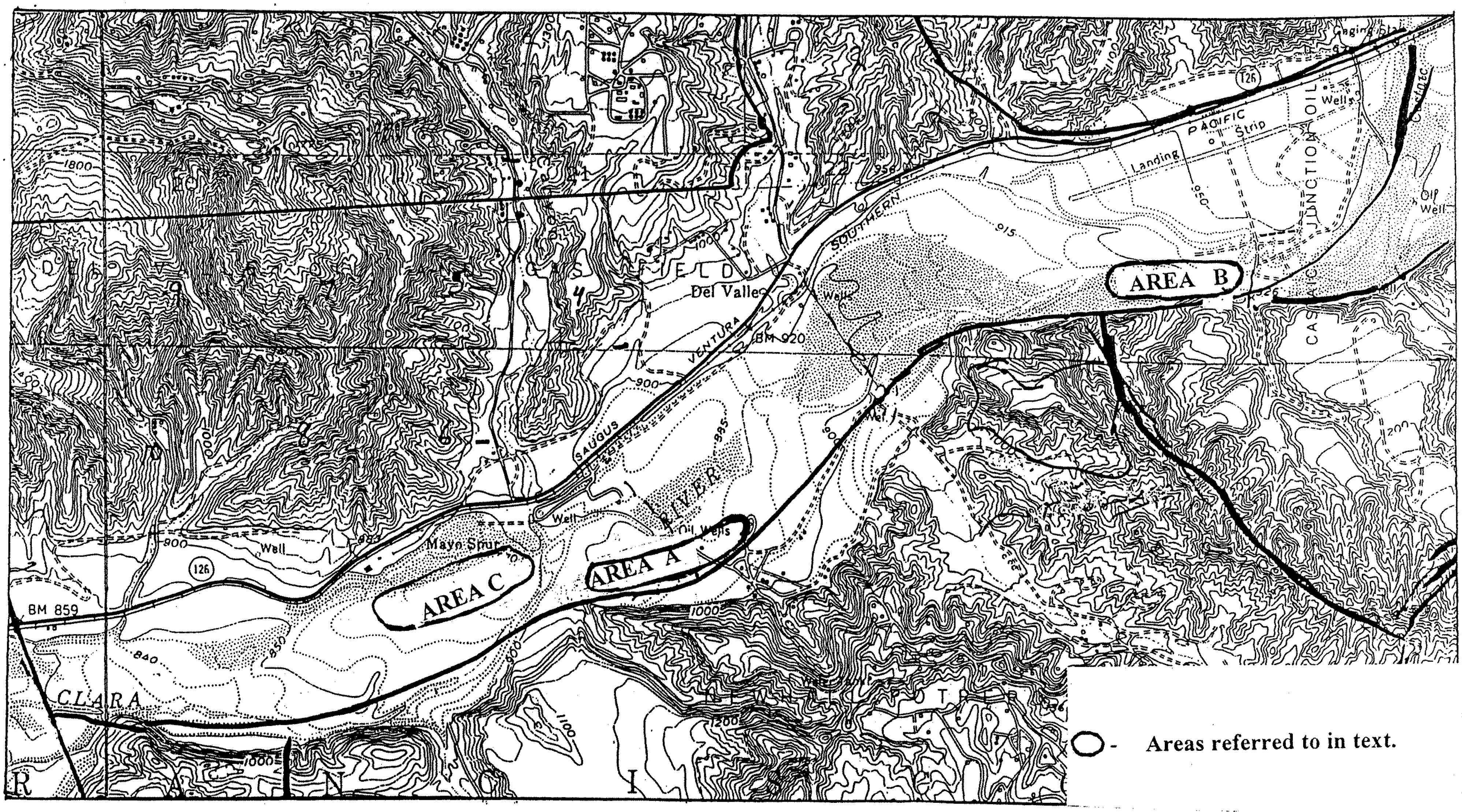
Figure 1. Survey Area in Ventura County.



O- Areas referred to in text.

Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series, Val Verde Quadrangle, 1952. Photorevised, 1969.

Figure 2. Survey Area in Los Angeles County



Base Map: U.S.G.S. 7.5 minute topographic map for Val Verde, California, 1952, photorevised 1969.

Willow Flycatcher Survey and Detection Form (rev. 4/98)

Site Name____Santa Clara River: Newhall Ranch, Los Angeles County_______Total Site No ________________________

Was site surveyed in previous year? **Yes** No Drainage Santa Clara River
If yes, what site name was used? __lower Santa Clara River__________
County __Los Angeles________________________ State__CA____ USGS Quad Name Val Verde____

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)?* X☐ *Yes* ☐ *No
Site Coordinates: Start: N__34 25.300________________ W 118 36.755____________ UTM
Stop: N__34 24.197________________ W 118 41.307____________ UTM Zone ________
Elevation ____840-950 ft.___________ feet / meters (circle one)

***** Fill in additional site information on back of this page *****

Survey # Observer(s)	Date (m/d/y) Survey time	Number of WIFLs Found	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign Y or N	Comments about this survey (e.g., evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
D. Guthrie	Date 5/16,18 start 7-9:30 6:30-7:30 total hrs _2.5	0	0	0	n	Y	Y	
D. Guthrie	Date 6/11,12 Start 6:30-9 6 - 7 total hrs _3.5	0	0	0	n	Y	Y	
D. Guthrie	Date 6/23,25 Start 6:30-8:45 6-7 total hrs 3.25_	0	0	0	n	Y	Y	
D. Guthrie	Date 7/4,5 start 6 – 8:15 6-7 total hrs 2.25\	0	0	0	n	Y	Y	Immature of the year?
D. Guthrie	Date 7/14,15 start 6-6:45 6 - 8 total hrs _2.75_	0	0	0	n	Y	Y	

Overall Site Summary (Total only resident WIFLs)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? No
Total survey hrs___14.25	0	0	0	0	If yes, report color combination(s) in the comments section on back of form

Name of Reporting Individual ____Dan Guthrie_____________ Date Report Completed ___7/20/03________________

Submit the original of this form. Retain a copy for your records.

Fill in the following information completely. Submit original form. Retain copy for your records.

Name of Reporting Individual ___Dan Guthrie________________________ Phone # _909 607 2836____________

Affiliation __Claremont Colleges__________________________ Email dguthrie@jsd.claremont.edu_______________

Site Name__Santa Clara River:Newhall Ranch, los Angeles County
Did you verify that this site name is consistent with that used in previous years? Yes No ? (circle one)
This is a section of site previously lumped as lower Santa Clara River
Management Authority for Survey Area (circle one):

Federal Municipal/County State Tribal **Private**

Name of Management Entity or Owner (e.g., Tonto National Forest) _Newhall Land Co.________________________

Length of area surveyed: _4 miles_____ (specify units, e.g., miles = mi, kilometers = km, meters = m)

Did you survey the same general area during each visit to this site this year? **Yes /** If no, summarize in comments below.

If site was surveyed last year, did you survey the same general area this year? **Yes /** If no, summarize in comments below.

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

XX Native broadleaf plants

☐ Mixed native and exotic plants (mostly native)
(entirely or almost entirely, includes high-elevation willow)

☐ Mixed native and exotic plants (mostly exotic) ☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: __Cottonwood, willow, ___________________________________

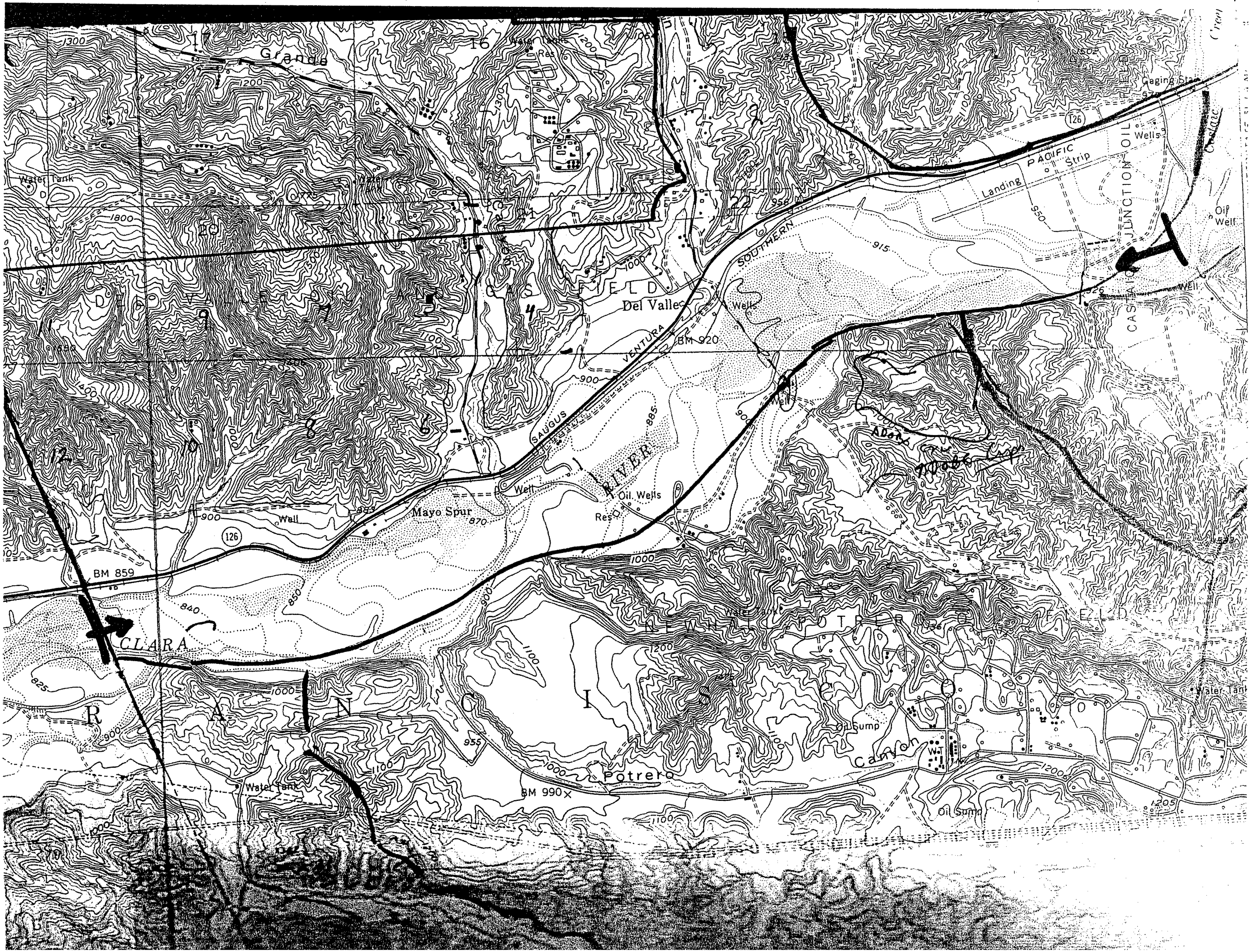
Average height of canopy: __40 ft.____________________________ (specify units)

Was surface water or saturated soil present at or adjacent to site? YES .
Distance from the site to surface water or saturated soil: _____________ (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? **No** (circle one)
If yes, describe in comments section below. no water present except for 50 yd section trickle in center of section.

Remember to attach a xerox copy of a USGS quad/topographical map (REQUIRED) of the survey area, noting the survey site and location of WIFL detections. You may also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map.

Comments (attach additional sheets if necessary):____



Grande
Water Tank
Del Valle
BM 920
SOUTHERN
PACIFIC
Landing Strip
Wells
Oil Well
Gaging Sta
CASTAIC JUNCTION OIL FIELD
VENTURA
SAUGUS
RIVER
Oil Wells
Mayo Spur
BM 859
CLARA
NEWHALL POTRERO OIL FIELD
Water Tank
Oil Sump
Canyon
Potrero
BM 990

Willow Flycatcher Survey and Detection Form (rev. 4/98)

Site Name____Santa Clara River, Newhall Ranch, Ventura Co.___________________Total Site No ___________________

Was site surveyed in previous year? **Yes** No Drainage Santa Clara River
If yes, what site name was used? Lower Santa Clara River
County __Ventura____________________________ State__CA____ USGS Quad Name Val Verde____

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? *X☐ Yes ☐ No*
Site Coordinates: Start: N__34 24.197________________ W 118 41.307____________ UTM
Stop: N__34 24.265________________ W 118 44.370____________ UTM Zone ________
Elevation ____725-850 ft.___________ feet / meters (circle one)

***** Fill in additional site information on back of this page *****

Survey # / Observer(s)	Date (m/d/y) / Survey time	Number of WIFLs Found	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign Y or N	Comments about this survey (e.g., evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
D. Guthrie J.Sugden_____ ___________	Date 5/16 start 6.45 stop 9:15 total hrs _2.5____	0	0	0	n	Y	n	
D. Guthrie _J. Sugden_ ___________	Date 6/11 Start 6:15 Stop 9.15 total hrs _3___	0	0	0	n	Y	N	
D. Guthrie J. Sugden_____ ___________	Date 6/25 Start 7 Stop 9 total hrs _2.0__	0	0	0	n	Y	N	
D. Guthrie J. Sugden__ ___________	Date 7/5 start 6:45 stop 8:45 total hrs 2.0_	0	0	0	n	Y	N	Immature of the year?
D. Guthrie _J. Sugden__ ___________	Date 7/15 start 6:45 stop 8:45 total hrs _2.0____	0	0	0	n	Y	N	

Overall Site Summary (Total only resident WIFLs) Total survey hrs__11.5 Sugden. 5.0 guthrie	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? No
	0	0	0	0	If yes, report color combination(s) in the comments section on back of form

Name of Reporting Individual ____Dan Guthrie_____________ Date Report Completed ___7/20/03________________

Submit the original of this form. Retain a copy for your records.

Fill in the following information completely. Submit original form. Retain copy for your records.

Name of Reporting Individual ___Dan Guthrie________________________ Phone # _909 607 2836____________

Affiliation __Claremont Colleges_________________________ Email dguthrie@jsd.claremont.edu_______________

Site Name__Santa Clara River, Newhall Ranch, Ventura Co.________________________________
Did you verify that this site name is consistent with that used in previous years? **Yes** No ? (circle one)
called lower Santa Clara River in previous surveys.

Management Authority for Survey Area (circle one):

Federal Municipal/County State Tribal **Private**

Name of Management Entity or Owner (e.g., Tonto National Forest) _Newhall Land Co._______________________

Length of area surveyed: _3 miles_____ (specify units, e.g., miles = mi, kilometers = km, meters = m)

Did you survey the same general area during each visit to this site this year? **Yes** / If no, summarize in comments below.

If site was surveyed last year, did you survey the same general area this year? **Yes** / If no, summarize in comments below.

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):
XX Native broadleaf plants
☐ Mixed native and exotic plants (mostly native)
(entirely or almost entirely, includes high-elevation willow)
☐ Mixed native and exotic plants (mostly exotic) ☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: __Cotrtonwood, willow, tamarisk__________________________________

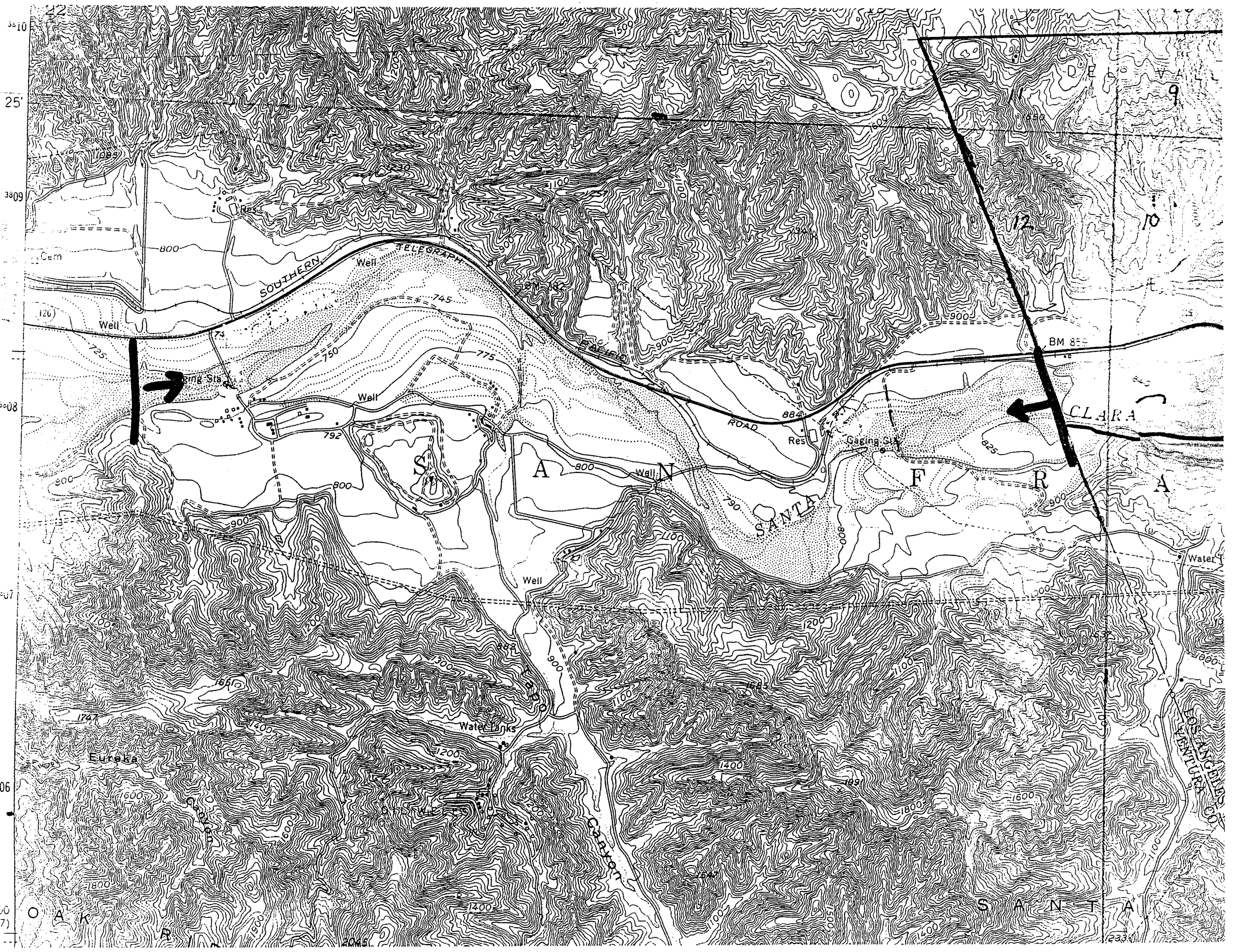
Average height of canopy: __40 ft.___________________________ (specify units)

Was surface water or saturated soil present at or adjacent to site? **Yes** – river free flowing through whole section.
Distance from the site to surface water or saturated soil: _____________ (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? **No** (circle one)
If yes, describe in comments section below. no water present except for 50 yd section trickle in center of section.

Remember to attach a xerox copy of a USGS quad/topographical map (REQUIRED) of the survey area, noting the survey site and location of WIFL detections. You may also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map.

Comments (attach additional sheets if necessary):____



SANTA CLARA
SAN FRA
SOUTHERN
TELEGRAPH
ROAD
Well
Gaging Sta
Res
Cem
BM 859
884
792
745
750
775
725
790
800
825
900
Lopo
Canyon
Water Tanks
Eureka
Canyon
SANTA
OAK
LOS ANGELES CO
VENTURA CO
DE VALL
12
10
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3810
3809
3808
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3806
25'

Bird Surveys Along a Portion of Castaic Creek Within the Proposed Castaic Mesa Project

BIRD SURVEYS ALONG A PORTION OF CASTAIC CREEK

WITHIN THE PROPOSED CASTAIC MESA PROJECT,

Prepared for:

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Valencia Corporation
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Valencia, Ca. 91355

Prepared by:

Daniel A. Guthrie
W.M. Keck Science Center
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Claremont Ca. 91711
(909) 607-2836
dguthrie@jsd.claremont.edu

July 28, 2003

REVISED

Bird Surveys along a Portion of Castaic Creek within the Proposed Castaic Mesa Project

Prepared by: Daniel A. Guthrie
W.M. Keck Science Center
925 N. Mills Ave
Claremont Ca. 91711
(909) 607-2836

Nature and Scope of Surveys

During the spring and early summer of 2003 surveys were conducted a portion of Castaic Creek directly south of Lake Hughes Road and extending south to a fence marking the boundary of the Los Angeles County Jail property, a distance of approximately one half mile (Figure 1).

Eight surveys were conducted in accordance to the U.S. Fish and Wildlife Service Protocol for least Bell's vireo. Five of the surveys were conducted within the time frames recommended by the U.S. Fish and Wildlife Service Protocol for southwestern willow flycatcher.

Each survey was conducted on foot by observers well acquainted with both visual and auditory and behavioral characteristics of southern California birds. Surveys occurred approximately every other week between mid April and mid July (there was some variation in timing to avoid periods of poor weather) and occurred between 6:00 and 10:00 a.m. All birds sighted were counted, but special emphasis was placed on finding focus species, Species of Special Concern, and brown-headed cowbirds. If focus species (yellow-billed cuckoo, least Bell's vireo, southwestern willow flycatcher), were not visually observed, tapes of their calls were played in an attempt to elicit a response. Personnel for all surveys were Daniel A. Guthrie and Judith A. Sugden, both working under Federal Fish and Wildlife Service Permit number TE810394-1, issued under section 10(a)(1)(A) of the Endangered Species Act and permitted for both least Bell's vireo and southwestern willow flycatcher.

Habitat Condition and Bird Observations

Runoff from the lake immediately on the north side of Lake Hughes Rd. creates a shallow lake along most of the surveyed section of the stream, which was full of water throughout the census period. This linear pond is bounded by an edge of willow and cottonwood. The banks of the stream rise steeply so that there is little development of wet riparian vegetation. The surrounding vegetation is mostly coastal sage scrub and ruderal where clearing has occurred in the past.

Observations of all birds are shown in Table 1. The numbers shown are of birds seen and heard, with heard individuals forming the majority of the observations. Numbers vary between censuses for several reasons. Bird activity varies with season. Different species breed at different times of the year. In general, species are most easily observed when they are actively defending territories by song during the establishment of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, numbers observed increase. Thus, for most resident species, numbers of adult birds are most accurately censused in April and

May, when territorial activity is at a maximum. A few species such as Anna's hummingbird that nest early in the season may be underestimated. Numbers of nesting species observed may be higher than normal in May due to migratory birds passing through the area, then decrease slightly in June and early July when birds are less active during nesting, and increase in late June and July when young birds leave the nest.

Comments on Threatened and Endangered Species

Yellow-billed Cuckoo

The Yellow-billed Cuckoo is listed as a State Endangered Species. No individuals of this species were observed in 2003.

Southwestern Willow Flycatcher

This subspecies is listed as Federally Endangered under the Federal Endangered Species Act. Willow flycatchers were once widespread in wet riparian woodland in southern California but now only a few individuals remain. Following the Revised Protocol (Fish And Wildlife Service, July 2000) five surveys (see table 1 for dates) were conducted specifically for southwestern willow flycatcher. All surveys occurred between 6:00 and 10:00 am. and used taped calls to elicit a response if flycatchers were not first observed.

A single willow flycatchers was observed approximately 200 yards below Lake Hughes Rd. on the west side of the stream on both May 15th and June 2nd (Figure 1). The bird was not singing on either visit, but did respond to a taped call. This bird could not be relocated on subsequent visits.

Willow flycatchers are fairly common migrants through southern California and most of the migrants are believed to be of the common subpsecies of willow flycatcher, *E. t. brewsteri,* which breeds throughout southern Canada and the northern United States, rather than representatives of the southwestern subspecies. Southwestern willow flycatchers are positively identified primarily by nesting within the geographic area of their range or by measurements of in hand specimens. Lacking any evidence of nesting, and the presence of the bird only during the time of migration, this observation of willow flycatcher is considered to be of a migrant passing through the area and cannot be positively identified as belonging to the southwestern form of willow flycatcher.

The report forms required for this species are attached and will be forwarded to the Ventura Office of the U.S. Fish and Wildlife Service.

Least Bell's Vireo

Surveys of the wet riparian areas followed U.S. Fish and Wildlife Service Guidelines for least Bell's vireo. Eight surveys were conducted between April 10 and July 31 (see tables 1-2 for dates). All surveys occurred between 6:00 and 10:00 am. and taped vireo calls were played if no vireos were heard or seen. No vireos were observed during any of these surveys.

Comments on Sensitive Species

Great Blue Heron

Great Blue Herons are listed on the California Natural Diversity Data Base as a species that warrants monitoring. A single individuals of this species was observed fishing in late June and July. No nesting was observed.

Great Egret

The Great egret is listed on the California Natural Diversity Data Base as a species that warrents monitoring. A few individuals were observed along the stream during migration.

White-tailed Kite

This species is considered a Species of Management Concern by the U.S. Fish and Wildlife Service. A single kite was observed hunting over the dry ruderal vegetation along the west side of Castaic Creek on April 24th.

Yellow Warbler

The yellow warbler is considered a Species of Special Concern by the State of California. Yellow warblers prefer wet riparian habitat but are also found in large cottonwoods in drier riparian areas. Small numbers of singing yellow warblers were observed throughout the survey period and are presumed to nest in the area.

Yellow-breasted Chat

The yellow-breasted chat is considered a Species of Special Concern by the State of California. Two chats were observed on May 4th, and a single bird was seen on June 23.

Lawrence's Goldfinch

This species is a highest priority species on the Audubon Birds to Watch list for 1996 and is a Bird of Management Concern for the Fish and Wildlife Service. Although a species of the coastal sage, small numbers of this species were attracted to the water in the riparian zone of Castaic Creek.

Comments on Brown Headed Cowbird

The small numbers of cowbirds observed is compatible with the small numbers of their prey species, song sparrow and yellow warbler.

Summary

No yellow billed-cuckoos or least Bell's vireos were observed during 2003. A single willow flycatcher was observed during their migration period but, despite careful searches and the use of taped calls, could not be relocated on subsequent visits. Because of the time of observation, this bird is considered to represent a migrant passing through the area to breeding grounds further north.

Table 1. Birds observed along Castaic Creek adjacent to the proposed Castaic Mesa Project, 2003

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 4/24	5/4	5/15	6/2	6/11	6/25	7/4	7/15
Great Blue Heron	m,w	0	0	0	0	0	1	1	0
Great Egret	m	0	0	2	0	0	0	0	0
Green Heron	r	0	0	0	0	2	0	0	0
Black-cr. Night Heron	r,m	0	0	0	0	0	0	1	0
Turkey Vulture	r	1	1	0	0	0	0	0	0
Mallard	r	2	4	0	0	0	9	14	2
Cinnamon Teal	m	0	1	0	0	0	0	0	0
Ruddy Duck	m	0	1	0	0	0	0	0	0
White-tailed Kite	r	1	0	0	0	0	0	0	0
Red-shouldered Hawk	r	0	0	0	0	0	0	0	1
Red-tailed Hawk	r	1	1	0	0	1	1	3	2
American Coot	r	0	0	0	1	0	0	0	1
California Quail	r	6	14	0	1	0	2	0	8
Killdeer	r	4	3	2	4	2	0	1	2
Spotted Sandpiper	s	0	1	0	0	0	0	0	0
Mourning Dove	r	12	14	11	7	5	2	8	28
Barn Owl	r	0	0	1	0	0	0	1	0
Lesser Nighthawk	s	0	0	0	0	0	0	1	0
Poorwill	r	0	0	0	0	0	0	0	3
Black-chinned Hummingbird	s	0	3	0	2	0	0	2	0
Anna's Hummingbird	r	7	3	11	6	2	1	3	1
Costa's Hummingbird	s	0	1	0	1	0	0	0	0
Nuttall's Woodpecker	r	0	0	1	1	0	1	3	0
Downy Woodpecker	r	0	0	0	0	0	0	0	1
Pacific-slope Flycatcher	m	2	0	0	0	0	0	0	1
Willow Flycatcher	m	0	0	1	1	0	0	0	0
Black Phoebe	r	2	0	0	2	0	2	3	0
Ash-throated Flycatcher	s	2	1	1	1	0	0	0	1
Western Kingbird	s	0	0	0	3	0	0	0	5
Western Scrub Jay	r	3	0	0	3	0	2	3	0
American Crow	r	0	1	0	0	0	0	0	0
Common Raven	r	2	7	0	0	2	0	0	0
Rough-winged Swallow	s	2	50	2	2	6	2	7	4
Cliff Swallow	s	25	26	30	20	6	15	2	100
Barn Swallow	s	0	3	0	0	0	0	0	0
Horned Lark	r	0	0	0	10	0	0	0	0
Plain Titmouse	r	0	0	0	0	0	0	2	0
Bushtit	r	5	0	14	2	0	0	23	2
Marsh Wren	m	0	0	1	0	0	0	0	0
Bewick's Wren	r	7	9	20	3	5	1	7	11
House Wren	r	0	2	2	0	0	0	0	4
Western Bluebird	r	0	0	2	5	0	0	0	0
Wrentit	r	5	0	8	0	0	0	4	0

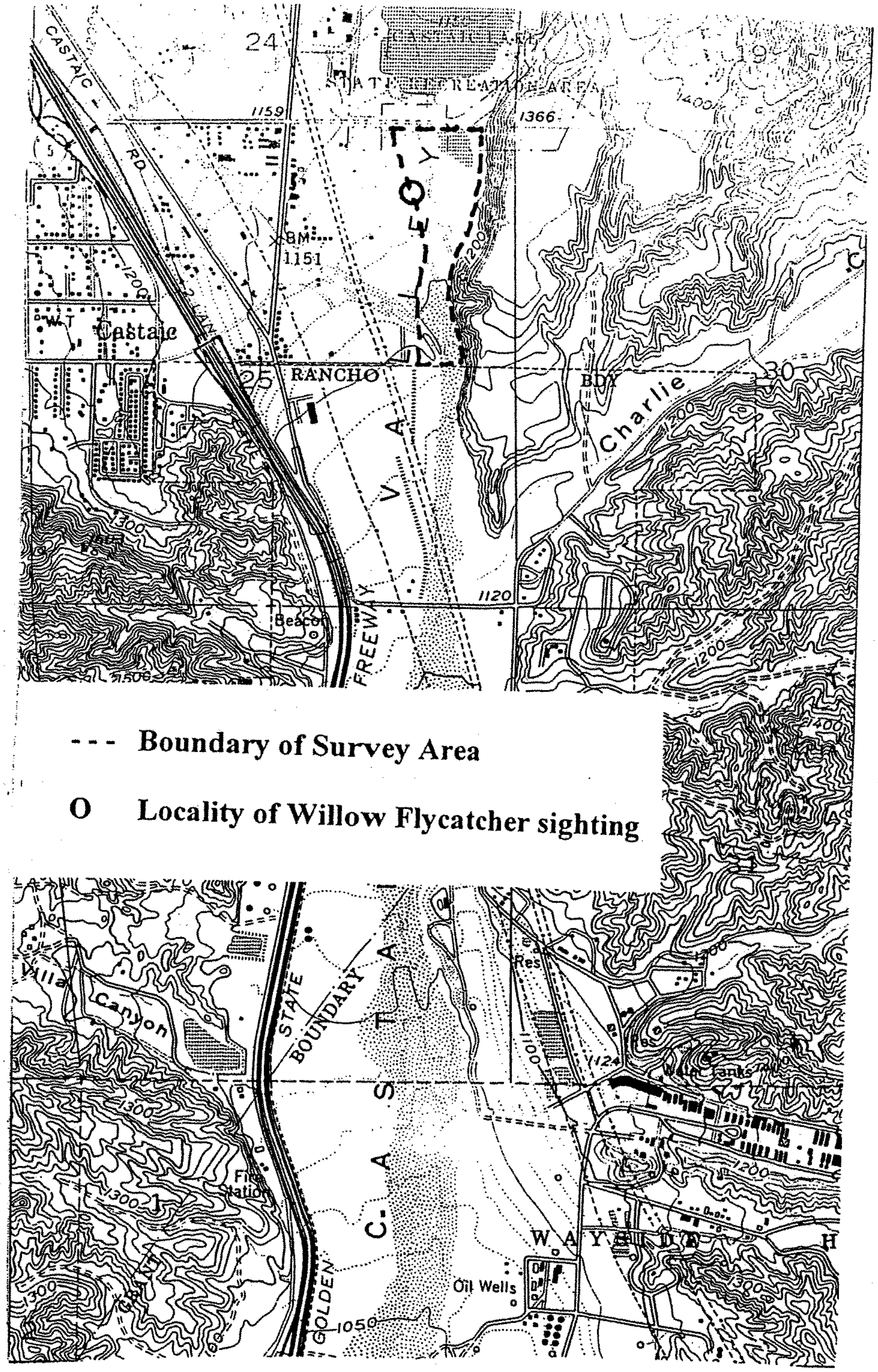
Table 1 (cont.). Birds observed along Castaic Creek adjacent to the proposed Castaic Mesa Project, 2003

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 4/24	5/4	5/15	6/2	6/11	6/25	7/4	7/15
Northern Mockingbird	r	0	0	0	0	1	0	0	0
European Starling	r	1	2	0	3	0	0	0	0
Phainopepla	r	0	1	0	0	0	0	0	0
Orange-crowned Warbler	m	1	0	0	0	0	0	0	0
Nashville Warbler	m	0	1	0	0	0	0	0	0
Yellow Warbler	s,m	3	4	4	2	0	0	2	1
Yellow-rumped Warbler	w,m	10	1	0	0	0	0	0	0
Black-th. Gray Warbler	m	0	1	0	0	0	0	0	0
Common Yellowthroat	r	4	5	13	1	0	0	7	3
Wilson's Warbler	m	1	16	3	0	0	0	0	0
Yellow-breasted Chat	s	0	2	0	0	0	0	1	0
Western Tanager	m	0	1	0	0	0	0	0	0
Spotted Towhee	r	10	10	11	3	5	3	4	5
California Towhee	r	14	10	4	5	4	0	6	10
Song Sparrow	r	6	11	10	3	3	0	1	2
Lincoln's Sparrow	w,m	1	0	0	0	0	0	0	0
Black-headed Grosbeak	s	0	2	3	0	0	0	0	0
Lazuli Bunting	s	0	4	0	0	0	0	0	0
Red-winged Blackbird	s	3	20	31	7	8	15	0	1
Yellow-headed Blackbird	m	2	0	0	0	0	0	0	0
Brewer's Blackbird	r	0	0	0	5	0	0	0	0
Great-tailed Grackle	s	6	2	3	8	1	0	7	2
Brown-headed Cowbird	s	0	1	0	2	0	0	0	0
Bullock's Oriole	s	0	0	0	2	0	0	0	2
House Finch	r	8	6	36	7	4	4	0	13
Lesser Goldfinch	r	4	7	1	2	3	1	13	3
Lawrence's Goldfinch	r	0	0	1	0	0	0	2	2
American Goldfinch	w,m,r	0	0	0	0	0	0	1	0

Status: m, migrant; r, resident; s, summer only; w, winter

Figure 1. Survey Area for Castaic Mesa Project.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988

Willow Flycatcher Survey and Detection Form (rev. 4/98)

Site Name____Castaic MESA______________________________ Total Site No ______________________________

Was site surveyed in previous year? NO
If yes, what site name was used? ________________
County __Los Angeles__________________________

Drainage Castaic Creek into Santa Clara River

State__CA___USGS Quad Name Newhall_

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? X☐ *Yes* ☐ *No*

Site Coordinates: Start: N__34 29.822________________ W 118 36.770____________ UTM
Stop: N__34 29.300________________ W 118 36.755_____________ UTM Zone ________
Elevation ____1150 ft..___________ feet / meters (circle one)

** *Fill in additional site information on back of this page* **

Survey # Observer(s)	Date (m/d/y) Survey time	Number of WIFLs Found	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign Y or N	Comments about this survey (e.g., evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
J. Sugden	Date 5/15 start 8:30 stop 9:15 total hrs .75	1	0	0	n	n	n	
J. Sudgden	Date 6/2 Start 8:30 Stop 9:15 total hrs _.75_	1	0	0	n	Y	N	
d. Guthrie	Date 6/25 Start 8:30 Stop 9:00 total hrs _.5__	0	0	0	n	N	N	
J. Sugden	Date 7/4 start 9 stop 10 total hrs 1._	0	0	0	n	N	N	?
J. Sugden	Date 7/15 start 8:30 stop 9:15 total hrs _.75	0	0	0	n	n	N	

Overall Site Summary (Total only resident WIFLs)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? No
Total survey hrs___3.75___	1	0	0	0	If yes, report color combination(s) in the comments section on back of form

Name of Reporting Individual ____Dan Guthrie______________ Date Report Completed ___7/20/03________________

Submit the original of this form. Retain a copy for your records.

Fill in the following information completely. Submit original form. Retain copy for your records.

Name of Reporting Individual ___Dan Guthrie______________________Phone # _909 607 2836___________

Affiliation __Claremont Colleges________________________ Email dguthrie@jsd.claremont.edu______________

Site Name__Castaic MESA____

Did you verify that this site name is consistent with that used in previous years? **Yes** No ? (circle one)

Management Authority for Survey Area (circle one):

Federal Municipal/County State Tribal **<u>Private</u>**

Name of Management Entity or Owner (e.g., Tonto National Forest) _Newhall Land Co.______________________

Length of area surveyed: 0.5 miles_____ (specify units, e.g., miles = mi, kilometers = km, meters = m)

Did you survey the same general area during each visit to this site this year? **Yes /** If no, summarize in comments below.

If site was surveyed last year, did you survey the same general area this year? not applicable/ If no, summarize in comments below.

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

XX Native broadleaf plants

☐ Mixed native and exotic plants (mostly native)
(entirely or almost entirely, includes high-elevation willow)

☐ Mixed native and exotic plants (mostly exotic) ☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: __Cotrtonwood, willow, ________________________________

Average height of canopy: __40 ft.__________________________ (specify units)

Was surface water or saturated soil present at or adjacent to site? yes
Distance from the site to surface water or saturated soil: see below
Did hydrological conditions change significantly among visits (did the site flood or dry out)? see below
If yes, describe in comments section below. no water present except for 50 yd section trickle in center of section.

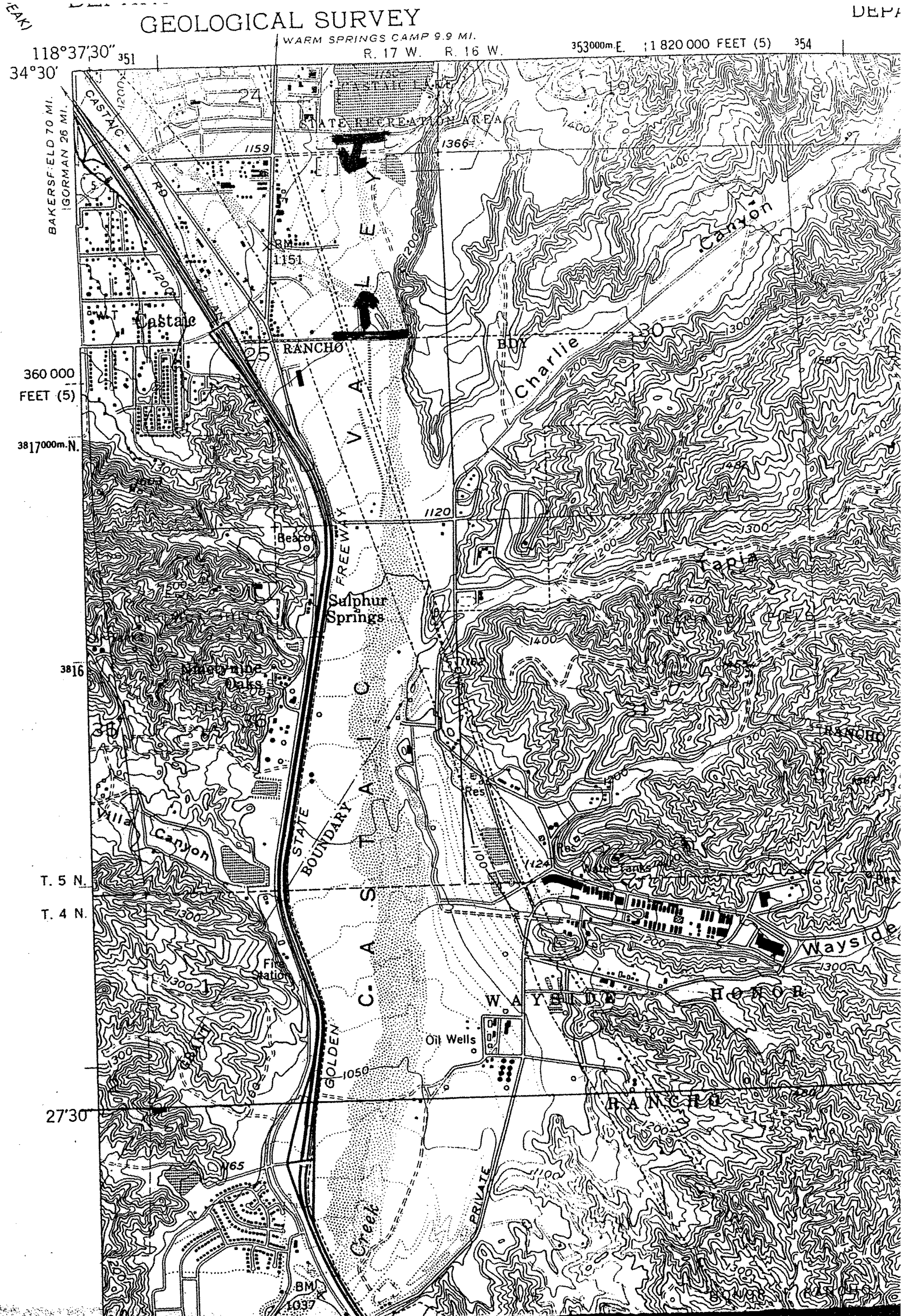
Remember to attach a xerox copy of a USGS quad/topographical map (REQUIRED) of the survey area, noting the survey site and location of WIFL detections. You may also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map.

Comments (attach additional sheets if necessary):____

Section is fed by water release from Castaic Dam. Water was continually present during surveys..

<u>subspecific identity of willow flycatcher not clear. Probably a migrant that may belong to a subspecies other than southwestern</u>

3 19. / 51


GEOLOGICAL SURVEY
WARM SPRINGS CAMP 9.9 MI.
118°37'30"
34°30'
351
R. 17 W. R. 16 W.
353000m.E.
1 820 000 FEET (5)
354
BAKERSFIELD 70 MI.
GORMAN 26 MI.
CASTAIC RD
STATE RECREATION AREA
1159
1366
BM 1151
Castaic
RANCHO
BDY
Charlie
Canyon
360 000
FEET (5)
3817000m.N.
1120
Beacon
FREEWAY
Tapia
Sulphur Springs
1400
3816
Oaks
RANCHO
Res
Villa
Canyon
STATE
BOUNDARY
1124
Water Tanks
T. 5 N.
T. 4 N.
Wayside
Fire Station
WAYSIDE
HONOR
Oil Wells
GOLDEN
1050
27'30"
RANCHO
PRIVATE
Creek
BM
1037
CASTAIC VALLEY

Bird Surveys Along a Portion of the Santa Clara River and its Tributaries Upstream from the Castaic Creek Confluence, Near Valencia, California, 2003

BIRD SURVEYS ALONG A PORTION OF THE SANTA CLARA RIVER AND ITS TRIBUTARIES UPSTREAM FROM THE CASTAIC CREEK CONFLUENCE, NEAR VALENCIA, CALIFORNIA, 2003

Prepared for:

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July 28, 2003

REVISED

Bird Surveys along a Portion of the Santa Clara River Upstream from the Castaic Creek Confluence, near Valencia, California, 2003

Prepared by: Daniel A. Guthrie
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Nature and Scope of Surveys

During the spring and early summer of 2003 surveys were conducted along a section of the Santa Clara River and its tributaries near Valencia, California (Figure 1). Surveys were focused on determining presence or absence of yellow-billed cuckoo, least Bell's vireo and southwestern willow flycatcher, and followed U.S. Fish and Wildlife Service Guidelines for the latter two species. Numbers of all species observed were noted, and, in addition to the three species noted above, special attention was placed on locating species considered rare and endangered or of Special Concern, and on determining numbers of brown-headed cowbirds.

Each survey was conducted on foot by observers well acquainted with visual, auditory and behavioral characteristics of southern California birds. Survey routes were designed to cover all areas of each section of the river, with emphasis placed on wetter habitats where least Bell's vireos and other sensitive riparian species are most likely to occur. All surveys occurred between 6:00 and 10:00 a.m. If focus species (yellow-billed cuckoo, least Bell's vireo, and southwestern willow flycatcher), were not visually observed, tapes of their calls were played in an attempt to elicit a response. Personnel for all surveys were Daniel A. Guthrie and Judith A. Sugden, both working under Federal Fish and Wildlife Service Permit number TE810394-1, issued under section 10(a)(1)(A) of the Endangered Species Act.

To facilitate surveys and observe the coverage guidelines for focus species, the area was divided into eight sections (Figure 1). Delineation of the eight areas and comments on each follow. Surveys of all sections of the river system were conducted five times during the nesting season and followed the Revised Protocol (Fish And Wildlife Service, July 2000) for southwestern willow flycatcher. Several sections of the river (Areas 4, 6-8) had no running water or wet riparian vegetation and were not considered suitable habitat for least Bell's vireo. However, areas 1-3,5 had flowing water and wet riparian vegetation. These sections were surveyed according to the protocol for least Bell's vireo as outlined by the Fish and Wildlife Service. This latter protocol requires 8 surveys between April 10 and July 31st, at least 10 days apart.

Habitat Condition and Bird Observations.

The riparian zone of the Santa Clara River, as described here, consists of two major habitat types, a wet riparian zone and a dry riparian woodland. The wet riparian zone consists of obligatory wet plants such as cattail and watercress found in continually moist soils along the active river channel and some willow, tamarisk and *Baccharis* shrubs also found in this zone. This zone underwent severe flooding during late winter and early spring. The result was scouring of all existing wet riparian vegetation which was absent for most of the survey period. Only in early July were new plants becoming established. Annual plants were well developed in April but by mid May had mostly died under dry conditions.

The early heavy rains provided enough ground water flow to support lush growth in the dry riparian perennial trees. This was in sharp contrast to the near lack of annual plant undergrowth.

Observations of all birds are shown in Tables 1-8. The numbers shown are of birds seen and heard, with heard individuals forming the majority of the observations. Numbers vary between censuses. Bird activity varies with season. Different species breed at different times of the year. In general, species are most easily observed when they are actively defending territories by song during the establishment of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, numbers observed may increase. Thus, for most resident species, numbers of adult birds are most accurately censused in April and May, when territorial activity is at a maximum. A few species such as Anna's hummingbird that nest early in the season may be underestimated. Numbers of some nesting species, such as yellow warbler may be higher than normal in May due to migratory birds passing through the area. Numbers may also increase in late June and July when young birds leave the nest.

Area 1 (Table 1). Santa Clara River; The Old Road Bridge to the mouth of Castaic Creek.

Length of section, 3.5 miles. The Santa Clara River flows continuously in this section and is augmented by the Valencia waste water outfall near the upstream end of this section and by some irrigation runoff from Magic Mountain and agricultural fields along the north side.

Along the upper portion of this section, wet riparian vegetation forms a narrow strip along the main channel of the Santa Clara River. This section was little damaged by spring flooding. The extensive willow riparian zone near Magic Mountain and along the agricultural fields north of the river also was not damaged. Scouring did occur further downstream towards the mouth of Castaic Creek. Least Bell's vireos nested near Castaic Junction and white-tailed kite nested in the dry woodlands towards the mouth of Castaic Creek.

Area 2 (Table 2). Santa Clara River; McBean Parkway downstream to The Old Road.

Length of section, 1.4 miles. The Santa Clara River flows continuously in this section and additional water is provided by irrigation runoff from industrial parks along the north side.

There was heavy scouring of the channel by winter flooding with the result that little wet riparian vegetation was present during most of the survey period. The wet willow forest near the mouth of San Francisquito Creek was carefully surveyed for focus species as migrating willow flycatcher have been seen here in previous years. None were found this year.

Area 3 (Table 3). Santa Clara River; Bouquet Canyon Road downstream to McBean Parkway

Length of section, 1.2 miles. Water, supplied by the Saugus wastewater outfall at the Bouquet Canyon Bridge, is continuous in this section of the Santa Clara River. A small amount of additional water is provided from irrigation runoff coming from Bouquet Canyon and suburban development along the north side of the Santa Clara River. Spring flooding eliminated almost all wet riparian vegetation. A small cattail marsh at the Saugus wastewater outfall survived and was the site of redwing blackbird nesting.

Area 4 (Table 4). Santa Clara River; Bouquet Canyon Road upstream to DWP transmission lines.

Length of section, 2.3 miles. The river channel in this section consists of a broad, flat, dry wash with narrow margins of dry riparian woodland. Within the channel are areas of coastal sage scrub habitat. This section of the Santa Clara River in past years has been wet only briefly during spring rains and due to water release from pumps one mile upstream from Bouquet Canyon Road. This section was completely dry during all surveys this year. This resulted in the almost complete absence of riparian species such as song sparrow and yellowthroat.

Rufous-crowned sparrows, resident on hillsides along the river, were observed once in the stream channel. Aside from migrants, most of the other birds observed in this section are characteristic of coastal sage and dry riparian woodlands.

Area 5 (Table 5). Castaic Creek; Route 126 to Interstate 5.

Length of section, 1.8 miles. Except for pockets of wet vegetation formed near irrigation runoff channels, and remnant puddles from spring water releases near the middle and lower part of this section , the creek was dry much of this spring. Despite this lack of permanent water flow, many wet riparian species (song sparrow, yellowthroat, nested successfully. Cliff and rough-winged swallows nested under the three bridges that cross this section of the river. The extensive willow forest on this section where least Bell's vireo once nested has matured and was dry much of this year. A single vireo was observed in July. The late date of this observation and lack of earlier sightings in the area suggests that the bird was a post-breeding juvenile.

Area 6 (Table 6). San Francisquito Creek; Santa Clara River upstream to Copper Hill Drive Crossing.

Length of section, 2.5 miles. Along most of this section the riparian zone consists of a broad sandy channel. In the upper part of this section the creek is bordered by land undergoing development. Coastal sage scrub plants occur within the channel as do sections of dry riparian woodland consisting mostly of cottonwoods. Although some water releases from upstream dams occurred during the winter months, no water was present during the survey period except along short sections due to suburban runoff at Copper Hill and at the Decoro Drive crossings. A single willow flycatcher was observed near the top of this section on July 2nd. The bird appeared to be a young of the year and was probably a post-nesting migrant. Despite a thorough search, this bird could not be found on a subsequent visit. Barn owls nested under the Copper Hill bridge and a Cooper's hawk nested about ½ mile south of the Copper Hill crossing.

Area 7 (Table 7). South Fork of the Santa Clara River; McBean Parkway to Magic Mountain Parkway (Route 126).

Length of section, 1.0 miles. The channel along this section of the South Fork is narrow and very sandy. Along most of this section vegetation is restricted to a narrow band of dry woodland at each side of the channel and a few pockets of wet vegetation supported by runoff from adjacent development. No flooding occurred on the South Fork and perennial vegetation showed good development thanks to spring rains. The cattail marsh near the confluence with the main channel of the Santa Clara river was soured by spring floods and no new growth occurred during the study period.

Area 8 (Table 8). South Fork of the Santa Clara River, Route 126 upstream to Newhall Creek.

Length of section, 1.4 miles. This section of the river consists of a wide sandy channel intersected by several concrete sills designed to restrict sand movement and flood damage. The river is entirely bordered by developed areas but contains small islands of dry riparian vegetation and some wet riparian areas formed by runoff from culverts along the sides of the creek. No flooding has occurred on this section of the river in recent years and riparian vegetation around these culverts continues to develop into areas of cottonwood and willow woodland, resulting in the continued increase in riparian species along this section of the river.

Comments on Threatened and Endangered Species

Yellow-billed Cuckoo

The Yellow-billed Cuckoo is listed as a State Endangered Species. Despite playing taped calls of this species during June and July surveys, no individuals of this species were observed in 2003.

Southwestern Willow Flycatcher

This subspecies is listed under the Federal Endangered Species Act. Willow Flycatchers were once widespread in wet riparian woodland in southern California but now only a few individuals exist. Following the Revised Protocol (Fish And Wildlife Service, July 2000) five surveys were conducted specifically for Southwestern willow flycatcher. All surveys occurred between 6:00 and 10:00 am. and used taped calls to elicit a response if flycatchers were not first observed.

Three willow flycatchers were observed during 2003 (Figure2). Two birds were found early in the migration period for this species, one on Castaic Creek and one along the main river near Castaic Junction. Neither bird could be found on subsequent visits. A third bird was found along San Francisquito Creek (Fig. 2), on July 2.nd This bird was not in typical habitat. It was fly-catching from a plastic barrier fence separating the dry sandy river channel from coastal sage scrub. It was in company with a black phoebe and appeared to be an immature bird. It did not call. It is believed that this bird was a young of the year migrating through the area. Despite attempts on a subsequent visit this bird could not be relocated. Lacking any evidence of nesting, these observations of willow flycatchers cannot be positively identified as belonging to the southwestern form of willow flycatcher.

Willow flycatchers are fairly common migrants through southern California and most of the migrants are believed to be of the common subpsecies of willow flycatcher, *E. t. brewsteri,* which breeds throughout southern Canada and the northern United States, rather than representatives of the southwestern subspecies. Southwestern willow flycatchers are positively identified primarily by nesting within the geographic area of their range or by measurements of in hand specimens.

The report forms required for this species are attached and will be forwarded to the Ventura Office of the U.S. Fish and Wildlife Service.

Least Bell's Vireo

Surveys of the wet riparian areas (Areas 1-3,5) followed U.S. Fish and Wildlife Service Guidelines for least Bell's vireo. Eight surveys were conducted between April 10 and July 31 (see Tables 1-3,5 for dates). All surveys occurred between 6:00 and 10:00 am. and taped vireo calls were played if no vireos were heard or seen. Vireos were regularly observed along the Santa Clara River at Castaic Junction in an extensive stand of willows. Vireos were regularly heard in at least 4 locations within area A (Figure 3) through May and June and thought to represent four nesting pairs. Three additional birds were heard and observed on June 22nd downstream from these birds but within area A. These birds are thought to be young of the year.. An observation of a single bird in the same area on July 15th is also suspected to have been a young of the year. These birds did not sing very well, appeared to be juveniles, and could not be refound on subsequent visits. Along Castaic Creek a single bird observed on April 17th could not be refound in May and June. This bird is considered a migrant.

Comments on Sensitive Species

Great Blue Heron

Great blue herons are listed on the California Natural Diversity Data Base as a species that warrants monitoring. A single heron was seen on Castaic Creek June 12th, and a single bird was seen west of McBean Parkway on June 10th and 22nd. No nesting was observed

Great Egret

The great egret is listed on the California Natural Diversity Data Base as a species that warrants monitoring. A single individual was near Castaic Junction on April 17, April 29 and May 15. There was no evidence of breeding.

White-tailed Kite

This species, formerly the black-shouldered kite, is considered a Species of Special Concern by the State of California. A pair of kites nested near the railroad bridge between the McBean crossing and Interstate 5 and a second pair nested in the dry riparian woodland near Travel Village west of Castaic Junction.

Cooper's Hawk

Cooper's hawk is considered a Species of Special Concern by the State of California. A Cooper's Hawk nested along San Francisquito Creek a little below the Copper Hill Crossing. Single sightings of Cooper's hawks occurred on the upper section of the Santa Clara River and more regularly along Castaic Creek where they may also have nested.

California Horned Lark

This is a California Special Concern species. Although none were observed nesting on the study site, horned larks are ground nesters that prefer bare hillsides and abandoned fields. A few were observed feeding on bare fields and construction areas along Castaic Creek

Loggerhead Shrike

This is a California Special Concern species. Shrikes are resident in the coastal sage scrub areas adjacent to the Santa Clara River. A single observation on July 14 between Bouquet Canyon Crossing and McBean parkway along the river appeared to be a young individual visiting the riparian zome from the coastal sage habitat.

Yellow Warbler

The yellow warbler is considered a Species of Special Concern by the State of California. Yellow warblers prefer wet riparian habitat but are also found in large cottonwoods in drier riparian areas. Singing yellow warblers were observed throughout the survey period along sections 1, 2 (main river from McBean Parkway to Castaic Creek) and 5 (Castaic Creek). Observations in sections 3, 6 and occurred only during the migration period.

Yellow-breasted Chat

The yellow-breasted chat is considered a Species of Special Concern by the State of California. Chats were observed throughout the survey period along the Santa Clara river between the Old Road and the mouth of Castaic Creek. Two observations of single birds along nearby Castaic Creek may have been visitors from this area.

Southern California Rufous-crowned Sparrow

This species is considered a California Special Concern species by the Department of Fish and Game and is also a Federal Special Concern species. A few birds visited the the river channel near Castaic Junction and a mile above the Bouquet Canyon Rd crossing. In both areas there is extensive coastal sage habitat adjacent to the river in which this species breeds.

Lawrence's Goldfinch

This species is a highest priority species on the Audubon Birds to Watch list for 1996 and is a Bird of Management Concern for the Fish and Wildlife Service. Small numbers of this species were observed along Castaic Creek and along the Santa Clara river between the mouth of Castaic Creek and the McBean Parkway bridge. This species is a resident in coastal sage habitat

Comments of Brown-headed Cowbirds

Although not a Species of Concern, comments about this species are warranted due to its influence on several endangered species. Cowbirds were regularly observed along all sections of the Santa Clara River, usually flying along the riparian corridor searching for either mates or potential nests to parasitize. Cowbird females often responded to taped calls of least Bell's Vireo. Cowbird traps were operated throughout the study period just north of the Valencia Wastewater outfall (section 1).

Summary

No yellow-billed cuckoos were observed in 2003. Three willow flycatchers were observed, two during migration and one late in the season. Based on the behavior and appearance of these bird, they are thought to be migrants and a young of the year post-nesting migrant. None could be relocated on subsequent surveys. It is not known which subspecies these birds represented. Up to four pairs of Least Bell's vireos were regularly observed at Castaic Junction. Additional individuals of this species observed late in the season are thought to have been young of the year.

Three riparian Species of Concern, Cooper's hawk, yellow warbler and yellow-breasted chat nested in small numbers along wet sections of the river. Other Species of Concern include two migrant or wintering species; great blue heron and great egret and four visitors from nearby coastal sage scrub habitat; horned lark, loggerhead shrike, rufous-crowned sparrow, and Lawrence's goldfinch. Cowbirds were numerous along the river and probably contributed to the small numbers of yellow warblers and least Bell's vireos observed.

Table 1. BIRDS OF THE SANTA CLARA RIVER BASIN, 2003: Santa Clara River from Old Road downstream to the mouth of Castaic Creek.									
Endangered Species and Species of Concern Shaded									
				Dates of Surveys					
SPECIES	**STATUS**	**4/17**	**4/29**	**5/15**	**5/29**	**6/10**	**6/22**	**7/3**	**7/14**
Great Egret	m	1	1	1	0	0	0	0	0
Green Heron	r	3	3	0	2	5	3	5	6
Black-crowned Night Heron	m,r?	0	0	0	2	0	0	1	5
Turkey Vulture	r	0	0	2	0	0	0	0	0
Mallard	r	5	10	11	2	2	2	19	12
Cinnamon Teal	m	1	0	0	0	0	0	0	0
White-tailed Kite	r	1	2	0	1	2	1	1	4
Red-shouldered Hawk	r	1	4	2	2	2	1	3	6
Red-tailed Hawk	r	3	2	1	0	4	0	0	3
American Kestrel	r	0	1	0	1	2	0	0	0
Sora	m	2	0	0	0	0	0	0	0
California Quail	r	2	16	23	19	6	23	17	12
Killdeer	r	2	10	5	15	22	6	32	9
Spotted Sandpiper	s	0	2	0	1	5	0	15	6
Rock Dove	r	0	0	10	6	0	0	3	5
Mourning Dove	r	13	18	12	25	29	27	57	75
Barn Owl	r	0	0	0	0	0	1	0	0
White-throated Swift	r	0	6	6	8	0	4	3	0
Black-chinned Hummingbird	s	0	0	0	2	0	0	3	0
Anna's Hummingbird	r	8	11	16	3	6	5	7	15
Costa's Hummingbird	s	0	0	0	0	0	0	1	1
Nuttall's Woodpecker	r	4	8	7	9	6	12	10	10
Downy Woodpecker	r	7	8	4	3	3	8	9	6
Hairy Woodpecker	r	0	2	2	1	3	1	0	0
Northern Flicker	r	1	0	0	0	0	2	0	2
Willow Flycatcher	m	0	0	1	0	0	0	0	0
Black Phoebe	r	1	0	6	7	5	7	12	29
Say's Phoebe	r	0	0	0	0	0	0	1	0
Ash-throated Flycatcher	s	4	20	11	10	11	13	14	27
Western Kingbird	s	0	0	0	0	0	1	0	9
Horned Lark	r	0	0	0	0	0	0	12	0
Bell's Vireo	s	4	4	4	6	5	10	9	5
Western Scrub Jay	r	12	27	16	18	17	15	15	22
American Crow	r	10	2	5	1	0	3	3	3
Common Raven	r	16	8	12	11	18	40	37	35
Tree Swallow	s	0	0	0	0	0	4	2	0
Violet-green Swallow	s	0	5	0	0	0	3	3	1
N. Rough-winged Swallow	s	1	8	14	8	7	26	7	12
Cliff Swallow	s	4	4	86	16	15	31	54	20
Barn Swallow	s	0	0	0	1	1	4	0	5
White-breasted Nuthatch	r	0	0	0	0	0	5	0	0
Oak Titmouse	r	3	4	5	13	5	25	19	32
Bushtit	r	16	27	37	40	23	30	10	71

Table 1.(cont.) BIRDS OF THE SANTA CLARA RIVER BASIN, 2003: Santa Clara River from Old Road downstream to the mouth of Castaic Creek.

Endangered Species and Species of Concern Shaded

		Dates of Surveys							
SPECIES	STATUS	4/17	4/29	5/15	5/29	6/10	6/22	7/3	7/14
Bewick's Wren	r	37	53	86	49	52	62	31	57
House Wren	r	7	20	22	10	12	15	0	12
Western Bluebird	r	2	10	4	4	2	10	3	3
Wrentit	r	0	0	1	0	7	13	1	22
California Thrasher	r	2	3	5	9	9	11	10	6
European Starling	r	5	4	7	6	30	32	0	1
Cedar Waxwing	w,m	0	0	3	0	0	0	0	0
Phainopepla	r	0	0	1	0	1	0	3	4
Orange-crowned Warbler	m	1	0	0	0	0	0	0	0
Yellow Warbler	s,m	5	8	9	5	2	4	1	5
Yellow-rumped Warbler	w,m	5	0	0	0	0	0	0	0
Common Yellowthroat	r	12	14	34	3	25	44	62	67
Wilson's Warbler	m	1	18	9	0	0	0	0	0
Yellow-breasted Chat	s	4	1	1	3	2	4	2	5
Spotted Towhee	r	23	26	15	22	21	29	3	17
California Towhee	r	27	96	34	19	16	23	28	12
Rufous-crowned Sparrow	r	0	1	0	0	0	0	0	0
Lark Sparrow	r	0	0	0	0	0	1	6	12
Song Sparrow	r	116	98	66	60	40	115	178	200
Black-headed Grosbeak	s	11	11	16	4	11	17	11	38
Blue Grosbeak	s	1	3	1	2	2	1	5	3
Lazuli Bunting	s	0	0	1	0	0	0	18	16
Red-winged Blackbird	s	10	6	20	16	16	171	7	1
Great-tailed Grackle	s	0	0	0	1	0	0	0	0
Brown-headed Cowbird	s	0	7	18	8	4	12	16	19
Hooded Oriole	s	0	0	0	0	0	1	4	0
Bullock's Oriole	s	1	5	2	1	3	8	5	0
House Finch	r	7	24	7	11	6	96	40	17
Lesser Goldfinch	r	7	9	7	1	1	8	2	10
Lawrence's Goldfinch	r	0	3	0	0	0	0	0	0
American Goldfinch	w,m,r	0	0	1	0	0	0	0	0

Status: m, migrant; r, resident; s, summer only; w, winter

Table 2. BIRDS OF THE SANTA CLARA RIVER BASIN, 2003: Santa Clara River from McBean Highway to The Old Road.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 4/17	4/29	5/15	5/29	6/10	6/22	7/3	7/14
Great Blue Heron	m,w	0	0	0	0	1	1	0	0
Green Heron	r	0	0	0	1	0	1	0	1
Black-crowned Night Heron	m	0	0	0	0	0	0	0	1
Mallard	r	2	2	0	0	0	0	0	0
Turkey Vulture	s	0	1	0	0	0	0	0	0
White-tailed Kite	r	0	0	2	1	2	0	2	1
Red-shouldered Hawk	r	1	0	0	0	0	0	1	1
Red-tailed Hawk	r	1	0	0	1	0	0	1	2
American Kestrel	r	0	0	0	1	0	0	0	0
California Quail	r	0	0	2	0	6	5	2	7
Killdeer	r	6	4	5	6	4	4	3	2
Least Sandpiper	m	1	1	0	0	0	0	0	0
Mourning Dove	r	2	12	3	8	4	15	4	4
Barn Owl	r	0	0	0	0	1	0	0	0
Anna's Hummingbird	r	1	1	0	0	0	0	3	2
Acorn Woodpecker	r	0	0	2	0	0	0	1	0
Nuttall's Woodpecker	r	3	4	3	6	2	6	1	5
Downy Woodpecker	r	1	2	0	0	0	1	2	0
Hairy Woodpecker	r	1	0	0	0	0	1	0	1
Northern Flicker	r	0	0	0	0	0	1	0	1
Black Phoebe	r	1	4	1	1	4	3	8	8
Ash-throated Flycatcher	s	0	0	4	1	2	4	1	4
Western Kingbird	s	0	0	0	0	0	0	2	1
Warbling Vireo	m	1	0	0	0	0	0	0	0
Western Scrub Jay	r	7	11	4	4	5	7	7	13
American Crow	r	0	0	1	3	0	2	4	2
Common Raven	r	4	2	2	3	10	2	3	4
N. Rough-winged Swallow	s	0	0	0	1	2	8	0	0
Cliff Swallow	s	0	0	4	4	30	28	3	4
Barn Swallow	s	0	0	0	1	2	0	0	1
Oak Titmouse	r	3	0	2	0	0	3	6	0
Bushtit	r	0	3	3	0	2	9	8	3
Bewick's Wren	r	27	10	10	12	14	12	13	12
House Wren	r	6	2	16	12	12	6	1	0
Western Bluebird	r	2	0	2	0	1	6	2	0
Wrentit	r	0	0	0	1	0	0	1	0
California Thrasher	r	2	3	3	3	0	3	0	0
European Starling	r	6	2	1	0	2	7	2	2
Cedar Waxwing	w,m	0	25	33	0	4	0	0	0
Phainopepla	r	0	0	0	0	0	0	1	2
Yellow Warbler	s,m	0	3	4	1	0	0	0	1
Black-throated Gray Warbler	m	1	0	0	0	0	0	0	0
Townsend's Warbler	m	1	0	0	0	0	0	0	0

Table 2 (cont.). **BIRDS OF THE SANTA CLARA RIVER BASIN, 2003: Santa Clara River from McBean Highway to The Old Road.**

Endangered Species and Species of Concern Shaded

		Dates of Surveys							
SPECIES	**STATUS**	**4/17**	**4/29**	**5/15**	**5/29**	**6/10**	**6/22**	**7/3**	**7/14**
Yellow-rumped Warbler	w,m	1	1	0	0	0	0	0	0
Common Yellowthroat	r	2	1	2	3	1	3	2	2
Wilson's Warbler	m	0	1	0	0	0	0	0	0
Spotted Towhee	r	2	4	6	6	6	12	6	5
California Towhee	r	2	7	2	8	8	8	4	8
Song Sparrow	r	26	28	36	32	32	29	20	14
Black-headed Grosbeak	s	3	7	4	4	3	4	7	2
Red-winged Blackbird	s	0	0	0	8	1	1	0	0
Brown-headed Cowbird	s	0	1	1	0	1	2	1	1
Bullock's Oriole	s	0	0	0	0	0	0	1	2
House Finch	r	23	8	3	9	0	15	15	22
Lesser Goldfinch	r	0	0	0	0	0	0	0	2
Lawrence's Goldfinch	r	0	0	0	0	0	0	2	0
American Goldfinch	w,m,r	10	0	0	0	0	0	0	0

Status: m, migrant; r, resident; s, summer only; w, winter

Table 3. BIRDS OF THE SANTA CLARA RIVER BASIN, 2003: Santa Clara River from Boquet Canyon Bridge to McBean Parkway Bridge

Endangered Species and Species of Concern Shaded

		Dates of Surveys							
SPECIES	STATUS	4/17	4/29	5/15	5/29	6/10	6/27	7/3	7/14
Snowy Egret	m	0	0	0	0	0	0	0	1
Mallard	r	0	0	0	1	0	0	0	0
Red-tailed Hawk	r	1	1	1	1	0	0	1	1
California Quail	r	0	2	4	0	0	6	2	0
Black-necked Stilt	m	0	0	0	0	0	0	1	0
Killdeer	r	0	6	4	6	6	5	14	10
Rock Dove	r	0	0	0	1	0	1	0	0
Mourning Dove	r	3	5	6	3	8	9	7	8
Greater Roadrunner	r	0	0	0	1	0	0	0	0
Black-chinned Hummingbird	s	0	0	1	0	0	0	0	0
Anna's Hummingbird	r	3	0	2	1	0	0	1	3
Nuttall's Woodpecker	r	0	0	1	2	1	1	1	1
Downy Woodpecker	r	0	0	0	1	0	0	0	0
Say's Phoebe	r	0	0	0	1	0	0	0	0
Black Phoebe	r	3	2	5	3	4	2	3	6
Ash-throated Flycatcher	s	0	2	1	3	2	0	0	0
Warbling Vireo	m	0	1	0	0	0	0	0	0
Western Scrub Jay	r	3	13	2	0	4	4	7	6
American Crow	r	0	0	2	0	0	0	0	2
Common Raven	r	10	11	8	4	4	6	10	14
N. Rough-winged Swallow	s	0	4	2	2	0	0	0	0
Cliff Swallow	s	0	25	8	25	36	28	6	59
Bushtit	r	2	8	8	4	5	3	0	0
Bewick's Wren	r	14	4	7	10	11	5	5	7
House Wren	r	0	0	1	0	0	0	0	0
Western Bluebird	r	0	0	0	0	0	0	0	1
Northern Mockingbird	r	1	4	4	3	3	1	6	1
California Thrasher	r	0	1	0	2	0	1	1	0
European Starling	r	1	0	0	31	0	5	0	0
Loggerhead Shrike	r	0	0	0	0	0	0	0	1
Yellow Warbler	s,m	0	1	4	0	0	0	0	0
Common Yellowthroat	r	2	3	1	2	3	3	0	2
Wilson's Warbler	m	0	2	0	0	0	0	0	0
Spotted Towhee	r	4	4	6	3	1	6	3	0
California Towhee	r	5	4	4	10	6	6	2	2
Song Sparrow	r	22	16	16	26	20	14	5	4
Black-headed Grosbeak	s	0	1	3	2	0	1	1	0
Red-winged Blackbird	r	0	0	0	1	2	12	25	1
Brewer's Blackbird	r	0	0	0	1	0	0	0	0
Brown-headed Cowbird	s	0	0	2	0	0	1	0	1
House Finch	r	18	7	14	7	31	11	19	13
Lesser Goldfinch	r	5	0	0	0	0	0	0	0
American Goldfinch	w,m,r	14	0	2	0	0	0	0	0

Status: m, migrant; r, resident; s, summer only; w, winter

Table 4. **BIRD SURVEYS OF THE SANTA CLARA RIVER BASIN, 2003: Santa Clara River from Boquet Canyon Bridge upstream for two miles.**

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	5/19	6/4	6/16	6/26	7/1	7/11
				Dates of Surveys			
Cooper's Hawk	r	0	0	0	0	1	0
Red-tailed Hawk	r	2	2	0	0	1	0
American Kestrel	r	0	1	0	0	1	0
California Quail	r	27	19	6	4	9	6
Killdeer	r	1	0	1	0	0	0
Rock Dove	r	0	8	0	0	0	0
Mourning Dove	r	18	60	16	13	10	16
Black-chinned Hummingbird	s	6	1	0	0	0	0
Anna's Hummingbird	s	5	6	2	3	3	3
Costa's Hummingbird	s	0	1	0	0	1	0
Nuttall's Woodpecker	r	8	5	2	1	1	1
Say's Phoebe	r	0	2	0	0	0	1
Ash-throated Flycatcher	s	1	0	0	0	0	0
Western Kingbird	s	2	5	0	0	0	0
Western Scrub Jay	r	15	4	13	7	14	8
Common Raven	r	9	8	2	3	8	2
N. Rough-winged Swallow	s	2	5	0	0	1	0
Cliff Swallow	s	3	7	0	0	0	0
Oak Titmouse	r	1	0	3	0	0	0
Bushtit	r	9	0	2	3	0	0
Bewick's Wren	r	50	24	6	6	8	3
House Wren	r	4	0	3	0	0	0
Western Bluebird	r	3	0	3	0	0	0
Wrentit	r	5	12	2	3	2	1
Northern Mockingbird	r	10	12	14	12	9	10
California Thrasher	r	2	2	2	1	0	0
European Starling	r	2	15	1	0	0	1
Phainopepla	r	5	7	2	2	4	3
Common Yellowthroat	r	2	0	0	0	0	0
Wilson's Warbler	m	2	0	0	0	0	0
Summer Tanager	s	1	0	0	0	0	0
Spotted Towhee	r	6	11	5	4	2	2
California Towhee	r	15	21	19	9	11	8
Rufous-crowned Sparrow	r	0	9	0	0	0	0
Black-headed Grosbeak	s	0	0	2	0	0	0
Lazuli Bunting	s	1	0	0	0	0	0
Red-winged Blackbird	s	0	8	0	0	0	0
Brown-headed Cowbird	s	2	0	0	0	0	0
Bullock's Oriole	s	0	10	2	3	2	0
House Finch	r	38	39	8	13	14	4
House Sparrow	r	0	1	0	0	0	0

Status: m, migrant; r, resident; s, summer only

Table 5. BIRDS OF THE SANTA CLARA RIVER BASIN, 2003: Castaic Creek from I-5 to the Santa Clara River									
Endangered Species and Species of Concern Shaded									
				Dates of Surveys					
SPECIES	**STATUS**	**4/17**	**5/1**	**5/18**	**6/2**	**6/12**	**6/23**	**7/4**	**7/13**
Great Blue Heron	m,w	0	0	0	0	1	0	0	0
Green Heron	r	0	1	0	0	0	0	0	0
Mallard	r	0	0	1	0	0	0	0	0
Cooper's Hawk	r	0	1	1	0	0	0	0	0
Red-shouldered Hawk	r	1	0	0	0	0	0	2	0
Red-tailed Hawk	r	2	2	2	1	3	3	3	1
American Kestrel	r	2	1	1	1	4	0	0	0
California Quail	r	33	32	19	17	15	12	53	30
Killdeer	r	3	6	2	3	3	3	5	0
Rock Dove	r	180	15	2	0	6	5	7	8
Collared Dove	r	3	0	0	0	0	0	0	0
Mourning Dove	r	52	47	9	13	24	18	24	10
Barn Owl	r	0	0	0	0	0	2	0	0
Black-chinned Hummingbird	s	0	0	0	0	1	2	2	6
Anna's Hummingbird	r	5	5	22	4	5	6	8	11
Costa's Hummingbird	s	0	0	0	1	1	2	1	2
Nuttall's Woodpecker	r	4	5	3	7	1	9	5	13
Downy Woodpecker	r	1	0	0	0	3	6	6	8
Hairy Woodpecker	r	0	2	1	2	0	0	0	0
Northern Flicker	r	0	2	0	0	0	0	0	0
Willow Flycatcher	m	0	0	1	0	0	0	0	0
Black Phoebe	r	0	0	1	4	4	3	2	0
Ash-throated Flycatcher	s	8	2	5	7	6	6	6	6
Western Kingbird	s	0	0	2	3	8	1	2	2
Least Bell's Vireo	s	1	0	0	0	0	0	0	2
Western Scrub Jay	r	13	19	13	18	17	17	32	23
American Crow	r	1	0	0	0	0	0	0	0
Common Raven	r	3	10	8	4	6	12	14	19
Horned Lark	r	0	0	0	0	4	0	0	0
N. Rough-winged Swallow	s	7	6	7	3	6	6	18	3
Cliff Swallow	s	600	387	300	133	310	259	92	52
Barn Swallow	s	2	0	0	0	2	0	0	0
Oak Titmouse	r	2	2	0	3	4	22	19	10
Bushtit	r	0	13	4	7	6	16	19	45
Bewick's Wren	r	33	36	21	16	25	18	30	35
House Wren	r	3	0	0	0	0	0	0	0
Western Bluebird	r	0	0	0	0	7	1	2	1
Swainson's Thrush	s	0	0	0	1	0	0	0	0
Wrentit	r	0	1	4	5	2	6	10	0
Northern Mockingbird	r	0	0	0	2	1	1	2	0
California Thrasher	r	3	4	3	2	5	5	5	4
European Starling	r	7	6	1	1	18	4	0	0
Cedar Waxwing	w	0	0	125	0	0	0	0	0

Table 5 (cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2003: Castaic Creek from I-5 to the Santa Clara River

Endangered Species and Species of Concern Shaded

		Dates of Surveys							
SPECIES	**STATUS**	**4/17**	**5/1**	**5/18**	**6/2**	**6/12**	**6/23**	**7/4**	**7/13**
Phainopepla	r	0	0	0	1	0	0	0	0
Yellow Warbler	s	4	6	3	2	0	0	0	0
Yellow-rumped Warbler	w,m	2	5	0	0	0	0	0	0
Black-throated Gray Warbler	m	0	1	0	0	0	0	0	0
Common Yellowthroat	r	6	9	3	3	2	3	2	6
Wilson's Warbler	m	1	13	3	0	0	0	0	0
Yellow-breasted Chat	s	0	1	0	0	1	0	0	0
Western Tanager	m	0	2	2	0	0	0	0	0
Spotted Towhee	r	25	28	8	15	24	22	14	18
California Towhee	r	30	35	14	18	30	36	21	28
Lark Sparrow	r	0	0	1	0	0	0	0	0
Song Sparrow	r	25	33	17	12	16	24	7	5
Black-headed Grosbeak	s	4	11	12	5	3	10	6	7
Blue Grosbeak	s	2	2	0	0	3	0	0	0
Lazuli Bunting	s	0	3	0	0	0	0	0	0
Red-winged Blackbird	s	16	6	10	1	16	7	3	0
Brown-headed Cowbird	s	11	7	13	5	7	4	5	2
Hooded Oriole	s	0	1	0	0	1	0	0	1
Bullock's Oriole	s	0	1	3	1	2	2	5	1
House Finch	r	31	4	14	3	6	14	6	40
Lesser Goldfinch	r	1	2	0	1	0	0	0	0
Lawrence's Goldfinch	r	0	2	0	0	0	0	0	0
House Sparrow	r	6	3	4	3	4	2	6	1

Status: m, migrant; r, resident; s, summer only; w, winter

Table 6. BIRDS OF THE SANTA CLARA RIVER BASIN, 2003: San Francisquito Creek from Santa Clara River to Copper Hill Drive.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	5/26	6/6	6/17	6/27	7/2	7/10
		Dates of Surveys					
White-tailed Kite	r	0	0	0	2	0	0
Cooper's Hawk	r	0	0	1	0	0	3
Red-shouldered Hawk	r	0	0	0	1	0	0
Red-tailed Hawk	r	2	3	0	1	1	0
American Kestrel	r	1	3	1	0	0	0
California Quail	r	16	4	18	12	6	10
Killdeer	r	10	2	3	0	2	0
Mourning Dove	r	30	45	46	34	18	38
Barn Owl	r	2	1	1	0	1	1
Anna's Hummingbird	r	10	3	2	8	6	5
Costa's Hummingbird	s	0	0	1	1	1	1
Nuttall's Woodpecker	r	7	8	4	7	2	8
Northern Flicker	r	0	0	1	0	0	0
Willow Flycatcher	m	0	0	0	0	1	0
Say's Phoebe	r	0	0	1	0	2	3
Black Phoebe	r	1	0	2	1	2	3
Ash-throated Flycatcher	s	7	4	3	2	2	2
Western Kingbird	s	2	4	5	6	8	4
Western Scrub Jay	r	12	6	6	9	11	9
American Crow	r	0	1	5	2	0	7
Common Raven	r	7	10	35	7	4	12
N. Rough-winged Swallow	s	0	2	0	0	2	0
Cliff Swallow	s	6	6	5	10	10	25
Barn Swallow	s	1	2	0	1	1	2
Oak Titmouse	r	1	5	2	2	0	2
Bushtit	r	4	3	4	4	0	0
Bewick's Wren	r	18	15	11	8	6	6
Hoiuse Wren	r	0	0	0	0	0	2
Western Bluebird	r	1	4	3	6	2	3
Wrentit	r	0	0	0	0	1	0
Northern Mockingbird	r	10	7	10	7	10	8
California Thrasher	r	3	3	1	0	1	1
European Starling	r	4	0	14	0	0	0
Phainopepla	r	4	10	10	9	2	4
Yellow Warbler	s	1	0	0	0	0	0
Common Yellowthroat	r	0	1	0	0	2	0
Spotted Towhee	r	22	9	19	12	16	12
California Towhee	r	32	28	26	30	12	16
Song Sparrow	r	8	8	4	0	0	0
Black-headed Grosbeak	s	3	0	6	2	3	3
Lazuli Bunting	s	2	0	0	0	0	0
Blue Grosbeak	s	0	0	0	1	0	0
Red-winged Blackbird	r	8	2	0	0	0	0

Table 6. (cont.) BIRDS OF THE SANTA CLARA RIVER BASIN, 2003: San Francisquito Creek from Santa Clara River to Copper Hill Drive.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	5/26	6/6	6/17	6/27	7/2	7/10
				Dates of Surveys			
Brewer's Blackbird	r	0	0	0	0	5	0
Bullock's Oriole	s	9	9	9	9	8	6
House Finch	r	51	62	44	71	84	53
Lesser Goldfinch	r	5	6	3	2	2	0
House Sparrow	r	0	0	2	2	0	0

Status: m, migrant; r, resident; s, summer only; w, winter

Table 7. BIRDS OF THE SANTA CLARA RIVER BASIN, 2003: South Fork from Rte 126 downstream to Santa Clara River.

Endangered Species and Species of Concern Shaded

		Dates of Surveys					
SPECIES	**STATUS**	**5/26**	**6/6**	**6/17**	**6/27**	**7/2**	**7/10**
Red-tailed Hawk	r	1	1	0	0	0	0
California Quail	r	1	0	13	8	9	2
Killdeer	r	0	0	0	0	0	1
Rock Dove	r	0	2	0	2	0	0
Mourning Dove	r	12	5	43	43	10	8
Black-chinned Hummingbird	s	0	0	0	0	0	1
Anna's Hummingbird	r	10	0	2	0	0	1
Nuttall's Woodpecker	r	3	1	0	0	3	0
Downy Woodpecker	r	1	0	1	0	0	0
Black Phoebe	r	0	0	0	0	7	0
Ash-throated Flycatcher	s	0	3	0	2	1	3
Western Kingbird	s	4	2	0	0	0	1
Western Scrub Jay	r	0	8	4	6	3	5
American Crow	r	0	1	0	1	0	0
Common Raven	r	38	56	17	9	17	27
N. Rough-winged Swallow	s	4	7	9	22	15	5
Cliff Swallow	s	10	46	18	2	5	6
Barn Swallow	s	0	0	3	0	0	0
Oak Titmouse	r	2	1	3	0	3	0
Bushtit	r	2	10	5	0	0	0
Bewick's Wren	r	19	20	15	8	5	7
Western Bluebird	r	0	2	2	0	0	0
Wrentit	r	2	0	2	0	0	0
Northern Mockingbird	r	4	3	6	3	8	2
California Thrasher	r	1	1	3	0	3	0
European Starling	r	8	55	36	64	20	8
Phainopepla	r	0	2	0	0	0	0
Spotted Towhee	r	10	6	1	1	1	4
California Towhee	r	10	5	7	2	5	5
Song Sparrow	r	4	3	0	2	1	0
Red-winged Blackbird	s	0	0	0	0	0	6
Brewer's Blackbird	r	2	2	0	0	0	0
Brown-headed Cowbird	s	2	1	0	0	2	0
Bullock's Oriole	s	1	2	0	4	0	0
House Finch	r	25	41	50	46	95	164
Lesser Goldfinch	r	4	0	0	4	61	4
House Sparrow	r	4	0	0	12	3	6

Status: m, migrant; r, resident; s, summer only; w, winter

Table 8. BIRDS OF THE SANTA CLARA RIVER BASIN, 2003: South Fork of the Santa Clara River from Route 126 upstream to Coyote Creek.								
Endangered Species and Species of Concern Shaded								
				Dates of Surveys				
SPECIES	**STATUS**	**5/26**	**6/6**	**6/17**	**6/27**	**7/2**	**7/10**
Cooper's Hawk	r	0	0	0	1	0	0
Red-tailed Hawk	r	1	1	0	0	0	1
Red-shouldered Hawk	r	0	0	0	2	2	2
California Quail	r	8	3	10	2	6	9
Killdeer	r	1	0	0	0	0	0
Rock Dove	r	0	0	0	0	22	3
Mourning Dove	r	15	7	14	22	8	8
White-throated Swift	r	6	4	0	2	9	0
Black-chinned Hummingbird	s	2	0	0	0	0	1
Anna's Hummingbird	r	14	9	5	2	0	3
Costa's Hummingbird	s	0	1	1	0	0	0
Nuttall's Woodpecker	r	5	2	1	5	1	3
Downy Woodpecker	r	0	1	1	3	0	0
Western Wood-Pewee	s	1	0	0	0	0	0
Black Phoebe	r	1	1	1	9	5	10
Say's Phoebe	r	1	1	0	0	1	1
Ash-throated Flycatcher	s	0	0	0	0	0	1
Warbling Vireo	m	1	0	0	0	0	0
Western Scrub Jay	r	12	11	10	12	10	21
American Crow	r	2	3	2	2	1	0
Common Raven	r	13	6	8	16	9	9
N. Rough-winged Swallow	s	9	1	1	4	6	0
Cliff Swallow	s	2	0	2	4	6	0
Oak Titmouse	r	2	5	4	2	4	7
Bushtit	r	5	15	11	14	6	8
Bewick's Wren	r	8	18	21	8	5	6
House Wren	r	0	0	4	0	0	0
Western Bluebird	r	0	1	1	2	0	0
Wrentit	r	5	2	8	0	0	0
Northern Mockingbird	r	8	6	8	8	12	14
California Thrasher	r	4	2	3	6	1	9
European Starling	r	0	2	3	0	7	6
Orange-crowned Warbler	s	1	0	0	0	0	0
Yellow Warbler	s,m	9	0	0	0	0	0
Wilson's Warbler	m	2	0	0	0	0	0
Western Tanager	m	3	0	0	0	0	0
Spotted Towhee	r	8	6	5	6	4	9
California Towhee	r	15	10	28	13	11	12
Song Sparrow	r	7	5	4	12	3	1
Black-headed Grosbeak	s	2	2	0	2	2	4
Red-winged Blackbird	s	0	1	0	0	0	0
Brewer's Blackbird	r	0	0	0	0	0	3
Brown-headed Cowbird	s	5	0	0	1	3	0
Hooded Oriole	s	0	0	0	1	0	0

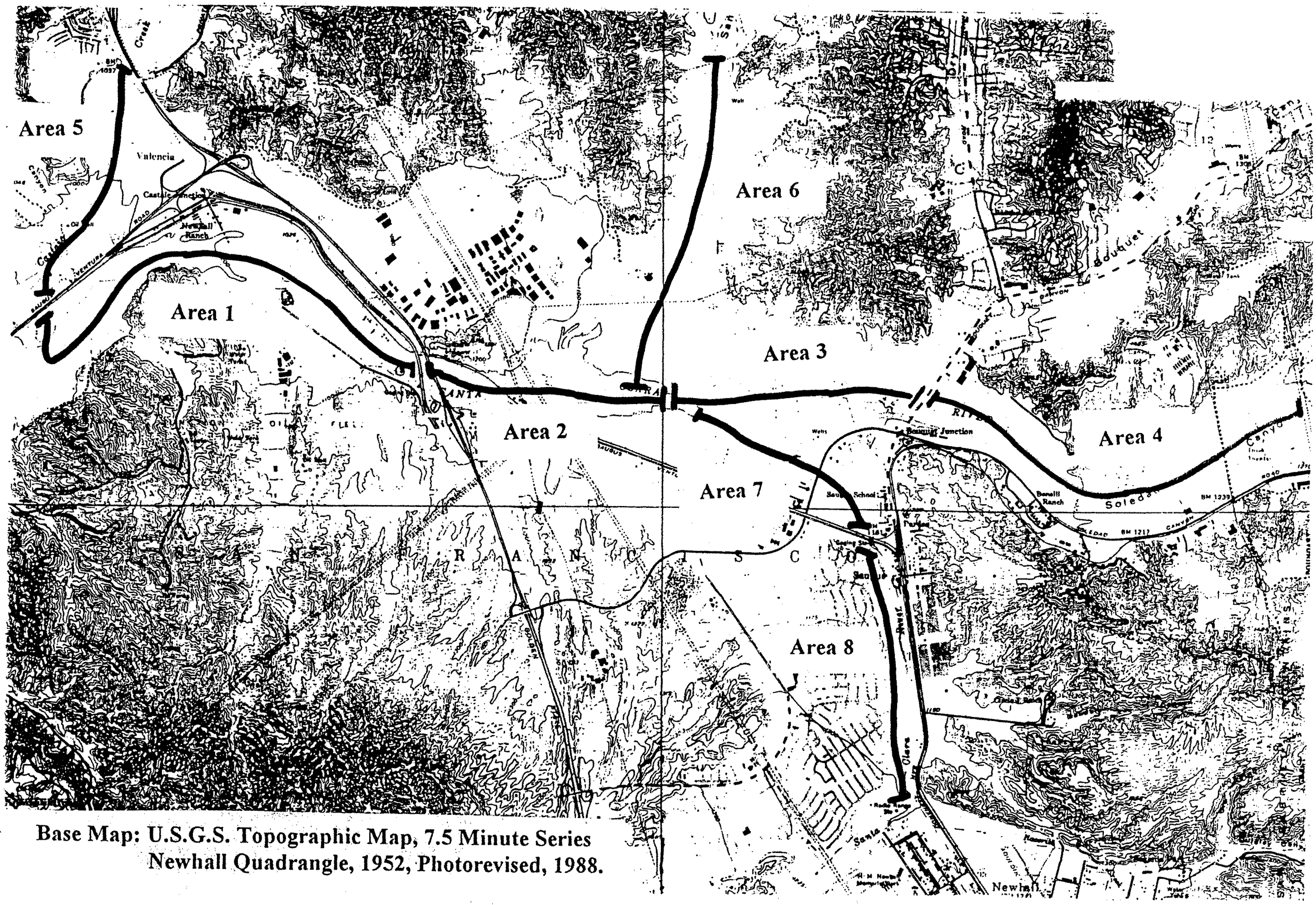
Table 8. (cont,) BIRDS OF THE SANTA CLARA RIVER BASIN, 2003: South Fork of the Santa Clara River from Route 126 upstream to Coyote Creek.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	5/26	6/6	6/17	6/27	7/2	7/10
				Dates of Surveys			
Bullock's Oriole	s	3	0	1	9	6	1
House Finch	r	30	46	29	18	71	82
Lesser Goldfinch	r	1	1	0	0	5	11
House Sparrow	r	6	4	6	21	15	23

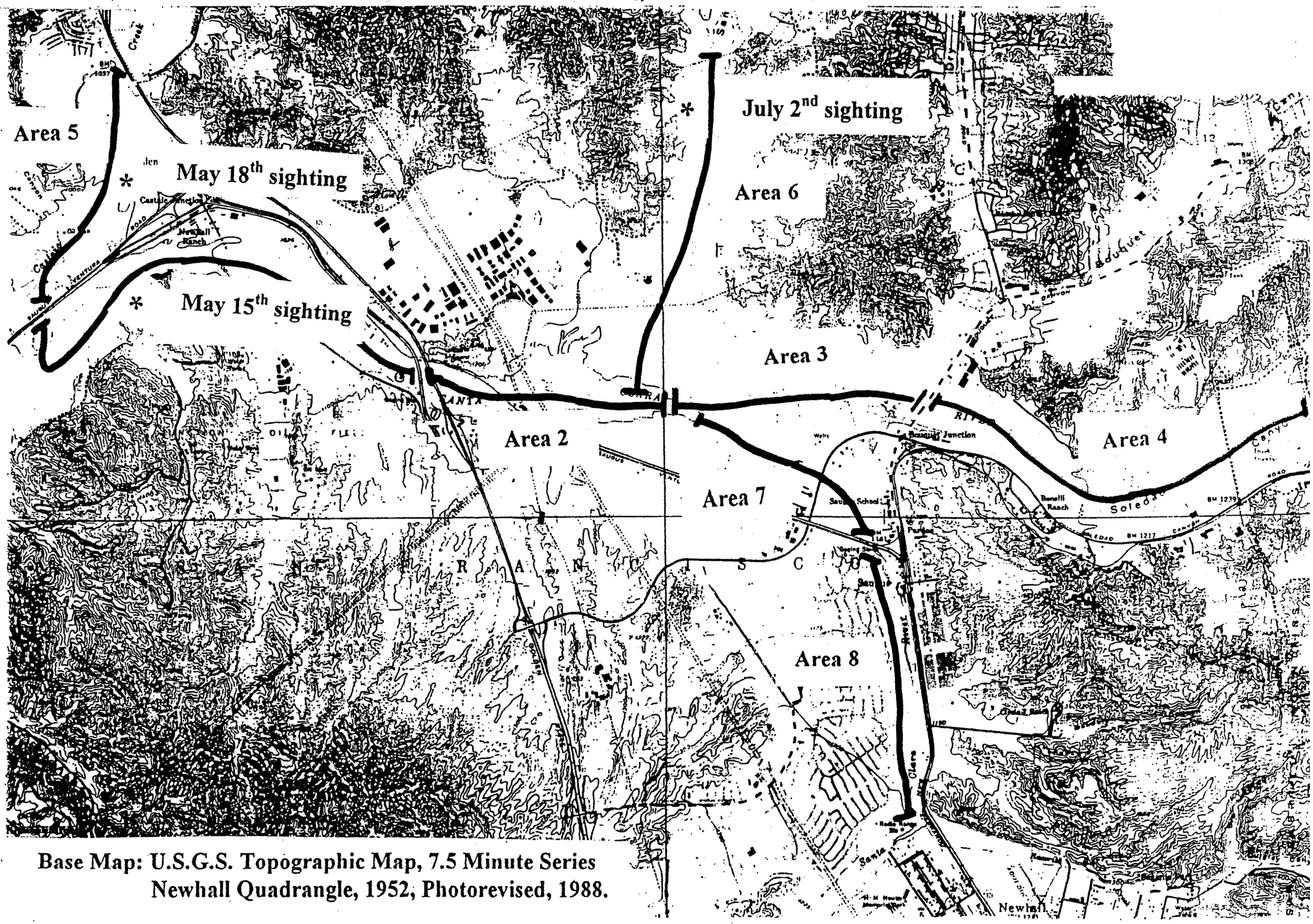
Status: m, migrant; r, resident; s, summer only; w, winter

Figure 1. Survey Areas along the Santa Clara River and Tributaries.



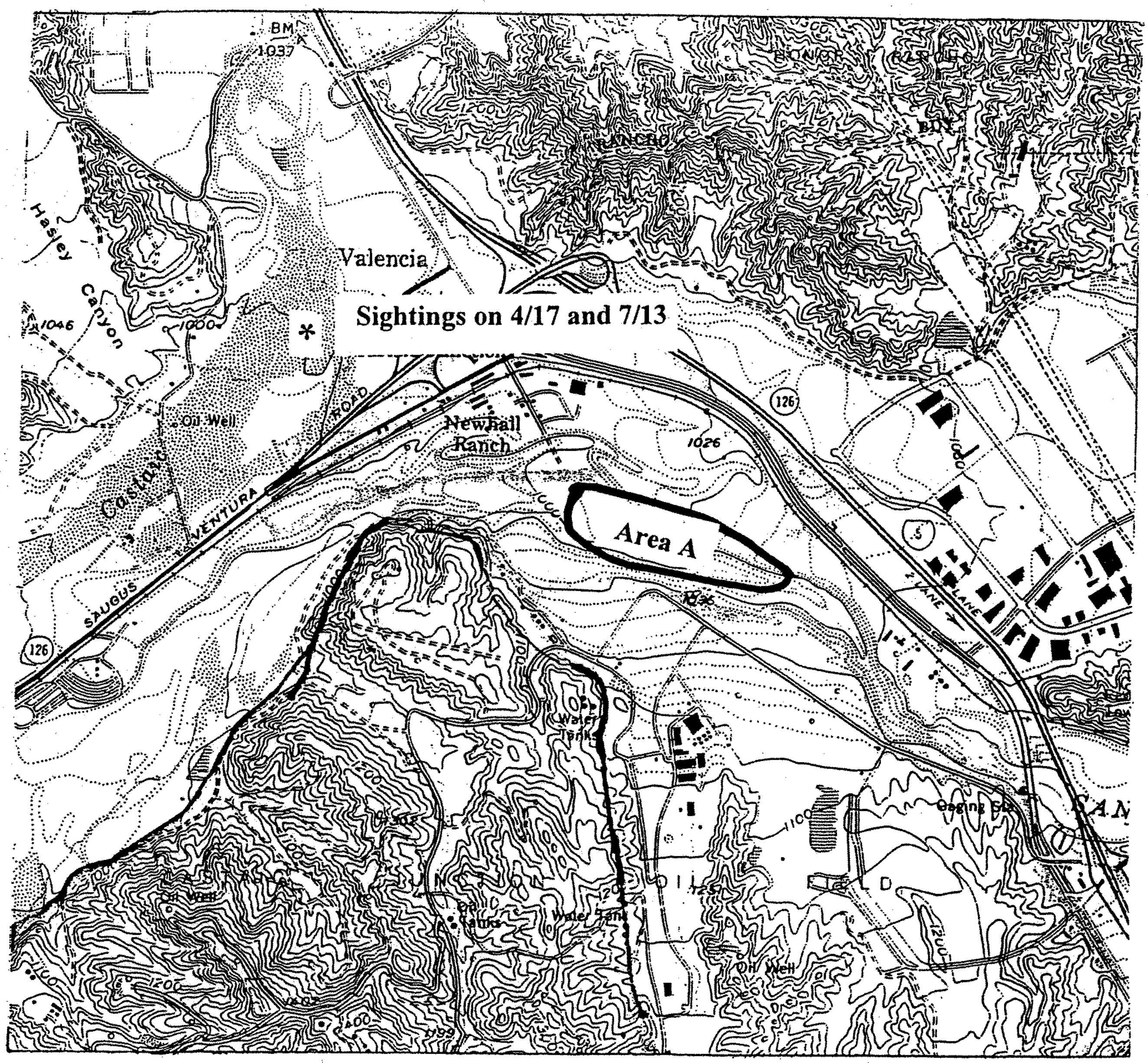
Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988.

Figure 2. Locations of willow flycatcher sightings, 2003.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988.

Figure 3. Locations of least Bell's vireo sightings, 2003.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988

Willow Flycatcher Survey and Detection Form (rev. 4/98)

Site Name____South Fork______________________________ Total Site No ______________________________

Was site surveyed in previous year? **Yes** Drainage Santa Clara River

If yes, what site name was used? __Upper Santa Clara River__________

County __Los Angeles____________________________ State__CA____ USGS Quad Name Newhall______

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? X☐ *Yes* ☐ *No*

Site Coordinates: Start: N__34 23.735________________ W 118 32.354____________ UTM

Stop: N__34 25.507________________ W 118 33.710______________ UTM Zone ________

Elevation ____1120- 1200 ft.___________ feet / meters (circle one)

** Fill in additional site information on back of this page **

Survey # Observer(s)	Date (m/d/y) Survey time	Number of WIFLs Found	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign Y or N	Comments about this survey (e.g., evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
J. Sugden	Date 5/26 start 8 stop 9:45 total hrs _1.75____	0	0	0	n	Y	n	
j. Sudgden	Date 6/6 Start 6:30 Stop 8:30 total hrs _2___	0	0	0	n	Y	N	
J. Sugden	Date 6/27 Start5.45 Stop 7:15 total hrs _1.5__	0	0	0	n	Y	N	
J. Sugden	Date 7/2 start 6 stop 7:45 total hrs 1.75_	0	0	0	n	Y	N	Immature of the year?
J. Sugden.	Date 7/10 start 5:45 stop 7:15 total hrs _1.5____	0	0	0	n	Y	N	

Overall Site Summary (Total only resident WIFLs)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? No
Total survey hrs___8.5_____	0	0	0	0	If yes, report color combination(s) in the comments section on back of form

Name of Reporting Individual ____Dan Guthrie______________ Date Report Completed ___7/20/03_______________

Submit the original of this form. Retain a copy for your records.

Fill in the following information completely. Submit original form. Retain copy for your records.

Name of Reporting Individual ___Dan Guthrie________________________ Phone # _909 607 2836____________

Affiliation __Claremont Colleges_________________________ Email dguthrie@jsd.claremont.edu______________

Site Name__South Fork, Santa Clara River____

Did you verify that this site name is consistent with that used in previous years? Yes No ? (circle one)

This is a section of site previously lumped as upper Santa Clara River

Management Authority for Survey Area (circle one):

Federal Municipal/County State Tribal **Private**

Name of Management Entity or Owner (e.g., Tonto National Forest) _Newhall Land Co.________________________

Length of area surveyed: _2 miles_____ (specify units, e.g., miles = mi, kilometers = km, meters = m)

Did you survey the same general area during each visit to this site this year? **Yes** / If no, summarize in comments below.

If site was surveyed last year, did you survey the same general area this year? **Yes** / If no, summarize in comments below.

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

Native broadleaf plants

XX☐ Mixed native and exotic plants (mostly native)

(entirely or almost entirely, includes high-elevation willow)

☐ Mixed native and exotic plants (mostly exotic) ☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: __Cotrtonwood, willow, tamarisk_______________________

Average height of canopy: __30t.__________________________ (specify units)

Was surface water or saturated soil present at or adjacent to site? **No** water present only in three spots due to suburban runoff.

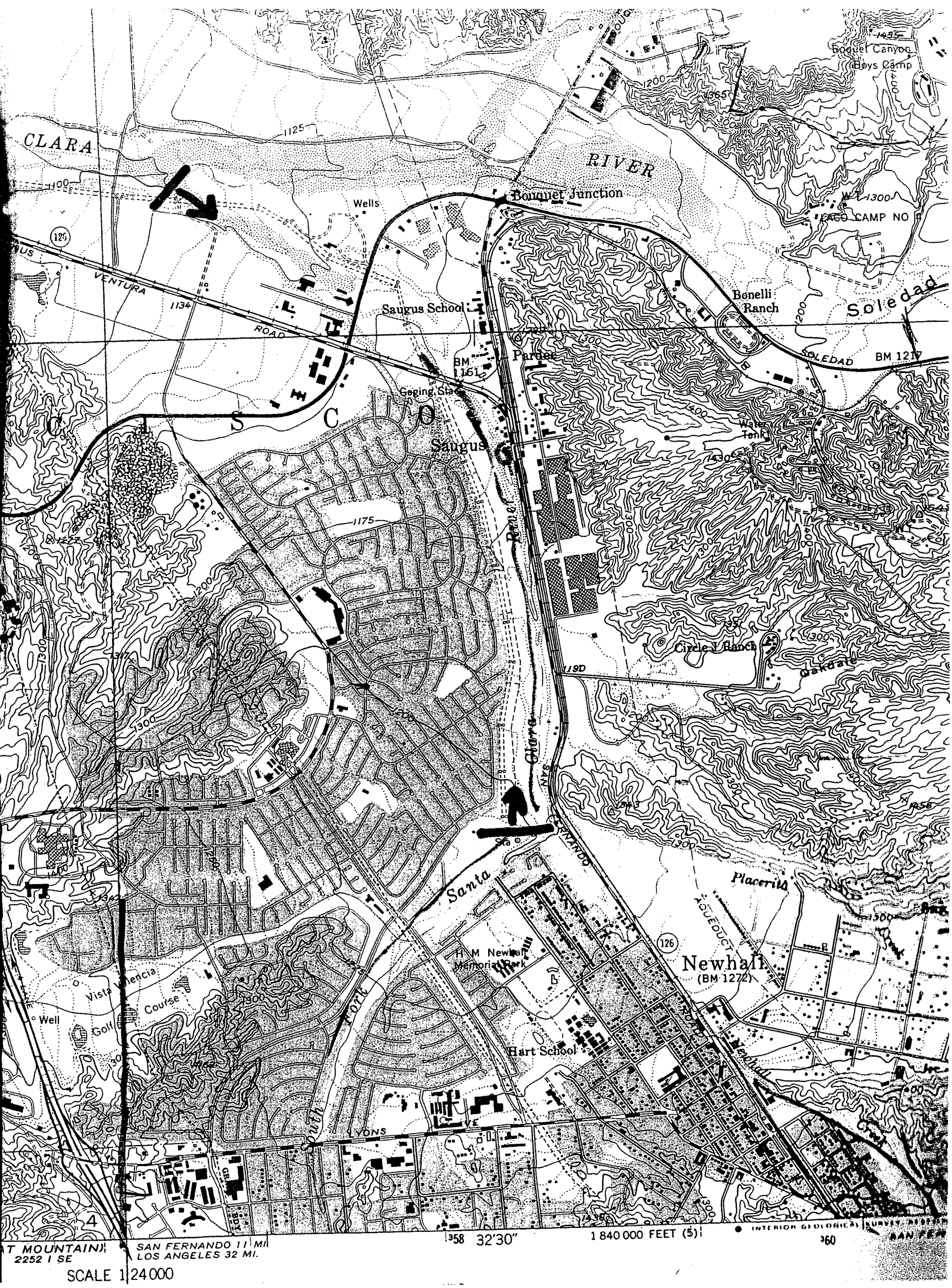
Distance from the site to surface water or saturated soil: ____________ (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? No (circle one)

If yes, describe in comments section below. no water present except for 50 yd section trickle in center of section.

Remember to attach a xerox copy of a USGS quad/topographical map (REQUIRED) of the survey area, noting the survey site and location of WIFL detections. You may also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map.

Comments (attach additional sheets if necessary):_______________________________________


CLARA
RIVER
Bouquet Junction
Bouquet Canyon Boys Camp
Wells
VENTURA
ROAD
Saugus School
Bonelli Ranch
Soledad
SOLEDAD
BM 1217
Pardee
BM 1161
Gaging Sta
Saugus
Water Tank
1175
Circle J Ranch
Oakdale
SAN FERNANDO
Santa
Placerita
AQUEDUCT
H M Newhall Memorial Park
Newhall
(BM 1272)
Vista Valencia
Golf Course
Well
Hart School
South Fork
LYONS
126
1125
1100
1134
1200
1300
1400
1365
1495
358 32'30"
1 840 000 FEET (5)
360
INTERIOR GEOLOGICAL SURVEY
(T MOUNTAIN)
2252 I SE
SAN FERNANDO 11 MI
LOS ANGELES 32 MI
SCALE 1:24 000

Willow Flycatcher Survey and Detection Form (rev. 4/98)

Site Name____Castaic Creek________________________ Total Site No ______________________

Was site surveyed in previous year? **Yes** No   Drainage Santa Clara River
If yes, what site name was used? __Upper Santa Clara River, section 5______
County __Los Angeles______________________   State__CA____ USGS Quad Name Newhall______

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? *X☐ Yes ☐ No*
Site Coordinates: Start: N__34 25/306______________ W 118 36.755___________ UTM
Stop: N__34 26______________ W 118 37____________ UTM Zone ________
Elevation ____ 950-1027 ft.__________ feet / meters (circle one)

***** Fill in additional site information on back of this page *****

Survey # Observer(s)	Date (m/d/y) Survey time	Number of WIFLs Found	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign Y or N	Comments about this survey (e.g., evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
J. Sugden	Date 5/18 start 6 stop 7:30 total hrs _1.50_	1	0	0	n	Y	n	
J. Sugden	Date 6/12 Start 6:30 Stop 8:0 total hrs _1.5	0	0	0	n	Y	N	
J. Sugden	Date 6/23 Start 6:00 Stop 7:30 total hrs _1.5__	0	0	0	n	Y	N	
J. Sugden	Date 7/4 start 6 stop 7:30 total hrs 1.50_		0	0	n	Y	N	Immature of the year?
J. Sugden	Date 7/14 start 6:00 stop 7:30 total hrs _1.5___	0	0	0	n	Y	N	

Overall Site Summary (Total only resident WIFLs)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? No
Total survey hrs___75_____	1	0	0	0	If yes, report color combination(s) in the comments section on back of form

Name of Reporting Individual ____Dan Guthrie____________ Date Report Completed ___7/20/03________________

Submit the original of this form. Retain a copy for your records.

Fill in the following information completely. Submit original form. Retain copy for your records.

Name of Reporting Individual ___Dan Guthrie_______________________Phone # _909 607 2836____________

Affiliation __Claremont Colleges__________________________ Email dguthrie@jsd.claremont.edu_______________

Site Name__Castaic Creek____
Did you verify that this site name is consistent with that used in previous years? Yes No ? (circle one)
This is a section of site previously lumped as upper Santa Clara River. section 5.
Management Authority for Survey Area (circle one):

Federal Municipal/County State Tribal **Private**

Name of Management Entity or Owner (e.g., Tonto National Forest) _Newhall Land Co.________________________

Length of area surveyed: _2 miles_____ (specify units, e.g., miles = mi, kilometers = km, meters = m)

Did you survey the same general area during each visit to this site this year? Yes / If no, summarize in comments below.

If site was surveyed last year, did you survey the same general area this year? Yes / If no, summarize in comments below.

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):
Native broadleaf plants
XX☐ Mixed native and exotic plants (mostly native)
(entirely or almost entirely, includes high-elevation willow)
☐ Mixed native and exotic plants (mostly exotic) ☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: __Cotrtonwood, willow, tamarisk_________________________________

Average height of canopy: __40 ft.___________________________ (specify units)

Was surface water or saturated soil present at or adjacent to site? No see comment
Distance from the site to surface water or saturated soil: _____see comment

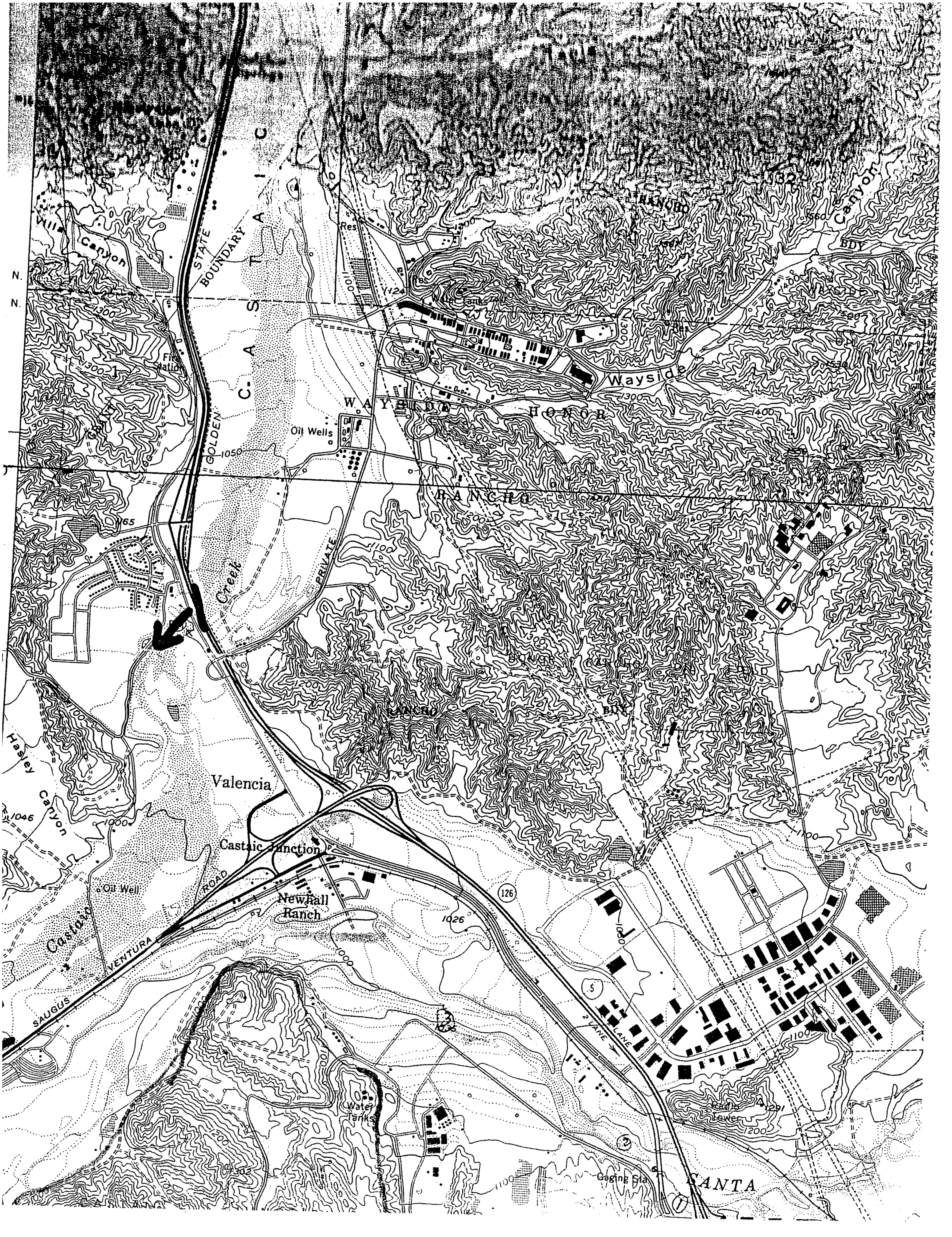
Did hydrological conditions change significantly among visits (did the site flood or dry out)? No (circle one)
If yes, describe in comments section below. no water present except for 50 yd section trickle in center of section.

Remember to attach a xerox copy of a USGS quad/topographical map (REQUIRED) of the survey area, noting the survey site and location of WIFL detections. You may also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map.

Comments (attach additional sheets if necessary):____

Water in this section of Castaic Creek comes from releases from Castaic Dam. There were no releases during the survey period. Some residential runoff was present at upper section of survey area but the rest of the creek was dry. Nearest water in Santa Clara River a mile away.

The timing of this sighting suggestes that the bird was a migrant passing through the area. Its identity to subspecies is not known. It may have belonged to a subspecies other than southwestern.



Villa Canyon
STATE BOUNDARY
GOLDEN
C A S T A I C
RANCHO
Canyon
BDY
Res
Water Tanks
Fire Station
Wayside
W A Y S I D E
H O N O R
Oil Wells
RANCHO
Creek
PRIVATE
Hasley Canyon
Valencia
Castaic Junction
Newhall Ranch
Oil Well
Castaic
VENTURA
ROAD
SAUGUS
126
5
2 LANE
Water Tanks
Gaging Sta
SANTA

Willow Flycatcher Survey and Detection Form (rev. 4/98)

Site Name____Santa Clara River above Bouquet Canyon rd.__________________Total Site No ________________

Was site surveyed in previous year? **Yes** No   Drainage Santa Clara River
If yes, what site name was used? __Upper Santa Clara River- section 4______
County __Los Angeles________________________ State__CA____ USGS Quad Name Newhall______

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? X☐ ***Yes*** ☐ ***No***
Site Coordinates: Start: N__34 25.415_______________ W 118 32.399____________ UTM
Stop: N__34 25.515_______________ W 118 30.125 UTM Zone ________
Elevation _____1125-1320 ft.___________ feet / meters (circle one)

***** Fill in additional site information on back of this page *****

Survey # Observer(s)	Date (m/d/y) Survey time	Number of WIFLs Found	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign Y or N	Comments about this survey (e.g., evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
J. Sugden	Date 5/19 start 6 stop 7:45 total hrs _1.75_	0	0	0	N	n	n	
J. Sugden	Date 6/4 Start 6:00 Stop 8:30 total hrs _1.5__	0	0	0	n	n	N	
D. Guthrie	Date 6/26 Start5.30 Stop 7: total hrs _1.5__	0	0	0	n	n	N	
D. Guthrie	Date 7/1 start 5:30 stop 7:00 total hrs 1.50_	0	0	0	n	n	N	Immature of the year?
D. Guthrie	Date 7/11 start 5:30 stop 7:00 total hrs _1.5__	0	0	0	n	n	N	

Overall Site Summary (Total only resident WIFLs)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? No
Total survey hrs___7.75_____	0	0	0	0	If yes, report color combination(s) in the comments section on back of form

Name of Reporting Individual ____Dan Guthrie_____________ Date Report Completed ___7/20/03_________________

Submit the original of this form. Retain a copy for your records.

Fill in the following information completely. Submit original form. Retain copy for your records.

Name of Reporting Individual ___Dan Guthrie_______________________Phone # _909 607 2836____________

Affiliation __Claremont Colleges_________________________ Email dguthrie@jsd.claremont.edu______________

Site Name__Santa Clara River above boquet Canyon Rd.____
Did you verify that this site name is consistent with that used in previous years?
This is a section of site previously lumped as upper Santa Clara River, section 4.

Management Authority for Survey Area (circle one):

Federal   Municipal/County   State   Tribal   **Private**

Name of Management Entity or Owner (e.g., Tonto National Forest) _Newhall Land Co.________________________

Length of area surveyed: _2 miles_____ (specify units, e.g., miles = mi, kilometers = km, meters = m)

Did you survey the same general area during each visit to this site this year? Yes /   If no, summarize in comments below.

If site was surveyed last year, did you survey the same general area this year? Yes /   If no, summarize in comments below.

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):
Native broadleaf plants
XX☐ Mixed native and exotic plants (mostly native)
(entirely or almost entirely, includes high-elevation willow)
☐ Mixed native and exotic plants (mostly exotic)   ☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: __Cotrtonwood, Baccharis, tamarisk______________________________

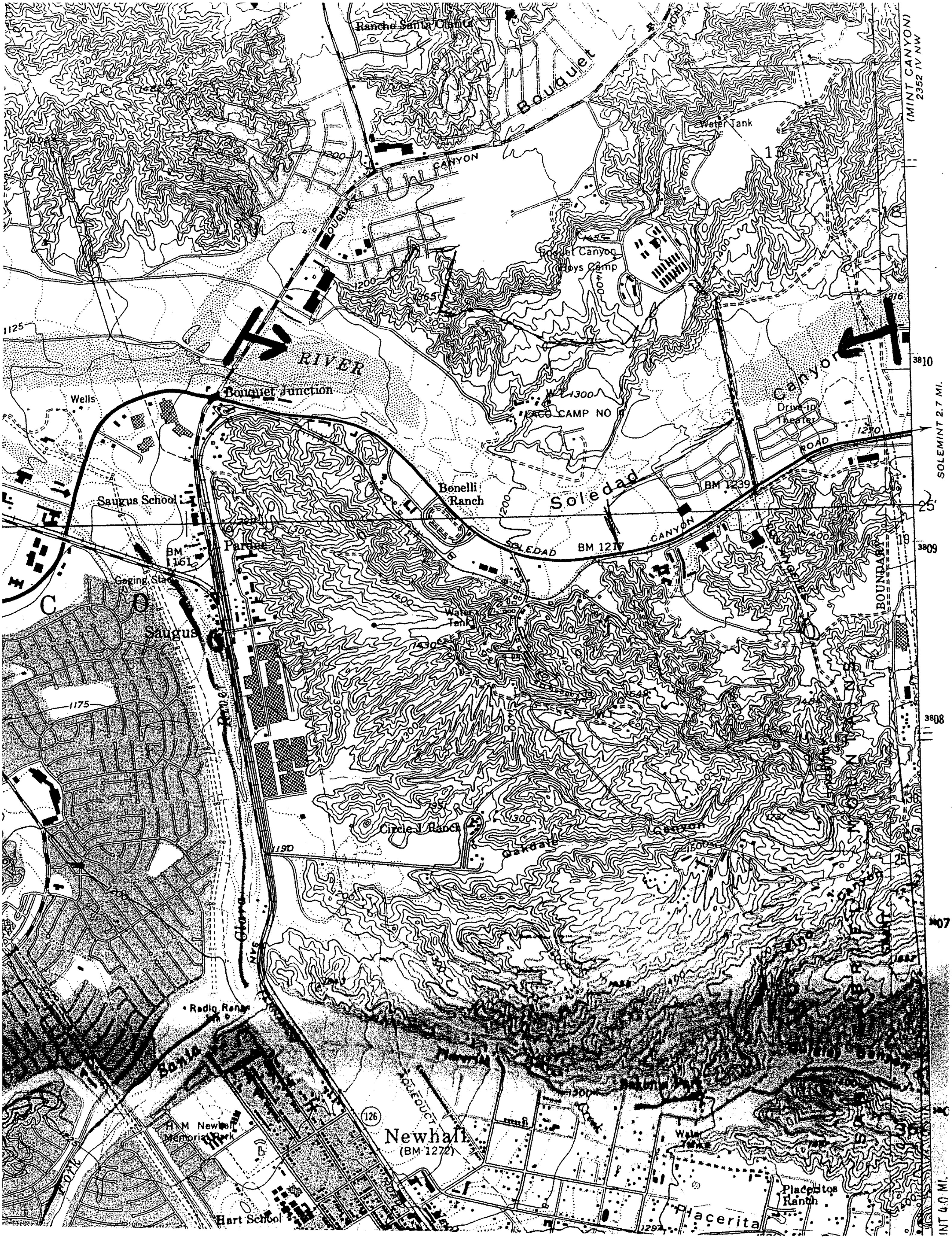
Average height of canopy: __30 ft._if present.__________________________ (specify units)

Was surface water or saturated soil present at or adjacent to site? No .
Distance from the site to surface water or saturated soil: __water starts at downstream end of section._ (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? No (circle one)
If yes, describe in comments section below. no water present except for 50 yd section trickle in center of section.

Remember to attach a xerox copy of a USGS quad/topographical map (REQUIRED) of the survey area, noting the survey site and location of WIFL detections. You may also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map.

Comments (attach additional sheets if necessary):____



Rancho Santa Clarita
Bouquet
CANYON
Water Tank
(MINT CANYON)
2352 IV NW
Bouquet Canyon
Boys Camp
RIVER
Bouquet Junction
Wells
Canyon
Drive-in
Theater
SOLEMINT 2.7 MI.
ROAD
Soledad
BM 1239
Bonelli
Ranch
Saugus School
SOLEDAD
BM 1217
CANYON
BM
1161
Pardee
Coging Sta
C
O
Saugus
Water
Tank
BOUNDARY
1175
Circle J Ranch
Oakdale
Canyon
Radio Range
Newhall
(BM 1272)
H M Newhall
Memorial Park
126
Hart School
Placerita
Placeritos
Ranch
Water
Tanks
25'
3810
3809
3808
3807
INT 4.0 MI.

Willow Flycatcher Survey and Detection Form (rev. 4/98)

Site Name____Santa Clara River: Castaic Creek to Boquet Canyon Rd.___Total Site No ______________________

Was site surveyed in previous year? **Yes** Drainage Santa Clara River

If yes, what site name was used? __Upper Santa Clara River: Sections 1-3______

County __Los Angeles______________________ State__CA____ USGS Quad Name Newhall______

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? X☐ ***Yes*** ☐ ***No***

Site Coordinates: Start: N__34 25.415________________ W 118 32.399___________ UTM

Stop: N__34 25.172________________ W 118 38.070___________ UTM Zone ________

Elevation ____980 - 1125 ft.___________ feet / meters (circle one)

***** Fill in additional site information on back of this page *****

Survey # Observer(s)	Date (m/d/y) Survey time	Number of WIFLs Found	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign Y or N	Comments about this survey (e.g., evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
D. Guthrie _J._Sugden____	Date 5/15 start 6:30 stop 9:00 total hrs _1.75____	1	0	0	n	Y	n	
D. Guthrie J. Sugden	Date 6//10 Start 6:30 Stop 9:00 total hrs _2___	0	0	0	n	Y	N	
D. Guthrie _J.Sugden_____	Date 6//22 Start 6:30 Stop 9:00 total hrs _1.5__	0	0	0	n	Y	N	
D. Guthrie __J. Sugden___	Date 7/3 start 5:45 stop 8:45 total hrs 1.75_	0	0	0	n	Y	N	
D. Guthrie _J. Sugden___	Date 7/14 start 5:45 stop 8:45 total hrs _1.5____	0	0	0	n	Y	N	

Overall Site Summary (Total only resident WIFLs)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? No
Total survey hrs__13.5 (x2)	1	0	0	0	If yes, report color combination(s) in the comments section on back of form

Name of Reporting Individual ____Dan Guthrie_____________ Date Report Completed ___7/20/03________________

Submit the original of this form. Retain a copy for your records.

Fill in the following information completely. Submit original form. Retain copy for your records.

Name of Reporting Individual ___Dan Guthrie________________________Phone # _909 607 2836____________

Affiliation __Claremont Colleges__________________________ Email dguthrie@jsd.claremont.edu______________

Site Name__Santa Clara River: Castaic Creek to Boquet River Bridge____________________________
Did you verify that this site name is consistent with that used in previous years? Yes No ? (circle one)
This is a section of site previously lumped as upper Santa Clara River, sections 1-3
Management Authority for Survey Area (circle one):

Federal Municipal/County State Tribal **Private**

Name of Management Entity or Owner (e.g., Tonto National Forest) _Newhall Land Co.________________________

Length of area surveyed: _5.9 miles_____ (specify units, e.g., miles = mi, kilometers = km, meters = m)

Did you survey the same general area during each visit to this site this year? **Yes /** If no, summarize in comments below.

If site was surveyed last year, did you survey the same general area this year? **Yes /** If no, summarize in comments below.

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):
Native broadleaf plants
XX☐ Mixed native and exotic plants (mostly native)
(entirely or almost entirely, includes high-elevation willow)
☐ Mixed native and exotic plants (mostly exotic) ☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: __Cotrtonwood, willow, tamarisk______________________________

Average height of canopy: __40 ft.__________________________(specify units)

Was surface water or saturated soil present at or adjacent to site? **yes.**
Distance from the site to surface water or saturated soil: ____________ (specify units)

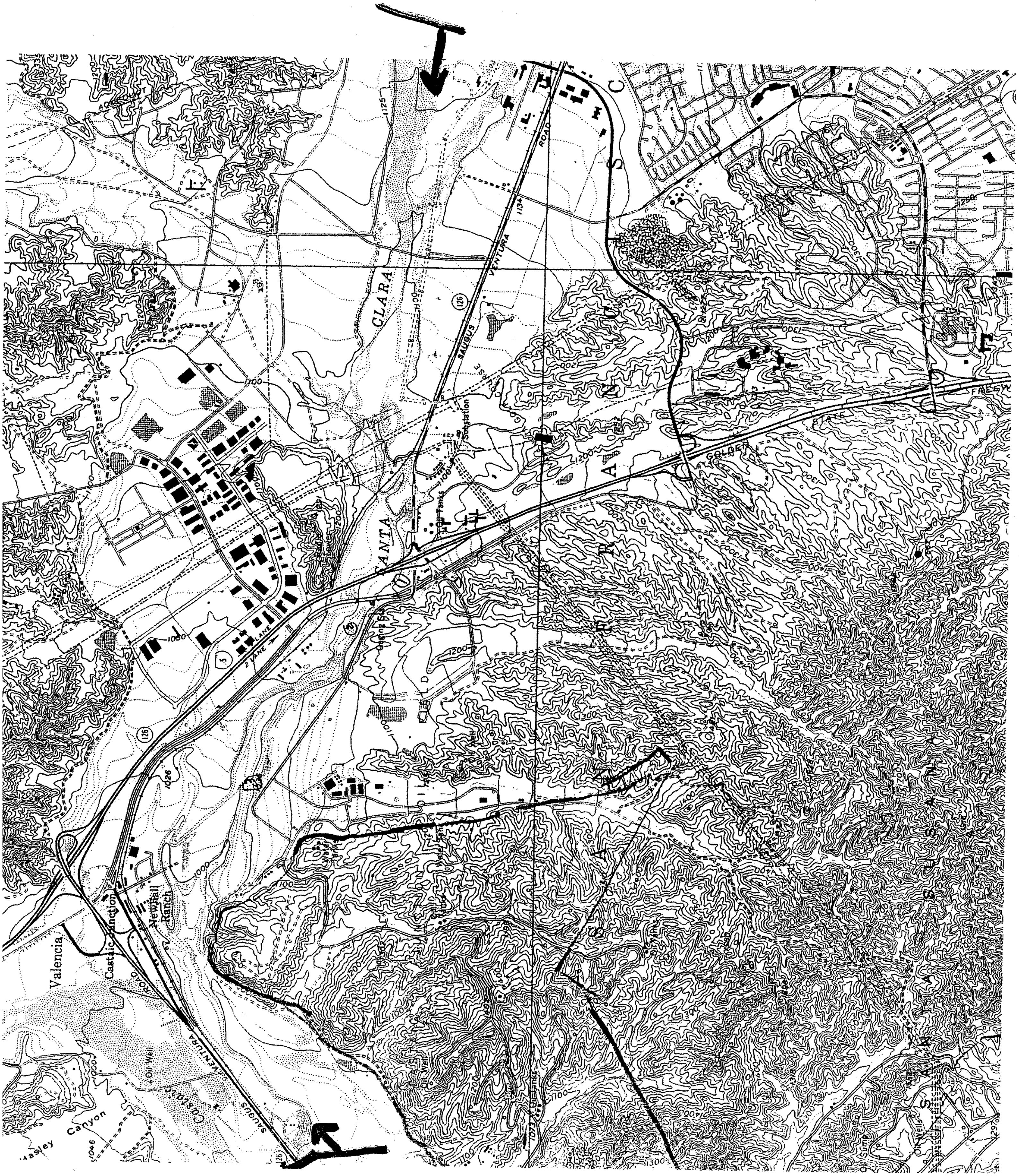
Did hydrological conditions change significantly among visits (did the site flood or dry out)? **No** (circle one)
If yes, describe in comments section below. no water present except for 50 yd section trickle in center of section.

Remember to attach a xerox copy of a USGS quad/topographical map (REQUIRED) of the survey area, noting the survey site and location of WIFL detections. You may also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map.

Comments (attach additional sheets if necessary):____

_______Santa Clara River flows continuously along this section of the river. Water is provided by two sewage treatment plants. There was no natural flow during the survey period.____

The timing of this sighting suggestes that the bird was a migrant passing through the area. Its identity to subspecies is not known. It may have belonged to a subspecies other than southwestern.



Valencia
Castaic Junction
Newhall Ranch
SANTA
CLARA
SAUGUS
VENTURA
ROAD
GOLDEN
Hasley
Canyon
Oil Well
Oil Tanks
Substation

Willow Flycatcher Survey and Detection Form (rev. 4/98)

Site Name____San Francisquito Creek__________________________ Total Site No ____________________________

Was site surveyed in previous year? **Yes** No   Drainage Santa Clara River
If yes, what site name was used? __Upper Santa Clara River__________
County __Los Angeles___________________________ State__CA____ USGS Quad Name Newhall_____

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? X☐ Yes ☐ No

Site Coordinates: Start: N__34 25/631________________ W 118 33.899____________ UTM
Stop: N__34 27.752________________ W 118 33.047_____________ UTM Zone ________
Elevation ____1125-1300 ft.___________ feet / meters (circle one)

***** Fill in additional site information on back of this page *****

Survey # Observer(s)	Date (m/d/y) Survey time	Number of WIFLs Found	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign Y or N	Comments about this survey (e.g., evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
D. Guthrie ___ ___	Date 5/26 start 8 stop 9:45 total hrs _1.75____	0	0	0	n	n	n	
D. Guthrie ___ ___	Date 6/6 Start 6:30 Stop 8:30 total hrs _2___	0	0	0	n	n	N	
D. Guthrie ___ ___	Date 6/27 Start5.45 Stop 7:15 total hrs _1.5__	0	0	0	n	n	N	
D. Guthrie ___ ___	Date 7/2 start 6 stop 7:45 total hrs 1.75_	1	0	0	n	n	N	Immature of the year?
D. Guthrie ___ ___	Date 7/10 start 5:45 stop 7:15 total hrs _1.5____	0	0	0	n	n	N	

Overall Site Summary (Total only resident WIFLs) Total survey hrs___8.5______	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? No
	1	0	0	0	If yes, report color combination(s) in the comments section on back of form

Name of Reporting Individual ____Dan Guthrie______________ Date Report Completed ___7/20/03________________

Submit the original of this form. Retain a copy for your records.

Fill in the following information completely. Submit original form. Retain copy for your records.

Name of Reporting Individual ___Dan Guthrie______________________Phone # _909 607 2836____________

Affiliation __Claremont Colleges_________________________ Email dguthrie@jsd.claremont.edu______________

Site Name__San Francisquito Creek____
Did you verify that this site name is consistent with that used in previous years? Yes No ? (circle one)
This is a section of site previously lumped as upper Santa Clara River
Management Authority for Survey Area (circle one):

Federal Municipal/County State Tribal **Private**

Name of Management Entity or Owner (e.g., Tonto National Forest) _Newhall Land Co.______________________

Length of area surveyed: _2 miles_____ (specify units, e.g., miles = mi, kilometers = km, meters = m)

Did you survey the same general area during each visit to this site this year? Yes / If no, summarize in comments below.

If site was surveyed last year, did you survey the same general area this year? Yes / If no, summarize in comments below.

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):
Native broadleaf plants
XX☐ Mixed native and exotic plants (mostly native)
(entirely or almost entirely, includes high-elevation willow)
☐ Mixed native and exotic plants (mostly exotic) ☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: __Cotrtonwood, willow, tamarisk_______________________________

Average height of canopy: __40 ft.___________________________ (specify units)

Was surface water or saturated soil present at or adjacent to site? No water present only for 50 yds in middle of section.
Distance from the site to surface water or saturated soil: _____________ (specify units)

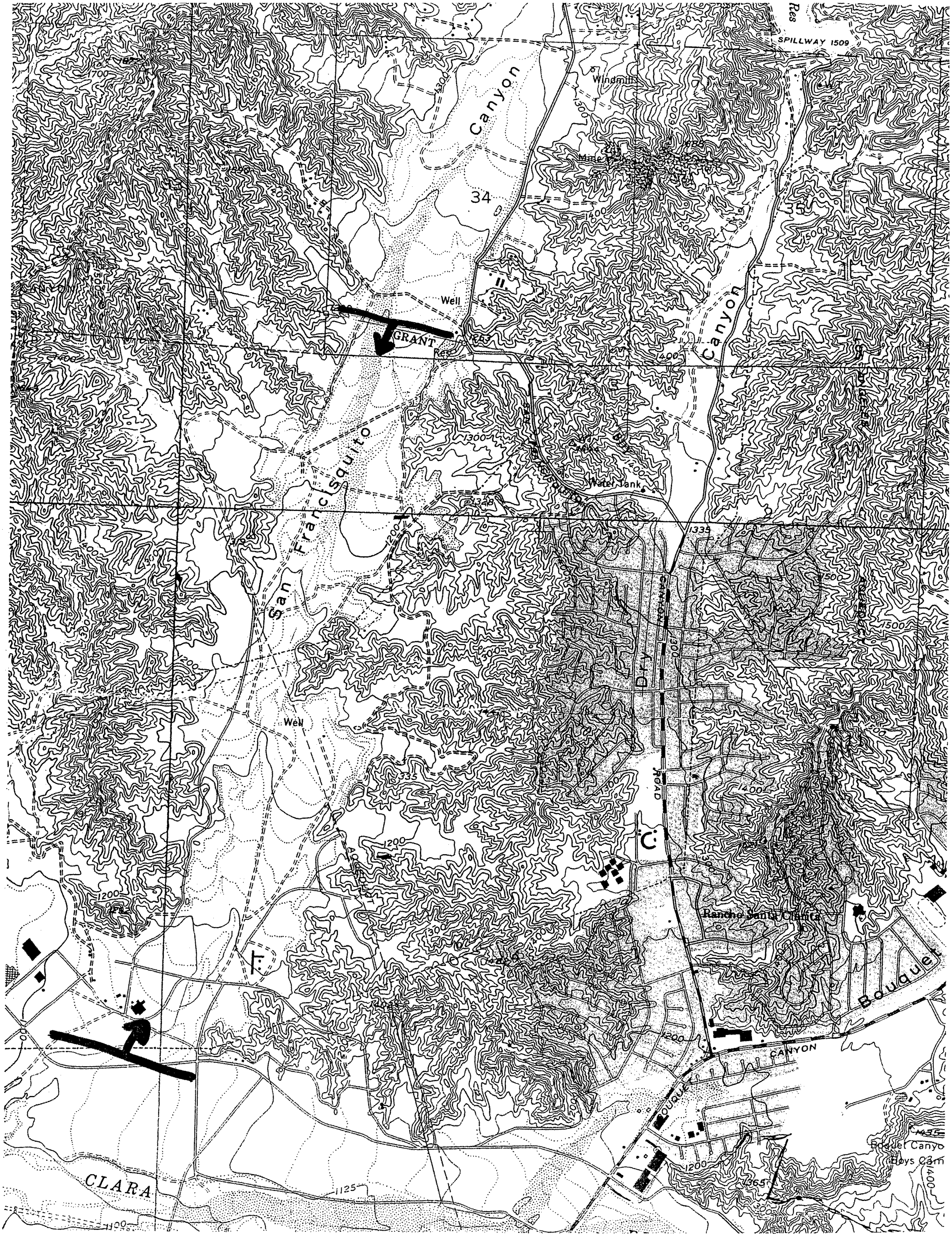
Did hydrological conditions change significantly among visits (did the site flood or dry out)? No (circle one)
If yes, describe in comments section below. no water present except for 50 yd section trickle in center of section.

Remember to attach a xerox copy of a USGS quad/topographical map (REQUIRED) of the survey area, noting the survey site and location of WIFL detections. You may also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map.

Comments (attach additional sheets if necessary):____

no flowing water present except for small area of suburban runoff in middle of section.

the timing of this observation suggests that it was of a post breeding young of the year that had dispersed from its nest. It is not known to which subspecies this individual belonged. It may have been from a subsepecies other than southwestern.



Res
SPILLWAY 1509
Windmill
Canyon
34
35
Well
GRANT
Res
Canyon
San Francisquito
Water Tank
Dry
ROAD
Well
Rancho Santa Clarita
Bouquet
CANYON
CLARA

Bird Surveys Along a Portion of the Santa Clara River and its Tributaries Upstream from the Castaic Creek Confluence, Near Valencia, California, 2002

BIRD SURVEYS ALONG A PORTION OF THE SANTA CLARA RIVER AND ITS TRIBUTARIES UPSTREAM FROM THE CASTAIC CREEK CONFLUENCE, NEAR VALENCIA, CALIFORNIA, 2002

Prepared for:

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August 16, 2002

REVISED

Bird Surveys along a Portion of the Santa Clara River Upstream from the Castaic Creek Confluence, near Valencia, California, 2002

Prepared by: Daniel A. Guthrie
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Nature and Scope of Surveys

During the spring and early summer of 2002 surveys were conducted along a section of the Santa Clara River and its tributaries near Valencia, California (Figure 1). Surveys were focused on determining presence or absence of yellow-billed cuckoo, least Bell's vireo and southwestern willow flycatcher, and followed U.S. Fish and Wildlife Service Guidelines for the latter two species. Numbers of all species observed were noted, and, in addition to the three species noted above, special attention was placed on locating species considered rare and endangered or of Special Concern, and on determining numbers of brown-headed cowbirds.

Each survey was conducted on foot by observers well acquainted with visual, auditory and behavioral characteristics of southern California birds. Survey routes were designed to cover all areas of each section of the river, with emphasis placed on wetter habitats where least Bell's vireos and other sensitive riparian species are most likely to occur. All surveys occurred between 6:00 and 10:00 a.m. If focus species (yellow-billed cuckoo, least Bell's vireo, and southwestern willow flycatcher), were not visually observed, tapes of their calls were played in an attempt to elicit a response. Personnel for all surveys were Daniel A. Guthrie and Judith A. Sugden, both working under Federal Fish and Wildlife Service Permit number TE810394-1, issued under section 10(a)(1)(A) of the Endangered Species Act.

To facilitate surveys and observe the coverage guidelines for focus species, the area was divided into eight sections (Figure 1). Delineation of the eight areas and comments on each follow. Surveys of all sections of the river system were conducted five times during the nesting season and followed the Revised Protocol (Fish And Wildlife Service, July 2000) for southwestern willow flycatcher. Several sections of the river (Areas 4, 6-8) had no running water or wet riparian vegetation and were not considered suitable habitat for least Bell's vireo. However, areas 1-3,5 had flowing water and wet riparian vegetation. These sections were surveyed according to the protocol for least Bell's vireo as outlined by the Fish and Wildlife Service. This latter protocol requires 8 surveys between April 10 and July 31st, at least 10 days apart.

Habitat Condition and Bird Observations.

The riparian zone of the Santa Clara River, as described here, consists of two major habitat types, a wet riparian zone and a dry riparian woodland. The wet riparian zone consists of obligatory wet plants such as cattail and watercress found in continually moist soils along the active river channel and some willow, tamarisk and *Baccharis* shrubs also found in this zone. This zone is usually flooded during winter rains with the removal of much of the annual vegetation. Although this results in bare areas in April and early May, by June and July, most of this wet riparian vegetation has been reestablished. The dry riparian woodland consists of larger willow and cottonwood forests along the margins of the wet riparian zone and occurring on soils above the flood plain that are normally not damaged in winter floods. The 2001-2002 winter and spring seasons were the driest on record in southern California. As a result, there was no flooding. All annual vegetation away from the permanently flowing sections of the river failed to show any development, except near runoff drains from nearby suburban areas. Many perennial plants showed the effects of drought. Some smaller perennials died while older trees dropped branches.

Observations of all birds are shown in Tables 1-8. The numbers shown are of birds seen and heard, with heard individuals forming the majority of the observations. Numbers vary between censuses. Bird activity varies with season. Different species breed at different times of the year. In general, species are most easily observed when they are actively defending territories by song during the establishment of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, numbers observed may increase. Thus, for most resident species, numbers of adult birds are most accurately censused in April and May, when territorial activity is at a maximum. A few species such as Anna's hummingbird that nest early in the season may be underestimated. Numbers of some nesting species, such as yellow warbler may be higher than normal in May due to migratory birds passing through the area. Numbers may also increase in late June and July when young birds leave the nest.

Due to drought conditions, more migratory birds than usual were observed in wet areas along the river. However, in dry sections not only were migrants absent but many resident species, especially insect feeders were less numerous than usual. The following sections contain specific comments on the habitat and bird observations in each area.

Area 1 (Table 1). Santa Clara River; The Old Road Bridge to the mouth of Castaic Creek.

Length of section, 3.5 miles. The Santa Clara River flows continuously in this section and is augmented by the Valencia waste water outfall near the upstream end of this section and by some irrigation runoff from Magic Mountain and agricultural fields along the north side.

Along most of this section, wet riparian vegetation forms a narrow strip along the main channel of the Santa Clara River. There was no scouring of this vegetation during the winter, and wet riparian vegetation was very well developed. A section of dense willows along The Old Road, protected from spring flooding by a dike and irrigated by runoff from agricultural fields was the site of nesting by two pairs of least Bell's vireos (Figure 3).

Construction at the Valencia Waste water outfall throughout the survey period, plus the drought conditions, limited observations of species normally found in dry riparian forests. A cowbird trap was in operation just north of the Valencia Waste water outfall during the latter half of the study period.

Area 2 (Table 2). Santa Clara River; McBean Parkway downstream to The Old Road.

Length of section, 1.4 miles. The Santa Clara River flows continuously in this section and additional water is provided by irrigation runoff from industrial parks along the north side. There was no scouring of the channel be winter flooding, but dry conditions limited vegetation to a narrow band along the flowing stream. The wet willow forest near the mouth of San Francisquito Creek was carefully surveyed for focus species as migrating willow flycatcher have been seen here in previous years. None were found this year.

Area 3 (Table 3). Santa Clara River; Bouquet Canyon Road downstream to McBean Parkway

Length of section, 1.2 miles. Water, supplied by the Saugus wastewater outfall at the Bouquet Canyon Bridge, is continuous in this section of the Santa Clara River. A small amount of additional water is provided from irrigation runoff coming from Bouquet Canyon and suburban development along the north side of the Santa Clara River. Drought conditions resulted in green vegetation being restricted to a narrow band along the flowing river. Cottonwood plantings along both sides of the river showed signs of drought with many smaller trees dying. A single willow flycatcher was observed along this section of the river on May 18th (Figure 2) but could not be found on subsequent visits. This sighting is thought to be of an individual migrating through the area rather than of a breeding individual.

Area 4 (Table 4). Santa Clara River; Bouquet Canyon Road upstream to DWP transmission lines.

Length of section, 2.3 miles. The river channel in this section consists of a broad, flat, dry wash with narrow margins of dry riparian woodland. Within the channel are areas of coastal sage scrub habitat. This section of the Santa Clara River in past years has been wet only briefly during spring rains and due to water release from pumps one mile upstream from Bouquet Canyon Road. This section was completely dry during all surveys this year. This resulted in the almost complete absence of riparian species such as song sparrow and yellowthroat. A single yellow warbler was observed during migration and two rufous-crowned sparrows, resident on hillsides along the river, were observed once in the stream channel. Aside from migrants, most of the other birds observed in this section are characteristic of coastal sage and dry riparian woodlands.

Area 5 (Table 5). Castaic Creek; Route 126 to Interstate 5.

Length of section, 1.8 miles. Except for pockets of wet vegetation formed near irrigation runoff channels, and remnant puddles near the middle of this section, the creek was dry much of this spring. Despite this lack of permanent water flow, many wet riparian species (song sparrow, yellowthroat, nested successfully. Swallows nested under the three bridges that cross this section of the river. The extensive willow forest on this section where least Bell's vireo once nested has matured and was dry much of this year. No vireos have been seen here the last four years and the area no longer seems suitable habitat due to its age and lack of permanent water. A single willow flycatchers was observed in this section on May 19th. As this bird was not singing and could not be relocated on subsequent visits, it is considered to be a migrant passing through the area.

Area 6 (Table 6). San Francisquito Creek; Santa Clara River upstream to Copper Hill Drive Crossing.

Length of section, 2.5 miles. Along most of this section the riparian zone consists of a broad sandy channel. In the upper part of this section the creek is bordered by land undergoing development. Coastal sage scrub plants occur within the channel as do sections of dry riparian woodland consisting mostly of cottonwoods. The lower ½ mile of San Francisquito Creek is wet due to runoff from adjacent development and is the only portion of this section where species preferring wet riparian habitat were observed. Although some water releases from upstream dams occurred during the winter months, no water was present during the survey period except along a short portion near the center of the section where a small amount of suburban runoff was present. Bridge construction across San Francisquito Creek affected one narrow section of the survey area.

Area 7 (Table 7). South Fork of the Santa Clara River; McBean Parkway to Magic Mountain Parkway (Route 126).

Length of section, 1.0 miles. The channel along this section of the South Fork is narrow and very sandy. Along most of this section vegetation is restricted to a narrow band of dry woodland at each side of the channel and a few pockets of wet vegetation supported by runoff from adjacent development. Near the confluence with the main channel of the Santa Clara River a more extensive area of woodland exists on the north side of this section and a small cattail marsh is present.

Area 8 (Table 8). South Fork of the Santa Clara River, Route 126 upstream to Newhall Creek.

Length of section, 1.4 miles. This section of the river consists of a wide sandy channel intersected by several concrete sills designed to restrict sand movement and flood damage. The river is entirely bordered by developed areas but contains small islands of dry riparian vegetation and some wet riparian areas formed by runoff from culverts along the sides of the creek. No flooding has occurred on this section of the river in recent years and riparian vegetation around these culverts continues to develop into areas of cottonwood and willow woodland, resulting in the continued increase in riparian species along this section of the river.

Comments on Threatened and Endangered Species

Yellow-billed Cuckoo

The Yellow-billed Cuckoo is listed as a State Endangered Species. Despite playing taped calls of this species during June and July surveys, no individuals of this species were observed in 2002.

Southwestern Willow Flycatcher

This subspecies is listed under the Federal Endangered Species Act. Willow Flycatchers were once widespread in wet riparian woodland in southern California but now only a few individuals exist. Following the Revised Protocol (Fish And Wildlife Service, July 2000) five surveys were conducted specifically for Southwestern willow flycatcher. All surveys occurred between 6:00 and 10:00 am. and used taped calls to elicit a response if flycatchers were not first observed.

Five willow flycatchers were observed at locations shown on Figure 2. None of these birds were calling, and did respond to tapes. Despite attempts on subsequent visits to elicit responses none of these birds could be relocated.

Willow flycatchers are fairly common migrants through southern California and most of the migrants are believed to be of the common subpsecies of willow flycatcher, *E. t. brewsteri,* which breeds throughout southern Canada and the northern United States, rather than representatives of the southwestern subspecies. Southwestern willow flycatchers are positively identified primarily by nesting within the geographic area of their range or by measurements of in hand specimens. Lacking any evidence of nesting, none of the observations of willow flycatchers can be positively identified as belonging to the southwestern form of willow flycatcher. The report forms required for this species have been forwarded to the Ventura Office of the U.S. Fish and Wildlife Service.

Least Bell's Vireo

Surveys of the wet riparian areas (Areas 1-3,5) followed U.S. Fish and Wildlife Service Guidelines for least Bell's vireo. Eight surveys were conducted between April 10 and July 31 (see Tables 1-3,5 for dates). All surveys occurred between 6:00 and 10:00 am. and taped vireo calls were played if no vireos were heard or seen. The only vireos observed were on the Santa Clara River at Castaic Junction in an extensive stand of willows. Vireos were heard in at least 5 locations (Figure 3) but were present at only two of the locations throughout the study period. Single observations at other sights on May 18th were at the height of migration and may have been of birds passing through the area.

Comments on Sensitive Species

Great Blue Heron

Great blue herons are listed on the California Natural Diversity Data Base as a species that warrants monitoring. Individuals of this species were observed sparingly along the river after the breeding season. No nesting was observed and herons were absent during the nesting season.

Great Egret

The great egret is listed on the California Natural Diversity Data Base as a species that warrants monitoring. A few individuals were observed along the river during migration and after the breeding season.

White-tailed Kite

This species, formerly the black-shouldered kite, is considered a Species of Special Concern by the State of California. Kites were infrequently observed along the river and there was no evidence of nesting this year.

Sharp-shinned Hawk

This species is considered a Species of Special Concern by the State of California. Sharp-shinned hawks regularly winter in southern California and the bird observed on May 7th is thought to be a late migrant through the area.

Cooper's Hawk

Cooper's hawk is considered a Species of Special Concern by the State of California. Cooper's hawks were observed rarely along the main river in 2002 and may have nested near Castaic Junction.

California Horned Lark

This is a California Special Concern species. Although none were observed nesting on the study site, horned larks are ground nesters that prefer bare hillsides and abandoned fields. A few were observed feeding on bare fields and construction areas along Castaic Creek

Yellow Warbler

The yellow warbler is considered a Species of Special Concern by the State of California. Yellow warblers prefer wet riparian habitat but are also found in large cottonwoods in drier riparian areas. Singing yellow warblers were observed along the continuously wet sections of the survey area during nesting season, but were observed in other dry sections of the river only during migration.

Yellow-breasted Chat

The yellow-breasted chat is considered a Species of Special Concern by the State of California. A few chats nested along the wet sections of the Santa Clara River.

Southern California Rufous-crowned Sparrow

This species is considered a California Special Concern species by the Department of Fish and Game and is also a Federal Special Concern species. Because of drought conditions a few rufous-crowned sparrows were visitors to the riparian zone from the surrounding coastal sage habitat where this species is a breeding resident.

Lawrence's Goldfinch

This species is a highest priority species on the Audubon Birds to Watch list for 1996 and is a Bird of Management Concern for the Fish and Wildlife Service. Although the preferred habitat of this species is coastal sage, small flocks of this species visited the riparian zone of the Santa Clara River during early spring and summer.

Comments of Brown-headed Cowbirds

Although not a Species of Concern, comments about this species are warranted due to its influence on several endangered species. Cowbirds were regularly observed along all sections of the Santa Clara River, usually flying along the riparian corridor searching for either mates or potential nests to parasitize. Cowbird females often responded to taped calls of least Bell's Vireo. Cowbird traps were operated throughout the study period just north of the Valencia Wastewater outfall (section 1).

Summary

No yellow-billed cuckoos were observed in 2002. Five willow flycatchers were observed but could not be relocated on subsequent surveys. This failure, and their behavior suggests that these were migrant birds passing through the area and, as such, members of the more common northern subspecies of willow flycatcher, *E. t. brewsteri*, rather than of the southwestern form. Two pairs of Least Bell's vireos were regularly observed and probably nested at Castaic Junction. Additional individuals of this species observed only on May 18th were probably migrants.

Three riparian Species of Concern, Cooper's hawk, yellow warbler and yellow-breasted chat nested in small numbers along wet sections of the river. Other Species of Concern include three migrant or wintering species; great blue heron, great egret and sharp-shinned hawk, and three visitors from nearly coastal sage scrub habitat; horned lark, rufous-crowned sparrow, and Lawrence's goldfinch. Cowbirds were numerous along the river and probably contributed to the small numbers of yellow warblers and least Bell's vireos observed.

Table 1. BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: Santa Clara River from Old Road downstream to the mouth of Castaic Creek.

Endangered Species and Species of Concern Shaded

		Dates of Surveys							
SPECIES	**STATUS**	**18-Apr**	**7-May**	**18-May**	**3-Jun**	**14-Jun**	**24-Jun**	**4-Jul**	**14-Jul**
Great Blue Heron	m,w	0	0	0	0	0	1	0	0
Great Egret	m	0	1	0	0	0	0	0	0
Green Heron	r	0	6	3	6	0	2	7	6
American Bittern	m	0	7	0	0	0	0	0	0
Turkey Vulture	r	0	1	0	10	0	0	0	0
Mallard	r	6	0	4	0	0	0	0	0
Sharp-shinned Hawk	w	0	1	0	0	0	0	0	0
Cooper's Hawk	r	0	1	2	0	0	0	0	3
Red-shouldered Hawk	r	2	5	1	0	4	3	3	3
Red-tailed Hawk	r	0	2	4	2	1	0	3	0
American Kestrel	r	0	0	1	3	0	0	2	0
California Quail	r	8	28	19	3	0	4	34	16
Killdeer	r	3	9	13	3	8	0	2	0
Spotted Sandpiper	s	0	2	0	2	2	0	1	0
Least Sandpiper	m	1	0	0	0	0	0	0	0
Rock Dove	r	2	0	7	0	8	0	3	0
Mourning Dove	r	13	47	42	38	35	21	44	14
Great Horned Owl	r	0	1	0	0	0	0	0	0
Vaux's Swift	m	8	12	0	0	0	0	0	0
White-throated Swift	r	0	0	0	1	10	0	0	3
Selasphorus sp.	r	0	0	0	0	1	0	2	3
Black-chinned Hummingbird	s	0	0	2	2	4	1	1	2
Anna's Hummingbird	r	3	3	8	4	13	8	25	13
Costa's Hummingbird	s	0	0	1	1	0	0	1	3
Belted Kingfisher	m,w	1	1	0	0	0	0	0	0
Acorn Woodpecker	r	0	0	0	0	0	2	0	0
Nuttall's Woodpecker	r	1	9	9	11	13	11	10	16
Downy Woodpecker	r	0	5	7	6	10	4	7	9
Hairy Woodpecker	r	1	0	3	3	2	1	4	0
Northern Flicker	r	0	0	0	1	0	0	0	0
Western Wood-Pewee	m	0	0	1	3	0	0	0	0
Willow Flycatcher	m	0	0	2	0	0	0	0	0
Black Phoebe	r	3	0	0	4	12	4	4	2
Say's Phoebe	r	0	0	0	1	0	0	0	0
Ash-throated Flycatcher	s	6	13	11	10	13	13	11	8
Cassin's Kingbird	s	0	0	0	0	0	0	5	1
Western Kingbird	s	0	0	1	1	9	2	4	3
Bell's Vireo	s	2	1	6	0	2	1	1	2
Warbling Vireo	m	0	3	1	0	0	0	0	0
Western Scrub Jay	r	2	11	11	25	17	8	11	5
American Crow	r	2	2	2	1	1	0	6	2
Common Raven	r	4	19	7	13	25	19	14	29

Table 1 (cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: Santa Clara River from the Old Road downstream to the mouth of Castaic Creek.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 18-Apr	7-May	18-May	3-Jun	14-Jun	24-Jun	4-Jul	14-Jul
Tree Swallow	s	0	2	4	3	0	1	1	0
White-breasted Nuthatch	r	0	0	0	0	0	2	0	1
Bewick's Wren	r	7	41	24	17	33	20	18	23
House Wren	r	2	11	20	48	0	6	0	1
Western Bluebird	r	2	3	5	2	4	3	10	5
Swainson's Thrush	m	0	3	1	0	0	0	0	0
American Robin	r	1	2	1	0	0	2	0	0
Wrentit	r	0	0	3	6	16	10	11	11
Northern Mockingbird	r	2	0	0	0	0	0	0	0
California Thrasher	r	0	0	4	1	4	2	8	7
European Starling	r	2	10	19	13	1	3	3	1
Phainopepla	r	0	4	5	5	28	17	2	0
Orange-crowned Warbler	m	2	3	0	2	1	0	0	1
Yellow Warbler	s,m	1	30	12	13	13	4	6	0
Townsend's Warbler	m	0	1	0	0	0	0	0	0
Yellow-rumped Warbler	w,m	3	0	0	0	0	0	0	0
Common Yellowthroat	r	6	61	36	122	112	40	23	63
Wilson's Warbler	m	0	8	10	1	0	0	0	0
Yellow-breasted Chat	s	0	0	3	6	0	5	0	1
Western Tanager	m	1	2	1	0	0	0	0	0
Spotted Towhee	r	3	25	25	43	24	14	4	5
California Towhee	r	8	27	64	91	55	23	18	26
Lark Sparrow	r	0	0	2	0	10	0	5	2
Savannah Sparrow	w,m	9	0	0	0	0	0	0	0
Song Sparrow	r	36	144	106	122	57	33	40	81
White-crowned Sparrow	w,m	9	0	0	0	0	0	0	0
Black-headed Grosbeak	s	3	12	17	21	19	16	21	4
Blue Grosbeak	s	1	3	8	7	2	9	5	6
Indigo Bunting	m	0	1	0	1	0	0	0	0
Lazuli Bunting	s	0	1	0	0	0	0	0	0
Red-winged Blackbird	s	35	55	80	17	1	0	1	2
Brewer's Blackbird	r	0	3	0	0	0	0	0	0
Great-tailed Grackle	s	0	0	2	0	0	0	0	0
Brown-headed Cowbird	s	4	32	39	11	11	2	4	4
Hooded Oriole	s	0	6	0	0	13	3	0	3
Bullock's Oriole	s	2	8	1	1	14	7	3	1
House Finch	r	5	17	52	68	129	196	123	72
Lesser Goldfinch	r	11	38	15	18	38	5	16	13
Lawrence's Goldfinch	r	0	0	2	0	0	0	0	0
American Goldfinch	w,m,r	8	0	0	0	2	0	0	1
House Sparrow	r	0	1	0	0	0	0	1	0

Status: m, migrant; r, resident; s, summer only; w, winter

Table 2. BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: Santa Clara River from McBean Highway to The Old Road.

Endangered Species and Species of Concern Shaded

		Dates of Surveys							
SPECIES	**STATUS**	**18-Apr**	**7-May**	**18-May**	**3-Jun**	**14-Jun**	**24-Jun**	**4-Jul**	**14-Jul**
Great Egret	m,w	0	1	0	0	0	0	0	0
Snowy Egret	m,w	0	1	0	0	0	0	0	0
Green Heron	r	0	0	2	1	2	2	3	4
Canada Goose	r	3	0	0	0	0	0	0	0
Mallard	r	1	1	5	0	0	0	2	0
Turkey Vulture	s	0	0	1	0	0	0	0	0
Red-shouldered Hawk	r	1	0	0	2	2	0	1	0
Red-tailed Hawk	r	0	0	1	1	1	0	0	0
California Quail	r	4	8	2	12	3	4	0	2
Killdeer	r	8	2	0	2	0	0	0	0
Mourning Dove	r	6	6	6	13	4	6	7	10
Vaux's Swift	m	3	0	0	0	0	0	0	0
White-throated Swift	r	0	0	10	0	0	0	0	0
Selaphorus sp.	s	0	0	0	0	0	0	1	0
Anna's Hummingbird	r	2	1	1	0	1	0	2	0
Nuttall's Woodpecker	r	4	3	2	1	4	4	8	3
Downy Woodpecker	r	3	0	0	0	0	2	0	0
Hairy Woodpecker	r	1	1	0	0	0	0	0	0
Northern Flicker	r	0	0	1	0	0	0	1	0
Western Wood-pewee	m	0	4	3	0	0	0	0	0
Black Phoebe	r	0	3	0	3	3	2	0	0
Ash-throated Flycatcher	s	9	2	2	3	5	3	8	5
Western Kingbird	s	0	0	0	1	0	0	1	3
Plumbeous Vireo	m	0	1	0	0	0	0	0	0
Warbling Vireo	m	0	4	1	0	0	0	0	0
Western Scrub Jay	r	2	7	3	5	6	2	4	2
American Crow	r	0	0	2	3	4	2	6	0
Common Raven	r	4	2	0	4	0	2	8	0
N. Rough-winged Swallow	s	0	4	37	7	14	2	5	2
Cliff Swallow	s	5	50	45	40	24	30	50	15
Barn Swallow	s	0	0	1	0	2	8	4	3
Oak Titmouse	r	0	0	0	0	2	3	0	6
Bushtit	r	7	4	2	0	0	3	0	0
Bewick's Wren	r	8	10	7	3	5	0	3	11
House Wren	r	6	7	5	0	0	0	0	0
Western Bluebird	r	3	4	0	0	4	0	0	0
Swainson's Thrush	m	0	1	2	0	0	0	0	0
Wrentit	r	0	0	1	0	0	0	0	0
Northern Mockingbird	r	0	0	1	1	0	0	0	0
California Thrasher	r	0	3	2	0	1	2	1	3
European Starling	r	4	4	4	3	14	8	10	0
Cedar Waxwing	w,m	10	23	0	0	0	0	0	0
Phainopepla	r	0	3	2	5	16	35	34	62

Table 2 (cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: Santa Clara River from McBean Highway to The Old Road.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 18-Apr	7-May	18-May	3-Jun	14-Jun	24-Jun	4-Jul	14-Jul
Orange-crowned Warbler	w,m	7	4	0	0	0	0	0	0
Yellow Warbler	s,m	0	2	4	0	0	0	1	0
Black-throated Gray Warbler	m	1	0	0	0	0	0	0	0
Townsend's Warbler	m	0	1	0	0	0	0	0	0
Yellow-rumped Warbler	w,m	1	0	0	0	0	0	0	0
Common Yellowthroat	r	5	12	34	21	18	30	38	8
McGillivray's Warbler	m	1	1	0	0	0	0	0	0
Wilson's Warbler	m	0	6	10	0	0	0	0	0
Yellow-breasted Chat	s	0	2	0	1	1	3	2	0
Western Tanager	s	0	4	0	0	0	0	0	0
Spotted Towhee	r	2	4	5	12	7	3	7	0
California Towhee	r	1	1	0	2	0	2	10	8
Song Sparrow	r	30	50	52	52	40	36	36	52
Black-headed Grosbeak	s	1	4	4	5	9	6	3	2
Blue Grosbeak	s	0	1	0	0	0	3	7	12
Red-winged Blackbird	s	5	45	50	10	13	0	15	0
Brown-headed Cowbird	s	8	13	4	3	3	10	9	6
Hooded Oriole	s	0	0	1	0	0	0	0	0
Bullock's Oriole	s	0	1	1	0	0	0	1	2
House Finch	r	4	2	3	6	11	12	26	50
Lesser Goldfinch	r	29	3	3	2	3	2	0	0
American Goldfinch	w,m,r	47	4	0	0	0	1	0	0

Status: m, migrant; r, resident; s, summer only; w, winter

Table 3. **BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: Santa Clara River from Boquet Canyon Bridge to McBean Parkway Bridge**

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 18-Apr	7-May	18-May	3-Jun	14-Jun	24-Jun	4-Jul	14-Jul
Green Heron	r	0	1	0	0	0	0	0	0
Cattle Egret	m	0	0	0	0	6	0	0	0
Mallard	r	7	3	2	2	2	0	0	0
Red-shouldered Hawk	r	2	0	0	1	0	0	0	0
Red-tailed Hawk	r	0	0	0	0	0	3	0	0
California Quail	r	30	8	2	1	22	11	18	18
Killdeer	r	12	2	2	2	0	2	0	0
Spotted Sandpiper	s	0	0	1	0	0	0	0	0
Least Sandpiper	m	12	0	0	0	0	0	0	0
Mourning Dove	r	15	17	7	8	6	8	12	8
Greater Roadrunner	r	0	0	1	0	0	0	0	0
Vaux's Swift	m	0	4	0	0	0	0	0	0
Black-chinned Hummingbird	s	0	1	0	0	0	0	2	0
Anna's Hummingbird	r	2	1	3	2	0	0	2	3
Costa's Hummingbird	s	0	0	0	0	0	0	0	1
Nuttall's Woodpecker	r	2	0	2	0	1	1	1	0
Northern Flicker	r	1	0	0	0	0	0	0	2
Western Wood-Pewee	m	0	0	1	0	0	0	0	0
Willow Flycatcher	m	0	0	1	0	0	0	0	0
Black Phoebe	r	1	2	4	0	1	2	1	5
Ash-throated Flycatcher	s	5	3	2	2	1	0	5	5
Warbling Vireo	m	0	0	2	0	0	0	0	0
Western Scrub Jay	r	2	1	5	3	3	3	4	2
American Crow	r	0	0	1	0	1	2	3	2
Common Raven	r	55	20	14	14	4	6	6	8
N. Rough-winged Swallow	s	0	18	7	6	4	4	12	3
Cliff Swallow	s	6	65	14	27	6	18	36	20
Barn Swallow	s	0	2	1	2	0	6	0	0
Oak Titmouse	r	0	0	0	0	0	0	1	2
Bushtit	r	4	2	4	0	5	0	0	0
Bewick's Wren	r	6	2	7	4	5	0	4	5
House Wren	r	1	0	0	0	0	0	0	0
Western Bluebird	r	2	0	0	0	0	0	0	0
Northern Mockingbird	r	0	0	0	2	0	0	0	1
California Thrasher	r	1	0	1	0	1	2	0	0
European Starling	r	2	4	3	0	2	4	9	0
Phainopepla	r	0	0	0	1	1	5	0	0
Orange-crowned Warbler	w,m	4	0	0	0	0	0	0	0
Yellow Warbler	s,m	4	1	10	1	2	0	0	0
Yellow-rumped Warbler	w,m	2	0	0	0	0	0	0	0
Common Yellowthroat	r	31	12	8	14	13	14	6	2
McGillivray's Warbler	m	0	0	1	0	0	0	0	0
Wilson's Warbler	m	11	0	20	0	0	0	0	0

Table 3 (cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: Santa Clara River from Boquet Canyon Bridge to McBean Parkway Bridge

Endangered Species and Species of Concern Shaded

		Dates of Surveys							
SPECIES	**STATUS**	**18-Apr**	**7-May**	**18-May**	**3-Jun**	**14-Jun**	**24-Jun**	**4-Jul**	**14-Jul**
Western Tanager	m	0	1	0	0	0	0	0	0
Spotted Towhee	r	5	3	4	9	5	3	3	1
California Towhee	r	8	0	2	0	0	0	6	4
Lincoln's Sparrow	w,m	2	0	0	0	0	0	0	0
Savannah Sparrow	w,m	0	1	0	0	0	0	0	0
Song Sparrow	r	47	20	24	14	24	14	12	24
White-crowned Sparrow	w,m	2	0	0	0	0	0	0	0
Black-headed Grosbeak	s	0	3	4	2	2	1	0	0
Blue Grosbeak	s	0	1	1	0	0	0	1	3
Great-tailed Grackle	r	1	0	2	0	0	0	0	0
Red-winged Blackbird	r	90	90	50	60	14	28	50	173
Brewer's Blackbird	r	6	0	0	0	0	0	0	0
Brown-headed Cowbird	s	25	4	2	2	5	3	3	3
Hooded Oriole	s	2	0	0	0	0	0	0	0
Bullock's Oriole	s	3	0	0	2	4	0	2	0
House Finch	r	25	15	17	19	18	10	75	66
Lesser Goldfinch	r	4	6	0	7	3	5	0	2
American Goldfinch	w,m,r	11	1	0	0	0	0	1	0

Status: m, migrant; r, resident; s, summer only; w, winter

Table 4. BIRD SURVEYS OF THE SANTA CLARA RIVER BASIN, 2002: Santa Clara River from Boquet Canyon Bridge upstream for two miles.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 17-May	8-Jun	22-Jun	2-Jul	12-Jul
Green Heron	r	0	0	0	0	1
Red-shouldered Hawk	r	1	3	0	1	0
Red-tailed Hawk	r	1	2	2	3	2
American Kestrel	r	1	3	0	0	0
California Quail	r	0	57	0	0	3
Killdeer	r	5	6	1	0	0
Rock Dove	r	0	2	0	0	0
Mourning Dove	r	11	74	12	12	10
Black-chinned Hummingbird	s	0	0	0	0	1
Anna's Hummingbird	s	2	6	1	2	2
Nuttall's Woodpecker	r	1	2	3	3	4
Northern Flicker	r	0	0	0	0	3
Western Wood-Pewee	m	1	0	0	0	0
Black Phoebe	r	1	1	0	0	0
Say's Phoebe	r	0	1	0	0	0
Ash-throated Flycatcher	s	1	2	0	1	0
Western Kingbird	s	1	0	0	2	3
Western Scrub Jay	r	9	18	5	13	11
American Crow	r	0	2	0	0	0
Common Raven	r	1	22	8	4	6
N. Rough-winged Swallow	s	0	6	0	1	1
Cliff Swallow	s	0	8	0	0	0
Barn Swallow	s	0	1	0	0	0
Oak Titmouse	r	0	5	0	1	0
Bushtit	r	0	10	5	0	15
Bewick's Wren	r	9	12	3	3	4
House Wren	r	1	0	0	0	0
Western Bluebird	r	2	0	0	0	0
Wrentit	r	3	8	4	1	1
Northern Mockingbird	r	4	10	19	9	4
California Thrasher	r	2	10	2	3	1
European Starling	r	0	5	12	3	1
Phainopepla	r	2	47	8	15	6
Yellow Warbler	s	1	0	0	0	0
Wilson's Warbler	m	5	0	0	0	0
Spotted Towhee	r	4	20	9	1	3
California Towhee	r	4	11	10	4	12
Rufous-crowned Sparrow	r	0	2	0	0	0
Song Sparrow	r	0	6	0	0	0
Black-headed Grosbeak	s	1	0	1	0	0
Red-winged Blackbird	s	0	0	2	0	0
Brown-headed Cowbird	s	4	0	0	0	0
Bullock's Oriole	s	5	10	5	2	1
House Finch	r	18	78	21	21	43
Lesser Goldfinch	r	2	4	0	0	3

Table 4 (cont.). **BIRD SURVEYS OF THE SANTA CLARA RIVER BASIN, 2002: Santa Clara River from Boquet Canyon Bridge upstream for two miles.**

Endangered Species and Species of Concern Shaded

		Dates of Surveys				
SPECIES	**STATUS**	**17-May**	**8-Jun**	**22-Jun**	**2-Jul**	**12-Jul**
House Sparrow	r	0	0	0	6	0

Status: m, migrant; r, resident; s, summer only

Table 5. BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: Castaic Creek from I-5 to the Santa Clara River

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	25-Apr	9-May	19-May	4-Jun	14-Jun	25-Jun	5-Jul	16-Jul
		Dates of Surveys							
Great Blue Heron	m,w	0	0	2	0	0	0	0	0
Green Heron	r	0	0	0	0	1	0	0	0
Red-shouldered Hawk	r	0	0	0	0	0	0	1	0
Red-tailed Hawk	r	1	2	1	5	2	2	2	0
American Kestrel	r	1	1	1	2	0	0	0	0
California Quail	r	31	26	44	10	87	9	55	92
Killdeer	r	2	2	4	4	5	3	1	1
Common Snipe	m	0	0	1	0	0	0	0	0
Rock Dove	r	4	0	41	8	6	0	3	0
Mourning Dove	r	38	30	27	35	21	17	24	74
Barn Owl	r	1	0	0	0	0	0	0	0
Vaux's Swift	m	3	0	0	0	0	0	0	0
White-throated Swift	r	0	1	0	0	0	0	0	0
Black-chinned Hummingbird	s	3	0	0	4	2		3	6
Anna's Hummingbird	r	7	1	12	13	10	17	10	7
Costa's Hummingbird	s	1	0	0	1	0	0	2	4
Nuttall's Woodpecker	r	6	10	3	14	5	5	4	1
Downy Woodpecker	r	2	2	1	10	2	2	0	2
Hairy Woodpecker	r	0	0	0	0	0	0	0	2
Northern Flicker	r	0	2	0	1	0	0	0	0
Western Wood-pewee	m	0	0	1	0	0	0	0	0
Willow Flycatcher	m	0	0	1	0	0	0	0	0
Pacific slope Flycatcher	s	0	0	0	0	2	0	0	0
Black Phoebe	r	0	0	1	0	0	2	2	0
Ash-throated Flycatcher	s	10	10	10	9	18	7	4	2
Cassin's Kingbird	s	0	0	0	0	0	0	6	0
Western Kingbird	s	6	2	15	27	13	23	10	0
Warbling Vireo	m	2	3	0	1	0	0	0	0
Western Scrub Jay	r	11	28	20	15	14	14	20	8
American Crow	r	2	17	4	16	0	0	3	0
Common Raven	r	7	5	15	6	5	23	57	34
Horned Lark	r	0	0	12	4	0	0	0	0
N. Rough-winged Swallow	s	80	40	62	18	40	2	21	8
Cliff Swallow	s	220	525	320	102	296	424	89	41
Barn Swallow	s	6	1	0	1	2	2	2	2
Oak Titmouse	r	2	10	2	10	5	10	3	7
Bushtit	r	11	11	21	8	26	39	20	23
Bewick's Wren	r	30	35	22	26	8	10	12	13
House Wren	r	8	9	2	13	2	0	0	0
Western Bluebird	r	4	2	2	2	1	4	0	2
Swainson's Thrush	s	0	1	0	0	0	0	0	0
Wrentit	r	0	0	2	2	3	2	7	6

Table 5 (cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: Castaic Creek from I-5 to the Santa Clara River

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 25-Apr	9-May	19-May	4-Jun	14-Jun	25-Jun	5-Jul	16-Jul
Northern Mockingbird	r	1	3	4	0	0	1	1	0
California Thrasher	r	2	2	0	5	10	4	2	2
European Starling	r	13	10	22	18	60	15	38	2
Phainopepla	r	0	0	2	4	0	1	0	1
Orange-crowned Warbler	w,m	3	2	0	0	0	0	0	0
Nashville Warbler	m	1	0	0	0	0	0	0	0
Yellow Warbler	s	4	5	14	2	8	1	1	0
Black-throated Gray Warbler	m	1	0	0	0	0	0	0	0
Townsend's Warbler	m	0	1	0	0	0	0	0	0
Common Yellowthroat	r	26	3	0	8	12	13	6	13
Wilson's Warbler	m	6	10	12	0	0	0	0	0
Yellow-breasted Chat	s	0	0	0	0	0	1	0	0
Western Tanager	m	0	6	0	0	0	0	0	0
Spotted Towhee	r	25	34	14	32	9	3	2	5
California Towhee	r	31	25	27	47	23	16	20	21
Rufous-crowned Sparrow	r	0	0	0	0	2	0	0	0
Lark Sparrow	r	0	0	0	4	2	1	0	5
Song Sparrow	r	26	21	22	37	43	38	22	8
White-crowned Sparrow	w,m	1	0	0	0	0	0	0	0
Black-headed Grosbeak	s	12	13	12	13	12	7	5	0
Blue Grosbeak	s	1	0	0	2	3	7	8	23
Lazuli Bunting	s	4	0	0	0	4	1	0	15
Red-winged Blackbird	s	57	24	50	14	59	5	35	2
Brewer's Blackbird	r	4	1	0	4	0	0	0	0
Brown-headed Cowbird	s	17	17	16	18	19	4	26	8
Hooded Oriole	s	0	2	3	0	11	9	1	1
Bullock's Oriole	s	6	3	7	8	12	14	3	0
House Finch	r	34	24	20	42	39	75	39	146
Lesser Goldfinch	r	7	9	0	23	15	20	18	5
American Goldfinch	w,m,r	0	0	0	1	0	0	0	2
House Sparrow	r	0	10	16	3	3	10	2	2

Status: m, migrant; r, resident; s, summer only; w, winter

Table 6. BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: San Franciscquito Creek from Santa Clara River to Copper Hill Drive.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 15-May	6-Jun	23-Jun	3-Jul	13-Jul
Red-shouldered Hawk	r	1	0	0	1	0
Red-tailed Hawk	r	1	2	3	4	4
California Quail	r	28	12	5	3	4
Killdeer	r	2	6	5	1	0
Mourning Dove	r	45	20	30	63	32
Barn Owl	r	0	0	1	0	1
Selasphorus sp.	m	0	0	0	0	2
Black-chinned Hummingbird	s	0	0	2	1	3
Anna's Hummingbird	r	4	3	6	4	16
Costa's Hummingbird	s	0	0	1	0	0
Nuttall's Woodpecker	r	6	3	7	2	1
Northern Flicker	r	0	0	0	0	1
Western Wood-Pewee	m	3	0	0	0	0
Willow Flycatcher	m	0	1	0	0	0
Black Phoebe	r	6	3	2	0	1
Ash-throated Flycatcher	s	4	1	6	9	6
Western Kingbird	s	2	0	3	0	0
Warbling Vireo	m	3	0	0	0	0
Western Scrub Jay	r	15	16	3	8	10
American Crow	r	2	2	0	5	18
Common Raven	r	13	2	5	1	5
N. Rough-winged Swallow	s	8	0	3	0	11
Cliff Swallow	s	10	56	36	0	26
Barn Swallow	s	0	0	0	0	4
Oak Titmouse	r	3	2	0	2	0
Bushtit	r	10	12	0	0	0
Bewick's Wren	r	19	7	2	4	3
Western Bluebird	r	3	4	1	0	0
Swainson's Thrush	m	1	0	0	0	0
Wrentit	r	0	0	0	1	0
Northern Mockingbird	r	5	0	7	0	4
California Thrasher	r	1	4	1	0	1
European Starling	r	2	2	0	5	0
Phainopepla	r	6	25	43	13	18
Common Yellowthroat	r	1	2	2	1	1
Wilson's Warbler	m	18	0	0	0	0
Yellow-breasted Chat	s	0	1	0	0	0
Western Tanager	m	4	0	0	0	0
Spotted Towhee	r	14	12	7	4	1
California Towhee	r	20	22	16	14	14
Lark Sparrow	r	0	2	0	0	0
Song Sparrow	r	5	10	2	4	2

Table 6 (cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: San Francisquito Creek from Santa Clara River to Copper Hill Drive.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 15-May	6-Jun	23-Jun	3-Jul	13-Jul
Black-headed Grosbeak	s	2	1	1	0	0
Blue Grosbeak	s	0	3	1	2	3
Red-winged Blackbird	r	28	21	14	2	4
Brewer's Blackbird	r	3	0	0	0	0
Brown-headed Cowbird	s	1	2	0	4	1
Bullock's Oriole	s	7	6	5	1	2
House Finch	r	42	48	118	67	137
Lesser Goldfinch	r	9	7	6	9	2
Lawrence's Goldfinch	r					

Status: m, migrant; r, resident; s, summer only; w, winter

Table 7. BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: South Fork from Rte. 126 to the McBean Crossing.

Endangered Species and Species of Concern Shaded

		Dates of Surveys				
SPECIES	**STATUS**	**15-May**	**6-Jun**	**23-Jun**	**3-Jul**	**13-Jul**
Cooper's Hawk	r	0	0	0	0	1
Red-shouldered Hawk	r	1	0	0	1	0
Red-tailed Hawk	r	1	2	0	2	1
American Kestrel	r	1	0	0	0	0
California Quail	r	6	2	2	0	0
Killdeer	r	0	0	1	1	0
Mourning Dove	r	12	23	34	16	33
Black-chinned Hummingbird	s	0	0	4	0	0
Anna's Hummingbird	r	1	4	4	1	9
Nuttall's Woodpecker	r	0	0	2	0	3
Black Phoebe	r	0	7	3	1	1
Ash-throated Flycatcher	s	3	0	2	3	1
Western Kingbird	s	0	0	2	2	0
Western Scrub Jay	r	3	5	5	3	1
American Crow	r	2	0	0	5	0
Common Raven	r	18	7	14	20	8
N. Rough-winged Swallow	s	4	4	14	3	2
Cliff Swallow	s	0	0	0	3	3
Oak Titmouse	r	0	2	4	0	0
Bushtit	r	0	0	4	0	16
Bewick's Wren	r	6	4	7	5	5
House Wren	r	2	0	1	0	0
Swainson's Thrush	m,s	5	0	0	0	0
Northern Mockingbird	r	2	2	1	1	3
California Thrasher	r	0	1	0	1	0
European Starling	r	3	4	6	7	1
Phainopepla	r	0	0	0	2	3
Yellow Warbler	s,m	1	0	0	0	0
Common Yellowthroat	r	0	0	4	0	0
Wilson's Warbler	m	1	0	0	0	0
Spotted Towhee	r	7	4	0	2	0
California Towhee	r	11	4	9	7	0
Song Sparrow	r	5	0	0	0	0
Red-winged Blackbird	s	0	0	0	4	0
Brewer's Blackbird	r	0	0	1	3	0
Brown-headed Cowbird	s	0	0	0	3	0
Hooded Oriole	s	0	0	3	0	0
Bullock's Oriole	s	1	0	0	0	2
House Finch	r	34	21	42	50	15
Lesser Goldfinch	r	6	10	4	0	3
House Sparrow	r	6	1	1	0	0

Status: m, migrant; r, resident; s, summer only; w, winter

Table 8. BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: South Fork of the Santa Clara River from Route 126 upstream to Coyote Creek.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 15-May	6-Jun	23-Jun	3-Jul	13-Jul
Red-tailed Hawk	r	0	1	0	1	0
Red-shouldered Hawk	r	1	0	0	0	10
American Kestrel	r	0	1	0	0	0
California Quail	r	20	12	9	0	0
Killdeer	r	4	0	1	1	2
Rock Dove	r	0	0	2	0	3
Mourning Dove	r	24	50	28	30	30
White-throated Swift	r	10	6	1	1	6
Black-chinned Hummingbird	s	1	1	3	1	1
Anna's Hummingbird	r	11	12	9	8	14
Costa's Hummingbird	s	0	0	1	0	0
Nuttall's Woodpecker	r	2	0	5	2	1
Downy Woodpecker	r	0	0	0	1	0
Western Wood-Pewee	s	1	0	0	0	0
Pacific slope Flycatcher	m,s	0	1	0	0	0
Black Phoebe	r	4	3	1	2	1
Say's Phoebe	r	0	2	0	0	0
Ash-throated Flycatcher	s	1	2	0	0	0
Cassin's Kingbird	s	0	0	0	1	0
Western Kingbird	s	0	0	6	1	0
Warbling Vireo	m	2	0	0	0	0
Western Scrub Jay	r	7	9	5	12	10
American Crow	r	0	2	1	1	0
Common Raven	r	3	10	12	95	136
N. Rough-winged Swallow	s	8	38	10	2	6
Cliff Swallow	s	0	2	6	4	8
Oak Titmouse	r	3	1	1	0	2
Bushtit	r	7	4	6	4	17
Bewick's Wren	r	11	8	5	3	4
American Robin	r	0	0	0	1	0
Swainson's Thrush	m	2	0	0	0	0
Wrentit	r	2	3	1	2	1
Northern Mockingbird	r	3	6	3	3	6
California Thrasher	r	1	2	3	0	4
European Starling	r	11	31	15	2	3
Phainopepla	r	1	1	0	0	0
Yellow Warbler	s,m	3	0	0	1	0
Common Yellowthroat	r	3	5	3	3	0
Wilson's Warbler	m	16	0	0	0	0
Western Tanager	m	2	0	0	0	1
Spotted Towhee	r	9	4	1	2	2
California Towhee	r	16	9	18	8	7
Song Sparrow	r	10	11	2	3	2

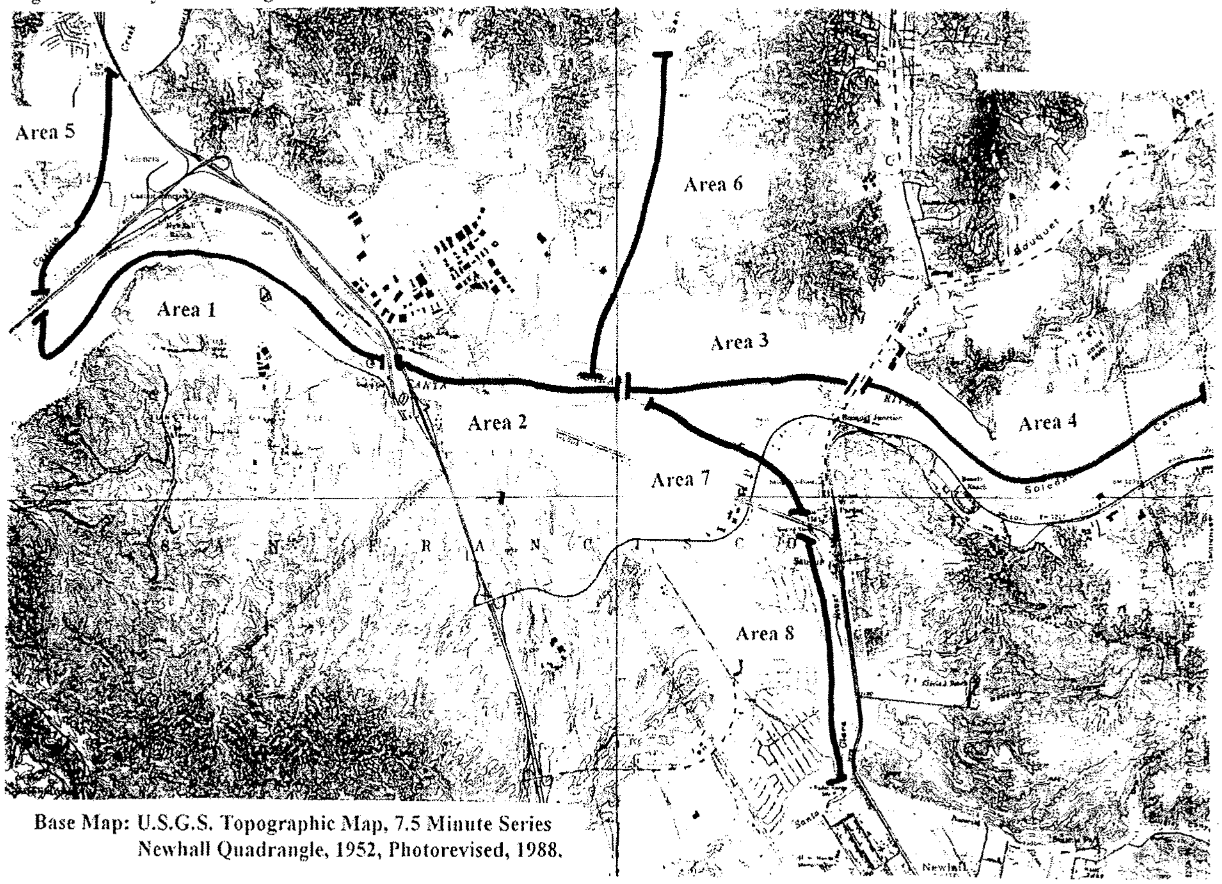
Table 8(cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2002: South Fork of the Santa Clara River from Route 126 upstream to Coyote Creek.

Endangered Species and Species of Concern Shaded

		Dates of Surveys				
SPECIES	**STATUS**	**15-May**	**6-Jun**	**23-Jun**	**3-Jul**	**13-Jul**
Black-headed Grosbeak	s	2	2	1	0	0
Brewer's Blackbird	r	0	0	1	0	0
Brown-headed Cowbird	s	2	0	2	3	0
Hooded Oriole	s	0	0	0	0	1
Bullock's Oriole	s	2	2	5	0	4
House Finch	r	46	36	35	25	43
Lesser Goldfinch	r	16	14	30	7	10
House Sparrow	r	0	1	3	8	5

Status: m, migrant; r, resident; s, summer only; w, winter

Figure 1. Survey Areas along the Santa Clara River and Tributaries.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988.

Figure 2. Southwestern Willow Flycatcher Sightings during 2002.

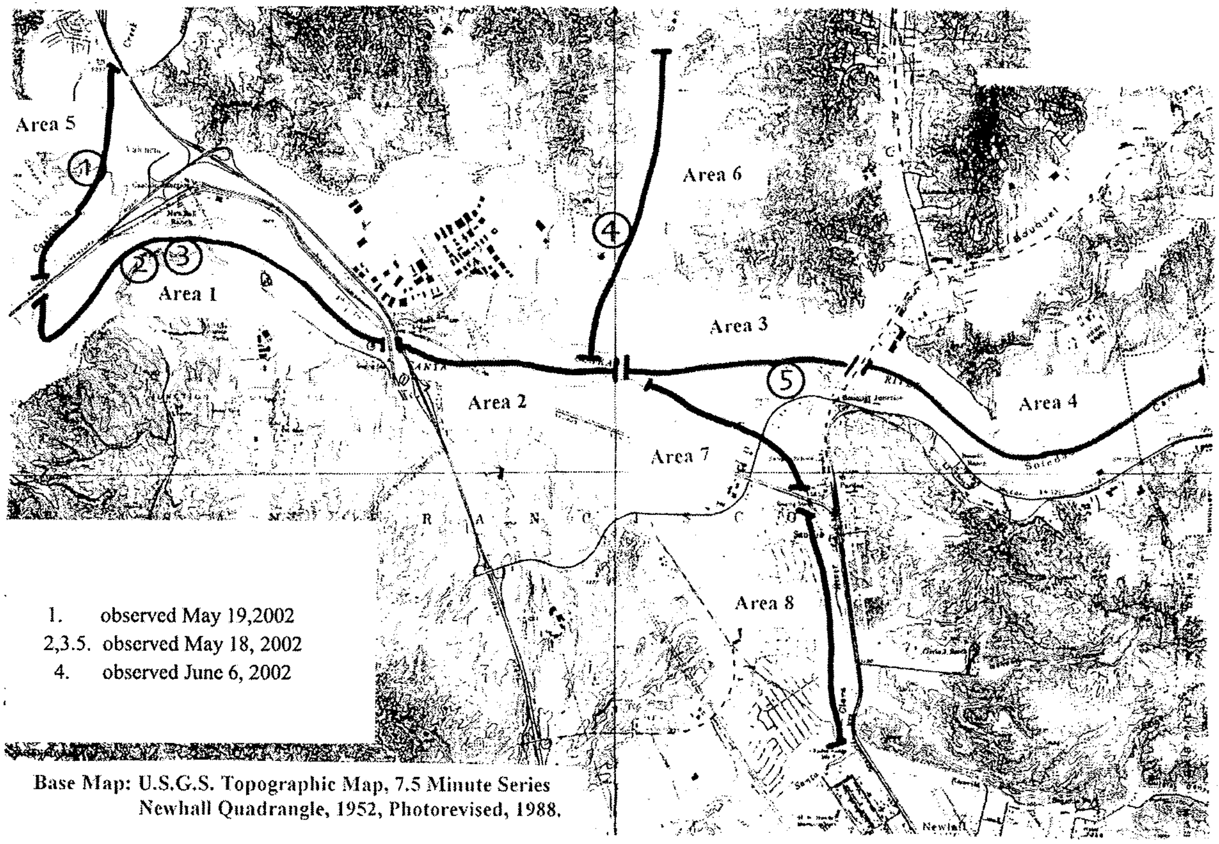
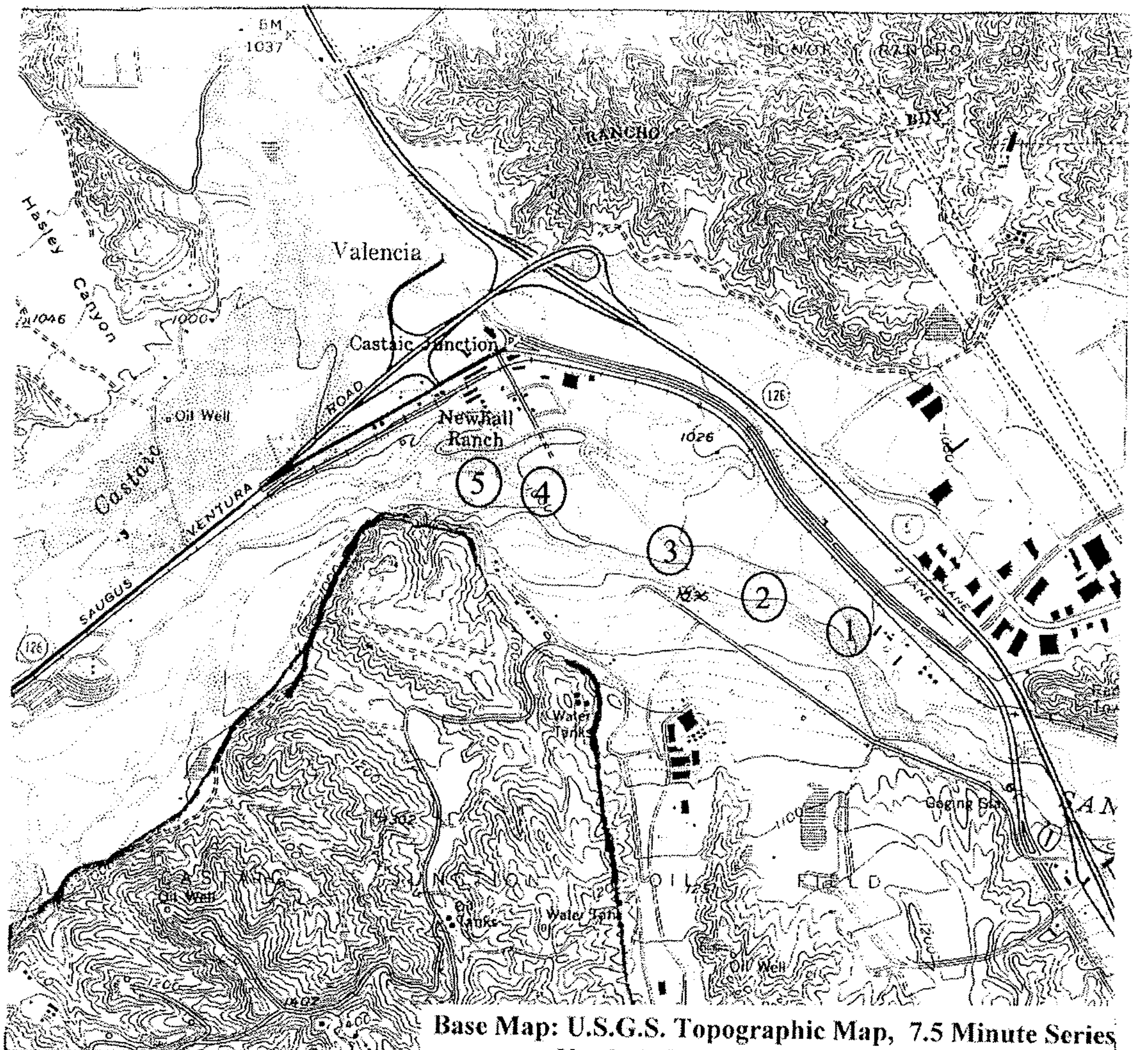


Figure 3. Observations of Least Bell's Vireo during 2002.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988

Dates of vireo observations.

1. - 4/18, 5/7, 5/18, 6/14, 7/14
2,4,5 - 5/18
3 - 4/18, 5/18, 6/14, 7/4

The Landmark Village Planning Area Oak Tree Report
Los Angeles County, California

Prepared for:

The Newhall Land and Farming Company
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September 2006

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All oak trees surveyed within the Landmark Village Planning Area are displayed on attached engineering plans prepared by Psomas Engineering (Sheets 1, 2, and 3) and an aerial photograph showing the limits of the Onion Field Bank Stabilization prepared by Impact Sciences. All exhibits show oak trees occurring within the proposed grading limits and within 200 feet of the grading limit line. **Table 2** on page 14 of this report lists the type of project-related impact that may occur to each oak tree, and identifies on which sheet each tree is located.

2.0 INTRODUCTION

Pursuant to the Los Angeles County Oak Tree Ordinance, removal or damage of any tree of the oak genus (*Quercus*) that is 25 inches in circumference (8 inches in diameter), or has a combined trunk circumference of any two trunks of at least 38 inches (12 inches in diameter), as measured 4.5 feet above the mean natural grade (i.e., diameter at breast height [dbh]), is unlawful without a permit (Ordinance 88-0157 1, 82-0168 2, Section 22.56.2050, 1988). Damage is defined as any act causing or tending to cause injury to the root system or other parts of an oak tree, including, but not limited to, burning, application of toxic substances, operation of equipment or machinery, paving, changing of natural grade, and trenching or excavating (i.e., encroached) within the protective zone (the area within the dripline of an oak tree and extending therefrom to a point at least 5 feet outside the dripline, or 15 feet from the trunk[s] of a tree, whichever distance is greater) of an oak tree.

2.1 Purpose

As required by the County of Los Angeles and pursuant to Section 22.56.2090 of the Los Angeles County Code, the purpose of this oak tree report is to provide information to the County on oak trees that may be removed or damaged by the development of the Landmark Village Planning Area. The parameters used to evaluate each tree that was surveyed are described on the following pages under heading **2.0, METHODS**. A spreadsheet showing data collected for each oak tree surveyed is provided in **Appendix A**.

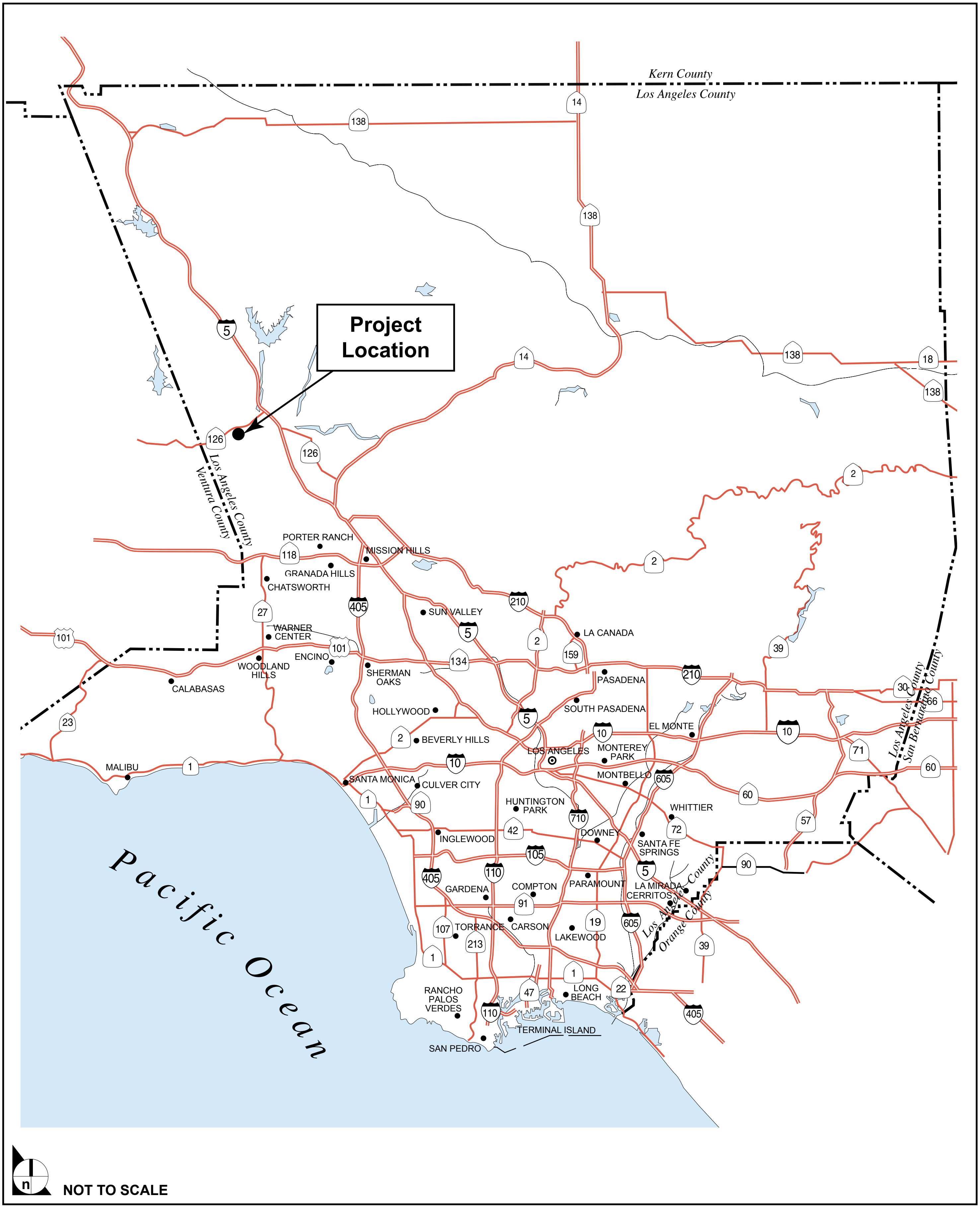
2.2 Site Location and Project Description

The project site is located in an unincorporated portion of northwestern Los Angeles County, approximately 30 miles northwest of downtown Los Angeles, in the Santa Clarita Valley. The Landmark Village Planning Area (project site) is part of the approved Newhall Ranch Specific Plan (Specific Plan), which was adopted by the Los Angeles County Board of Supervisors on May 27, 2003. The Specific Plan will guide the long-term development of the 11,963-acre Newhall Ranch community, including the goals, policies, and objectives of the County of Los Angeles General Plan and Santa Clarita Valley Areawide Plan. The Specific Plan is regulatory in nature and serves as the zoning for Newhall Ranch.

A regional location map (**Figure 1, Regional Location**) and a site vicinity map (**Figure 2, Site Vicinity**) illustrate the project site in a regional and local context, respectively. The site is located on both the south and north sides of State Route 126 (SR-126) near the intersection of Chiquita Canyon Road, and the confluence of the Santa Clara River and Castaic Creek. This area equates to approximately 679 acres, of which roughly 291 acres would be developed as part of the VTTM 53108 (**Figure 3, Landmark Village VTTM Boundary and Project Grading Limit Line**). The area that is 200 feet from the proposed grading line (project boundary) is approximately 1,751 acres.

The applicant is proposing to implement a portion of the Specific Plan through the processing of a VTTM 53108 to allow mixed-density residential development, supporting commercial, public facilities, recreation, and open space uses, along with necessary infrastructure. Consistent with the allowed uses identified in the Specific Plan, the proposed project contains 1,444 dwelling units along with 1,033,000 square feet of commercial/office/mixed use space, a 9-acre elementary school, 16.1-acre community park, 5.2 acres of private recreational facilities, 38.3 acres of open space and river trail uses, and roads. To support this development, an approved Water Reclamation Plant is to be constructed downstream on land located south of SR-126 near the Los Angeles County/Ventura County boundary line. The applicant also proposes to construct the planned Long Canyon Road Bridge as part of Landmark Village, which traverses the Santa Clara River.

The applicant will be required to construct or arrange for funding the construction of all infrastructures necessary to support the proposed project, including a domestic water system, sanitary sewer system, a drainage network, and Long Canyon Road Bridge. The project also includes introduced oak woodlands to serve as mitigation for damaged or removed oak trees (**Figure 4, Potential Oak Tree Mitigation Areas**). The Resource Management Plan component of the Specific Plan (Section 2.6) contains an Oak Resources Replacement Program, which identifies suitable replacement areas for oak trees. This section also defines the standards for the restoration and enhancement of oak resources within the Specific Plan.

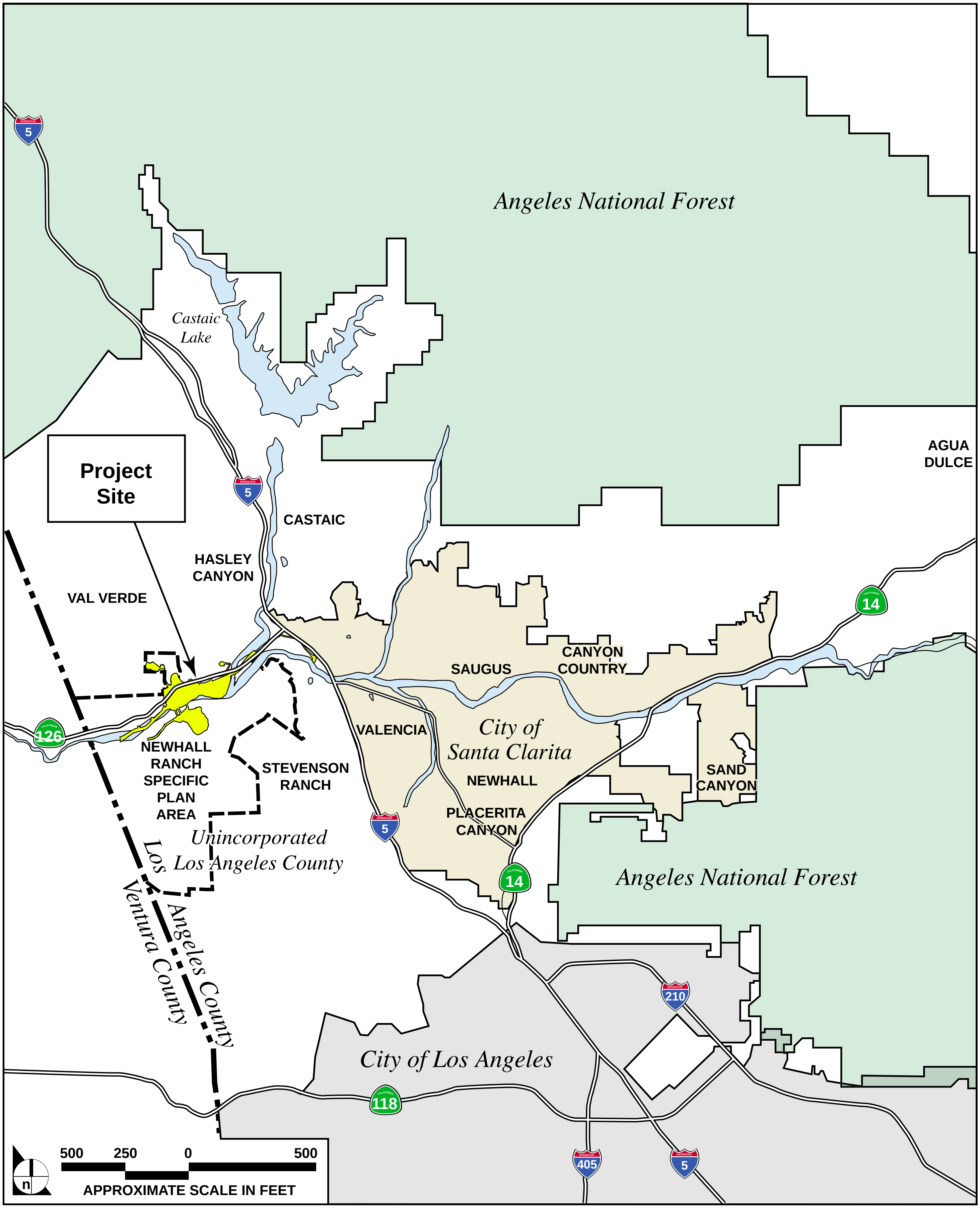


SOURCE: Impact Sciences, Inc. – January 2006

FIGURE 1

Regional Location

32-92•01/06

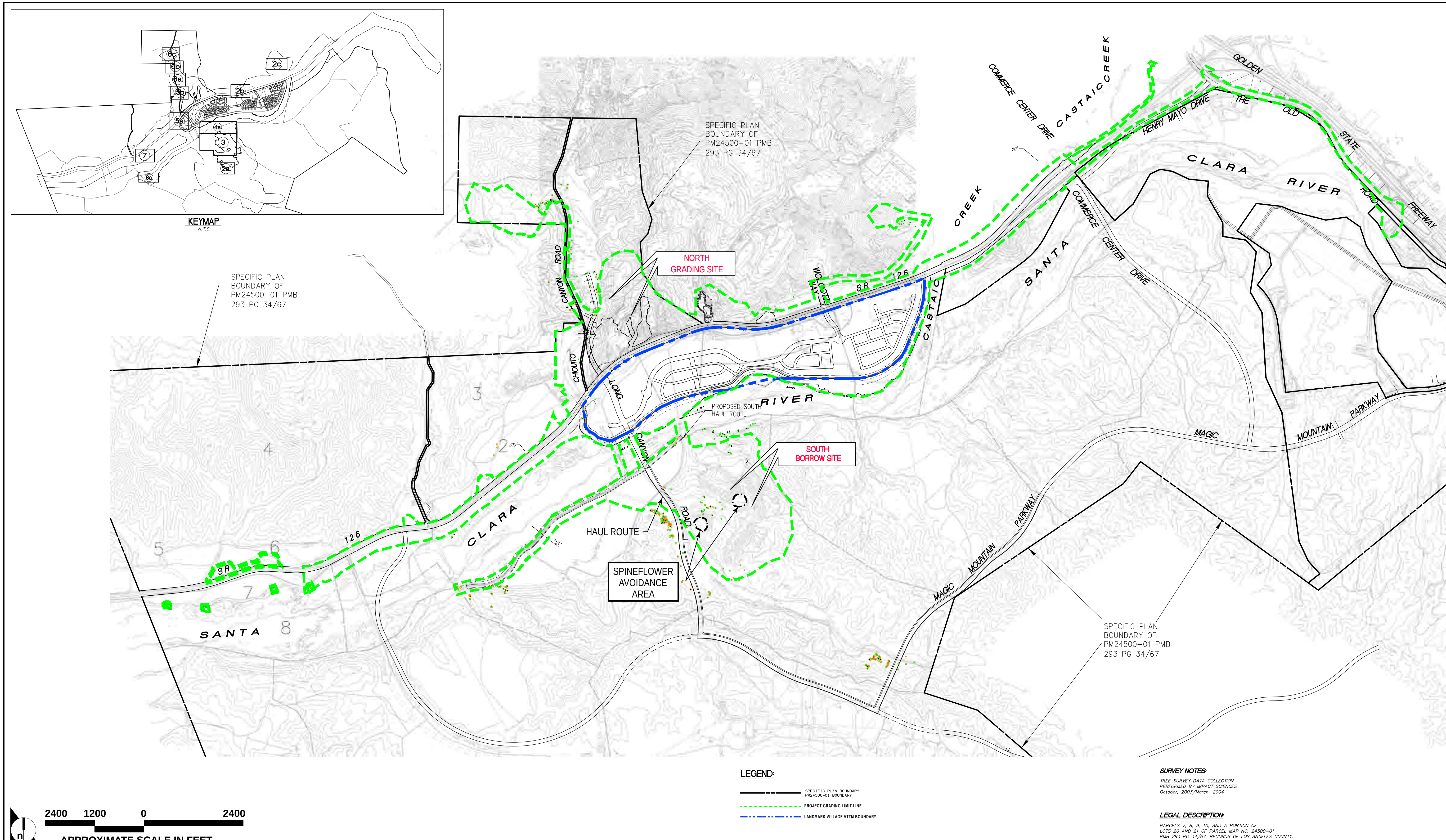


SOURCE: Impact Sciences, Inc. – January 2006

FIGURE 2

Site Vicinity

32-92•02/06



SOURCE: PSOMAS – May 2005

FIGURE 3

Landmark Village VTTM Boundary and Project Grading Limit Line

32-92•02/06

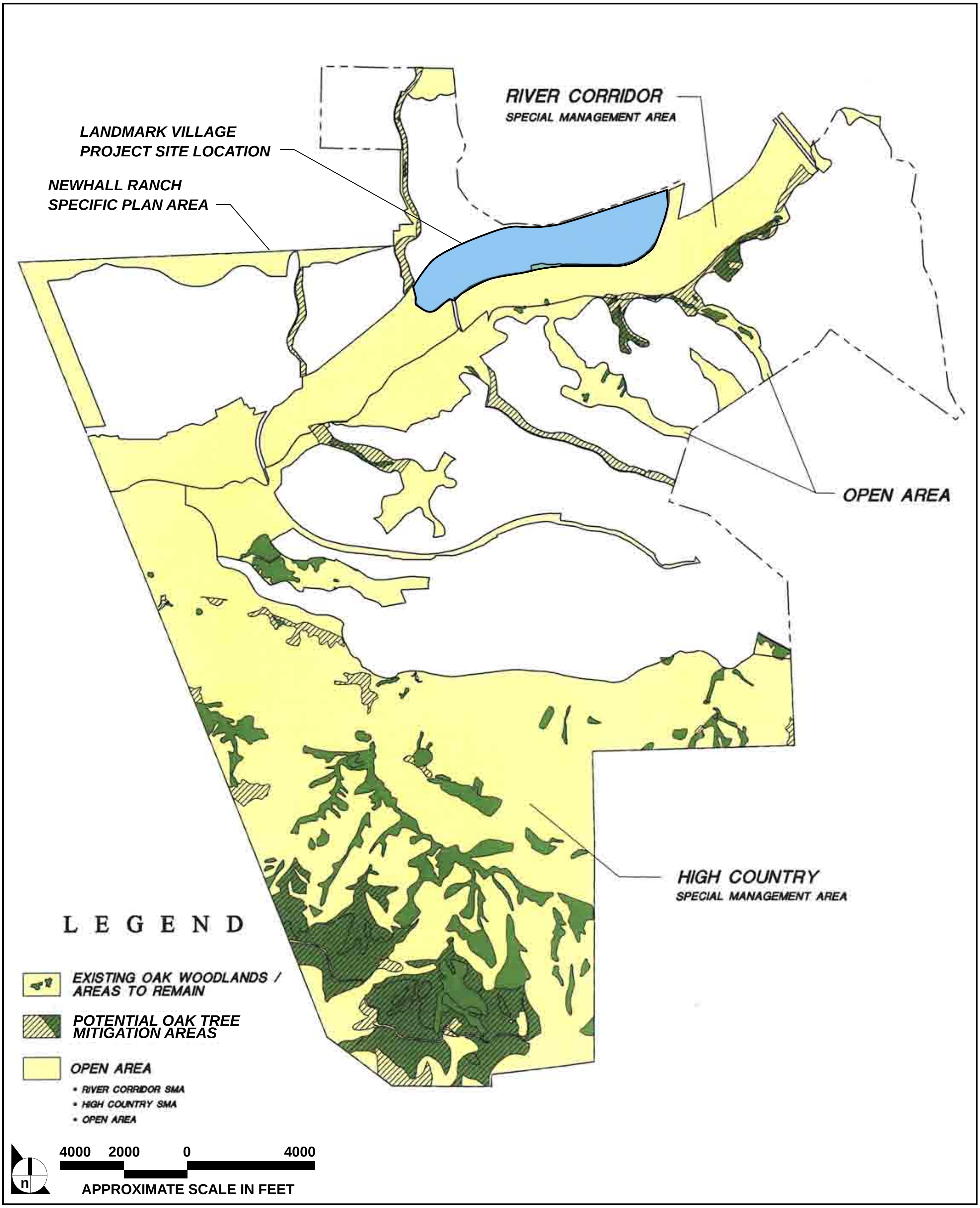
As indicated in the Resource Management Plan, suitable areas exist in the High Country Special Management Area of the Specific Plan for the restoration of oak resources and the enhancement of existing stands of oak trees. The High Country Special Management Area, which is depicted in **Figure 4**, includes areas in the upper elevations of the Santa Susana Mountains that have been disturbed by grazing. Additional opportunities exist within the Open Area designations of the Specific Plan (also shown in **Figure 4**), where oak resources can be planted as an expansion of existing oak woodlands or savannahs and in other areas that exhibit suitable topographic and soil conditions.

3.0 METHODS

Impact Sciences' biologists conducted on-site surveys and evaluations of the oak trees during 2005 and 2006. Only oak trees protected under the Los Angeles County Oak Tree Ordinance were surveyed. The project site was traversed on foot through areas where oak trees occur. Oak trees were surveyed from the base of each tree. A subjective alphabetical ranking ("A" being best and "F" being worst) was assigned for vigor, overall health, aesthetic value, and balance for each tree based on the criteria described below. Photographic examples of the alphabetical rankings for each of the four aforementioned survey parameters are shown below in **Figures 5–10**. All data collected for each oak tree are provided in **Appendix A**.

Evaluation of all oak trees surveyed included the following:

- Measuring the diameter of the trunk of each (ordinance size) oak tree using a forester's steel diameter-equivalent tape measure. Trees with multiple trunks were measured at breast height and measurements for up to five trunks were inputted in the field. The total number of trunks of trees with more than five trunks were noted in the comment section of the data spreadsheet (**Appendix A**);
- Measuring height and crown radius for each tree in all directions (north, south, east, and west);
- Identification of damage caused by pathogens or insect pests, by natural causes such as lightning, or from human activity;
- Evaluation of vigor based on such parameters as amount of new growth, leaf color, abnormal bark, dead wood, evidence of wilt, excessive necrosis or leaf chlorosis, thinning of crown, etc.;
- Characterizing the balance or symmetry of each oak tree based on the crown radius measurements and whether or not the tree was leaning or unstable;
- Assessment of overall health based on the evaluation of vigor, presence of damage, and comparison of typical archetype tree of same species; and
- Identification of trees that are classified as heritage oak trees.



SOURCE: PSOMAS – May 2003

FIGURE **4**

Potential Oak Tree Mitigation Areas

Figure 5 – Tree # 489 – Coast Live Oak tree with all "A" Grades (Vigor, Health, Aesthetics, Balance)

Figure 6 – Tree # 454 – Coast Live Oak tree with all "B" Grades (Vigor, Health, Aesthetics, Balance)

SOURCE: Impact Sciences, Inc. – February 2006

FIGURES **5 & 6**

Site Photos

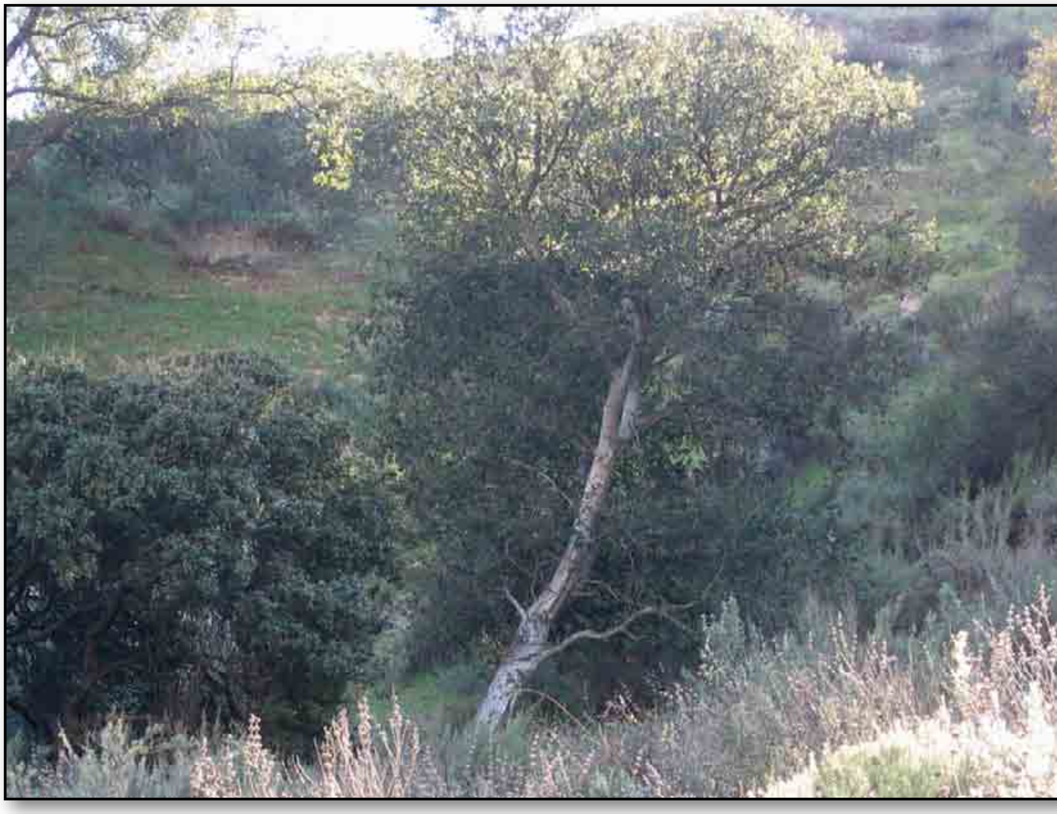


Figure 7 – Tree # 61 – Coast Live Oak tree with all "C" Grades (Vigor, Health, Aesthetics, Balance)

Figure 8 – Tree # 338 – Coast Live Oak tree with all "D" Grades (Vigor, Health, Aesthetics, Balance)

SOURCE: Impact Sciences, Inc. – February 2006

FIGURES **7 & 8**

Site Photos

Figure 9 – Tree # 26 – Coast Live Oak tree with all "E" Grades (Vigor, Health, Aesthetics, Balance)

Figure 10 – Tree # 585 – Coast Live Oak tree with all "F" Grades (Vigor, Health, Aesthetics, Balance)

SOURCE: Impact Sciences, Inc. – February 2006

FIGURES **9 & 10**

Site Photos

All oak trees surveyed were tagged for identification purposes with 1-inch (or 3-inch oval), non-corrosive, all-weather metal tags. All oak trees were surveyed with a Trimble Pro XRS GPS system, utilizing the OmniSTAR system specifically for surveying the trees and inputting the evaluation criteria data described above. The OmniSTAR system is a wide-area differential GPS service using satellite broadcast techniques in which data from many widely-spaced reference stations are used in a proprietary multi-site solution to achieve sub-meter, or less, positioning over most land areas worldwide. All trees surveyed were mapped using a Global Information System (GIS).

All oak trees surveyed within the Landmark Village Planning Area are displayed on attached engineering plans prepared by Psomas Engineering (Sheets 1, 2, and 3) and an aerial photograph showing the limits of the Onion Field Bank Stabilization prepared by Impact Sciences. All exhibits show oak trees occurring within the proposed grading limits and within 200 feet of the grading limit line.

In addition, while conducting tree surveys, biologists identified all oak trees that have the potential to be successfully relocated to undisturbed open space areas within the Newhall Ranch Specific Plan boundary. Trees identified as candidates for relocation based on the current assessments (e.g., health, vigor, aesthetics, balance) are identified below in **Table 3, Oak Trees Located on the Landmark Village Project Site that are Proposed for Relocation Within the Specific Plan Boundary Based on Current Assessments**.

4.0 RESULTS

A total of 201 oak trees subject to the Los Angeles County Oak Tree Ordinance were surveyed within the Landmark Village Planning Area, which includes the Landmark Village VTTM 53108, all proposed grading limits (including access roads, infrastructure, bank stabilization, and the borrow site), and the area within 200 feet of the grading limit line (see attached maps). Of the 201 oak trees surveyed, a total of 67 (33% of all trees surveyed) oak trees will be removed; 56 of which are coast live oaks (*Quercus agrifolia)*, 5 are valley oaks (*Q. lobata)*, 5 are scrub oaks (*Q. berberidifolia)*, and one is a MacDonald oak (*Q. x macdolnaldii*), a hybrid of a valley oak and a scrub oak. A total of 10 of these trees are considered heritage trees under Los Angeles County Oak Tree Ordinance (9 coast live oaks and one valley oak). Furthermore, a total of 14 (7% of all trees surveyed) oak trees may be encroached/damaged by proposed grading and construction activities, all of which are coast live oaks (3 are considered heritage trees). A total of 120 oak trees (60% of all trees surveyed) occur within 200 feet from the grading limit line, none of which would be removed or encroached upon by construction related activities.

In addition, a total of 26 oak trees were identified as candidates for relocation to undisturbed open space areas within the Specific Plan boundary (**Table 3**).

Table 1
Summary of Landmark Village Project Area Oak Tree Survey Data

	Number of Ordinance-Size Oak Trees (% of trees surveyed)	Oak Tree Tag Number
Total Number of Oak Trees Surveyed	201 (100%)	**Appendix A: Oak Tree Survey Data**
Total Number of Oak Trees Planned for Removal	67 (33%)	8, 9, 10, 51, 60, 61, 63, 64, **83***, 84, **87***, 248–250, 335–337, **338***, 339–342, **344***–348, **349***, 350, 351, **352***, 354–356, **357***, 396–398, 400, 401, **492***, 594, 1587–1592, 1594, 1596, **1597***, 1598, 3073, **4003***, 4016–4019, 4022, 4025–4028, 4055–4057
Total Number of Oak Trees That May be Encroached Within the Protective Zone	14 (7%)	92, 93, 98, 99, 100, 439, 448, **488***, **489***, 498, **503***, 592, 1605, 4007
Total Number of Oak Trees That Would Not Be Removed or Encroached, But Occur within 200 Feet From Grading Limit Line	120 (60%)	**Appendix A: Oak Tree Survey Data**
Total Number of Oak Trees that Would Require a Los Angeles County Oak Tree Permit (Removed+Encroached)	**81 (40%)**	8, 9, 51, 60, 61, 63, 64, **83***, 84, **87***, 92, 93, 98, 99, 100, 248–250, 335-337, **338***, 339–342, **344***–348, **349***, 350, 351, **352***, 354–356, **357***, 396–398, 400, 401, 439, 448, **488***, **489***, **492***, 498, **503***, 592, 594, 1587–1592, 1594, 1596, **1597***, 1598, 1605, 3073, **4003***, 4007, 4016–4019, 4022, 4025–4028, 4055–4057

*** Heritage tree**
Note: Dead trees are displayed on all exhibits and are included in Appendix A, but are not included on page 12 or in Table 1.

Table 2 lists the type of project-related activity that would result in removal or encroachments for each tree occurring within the Landmark Village Planning Area. **Table 2** also lists the map and sheet location where each tree can be viewed.

Table 2
Type of Project-Related Impact Proposed on Each Oak Tree Planned for Removal

Tree Number	Type of Impact	Type of Project-Related Impact	Map Location
8	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
9	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
10	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
51	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
60	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
61	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
63	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
64	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
***83**	Removal	State Route 126 Widening	Psomas: Sheets 1, 2 of 3
84	Removal	Utility Corridor – Chiquito Canyon Road	Psomas: Sheet 1 of 3
***87**	Removal	State Route 126 Widening	Psomas: Sheets 1 of 3
92	Encroachment	Valencia Commerce Center Water Tank Grading	Psomas: Sheet 3 of 3 (Franklin Parkway)
93	Encroachment	Valencia Commerce Center Water Tank Grading	Psomas: Sheet 3 of 3 (Franklin Parkway)
98	Encroachment	Valencia Commerce Center Water Tank Grading	Psomas: Sheet 3 of 3 (Franklin Parkway)
99	Encroachment	Valencia Commerce Center Water Tank Grading	Psomas: Sheet 3 of 3 (Franklin Parkway)
100	Encroachment	Valencia Commerce Center Water Tank Grading	Psomas: Sheet 3 of 3 (Franklin Parkway)
248	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
249	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
250	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)

Tree Number	Type of Impact	Type of Project-Related Impact	Map Location
335	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
336	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
337	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
***338**	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
339	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
340	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
341	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
342	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
***344**	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
345	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
347	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
348	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
***349**	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
350	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
351	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
***352**	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
354	Removal	Bank Stabilization – South Bank Santa Clara River	Psomas: Sheet 1 of 3
355	Removal	Bank Stabilization – South Bank Santa Clara River	Psomas: Sheet 1 of 3
356	Removal	Bank Stabilization – South Bank Santa Clara River	Psomas: Sheet 1 of 3
***357**	Removal	Bank Stabilization – South Bank Santa Clara River	Psomas: Sheet 1 of 3
396	Removal	Utility Corridor	Psomas: Sheet 2 of 3
397	Removal	Bank Stabilization – Chiquito Canyon Creek	Psomas: Sheets 1, 2 of 3
398	Removal	Bank Stabilization – Chiquito Canyon Creek	Psomas: Sheets 1, 2 of 3

Tree Number	Type of Impact	Type of Project-Related Impact	Map Location
400	Removal	State Route 126 Widening	Psomas: Sheets 1, 2 of 3
401	Removal	State Route 126 Widening	Psomas: Sheets 1, 2 of 3
439	Encroachment	North Grading Area – Chiquito Canyon Road Realignment	Psomas: Sheet 3 of 3 (Chiquito Canyon)
448	Encroachment	North Grading Area – Chiquito Canyon Road Realignment	Psomas: Sheet 3 of 3 (Chiquito Canyon)
***488**	Encroachment	North Grading Area – Chiquito Canyon Road Realignment	Psomas: Sheet 3 of 3 (Chiquito Canyon)
***489**	Encroachment	North Grading Area – Chiquito Canyon Road Realignment	Psomas: Sheet 3 of 3 (Chiquito Canyon)
***492**	Removal	North Grading Area – Chiquito Canyon Road Realignment	Psomas: Sheet 3 of 3 (Chiquito Canyon)
498	Encroachment	North Gorading Area – Chiquito Canyon Road Realignment	Psomas: Sheet 3 of 3 (Chiquito Canyon)
***503**	Encroachment	North Grading Area – Chiquito Canyon Road Realignment	Psomas: Sheet 3 of 3 (Chiquito Canyon)
***592**	Encroachment	North Grading Area – Chiquito Canyon Road Realignment	Psomas: Sheet 3 of 3 (Chiquito Canyon)
594	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
1587	Removal	Bank Stabilization – South Bank Santa Clara River	Impact Sciences: Aerial Photograph
1588	Removal	Bank Stabilization – South Bank Santa Clara River	Impact Sciences: Aerial Photograph
1589	Removal	Bank Stabilization – South Bank Santa Clara River	Impact Sciences: Aerial Photograph
1590	Removal	Bank Stabilization – South Bank Santa Clara River	Impact Sciences: Aerial Photograph
1591	Removal	Bank Stabilization – South Bank Santa Clara River	Impact Sciences: Aerial Photograph
1592	Removal	Bank Stabilization – South Bank Santa Clara River	Impact Sciences: Aerial Photograph
1594	Removal	Bank Stabilization – South Bank Santa Clara River	Impact Sciences: Aerial Photograph
1596	Removal	Bank Stabilization – South Bank Santa Clara River	Impact Sciences: Aerial Photograph
***1597**	Removal	Bank Stabilization – South Bank Santa Clara River	Impact Sciences: Aerial Photograph
1598	Removal	Bank Stabilization – South Bank Santa Clara River	Impact Sciences: Aerial Photograph

Tree Number	Type of Impact	Type of Project-Related Impact	Map Location
1605	Encroachment	Bank Stabilization – South Bank Santa Clara River	Impact Sciences: Aerial Photograph
3073	Removal	Bank Stabilization – South Bank Santa Clara River	Impact Sciences: Aerial Photograph
***4003**	Removal	Utility Corridor – Chiquito Canyon Road	Psomas: Sheet 3 of 3 (Chiquito Canyon)
4016	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
4017	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
4018	Removal	Valencia Commerce Center Water Tank Grading	Psomas: Sheet 3 of 3 (Franklin Parkway)
4019	Removal	Bank Stabilization – South Bank Santa Clara River	Impact Sciences: Aerial Photograph
4022	Removal	Valencia Commerce Center Water Tank Grading	Psomas: Sheet 3 of 3 (Franklin Parkway)
4025	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
4026	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
4027	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
4028	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
4055	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
4056	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)
4057	Removal	Adobe Borrow Site Grading	Psomas: Sheet 3 of 3 (Adobe Canyon)

Table 3
Oak Trees Located on the Landmark Village Project Site that are Proposed for Relocation within the Specific Plan Boundary Based on Current Assessments

Oak Species	Oak Tree Tag Number
Quercus berberidifolia	60
Quercus x macdonaldii	64
Quercus lobata	1587
Quercus agrifolia	83, 84, 248, 249, 336, 337, 339, 340-342, 344, 347-351, 354, 355, 1588, 1590, 3073, 4018, 4022

5.0 CONCLUSION

A total of 81 (40% of all trees surveyed) oak trees would be either removed or potentially damaged (encroached) from construction-related activities, and thus all 81 trees would require an oak tree permit from the County of Los Angeles. To reduce the permanent loss of mature oak trees and the habitat they provide to indigenous plant and animal species, as well as migrating birds, Newhall Land and Farming has retained Richard Johnson and Associates to develop boxing, planting, and maintenance procedures for candidate trees for relocation within the Newhall Ranch Specific Plan boundary. Attached to this report as **Appendix B** are Richard Johnson and Associates' Boxing Specifications and Recommendations for transplanting and maintaining trees selected for relocation. A summary of the field data collected from the 2005/2006 oak tree survey is shown below in **Table 1, Summary of Landmark Village Project Area Oak Tree Survey Data**.

6.0 SUGGESTED MITIGATION MEASURES

Pursuant to Section 22.56.2090 of the Los Angeles County Oak Tree Ordinance, the following mitigation measures are proposed to preserve and protect the oak trees addressed in this report. These mitigation and maintenance measures are suggested to mitigate the loss and impacts to 81 oak trees and to preserve and protect the remaining oak trees on the site.

MM-1 Replacement Trees

- *Consistent with the Newhall Ranch Specific Plan, oak trees removed or damaged shall be replaced by a tree of the same species at a ratio of 2:1.*
- *All replacement trees shall be at least a 15-gallon specimen in size and measure 1 inch or more in diameter, as measured from 1 foot above the base. Free-form trees with multiple stems are permissible; the combined*

diameter of the two largest stems of such trees shall measure a minimum of 1 inch in diameter, as measured 1 foot above the base. Replacement trees shall consist exclusively of indigenous oak trees and be certified as being grown from a seed source collected in Los Angeles or Ventura Counties.

MM-2 Protective Fencing

A plan shall be developed for protecting oak trees on the subject property during and after development. This plan shall be approved by the Forestry Division of the County of Los Angeles.

- *Equipment damage to limbs, trunks, and roots of all remaining trees shall be avoided during project construction and development. Even slight trunk injuries can result in susceptibility to long-term pathogenic maladies.*

- *Protective fencing not less than four feet in height shall be placed at the limits of the protective zone of any individual oak tree or dense stand of oak trees within 200 feet of the grading limits, and shall be inspected by the forester and/or fire warden prior to commencement of any activity on the subject property, and shall remain in place until construction is completed.*

MM-3 Grading Restrictions near Protective Zones

Care must be taken to limit grade changes near the protective zone of an oak tree. Grade changes can lead to plant stress from oxygen deprivation or oak root fungus at the root collar of oaks. Minor grade changes further from the trunk are not as critical but can negatively affect the health of the tree if not carefully monitored by a County-approved certified arborist.

- *The grade shall not be lowered or raised around the trunks (i.e., within the protective zone) of any oak tree without the approval of the Los Angeles County forester or a County-certified arborist. A certified arborist shall supervise all excavation or grading proposed within the protective zone of a tree.*

- *Trenching, excavation, or clearance of vegetation within the protective zone of an oak tree shall be accomplished by the use of hand tools or small hand-held power tools. Any major roots encountered shall be conserved to the greatest extent possible and treated as recommended by the certified arborist.*

- *No utility trenches shall be routed within the protective zone of an oak tree unless no feasible alternative locations are available, and shall be approved by the County forester.*

MM-4 Equipment Storage

- *No storage of equipment, supplies, vehicles, or debris shall be permitted within the protective zone of an oak tree.*

- *No dumping of construction wastewater, paint, stucco, concrete, or any other clean-up waste shall occur within the protective zone of an oak tree.*

- *No temporary structures shall be placed within the protective zone of any remaining oak tree.*

MM-5 Maintenance

Healthy trees, if not maintained, often grow beyond their ability to support themselves and fail at their most naturally occurring weak point. This is typically at a branch union at or near the main crotch of the tree. Weight-reduction pruning and/or cabling is important in any tree preservation program. Pruning of oak trees within residential neighborhoods is recommended every four to six years, based on a County-certified arborist's determination.

- *Pruning of replacement oak trees and preserved oak trees shall include the removal of dead wood, stubs, and medium pruning of branches 2 inches in diameter or less.*

- *Pruning of replacement oak trees and preserved oak trees shall be in accordance with the guidelines published by the National Arborist Association. In no case shall more than 20 percent of the tree canopy of any oak tree be removed. Cuts over 2 inches in diameter shall require a pruning permit from the County. After pruning, installation of support cables to prevent future main crotch failures may be necessary based on a County-certified arborist's determination.*

- *All replacement oak trees shall be maintained in accordance with the principles set forth in the publication, Oak Trees: Care and Maintenance prepared by the Forestry Division of the County of Los Angeles.*

- *A two-year maintenance period shall begin upon the start of planting the replacement trees. All replacement trees failing to survive within this period shall be replaced. A new two-year maintenance period shall start for each tree that failed to survive and required a replacement tree to be planted.*

MM-6 Frequency of Watering

Care should be taken to avoid placing any irrigation devices within watering distance of the protected zone of oak trees. Too much moisture near the base of an oak tree is generally believed to be the leading cause of death of oak trees in residential settings, and oak root fungus can occur as a result of over watering. Oak trees survive and thrive on annual rainfall alone and generally do not require supplemental irrigation except during periods of extreme drought or for establishment of newly planted trees (i.e., replacement trees).

- *Irrigation water shall not reach within 15 feet of any oak trunk.*

- *Neither grass nor ground covers shall be planted under the canopy of oak trees.*

MM-7 Control of Diseases and Pests

Oak trees generally have an acceptable level of common insect pests. During the visual inspection of the trees assessed, no evidence of sudden oak death (*Phytophthora ramorum*) or bleeding canker (*Phytophthora cactorum*) was observed. However, oak wilt fungus (*Ceratocystis fagacearum)* was observed on two trees on the project site. The parasite, mistletoe (*Phoradendron villosum* ssp. *villosum*), is a common threat to oak trees; however, despite the negative effect mistletoe has on its tree hosts, both mistletoe and oaks are native to California and have co-existed and co-evolved for hundreds of years. Mistletoe was observed on several of the oak trees surveyed.

- *A County-certified arborist shall evaluate the effects of mistletoe, pathogens, and insect pests on the remaining preserved and planted oak trees periodically (about every five to seven years), in addition to the overall health and structural integrity of the trees, to ensure longevity of remaining oak trees.*

MM-8 Construction Monitoring

Damage to remaining trees must be avoided by workers and equipment during construction activities.

- *A qualified biologist or County-certified arborist shall monitor on-site construction and grading activities occurring near all identified oak tree protection zones to ensure that damage to oak trees does not occur.*

- *Prior to initiation of construction activities, the qualified biologist or County-certified arborist shall schedule a field meeting to inform personnel (involved in construction) where all protective zones are located and the importance of avoiding encroachment within the protective zones.*

APPENDIX A

Oak Tree Survey Data

Appendix A - Landmark Village Project Oak Tree Survey Data

	Tree Number	4	8	9	10	13	14	15	16	17	18	19	20	21	22
Tree Characteristics	**Species**														
	Coast Live Oak	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Valley Oak														
	Scrub Oak														
	McDonald's Oak														
	Heritage Oak														
	Trunk Diameter	25,20,12,11	26,17,8	19,11	22, 16	24	25	12,8,6,6	17	20,18,15,11	20	22	22	30	17
	Tree Height	40	30	37	30	35	32	28	32	27	26	19	30	28	25
	Canopy North	33	26	27	18	24	10	15	32	16	20	2	18	15	15
	Canopy West	29	25	30	25	22	18	20	12	20	18	15	22	5	18
	Canopy South	30	27	28	11	28	19	12	13	28	23	3	15	0	3
	Canopy East	31	21	22	14	26	17	18	26	19	17	2	15	10	6
Physical Condition	**Tree Declining**				X		X					X			
	Broken/Dead Limbs				X					X		X	X	X	
	Sparse Foliage				X							X	X	X	
	Excessive Chlorosis/Necrosis											X			
	Mainstem Dieback														
	Poor Tip Growth				X							X		X	
	Cavity		X			X		X	X						
	Weak Crotch		X												
	Hollow Trunk													X	
	Trunk Exudation														
	Regrown Stump														
	Exfoliating Bark				X	X		X							
	Insect Damage					X	X	X							
	Diseased					X									
	Mistletoe														
	Leaning											X	X		X
	Excessive Water Shoots												X		
	Surface Roots														
	Fire Damage		X							X				X	
Measures	**Safety Prune**		X							X					
	Remove Deadwood														
	Cable/Brace			X											
Rating	**Vigor**	A	B	B	D	D	C	C	B	B	A	D	C	C	B
	Health	A	B	B	D	D	C	C	B	A	A	D	C	C	B
	Aesthetics	A	B	B	D	D	D	C	C	B	A	D	C	D	B
	Balance	A	C	A	D	D	C	C	D	B	B	D	D	D	D
Impact	**Removal**		X	X	X										
	Encroached														
	200ft from Grading	X				X	X	X	X	X	X	X	X	X	X
Comments				NT.	NT.	NT. BH.	NT.	NT.	NT.	NT.	NT.	NT.			

Key for Comments:
BH = Bee Hive in Tree
DE = Data Estimated
NA = Not Accessable
NT = Not Transplantable
NTg = Not Tagged
LHB = Low Horizontal Branching

Appendix A - Landmark Village Project Oak Tree Survey Data

	Tree Number	24	25	26	51	60	61	63	64	81	83	84	87	90	91
Tree Characteristics	**Species**														
	Coast Live Oak	X	X	X	X		X	X		X	X	X		X	X
	Valley Oak												X		
	Scrub Oak					X									
	McDonald's Oak								X						
	Heritage Oak									X	X		X		
	Trunk Diameter	19	16	19	30	6,6,5,5,4	12,3	18,24	12	52,14	38,15	16,14	51	27	15,13,7,7
	Tree Height	17	32	22	42	16	20	47	28	20	39	21	50	28	40
	Canopy North	15	27	7	30	13	19	33	18	0	30	16	30	19	22
	Canopy West	17	24	7	28	13	22	32	20	0	34	15	29	16	23
	Canopy South	6	19	0	28	15	13	33	22	0	29	15	31	16	21
	Canopy East	11	8	2	30	14	9	30	18	0	32	12	29	18	22
Physical Condition	**Tree Declining**	X		X									X	X	
	Broken/Dead Limbs			X			X								
	Sparse Foliage	X		X									X		
	Excessive Chlorosis/Necrosis	X		X									X	X	
	Mainstem Dieback			X											
	Poor Tip Growth			X									X	X	
	Cavity	X	X											X	
	Weak Crotch														
	Hollow Trunk	X													
	Trunk Exudation														
	Regrown Stump														
	Exfoliating Bark	X	X	X	X		X	X							
	Insect Damage	X			X		X							X	
	Diseased														
	Mistletoe														
	Leaning														
	Excessive Water Shoots														
	Surface Roots							X							
	Fire Damage				X									X	
Measures	**Safety Prune**											X	X	X	
	Remove Deadwood														
	Cable/Brace														
Rating	**Vigor**	D	C	E	A	A	C	A	B	F	B	B	D	D	B
	Health	D	C	E	B	A	C	A	A	F	B	A	D	D	B
	Aesthetics	D	C	E	A	B	C	A	B	F	B	B	C	C	B
	Balance	D	C	E	B	B	C	C	B	F	B	B	B	C	B
Impact	**Removal**				X	X	X	X	X		X	X	X		
	Encroached														
	200ft from Grading	X	X	X										X	X
Comments		NT.	NT.	NT.						Permit not needed.				NT. BH.	

Key for Comments:
BH = Bee Hive in Tree
DE = Data Estimated
NA = Not Accessable
NT = Not Transplantable
NTg = Not Tagged
LHB = Low Horizontal Branching

Appendix A - Landmark Village Project Oak Tree Survey Data

	Tree Number	92	93	96	97	98	99	100	101	102	103	247	248	249	250
Tree Characteristics	**Species**														
	Coast Live Oak	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Valley Oak														
	Scrub Oak														
	McDonald's Oak														
	Heritage Oak				X										
	Trunk Diameter	18,10	17	8,6,6,5	39	23,22	15	19,13,8,6	14,10,5	13,4	17,14,14,4	30,12,7	16,11,13,12	21,20,15,11	23,16,15,14
	Tree Height	32	32	30	55	42	22	41	32	37	40	43	38	47	35
	Canopy North	20	15	12	41	30	15	26	25	25	25	29	28	28	20
	Canopy West	18	17	15	40	27	10	26	22	26	29	30	25	29	21
	Canopy South	20	20	14	40	18	11	29	21	27	25	29	27	27	25
	Canopy East	17	21	15	36	21	11	28	20	24	27	27	29	26	25
Physical Condition	**Tree Declining**														
	Broken/Dead Limbs					X					X				
	Sparse Foliage					X									
	Excessive Chlorosis/Necrosis														
	Mainstem Dieback														
	Poor Tip Growth					X									
	Cavity				X	X					X			X	
	Weak Crotch														X
	Hollow Trunk														
	Trunk Exudation														
	Regrown Stump														
	Exfoliating Bark														
	Insect Damage														
	Diseased														
	Mistletoe														
	Leaning					X									
	Excessive Water Shoots														
	Surface Roots														
	Fire Damage				X	X				X	X				
Measures	**Safety Prune**					X									X
	Remove Deadwood					X									
	Cable/Brace					X									X
Rating	**Vigor**	B	A	A	C	C	B	A	B	B	B	B	A	A	A
	Health	B	A	B	B	C	B	A	B	B	B	B	A	A	A
	Aesthetics	B	B	B	B	B	B	A	B	B	B	A	B	A	B
	Balance	B	B	A	A	C	B	A	A	C	B	B	A	A	B
Impact	**Removal**												X	X	X
	Encroached	X	X			X	X	X							
	200ft from Grading			X	X				X	X	X	X			
Comments															LHB.

Key for Comments:
BH = Bee Hive in Tree
DE = Data Estimated
NA = Not Accessable
NT = Not Transplantable
NTg = Not Tagged
LHB = Low Horizontal Branching

Appendix A - Landmark Village Project Oak Tree Survey Data

	Tree Number	318	319	320	321	322	323	324	325	326	328	329	330	331	332
Tree Characteristics	**Species**														
	Coast Live Oak	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Valley Oak														
	Scrub Oak														
	McDonald's Oak														
	Heritage Oak									X	X	X		X	
	Trunk Diameter	18,21,14	16	30,15	19,11	17,17,16,16,9	25	10,11,16	27,13	55	39,7	42,11	32,32	39	25,22,17,8
	Tree Height	55	20	53	24	50	35	35	38	65	50	50	60	25	37
	Canopy North	29	1	31	33	27	27	1	31	38	12	24	38	30	26
	Canopy West	31	24	30	11	29	26	27	30	37	15	26	38	14	28
	Canopy South	30	32	43	2	28	25	30	28	39	32	21	40	2	33
	Canopy East	30	8	32	30	28	27	27	32	43	29	30	40	7	20
Physical Condition	**Tree Declining**		X												
	Broken/Dead Limbs											X		X	
	Sparse Foliage		X	X											
	Excessive Chlorosis/Necrosis														
	Mainstem Dieback														
	Poor Tip Growth														
	Cavity					X				X	X	X		X	X
	Weak Crotch														
	Hollow Trunk														
	Trunk Exudation		X		X										
	Regrown Stump											X			
	Exfoliating Bark										X				
	Insect Damage														
	Diseased														
	Mistletoe														
	Leaning		X												
	Excessive Water Shoots														
	Surface Roots														
	Fire Damage									X	X				
Measures	**Safety Prune**														
	Remove Deadwood														
	Cable/Brace														X
Rating	**Vigor**	A	C	B	B	B	B	B	A	A	B	B	A	B	A
	Health	A	C	B	B	B	A	B	A	A	C	B	A	B	B
	Aesthetics	A	D	B	C	B	A	B	A	A	C	D	A	D	B
	Balance	A	D	B	D	B	B	B	A	B	D	C	A	D	C
Impact	**Removal**														
	Encroached														
	200ft from Grading	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Comments		NT.	NT. IP.	NT.	NT.	NT.	NT.	NT.	NT.	NT.	NT.	NT. IP.	NT.	NT.	NT. Tagged on south side.

Key for Comments:
BH = Bee Hive in Tree
DE = Data Estimated
NA = Not Accessable
NT = Not Transplantable
NTg = Not Tagged
LHB = Low Horizontal Branching

Appendix A - Landmark Village Project Oak Tree Survey Data

	Tree Number	333	334	335	336	337	338	339	340	341	342	343	344	345	346
Tree Characteristics	**Species**														
	Coast Live Oak	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Valley Oak														
	Scrub Oak														
	McDonald's Oak														
	Heritage Oak						X						X		
	Trunk Diameter	29	24	24,21,23	12,12,10,7	17,19	47	29	25	14	17,19,12,6	7	22,47	34,13	29
	Tree Height	30	37	40	17	45	21	45	48	42	40	18	37	57	34
	Canopy North	25	21	27	15	25	22	30	28	8	22	1	28	29	29
	Canopy West	25	26	25	12	28	12	28	27	11	30	6	32	33	30
	Canopy South	17	23	28	15	25	13	27	18	11	27	14	29	34	30
	Canopy East	25	22	23	17	27	44	28	26	22	24	8	30	28	28
Physical Condition	**Tree Declining**						X								
	Broken/Dead Limbs						X							X	X
	Sparse Foliage						X								
	Excessive Chlorosis/Necrosis														
	Mainstem Dieback						X								
	Poor Tip Growth														
	Cavity			X		X	X							X	X
	Weak Crotch														
	Hollow Trunk														
	Trunk Exudation			X										X	
	Regrown Stump														
	Exfoliating Bark						X							X	
	Insect Damage		X							X				X	
	Diseased			X											
	Mistletoe														
	Leaning														
	Excessive Water Shoots														
	Surface Roots														
	Fire Damage			X											
Measures	**Safety Prune**														
	Remove Deadwood														
	Cable/Brace														
Rating	**Vigor**	B	A	B	B	B	D	A	A	B	A	B	B	A	C
	Health	B	B	B	B	B	D	A	A	B	A	B	B	C	C
	Aesthetics	B	A	B	B	A	D	A	A	C	A	C	B	C	B
	Balance	A	B	B	A	A	D	A	A	C	A	C	B	C	C
Impact	**Removal**			X	X	X	X	X	X	X	X	X	X	X	X
	Encroached														
	200ft from Grading	X	X												
Comments				BH.											

Key for Comments:
BH = Bee Hive in Tree
DE = Data Estimated
NA = Not Accessable
NT = Not Transplantable
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LHB = Low Horizontal Branching

Appendix A - Landmark Village Project Oak Tree Survey Data

	Tree Number	347	348	349	350	351	352	354	355	356	357	390	391	392	393
Tree Characteristics	**Species**														
	Coast Live Oak	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Valley Oak														
	Scrub Oak														
	McDonald's Oak														
	Heritage Oak			X			X				X				
	Trunk Diameter	28	17,11,8,8	36	17,11,11,10	25	63	30,18,15	35	16	53	14	14	19	19
	Tree Height	41	22	32	30	21	50	35	39	24	40	38	38	41	33
	Canopy North	21	15	16	18	16	45	25	28	0	30	20	27	30	15
	Canopy West	20	12	25	17	18	40	30	25	10	31	10	10	12	30
	Canopy South	22	16	27	22	15	43	21	23	32	37	10	7	13	12
	Canopy East	23	20	25	20	17	55	26	22	10	29	8	19	12	14
Physical Condition	**Tree Declining**										X				
	Broken/Dead Limbs														
	Sparse Foliage										X				
	Excessive Chlorosis/Necrosis														
	Mainstem Dieback														
	Poor Tip Growth														
	Cavity					X									
	Weak Crotch														
	Hollow Trunk														
	Trunk Exudation					X									
	Regrown Stump														
	Exfoliating Bark														
	Insect Damage														
	Diseased														
	Mistletoe										X				
	Leaning									X					
	Excessive Water Shoots														
	Surface Roots														
	Fire Damage														
Measures	**Safety Prune**			X		X									
	Remove Deadwood														
	Cable/Brace							X							
Rating	**Vigor**	B	A	A	B	B	A	B	B	B	C	B	B	B	B
	Health	A	A	A	B	B	A	B	B	B	C	B	B	B	B
	Aesthetics	A	A	A	B	B	A	A	A	C	B	C	B	B	B
	Balance	A	B	B	B	B	A	A	A	D	B	C	C	C	C
Impact	**Removal**	X	X	X	X	X	X	X	X	X	X				
	Encroached														
	200ft from Grading											X	X	X	X
Comments				LHB.											

Key for Comments:
BH = Bee Hive in Tree
DE = Data Estimated
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NT = Not Transplantable
NTg = Not Tagged
LHB = Low Horizontal Branching

Appendix A - Landmark Village Project Oak Tree Survey Data

	Tree Number	396	397	398	400	401	404	405	410	414	415	417	422	425	426
Tree Characteristics	**Species**														
	Coast Live Oak	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Valley Oak														
	Scrub Oak														
	McDonald's Oak														
	Heritage Oak								X						
	Trunk Diameter	26,13,13,11	16	16	26	33,25,11,7	23	18,4	41	30	15	24	8,3,2,2	14,14,14	13,21,18
	Tree Height	40	38	28	39	43	50	47	46	30	25	30	25	42	40
	Canopy North	35	5	20	28	30	28	1	21	15	10	11	9	20	28
	Canopy West	28	17	19	27	30	34	17	33	15	21	16	16	27	30
	Canopy South	26	21	15	25	33	20	42	38	21	27	21	15	27	33
	Canopy East	39	21	3	27	36	24	12	20	40	11	15	6	17	30
Physical Condition	**Tree Declining**														
	Broken/Dead Limbs														
	Sparse Foliage														
	Excessive Chlorosis/Necrosis														
	Mainstem Dieback														
	Poor Tip Growth														
	Cavity														
	Weak Crotch														
	Hollow Trunk														
	Trunk Exudation														
	Regrown Stump														
	Exfoliating Bark					X									
	Insect Damage					X									
	Diseased														
	Mistletoe														
	Leaning		X	X						X					
	Excessive Water Shoots														
	Surface Roots											X			
	Fire Damage														
Measures	**Safety Prune**	X													
	Remove Deadwood									X					
	Cable/Brace														
Rating	**Vigor**	A	A	A	A	B	B	B	B	B	B	B	B	A	A
	Health	A	A	A	A	B	B	B	A	B	A	A	A	A	A
	Aesthetics	B	B	B	A	A	B	B	B	C	C	C	C	A	A
	Balance	B	C	C	A	B	B	B	B	D	C	C	B	B	B
Impact	**Removal**	X	X	X	X	X									
	Encroached														
	200ft from Grading						X	X	X	X	X	X	X	X	X
Comments										LHB.		Tag on west side of trunk.			Tagged on south side.

Key for Comments:
BH = Bee Hive in Tree
DE = Data Estimated
NA = Not Accessable
NT = Not Transplantable
NTg = Not Tagged
LHB = Low Horizontal Branching

Appendix A - Landmark Village Project Oak Tree Survey Data

	Tree Number	427	429	430	431	432	436	439	441	443	448	449	450	451	452
Tree Characteristics	**Species**														
	Coast Live Oak	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Valley Oak														
	Scrub Oak														
	McDonald's Oak														
	Heritage Oak				X									X	
	Trunk Diameter	20,26,7	17,18	8,8,4,4,3	38	18	27	19,6,17	8,7,7,3,2	32	15,16,20	33,19,21,24	15,13,9,9	37	23,26
	Tree Height	40	40	22	45	47	41	24	18	38	38	35	29	49	45
	Canopy North	26	26	18	28	20	31	12	15	32	31	25	26	32	30
	Canopy West	27	28	15	24	23	30	13	17	32	30	28	25	27	28
	Canopy South	27	28	6	35	20	29	18	8	30	32	42	16	26	25
	Canopy East	26	27	8	36	20	29	16	5	35	33	27	17	29	30
Physical Condition	**Tree Declining**	X													
	Broken/Dead Limbs														
	Sparse Foliage	X													
	Excessive Chlorosis/Necrosis														
	Mainstem Dieback														
	Poor Tip Growth														
	Cavity														
	Weak Crotch														
	Hollow Trunk														
	Trunk Exudation														
	Regrown Stump														
	Exfoliating Bark						X			X					
	Insect Damage														
	Diseased														
	Mistletoe														
	Leaning														
	Excessive Water Shoots														
	Surface Roots											X			
	Fire Damage														
Measures	**Safety Prune**											X			
	Remove Deadwood														
	Cable/Brace														
Rating	**Vigor**	D	B	B	B	A	B	A	B	B	A	B	A	A	A
	Health	D	B	A	B	A	B	A	A	B	A	A	A	A	A
	Aesthetics	C	A	C	A	B	B	A	B	B	A	C	A	A	A
	Balance	C	B	B	B	A	A	A	B	B	A	D	A	A	A
Impact	**Removal**														
	Encroached							X			X				
	200ft from Grading	X	X	X	X	X	X		X	X		X	X	X	X
Comments			Trunk growing around tag.	Numerous trunks.								Located in wash.			

Key for Comments:
BH = Bee Hive in Tree
DE = Data Estimated
NA = Not Accessable
NT = Not Transplantable
NTg = Not Tagged
LHB = Low Horizontal Branching

Appendix A - Landmark Village Project Oak Tree Survey Data

	Tree Number	453	454	455	458	459	485	487	488	489	490	491	492	498	499
Tree Characteristics	**Species**														
	Coast Live Oak	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Valley Oak														
	Scrub Oak														
	McDonald's Oak														
	Heritage Oak	X			X			X	X	X		X	X		
	Trunk Diameter	36	17,16,15,25	28,27,29,20,15	53	17	25	36,26	52	42	20	56	67	30,30,9,5,5,4	15,3
	Tree Height	45	35	25	40	29	40	48	65	52	40	46	50	35	25
	Canopy North	30	28	30	27	20	30	30	45	35	20	40	40	29	8
	Canopy West	28	29	25	26	18	32	36	40	35	25	31	32	21	11
	Canopy South	29	35	30	22	25	30	26	42	35	21	40	50	27	15
	Canopy East	32	28	18	30	18	21	32	45	45	5	43	36	21	14
Physical Condition	**Tree Declining**	X									X			X	X
	Broken/Dead Limbs														
	Sparse Foliage								X		X				X
	Excessive Chlorosis/Necrosis														
	Mainstem Dieback	X							X		X				X
	Poor Tip Growth														
	Cavity														
	Weak Crotch														
	Hollow Trunk														
	Trunk Exudation														
	Regrown Stump														
	Exfoliating Bark													X	
	Insect Damage														
	Diseased														
	Mistletoe														
	Leaning														
	Excessive Water Shoots														
	Surface Roots														
	Fire Damage														
Measures	**Safety Prune**				X			X				X		X	
	Remove Deadwood										X	X	X		X
	Cable/Brace														
Rating	**Vigor**	C	B	A	B	B	B	A	C	A	D	B	B	D	D
	Health	C	B	A	A	B	B	A	B	A	C	B	B	D	D
	Aesthetics	B	B	A	B	B	B	A	B	A	D	B	B	D	D
	Balance	A	B	A	C	A	B	B	A	A	D	A	A	C	C
Impact	**Removal**												X		
	Encroached								X	X				X	
	200ft from Grading	X	X	X	X	X	X	X			X	X			X
Comments							Located on toe of slope.								Excess water sprouts.

Key for Comments:
BH = Bee Hive in Tree
DE = Data Estimated
NA = Not Accessable
NT = Not Transplantable
NTg = Not Tagged
LHB = Low Horizontal Branching

Appendix A - Landmark Village Project Oak Tree Survey Data

	Tree Number	501	502	503	565	566	567	568	569	572	573	576	579	580	581
Tree Characteristics	**Species**														
	Coast Live Oak	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Valley Oak														
	Scrub Oak														
	McDonald's Oak														
	Heritage Oak			X	X										
	Trunk Diameter	9,5	12	41,27	45	29	35	14,15,17,10,5	32	12,12,14,34,22	7,6,5,5,6,5	6,6,5,4,4	15,3,3,1,4,4	7,5,4,4	8,6
	Tree Height	25	25	38	37	29	28	35	43	20	20	19	25	18	18
	Canopy North	12	15	32	22	23	22	29	33	16	8	12	12	10	8
	Canopy West	17	15	29	20	27	10	20	38	25	11	16	11	6	11
	Canopy South	18	16	33	30	20	25	26	40	27	16	18	12	12	10
	Canopy East	15	6	37	27	23	25	32	32	25	16	6	10	9	7
Physical Condition	**Tree Declining**				X		X								
	Broken/Dead Limbs														
	Sparse Foliage				X										
	Excessive Chlorosis/Necrosis														
	Mainstem Dieback				X		X								
	Poor Tip Growth														
	Cavity														
	Weak Crotch														
	Hollow Trunk														
	Trunk Exudation														
	Regrown Stump														
	Exfoliating Bark				X				X						
	Insect Damage														
	Diseased														
	Mistletoe														
	Leaning														
	Excessive Water Shoots														
	Surface Roots														
	Fire Damage														
Measures	**Safety Prune**														
	Remove Deadwood														
	Cable/Brace														
Rating	**Vigor**	A	B	B	D	B	D	B	B	C	A	B	C	A	B
	Health	A	B	B	D	B	D	A	B	C	A	A	C	A	A
	Aesthetics	A	B	B	D	B	C	B	B	B	A	C	B	A	B
	Balance	A	C	B	C	B	C	B	B	B	A	B	D	A	B
Impact	**Removal**														
	Encroached			X											
	200ft from Grading	X	X		X	X	X	X	X	X	X	X	X	X	X
Comments					Mistle toe.			Soil build up at base.				Multiple trunks.			

Key for Comments:
BH = Bee Hive in Tree
DE = Data Estimated
NA = Not Accessable
NT = Not Transplantable
NTg = Not Tagged
LHB = Low Horizontal Branching

Appendix A - Landmark Village Project Oak Tree Survey Data

	Tree Number	585	586	587	592	593	594	1587	1588	1589	1590	1591	1592	1594	1596
Tree Characteristics	**Species**														
	Coast Live Oak			X	X	X			X	X	X		X	X	X
	Valley Oak	X	X					X				X			
	Scrub Oak						X								
	McDonald's Oak														
	Heritage Oak	X													
	Trunk Diameter	32,42	31	12,6,7,7	21,14,10,7	18	7,7,5,5,4	16	25	31	25,20	10	13	12	11
	Tree Height	40	40	20	23	30	17	37	40	37	48	32	37	19	20
	Canopy North	0	30	10	35	21	13	17	27	17	27	1	24	8	15
	Canopy West	0	34	14	22	20	17	16	21	34	38	18	15	12	5
	Canopy South	0	35	12	17	20	16	19	23	36	14	16	23	14	6
	Canopy East	0	30	12	16	26	17	18	17	28	30	2	12	8	10
Physical Condition	**Tree Declining**	X													
	Broken/Dead Limbs														
	Sparse Foliage													X	X
	Excessive Chlorosis/Necrosis														
	Mainstem Dieback														
	Poor Tip Growth														
	Cavity														
	Weak Crotch														
	Hollow Trunk														
	Trunk Exudation														
	Regrown Stump														
	Exfoliating Bark														
	Insect Damage														
	Diseased														
	Mistletoe														
	Leaning				X										
	Excessive Water Shoots				X										
	Surface Roots		X												
	Fire Damage														
Measures	**Safety Prune**														
	Remove Deadwood														
	Cable/Brace														
Rating	**Vigor**	F	A	A	C	A	B	B	B	B	A	B	B	C	C
	Health	F	A	A	C	A	B	B	A	A	A	B	B	C	B
	Aesthetics	F	A	B	D	B	B	B	A	B	A	C	B	C	C
	Balance	F	B	A	D	B	B	B	B	B	B	C	B	C	C
Impact	**Removal**						X	X	X	X	X	X	X	X	X
	Encroached				X										
	200ft from Grading		X	X		X									
Comments		Permit not needed.													Located on slide.

Key for Comments:
BH = Bee Hive in Tree
DE = Data Estimated
NA = Not Accessable
NT = Not Transplantable
NTg = Not Tagged
LHB = Low Horizontal Branching

Appendix A - Landmark Village Project Oak Tree Survey Data

	Tree Number	1597	1598	1599	1600	1601	1602	1605	1606	1607	1608	1609	1610	1611	1612
Tree Characteristics	**Species**														
	Coast Live Oak		X	X	X	X	X	X	X	X	X	X	X	X	X
	Valley Oak	X													
	Scrub Oak														
	McDonald's Oak														
	Heritage Oak	X													
	Trunk Diameter	45	21	15,15	17,4,3	10,8	9,11	12	32	15	14	22	11,11	9	13,10
	Tree Height	55	25	32	33	26	35	40	45	32	42	40	30	21	23
	Canopy North	40	18	20	22	5	15	18	25	15	17	20	17	12	15
	Canopy West	35	16	15	24	15	19	16	27	18	15	25	18	13	11
	Canopy South	35	21	10	23	15	23	15	21	15	18	24	15	8	16
	Canopy East	35	16	10	26	8	14	15	23	16	15	23	17	10	12
Physical Condition	**Tree Declining**														
	Broken/Dead Limbs						X								
	Sparse Foliage		X												
	Excessive Chlorosis/Necrosis														
	Mainstem Dieback														
	Poor Tip Growth		X												
	Cavity				X		X								
	Weak Crotch														
	Hollow Trunk														
	Trunk Exudation														
	Regrown Stump														
	Exfoliating Bark														
	Insect Damage				X										
	Diseased														
	Mistletoe														
	Leaning														
	Excessive Water Shoots														
	Surface Roots		X												
	Fire Damage														
Measures	**Safety Prune**														
	Remove Deadwood														
	Cable/Brace														
Rating	**Vigor**	A	C	C	B	C	B	C	B	C	B	B	B	B	A
	Health	A	B	B	C	B	C	B	B	B	B	B	B	B	B
	Aesthetics	A	C	C	C	C	C	B	B	B	B	B	B	C	B
	Balance	A	C	B	B	C	C	B	A	B	B	B	B	B	B
Impact	**Removal**	X	X												
	Encroached							X							
	200ft from Grading			X	X	X	X		X	X	X	X	X	X	X
Comments			NT.						NT.					NT.	

Key for Comments:
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NTg = Not Tagged
LHB = Low Horizontal Branching

Appendix A - Landmark Village Project Oak Tree Survey Data

	Tree Number	1613	1614	1618	1620	1621	2251	2278	2279	2428	3073	4003	4007	4009	4016
Tree Characteristics	**Species**														
	Coast Live Oak	X	X	X	X	X	X	X	X	X	X	X	X	X	
	Valley Oak														
	Scrub Oak														X
	McDonald's Oak														
	Heritage Oak											X			
	Trunk Diameter	16,13,9,8	11,7	12	12	12	20,14	24	23	7.5	13	65,7,12,6	6,6,5,5,4	13	8,6,4,4,3
	Tree Height	30	27	21	40	30	37	40	37	20	30	22	23	25	16
	Canopy North	15	15	15	20	15	22	24	21	10	8	12	12	16	13
	Canopy West	15	20	10	22	10	23	28	29	12	14	30	12	16	19
	Canopy South	10	15	12	25	11	27	10	33	12	16	17	13	17	8
	Canopy East	12	16	10	22	15	17	25	30	4	12	12	11	17	5
Physical Condition	**Tree Declining**									X					
	Broken/Dead Limbs														
	Sparse Foliage									X					
	Excessive Chlorosis/Necrosis									X					
	Mainstem Dieback											X			
	Poor Tip Growth									X					
	Cavity														
	Weak Crotch														
	Hollow Trunk											X			
	Trunk Exudation														
	Regrown Stump											X			
	Exfoliating Bark														
	Insect Damage												X		
	Diseased														
	Mistletoe														
	Leaning														
	Excessive Water Shoots														
	Surface Roots														
	Fire Damage								X						
Measures	**Safety Prune**														
	Remove Deadwood														
	Cable/Brace														
Rating	**Vigor**	B	B	B	B	B	A	B	B	D	B	D	B	B	B
	Health	B	B	B	B	B	A	B	B	D	A	B	C	A	A
	Aesthetics	B	B	B	B	B	B	B	A	D	B	C	B	B	B
	Balance	B	B	B	B	B	B	B	B	B	B	C	B	B	B
Impact	**Removal**										X	X			X
	Encroached												X		
	200ft from Grading	X	X	X	X	X	X	X	X	X				X	
Comments			NT.	NT.	NT.	NT.	NT.					Main trunk is nearly dead.	Multiple trunks.		

Key for Comments:
BH = Bee Hive in Tree
DE = Data Estimated
NA = Not Accessable
NT = Not Transplantable
NTg = Not Tagged
LHB = Low Horizontal Branching

Appendix A - Landmark Village Project Oak Tree Survey Data

	Tree Number	4017	4018	4019	4021	4022	4025	4026	4027	4028	4029	4030	4031	4032	4033
Tree Characteristics	**Species**														
	Coast Live Oak		X	X	X	X	X	X	X	X	X	X	X	X	X
	Valley Oak														
	Scrub Oak	X													
	McDonald's Oak														
	Heritage Oak														
	Trunk Diameter	8,7,6,4,5	8	10,17	8	7,6,4	8	8	30	8	15,14	8	20	8	8
	Tree Height	16	23	40	18	25	20	16	40	15	28	20	30	20	16
	Canopy North	12	20	24	7	17	12	8	20	10	18	10	30	10	8
	Canopy West	9	13	14	5	11	12	11	20	10	20	11	20	10	12
	Canopy South	14	8	16	7	11	18	9	20	7	20	10	10	10	5
	Canopy East	12	13	20	10	17	10	8	20	10	16	12	20	5	4
Physical Condition	**Tree Declining**														
	Broken/Dead Limbs														
	Sparse Foliage														
	Excessive Chlorosis/Necrosis														
	Mainstem Dieback														
	Poor Tip Growth														
	Cavity														
	Weak Crotch														
	Hollow Trunk														
	Trunk Exudation														
	Regrown Stump														
	Exfoliating Bark														
	Insect Damage														
	Diseased														
	Mistletoe														
	Leaning												X		
	Excessive Water Shoots														
	Surface Roots			X					X						
	Fire Damage														
Measures	**Safety Prune**														
	Remove Deadwood														
	Cable/Brace														
Rating	**Vigor**	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	Health	B	B	B	B	B	B	B	B	B	A	C	B	B	B
	Aesthetics	B	B	B	C	B	B	B	B	B	B	B	B	B	B
	Balance	B	B	C	C	B	B	C	B	B	B	B	D	C	B
Impact	**Removal**	X	X	X		X	X	X	X	X					
	Encroached														
	200ft from Grading				X						X	X	X	X	X
Comments			Soil build up at base.				NT. NTg, NAc, DE	NT.	NT. NTg, NAc, DE		NT.	NT. NTg, NAc, DE	NT. NTg, NAc, DE	NT. NTg, NAc, DE	NT. NTg, NAc, DE

Key for Comments:
BH = Bee Hive in Tree
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NTg = Not Tagged
LHB = Low Horizontal Branching

Appendix A - Landmark Village Project Oak Tree Survey Data

	Tree Number	4034	4035	4036	4037	4055	4056	4057
Tree Characteristics	**Species**							
	Coast Live Oak	X	X	X	X		X	X
	Valley Oak							
	Scrub Oak					X		
	McDonald's Oak							
	Heritage Oak							
	Trunk Diameter	15, 10	22, 10	23	8	6,6	9,8,6,5	24
	Tree Height	40	40	36	20	20	28	18
	Canopy North	20	25	28	15	10	16	24
	Canopy West	22	30	25	10	15	15	21
	Canopy South	23	20	27	8	15	18	27
	Canopy East	25	10	26	10	14	14	22
Physical Condition	**Tree Declining**							
	Broken/Dead Limbs							
	Sparse Foliage							
	Excessive Chlorosis/Necrosis							
	Mainstem Dieback							
	Poor Tip Growth							
	Cavity							X
	Weak Crotch							
	Hollow Trunk							X
	Trunk Exudation							
	Regrown Stump							
	Exfoliating Bark							
	Insect Damage							
	Diseased							
	Mistletoe							
	Leaning							
	Excessive Water Shoots							
	Surface Roots						X	
	Fire Damage							X
Measures	**Safety Prune**							
	Remove Deadwood							
	Cable/Brace							
Rating	**Vigor**	B	B	B	B	A	B	C
	Health	B	B	B	B	A	B	C
	Aesthetics	B	B	B	B	B	B	B
	Balance	B	C	B	B	B	B	B
Impact	**Removal**					X	X	X
	Encroached							
	200ft from Grading	X	X	X	X			
Comments		NT. NTg, NAc, DE	NT. NTg, NAc, DE	NT. NTg, NAc, DE	NT. NTg, NAc, DE			

Key for Comments:
BH = Bee Hive in Tree
DE = Data Estimated
NA = Not Accessable
NT = Not Transplantable
NTg = Not Tagged
LHB = Low Horizontal Branching

APPENDIX B

Richard Johnson and Associates' Boxing Specifications and Recommendations

Richard Johnson & Associates
Environmental Horticulture

801 Glenneyre Street, Suite D, Laguna Beach, CA 92651
P.O. Box 127, Laguna Beach, CA 92652
Ph. (949) 497-4248 • Fx. (949) 497-6440

RJA

January 31, 2006

Mr. Glenn Adamick
NEWHALL LAND
23823 Valencia Blvd.
Valencia, CA 91355

RE: **Landmark Village Oak Tree Boxing Specifications and Recommendations**

Dear Mr. Adamick:

Below are the boxing specifications and recommendations you requested for use in the Landmark Village Oak Tree Report.

Phase 1- Pre-Boxing Procedure Recommendations

1. First and most importantly, any and all candidate trees will be treated with the biostimulant product **IRON ROOTs** at a blended ratio of one gallon of product to 100-gallons of water. Hydro-inject this mixture in increments of 25-gallons(100 gallons per tree) into the root zone on all sides (4-points of the compass) of each tree to be boxed. Implement this action as soon as possible so product can be absorbed prior to excavation, at least one month prior to any perceived construction impact.

2. Apply the anti-desiccant product *Cloudcover* or equal 48 hours prior to side boxing per label instructions.

3. It is also highly recommended that all trees to be relocated be pre-watered prior to side boxing and relocation. Unless weather conditions are favorable

with periods of moderate rainfall in the months leading up to relocation, trees should be pre-watered two to three times prior to excavation. The last application should be made 48 hours prior to side boxing. The water should be applied at a slow rate to facilitate soil infiltration to a depth of at least four (4) feet. Application of water can be made using a water truck and hose.

4. Prune by removing all deadwood. **Do not remove any live tissue/branches greater than 2-inches., without a permit from the Forester.**

Phase 2- Oak Tree Side Boxing and Bottom Boxing Recommendations

1. Excavate the root ball of each tree in a manner that accommodates as much of the roots as possible and so root ball fits snugly in a square box with sloping and/or tapered sides.

2. Construct a soil berm around the inside edge of the box sides with cross dams to direct water into root ball. Also construct a soil berm 1 foot outside the trunk to prevent excess water from contacting trunk base. It is recommended that the root ball surface within the excavation be disturbed as little as possible. **Do not excavate soil surface within the boxed root ball to create watering basins**. Soil from side boxing excavation should be used for watering basin berms. Do not cover native soil grade with fill soil.

3. Box sides shall be made of one or two layers of ¾-inch plywood, or planks, one to 2-inches thick and reinforced with exterior bracing.

4. Two of the sides will be wider than the others and will have cleats along the vertical edges to hold the other two sides in place. Insert steel rods through and between the cleats to hold the four sides securely against the root ball. The root ball can then be undercut and the boards can be inserted to form the box bottom.

5. An option to using the steel rods, if tree weight is not too heavy, is to use steel straps (banding). Three bands will be needed around the sides and three around the bottom to secure the box.

6. No sooner than ninety (90) days after the above detailed side boxing, undercut the root ball, similar to using the rods. Secure the bottom to the box by banding the box with a minimum of two straps – install straps from top around the bottom in two places. A total of five bands should be needed.

7. Water needs will be dictated by both visual inspection and data obtained via optional soil moisture sensor readings.

8. Root ball soil moisture must be monitored on a weekly basis during winter months and daily during hot summer months.

9. An irrigation system is recommended. Otherwise, boxed trees will have to be hand-watered, via irrigation hose. An irrigation system should include a series of bubbler heads, placed in each corner of each tree box, to ensure even distribution of water.

10. Once the boxed trees are placed in the holding area, apply a 3-inch layer of oak leaves or coarse mulch atop the root ball area.

11. <u>It is highly recommended that native soil from side box excavation be stored in a holding area to be used for backfill when replanting takes place.</u>

<u>Phase 3 - Planting Recommendations</u>

Rooting patterns are determined by soil characteristics and growing practices as well as by species. Urban planting sites can prove extremely harsh for newly transplanted trees. Hardscape, such as paving and buildings, can greatly increase air temperature and radiation intensity. These conditions can make it difficulty for tree root systems to supply enough water to adequately support their tops or crowns. Thinning of the top growth, to balance with the root system, is often necessary to assist native plant recovery. Frequent watering and sturdy anchor staking will be needed.

1. When trees are transplanted, place the root ball one foot above grade to allow for any settling. Form a slope from root ball surface to grade with backfill soil. This will also reduce drainage problems. Surface to drain away from root ball.

2. <u>Backfill tree with native surface soil from site or excavation soil saved from original tree boxing</u>**<u>. Do not use excavated soil from construction grading for backfill</u>**.

3. Avoid planting tree in soil that has been compacted for construction. If there is absolutely no other alternative and tree is to be planted in soil compacted for construction, tree will need supplemental drainage installed and a wider planting pit. Do not cover native soil grade with fill soil.

4. Planting pit should be at least 4 feet wider than the root ball. All inside surfaces of the planting pit should be scarified to avoid creation of soil interface.

5. Form a basin around the root ball with cross dams and keep the root zone area wet.

6. Form the basin at the outer root ball edge so irrigation waters will be forced to percolate into the soil interface with the root ball and backfill, not just through the root ball. This is important as the root ball will consist mostly of porous soil and the possibility of an interface problem can prove critical to oak tree survival.

Follow-up Maintenance for Planting & Boxed Oak Trees

The following recommendations are given for newly planted specimen oak trees.

1. **All** trees require a basin formed at outer edge of root ball.

2. Form a cross dam for each basin to control applied irrigation.

3. Apply a consistent 3-inch layer of coarse mulch atop root ball. Keep mulch away from trunk by 10 to 12-inches. Do not allow mulch to cover root crown.

4. Apply **first irrigation** with a solution of product **Mycorrhiza ROOTs** at a ratio of one-16-ounce bag of product to 100-gallons of water. Flood/thoroughly drench each tree basin root ball and root zone area with resulting mixture, or enough to penetrate and wet sides of root ball and native soil of each tree.

5. **Second irrigation** apply **IRONROOTs** product only at a ratio of 32-ounces of product to 100-gallons of water. Inject in 25-gallon increments at the four points of the compass in each tree basin, or flood basin with the same amount.

6. After three months apply the product **Mycorrhiza ROOTS** to the root zone area.

Positive drainage is a critical component if trees are to survive. Positive, quick drainage is a must to ensure that soil remains damp, and not wet with standing water.

Fill basin with water. If water does not drain within one hour consider drilling holes through the pit bottom into native soil to a depth of 3-feet. Auger size should be no less than 2-inches in diameter. Backfill augered holes with ¾" crushed rock. Do not use pea gravel.
If you have any questions please, do not hesitate to give us a call.

RICHARD JOHNSON & ASSOCIATES, INC.

Dick Johnson
Resource Monitor

Please refer to map No. 4.4-A in the accompanying map box.

Please refer to map No. 4.4-B in the accompanying map box.

Please refer to map No. 4.4-C in the accompanying map box.

Please refer to map No. 4.4-D in the accompanying map box.

Results of Focused Surveys for Unarmored Threespine Stickleback and Other Special-Status Fish Species

Results of Focused Surveys for Unarmored Threespine Stickleback and Other Special-Status Fish Species; Natural River Management Plan Area Valencia, California

Prepared for:

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June 2003

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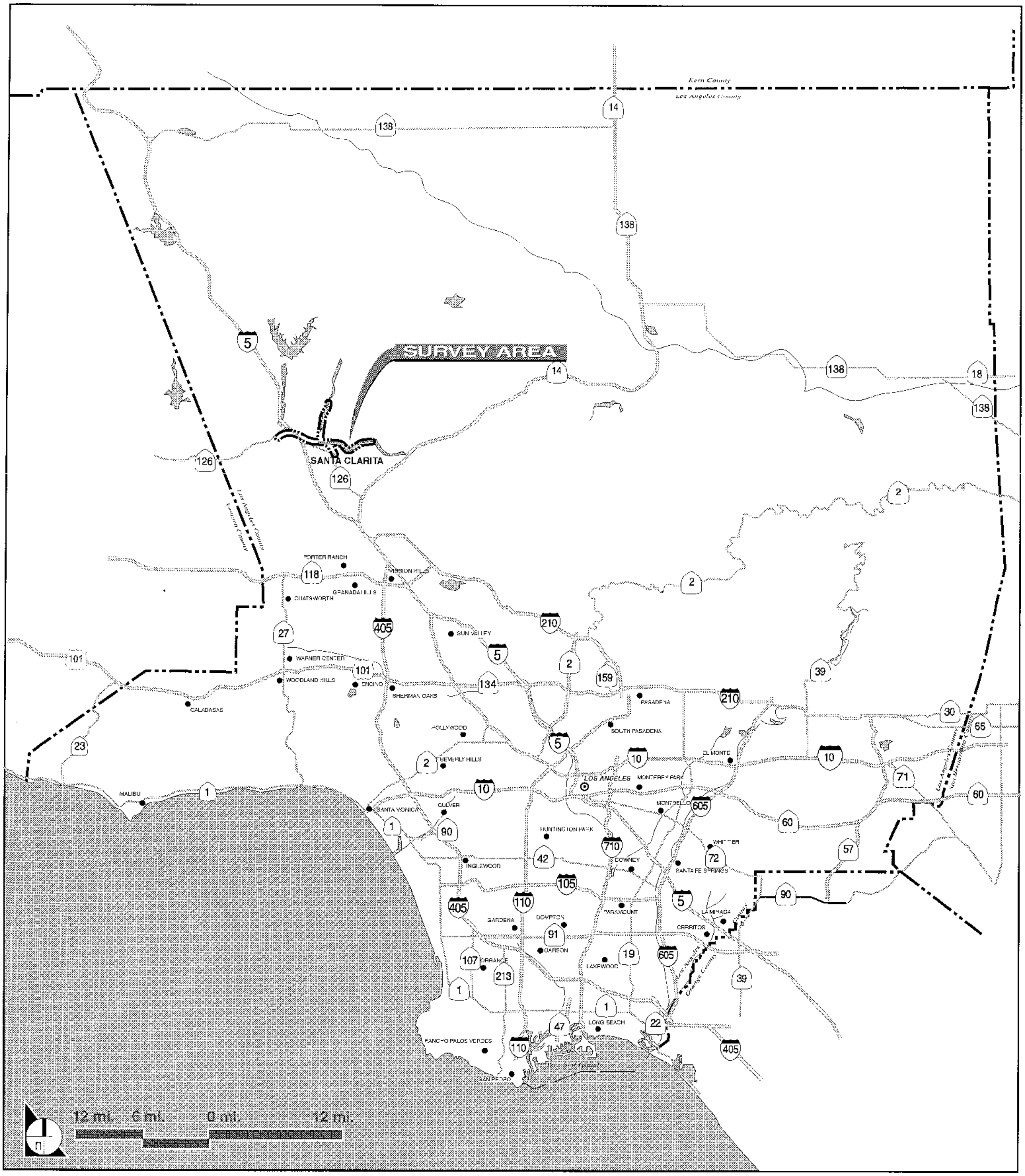
Results of Focused Surveys for Unarmored Threespine Stickleback and Special-Status Fish Species Newhall Ranch Valencia, California

The following presents the findings of focused protocol surveys that were conducted from March through June, 2002 to determine the presence/absence of the federally- and state-listed Endangered unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*) (herein UTS) in portions of the Santa Clara River in Los Angeles County that are incorporated within and upstream of the Natural River Management Plan area. This report is intended to provide project specific biological information to Newhall Ranch Company, US Army Corps of Engineers (ACOE), US Fish and Wildlife Service (USFWS), and California Department of Fish and Game (DFG) regarding results of focused surveys for unarmored threespine stickleback and additional special-status fish species including arroyo chub (*Gila orcutti*) and Santa Ana sucker (*Catastomus santaanae*) identified within the subject survey reaches.

INTRODUCTION

The survey area is located in northwestern Los Angeles County (**Figure 1**), within the Newhall, California US Geological Survey (USGS) 7.5-Minute Quadrangle Map, All sample sites selected were within potentially suitable habitats in portions of the Santa Clara River from near its confluence with Castaic Creek, east (upstream) approximately 7.2 miles. The survey effort also included approximately 2.5 miles of tributary drainages including San Francisquito Creek from its confluence with the Santa Clara River, north to the Copper Hill Bridge; the South Fork Santa Clara River from its confluence with the Santa Clara River, southeast to the Saugus Ventura Road Bridge crossing; and Bouquet Canyon Creek from its confluence with the Santa Clara River, northeast to the Newhall Road Bridge crossing. The primary purpose of these surveys was to determine current distribution of the UTS and to differentiate specific habitat characteristics being utilized by UTS within the portions of the Santa Clara River watershed included in the Natural River Management Plan area, as well as additional drainage areas on land owned by The Newhall Land and Farming Company. The secondary purpose was to determine the presence and current distribution of other special-status fish species including the Santa Ana sucker and the Arroyo chub.



NEWHALL RANCH
SPECIFIC PLAN
Prepared For: Newhall Ranch Company

Figure 1
REGIONAL LOCATION

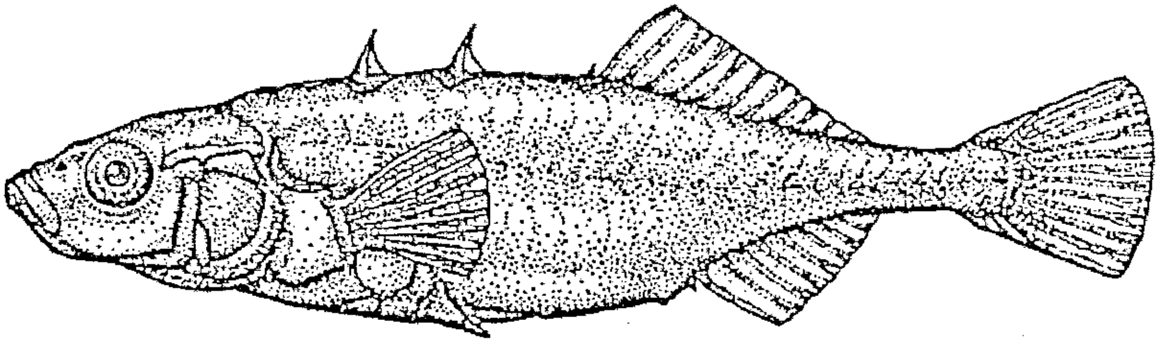
General UTS Background

Sticklebacks are a small (rarely exceeding 2.4 inches) streamline fish with two isolated dorsal spines, with a third, smaller spine at the front edge of the soft-rayed portion of the dorsal fin (USFWS 1985). Additional distinctive features include the unusual pelvic girdle that includes a spine on both sides, and the bright nuptial coloration of the male. The male stickleback builds a nest of fine plant debris and algal strands where it courts females that enter its territory. Several females may deposit eggs in a single nest. The males care for and protect the eggs and young. Sticklebacks are apparently an annual species, surviving for only one year (USFWS 1985), though some local scientists believe some individuals may live more than one year.

Three morphologically distinct subspecies of threespine stickleback (*Gasterosteus aculatus*) occur in California. Two of these, the semi-armored (*G. a. microcephalus*) and the subject unarmored subspecies (*G. a. williamsoni*) occur in the Santa Clara River system. The number of, or absence of, bony lateral plates is the primary characteristic in differentiating the subspecies. The fully armored subspecies (*G. a. aculeatus*) typically has a row of bony plates that extends the full length of both sides of its lateral surface from above the gill plate to the base of the caudal fin. Lateral plates on the semi-armored subspecies do not extend the full length and are limited to the anterior portion of the body. **Figure 2** provides an illustration of the three subspecific morphological characteristics.

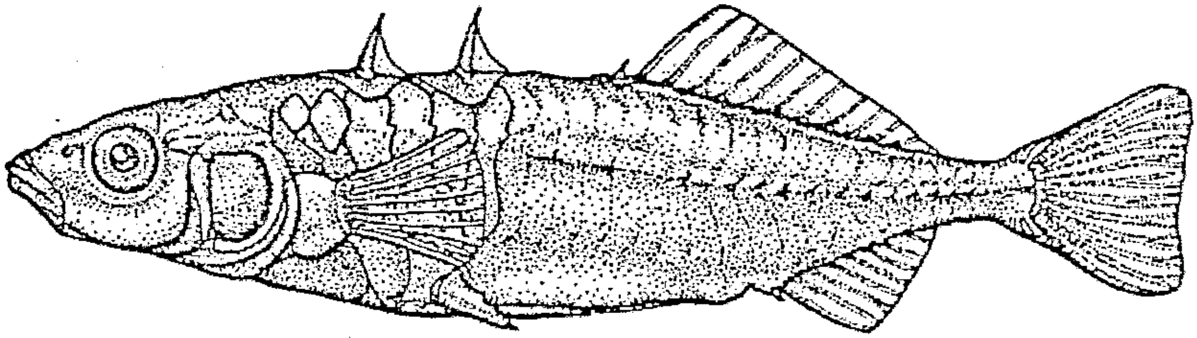
Regional distribution of UTS is thought to have originally included the headwaters of the Santa Clara River, and low gradient portions of the Santa Ana, San Gabriel, and Los Angeles Rivers (USFWS 1985). The latter three populations are now extinct and it is now generally accepted that distribution of the remaining naturally occurring UTS population is limited to the Santa Clara River, east (upstream) and including the juncture with San Martinez Grande Canyon. The USFWS 1985 Revised Recovery Plan also includes a population in the San Antonio Creek drainage in Santa Barbara County and was considering a population in Shay Creek, San Bernardino County. All of these populations are protected by the federal listing. However, more recent genetic data suggest these and another population later discovered in the Baldwin Lake basin are not UTS (Haglund 1988).

The UTS was listed as an Endangered species by the USFWS in October 1970 (35 Federal Register 16047) and by the State of California in June 1971. A federal Recovery Plan was initially prepared by USFWS in 1977 and a Revised Recovery Plan was prepared in December 1985. Critical habitat was proposed in 1980. However, in September 2002, the USFWS determined that the proposed designation of critical habitat should not be made (67 Federal Register 58580).



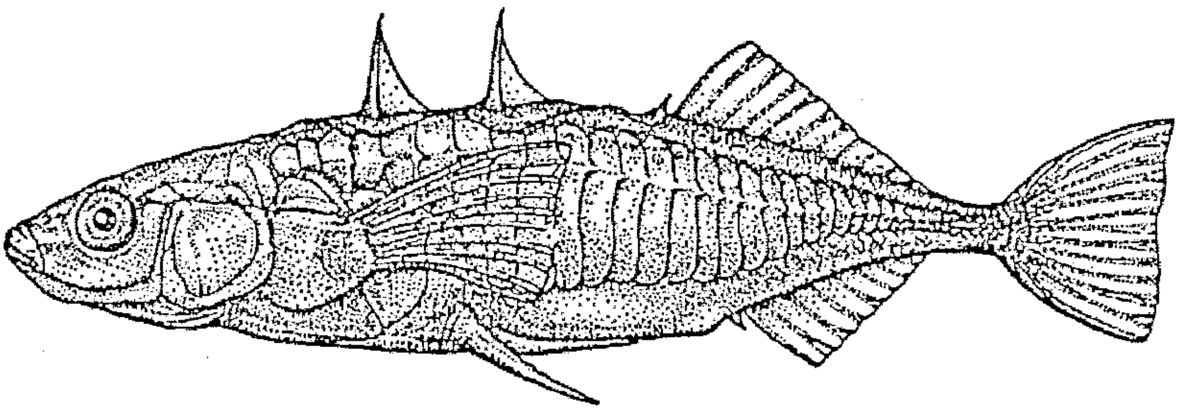
G. a. williamsoni

1 CM



G. a. microcephalus

1 CM



G. a. aculeatus

1 CM

Source Haglund, 1989

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Figure 2

SUBSPECIFIC MORPHOLOGICAL CHARACTERISTICS

JUNE 2003

Overview of UTS Habitat Characteristics

Breeding, and newly hatched young occur in clean water, along shallow stream edges or braids in dense vegetation, where they are protected from being washed away in the stream current. In these areas the water temperatures are typically warmer, which is thought to increase the speed of development of the young. Larger juveniles and sub-adults (less than 0.8 inches) are also usually observed in the protection of dense vegetation, in slow moving or standing water (USFWS 1985).

Adults have been found in a variety of habitats throughout the stream, but tend to occur most frequently in areas of slow or standing water. When occurring in the main stream channel, they tend to seek shelter behind obstructions and under vegetation (USFWS 1985).

Essential Habitat Designation

Essential habitat is not specifically defined in the Recovery Plan for the species. However, it is stated that the designated Essential Habitat coincides with the areas proposed by the USFWS as Critical Habitat (45 Federal Register 76012-76015). In this proposal Critical Habitat is defined as: (1) the specific areas within the geographic area occupied by a species, at the time it is listed in accordance with the Endangered Species Act of 1973 as amended, on which are found those physical or biological features (a) essential to the conservation of the species and (b) that may require special management considerations or protection; and (2) specific areas outside the geographic area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. "Conservation" means the use of all methods and procedures that are necessary to bring an endangered or a threatened species to the point at which listing under the Act is no longer necessary (USFWS, 2001).

Critical Habitat was initially proposed for UTS in 1980. However, as a result of a lawsuit by the Center for Biological Diversity in January 2002, USFWS was forced to evaluate whether or not to designate Critical Habitat for the UTS and reached a finding that the designation should not be made (67 Federal Register 58580). In 1985, the USFWS prepared a Revised Recovery Plan identifying three Essential Habitat zones within the Santa Clara River watershed (**Figure 3**). They are described in the Revised Recovery Plan (USFWS 1985) as follows:

1. Del Valle Zone. An area of land and water with the following components (San Bernardino meridian): Santa Clara River within T4N, R16W and R17W, beginning at its confluence with San Martinez Grande Canyon, at a point 0.9 of a mile (1.5

kilometers) southwest of Del Valle settlement, and extending upstream approximately 5.6 miles (8.8 kilometers) to the Interstate Highway 5 Bridge.

2. San Francisquito Creek Zone. An area of land and water with the following components (San Bernardino meridian): San Francisquito Canyon watercourse, within T5N, R16W and T6N, R15W, beginning at a point where the Angeles National Forest boundary intersects the San Francisquito Canyon watercourse approximately 2.5 miles southwest of San Francisquito Powerhouse No. 2, and extending upstream in San Francisquito Canyon approximately 8.4 miles (13.5 kilometers) to San Francisquito Powerhouse No. 1, near its junction with Clearwater Canyon.

3. Soledad Canyon Zone. An area of land and water in Los Angeles County, with the following components (San Bernardino meridian): Santa Clara River within T4N, R13W, and R14W, beginning at a point 1.4 miles (2.3 kilometers) upstream in Soledad Canyon from the community of Lang, at the downstream end of the area called River's End Park, at 34° 26′ 7″ N, 118° 21′ 51″ W, thence extending upstream approximately 8.5 miles (13.7 kilometers) to its confluence with Arrastre Canyon, at a point located about 0.6 of a mile (1 kilometer) southwest of Los Angeles County Rehabilitation Camp, thence upstream in Arrastre Canyon approximately 0.8 of a mile (1.4 kilometers) to 34° 26′ 7″ N, 118° 11′ 51″ W.

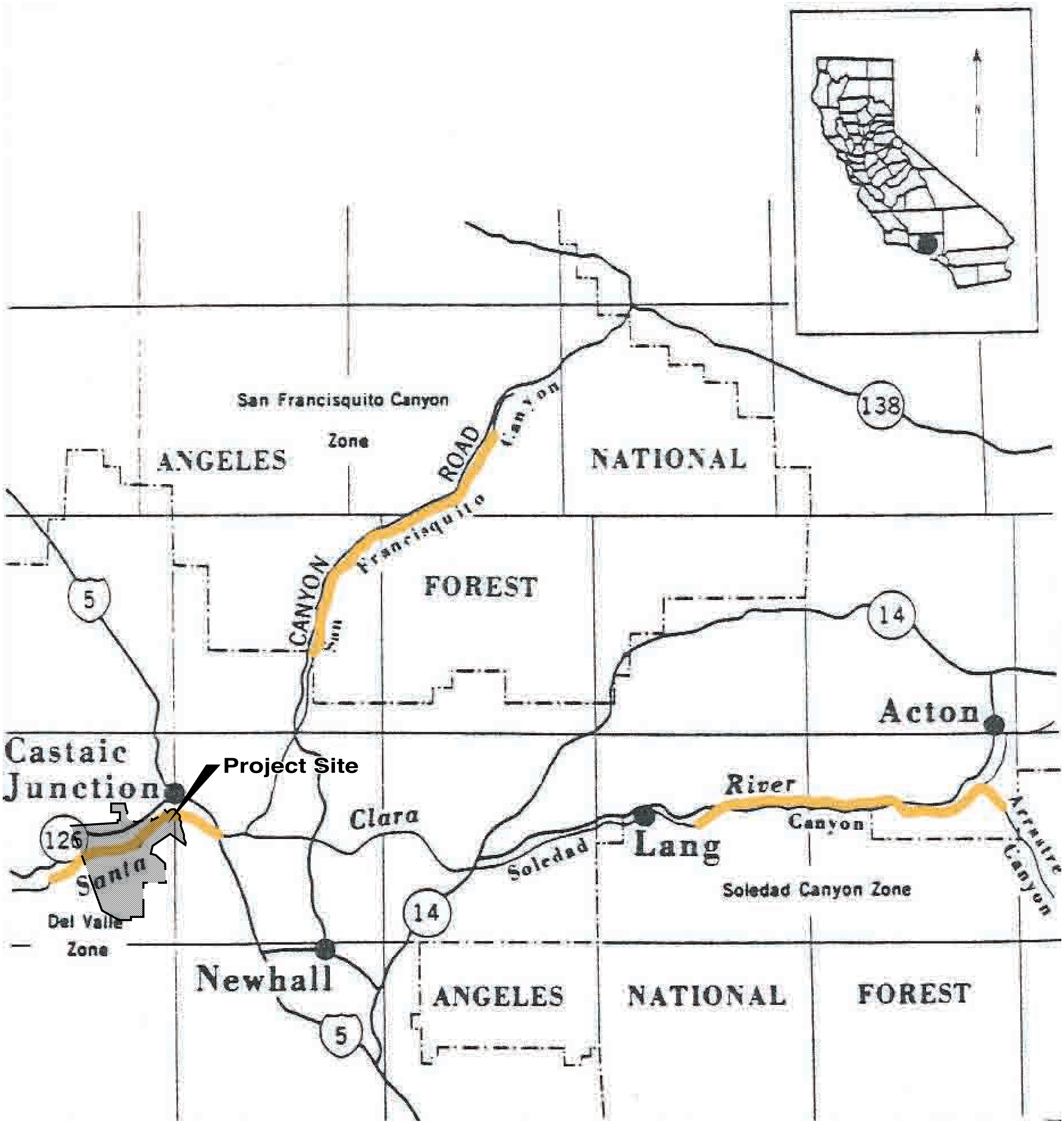
Criteria used by USFWS to select Critical Habitat, and thus Essential Habitat, include evaluation of an area to determine the presence of primary constituent elements. These elements include physical and biological features that are essential to the conservation of the species, and that may require special management and protection (USFWS 1980). Primary constituent elements for UTS include specific quantity and quality of water and isolation from predators. These elements are specifically outlined in the Proposed Rule (USFWS 1980) and include:

- Permanent Stream Flow. Remaining streams utilized by this fish have low discharge rates, so that relatively minor modifications of ground water levels or channel characteristics could result in elimination of all fishes by desiccation.

- Slow Current. Sticklebacks favor shallow water with slow to moderate current, and probably can not reproduce effectively in deep, swift or completely still water.

- Low Turbidity and Pollution. Sticklebacks strongly favor clear water, seldom or never being found in turbid water conditions. Specific pollution susceptibilities have not yet been established, but water quality has been found to be high where populations have persisted, and they have disappeared from streams with reduced water quality.

- Isolation. Survival and genetic integrity evidently depend on the absence of large aquatic predators, certain potential competitors, and all other subspecies of sticklebacks. The latter are not particularly strong swimmers, and apparently do not move upstream during times of high water. They are excluded from the designated areas at other times by natural barriers in certain segments of the watercourse. These barriers should not be modified or bypassed.



ESSENTIAL HABITAT

Source UTS Recovery Plan, 1985

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Figure 3
ESSENTIAL HABITAT ZONES

JUNE 2003

It should be noted that, as with most fish species, UTS are not distributed uniformly throughout the Santa Clara River, and that breeding habitats are patchily distributed. The nature of breeding habitats is dynamic and may shift in structure and specific location from year to year depending upon seasonal rainfall and storm cycles. However, most of the breeding habitats identified over the past several years of study have been concentrated in the same general areas and support the same general habitat conditions.

It is expected that the perennial source of tertiary treated effluent discharged from Water Reclamation Plants (WRP) 32 and 26 contribute to provide more persistent breeding and nursery habitats than occurred naturally in areas located downstream from these locations. The discharge is relatively consistent in temperature and average velocity. Larger storm events are still expected to significantly alter breeding and nursery areas in the short term, but the regular release of water from the WRPs likely allows for extended breeding throughout the otherwise dry summer months.

General Santa Ana Sucker Background

Santa Ana suckers are endemic to drainages of the Los Angeles Basin including the Los Angeles, San Gabriel, and Santa Ana Rivers. This is the smallest sucker species in California, rarely reaching lengths greater than six inches (McGinnis 1984). They primarily feed on algae, detritus, and diatoms and have indicated intolerance for polluted or highly modified streams. Spawning generally occurs from April through early July and peaks in late May to early June. From 4,400 to over 16,000 eggs may be laid by a single female over gravel substrate. Santa Ana suckers are relatively short-lived, rarely surviving beyond their second year (Haglund and Baskin 1995). Like the UTS, Santa Ana suckers have evolved in drainages that often dry to small scattered pools in the dry summers; tolerant of warm water and low oxygen levels.

This species occurs in a variety of habitats within small to medium-sized (less than 22 feet wide) perennial stream channels with gravelly to rocky substrates. They are found in depths ranging from a few inches to over three feet and occur in variable flows from slow to swift (Moyle et al. 1995). Santa Ana suckers are typically found in clear water, but can tolerate periods of increased turbidity.

The Santa Ana sucker was listed by the USFWS as a threatened species on May 12, 2000. However, as this species is considered to be introduced in the Santa Clara River watershed, the population here is specifically excluded from the federal threatened status. Santa Ana suckers are considered by CDFG to be Species of Special Concern. CDFG does not differentiate Santa Ana Suckers occurring in the Santa

Clara River from other populations. This species was considered to be abundant as recently as 1970, but has since significantly declined in most of its native drainages (Moyle et al. 1995).

General Arroyo Chub Background

According to Moyle (1995) arroyo chubs are native to the Los Angeles, San Gabriel, San Luis Rey, Santa Ana, and Santa Margarita rivers, as well as, Malibu and San Juan Creeks. They have also been introduced into a number of drainages, extending their current range north to Chorro Creek in San Luis Obispo County. The population in the Santa Clara River, including the study reach, is also considered an introduced population.

The arroyo chub is relatively small, with adults averaging five inches in length. They are known to spawn primarily during March and April, though some may breed into July (Haglund and Baskin 1995). Spawning typically occurs in slow pools with aquatic vegetation. Some arroyo chubs have been determined to be over 4 years old, but breeding begins after the first year. After the second year, females are generally larger than males (Haglund and Baskin 1995). An omnivorous species, the arroyo chub feeds on algae, insects, and small crustaceans. They are believed to obtain much of their nutrition from the organisms associated with the aquatic plants (Haglund and Baskin 1995). Like the other two fish species discussed, the arroyo chub has evolved to tolerate high temperatures and hypoxic conditions that occur in the dry summers.

Habitat requirements are described by Moyle (1995) as slow-moving or backwater sections of warm to cool streams with mud or sand substrates. Within the survey reach, chubs were the most abundant species present and were detected in a variety of microhabitat conditions and flows, including open swift flowing portions of the channel.

The arroyo chub is not listed by either federal or state regulatory agencies, but is considered a Species of Special Concern by CDFG due to its declining status in its native drainages. The special concern status does not distinguish between native and introduced populations.

METHODOLOGY

Previous Studies In and Near the Newhall Ranch Project Area

Documentation pertinent to the biological resources in the vicinity of the site was reviewed and analyzed. Information reviewed included: (1) the Revised Recovery Plan for the unarmored threespine stickleback; (2) literature pertaining to habitat requirements of sensitive species potentially occurring on the project site; (3) the California Natural Diversity Data Base (CNDDB 2002) information regarding special-status species potentially occurring on the project site for the Newhall and Val Verde USGS 7.5-Minute Quadrangle Maps, and (4) previous surveys for aquatic resources in the Newhall Ranch Specific Plan area and vicinity.

The following are sources that provide information regarding special-status fish distribution within and/or in the near vicinity of the study reach. Each of these sources has identified UTS, Santa Ana sucker and arroyo chub as occurring in and near portions of the respective study areas. The general consensus of distribution for UTS in the Santa Clara River includes all areas supporting surface water east (upstream) of the Ventura/Los Angeles County line near San Martinez Grande Canyon.

- U.S. Fish and Wildlife Service. <u>Recovery Plan</u> (revised); <u>Unarmored Threespine Stickleback</u>. Revision approved December 26, 1985. The first description of the unarmored subspecies was by Girard in 1854 from a specimen collected in Soledad Canyon. Distribution of UTS in the Santa Clara River is described as "…the headwaters of the Santa Clara River and its tributaries, in northern Los Angeles County.

- Aquatic Consulting Services, Inc.; July 2002. <u>Aquatic Surveys Along the Santa Clara River; Part IV: Ventura County Line to Las Brisas Bridge, Ventura County, California</u> – Protocol surveys for special status fish species during 2001. Three of 49 sampling locations identified stickleback as being present. All three were within 1.3 miles of the County boundary. None of the sample data indicated the total number of individuals collected and two of the three sample sites indicated sticklebacks were represented as fry or juveniles.

- Aquatic Consulting Services, Inc.; June 2002. <u>Aquatic Surveys Along the Santa Clara River: Part III: West of Commerce Center Bridge to the Ventura County Line, California</u> – Protocol surveys for special status fish species during 2001. Seven of the 56 locations sampled included UTS. None of the sample data indicated the total number of individuals collected and some of the sample sites indicated sticklebacks were represented as juveniles.

- Thomas Haglund and Jonathan Baskin, 2000. <u>Fish and Wildlife Survey and Habitat Assessment of the Santa Clara River at Interstate 5</u> – This project was conducted for the California Department of Transportation for replacement of the Interstate 5 Bridge where it crosses the Santa Clara River. This study included focused special-status fish surveys. Several sites were sampled within 500 meters upstream and downstream of the bridge using a 1/8 inch mesh seine. Arroyo chub, UTS and Santa Ana sucker were detected throughout the survey reach. Large numbers of fry of all threes species were detected and suggest breeding by all three species was occurring in that vicinity in 2000. Identification of UTS was made by morphological characteristics, primarily plate counts.

- Thomas Haglund and Jonathan Baskin; December 1995. <u>Final Report; Sensitive Aquatic Species Survey, Santa Clara River and San Francisquito Creek, Newhall Land and Farming Company Property, Los Angeles County, California</u> – Survey results indicated UTS were "continuously distributed from Bouquet Canyon Road Bridge downstream to the confluence of Castaic Creek". Positive subspecific identification was made through horizontal starch gel electrophoresis.

- Thomas Haglund, 1989. <u>Current Status of the Unarmored Threespine Stickleback (Gasterosteus aculeatus williamsoni) along portions of the Santa Clara River Drainage</u> – The project reach for this report included the Santa Clara River from near the confluence with Castaic Creek upstream to near Saugus; Castaic Creek from Interstate 5, downstream to SR 126; and the downstream portion of San Francisquito Creek outside the National Forest. Identification methodology included characterization of lateral plate counts and then identification was further verified utilizing electrophoretic methods. The report concluded that stickleback were absent from lower San Francisquito Creek and were rare in Castaic Creek. Distribution of sticklebacks was patchy along the study reach within the Santa Clara River. The report further determined that the sticklebacks sampled throughout the reach were the unarmored *G. a. williamsoni*.

- Impact Sciences, Inc. 2003. Results of Focused Surveys For Unarmored Threespine Stickleback and Other Special-Status Fish Species; Newhall Ranch, Valencia, California – This report covered survey results conducted in the Santa Clara River from the Las Brisas Bridge crossing in Ventura County, east (upstream) to the Castaic Creek Confluence. Identification of UTS was accomplished by lateral plate counts. Results of the survey indicated scattered, but regular distribution of UTS east of San Martinez Grande crossing. A few individuals appearing to be UTS, based solely on lateral plate counts, occurred downstream of San Martinez Grande crossing.

Survey Scope and Methods

Though there are no specific survey protocol for sampling UTS, USFWS developed particular criteria to determine sub-specific identification when surveying for sticklebacks. The criteria state "*G. a. williamsoni* are readily distinguished from the other two subspecies on the basis of lateral plate counts alone, provided that at least 25 morphologically mature specimens (i.e., individuals of at least 32mm in standard length [SL], Bell [1981]) are available. Samples of *G. a. williamsoni* generally average 0.06 to 0.55 lateral plates per individual and *G. a. microcephalus* average more than six lateral plates per individual (Bell 1976b)." Plate counts referred to include total number occurring on both sides of the body.

As previously discussed, it is generally accepted by USFWS and UTS experts that sticklebacks occurring east (upstream) of San Martinez Grande Canyon, near the Los Angeles/Ventura County boundary, are the endangered unarmored subspecies. Impact Sciences performed focused surveys for UTS between March 27 and June 15, 2002. Surveys were conducted by Mr. Dave Crawford under the authority of his individual USFWS Section 10(a)(1)(A) Endangered Species Recovery permits.

The purpose of the survey effort was to determine presence/absence, and if present the current distribution of UTS and other special-status fish species within the Natural River Management Plan area. In order to minimize impacts to the species, whenever UTS were detected, an effort was made to collect no more than 25 individuals for subspecific identification purposes. If 25 individual UTS were collected, no further sampling was to be conducted at that survey location. All fish collected during the survey effort were released immediately following identification. No UTS or other special-status fish species were lost during the survey effort.

Sampling was conducted utilizing a 15x5-foot 1/8-inch mesh seine and a small hand net. Most locations observed within the survey reach that supported typically suitable habitat were sampled. However, additional survey sites were also sampled such that representative locations of all habitat types present in the survey reach were included. A total of 48 survey locations were sampled within the survey reach covered in this study (**Figure 4**). At each sample site, the location was recorded utilizing a GPS unit (with sub-meter accuracy), the stream was sampled for fish and general habitat characteristics were recorded. All fish were identified, as were any other special-status aquatic wildlife species observed. In addition to fish sampling, the survey effort included an analysis of habitat types being utilized by UTS.

SURVEY RESULTS

During some of the survey efforts, there was a higher than average volume of water flowing at a relatively high velocity compared to typical summer season flows. The focus species of this survey, particularly sticklebacks, tend to avoid areas of high velocity flows. Additionally, areas of high flow rates combined with a high volume of water affects the efficiency of the seining efforts with small mesh nets as the weighted line is often lifted from the bottom of the stream, permitting escape of trapped fish. As such, the higher flow rates may have some affect on the data, and therefore, on the perceived distribution of special-status fish species occurring in the survey area.

Several portions of the survey reach were dry at the time of the surveys. These areas are also illustrated in **Figure 4**. Each of these areas was walked to determine if there were isolated pools potentially supporting fish. There were no such pools discovered in any of the indicated dry stretches of streambed.

Unarmored threespine stickleback and Arroyo chub were recorded in multiple locations within remaining flowing channels of the survey area. One sample site recorded the presence of Santa Ana sucker.

Out of the total 48 sample locations, 21 locations recorded the presence of one or more UTS. Both adults and subadults were recorded in most of the locations where the species was detected. Numerous individuals, including early stage juveniles, were recorded in two general areas including the marshy area north of the main channel at Castaic Junction and the confluence of San Francisquito Creek. Their presence combined with the occurrence of relatively ideal habitat conditions at those areas suggest these may be important breeding and/or nursery areas.

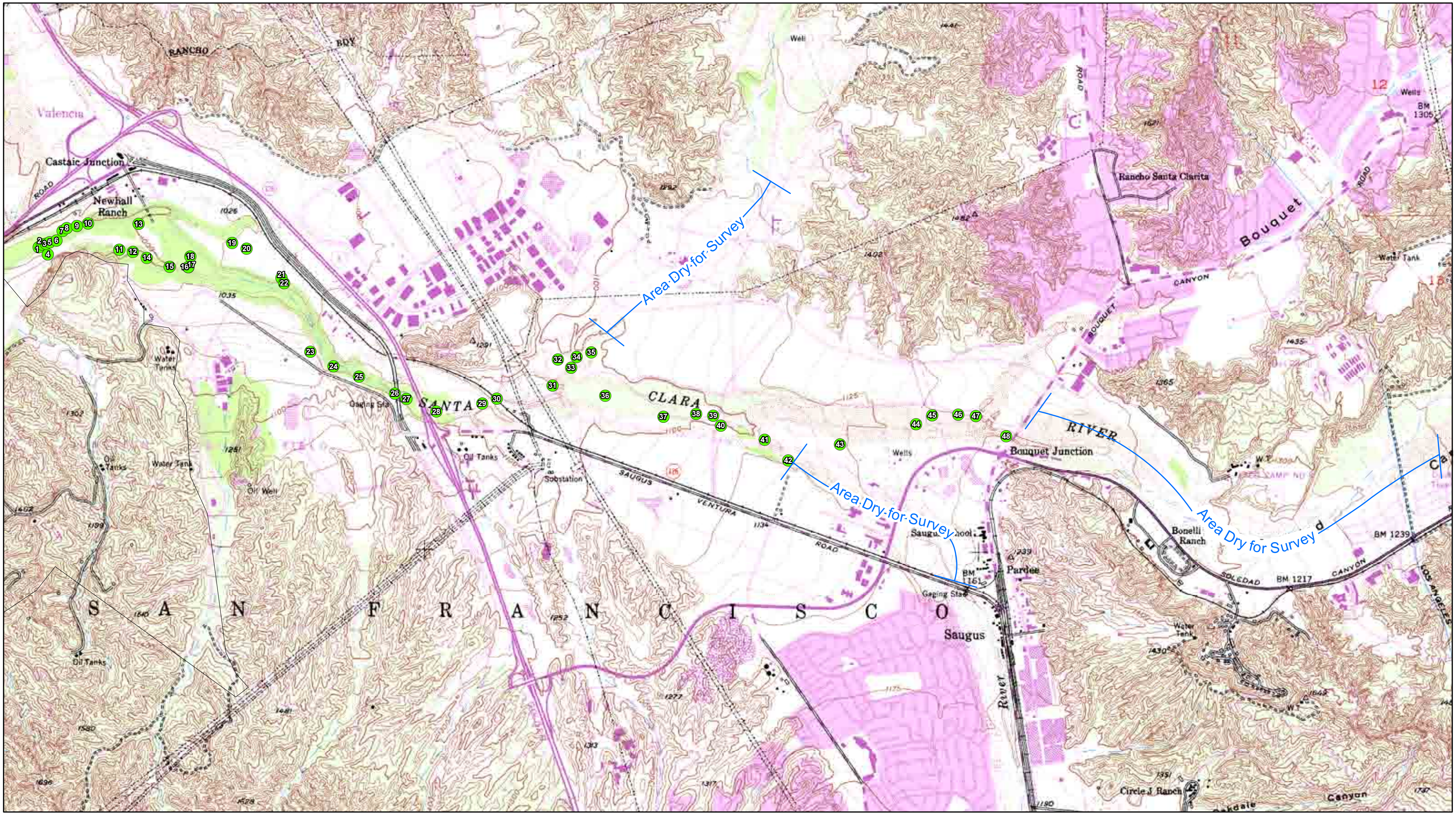

FIGURE 4

SURVEY REACH

All sticklebacks captured and recorded had one or less lateral plates. Several of the locations yielded 25 or more individuals, confirming the conclusion that these were the endangered unarmored subspecies *G. williamsoni*. The plate counts from this and previous studies in this area, and electrophoresis data previously recorded from these areas, suggest all of the UTS recorded in this survey reach were also of the endangered subspecies.

Santa Ana suckers were identified at only one location. Two single adults were observed at sample station 24. This species has been identified in the survey reach covered by this study previously. As two individuals were identified, and the survey methodology for this study only included a single sampling at any one given point, it is reasonable to assume that Santa Ana suckers still periodically occur throughout the study reach.

Arroyo chub were abundant throughout the reach. They were observed at nearly half of the sample locations, and they occurred in large numbers at most of those locations. All age classes were recorded suggesting that spawning likely occurs throughout both of the survey reaches.

Additional fish species recorded in this survey include prickly sculpin (*Cottus asper*), mosquitofish (*Gambusia affinis*), sailfin molly (*Poecilia latipinna*), goldfish (*Carassius auratus*), and largemouth bass (*Micropterus salmoides*). The latter three species were all recorded at station 48, in the pool created by runoff outfall. None of these species are considered native to the Santa Clara River watershed. Largemouth bass is a predatory fish that may significantly affect native fish populations where it occurs.

Appendix A provides a summary of data collected for each sample site including the recorded GPS coordinates, a brief description of the habitat(s), the species of fish collected, and any other pertinent and incidental recorded observances.

Habitat Evaluation Summary

Nearly all of the Santa Clara River within the Natural River Management Plan area, east (upstream) of the Castaic Creek confluence is considered by regulatory agencies and fisheries biologists to be of relatively high quality for UTS as this species has been identified throughout this reach and because most or all of the primary constituent elements for UTS habitat are present. Results of the surveys reported herein confirm the presence of UTS in scattered locations throughout the survey reach and generally support previous data.

As discussed the habitat evaluation was conducted concurrently with the presence/absence surveys within the survey reach with the goal of identifying specific important breeding and nursery areas, and any other habitats where UTS appeared to occur in concentrated numbers. The data suggest there were two areas within the Natural River Management Plan survey reach that may be of particular importance as breeding and/or nursery areas. These include the marshy areas north of the primary channel at Castaic Junction and the San Francisquito Creek confluence area.

In both areas, habitat conditions are relatively similar in that each support very dense riparian woodlands providing relatively constant shade over shallow, slow moving, marshy areas. In the majority of locations where juvenile UTS were located, there were submergent filamentous algae, emergent vegetation, or both. Juveniles were rarely found where the combined submergent and emergent vegetation covered more than 50 percent of a channel or pool.

CONCLUSION/DISCUSSION

Special status fish species including UTS, Santa Ana sucker, and arroyo chub were identified within several areas of the survey reach that supported surface water. The data further indicate that there are currently two areas of important breeding and grow-out habitat for UTS. Additionally, the presence of several arroyo chubs suggest that habitats and conditions within the surveyed areas continue to be of suitable quality to support reproducing populations of this special-status species. Although only two Santa Ana suckers were identified during the survey effort, it is expected that they still periodically occur as well.

Although the populations of Santa Ana sucker and arroyo chub in the Santa Clara River watershed are considered to be introduced, their presence and persistence here is important as many of the drainages to which they are native, continue to be impacted by urbanization. As such, the Santa Clara River populations may one day serve as an important genetic base for the continued survival of these species if remaining native populations continue to decline elsewhere.

The presence of Santa Ana sucker and arroyo chub does not appear to negatively affect the persistence of UTS where they occur together. Because all three have similar habitat requirements, the management and protection of UTS will likely benefit Santa Ana sucker and arroyo chub.

Management and protection of UTS should continue and should include measures to preserve and protect all of the primary constituent elements. Permanent stream flow is facilitated in the subject survey area by releases of tertiary treated water from the WRP No. 32 near Castaic Junction and WRP No. 26

further upstream (adjacent to Bouquet Canyon Road Bridge). Past and recent survey data suggest that this perennial effect may facilitate year-round breeding and a greater amount of dispersal habitat for young downstream of these releases. As the releases are intermittent, some areas of slow current are maintained, turbidity is minimized and the treatment process of the water appears to satisfactorily limit pollution. Additional measures to limit the influx of pollutants into the river should continue to be part of the design and environmental review process for future development projects along the river. Further, it will be important to ensure existing natural barriers of genetic transfer are maintained such that the semi-armored subspecies of stickleback is not permitted to breed with the unarmored population.

Of particular importance is the protection of the two identified breeding/nursery areas. It will be important to consider these areas when designing any future bank stabilizations or channel improvements. Specifically, it will be important to maintain shallow, slow-moving marshy areas and the associated riparian woodland vegetation. Buried bank stabilization has already been completed on the northwest side of the San Francisquito Creek confluence. The existence and persistence of the adjacent high-quality breeding and nursery habitat suggest that this form of stream bank stabilization, combined with conservation of existing riparian woodlands, would be the preferred method for future projects in the river and its tributaries.

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APPENDIX A

Natural River Management Plan Area Fish Survey Data

Appendix A
Natural River Management Plan Area Fish Survey Data

Station # 1	GPS location: 34º 26' 07"N 118º 36' 45"W
Habitat Description:	[Main channel] Stream width ±5', Depth ±24" Sandy cobble substrate Outer dense willows; Stream edge dense cattails, mule fat No submergent algae
Species Recorded:	arroyo chub
Station # 2	GPS location: 34º 26' 08"N 118º 36' 44"W
Habitat Description:	[Marshy area at base of south bank] Stream width ±2', Depth ±1", Silty sand substrate Edge of dense cottonwood/willow woodland; mule fat, cocklebur No submergent algae
Species Recorded:	None
Station # 3	GPS location: 34º 26' 08"N 118º 36' 43"W
Habitat Description:	[Narrow braid] Stream width ±4', Depth ±2", sandy substrate Dense willow and cottonwood; No submergent algae
Species Recorded:	None
Station # 4	GPS location: 34º 26' 06"N 118º 36' 42"W
Habitat Description:	[Narrow braid at base of south bank] Stream width ±2', Depth ±4", Silty sand substrate Outer dense willow/cottonwood/arundo; Stream edge grass, water speedwell, cattail, watercress <5% submergent algae
Species Recorded:	14 UTS (all age classes)
Station # 5	GPS location: 34º 26' 08"N 118º 36' 42"W
Habitat Description:	[Narrow braid at base of north bank] Stream width ±3', Depth ±4", Sandy substrate Dense giant reed/willow/cottonwood/grass <10% submergent filamentous algae
Species Recorded:	1 UTS (1 subadult)
Station # 6	GPS location: 34º 26' 09"N 118º 36' 35"W
Habitat Description:	[Narrow braid at base of north bank] Stream width ±4', Depth ±3", Sandy substrate Dense giant reed/willow/cottonwood/grass <10% submergent filamentous algae
Species Recorded:	10 UTS (7 subadults, 3 adults), arroyo chub, mosquitofish

Appendix A (continued)
Natural River Management Plan Area Fish Survey Data

Station # 7	GPS location: 34º 26' 08"N 118º 36' 39"W
Habitat Description:	[Marshy area at base of north bank, south of ag field] Stream width ±6', Depth ±4", silty substrate Dense willows/arundo/mule fat - shaded No submergent filamentous algae
Species Recorded:	Four (4) UTS (1 adult m, 3 subadult)
Station # 8	GPS location: 34º 26' 11"N 118º 36' 37"W
Habitat Description:	[Marshy area at base of north bank, south of ag field] Stream width ±6', Depth ±4", silty substrate Dense willows/giant reed/mule fat - shaded No submergent filamentous algae
Species Recorded:	Four (4) UTS (1 adult m, 3 subadult)
Station # 9	GPS location: 34º 26' 12"N 118º 36' 35"W
Habitat Description:	[Small braided channel at base of north bank, south of ag field] Stream width ±4', Depth ±10", silty sand substrate Dense willows/giant reed - shaded 10% submergent filamentous algae
Species Recorded:	10 UTS (5 adult, 5 juvenile), mosquitofish
Station # 10	GPS location: 34º 26' 12"N 118º 36' 32"W
Habitat Description:	[Small braided channel at base of north bank, south of ag field] Stream width ±4', Depth ±10", silty sand substrate Dense willows/giant reed - shaded 20% submergent filamentous algae
Species Recorded:	12 UTS (5 adult, 2 subadult, 5 juvenile)
Station # 11	GPS location: 34º 26' 07"N 118º 36' 23"W
Habitat Description:	[Primary channel] Stream width ±5', Depth ±14" Gravelly cobble substrate Outer banks relatively dense willows/oak - partially shaded Stream edge grasses/water speedwell/sedge/cattail No submergent algae
Species Recorded:	arroyo chub
Station # 12	GPS location: 34º 26' 06"N 118º 36' 19"W
Habitat Description:	[Primary channel] Stream width ±5', Depth ±18" Gravelly cobble substrate Relatively dense willows/cottonwood - partially shaded Stream edge grasses/water speedwell/sedge/cattail No submergent algae
Species Recorded:	arroyo chub

Appendix A (continued)
Natural River Management Plan Area Fish Survey Data

Station # 13	GPS location: 34º 26' 12"N 118º 36' 18"W
Habitat Description:	[Marshy area/pool on north side of primary channel] Stream width ±4', Depth ±18", silty substrate Dense willow/cottonwood/mule fat - shaded 25% submergent filamentous algae
Species Recorded:	24 UTS (all age classes, one gravid female)
Station # 14	GPS location: 34º 26' 05"N 118º 36' 15"W
Habitat Description:	[Primary channel] Stream width ±5', Depth ±18" Gravelly cobble substrate North bank willows/mule fat - partially shaded Stream edge grasses/water speedwell/sedge/cattail No submergent algae
Species Recorded:	arroyo chub
Station # 15	GPS location: 34º 26' 03"N 118º 36' 09"W
Habitat Description:	[Primary channel] Stream width ±8', Depth ±14" Gravelly cobble substrate Outer clumps of willow/mule fat; Stream edge grass/water speedwell/sedge No submergent algae
Species Recorded:	None
Station # 16	GPS location: 34º 26' 03"N 118º 36' 04"W
Habitat Description:	[Primary channel] Stream width ±8', Depth ±12" Gravelly cobble substrate Outer clumps of willow/mule fat; Stream edge grass/water speedwell/sedge No submergent algae
Species Recorded:	arroyo chub
Station # 17	GPS location: 34º 26' 03"N 118º 36' 04"W
Habitat Description:	[Edge of marshy area north side of primary channel] Stream width ±3', Depth ±4", sandy cobble substrate Relatively dense willow/cottonwood/mule fat - partially shaded No submergent algae
Species Recorded:	Mosquitofish
Station # 18	GPS location: 34º 26' 05"N 118º 36' 04"W
Habitat Description:	[Edge of marshy area north side of primary channel] Stream width ±3', Depth ±4", sandy cobble substrate Dense willow/cottonwood/mule fat - partially shaded No submergent algae
Species Recorded:	12 UTS (10 subadult, 2 adult m)

Appendix A (continued)
Natural River Management Plan Area Fish Survey Data

Station # 19	GPS location: 34° 26' 08"N 118° 35' 52"W
Habitat Description:	[Marshy area north side of primary channel] Stream width ±8', Depth ±6", sandy substrate Dense willow/cottonwood/mule fat - shaded No submergent algae
Species Recorded:	Three (3) adult UTS (1 m, 2 f)
Station # 20	GPS location: 34° 26' 07"N 118° 35' 48"W
Habitat Description:	[Marshy area north side of primary channel] Stream width ±3', Depth ±10", sandy substrate Dense willow/cottonwood/mule fat - shaded No submergent algae
Species Recorded:	mosquitofish
Station # 21	GPS location: 34° 26' 06"N 118° 35' 39"W
Habitat Description:	[Marshy area north side of primary channel] Stream width ±5', Depth ±4", sandy substrate Dense willow/cottonwood/mule fat - shaded No submergent algae
Species Recorded:	Over 25 UTS (all age classes; many juvenile), mosquitofish
Station # 22	GPS location: 34° 26' 06"N 118° 35' 38"W
Habitat Description:	[Marshy area north side of primary channel] Stream width ±5', Depth ±6", sandy substrate Dense willow/cottonwood/mule fat - shaded No submergent algae
Species Recorded:	Five (5)adult UTS (1 m, 4 f [one gravid]), mosquitofish, Arroyo chub
Station # 23	GPS location: 34° 25' 44"N 118° 35' 31"W
Habitat Description:	[Primary channel] Stream width ±15', Depth ±10" Sandy cobble substrate Relatively dense willow/cottonwood; Stream edge grass/mustard/sedge/water speedwell No submergent filamentous algae
Species Recorded:	Arroyo chub/prickly sculpin
Station # 24	GPS location: 34° 25' 41"N 118° 35' 25"W
Habitat Description:	[Primary channel] Stream width ±8', Depth ±18" Cobbly rocky substrate Wooded terraces (willow/cottonwood); Stream edge grass/water speedwell/watercress No submergent filamentous algae
Species Recorded:	Arroyo chub/Santa Ana sucker

Appendix A (continued)
Natural River Management Plan Area Fish Survey Data

Station # 25	GPS location: 34° 25' 39"N 118° 35' 18"W
Habitat Description:	[Primary channel] Stream width ±6', Depth ±18" Sandy cobble substrate Wooded terraces (willow/cottonwood); Stream edge grass/water speedwell/watercress No submergent filamentous algae
Species Recorded:	Arroyo chub
Station # 26	GPS location: 34° 25' 35"N 118° 35' 08"W
Habitat Description:	[At Old Road Bridge] Stream width ±14', Depth ±6", cobble substrate Open scattered willow/mule fat/grass/water speedwell No submergent algae
Species Recorded:	Arroyo chub, mosquitofish
Station # 27	GPS location: 34° 25' 34"N 118° 35' 05"W
Habitat Description:	[Side channel – between I-5 and Old Road bridges] Stream width ±4', Depth ±18", Silty sand substrate Willow/mule fat/cattail/rush/speedwell/watercress No submergent algae
Species Recorded:	One (1) juv UTS, arroyo chub
Station # 28	GPS location: 34° 25' 31"N 118° 34' 57"W
Habitat Description:	[Primary channel, east side of I-5 Bridge] Stream width ±6', Depth ±20", Sandy cobble substrate Scattered willow/mule fat; Stream edge grass No submergent algae
Species Recorded:	arroyo chub
Station # 29	GPS location: 34° 25' 33"N 118° 34' 45"W
Habitat Description:	[Braided channels, downstream of RR crossing] Stream width ±5', Depth ±4", Sandy substrate Scattered mule fat; Stream edge grass/water speedwell/mustard 10% submergent algae
Species Recorded:	arroyo chub, mosquitofish – shallow areas appeared to be nursery for both species
Station # 30	GPS location: 34° 25' 34"N 118° 34' 41"W
Habitat Description:	[Primary channel, at RR crossing] Stream width ±6', Depth ±7", Sandy cobble substrate Willow/cocklebur/sedge/grasses No submergent filamentous algae
Species Recorded:	None

Appendix A (continued)

Natural River Management Plan Area Fish Survey Data

Station # 31	GPS location: 34º 25' 37"N 118º 34' 26"W
Habitat Description:	[River and Creek channel at San Francisquito Creek confluence) Width ±4', Depth ±6", Sandy cobble substrate Willow/cocklebur/nasturtium/sedge/grasses No submergent filamentous algae
Species Recorded:	Two (2) UTS (1 juv, 1 adult m), arroyo chub
Station # 32	GPS location: 34º 25' 43"N 118º 34' 24"W
Habitat Description:	[Marshy area at San Francisquito Creek confluence] Width ±15', Depth ±4" Silty cobble substrate Open willows/cottonwood/rush – partially shaded <10% submergent algae
Species Recorded:	Arroyo chub, mosquitofish
Station # 33	GPS location: 34º 25' 41"N 118º 34' 21"W
Habitat Description:	[Marshy area at San Francisquito Creek confluence] Width ±20', Depth ±10" Silty sand substrate Dense willows/cottonwood/rush - shaded No submergent algae
Sample Results:	Over 25 UTS (all age classes), mosquitofish, arroyo chub
Station # 34	GPS location: 34º 25' 43"N 118º 34' 19"W
Habitat Description:	[Marshy area at San Francisquito Creek confluence] Width ±25', Depth ±8" Silty cobble substrate Dense willows/rush - shaded No submergent algae
Species Recorded:	25+ UTS (all age classes),
Station # 35	GPS location: 34º 25' 44"N 118º 34' 15"W
Habitat Description:	[Edge of marshy area at San Francisquito Creek confluence] Width ±8', Depth ±4" Silty cobble substrate Willows/cottonwood/smartweed/grasses - partially shaded No submergent algae
Species Recorded:	Six (6) juvenile UTS, mosquitofish

Appendix A (continued)
Natural River Management Plan Area Fish Survey Data

Station # 36	GPS location: 34° 25' 35"N 118° 34' 11"W
Habitat Description:	[One of three channel braids] Stream width ±6', Depth ±6"; Sandy cobble substrate Cattail/smartweed <5% submergent filamentous algae
Species Recorded:	Four (4) adult UTS (3f, 1m), mosquitofish (western toad tadpoles)
Station # 37	GPS location: 34° 25' 30"N 118° 33' 55"W
Habitat Description:	[Small side channel] Stream width ±2', Depth ±2", Sandy substrate Scattered grasses/smartweed No submergent filamentous algae
Species Recorded:	One (1) adult UTS (f), arroyo chub
Station # 38	GPS location: 34° 25' 30"N 118° 33' 47"W
Habitat Description:	[Open channel] Stream width ±10'; Depth ±6"; Sandy cobble substrate Grasses/smartweed on both banks <5% submergent filamentous algae
Species Recorded:	None
Station # 39	GPS location: 34° 25' 30"N 118° 33' 42"W
Habitat Description:	[Smaller side channel, west side of McBean Bridge] Stream width ±2', Depth ±4"; Cobble substrate Smartweed, grasses, cattail, young willows on both banks No submergent algae
Species Recorded:	Mosquitofish
Station # 40	GPS location: 34° 25' 28"N 118° 33' 40"W
Habitat Description:	[Slow side channel near McBean Bridge] Stream width ±4'; Depth ±2"; Sandy silt substrate Relatively dense smartweed/mule fat/young willow on both banks No submergent filamentous algae
Species Recorded:	Four (4) subadult UTS, arroyo chub
Station # 41	GPS location: 34° 25' 25"N 118° 33' 28"W
Habitat Description:	[Primary channel] Stream width ±8'; Depth ±4" Sandy cobble substrate Both banks relatively dense willow/mule fat/smartweed/grasses 10% submergent filamentous algae
Species Recorded:	None

Appendix A (continued)
Natural River Management Plan Area Fish Survey Data

Station # 42	GPS location: 34º 25' 20"N 118º 33' 22"W
Habitat Description:	[Secondary braid in South Fork near confluence] Stream width ±3'; Depth ±2"; Sandy substrate Relatively open with willow, mule fat, smartweed, grass <5% submergent algae
Species Recorded:	Four (4) subadult UTS
Station # 43	GPS location: 34º 25' 24"N 118º 33' 08"W
Habitat Description:	[Secondary braid of channel] Stream width ±2'; Depth ±2" cobble substrate smartweed, grass, cattail, small willows <5% submergent filamentous algae
Species Recorded:	Mosquitofish
Station # 44	GPS location: 34º 25' 29"N 118º 32' 47"W
Habitat Description:	[Confluence of primary and secondary stream braids] Stream width ±10'; Depth ±14"; Sandy cobble substrate Willows, few cottonwood, giant reed, No submergent algae
Species Recorded:	None
Station # 45	GPS location: 34º 25' 30"N 118º 32' 43"W
Habitat Description:	[Primary channel] Stream width ±8'; Depth ±12"; Sandy substrate; dense cattails No submergent algae
Species Recorded:	None
Station # 46	GPS location: 34º 25' 31"N 118º 32' 36"W
Habitat Description:	[Secondary braid of channel] Stream width ±15'; Depth ±4"; Sandy cobble substrate Both banks relatively open with patches of willow, mule fat, smartweed, cattail, grass <10% submergent filamentous algae
Species Recorded:	Mosquitofish
Station # 47	GPS location: 34º 25' 30"N 118º 32' 31"W
Habitat Description:	[Near confluence w/ Bouquet Creek] Stream width ±6'; Depth ±6"; Sandy substrate; open cattail, willows Approximately 20% submergent filamentous algae
Species Recorded:	Mosquitofish

Appendix A (continued)
Natural River Management Plan Area Fish Survey Data

Station # 48	GPS location: 34º 25' 26"N 118º 32' 23"W
Habitat Description:	[Large outflow pipe from development to north] Stream width ±6'; Depth ±3'; Silty sand substrate Pool at base of pipe outflow, apparently planted with mule fat and willow. Cattails present. Dense filamentous algae
Species Recorded:	Sailfin molly, goldfish, largemouth bass

Bird Surveys Along the Santa Clara River, 2004 Mouth of the Castaic Creek Downstream to Just Below Las Brisas Crossing

BIRD SURVEYS ALONG THE SANTA CLARA RIVER, 2004

MOUTH OF CASTIAC CREEK DOWNSTREAM TO

JUST BELOW LAS BRISAS CROSSING

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August 24, 2004

REVISED

Bird Surveys along the Santa Clara River, 2004
Mouth of Castaic Creek Downstream to just below Las Brisas Crossing

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Nature and Scope of Surveys

During the spring and early summer of 2004 surveys were conducted along the section of the Santa Clara River between its confluence with Castaic Creek and a point 1/4 mile below the Las Brisas bridge over the Santa Clara River. The total length of the section surveyed was 7.5 miles.

Eight surveys were conducted in accordance to the U.S. Fish and Wildlife Service Protocol for least Bell's vireo. Five of the surveys were conducted within the time frames recommended by the U.S. Fish and Wildlife Service Protocol for southwestern willow flycatcher. In order to follow least Bell's vireo protocol on kilometers covered per day, each portion (one in Los Angeles and one in Ventura County) was divided into two sections, each surveyed separately. However, observations from these two surveys are combined in data presentation (Tables 1-2).

Each survey was conducted on foot by observers well acquainted with both visual and auditory and behavioral characteristics of southern California birds. Surveys occurred approximately every other week between mid April and mid July (there was some variation in timing to avoid periods of poor weather) and occurred between 6:30 and 10:30 a.m. All birds sighted were counted, but special emphasis was placed on finding focus species, Species of Special Concern, and brown-headed cowbirds. If focus species (yellow-billed cuckoo, least Bell's vireo, southwestern willow flycatcher), were not visually observed, tapes of their calls were played in an attempt to elicit a response. Personnel for all surveys were Daniel A. Guthrie and Judith A. Sugden, both working under Federal Fish and Wildlife Service Permit number TE810394-2, issued under section 10(a)(1)(A) of the Endangered Species Act and permitted for both least Bell's vireo and southwestern willow flycatcher. and under an MOU from State of California Department of Fish and Game, dated April 23, 2003, also for these species.

Habitat Condition and Bird Observations

Flooding during late winter and early spring of 2004 scoured many sections of the river bed, particularly in the portion in Los Angeles County. The result was extensive sandy areas and little wet riparian vegetation during April and May. Only along the narrower river section in Ventura County was the damage from flooding less severe. The flooding also resulted in a deepening of the river channel, leaving many sections adjacent to it dry.

Observations of all birds are shown in Tables 1-2. The numbers shown are of birds seen and heard, with heard individuals forming the majority of the observations. Numbers vary between censuses for several reasons. Bird activity varies with season. Different species breed at different times of the year. In general, species are most easily observed when they are actively defending territories by song during the establishment of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, the number of birds observed increase. Thus, for most resident species, numbers of adult birds are most accurately censused in April and May, when territorial activity is at a maximum. A few species such as Anna's hummingbird that nest early in the season may be underestimated. Numbers of nesting species observed may be higher than normal in May due to migratory birds passing through the area, then decrease slightly in June and early July when birds are less active during nesting, and may increase in late June and July when young birds leave the nest. Increases in some species also occur in July when species resident in nearby habitats visit the riparian zone to feed on elderberry and other wet riparian plants.

Comments on Threatened and Endangered Species

Yellow-billed Cuckoo *(Coccyzus americanus)*

The Yellow-billed Cuckoo is listed as a State Endangered Species. Despite playing taped calls of this species during June and July surveys, when this species might be present, no individuals of this species were observed in 2004.

Southwestern Willow Flycatcher *(Empidonax traillii extimus)*

This subspecies is listed as Federally Endangered under the Federal Endangered Species Act. Willow flycatchers were once widespread in wet riparian woodland in southern California but now fewer than 70 pair remain, with the major concentrations being along the Kern River and the Santa Margarita River in San Diego County. Following the Revised Protocol (Fish And Wildlife Service, July 2000) five surveys (see tables 1-2 for dates) were conducted specifically for southwestern willow flycatcher. All surveys occurred between 6:00 and 10:00 am. and used taped calls to elicit a response if flycatchers were not first observed.

A single willow flycatcher was observed on May 31st just upstream from the Ventura/Los Angeles County line. (Figure 3). Attempts to relocate this bird on subsequent visits were unsuccessful. There were no sightings of willow flycatcher along the Ventura County section of the river in 2004 (Figure 4).

Willow flycatchers are fairly common migrants through southern California and most of the migrants are believed to be of the more northern common subpsecies of willow flycatcher, *E. t. brewsteri,* which breeds throughout southern Canada and the northern United States, rather than representatives of the southwestern subspecies *E. t. extimus.* Southwestern willow flycatchers are positively identified primarily by nesting within the geographic area of their range or by measurements of in hand specimens. Since May 31st is during the period when the northern subspecies is migrating through the area, and lacking any subsequent evidence of nesting, this observations of a willow flycatcher cannot be positively identified as belonging to the southwestern form of willow flycatcher.

The report forms required by the survey protocol for this species are attached and will be forwarded to the Ventura Office of the U.S. Fish and Wildlife Service.

Least Bell's Vireo ***(Vireo bellii pusillus)***

Surveys of the wet riparian areas along the Santa Clara River followed U.S. Fish and Wildlife Service Guidelines for least Bell's vireo. Eight surveys were conducted between April 10 and July 31 (see tables 1-2 for dates). All surveys occurred between 6:00 and 10:00 am. The least Bell's vireo is a very vocal species and most birds were located without the use of taped calls. However, tapes were used to elicit responses in early spring, before vireo arrival, in late summer, when vireos were less vocal, and in areas of marginal habitat or where vireos were expected from previous sightings but could not be heard. A calling vireo was considered a territorial male. If a second, silent bird was observed in the same area, a pair was considered to be present. However, to avoid disturbance, no efforts were made to find nests, locate with certainty females in territories, or to locate fledged young in established territories. Numbers of vireos shown in Tables 1 and 2 are actual numbers of birds observed. These numbers include all vireos, both singing and silent. In order to avoid disturbing vireos, no special efforts were made to determine nesting success or presence of leg bands once birds were observed. However, at each location where vireos were found, they were observed at least once, and no leg bands were observed.

Least Bell's vireos were regularly heard and seen in two locations, one in Ventura County and one in Los Angeles County. Vireos have been seen in the Ventura area, (Figure 1, area 1) for several years prior to 2004. There were up to 9 territorial males and a minimum of 7 mated pair nesting along this section of the river.

Least Bell's vireo were also found at a single location in Los Angeles County (Area 3 , Figure 2), another place where sightings of vireos have occurred in previous years. This area supported a minimum of 5 territorial males and at least 4 pair of birds.

Other areas along the river where least Bell's vireos were found in the past (Figures 1, area 2; Figure 2, areas 4,5)) were carefully surveyed during 2004, but no vireos were found.

Comments on Sensitive Species

Great Blue Heron *(Ardea herodias)*

Great Blue Herons are listed on the California Natural Diversity Data Base as a species that warrants monitoring. Individuals of this species was observed sparingly along the river after the breeding season and along other sections of the river during winter and migration. No nesting was observed.

Great Egret (Ardea alba)

The great egret is listed on the California Natural Diversity Data Base as a species that warrants monitoring. Individuals of this species was observed sparingly along the river after the breeding season and along other sections of the river during winter and migration. No nesting was observed.

White-tailed Kite (*Elanus leucurus*)

This species is considered a Species of Management Concern by the U.S. Fish and Wildlife Service. Hunting kites were regularly observed along the river but apparently nested further east near the trailier village at Castaic Junction.

Cooper's Hawk *(Accipiter cooperii)*

Cooper's hawk is considered a Species of Special Concern by the State of California. Cooper's hawks were regularly observed hunting along Ventura County section of the river and nested in the area.

Yellow Warbler *(Dendroica petechia)*

The yellow warbler is considered a Species of Special Concern by the State of California. Yellow warblers prefer wet riparian habitat but are also found in large cottonwoods in drier riparian areas. Singing yellow warblers were observed throughout the survey period in small numbers. Most sightings were in the areas where least Bell's vireos were present (Figures 1-2)

Yellow-breasted Chat *(Icteria virens)*

The yellow-breasted chat is considered a Species of Special Concern by the State of California. The numbers of chats calling from territories along this section of riparian woodland are about the same number as observed here in previous years. . Most sightings were in the areas where least Bell's vireos were present (Figures 1-2) . A few additional birds were regularly heard in a dry riparian woodland on the north side of the river (Area 4 in Figure 2).

Tricolored Blackbird (*Agelaius tricolor*)

This species is considered a California Special Concern species by the Department of Fish and game and is also a Federal Special Concern Species. A small colony of tricolored blackbirds nested one year in the 1990's along Castaic Creek and in recent years, one or two sightings of migratory individuals have occurred most years. In 2004 there were no sightings of this species.

Lawrence's Goldfinch *(Carduelis lawrencei)*

This species is a highest priority species on the Audubon Birds to Watch list for 1996 and is a Bird of Management Concern for the Fish and Wildlife Service. Although a species of the coastal sage, a few individuals of this species visited the riparian zone of the Santa Clara River after their nesting season.

Comments on Brown Headed Cowbird *(Molothrus ater)*

Cowbirds were regularly observed in all sections of the study area and seemed to be attracted by tapes of least Bell's vireo calls. Numbers remained high along the river throughout the survey period.

Summary

No yellow billed cuckoos were observed during 2004. There was a single observation of a willow flycatcher. Because of the date of observation and failure to relocate the bird on subsequent visits, it is likely that this bird represented the common northern subspecies of willow flycatcher *(E. t. brewsteri)* rather than the endangered southern California subspecies *(E. t. extimus)*.

Between 11 and 14 pair of least Bell's vireos were observed in two locations long this section of the Santa Clara River during 2004. This is a slight increase from previous years. This greater success in in line with the greater nesting success and population increase of this species statewide.

Among species of concern, the riparian species; yellow warbler and yellow-breasted chat occurred in small numbers in riparian woodlands along the river. There were several observations of two raptors, the white-tailed kite and Cooper's hawk. Both species nest in riparian woodlands. Two wintering and migrant species of concern, great blue heron and great egret, were observed feeding in small numbers on the river, but did not nest in the area. Finally, one coastal sage species, Lawrence's goldfinch, was observed along the river in small numbers as a visitor from nearby coastal sage habitat.

Table 1. BIRDS OBSERVATIONS ALONG THE SANTA CLARA RIVER,2004: Santa Clara River from the mouth of Castaic Creek downstream to the Los Angeles/Ventura County Line.									
Endangered Species and Species of Concern Shaded									
			Dates of Surveys						
SPECIES	STATUS	4/15,22	5/6,7	5/19,20	5/30,31	6/10,13	6/25,29	7/3,5	7/14.15
Great Blue Heron	m,w	0	0	0	0	0	0	1	0
Great Egret	m,w	0	0	1	0	0	0	0	0
Snowy Egret	m,w	1	0	0	0	0	0	0	1
Green Heron	r	0	1	2	0	0	1	1	2
Black-crowned Night-heron	m,w	0	1	0	0	0	0	0	0
Turkey Vulture	s	1	0	0	0	2	0	1	0
Mallard	r	21	9	6	8	3	10	2	7
White-tailed Kite	r	0	0	0	0	2	0	0	0
Red-shouldered Hawk	r	0	2	0	1	3	2	6	0
Red-tailed Hawk	r	1	1	1	3	1	3	3	1
American Kestrel	r	1	2	1	4	2	1	0	0
California Quail	r	38	26	18	28	45	15	31	52
Killdeer	r	20	18	18	19	20	14	5	9
Solitary Sandpiper	m	0	1	0	0	0	0	0	0
Spotted Sandpiper	s	2	4	7	2	7	11	5	7
Least Sandpiper	m	6	0	0	0	0	0	0	0
Western Gull	m,	0	0	10	0	35	0	7	0
Rock Dove	r	84	10	2	40	0	0	0	0
Mourning Dove	r	20	10	22	16	14	12	17	28
Greater Roadrunner	r	0	1	0	1	0	0	0	0
White-th. Swift	r	0	0	8	6	0	0	0	0
Anna's Hummingbird	r	1	1	1	5	3	2	12	4
Costa's Hummingbird	s	0	0	0	0	0	0	0	1
Belted Kingfisher	m	0	0	0	0	0	0	1	1
Nuttall's Woodpecker	r	5	7	6	5	7	8	15	7
Hairy Woodpecker	r	0	1	0	0	0	0	0	0
Northern Flicker	r	0	1	0	1	0	2	1	0
Willow Flycatcher	s	0	0	0	1	0	0	0	0
Pacific Slope Flycatcher	s	1	2	1	0	0	0	0	1
Black Phoebe	r	0	0	0	0	1	3	1	12
Ash-throated Flycatcher	s	9	23	17	7	14	16	10	11
Western Kingbird	s	4	0	5	1	2	0	2	4
Bell's Vireo	s	2	2	3	4	3	4	0	1
Warbling Vireo	m	1	0	0	0	0	0	0	0
Western Scrub Jay	r	10	16	14	14	9	10	15	10
American Crow	r	16	10	11	11	8	45	63	26
Common Raven	r	15	10	5	2	15	32	21	6
Tree Swallow	s	2	6	5	0	6	6	0	0
Violet-green Swallow	s	0	3	0	3	4	1	3	0
N. Rough-winged Swallow	s	5	7	5	10	8	11	3	6
Cliff Swallow	s	50	44	100	30	48	6	30	17
Barn Swallow	s	0	1	0	0	0	0	2	2
Oak Titmouse	r	11	8	4	8	7	4	6	7
Bushtit	r	4	4	6	2	0	13	7	3

Table 1 (cont.). BIRDS OBSERVATIONS ALONG THE SANTA CLARA RIVER,2004: Santa Clara River from the mouth of Castaic Creek downstream to the Los Angeles/Ventura County Line.

Endangered Species and Species of Concern Shaded

		Dates of Surveys							
SPECIES	**STATUS**	**4/15,22**	**5/6,7**	**5/19,20**	**5/30,31**	**6/10,13**	**6/25,29**	**7/3,5**	**7/14,15**
Bewick's Wren	r	21	27	20	21	9	10	10	11
House Wren	r	27	32	17	6	1	0	3	0
Western Bluebird	r	12	6	7	6	12	12	15	7
American Robin	r	1	0	0	0	1	0	0	0
Wrentit	r	7	6	2	5	5	10	4	1
California Thrasher	r	1	1	0	0	0	1	0	1
European Starling	r	19	13	11	5	27	22	4	19
Phainopepla	r	0	0	4	1	1	2	5	2
Nashville Warbler	m	1	0	0	0	0	0	0	0
Yellow Warbler	s,m	1	9	8	4	1	1	0	2
Yellow-rumped Warbler	w,m	8	0	0	0	0	0	0	0
MacGillivray's Warbler	m	1	0	0	0	0	0	0	0
Common Yellowthroat	r	7	18	26	16	29	20	5	13
Wilson's Warbler	m	2	1	0	1	0	0	0	0
Yellow-breasted Chat	s	1	0	3	9	4	2	2	0
Western Tanager	m	0	0	1	0	0	0	0	0
Spotted Towhee	r	9	16	12	16	10	9	6	2
California Towhee	r	6	24	16	24	10	16	25	18
Lark Sparrow	r	0	0	0	0	0	0	10	9
Savannah Sparrow	w,m	2	0	0	0	0	0	0	0
Song Sparrow	r	24	68	60	44	46	24	31	36
Lincoln's Sparrow	m	1	0	0	0	0	0	0	0
White-crowned Sparrow	w,m	3	0	0	0	0	0	0	0
Black-headed Grosbeak	s	11	20	14	23	18	6	5	4
Blue Grosbeak	s	0	2	4	5	6	2	7	9
Lazuli Bunting	s	0	0	0	0	0	0	8	3
Red-winged Blackbird	s	7	87	390	127	48	2	11	0
Western Meadowlark	r	0	0	0	1	0	0	0	0
Brewer's Blackbird	r	35	10	2	0	0	0	4	0
Great-tailed Grackle	r	0	0	0	3	0	0	0	0
Brown-headed Cowbird	s	9	15	9	6	4	4	4	5
Bullock's Oriole	s	15	2	0	4	5	0	4	4
House Finch	r	18	18	33	56	22	36	72	60
Lesser Goldfinch	r	3	0	1	12	0	11	8	9
Lawrence's Goldfinch	r	0	0	0	0	0	2	0	0
House Sparrow	r	0	0	0	0	3	0	0	0

Status: m, migrant; r, resident; s, summer only; w, winter
numbers in parentheses are nestlings.

Table 2. Bird Observations along the Santa Clara River; Los angeles/Ventura County Line West to 1/4 mile beyond Las Brisas Bridge.

Endangered Species and Species of Concern Shaded

				Dates of Surveys					
SPECIES	**STATUS**	**4/22**	**5/7**	**5/20**	**5/31**	**6/13**	**6/25**	**7/5**	**7/15**
Great Blue Heron	m,w	0	0	0	0	2	1	1	0
Great Egret	m,w	0	0	0	0	0	0	0	1
Snowy Egret	m,w	1	0	0	0	0	0	0	0
Green Heron	r	4	0	3	1	3	2	2	2
Mallard	r	11	10	3	3(8)	6	4	4	8(10)
White-tailed Kite	r	0	0	1	0	0	0	1	0
Cooper's Hawk	r	0	2	1	2	0	0	0	0
Red-shouldered Hawk	r	1	1	2	2	2	0	2	2
Red-tailed Hawk	r	2	1	1	2	1	2	1	1
Golden Eagle	r	1	0	0	0	0	0	0	0
American Kestrel	r	0	0	2	0	1	0	0	0
California Quail	r	4	34	18	23	26	18	12	15
Killdeer	r	15	14	12	6	18	9	6	4
Spotted Sandpiper	s	0	5	2	1	4	2	0	3
Least Sandpiper	m	4	0	0	0	0	0	0	0
Western Gull	m	0	0	0	0	9	0	0	0
Rock Dove	r	8	0	0	16	0	8	0	0
Mourning Dove	r	20	11	70	34	55	34	29	12
Common Ground Dove	r	0	2	0	0	0	0	0	0
Greater Roadrunner	r	0	0	0	0	0	0	0	1
Vaux's Swift	m	20	0	0	0	0	0	0	0
White-th. Swift	r	0	1	4	4	0	0	0	2
Black-chinned Hummingbird	s	1	0	1	1	0	0	0	1
Anna's Hummingbird	r	2	5	2	6	9	10	9	17
Costa's Hummingbird	s	0	0	0	0	1	0	0	0
Allen's Hummingbird	r,m	0	0	0	2	0	0	0	0
Belted Kingfisher	m	3	0	0	1	0	0	0	0
Acorn Woodpecker	r	0	0	0	0	0	0	0	8
Nuttall's Woodpecker	r	4	6	6	5	8	10	9	4
Downy Woodpecker	r	1	1	7	5	4	3	1	4
Hairy Woodpecker	r	3	2	3	2	0	3	2	0
Northern Flicker	r	0	2	1	1	0	0	0	0
Western Wood-Pewee	m	1	0	0	0	0	0	0	0
Pacific Slope Flycatcher	s	3	3	5	0	2	1	1	1
Black Phoebe	r	6	9	4	11	18	12	4	16
Say's Phoebe	r	1	0	0	1	0	0	0	0
Ash-throated Flycatcher	s	15	24	14	11	14	24	12	8
Cassin's Kingbird	s	0	0	0	2	0	0	0	0
Western Kingbird	s	2	2	0	4	2	2	2	0
Bell's Vireo	s	9	9	14	14	14	6	2	4
Western Scrub Jay	r	12	25	15	7	12	14	15	8
American Crow	r	21	6	22	14	15	15	23	67
Common Raven	r	12	6	4	4	2	3	11	1

Table 2 (cont.). Bird Observations along the Santa Clara River; Los angeles/Ventura County Line West to 1/4 mile beyond Las Brisas Bridge.

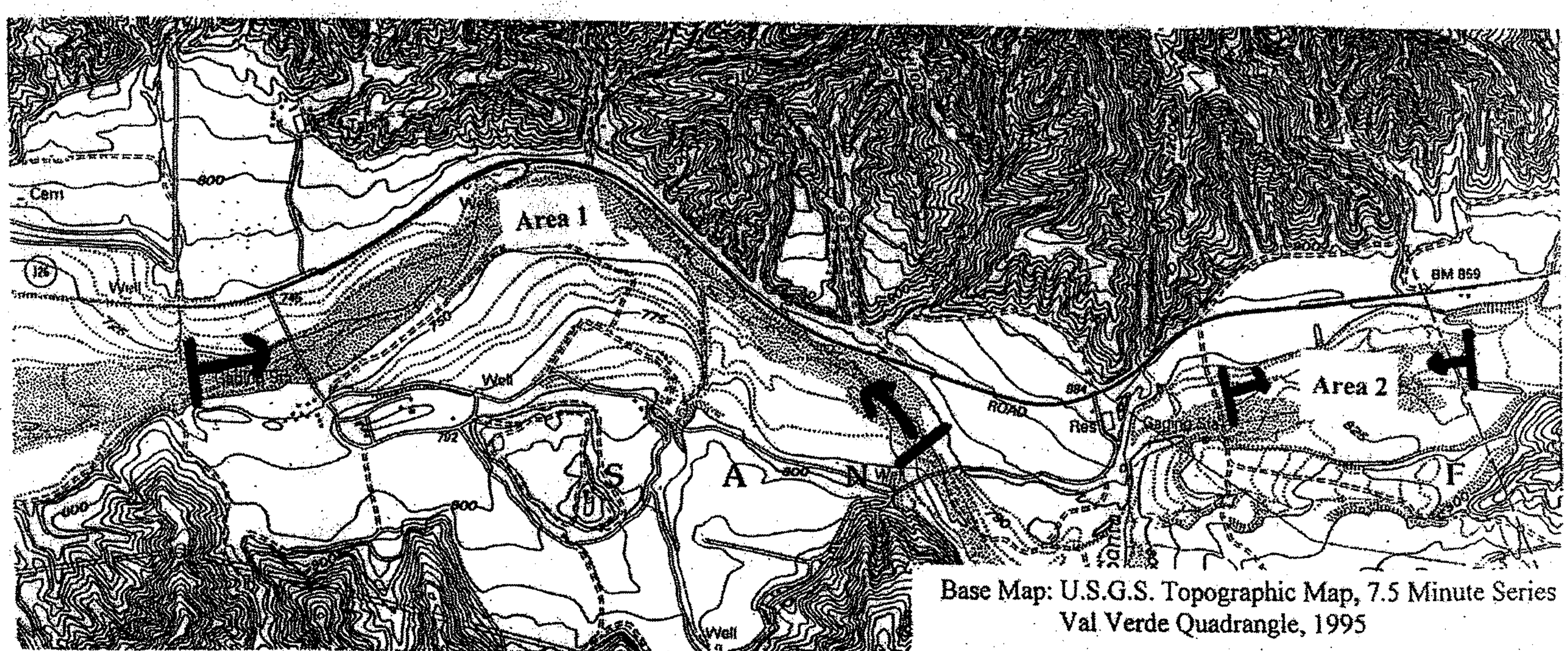
Endangered Species and Species of Concern Shaded

		Dates of Surveys							
SPECIES	**STATUS**	**4/22**	**5/7**	**5/20**	**5/31**	**6/13**	**6/25**	**7/5**	**7/15**
Tree Swallow	s	0	0	0	2	0	0	3	0
Violet-green Swallow	s	0	0	5	1	2	0	0	0
N. Rough-winged Swallow	s	0	3	10	12	7	14	6	2
Cliff Swallow	s	320	220	103	212	266	200	130	12
Barn Swallow	s	0	0	0	0	0	3	1	0
Oak Titmouse	r	5	5	12	5	6	3	14	5
Bushtit	r	10	4	16	16	21	15	48	40
Bewick's Wren	r	28	37	41	20	22	16	3	12
House Wren	r	10	8	15	13	6	0	0	2
Western Bluebird	r	0	4	0	0	1	4	0	1
American Robin	r	0	5	6	6	1	0	0	0
Wrentit	r	9	14	17	8	11	16	22	15
California Thrasher	r	2	1	2	3	6	0	2	4
European Starling	r	14	15	19	8	3	0	0	0
Phainopepla	r	0	2	3	6	5	0	0	0
Yellow Warbler	s,m	7	14	13	5	20	4	1	0
Yellow-rumped Warbler	w,m	7	0	0	0	0	0	0	0
Common Yellowthroat	r	38	50	97	68	120	33	54	89
Wilson's Warbler	m	8	1	0	0	0	0	0	0
Yellow-breasted Chat	s	0	2	10	4	4	3	1	1
Spotted Towhee	r	25	21	35	27	27	27	14	7
California Towhee	r	36	45	59	30	39	8	20	26
Lark Sparrow	r	0	0	0	1	0	0	0	0
Song Sparrow	r	76	120	224	76	139	60	64	97
Black-headed Grosbeak	s	22	15	26	25	33	15	18	1
Blue Grosbeak	s	0	3	3	1	17	9	12	8
Lazuli Bunting	s	4	19	1	0	0	7	4	29
Red-winged Blackbird	s	18	1	15	2	3	4	0	0
Brewer's Blackbird	r	0	8	3	3	2	80	60	0
Great-tailed Grackle	r	0	0	0	0	2	0	0	0
Brown-headed Cowbird	s	15	38	40	30	39	11	23	18
Hooded Oriole	s	5	0	0	2	0	2	0	0
Bullock's Oriole	s	7	0	8	15	3	3	3	2
House Finch	r	26	31	27	55	84	60	48	42
Lesser Goldfinch	r	66	48	72	62	75	21	38	54
Lawrence's Goldfinch	r	0	0	0	0	2	0	2	0
American Goldfinch	w,m,r	6	4	2	10	17	0	0	0
Nutmeg Manikin	r	0	0	1	0	0	0	0	0

Status: m, migrant; r, resident; s, summer only; w, winter

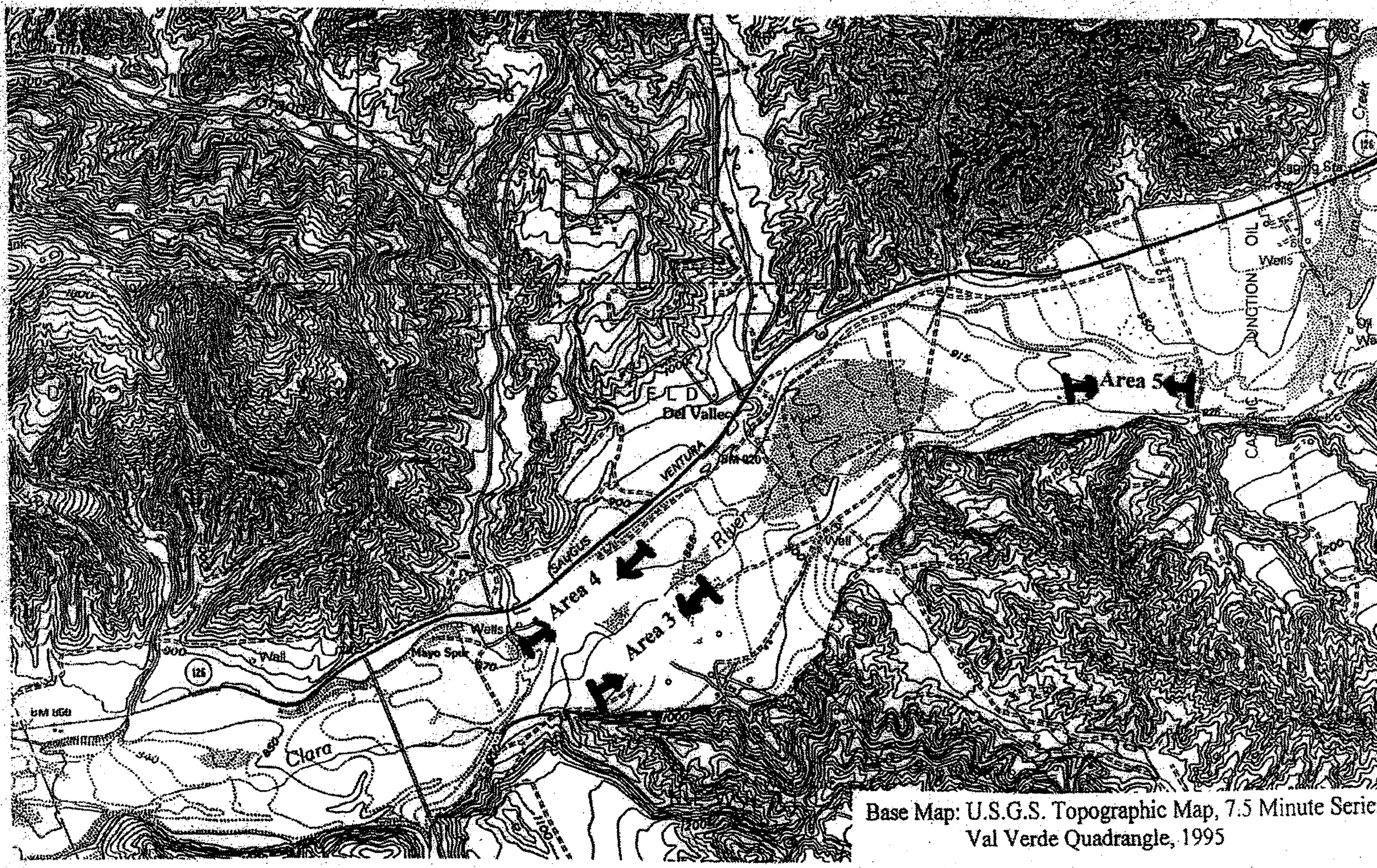
numbers in parentheses are nestlings

Figure 1. Locations of Least Bell's Vireo breeding records along the upper reaches of the Santa Clara River in Ventura County.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Val Verde Quadrangle, 1995

Figure 2. Location of Least Bell's Vireo breeding records along the Santa Clara River in Los Angeles County.



Willow Flycatcher Survey and Detection Form (rev. 4/98)

Site Name____Santa Clara River: Newhall Ranch, Los Angeles County_______ Total Site No ___________________

Was site surveyed in previous year? **Yes** No   Drainage Santa Clara River
If yes, what site name was used? __lower Santa Clara River__________
County __Los Angeles______________________   State__CA____   USGS Quad Name Val Verde____

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? X☐ ***Yes*** ☐ ***No***

Site Coordinates: Start: N__34 25.300______________ W 118 36.755____________ UTM
Stop: N__34 24.197______________ W 118 41.307____________ UTM   Zone _______

Elevation ____840-950 ft.__________ feet / meters (circle one)

*** Fill in additional site information on back of this page ***

Survey # / Observer(s)	Date (m/d/y) / Survey time	Number of WIFLs Found	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign Y or N	Comments about this survey (e.g., evidence of pairs or breeding; number of nests, nest contents or number of fledges seen; potential threats)
D. Guthrie	Date 5/30,31, start 6:30-9:30 6:30-7:30 total hrs _4.0	1	0	0	n	Y	Y	Non singing
D. Guthrie	Date 6/10,13 Start 6:30-9 6:30 – 7:30 total hrs _3.5	0	0	0	n	Y	Y	
D. Guthrie	Date 6/25,29 Start 6:30-9:00 6:30 -7:30 total hrs 3.50_	0	0	0	n	Y	Y	
D. Guthrie	Date 7/3,5 start 6 :30– 9:00 6:30-7:30 total hrs 3.5	0	0	0	n	Y	Y	?
D. Guthrie	Date 7/13,16 start 6:30-8:30 6:30 - 7:30 total hrs _3.0_	0	0	0	n	Y	Y	

Overall Site Summary (Total only resident WIFLs)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? No
Total survey hrs___17.5	1	0	0	0	If yes, report color combination(s) in the comments section on back of form

Name of Reporting Individual ___Dan Guthrie____________ Date Report Completed ___7/20/04______________

Submit the original of this form. Retain a copy for your records.

Fill in the following information completely. Submit original form. Retain copy for your records.

Name of Reporting Individual ___Dan Guthrie_________________________ Phone # _909 607 2836_____________

Affiliation __Claremont Colleges__________________________ Email dguthrie@jsd.claremont.edu_______________

Site Name__Santa Clara River:Newhall Ranch, los Angeles County
Did you verify that this site name is consistent with that used in previous years? Yes No ? (circle one)
This is a section of site previously lumped as lower Santa Clara River
Management Authority for Survey Area (circle one):

Federal Municipal/County State Tribal **Private**

Name of Management Entity or Owner (e.g., Tonto National Forest) _Newhall Land Co.________________________

Length of area surveyed: _4 miles_____ (specify units, e.g., miles = mi, kilometers = km, meters = m)

Did you survey the same general area during each visit to this site this year? **Yes /** If no, summarize in comments below.

If site was surveyed last year, did you survey the same general area this year? **Yes /** If no, summarize in comments below.

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):
XX Native broadleaf plants
☐ Mixed native and exotic plants (mostly native)
(entirely or almost entirely, includes high-elevation willow)
☐ Mixed native and exotic plants (mostly exotic) ☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: __Cottonwood, willow, ________________________________

Average height of canopy: __40 ft.____________________________ (specify units)

Was surface water or saturated soil present at or adjacent to site? YES .
Distance from the site to surface water or saturated soil: _____________ (specify units)

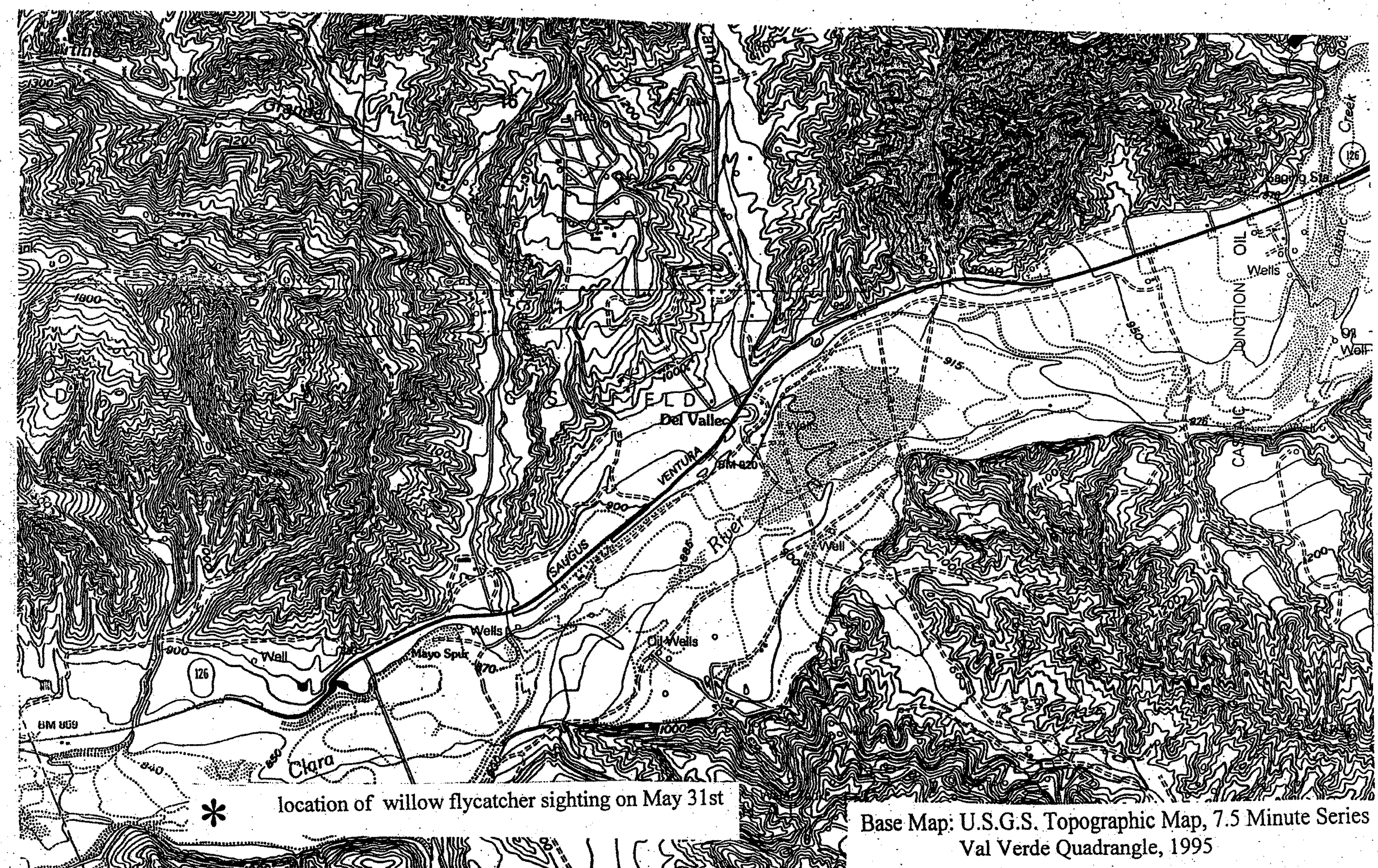
Did hydrological conditions change significantly among visits (did the site flood or dry out)? **No** (circle one)
If yes, describe in comments section below. no water present except for 50 yd section trickle in center of section.

Remember to attach a xerox copy of a USGS quad/topographical map (REQUIRED) of the survey area, noting the survey site and location of WIFL detections. You may also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map.

Comments (attach additional sheets if necessary):____

_____________________bird observed thought to be a migrant of a northern subspecies.

Figure 3. Map of area surveyed in 2004, showing location of Willow Flycatcher sighting.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Val Verde Quadrangle, 1995

Willow Flycatcher Survey and Detection Form (rev. 4/98)

Site Name____Santa Clara River, Newhall Ranch, Ventura Co.________________ Total Site No ________________

Was site surveyed in previous year? **Yes** No   Drainage Santa Clara River

If yes, what site name was used? __Lower Santa Clara River________

County __Ventura________________________   State__CA____ USGS Quad Name Val Verde____

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? X☐ ***Yes*** ☐ ***No***

Site Coordinates: Start: N__34 24.197________________ W 118 41.307____________ UTM

Stop: N__34 24.265________________ W 118 44.370____________ UTM   Zone ________

Elevation ____725-850 ft.____________ feet / meters (circle one)

***** Fill in additional site information on back of this page *****

Survey # Observer(s)	Date (m/d/y) Survey time	Number of WIFLs Found	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign Y or N	Comments about this survey (e.g., evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
D. Guthrie J.Sugden_____ ___________	Date 5/20 start 6.45 stop 9:15 total hrs _2.5_	0	0	0	n	Y	n	
D. Guthrie _J. Sugden_ ___________	Date 6/13 Start 6:30 Stop 9.30 total hrs _3___	0	0	0	n	Y	N	
D. Guthrie J. Sugden_____ ___________	Date 6/25 Start 6:30 Stop 9 total hrs _2.5_	0	0	0	n	Y	N	
D. Guthrie J. Sugden__ ___________	Date 7/5 start 6:45 stop 915 total hrs 2.5	0	0	0	n	Y	N	?
D. Guthrie _J. Sugden__ ___________	Date 7/17 start 6:45 stop 9:15 total hrs _2.5___	0	0	0	n	Y	N	

Overall Site Summary (Total only resident WIFLs)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? No
Total survey hrs__26.0 Sugden. 13.0 guthrie 13.0	0	0	0	0	If yes, report color combination(s) in the comments section on back of form

Name of Reporting Individual ____Dan Guthrie______________ Date Report Completed ___7/20/04________________

Submit the original of this form. Retain a copy for your records.

Fill in the following information completely. Submit original form. Retain copy for your records.

Name of Reporting Individual ___Dan Guthrie________________________ Phone # _909 607 2836____________

Affiliation __Claremont Colleges__________________________ Email dguthrie@jsd.claremont.edu______________

Site Name__Santa Clara River, Newhall Ranch, Ventura Co.________________________________
Did you verify that this site name is consistent with that used in previous years? **Yes** No ? (circle one)
called lower Santa Clara River in previous surveys.

Management Authority for Survey Area (circle one):

Federal Municipal/County State Tribal **Private**

Name of Management Entity or Owner (e.g., Tonto National Forest) _Newhall Land Co.______________________

Length of area surveyed: _3 miles_____ (specify units, e.g., miles = mi, kilometers = km, meters = m)

Did you survey the same general area during each visit to this site this year? **Yes** / If no, summarize in comments below.

If site was surveyed last year, did you survey the same general area this year? **Yes** / If no, summarize in comments below.

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

XX Native broadleaf plants
☐ Mixed native and exotic plants (mostly native)
(entirely or almost entirely, includes high-elevation willow)
☐ Mixed native and exotic plants (mostly exotic) ☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: __Cotrtonwood, willow, tamarisk________________________________

Average height of canopy: __40 ft.__________________________ (specify units)

Was surface water or saturated soil present at or adjacent to site? **Yes** – river free flowing through whole section.
Distance from the site to surface water or saturated soil: _____________ (specify units)

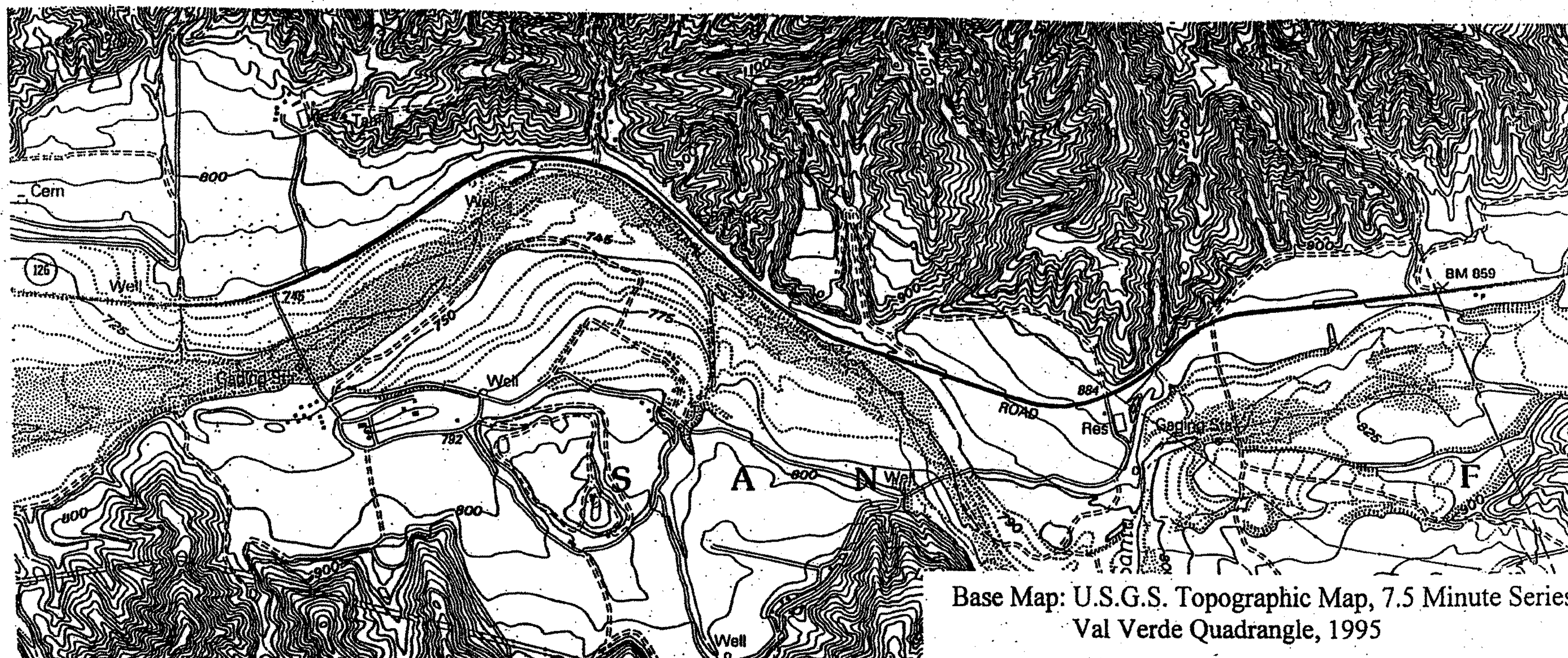
Did hydrological conditions change significantly among visits (did the site flood or dry out)? **No** (circle one)
If yes, describe in comments section below. no water present except for 50 yd section trickle in center of section.

Remember to attach a xerox copy of a USGS quad/topographical map (REQUIRED) of the survey area, noting the survey site and location of WIFL detections. You may also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map.

Comments (attach additional sheets if necessary):____

_________________two observers, each surveying approximately 1.5 miles.

Figure 4. Map of area surveyed in 2004, showing location of Willow Flycatcher sighting.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Val Verde Quadrangle, 1995

Bird Observations for Spring 2004 in the Proposed Potrero Valley, Long Canyon, Oak Valley and Onion Fields Development Areas, Near Valencia, California

BIRD OBSERVATIONS FOR SPRING 2004 IN THE PROPOSED POTRERO VALLEY, LONG CANYON, OAK VALLEY AND ONION FIELDS DEVELOPMENT AREAS NEAR VALENCIA, CALIFORNIA

Prepared for:

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Prepared by:

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REVISED

August 24, 2004

Bird observations for Spring, 2004 in the proposed Potrero Valley, Long Valley, Oak Valley and Onion Fields Development Areas near Valencia, California.

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Nature and Scope of Surveys

During the spring of 2004 surveys were conducted within the boundaries of the proposed Potrero Valley, Long Canyon, Oak Valley and Onions Fields Projects (Figure 1). Surveys were focused on determining presence or absence of California gnatcatcher, and followed U.S. Fish and Wildlife Service Guidelines for the gnatcatcher. Numbers of all species observed were noted (Table 1), and, in addition to the species noted above, special attention was placed on locating species considered rare and endangered or of Special Concern, and on determining numbers of brown-headed cowbirds.

Each survey was conducted on foot by observers well acquainted with both visual and auditory characteristics of southern California birds. All surveys occurred between 6:30 and 10:30 a.m. If the focus species (California gnatcatcher), was not visually observed, tapes of their calls were played in an attempt to elicit a response. Survey routes were designed to visit all areas within the Proposed Project Area. However, routes for regular coverage were selected through preliminary surveys and with the aid of detailed aerial photographic vegetational maps and were designed to cover all areas of appropriate habitat for California gnatcatcher.

Personnel for all surveys were David Crawford, Guy Bruyea and Scott Cameron, working under Federal Fish and Wildlife Service Permit numbers TE-821229-4 (Crawford), TE-837439-4 (Bruyea) and and TE-808242 (Cameron), issued under section 10(a)(1)(A) of the Endangered Species Act.

Habitat Condition and Bird Observations

The project area is roughly triangular in shape, bounded on the south by a ridge between Potrero and Salt Canyons, on the northeast by a ridge along the northern side of Long Canyon, and on the northwest by the Santa Clara River. The property consists of two main valleys, Potrero Canyon to the south and the lower half of Long Canyon to the north. Both valleys are generally east –west valleys, running westward into the Santa Clara River.

Potrero Canyon is a wide, gently sloping valley. Most of the valley is an active cattle ranch and cattle were grazing throughout the study period. Native plants have been removed from most of the valley and replaced with pasture grasses. The floor of the valley was mowed in May and June. Small streambeds with a narrow band of riparian vegetation meandered down the valley but were dry during the study period. Alkaline moist soils formed marshy areas in several spots on the western end of this valley. Scattered oak trees dot the hills on the southern side of the valley and coastal sage is found on higher slopes on both sides of the valley.

The top (eastern) half of Portrero Canyon is an active oil field, and during this study there was much activity associated with closing the oil field and removing equipment and contaminated soils.

Long Valley forms a narrow canyon with steep sides. The canyon bottom supports scattered oaks and Great Basin sage while the canyon sides are covered with dense chaparral with sections of coastal sage vegetation. The mouth of the canyon and the hilltop between the mouth of this canyon and Potrero Canyon are actively farmed and were under cultivation during the survey. Long Valley was also an active oil field, and oil activity was being curtailed during this study, involving removal of oil equipment and contaminated soil. Access to Potrero Valley, Long Valley, and the ridges between these two valleys and along the north side of Long Valley was greatly facilitated by a network of oil field roads.

A third section of the site, named Onion Fields, consists of active agricultural fields at the mouth of Long Canyon. A riparian woodland along the Santa Clara River and adjacent to these fields is a nesting site for least Bell's vireo. This area was not included in these surveys but has been regularly censused as part of studies along the Santa Clara River.

Observations of all birds are shown in Table 1. The numbers shown are of birds seen and heard, with heard individuals forming the majority of the observations. Numbers vary between censuses for several reasons. Some censuses were not complete but, rather, were focused on particular places or areas. Also, bird activity varies with season. Different species breed at different times of the year. In general, species are most easily observed when they are actively defending territories by song during the establishment of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, numbers observed increase. Thus, for most resident species, numbers of adult birds are most accurately censused in April and May, when territorial activity is at a maximum. A few species such as Anna's hummingbird that nest early in the season may be underestimated. Many species that nest in the area also migrate through the area to more northern portions of their ranges. Thus, numbers of nesting species observed in May, which include migratory birds passing through the area, do not give an accurate count of actual resident birds.

The avifauna of Potrero Canyon consists of species common to grasslands, such as western meadowlark, lark Sparrow, red-winged blackbird and kingbirds. Swallows nesting on cliffs along the Santa Clara River were frequently observed foraging over the area. In the oak trees acorn woodpecker and oak titmouse are found while in the areas of coastal sage California quail, Bewick's wren, lazuli bunting, California towhee, California thrasher and rufous-crowned sparrow are the common species. House finch, orioles and phainopepla were common in elderberry and tree tobacco along the valley floor.

The avifauna of Long Canyon consists mostly chaparral and coastal sage species on the canyon sides and oak woodland species along the canyon bottom. The irrigated agricultural fields at the mouth of Long Canyon attract ravens and a few riparian species from the adjacent Santa Clara River such as blue grosbeak and yellowthroat. Cliffs along the Santa Clara River and an isolated canyon extending up from the Santa Clara River between Long and Potrero Canyon provided nesting places for ravens, swallows and probably owls.

Comments on Threatened and Endangered Species

California Gnatcatcher *(Polioptila californica)*

The California Gnatcatcher is listed as a Threatened species under the Federal Endangered Species Act. Survey routes were selected to cover prime habitat for California Gnatcatcher, namely, stands of dense Coastal Sage Scrub. Surveys followed the protocol for non-NCCP areas, involving 6 surveys of each area, occurring between March 15 and June 30 (see Table 1 for exact dates). Because of the size of the area of sage scrub vegetation, two sets of surveys were completed, one primarily in Long Canyon and one primarily in Potrer and Oak Valley areas. Each survey involved two observers and lasted about 4 hours (6 to 10 am), with each observer covering an area containing about 80 acres of suitable habitat. Although all areas of coastal sage scrub habitat were surveyed, particular attention was placed on more open scrub areas with a slope of less than 40% and dominated by California sage as this type of vegetation has been shown to be preferred by gnatcatchers (Federal Register, 2003). Tapes of California gnatcatcher calls were played at regular intervals along all survey routes. No California gnatcatchers were heard or observed during this study.

Comments on Sensitive Species

Great Blue Heron *(Ardea herodias)*

Great Blue Herons are listed on the California Natural Diversity Data Base as a species that warrants monitoring. Individuals of this species are observed sparingly along the Santa Clara River before and after breeding season and occasionally visit agricultural fields and grasslands in the project area to hunt for mice and toads.

White-tailed Kite (*Elanus leucurus*)

This species, formerly the black-shouldered kite, is considered a Species of Special Concern by the State of California. Kites nest in the riparian forest along the Santa Clara River and a pair were observed once hunting over the grassy sections of this area.

Cooper's Hawk (*Accipiter cooperi*)

Cooper's hawk is considered a Species of Special Concern by the State of California. Cooper's hawks nest in woodlands along the Santa Clara River immediately north of the study area. Cooper's hawk were regularly observed hunting in the wooded areas of the project.

Southern California Rufous-crowned Sparrow (*Aimophila ruficeps canescens*)

This species is considered a California Special Concern species by the Department of Fish and Game and a Species of Concern by the Fish and Wildlife Service. Rufous-crowned sparrows are a fairly common resident and breeding species in denser sections of sage scrub habitat throughout the study site.

Lawrence's Goldfinch *(Carduelis canescens)*

This species is a highest priority species on the Audubon Birds to Watch list for 1996 and listed as a Bird of Management Concern by the Fish and Wildlife Service. This species was observed rarely in coastal sage areas.

Summary

No California gnatcatcher were observed during this study. Species of Concern on the site include the coastal sage species Southern California rufous-crowned sparrow and Lawrence's goldfinch, both of which may nest. Three other Species of Concern, great blue heron, Cooper's hawk and white-tailed kite were observed hunting on the site. The two latter species probably nest in riparian woodland along the Santa Clara River just north of the study area while the great blue heron is a migrant through the area.

References

Federal Register, 2003. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Coastal California Gnatcatcher (*Polioptila californica californica*) and Determination of Distinct Vertebrate Population for the California Gnatcatcher *Polioptila californica). Vol 68, no 79 April 24, 2003, p. 20228.*

Table 1. Observations of Birds in Potrero Valley, Oak Valley, Onion fields and Long Canyon, 2004:

Endangered Species and Species of Concern Shaded

SPECIES	STAT.	3/16	3/20	3/27	4/3	4/10	4/17	4/24	5/1	5/8	5/15	5/22	5/29
		Dates of Surveys											
Great Blue Heron	m,w	1	0	0	0	0	1	0	0	0	0	0	0
Turkey Vulture	s	3	1	3	1	0	3	2	1	2	5	2	3
White-tailed Kite	r	0	0	0	0	0	0	0	0	0	0	2	0
Cooper's Hawk	r	0	1	2	1	0	1	1	0	0	0	0	0
Red-tailed Hawk	r	1	3	1	1	2	2	1	1	2	2	1	4
American Kestrel	r	1	0	0	1	1	0	0	0	1	0	1	0
California Quail	r	18	24	30+	18	24	30+	30+	30+	30+	30+	30+	30+
Killdeer	r	0	0	0	0	0	0	0	0	2	0	1	0
Rock Dove	r	6	2	5	5	2	14	2	5	0	5	12	8
Mourning Dove	r	2	9	4	3	9	8	6	6	6	5	4	8
Greater Roadrunner	r	0	0	0	0	1	2	0	0	1	1	1	2
Barn Owl	r	0	0	1	0	0	0	1	0	0	0	0	0
White-th. Swift	r	0	0	0	0	0	0	0	0	0	0	2	0
Black-chin. Hummingbird	s	0	0	1	0	0	0	0	0	0	0	0	0
Anna's Hummingbird	r	6	11	10	5	4	5	6	4	5	8	6	11
Costa's Hummingbird	s	0	1	0	0	0	2	1	1	0	0	0	0
Rufous Hummingbird	m	0	0	1	0	0	0	0	0	0	0	0	0
Acorn Woodpecker	r	3	3	6	0	0	1	0	0	3	1	3	3
Northern Flicker	r	0	2	1	0	0	0	1	0	1	0	1	0
Black Phoebe	r	0	3	0	0	1	2	2	1	0	2	1	3
Cassin's Kingbird	s	0	0	0	0	0	1	0	0	0	0	0	0
Western Kingbird	s	0	0	8	3	4	6	5	2	7	1	5	9
Western Scrub Jay	r	17	9	11	9	12	18	15	10	14	13	10	17
American Crow	r	12	8	9	4	0	3	10	6	9	8	10	13
Common Raven	r	4	2	0	2	1	2	2	1	1	2	2	2
Violet-green Swallow	s	0	0	0	0	5	2	0	0	0	0	1	0
N. Rough-winged Swallow	s	0	0	0	0	0	5	4	5	2	5	8	6
Cliff Swallow	s	0	0	0	2	4	2	6	2	6	6	5	7
Barn Swallow	s	0	0	0	0	0	3	0	0	0	0	0	0
Oak Titmouse	r	0	0	2	0	2	0	0	0	0	0	0	0
Bushtit	r	9	16	7	8	2	11	8	8	2	0	0	4
Bewick's Wren	r	19	21	26	9	20	7	11	4	11	7	15	18
House Wren	r	1	0	3	1	0	0	1	1	0	0	1	0
Blue-gray Gnatcatcher	r	0	2	6	0	0	0	0	0	0	0	0	0
Western Bluebird	r	0	2	3	0	0	1	2	2	2	0	1	0
Wrentit	r	7	14	13	11	8	6	10	3	8	6	10	14
Northern Mockingbird	r	0	4	5	0	2	2	3	3	4	5	3	5
California Thrasher	r	5	2	5	5	2	8	3	2	5	1	4	6
European Starling	r	8	26	14	8	6	9	4	8	11	3	5	4
Phainopepla	r	0	0	0	0	0	0	0	0	2	3	6	8

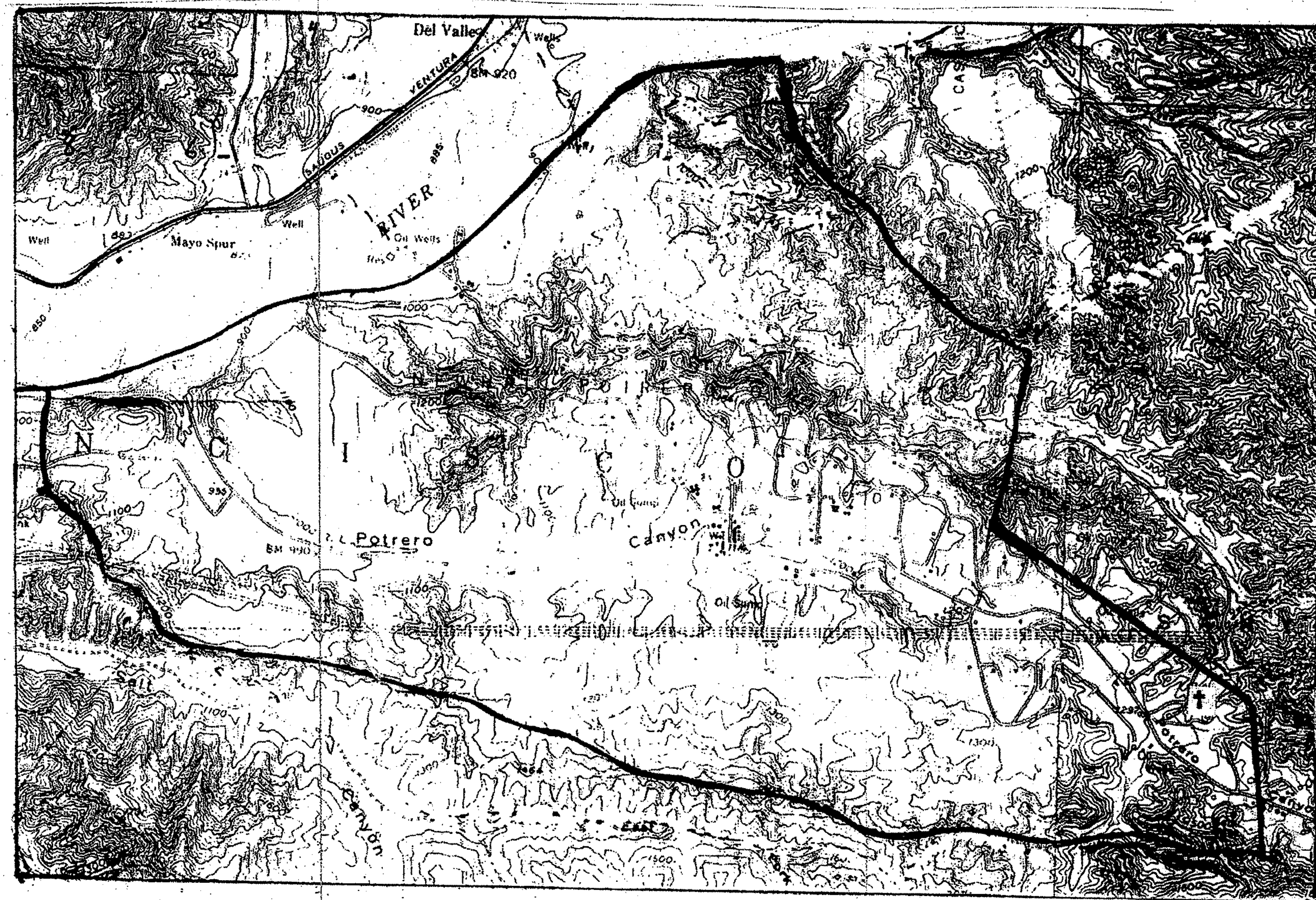
Table 1 (cont.). Observations of Birds in Potrero Valley, Oak Valley, Onion fields and Long Canyon, 2004

Endangered Species and Species of Concern Shaded

		Dates of Surveys											
SPECIES	**STATU**	**3/16**	**3/20**	**3/27**	**4/3**	**4/10**	**4/17**	**4/24**	**5/1**	**5/8**	**5/15**	**5/22**	**5/29**
Yellow-rumped Warbler	w,m	2	0	1	0	0	0	0	0	0	0	0	0
Spotted Towhee	r	30+	30+	30+	30+	30+	30+	30+	30+	30+	30+	30+	30+
California Towhee	r	30+	30+	30+	30+	30+	30+	30+	30+	30+	30+	30+	30+
Rufous-crowned Sparrow	r	0	2	4	1	1	3	2	1	1	0	0	0
Lark Sparrow	r	0	0	0	0	2	0	0	0	2	0	0	0
Savannah Sparrow	r	0	0	0	0	0	0	0	2	0	4	0	6
Fox Sparrow	w,m	0	0	4	0	0	0	0	0	0	0	0	0
Song Sparrow	r	0	0	0	0	0	0	0	2	0	0	1	2
White-crowned Sparrow	w,m	6	11	4	4	10	4	6	0	0	0	0	0
Black-headed Grosbeak	s	0	0	0	0	1	0	0	3	0	2	0	0
Blue Grosbeak	s	0	0	0	0	0	0	0	0	0	3	0	1
Lazuli Bunting	s	0	0	0	0	0	0	0	0	0	2	0	0
Red-winged Blackbird	s	0	0	0	0	5	18	12	9	19	10	12	12
Western Meadowlark	r	0	0	0	0	5	1	3	0	2	3	5	4
Brewer's Blackbird	r	8	0	0	0	4	0	0	0	0	0	6	3
Bullock's Oriole	s	0	0	0	1	5	2	3	3	3	5	4	8
House Finch	r	2	9	13	4	4	10	13	9	14	12	13	22
Lesser Goldfinch	r	0	2	0	0	0	1	4	4	5	1	3	11
Lawrence's Goldfinch	r	0	0	1	0	1	0	0	0	0	0	0	0

Status: m, migrant; r, resident; s, summer only; w, winter

Figure 1. Outline of areas surveyed for the proposed Potrero Valley, Long Canyon, Oak Valley and Onion Fields Development.



Base Map: U.S.G.S. 7.5 minute topographic map for Newhall, 1952 and Val Verde, 1968, California, both photorevised 1988.

Bird Observations in the Proposed Homestead and Chiquito Areas, Near Valencia, California, 2004

BIRD OBSERVATIONS IN THE PROPOSED HOMESTEAD AND CHIQUITO AREAS, NEAR VALENCIA, CALIFORNIA, 2004

Prepared for:

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REVISED

August 24, 2004

Bird Observations in the Proposed Homestead, Chiquito and River Village Project Areas near Valencia, California, 2004

Prepared by: Daniel A. Guthrie
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Nature and Scope of Surveys

During the spring of 2004 surveys were conducted within the boundaries of the proposed Homestead, Chiquito and River Village Project areas (Figure 1). Surveys were focused on determining presence or absence of California gnatcatcher, and followed U.S. Fish and Wildlife Service Guidelines for this species. Surveys followed the protocol for non-NCCP areas, involving 6 surveys of each area, occurring between March 15 and June 30 (see Table 1 for exact dates). Each survey involved two observers and lasted up to 4 hours (6:30 to 10:30 a.m.), with each observer covering an area less than 80 acres of suitable habitat.

Each survey was conducted on foot by observers well acquainted with both visual and auditory characteristics of southern California birds. Tapes of calls of California gnatcatcher were played periodically along survey routes in an attempt to elicit a response. Survey routes were designed to visit all areas within the Proposed Project Area. However, routes for regular coverage were selected through preliminary surveys and were designed to cover all areas of appropriate habitat for the focus species. Personnel for all surveys were David Crawford, Guy Bruyea and Scott Cameron, working under Federal Fish and Wildlife Service Permit numbers TE-821229-4 (Crawford), TE-837439-4 (Bruyea) and TE-808242 (Cameron), issued under section 10(a)(1)(A) of the Endangered Species Act.

On each survey, numbers of all species observed were noted and, in addition to the gnatcatcher, special attention was placed on locating species considered rare and endangered or of Special Concern, and on determining numbers of raptoral birds. Table 1 presents all observations during these surveys.

Habitat Condition and Bird Observations.

Much of the Homestead Project Area (Figure 1) was burned in 2003 with the result that the area was covered primarily with grasses. However, some sections of sage scrub habitat remained unburned along the sides of San Martinez Grande Canyon Rd. The River Village Project area consists almost entirely of agricultural fields under cultivation and were not surveyed. The Chiquito Project Area was unburned and covered with sage scrub vegetation. Surveys were focused on the sections of sage scrub vegetation with a slope of less than 40% in the Chiquito Project area and along San Martinez Grande Canyon Rd.

Observations of all birds are shown in Table 1. The numbers shown are of birds seen and heard, with heard individuals forming the majority of the observations. Numbers vary between censuses for several reasons. Some censuses were not complete but, rather, were focused on particular places or areas. Also, bird activity varies with season. Different species breed at different times of the year. In general, species are most easily observed when they are actively defending territories by song during the establishment of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, numbers observed increase. Thus, for most resident species, numbers of adult birds are most accurately censused in April and May, when territorial activity is at a maximum. A few species such as Anna's hummingbird that nest early in the season may be underestimated. Many species that nest in the area also migrate through the area to more northern portions of their ranges. Thus, numbers of nesting species observed in May, which include migratory birds passing through the area, do not give an accurate count of actual resident birds.

Comments on Threatened and Endangered Species

California Gnatcatcher (*Polioptila californica*)

The California Gnatcatcher was listed as a Threatened species under the Federal Endangered Species Act in 1993. Preferred habitat includes various sage scrub communities, often dominated by California sage (*Artemesia californica*) and buckwheat (*Eriogonum sp.*) California gnatcatchers generally avoid nesting in areas with a slope of greater that 40%. Although the area surveyed here is outside the Designated Critical Habitat for the California gnatcatcher, it is near to areas designated as critical habitat on the south side of route 126. (Federal Register, 2003)

Survey routes were selected to cover prime habitat for California Gnatcatcher, namely, stands of dense Sage Scrub in canyon bottoms and on north facing hillsides with slopes of less than 40%. No California gnatcatchers were heard or observed during our surveys.

Comments on Sensitive Species

Loggerhead Shrike (*Lanius ludovicianus*)

This is a California Species of Special Concern. A single shrike was observed on April 6$^{th.}$

Southern California Rufous-crowned Sparrow (*Aimophila ruficeps canescens*)

This species is considered a California Special Concern species by the Department of Fish and Game and a Species of Concern by the Fish and Wildlife Service. Rufous-crowned sparrows are a fairly common resident and breeding species in sage scrub habitat and were observed as uncommon residents in the study area.

Summary

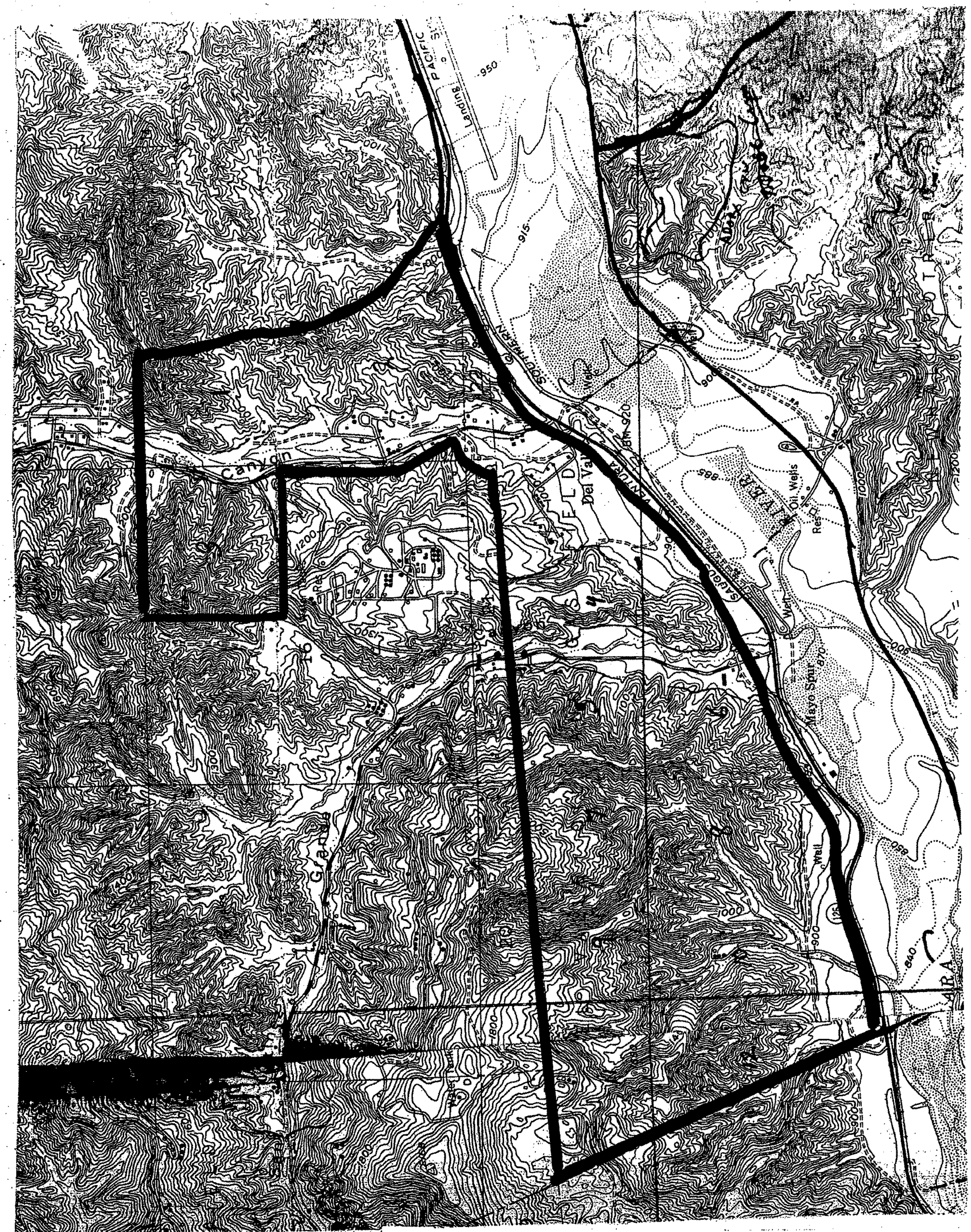
California gnatcatchers were not observed on the site. Birds of the site are those typical of dry sage scrub habitat and two of the observed species. loggerhead shrike and Southern California rufous-crowned sparrow, are considered Species of Concern.

References

Federal Register, 2003. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Coastal California Gnatcatcher (*Polioptila californica californica*) and Determination of Distinct Vertebrate Population for the California Gnatcatcher *Polioptila californica). Vol 68, no 79 April 24, 2003, p. 20228.*

Table 1. Bird Observations on the Homestead and Chiquito Areas, 2004:							
Endangered Species and Species of Concern Shaded							
		Dates of Surveys					
SPECIES	**STATUS**	**3/23**	**4/6**	**4/20**	**5/11**	**5/25**	**6/2**
Turkey Vulture	s	2	4	3	1	0	2
Red-tailed Hawk	r	2	2	2	1	1	1
California Quail	r	30+	30+	17	30+	17	30+
Western Gull	m	8	15	2	10	4	18
Rock Dove	r	0	8	4	0	4	5
Mourning Dove	r	11	6	3	3	3	5
Greater Roadrunner	r	1	1	0	1	0	0
Anna's Hummingbird	r	4	4	3	2	3	5
Costa's Hummingbird	s	0	0	1	0	0	0
Acorn Woodpecker	r	1	0	0	0	0	0
Black Phoebe	r	1	0	0	0	0	0
Say's Phoebe	r	0	1	0	0	0	0
Western Kingbird	s	6	5	3	4	3	0
Loggerhead Shrike	r	0	1	0	0	0	0
Western Scrub Jay	r	21	7	7	7	7	8
American Crow	r	9	5	4	5	4	4
Common Raven	r	3	4	2	4	2	1
N. Rough-winged Swallow	s	0	2	0	3	0	9
Cliff Swallow	s	0	0	3	0	3	4
Bushtit	r	12	9	4	9	4	6
Bewick's Wren	r	12	9	8	9	8	11
Wrentit	r	17	4	6	4	6	9
Northern Mockingbird	r	5	6	1	6	3	4
California Thrasher	r	8	2	6	1	2	2
European Starling	r	0	6	0	0	0	2
Yellow-rumped Warbler	w,m	0	3	0	0	0	0
Common Yellowthroat	r	1	0	0	0	0	0
Spotted Towhee	r	30+	11	9	10	9	14
California Towhee	r	30+	23	16	23	16	22
Rufous-crowned Sparrow	r	4	0	0	1	0	0
Chipping Sparrow	w,m	1	0	0	0	0	0
Lark Sparrow	r	17	0	0	0	0	0
Savannah Sparrow	r	3	2	0	2	0	0
Fox Sparrow	w,m	2	0	0	0	0	0
Song Sparrow	r	2	0	0	0	0	0
White-crowned Sparrow	w,m	26	17	2	6	2	0
Black-headed Grosbeak	s	0	0	1	1	0	0
Western Meadowlark	r	1	2	0	2	0	1
Brewer's Blackbird	r	0	3	0	3	0	0
House Finch	r	4	4	8	4	8	12
Lesser Goldfinch	r	0	2	3	2	3	6
Status: m, migrant; r, resident; s, summer only; w, winter							

Figure 1. Boundaries of Homestead and Chiquito Projects.



Base Map: U.S.G.S. 7.5 Minute topographic map for Val Verde, California, 1952, photorevised 1969

Bird Observations During 2004 at Castaic Junction, an Area on the north Side of the Santa Clara River at the Junction of SR-126 and I-5

BIRD OBSERVATIONS DURING 2004 AT CASTAIC JUNCTION, AN AREA ON THE NORTH SIDE OF THE SANTA CLARA RIVER AT THE JUNCTION OF STATE ROUTE 126 AND INTERSTATE 5. NEAR VALENCIA, CALIFORNIA

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REVISED

August 24, 2004

Bird Observations during 2004 at Castaic Junction, an area on the north side of the Santa Clara River at the Junction of State Route 126 and Interstate 5, near Valencia, California

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Nature and Scope of Surveys

During the spring and early summer of 2004 bird surveys were conducted on the north side of the Santa Clara River at Castaic Junction. The surveys covered an area roughly triangular in shape and bounded on the northeast by Interstate 5, on the northwest by State Route 126 and on the southern edge by the Santa Clara River (Figure 1).

Surveys were focused on determining presence or absence of California gnatcatcher, and followed U.S. Fish and Wildlife Service protocol for this species in non-NCCP areas. This protocol requires 6 surveys between March 15 and June 30 (see Table 1 for exact dates). Each survey involved one observer and lasted about 1 hour (9 to 10 am), and covered no more than 40 acres of suitable habitat

Each survey was conducted on foot by observers well acquainted with both visual and auditory characteristics of southern California birds. Tapes of calls of California gnatcatcher were played periodically along survey routes in an attempt to elicit a response. Survey routes were designed to visit all areas within the Proposed Project Area. However, routes for regular coverage were selected through preliminary surveys and were designed to cover all areas of appropriate habitat for the focus species. All surveys were conducted by Daniel A. Guthrie, working under Federal Fish and Wildlife Service Permit number TE810394-2, issued under section 10(a)(1)(A) of the Endangered Species Act.

On each survey, numbers of all species observed were noted and, in addition to the gnatcatcher, special attention was placed on locating species considered rare and endangered or of Special Concern, and on determining numbers of raptoral birds. Table 1 presents all observations during these surveys.

Habitat Condition and Bird Observations.

Over 80 % of the study area consists of agricultural fields. When crops were present, these fields were irrigated and attracted a few birds from adjacent riparian areas. During periods after plowing, blackbirds and killdeer were found foraging on the bare dirt areas.

A series of flowering eucalyptus trees along the frontage road in the area were attractive to starlings, orioles and wintering and migrating warblers. A pair of kestrels nested in one of these trees and red-shouldered hawk often hunted over uncultivated sections of the area.

A ditch containing irrigation and urban runoff (Figure 1) entered the site from the east and formed the southern border of the agricultural field. This ditch, containing cattails, was the only place within the study site where wet riparian species successfully nested, namely black phoebe, song sparrow and common yellowthroat.

The southwestern side of the study area bordered the Santa Clara River, with little or no transitional zone between the agricultural field area and the riparian river channel. Along most of this edge the river had cut into the bank, resulting in a cliff up to 15 feet high with agricultural field at the top and riparian vegetation directly below. In order to prevent further erosion of the river bank in this section, a new channel for the river was created by bulldozing in the spring of 1998. This new channel has moved the active river channel away from the field and road edge and has created a zone of low lying land along the north side of the riparian zone that is protected from erosion and scouring by spring floods. This protected section is wet from seepage from the main channel and from agricultural and urban runoff, with the result that a dense stand of willows has developed along the north edge of the riparian zone. These willows are now six years old and are prime habitat for both willow flycatchers and least Bell's vireo. This proximity of excellent riparian habitat to the agricultural area, and the need for any development of the lands adjacent to the river to encroach into the riparian area while stabilizing this bank are the reasons why some species from the riparian area immediately adjacent to the agricultural fields are mentioned in this report.

Observations of all birds are shown in Table 1. The numbers shown are of birds seen and heard, with heard individuals forming the majority of the observations. Numbers vary between censuses for several reasons. First, there was fog on some censuses which decreased bird activity. Secondly, some censuses were not complete but, rather, were focused on particular places or areas. Thirdly, bird activity varies with season. Different species breed at different times of the year. In general, species are most easily observed when they are actively defending territories by song during the establishment of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, numbers observed increase. Thus, for most resident species, numbers of adult birds are most accurately censused in April and May, when territorial activity is at a maximum. A few species such as Anna's hummingbird that nest early in the season may be underestimated. Many species that nest in the area also migrate through the area to more northern portions of their ranges. Thus, numbers of nesting species observed in May, which include migratory birds passing through the area, do not give an accurate count of actual resident birds.

Comments on Threatened and Endangered Species

California Gnatcatcher (*Polioptila californica*)

Lack of any coastal sage scrub vegetation in the study area make it an unsuitable habitat for this species, and none were observed.

Least Bell's Vireo (*Vireo bellii pusillus*)

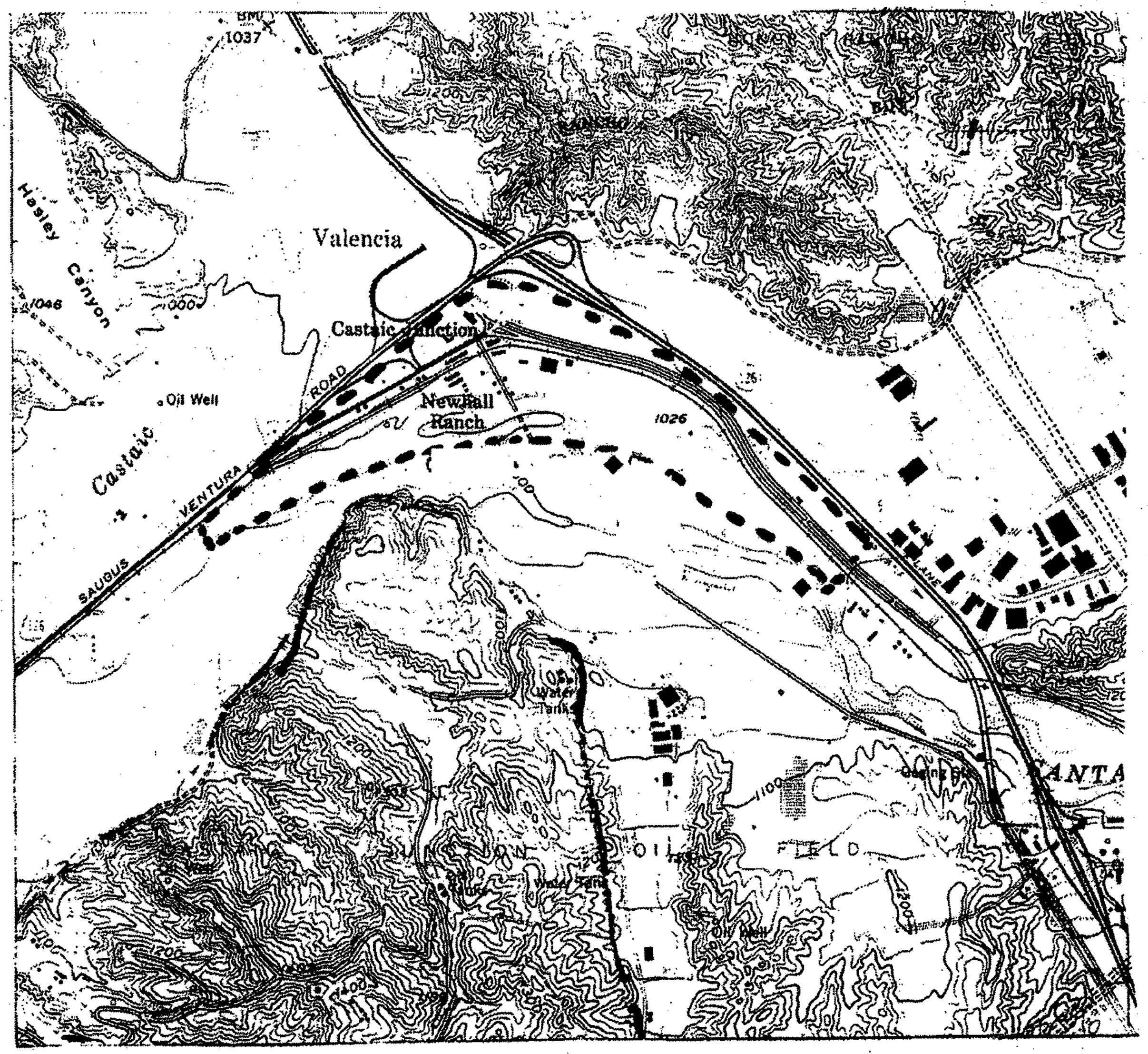
Although no least Bell's vireos were found on the study site, this species was heard and seen at two locations in the riparian zone immediately south of the study area where they nested (Figure 1). One of these nesting sites is immediately adjacent to the agricultural field.

Summary of Bird Sightings

No California gnatcatchers or any other Endangered or Threatened Species or Species of Concern was observed in the survey area. Least Bell's vireo nested in the riparian habitat adjacent to the site, and several other species of concern (yellow warbler, yellow-breasted chat) were also present in this riparian section. These species might be affected by construction activities along this riparian edge if these were to occur during the nesting season for these species.

Table 1. Bird Observations at Castaic Corner, 2004:							
Endangered Species and Species of Concern Shaded							
				Dates of Surveys			
SPECIES	**STATUS**	**4/27**	**5/18**	**5/27**	**6/9**	**6/15**	**6/23**
Turkey Vulture	s	1	0	0	0	0	0
Red-shouldered Hawk	r	1	1	0	0	0	1
American Kestrel	r	0	0	0	0	1	1
California Quail	r	4	0	2	4	0	0
Killdeer	r	0	0	1	0	2	0
Rock Dove	r	2	0	0	0	0	0
Mourning Dove	r	0	0	4	3	5	2
Black Phoebe	r	1	2	2	0	0	1
Ash-throated Flycatcher	s	1	1	1	0	2	0
Western Scrub Jay	r	5	2	0	0	1	0
American Crow	r	1	0	4	0	8	8
Common Raven	r	1	0	2	4	8	4
N. Rough-winged Swallow	s	4	3	0	0	0	2
Cliff Swallow	s	0	0	3	30	0	0
Barn Swallow	s	0	1	0	1	0	0
Bewick's Wren	r	2	0	0	0	1	0
House Wren	r	2	0	0	0	0	0
Western Bluebird	r	0	0	0	2	0	0
American Robin	r	0	0	0	2	0	0
California Thrasher	r	0	0	0	0	1	0
European Starling	r	6	0	1	2	0	4
Common Yellowthroat	r	0	0	1	0	0	0
Spotted Towhee	r	0	0	2	0	0	2
California Towhee	r	4	0	4	4	3	2
Song Sparrow	r	2	2	4	4	0	2
Black-headed Grosbeak	s	0	1	1	2	1	0
Blue Grosbeak	s	0	3	0	0	0	1
Red-winged Blackbird	s	2	10	18	9	8	6
Brewer's Blackbird	r	0	1	0	0	0	0
Hooded Oriole	s	0	0	0	0	0	1
Bullock's Oriole	s	0	0	2	0	0	0
House Finch	r	16	15	13	10	9	36
Lesser Goldfinch	r	0	2	0	0	0	0
American Goldfinch	w,m,r	0	0	0	0	0	1
House Sparrow	r	2	0	8	0	0	10
Status: m, migrant; r, resident; s, summer only; w, winter							

Figure 1. Survey area with indication of location of least Bell's vireo nesting.



- - - - Approximate boundary of survey area.

◆ - Least Bell's vireo nest site.

Base Map: U.S.G.S. 7.5 minute topographic map for Newhall, California, 1952, photorevised 198[illegible]

**Bird Surveys Along a Portion of the Santa Clara River and Its Tributaries
Upstream from the Castaic Creek Confluence,
Near Valencia, California, 2004**

BIRD SURVEYS ALONG A PORTION OF THE SANTA CLARA RIVER AND ITS TRIBUTARIES UPSTREAM FROM THE CASTAIC CREEK CONFLUENCE, NEAR VALENCIA, CALIFORNIA, 2004

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August 24, 2004

REVISED

Bird Surveys along a Portion of the Santa Clara River Upstream from the Castaic Creek Confluence, near Valencia, California, 2004

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Nature and Scope of Surveys

During the spring and early summer of 2004 surveys were conducted along a section of the Santa Clara River and its tributaries near Valencia, California (Figure 1). Surveys were focused on determining presence or absence of yellow-billed cuckoo, least Bell's vireo and southwestern willow flycatcher, and followed U.S. Fish and Wildlife Service Survey Protocols for the latter two species. Numbers of all species observed were noted, and, in addition to the three species noted above, special attention was placed on locating species considered rare and endangered or of Special Concern, and on determining numbers of brown-headed cowbirds.

Each survey was conducted on foot by observers well acquainted with visual, auditory and behavioral characteristics of southern California birds. Survey routes were designed to cover all areas of each section of the river, with emphasis placed on wetter habitats where least Bell's vireos and other sensitive riparian species are most likely to occur. All surveys occurred between 6:00 and 10:00 a.m. If focus species (yellow-billed cuckoo, least Bell's vireo, and southwestern willow flycatcher), were not visually observed, tapes of their calls were played in an attempt to elicit a response. Personnel for all surveys were Daniel A. Guthrie and Judith A. Sugden, both working under Federal Fish and Wildlife Service Permit number TE810394-2, issued under section 10(a)(1)(A) of the Endangered Species Act and under an MOU from State of California Department of Fish and Game, dated April 23, 2003.

To facilitate surveys and observe the coverage guidelines for focus species, the area was divided into eight sections (Figure 1). Delineation of the eight areas and comments on each follow. Surveys of all sections of the river system were conducted five times during the nesting season and followed the Revised Protocol (Fish And Wildlife Service, July 2000) for southwestern willow flycatcher. Several sections of the river (Areas 4, 6-8) had no running water or wet riparian vegetation and were not considered suitable habitat for least Bell's vireo. However, areas 1-3,5 had flowing water and wet riparian vegetation. These sections were surveyed according to the protocol for least Bell's vireo as outlined by the Fish and Wildlife Service. This latter protocol requires 8 surveys between April 10 and July 31st, at least 10 days apart.

Habitat Condition and Bird Observations.

The riparian zone of the Santa Clara River, as described here, consists of two major habitat types, a wet riparian zone and a dry riparian woodland. The wet riparian zone consists of obligatory wet plants such as cattail and watercress found in continually moist soils along the active river channel and some willow, tamarisk and *Baccharis* shrubs also found in this zone. This zone undergoes regular scouring in the winter which removes most annual vegetation and, depending on the severity of the flooding, some of the larger plants. These plants gradually repopulate the riparian zone, becoming completely established by July.

The dry riparian zone consists of larger trees and shrubs further back from the active river which obtain moisture through their deep root system. During 2004 rainfall was minimal with the result that in this zone annual plants were found only in a few areas that received runoff from nearby suburbs and agricultural fields.

Observations of all birds are shown in Tables 1-8. The numbers shown are of birds seen and heard, with heard individuals forming the majority of the observations. Numbers vary between censuses. Bird activity varies with season. Different species breed at different times of the year. In general, species are most easily observed when they are actively defending territories by song during the establishment of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, numbers observed may increase. Thus, for most resident species, numbers of adult birds are most accurately censused in April and May, when territorial activity is at a maximum. A few species such as Anna's hummingbird that nest early in the season may be underestimated. Many species that nest in the area also migrate through the area to more northern portions of their ranges. Thus, numbers of nesting species observed in May, which include migratory birds passing through the area, do not give an accurate count of actual resident birds.

Area 1 (Table 1). Santa Clara River; The Old Road Bridge to the mouth of Castaic Creek.

Length of section, 3.5 miles. The Santa Clara River flows continuously in this section, receiving most of its flow from the Valencia waste water outfall near the upstream end of this section and from some irrigation runoff from Magic Mountain and agricultural fields along the north side.

Along the upper portion of this section, wet riparian vegetation forms a narrow strip along the main channel of the Santa Clara River. This section was little damaged by spring flooding. The extensive willow riparian zone near Magic Mountain and along the agricultural fields north of the river also was not damaged. Scouring did occur further downstream towards the mouth of Castaic Creek. Least Bell's vireos nested near Castaic Junction and white-tailed kite nested in the dry woodlands towards the mouth of Castaic Creek.

Area 2 (Table 2). Santa Clara River; McBean Parkway downstream to The Old Road.

Length of section, 1.4 miles. Although the Santa Clara River has flowed continuously in this section in past years, in 2004 flow was very low. There was no flow from McBean Parkway west to the pipeline crossing where seepage within the stream channel began a small flow. This flow stopped at the railroad crossing. Seeps near Interstate 5 provided flow between Interstate 5 and The Old Road. Lack of water resulted in their being little wet riparian vegetation during most of the survey period. The wet willow forest near the mouth of San Francisquito Creek was carefully surveyed for focus species as migrating willow flycatcher have been seen here in previous years. None were found this year.

Area 3 (Table 3). Santa Clara River; Bouquet Canyon Road downstream to McBean Parkway

Length of section, 1.2 miles. Water, supplied by the Saugus wastewater outfall at the Bouquet Canyon Bridge usually flows the length of this section but this year the western half of this section was dry. This resulted in a reduction in birds that prefer wet riparian vegetation, such as song sparrow and yellowthroat.

Area 4 (Table 4). Santa Clara River; Bouquet Canyon Road upstream to DWP transmission lines.

Length of section, 2.3 miles. The river channel in this section consists of a broad, flat, dry wash with narrow margins of dry riparian woodland. Within the channel are areas of coastal sage scrub habitat. This section of the Santa Clara River in past years has been wet only briefly during spring rains and due to water release from pumps one mile upstream from Bouquet Canyon Road. This section was completely dry during all surveys this year. This resulted in the almost complete absence of riparian species such as song sparrow and yellowthroat.

Rufous-crowned sparrow and loggerhead shrike, resident on hillsides along the river, were observed visiting the stream channel. Aside from migrants, most of the other birds observed in this section are characteristic of coastal sage and dry riparian woodlands.

Area 5 (Table 5). Castaic Creek; Route 126 to Interstate 5.

Length of section, 1.8 miles. Except for pockets of wet vegetation formed near irrigation runoff channels, and remnant puddles from spring water releases near the middle and lower part of this section , the creek was dry much of this spring. Despite this lack of permanent water flow, many wet riparian species (song sparrow, yellowthroat, nested successfully. Cliff and rough-winged swallows nested under the three bridges that cross this section of the river. The extensive willow forest on this section where least Bell's vireo once nested has matured and was dry much of this year . Two willow flycatchers were observed here in late May but could not be refound on any subsequent visits.

Area 6 (Table 6). San Francisquito Creek; Santa Clara River upstream to Copper Hill Drive Crossing.

Length of section, 2.5 miles. Along most of this section the riparian zone consists of a broad sandy channel. In the upper part of this section the creek is bordered by land undergoing development. Coastal sage scrub plants occur within the channel as do sections of dry riparian woodland consisting mostly of cottonwoods. Although some water releases from upstream dams occurred during the winter months, no water was present during the survey period except along short sections due to suburban runoff at Copper Hill and at the Decoro Drive crossings Barn owls nested under the Copper Hill bridge and a Cooper's hawk nested about ½ mile south of the Copper Hill crossing.

Area 7 (Table 7). South Fork of the Santa Clara River; McBean Parkway to Magic Mountain Parkway (Route 126).

Length of section, 1.0 miles. The channel along this section of the South Fork is narrow and very sandy. Along most of this section vegetation is restricted to a narrow band of dry woodland at each side of the channel and a few pockets of wet vegetation supported by runoff from adjacent development. No flooding occurred on the South Fork and perennial vegetation was poorly developed due to the lack of much spring rainfall. The cattail marsh near the confluence with the main channel of the Santa Clara river was soured by spring floods and lack of water from the main channel resulted in no new growth during the study period.

Area 8 (Table 8). South Fork of the Santa Clara River, Route 126 upstream to Newhall Creek.

Length of section, 1.4 miles. This section of the river consists of a wide sandy channel intersected by several concrete sills designed to restrict sand movement and flood damage. The river is entirely bordered by developed areas but contains small islands of dry riparian vegetation and some wet riparian areas formed by runoff from culverts along the sides of the creek. No flooding has occurred on this section of the river in recent years and riparian vegetation around these culverts continues to develop into areas of cottonwood and willow woodland, resulting in the continued increase in riparian species along this section of the river.

Comments on Threatened and Endangered Species

Yellow-billed Cuckoo ***(Coccyzus americanus)***

The Yellow-billed Cuckoo is listed as a State Endangered Species. Despite playing taped calls of this species during June and July surveys, no individuals of this species were observed in 2004.

Southwestern Willow Flycatcher ***(Empidonax traillii extimus)***

This subspecies is listed as Federally Endangered under the Federal Endangered Species Act. Willow flycatchers were once widespread in wet riparian woodland in southern California but now fewer than 70 pair remain, with the major concentrations being along the Kern River and the Santa Margarita River in San Diego County. Following the Revised Protocol (Fish And Wildlife Service, July 2000) five surveys (see tables 1-8 for dates) were conducted specifically for southwestern willow flycatcher. All surveys occurred between 6:00 and 10:00 am. and used taped calls to elicit a response if flycatchers were not first observed.

A single willow flycatcher was observed on the South Fork of the Santa Clara river on June 11. This bird did not call until a tape was played. Two willow flycatchers were observed on Castaic Creek on May 31st. One of these birds was located by its calling. Despite attempts to relocated these birds on subsequent visits, they could not be relocated.

Willow flycatchers are fairly common migrants through southern California and most of the migrants are believed to be of the more northern common subspecies of willow flycatcher, *E. t. brewsteri,* which breeds throughout southern Canada and the northern United States, rather than representatives of the southwestern subspecies *E. t. extimus*. Southwestern willow flycatchers are positively identified primarily by nesting within the geographic area of their range or by measurements of in hand specimens. Both observations in 2004 were at a time when the northern subspecies is migrating through the area, and lacking any subsequent evidence of nesting, this observations of a willow flycatcher cannot be positively identified as belonging to the southwestern form of willow flycatcher.

The report forms required for this species are attached and will be forwarded to the Ventura Office of the U.S. Fish and Wildlife Service.

Least Bell's Vireo ***(Vireo bellii pusillus)***

Surveys of the wet riparian areas (Areas 1-3,5) followed U.S. Fish and Wildlife Service Guidelines for least Bell's vireo. Eight surveys were conducted between April 10 and July 31 (see Tables 1-3,5 for dates). All surveys occurred between 6:00 and 10:00 am.. The least Bell's vireo is a very vocal species and most birds were located without the use of taped calls. However, tapes were used to elicit responses in early spring, before vireo arrival, in late summer, when vireos were less vocal, and in areas of marginal habitat or where vireos were expected from previous sightings but could not be heard. A calling vireo was considered a territorial male. If a second, silent bird was observed in the same area, a pair was considered to be present.

However, to avoid disturbance, no efforts were made to find nests, locate with certainty females in territories, or to locate fledged young in established territories. Numbers of vireos shown in Table 1 are actual numbers of birds observed. These numbers include all vireos, both singing and silent. In order to avoid disturbing vireos, no special efforts were made to determine nesting success or presence of leg bands once birds were observed. However, at each location where vireos were found, they were observed at least once, and no leg bands were observed.

Least Bell's vireos were regularly observed along the Santa Clara River at Castaic Junction in an extensive stand of willows (Figure 3, area 7). An early survey (May 1st) found 10 singing birds, but 4 of these were not found in any subsequent visits. . Vireos were regularly heard in at least six locations and are thought to represent mated pairs. Although vireos have been present in previous years along Castaic Creek (Figure 3, area 6), none were found there this year.

Comments on Sensitive Species

Great Blue Heron *(Ardea herodias)*

Great blue herons are listed on the California Natural Diversity Data Base as a species that warrants monitoring. Herons were occasionally observed along the Santa Clara River at Castiac Junction. No nesting was observed

Great Egret (Ardea alba)

The great egret is listed on the California Natural Diversity Data Base as a species that warrants monitoring. A single individual was near Castaic Junction in early Spring. There was no evidence of breeding.

White-tailed Kite (*Elanus leucurus*)

This species, formerly the black-shouldered kite, is considered a Species of Special Concern by the State of California. A pair of kites nested near the railroad bridge between the McBean crossing and Interstate 5 and a second pair nested in the dry riparian woodland near Travel Village west of Castaic Junction. A third pair may have nested along the upper reaches of San Francisquito Creek.

Cooper's Hawk *(Accipiter cooperii)*

Cooper's hawk is considered a Species of Special Concern by the State of California. A Cooper's Hawk nested along San Francisquito Creek a little below the Copper Hill Crossing. Nesting also probably occurred near Travel Village west of Castaic Junction and near the railroad trestle west of McBean Crossing. Single sightings of Cooper's hawks occurred on the upper section of the Santa Clara River and on South Fork.

California Horned Lark *(Eremophila alpestris actia)*

This is a California Special Concern species. Although none were observed nesting on the study site, horned larks are ground nesters that prefer bare hillsides and abandoned fields. A few were observed feeding on bare fields and construction areas along Castaic Creek

Loggerhead Shrike *(Lanius ludovicianus)*

This is a California Special Concern species. Shrikes are resident in the coastal sage scrub areas adjacent to the Santa Clara River. A single bird was observed on June 27 above the Bouquet Canyon Crossing. This bird was hunting but there was no evidence of nesting in the river corridor.

Yellow Warbler *(Dendroica petechia)*

The yellow warbler is considered a Species of Special Concern by the State of California. Yellow warblers prefer wet riparian habitat but are also found in large cottonwoods in drier riparian areas. Singing yellow warblers were observed throughout the survey period along sections 1, 2 (main river from McBean Parkway to Castaic Creek) and 5 (Castaic Creek) and probably nested in these areas. Observations in sections 3, 4, 6 and 8 and occurred only during the migration period.

Yellow-breasted Chat *(Icteria virens)*

The yellow-breasted chat is considered a Species of Special Concern by the State of California. Chats were observed throughout the survey period along the Santa Clara river between the Old Road and the mouth of Castaic Creek.

Southern California Rufous-crowned Sparrow *(Aimophila rificeps canescens)*

This species is considered a California Special Concern species by the Department of Fish and Game and is also a Federal Special Concern species. A few birds visited the the river channel near Castaic Junction and a mile above the Bouquet Canyon Rd crossing. In both areas there is extensive coastal sage habitat adjacent to the river in which this species breeds.

Tricolored Blackbird (*Agelaius tricolor*)

This species is considered a California Special Concern species by the Department of Fish and game and is also a Federal Special Concern Species. A small colony of Tricolored blackbirds nested one year in the 1990's along Castaic Creek and in recent years, one or two sightings of migratory individuals have occurred most years. In 2004 there were no sightings of this species.

Lawrence's Goldfinch (*Carduelis lawrencei*)

This species is a highest priority species on the Audubon Birds to Watch list for 1996 and is a Bird of Management Concern for the Fish and Wildlife Service. Small numbers of this species were observed along Castaic Creek and along the Santa Clara river between the mouth of Castaic Creek and the McBean Parkway bridge. This species is a resident in coastal sage habitat

Comments of Brown-headed Cowbirds

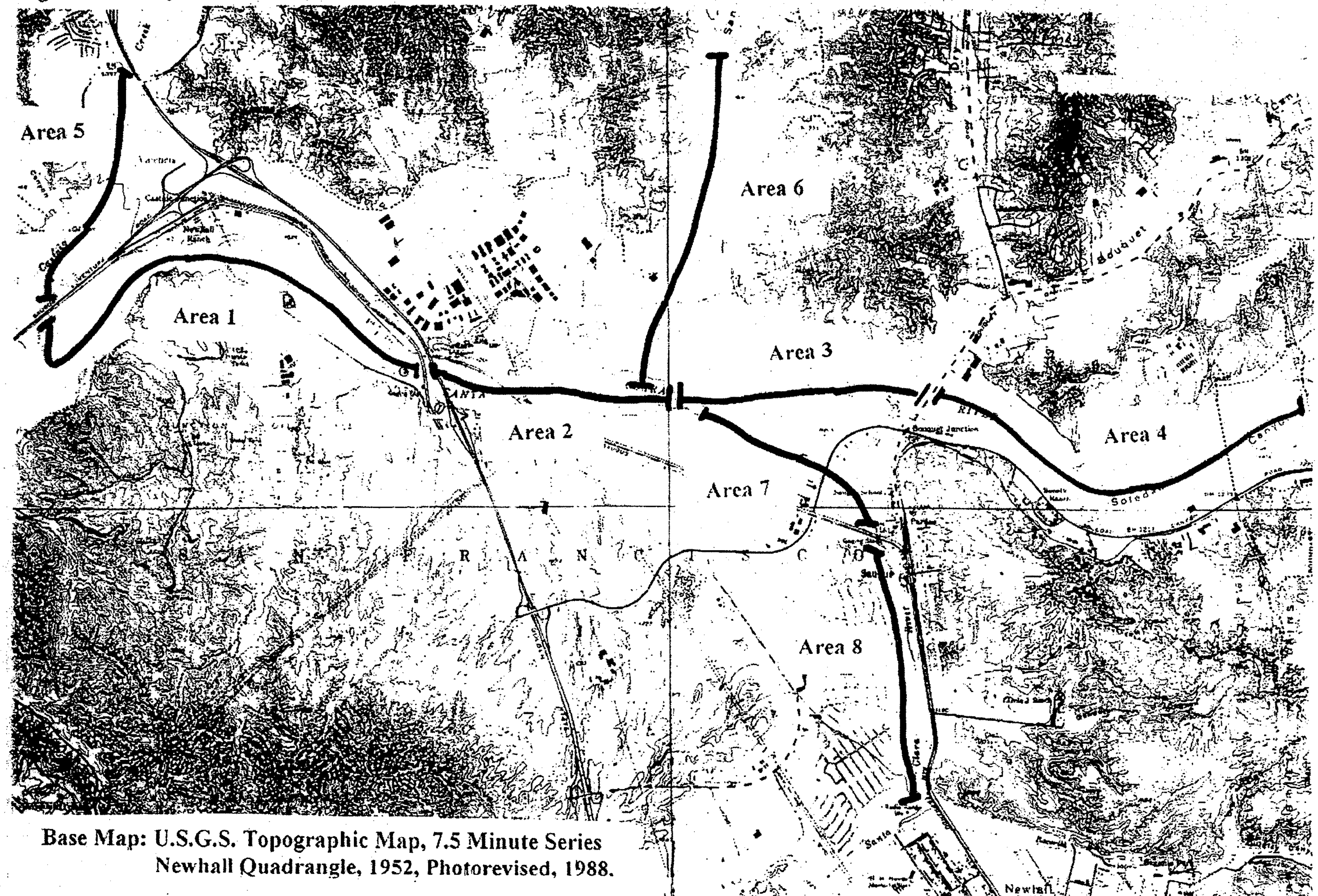
Although not a Species of Concern, comments about this species are warranted due to its influence on several endangered species. Cowbirds were regularly observed along all sections of the Santa Clara River, usually flying along the riparian corridor searching for either mates or potential nests to parasitize. Cowbird females often responded to taped calls of least Bell's Vireo. Cowbird traps were operated throughout the study period just north of the Valencia Wastewater outfall (section 1).

Summary

No yellow-billed cuckoos were observed in 2004. Three willow flycatchers were observed during the migration period for this species. Based on the behavior of these birds and failure to find them on subsequent visits, they are thought to be migrants passing through the area. It is not known which subspecies these birds represented. Up to six pairs of Least Bell's vireos were regularly observed at Castaic Junction. Additional territorial males observed early in the season could not be relocated in later surveys.

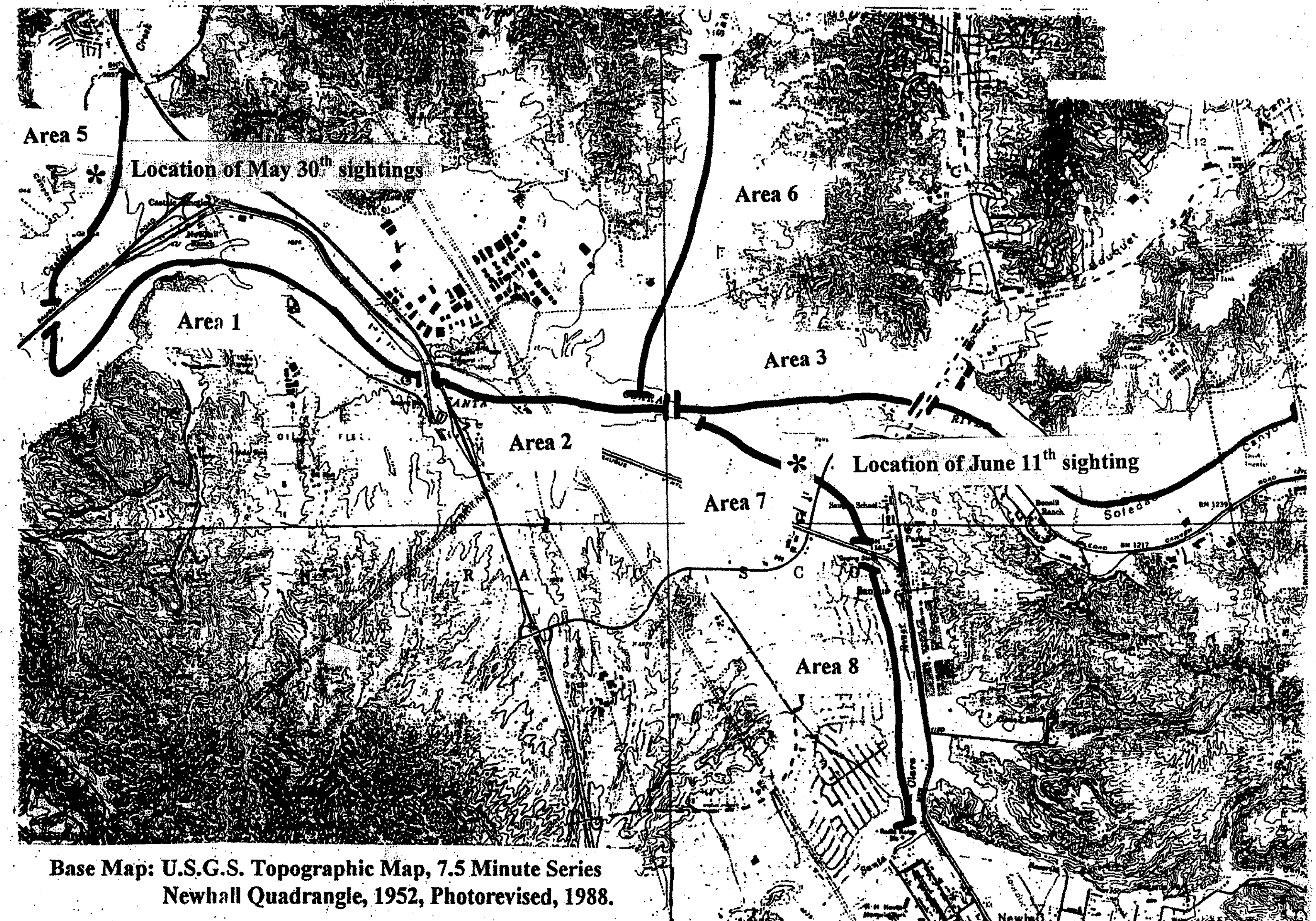
Four riparian Species of Concern, white-tailed kite, Cooper's hawk, yellow warbler and yellow-breasted chat nested in small numbers along wet sections of the river. Other Species of Concern include two migrant or wintering species; great blue heron and great egret and three visitors from nearby coastal sage scrub habitat; horned lark, loggerhead shrike and rufous-crowned sparrow. Cowbirds were numerous along the wet sections of the river where the wet riparian species that they parasitize were present.

Figure 1. Survey Areas along the Santa Clara River and Tributaries.



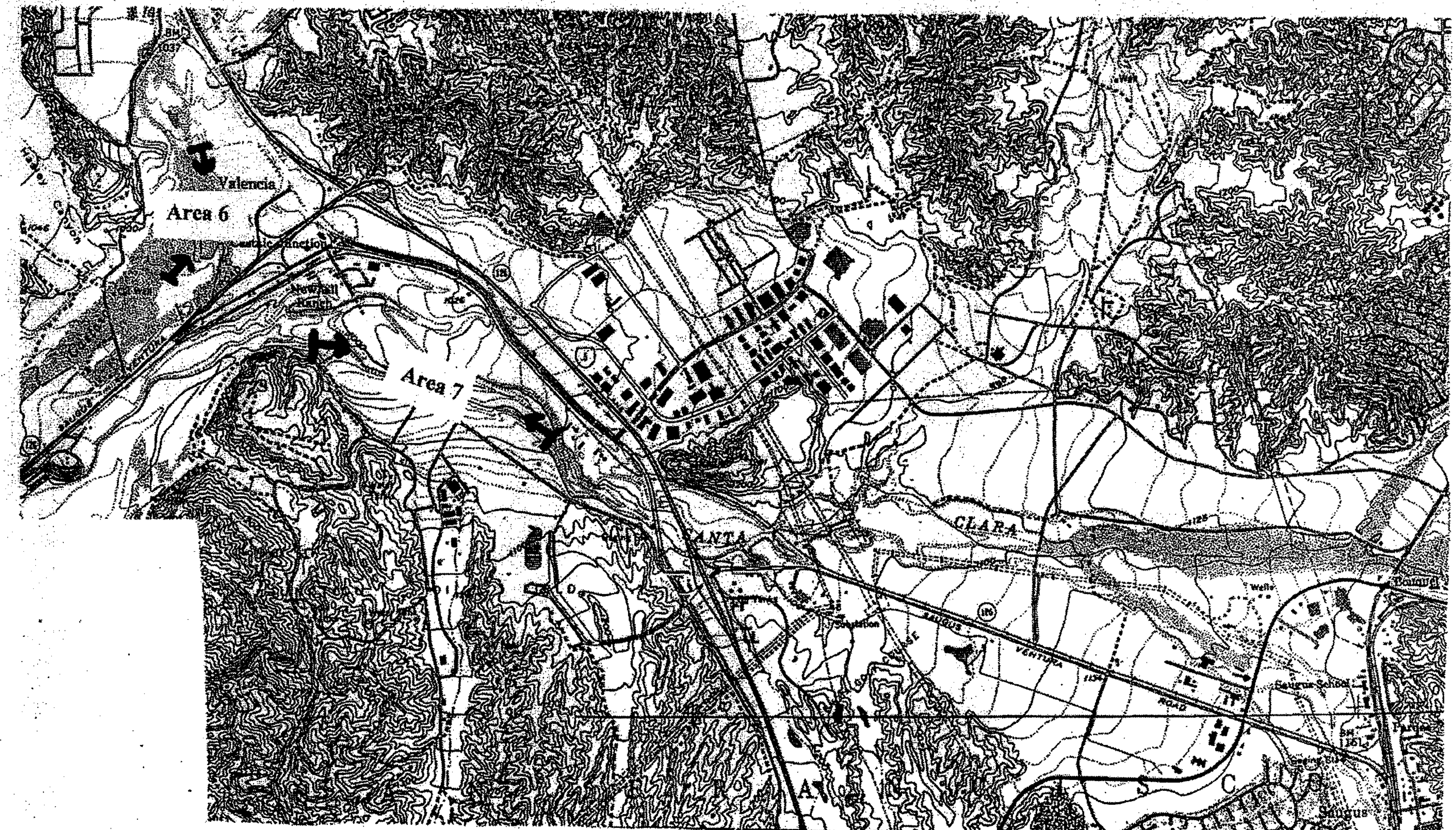
Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988.

Figure 2. Observations of willow flycatcher in 2004.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevised, 1988.

Figure 3. Location of Least Bell's Vireo breeding records near Castaic Junction.



Base Map: U.S.G.S. Topographic Map, 7.5 Minute Series
Newhall Quadrangle, 1952, Photorevicsed, 1988

Table 1. BIRDS OF THE SANTA CLARA RIVER BASIN, 2004: Santa Clara River from The Old Road downstream to the mouth of Castaic Creek.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 4/13	5/1	5/18	5/28	6/9	6/22	7/2	7/13
Great Blue Heron	m,w	0	0	0	0	2	0	1	0
Great Egret	m,w	1	0	0	0	0	0	0	0
Snowy Egret	m,w	1	0	0	0	0	0	0	0
Green Heron	r	5	2	4	6	3	3	6	2
Black-crowned Night-heron	m,w	0	0	1	0	8	3	1	0
Turkey Vulture	s	0	0	0	0	3	0	0	0
Mallard	r	12	4	16(22)	5	11(12)	5	0	19
White-tailed Kite	r	1	0	6	2	7	0	0	0
Cooper's Hawk	r	0	0	0	0	0	0	0	1
Red-shouldered Hawk	r	1	0	5(1)	3	1	5	0	2
Red-tailed Hawk	r	0	0	4	0	3	0	0	0
California Quail	r	12	7	10	12	12	5	22	48
Killdeer	r	12	3	16	9	18	4	0	0
Spotted Sandpiper	s	0	1	7	2	10	2	0	2
Rock Dove	r	6	4	0	0	0	0	0	0
Mourning Dove	r	28	8	51	10	25	24	16	29
White-th. Swift	r	0	0	2	4	3	8	0	2
Black-chinned Hummingbird	s	0	1	0	0	0	1	0	7
Anna's Hummingbird	r	3	12	1	8	2	10	0	22
Costa's Hummingbird	s	1	0	0	0	0	0	0	2
Rufous Hummingbird	m	0	0	0	0	0	0	1	0
Belted Kingfisher	m	2	0	1	0	0	0	0	0
Nuttall's Woodpecker	r	5	2	3	9	11	14	9	10
Downy Woodpecker	r	4	3	9	2	2	16	3	5
Hairy Woodpecker	r	1	0	2	2	2	2	0	3
Pacific Slope Flycatcher	s	0	1	2	8	2	0	0	0
Black Phoebe	r	1	4	6	3	20	15	14	28
Ash-throated Flycatcher	s	10	8	24	11	13	15	5	29
Western Kingbird	s	0	0	0	0	0	0	0	2
Bell's Vireo	s	2	10	4	6	6	5	4	3
Western Scrub Jay	r	15	7	14	14	16	7	6	10
American Crow	r	0	7	10	5	18	11	5	5
Common Raven	r	33	2	11	15	17	22	16	41
Horned Lark	r	0	0	0	0	0	0	25	6
Tree Swallow	s	0	0	2	0	0	1	0	0
Violet-green Swallow	s	1	1	4	0	5	3	11	0
N. Rough-winged Swallow	s	14	13	36	32	102	49	25	8
Cliff Swallow	s	44	2	49	210	82	43	58	18
Barn Swallow	s	0	0	0	0	13	4	1	2
Oak Titmouse	r	8	6	9	26	10	10	2	33
Bushtit	r	14	32	49	4	70	65	0	43
Bewick's Wren	r	29	19	60	84	56	40	23	44
House Wren	r	26	3	22	29	6	0	0	3

Table 1 (cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2004: Santa Clara River from The Old Road downstream to the mouth of Castaic Creek.

Endangered Species and Species of Concern Shaded

		Dates of Surveys							
SPECIES	**STATUS**	**4/13**	**5/1**	**5/18**	**5/28**	**6/9**	**6/22**	**7/2**	**7/13**
Western Bluebird	r	2	8	0	2	4	14	8	8
Wrentit	r	4	6	17	8	12	10	5	19
Northern Mockingbird	r	0	0	0	0	0	1	0	2
California Thrasher	r	2	4	4	2	1	2	1	6
European Starling	r	8	5	5	3	2	2	40	5
Phainopepla	r	0	0	0	0	0	6	0	4
Orange-crowned Warbler	w,m	8	0	0	0	0	0	0	0
Yellow Warbler	s,m	4	11	18	10	12	14	5	0
Yellow-rumped Warbler	w,m	18	0	0	0	0	0	0	0
Common Yellowthroat	r	25	37	56	84	144	160	22	28
Wilson's Warbler	m	33	7	0	2	0	0	0	0
Yellow-breasted Chat	s	2	0	4	2	4	4	0	0
Spotted Towhee	r	26	22	24	10	22	23	6	2
California Towhee	r	57	29	42	60	7	13	18	37
Rufous-crowned Sparrow	r	0	0	0	0	0	0	0	1
Lark Sparrow	r	0	0	2	0	0	0	11	6
Song Sparrow	r	96	100	160	140	192	165	42	68
Black-headed Grosbeak	s	7	16	26	23	36	24	13	18
Blue Grosbeak	s	0	1	0	1	4	6	4	18
Lazuli Bunting	s	0	0	0	0	6	19	3	19
Red-winged Blackbird	s	26	55	5	105	0	3	23	200
Brown-headed Cowbird	s	4	11	10	5	7	6	11	2
Hooded Oriole	s	0	0	0	1	0	0	1	0
Bullock's Oriole	s	4	2	1	4	5	2	6	0
House Finch	r	4	16	8	45	20	67	157	153
Lesser Goldfinch	r	12	0	1	1	10	2	5	17
American Goldfinch	w,m,r	22	0	0	0	0	0	0	0
House Sparrow	r	0	0	0	0	0	2	0	0

Status: m, migrant; r, resident; s, summer only; w, winter

numbers in parentheses are nestlings.

Table 2. BIRDS OF THE SANTA CLARA RIVER BASIN, 2004: Santa Clara River from McBean Highway to The Old Road.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	Dates of Surveys 4/13	5/1	5/18	5/28	6/9	6/22	7/2	7/13
Snowy Egret	m	0	1	0	0	0	0	0	0
Mallard	r	0	0	0	0	2	0	0	0
White-tailed Kite	r	0	1	1	0	0	0	0	0
Cooper's Hawk	r	0	0	0	0	1	2	0	0
Red-shouldered Hawk	r	0	0	0	1	2	0	1	0
Red-tailed Hawk	r	0	0	1	0	2	1	1	0
American Kestrel	r	0	0	0	2	0	0	0	0
California Quail	r	6	6	0	2	0	0	0	0
Killdeer	r	3	1	0	0	0	0	0	0
Mourning Dove	r	12	11	4	3	3	2	2	5
Greater Roadrunner	r	0	0	1	0	0	0	0	0
Barn Owl	r	1	0	0	0	0	0	0	0
White-th. Swift	r,m	0	6	0	0	0	0	0	0
Anna's Hummingbird	r	2	3	0	0	2	1	3	2
Nuttall's Woodpecker	r	1	2	4	4	1	4	4	2
Downy Woodpecker	r	0	0	0	0	1	2	1	1
Hairy Woodpecker	r	1	2	0	0	0	1	0	0
Pacific Slope Flycatcher	s	1	0	0	0	0	0	0	0
Black Phoebe	r	0	2	2	3	4	6	4	4
Ash-throated Flycatcher	s	3	3	5	3	4	2	5	3
Warbling Vireo	r	0	4	0	0	0	0	0	0
Western Scrub Jay	r	8	10	3	5	5	5	7	3
American Crow	r	2	2	2	0	1	6	0	0
Common Raven	r	4	2	12	4	5	2	8	3
N. Rough-winged Swallow	s	2	12	2	0	6	6	3	6
Cliff Swallow	s	0	10	6	8	12	12	3	0
Barn Swallow	s	0	1	0	0	0	0	0	0
Oak Titmouse	r	4	2	2	2	2	0	0	5
Bushtit	r	9	12	10	3	12	0	0	2
White-breasted Nuthatch	r	0	1	2	0	0	0	0	0
Bewick's Wren	r	16	9	3	6	4	5	4	6
House Wren	r	11	11	2	2	1	0	0	0
Western Bluebird	r	0	2	0	0	1	2	0	1
American Robin	r	0	0	0	0	0	1	0	0
Wrentit	r	1	0	0	1	0	0	0	0
Northern Mockingbird	r	1	0	0	0	0	0	0	1
California Thrasher	r	5	0	0	0	0	1	0	0
European Starling	r	4	11	2	3	0	0	0	1
Cedar Waxwing	w,m	0	8	1	0	0	0	0	0
Phainopepla	r	0	0	0	0	1	1	0	2
Orange-crowned Warbler	s	1	0	0	0	0	0	0	0
Yellow Warbler	m,s	2	6	1	2	1	2	0	0
Common Yellowthroat	r	3	4	3	5	5	2	8	1

Table 2 (cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2004: Santa Clara River from McBean Highway to The Old Road.

Endangered Species and Species of Concern Shaded

		Dates of Surveys							
SPECIES	**STATUS**	**4/13**	**5/1**	**5/18**	**5/28**	**6/9**	**6/22**	**7/2**	**7/13**
Spotted Towhee	r	6	11	6	15	7	9	4	3
California Towhee	r	7	9	4	4	3	0	4	6
Song Sparrow	r	24	40	20	14	3	6	8	8
Black-headed Grosbeak	s	3	13	7	8	6	5	5	1
Blue Grosbeak	s	0	0	0	0	0	0	1	0
Red-winged Blackbird	r	1	0	0	0	0	0	0	0
Western Meadowlark	r	0	0	1	0	0	0	0	0
Brown-headed Cowbird	r	0	3	0	1	0	0	0	0
Bullock's Oriole	s	0	0	2	0	1	0	1	0
House Finch	w,m,r	5	8	14	11	12	40	44	66
Lesser Goldfinch	r	0	0	0	0	4	0	5	0
American Goldfinch	m,s	2	2	0	0	0	0	0	0

Status: m, migrant; r, resident; s, summer only; w, winter

numbers in parentheses are nestlings

Table 3. **BIRDS OF THE SANTA CLARA RIVER BASIN, 2004: Santa Clara River from Boquet Canyon Bridge to McBean Parkway Bridge**

Endangered Species and Species of Concern Shaded

SPECIES	**STATUS**	**Dates of Surveys** 4/13	5/1	5/18	5/28	6/9	6/22	7/2	7/13
Great Egret	m	0	0	0	0	0	0	0	1
Mallard	r	2	0	2	3	2	1	0	0
Cooper's Hawk	r	0	2	0	0	0	0	1	0
Red-tailed Hawk	r	0	0	1	1	2	1	0	0
California Quail	r	2	2	0	2	0	0	8	4
Killdeer	r	5	1	2	2	4	2	4	0
Rock Dove	r	0	0	0	0	0	4	0	0
Mourning Dove	r	5	6	6	3	3	7	8	2
Greater Roadrunner	r	1	0	0	0	0	0	0	0
Black-chinned Hummingbird	s	0	0	0	0	0	0	2	0
Anna's Hummingbird	r	0	1	2	0	3	1	5	3
Nuttall's Woodpecker	r	1	1	1	0	0	0	3	3
Western Wood Pewee	m	0	0	1	0	0	0	0	0
Gray Flycatcher	m	1	0	0	0	0	0	0	0
Say's Phoebe	r	0	1	0	0	0	0	0	0
Black Phoebe	r	3	2	2	2	3	2	3	4
Ash-throated Flycatcher	s	1	3	2	2	0	2	2	4
Western Kingbird	s	1	1	1	0	0	0	0	0
Western Scrub Jay	r	8	6	8	4	3	5	3	3
American Crow	r	0	2	0	0	2	1	1	1
Common Raven	r	20	16	36	21	46	54	29	6
N. Rough-winged Swallow	s	3	0	2	2	2	8	10	2
Cliff Swallow	s	20	14	3	14	7	3	14	4
Barn Swallow	s	3	0	0	3	0	0	4	0
Oak Titmouse	r	2	0	1	0	0	0	0	0
Bushtit	r	0	3	5	0	0	0	4	0
Bewick's Wren	r	10	4	5	3	1	4	3	3
House Wren	r	0	0	1	1	0	0	0	0
Western Bluebird	r	0	1	0	0	1	0	0	0
Wrentit	r	0	0	0	0	1	1	0	0
Northern Mockingbird	r	1	2	4	2	1	0	2	1
California Thrasher	r	0	1	0	0	0	0	0	1
European Starling	r	1	2	5	0	0	3	0	0
Cedar Waxwing	w,m	0	0	8	0	0	0	0	0
Phainopepla	r	1	0	0	0	1	1	0	0
Yellow Warbler	s,m	1	0	4	0	0	0	0	0
Yellow-rumped Warbler	w,m	3	0	0	0	0	0	0	0
MacGillivray's Warbler	m	1	0	0	0	0	0	0	0
Common Yellowthroat	r	3	2	4	3	3	3	0	1
Wilson's Warbler	m	3	0	0	1	0	0	0	0
Spotted Towhee	r	7	3	4	4	3	4	2	0
California Towhee	r	2	0	2	2	0	0	1	2
Lark Sparrow	r	0	0	0	0	0	1	0	0

Table 3 cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2004: Santa Clara River from Boquet Canyon Bridge to McBean Parkway Bridge

Endangered Species and Species of Concern Shaded

		Dates of Surveys							
SPECIES	**STATUS**	**4/13**	**5/1**	**5/18**	**5/28**	**6/9**	**6/22**	**7/2**	**7/13**
Song Sparrow	r	16	16	20	12	12	7	2	2
Black-headed Grosbeak	s	2	0	1	1	1	0	1	0
Red-winged Blackbird	r	0	0	10	10	2	16	15	0
Brewer's Blackbird	r	0	2	0	0	0	0	0	0
Brown-headed Cowbird	s	1	2	1	0	0	1	4	0
Bullock's Oriole	s	0	0	1	1	0	1	3	0
House Finch	r	18	17	30	17	37	36	24	36
Lesser Goldfinch	r	0	0	0	0	0	2	0	0
American Goldfinch	w,m,r	10	0	0	0	0	0	0	0

Status: m, migrant; r, resident; s, summer only; w, winter

numbers in parentheses are nestlings

Table 4. BIRD SURVEYS OF THE SANTA CLARA RIVER BASIN, 2004: Santa Clara River from Boquet Canyon Bridge upstream for two miles.

Endangered Species and Species of Concern Shaded

SPECIES	STATUS	5/16	6/12	6/27	7/4	7/16
				Dates of Surveys		
Mallard	r	2	0	0	0	0
White-tailed Kite	r	1	0	0	0	0
Red-tailed Hawk	r	2	0	1	2	1
California Quail	r	82	4	9	5	3
Killdeer	r	12	0	0	0	0
Rock Dove	r	8	0	0	0	0
Mourning Dove	r	122	8	16	4	6
Greater Roadrunner	r	1	0	0	0	0
Black-chinned Hummingbird	s	1	0	0	1	0
Anna's Hummingbird	r	7	3	2	5	2
Costa's Hummingbird	s	1	0	0	0	0
Nuttall's Woodpecker	r	4	1	3	2	1
Downy Woodpecker	r	1	0	0	0	0
Northern Flicker	r	0	1	0	0	0
Say's Phoebe	r	2	1	0	0	0
Ash-throated Flycatcher	s	5	0	0	1	0
Western Kingbird	s	8	0	0	0	0
Loggerhead Shrike	r	0	0	1	0	0
Western Scrub Jay	r	27	12	15	9	6
American Crow	r	0	3	2	4	0
Common Raven	r	2	5	10	23	5
N. Rough-winged Swallow	s	2	2	1	0	0
Cliff Swallow	s	7	0	0	0	3
Barn Swallow	s	0	1	0	0	0
Oak Titmouse	r	4	0	0	0	0
Bushtit	r	19	5	2	6	2
Bewick's Wren	r	17	5	7	3	2
Wrentit	r	5	1	2	2	2
Northern Mockingbird	r	18	8	4	8	5
California Thrasher	r	8	0	1	0	0
European Starling	r	4	0	9	0	0
Phainopepla	r	30	8	2	6	3
Yellow Warbler	s,m	2	0	0	0	0
Spotted Towhee	r	22	5	6	0	0
California Towhee	r	28	4	11	10	4
Rufous-crowned Sparrow	r	4	0	0	2	0
Black-headed Grosbeak	s	4	0	0	2	0
Brown-headed Cowbird	s	2	0	1	0	0
Hooded Oriole	s	1	0	0	0	0
Bullock's Oriole	s	13	0	2	5	3
House Finch	r	60	26	41	45	45
House Sparrow	r	2	0	0	0	0

Status: m, migrant; r, resident; s, summer only; w, winter

numbers in parentheses are nestlings

Table 5. BIRDS OF THE SANTA CLARA RIVER BASIN, 2004: Castaic Creek from I-5 to the Santa Clara River									
Endangered Species and Species of Concern Shaded									
				Dates of Surveys					
SPECIES	**STATUS**	**4/15**	**5/6**	**5/19**	**5/30**	**6/10**	**6/23**	**7/3**	**7/14**
White-tailed Kite	r	0	0	0	0	0	0	0	1
Cooper's Hawk	r	1	1	0	0	0	0	2	1
Red-shouldered Hawk	r	0	0	1	1	0	0	0	0
Red-tailed Hawk	r	1	2	2	4	9	2	2	0
American Kestrel	r	2	2	2	2	5	3	0	1
California Quail	r	76	25	14	21	31	52	68	21
Killdeer	r	5	2	0	3	3	2	0	0
Rock Dove	r	0	1	0	7	53	19	19	6
Mourning Dove	r	20	16	33	14	12	23	48	16
Black-chinned Hummingbird	s	0	1	0	2	0	1	0	6
Anna's Hummingbird	r	3	8	8	10	8	10	6	29
Costa's Hummingbird	s	0	0	0	1	1	1	1	1
Rufous Hummingbird	m	0	0	0	0	0	0	1	0
Nuttall's Woodpecker	r	1	7	3	0	7	6	3	5
Downy Woodpecker	r	7	2	2	3	6	5	6	0
Hairy Woodpecker	r	3	2	0	2	0	0	0	2
Northern Flicker	r	0	2	2	1	7	2	3	1
Western Wood-Pewee	m	0	0	0	2	0	0	0	0
Willow Flycatcher	s	0	0	0	2	0	0	0	0
Pacific Slope Flycatcher	s	0	0	0	1	0	0	0	0
Black Phoebe	r	0	2	0	0	2	0	0	2
Say's Phoebe	r	0	0	0	0	0	0	2	0
Ash-throated Flycatcher	s	7	8	6	5	18	5	9	1
Western Kingbird	s	0	2	3	2	0	8	6	0
Warbling Vireo	m	1	1	0	0	0	0	0	0
Western Scrub Jay	r	13	18	8	17	15	22	23	18
American Crow	r	0	4	3	5	1	0	1	0
Common Raven	r	9	3	2	5	1	9	4	13
Horned Lark	r	0	0	3	0	4	0	3	0
Violet-green Swallow	s	2	0	0	0	0	0	0	0
N. Rough-winged Swallow	s	44	23	34	48	25	15	9	0
Cliff Swallow	s	200	300	455	482	371	60	235	32
Barn Swallow	s	0	0	0	0	2	4	0	4
Oak Titmouse	r	4	13	9	6	8	21	8	12
Bushtit	r	6	4	8	34	26	31	2	31
Bewick's Wren	r	24	16	18	25	33	12	18	14
House Wren	r	11	0	0	10	6	4	0	2
Western Bluebird	r	0	0	2	5	0	3	3	0
American Robin	r	2	0	0	0	0	2	2	0
Wrentit	r	4	6	7	6	8	6	3	3
Northern Mockingbird	r	0	1	0	1	0	0	0	0
California Thrasher	r	12	9	2	4	7	4	16	3
European Starling	r	2	4	11	9	5	0	35	0

Table 5 (cont.). BIRDS OF THE SANTA CLARA RIVER BASIN, 2004: Castaic Creek from I-5 to the Santa Clara River

Endangered Species and Species of Concern Shaded

		Dates of Surveys							
SPECIES	**STATUS**	**4/15**	**5/6**	**5/19**	**5/30**	**6/10**	**6/23**	**7/3**	**7/14**
Orange-crowned Warbler	w,m	2	0	0	0	0	0	0	0
Nashville Warbler	m	1	0	0	0	0	0	0	0
Yellow Warbler	s,m	1	4	2	0	4	4	0	0
Yellow-rumped Warbler	w,m	4	0	0	0	0	0	0	0
Common Yellowthroat	r	3	1	4	7	7	4	1	0
Wilson's Warbler	m	9	4	0	0	0	0	0	0
Yellow-breasted Chat	s	0	0	0	1	0	0	0	0
Spotted Towhee	r	17	26	20	21	39	10	26	4
California Towhee	r	32	35	18	18	39	19	55	20
Lark Sparrow	r	0	0	0	0	0	0	1	0
Song Sparrow	r	19	17	14	12	15	2	0	0
Black-headed Grosbeak	s	10	15	7	13	14	14	14	0
Blue Grosbeak	s	0	3	0	2	0	0	2	0
Red-winged Blackbird	s	4	9	7	6	0	5	40	0
Brewer's Blackbird	r	0	0	0	2	0	0	2	0
Brown-headed Cowbird	s	9	3	5	0	0	0	0	1
Hooded Oriole	s	0	1	2	0	0	0	0	1
Bullock's Oriole	s	2	6	2	5	7	2	0	0
House Finch	r	14	16	80	29	72	56	35	40
Lesser Goldfinch	r	6	2	4	3	1	4	0	1
House Sparrow	r	16	0	8	11	10	28	9	2

Status: m, migrant; r, resident; s, summer only; w, winter

numbers in parentheses are nestlings

Table 6. BIRDS OF THE SANTA CLARA RIVER BASIN, 2004: San Franciscquito Creek from Santa Clara River to Copper Hill Drive.

Endangered Species and Species of Concern Shaded

		Dates of Surveys				
SPECIES	**STATUS**	**5/17**	**6/11**	**6/26**	**7/6**	**7/17**
White-tailed Kite	r	2	1	0	1	0
Cooper's Hawk	r	0	1	1	4	3
Red-tailed Hawk	r	2	4	3	1	1
American Kestrel	r	2	2	0	1	2
California Quail	r	18	41	5	19	4
Killdeer	r	1	4	0	0	0
Rock Dove	r	4	0	0	0	0
Mourning Dove	r	50	28	32	23	15
Barn Owl	r	3	2	0	4	2
Black-chinned Hummingbird	s	0	0	1	0	3
Anna's Hummingbird	r	3	7	6	7	7
Costa's Hummingbird	s	0	0	1	0	0
Nuttall's Woodpecker	r	3	5	5	3	3
Black Phoebe	r	0	1	1	3	0
Say's Phoebe	r	3	0	0	0	0
Ash-throated Flycatcher	s	4	6	4	3	3
Western Kingbird	s	2	6	10	6	1
Western Scrub Jay	r	10	8	10	5	8
American Crow	r	2	0	0	1	1
Common Raven	r	12	3	9	7	6
N. Rough-winged Swallow	s	1	4	0	0	0
Cliff Swallow	s	2	8	56	8	11
Barn Swallow	s	1	1	1	0	1
Oak Titmouse	r	0	4	0	0	0
Bushtit	r	0	3	2	18	3
Bewick's Wren	r	10	8	8	3	6
House Wren	r	1	0	0	0	0
Western Bluebird	r	0	1	4	2	0
Wrentit	r	0	0	1	0	0
Northern Mockingbird	r	4	6	6	5	8
California Thrasher	r	0	1	1	1	0
European Starling	r	2	3	6	2	8
Phainopepla	r	27	23	10	12	2
Yellow Warbler	s,m	1	0	0	0	0
Common Yellowthroat	r	0	0	1	1	0
Spotted Towhee	r	8	8	6	6	3
California Towhee	r	20	2	6	7	3
Song Sparrow	r	6	4	1	0	0
Black-headed Grosbeak	s	2	2	3	1	2
Blue Grosbeak	s	0	0	0	0	1
Lazuli Bunting	s	2	0	0	0	0
Red-winged Blackbird	s	0	12	5	8	0
Brewer's Blackbird	r	2	0	0	0	0

Table 6 (cont.). **BIRDS OF THE SANTA CLARA RIVER BASIN, 2004: San Franciscquito Creek from Santa Clara River to Copper Hill Drive.**

Endangered Species and Species of Concern Shaded

		Dates of Surveys				
SPECIES	**STATUS**	**5/17**	**6/11**	**6/26**	**7/6**	**7/17**
Brown-headed Cowbird	s	1	0	0	1	0
Bullock's Oriole	s	5	13	9	6	3
House Finch	r	66	91	140	175	176
Lesser Goldfinch	r	5	4	5	2	25

Status: m, migrant; r, resident; s, summer only; w, winter

numbers in parentheses are nestlings

Table 7. BIRDS OF THE SANTA CLARA RIVER BASIN, 2004: South Fork from Rte 126 downstream to Santa Clara River.						
Endangered Species and Species of Concern Shaded						
				Dates of Surveys		
SPECIES	**STATUS**	**5/17**	**6/11**	**6/26**	**7/6**	**7/17**
Cooper's Hawk	r	0	1	0	0	0
Red-tailed Hawk	r	0	2	1	3	0
California Quail	r	10	10	2	0	1
Rock Dove	r	6	0	0	0	0
Mourning Dove	r	27	9	6	10	4
Greater Roadrunner	r	2	0	0	0	0
Black-chinned Hummingbird	s	3	0	0	1	2
Anna's Hummingbird	r	9	3	5	3	4
Nuttall's Woodpecker	r	2	2	1	2	0
Willow Flycatcher	s	0	1	0	0	0
Black Phoebe	r	1	1	0	7	0
Ash-throated Flycatcher	s	5	2	0	0	1
Western Kingbird	s	2	0	0	0	0
Western Scrub Jay	r	11	1	4	0	4
American Crow	r	0	1	2	0	0
Common Raven	r	19	3	4	4	3
N. Rough-winged Swallow	s	18	10	3	0	0
Cliff Swallow	s	28	14	14	0	0
Barn Swallow	s	1	0	0	0	0
Oak Titmouse	r	1	0	0	0	0
Bushtit	r	0	0	2	4	0
Bewick's Wren	r	11	2	8	4	7
House Wren	r	0	0	0	1	0
American Robin	r	0	0	1	0	0
Wrentit	r	3	0	3	0	0
Northern Mockingbird	r	5	2	0	0	1
California Thrasher	r	2	0	0	0	0
European Starling	r	7	2	0	0	0
Yellow Warbler	s,m	2	0	0	0	0
Spotted Towhee	r	4	0	3	0	0
California Towhee	r	14	0	5	5	1
Song Sparrow	r	2	0	0	0	0
Black-headed Grosbeak	s	1	0	0	0	0
Red-winged Blackbird	s	0	0	2	0	0
Brewer's Blackbird	r	0	0	5	0	0
Brown-headed Cowbird	s	2	0	1	0	0
Bullock's Oriole	s	1	4	0	0	0
House Finch	r	136	49	42	28	32
Lesser Goldfinch	r	4	5	11	3	1
House Sparrow	r	0	8	0	0	1
Status: m, migrant; r, resident; s, summer only; w, winter						
numbers in parentheses are nestlings						

Table 8. BIRDS OF THE SANTA CLARA RIVER BASIN, 2004: South Fork of the Santa Clara River from Route 126 upstream to Coyote Creek.

Endangered Species and Species of Concern Shaded

		Dates of Surveys				
SPECIES	**STATUS**	**17-May**	**11-Jun**	**26-Jun**	**6-Jul**	**17-Jul**
Mallard	r	0	0	3	0	0
Red-shouldered Hawk	r	1	0	2	0	0
Red-tailed Hawk	r	1	0	2	1	0
California Quail	r	18	26	2	6	33
Killdeer	r	0	3	4	0	2(1)
Mourning Dove	r	12	10	15	9	11
White-th. Swift	r	4	4	2	0	0
Black-chinned Hummingbird	s	1	7	1	6	2
Anna's Hummingbird	r	16	11	3	18	12
Costa's Hummingbird	s	0	2	0	3	0
Rufous Hummingbird	m	0	0	0	1	0
Nuttall's Woodpecker	r	4	3	2	5	2
Downy Woodpecker	r	1	0	0	1	0
Black Phoebe	r	2	2	6	3	3
Say's Phoebe	r	0	0	1	1	1
Ash-throated Flycatcher	s	5	3	0	1	0
Western Kingbird	s	4	0	7	1	3
Western Scrub Jay	r	4	6	16	11	15
American Crow	r	8	3	0	7	3
Common Raven	r	11	8	8	8	6
N. Rough-winged Swallow	s	24	30	2	0	0
Cliff Swallow	s	0	12	2	0	0
Oak Titmouse	r	0	12	1	0	0
Bushtit	r	6	17	5	15	2
Bewick's Wren	r	8	21	1	9	1
House Wren	r	0	4	0	0	2
Western Bluebird	r	0	0	1	0	0
American Robin	r	0	0	2	0	0
Wrentit	r	1	2	4	4	0
Northern Mockingbird	r	5	4	5	2	4
California Thrasher	r	6	5	2	3	5
European Starling	r	4	3	0	0	4
Yellow Warbler	s,m	4	2	0	0	0
Common Yellowthroat	r	3	10	3	1	0
Wilson's Warbler	m	1	0	0	0	0
Western Tanager	m	2	0	0	0	0
Spotted Towhee	r	10	8	4	8	2
California Towhee	r	30	21	13	28	13
Song Sparrow	r	10	18	4	4	7
Black-headed Grosbeak	s	5	7	0	4	0
Red-winged Blackbird	s	8	2	0	0	0
Brown-headed Cowbird	s	4	7	4	0	1

Table 8 (cont.). **BIRDS OF THE SANTA CLARA RIVER BASIN, 2004: South Fork of the Santa Clara River from Route 126 upstream to Coyote Creek.**

Endangered Species and Species of Concern Shaded

		Dates of Surveys				
SPECIES	**STATUS**	**17-May**	**11-Jun**	**26-Jun**	**6-Jul**	**17-Jul**
Hooded Oriole	s	1	0	0	0	0
Bullock's Oriole	s	8	2	2	1	0
House Finch	r	49	52	51	50	103
Lesser Goldfinch	r	2	4	3	8	0
American Goldfinch	w,m,r	0	1	0	0	
House Sparrow	r	11	16	30	3	28

Status: m, migrant; r, resident; s, summer only; w, winter

numbers in parentheses are nestlings

Willow Flycatcher Survey and Detection Form (rev. 4/98)

Site Name____Santa Clara River: Castaic Creek to Boquet Canyon Rd.___Total Site No ____________________________

Was site surveyed in previous year? **Yes** Drainage Santa Clara River
If yes, what site name was used? __Upper Santa Clara River: Sections 1-3__________
County __Los Angeles________________________ State__CA____ USGS Quad Name Newhall_____

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? X☐ ***Yes*** ☐ ***No***
Site Coordinates: Start: N__34 25.415________________ W 118 32.399___________ UTM
Stop: N__34 25.172________________ W 118 38.070____________ UTM Zone ________
Elevation ____980 - 1125 ft.__________ feet / meters (circle one)

***** Fill in additional site information on back of this page *****

Survey # Observer(s)	Date (m/d/y) Survey time	Number of WIFLs Found	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign Y or N	Comments about this survey (e.g., evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
D. Guthrie _J._Sugden____ ______ __________	Date 5/18 start 6:30 stop 9:00 total hrs _2.5____	0	0	0	n	Y	n	
D. Guthrie J. Sugden __________ __________	Date 6//9 Start 6:30 Stop 9:00 total hrs _2.5__	0	0	0	n	Y	N	
D. Guthrie _J.Sugden_____ __________	Date 6//22 Start 6:30 Stop 9:00 total hrs _2.5__	0	0	0	n	Y	N	
D. Guthrie __J. Sugden___ __________	Date 7/2 start 6:30 stop 9:00 total hrs 2.5_	0	0	0	n	Y	N	
D. Guthrie _J. Sugden___ __________	Date 7/13 start 6:30 stop 9:00 total hrs _2.5____	0	0	0	n	Y	N	

Overall Site Summary (Total only resident WIFLs) Total survey hrs_25 12.5 guthrie, 12.5 sugden	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? No
	0	0	0	0	If yes, report color combination(s) in the comments section on back of form

Name of Reporting Individual ____Dan Guthrie____________ Date Report Completed ___7/20/04________________

Submit the original of this form. Retain a copy for your records.

Fill in the following information completely. Submit original form. Retain copy for your records.

Name of Reporting Individual ___Dan Guthrie_________________________Phone # _909 607 2836_____________

Affiliation __Claremont Colleges__________________________ Email dguthrie@jsd.claremont.edu______________

Site Name__Santa Clara River: Castaic Creek to Boquet River Bridge_________________________________
Did you verify that this site name is consistent with that used in previous years? Yes No ? (circle one)
This is a section of site previously lumped as upper Santa Clara River, sections 1-3
Management Authority for Survey Area (circle one):

Federal Municipal/County State Tribal **Private**

Name of Management Entity or Owner (e.g., Tonto National Forest) _Newhall Land Co.________________________

Length of area surveyed: _5.9 miles_____ (specify units, e.g., miles = mi, kilometers = km, meters = m)

Did you survey the same general area during each visit to this site this year? **Yes /** If no, summarize in comments below.

If site was surveyed last year, did you survey the same general area this year? **Yes /** If no, summarize in comments below.

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):
Native broadleaf plants
XX☐ Mixed native and exotic plants (mostly native)
(entirely or almost entirely, includes high-elevation willow)
☐ Mixed native and exotic plants (mostly exotic) ☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: __Cottonwood, willow, tamarisk_________________________________

Average height of canopy: __40 ft.___________________________ (specify units)

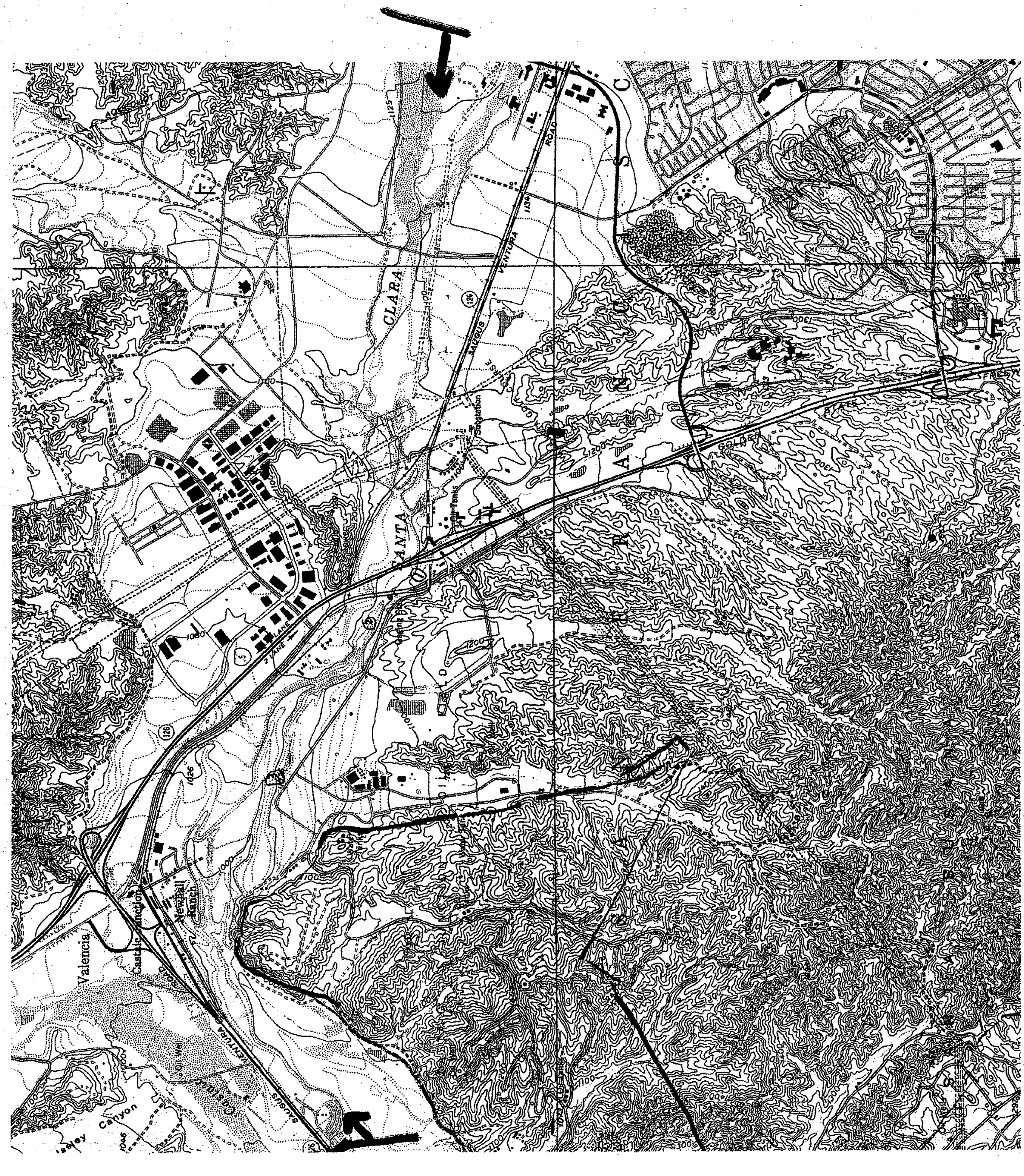
Was surface water or saturated soil present at or adjacent to site? **yes.**
Distance from the site to surface water or saturated soil: _____________ (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? **No** (circle one)
If yes, describe in comments section below. no water present except for 50 yd section trickle in center of section.

Remember to attach a xerox copy of a USGS quad/topographical map (REQUIRED) of the survey area, noting the survey site and location of WIFL detections. You may also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map.

Comments (attach additional sheets if necessary):____

_______Santa Clara River flows discontinuously along this section of the river. Water is provided by two sewage treatment plants. There was no natural flow during the survey period._____________________________________



SANTA
CLARA
Valencia
Castaic Junction
Newhall Ranch
SAUGUS
VENTURA
ROAD
2 LANE
GOLDEN
Canyon

Willow Flycatcher Survey and Detection Form (rev. 4/98)

Site Name ____Castaic Creek____________________ Total Site No ______________________

Was site surveyed in previous year? **Yes** No   Drainage Santa Clara River
If yes, what site name was used? Upper Santa Clara River, section 5________
County __Los Angeles______________________ State__CA____ USGS Quad Name Newhall______

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)?* X☐ *Yes* ☐ *No

Site Coordinates: Start: N__34 25/306________________ W 118 36.755___________ UTM
Stop: N__34 26________________ W 118 37____________ UTM Zone ________
Elevation ____ 950-1027 ft.__________ feet / meters (circle one)

***** Fill in additional site information on back of this page *****

Survey # Observer(s)	Date (m/d/y) Survey time	Number of WIFLs Found	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign Y or N	Comments about this survey (e.g., evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
J. Sugden	Date 5/19 start 6:30 stop 8:30 total hrs _2.0_	0	0	0	n	Y	n	
J. Sugden	Date 5/30 Start 6:30 Stop 8:30 total hrs _2.0	2	0	0	n	Y	N	Belived late migrants
J. Sugden	Date 6/10 Start 6:30 Stop 8:30 total hrs _2.0__	0	0	0	n	Y	N	
J. Sugden	Date 7/3 start 6:30 stop 8:30 total hrs 2.0_	0	0	0	n	Y	N	
J. Sugden	Date 7/14 start 6:30 stop 8:30 total hrs _2.0____	0	0	0	n	Y	N	

Overall Site Summary (Total only resident WIFLs)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? No
Total survey hrs___10.0_____	2	0	0	0	If yes, report color combination(s) in the comments section on back of form

Name of Reporting Individual ____Dan Guthrie____________ Date Report Completed ____7/20/04________________

Submit the original of this form. Retain a copy for your records.

Fill in the following information completely. Submit original form. Retain copy for your records.

Name of Reporting Individual ___Dan Guthrie_______________________ Phone # _909 607 2836____________

Affiliation __Claremont Colleges__________________________ Email dguthrie@jsd.claremont.edu______________

Site Name__Castaic Creek____

Did you verify that this site name is consistent with that used in previous years? Yes No ? (circle one)

This is a section of site previously lumped as upper Santa Clara River. section 5.

Management Authority for Survey Area (circle one):

Federal Municipal/County State Tribal **Private**

Name of Management Entity or Owner (e.g., Tonto National Forest) _Newhall Land Co.________________________

Length of area surveyed: _2 miles_____ (specify units, e.g., miles = mi, kilometers = km, meters = m)

Did you survey the same general area during each visit to this site this year? Yes / If no, summarize in comments below.

If site was surveyed last year, did you survey the same general area this year? Yes / If no, summarize in comments below.

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

Native broadleaf plants

XX☐ Mixed native and exotic plants (mostly native)

(entirely or almost entirely, includes high-elevation willow)

☐ Mixed native and exotic plants (mostly exotic) ☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: __Cotrtonwood, willow, tamarisk________________________________

Average height of canopy: __40 ft.___________________________ (specify units)

Was surface water or saturated soil present at or adjacent to site? No see comment

Distance from the site to surface water or saturated soil: _____see comment

Did hydrological conditions change significantly among visits (did the site flood or dry out)? No (circle one)

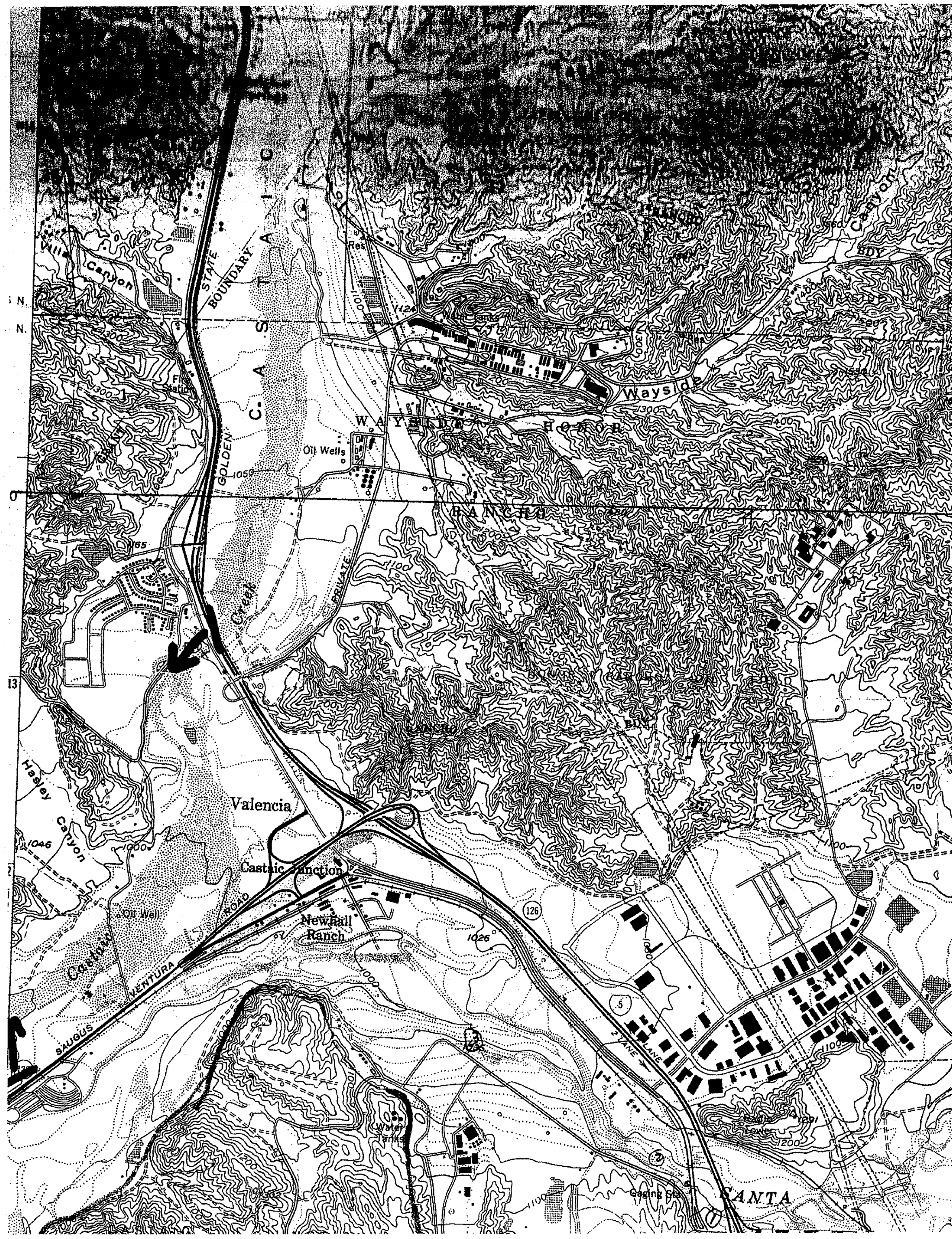
If yes, describe in comments section below. no water present except for 50 yd section trickle in center of section.

Remember to attach a xerox copy of a USGS quad/topographical map (REQUIRED) of the survey area, noting the survey site and location of WIFL detections. You may also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map.

Comments (attach additional sheets if necessary):____

Water in this section of Castaic Creek comes from releases from Castaic Dam. There were no releases during the survey period. Some residential runoff was present at upper section of survey area but the rest of the creek was dry. Nearest water in Santa Clara River a mile away.

The timing of this sighting suggestes that the bird was a migrant passing through the area. Its identity to subspecies is not known. It may have belonged to a subspecies other than southwestern.



Canyon
STATE
BOUNDARY
C A S T A I C
GOLDEN
Fire Station
Water Tanks
Wayside
W A Y S I D E
H O N O R
Oil Wells
R A N C H O
Creek
PRIVATE
Valencia
Hasley Canyon
Castaic Junction
Oil Well
ROAD
Newhall Ranch
VENTURA
SAUGUS
Castaic
Water Tanks
Gaging Sta
SANTA
LANE
126
5
1050
1165
1046
1026
1000
1100
1200
1300
1400

Willow Flycatcher Survey and Detection Form (rev. 4/98)

Site Name____Santa Clara River above Bouquet Canyon rd.________________ Total Site No ________________

Was site surveyed in previous year? **Yes** No   Drainage Santa Clara River
If yes, what site name was used? __same as above__________
County __Los Angeles________________________ State__CA____ USGS Quad Name Newhall______

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? X☐ ***Yes*** ☐ ***No***

Site Coordinates: Start: N__34 25.415______________ W 118 32.399___________ UTM
Stop: N__34 25.515______________ W 118 30.125 UTM Zone _______
Elevation ____1125-1320 ft.__________ feet / meters (circle one)

***** Fill in additional site information on back of this page *****

Survey # Observer(s)	Date (m/d/y) Survey time	Number of WIFLs Found	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign Y or N	Comments about this survey (e.g., evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
J. Sugden	Date 5/16 start 6 stop 7:30 total hrs _1.5_	0	0	0	N	n	n	
d. Guthrie	Date 6/12 Start 6:00 Stop 7:30 total hrs _1.5__	0	0	0	n	n	N	
D. Guthrie	Date 6/27 Start 6:00 Stop 7:30 total hrs _1.5__	0	0	0	n	n	N	
D. Guthrie	Date 7/4 start 6:00 stop 7:30 total hrs 1.50_	0	0	0	n	n	N	?
D. Guthrie	Date 7/15 start 6:00 stop 7:30 total hrs _1.5__	0	0	0	n	n	N	

Overall Site Summary (Total only resident WIFLs)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? No
Total survey hrs___7.5_____	0	0	0	0	If yes, report color combination(s) in the comments section on back of form

Name of Reporting Individual ____Dan Guthrie____________ Date Report Completed ___7/20/04________________

Submit the original of this form. Retain a copy for your records.

Fill in the following information completely. Submit original form. Retain copy for your records.

Name of Reporting Individual ___Dan Guthrie______________________________Phone # _909 607 2836_____________

Affiliation __Claremont Colleges_________________________________ Email dguthrie@jsd.claremont.edu_______________

Site Name__Santa Clara River above boquet Canyon Rd.____
Did you verify that this site name is consistent with that used in previous years?
This is a section of site previously lumped as upper Santa Clara River, section 4.

Management Authority for Survey Area (circle one):

Federal Municipal/County State Tribal **Private**

Name of Management Entity or Owner (e.g., Tonto National Forest) _Newhall Land Co._____________________________

Length of area surveyed: _2 miles_____ (specify units, e.g., miles = mi, kilometers = km, meters = m)

Did you survey the same general area during each visit to this site this year? **Yes** / If no, summarize in comments below.

If site was surveyed last year, did you survey the same general area this year? **Yes** / If no, summarize in comments below.

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):
Native broadleaf plants
XX☐ Mixed native and exotic plants (mostly native)
(entirely or almost entirely, includes high-elevation willow)
☐ Mixed native and exotic plants (mostly exotic) ☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: __Cotrtonwood, Baccharis, tamarisk_________________________________

Average height of canopy: __30 ft._if present.___________________________ (specify units)

Was surface water or saturated soil present at or adjacent to site? No .
Distance from the site to surface water or saturated soil: __water starts at downstream end of section._ (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? No (circle one)
If yes, describe in comments section below. no water present except for 50 yd section trickle in center of section.

Remember to attach a xerox copy of a USGS quad/topographical map (REQUIRED) of the survey area, noting the survey site and location of WIFL detections. You may also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map.

Comments (attach additional sheets if necessary):____

Rancho Santa Clarita
Bouquet
CANYON
Water Tank
(MINT CANYON)
2352 IV NW
Bouquet Canyon
Boys Camp
RIVER
Bouquet Junction
Wells
Canyon
Drive-in
Theater
ROAD
SOLEMINT 2.7 MI.
Soledad
Bonelli
Ranch
BM 1239
Saugus School
BM 1217
SOLEDAD
CANYON
BM
1161
Gaging Sta
Saugus
Water
Tank
BOUNDARY
1175
Circle J Ranch
Oakdale
Canyon
Radio Range
AQUEDUCT
126
Newhall
(BM 1272)
Memorial Park
Placeritos
Ranch
Hart School
Placerita

Willow Flycatcher Survey and Detection Form (rev. 4/98)

Site Name____San Francisquito Creek______________________________ Total Site No ______________________________

Was site surveyed in previous year? **Yes** No   Drainage Santa Clara River
If yes, what site name was used? __same as above____________
County __Los Angeles______________________   State__CA____ USGS Quad Name Newhall_____

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? X☐ Yes ☐ No

Site Coordinates: Start: N__34 25/631_______________ W 118 33.899__________ UTM
Stop: N__34 27.752_______________ W 118 33.047___________ UTM   Zone ________
Elevation ____1125-1300 ft.__________ feet / meters (circle one)

***** Fill in additional site information on back of this page *****

Survey # Observer(s)	Date (m/d/y) Survey time	Number of WIFLs Found	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign Y or N	Comments about this survey (e.g., evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
D. Guthrie	Date 5/17 start 6:30 stop 8:30 total hrs _2.0____	0	0	0	n	n	n	
D. Guthrie	Date 6/11 Start 6:30 Stop 8:30 total hrs _2___	0	0	0	n	n	N	
D. Guthrie	Date 6/26 Start 6:30 Stop 8:30 total hrs _2.0__	0	0	0	n	n	N	
D. Guthrie	Date 7/6 start 6:30 stop 8:30 total hrs 2.0	0	0	0	n	n	N	
D. Guthrie	Date 7/17 start 6:30 stop 8:30 total hrs _2.0_	0	0	0	n	n	N	

Overall Site Summary (Total only resident WIFLs)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? No
Total survey hrs___10.0__	0	0	0	0	If yes, report color combination(s) in the comments section on back of form

Name of Reporting Individual ____Dan Guthrie____________ Date Report Completed ___7/20/04________________

Submit the original of this form. Retain a copy for your records.

Fill in the following information completely. Submit original form. Retain copy for your records.

Name of Reporting Individual ___Dan Guthrie________________________Phone # _909 607 2836_____________

Affiliation __Claremont Colleges__________________________ Email dguthrie@jsd.claremont.edu_______________

Site Name__San Francisquito Creek____
Did you verify that this site name is consistent with that used in previous years? Yes No ? (circle one)
This is a section of site previously lumped as upper Santa Clara River
Management Authority for Survey Area (circle one):

Federal Municipal/County State Tribal **Private**

Name of Management Entity or Owner (e.g., Tonto National Forest) _Newhall Land Co.________________________

Length of area surveyed: _2 miles_____ (specify units, e.g., miles = mi, kilometers = km, meters = m)

Did you survey the same general area during each visit to this site this year? **Yes /** If no, summarize in comments below.

If site was surveyed last year, did you survey the same general area this year? **Yes /** If no, summarize in comments below.

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):
Native broadleaf plants
XX☐ Mixed native and exotic plants (mostly native)
(entirely or almost entirely, includes high-elevation willow)
☐ Mixed native and exotic plants (mostly exotic) ☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: __Cotrtonwood, willow, tamarisk_________________________________

Average height of canopy: __40 ft.___________________________ (specify units)

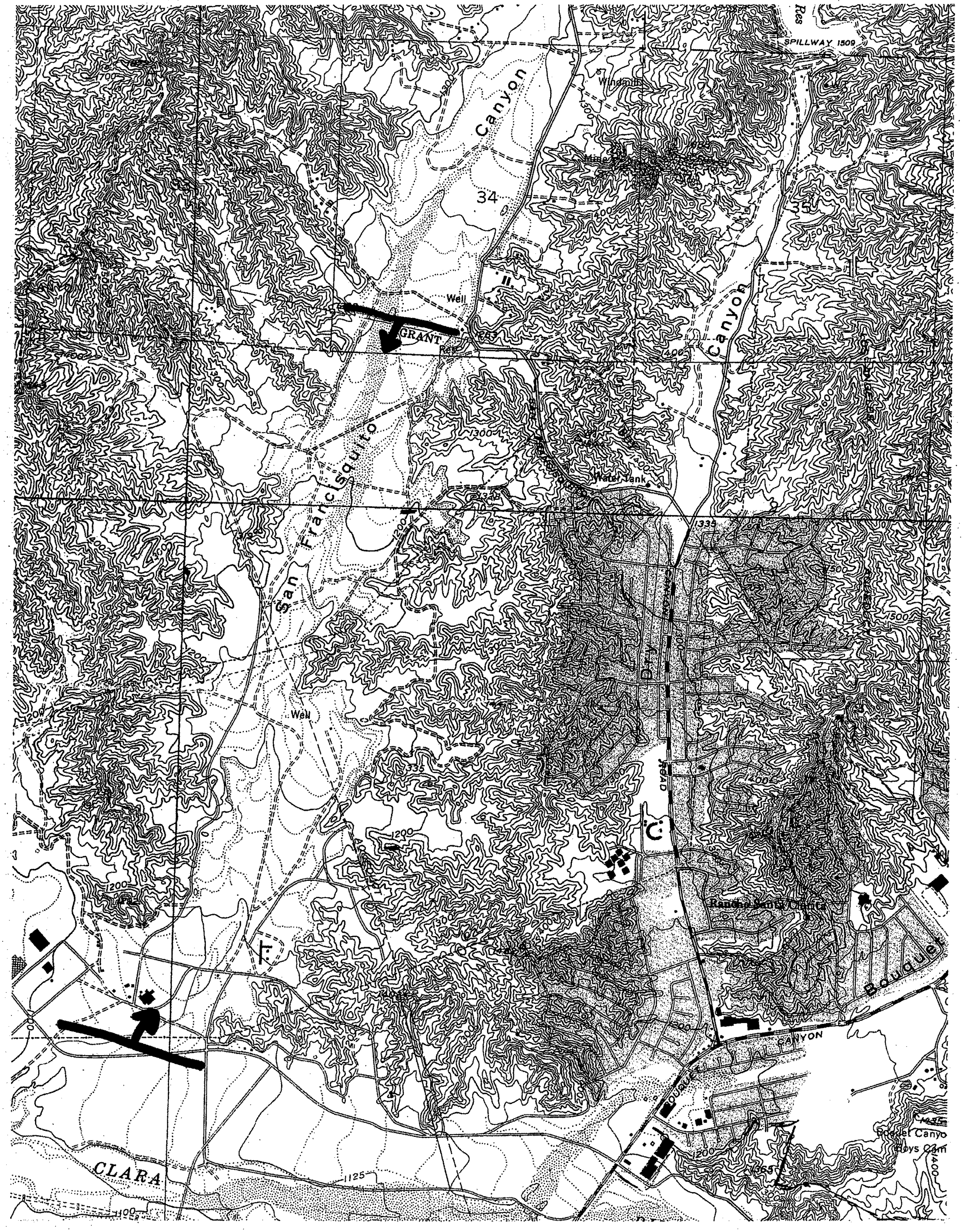
Was surface water or saturated soil present at or adjacent to site? No water present only for 50 yds in middle of section.
Distance from the site to surface water or saturated soil: _____________ (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? No (circle one)
If yes, describe in comments section below. no water present except for 50 yd section trickle in center of section.

Remember to attach a xerox copy of a USGS quad/topographical map (REQUIRED) of the survey area, noting the survey site and location of WIFL detections. You may also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map.

Comments (attach additional sheets if necessary):____

spring runoff occurred in March. There was no flowing water present during the survey period except for small area of suburban runoff in middle of section.



SPILLWAY 1509
Windmill
Canyon
34
35
Well
GRANT
Canyon
San Francisquito
Water Tank
Dry
Well
Rancho Santa Clarita
Bouquet
CANYON
CLARA
1125
1100
Bouquet Canyon
Boys Cam

Willow Flycatcher Survey and Detection Form (rev. 4/98)

Site Name____South Fork________________________ Total Site No ________________________

Was site surveyed in previous year? **Yes** Drainage Santa Clara River

If yes, what site name was used? __South Fork__________

County __Los Angeles________________ State__CA____ USGS Quad Name Newhall______

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)?* X☐ *Yes* ☐ *No

Site Coordinates: Start: N__34 23.735____________ W 118 32.354__________ UTM

Stop: N__34 25.507____________ W 118 33.710__________ UTM Zone ________

Elevation _____1120- 1200 ft.__________ feet / meters (circle one)

***** Fill in additional site information on back of this page *****

Survey # Observer(s)	Date (m/d/y) Survey time	Number of WIFLs Found	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign Y or N	Comments about this survey (e.g., evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
J. Sugden	Date 5/17 start 6:30 stop 8:30 total hrs _2:0____	0	0	0	n	Y	n	
j. Sudgden	Date 6/11 Start 6:30 Stop 8:30 total hrs _2___	1	0	0	n	Y	N	Non-singing
J. Sugden	Date 6/26 Start 6:30 Stop 8:30 total hrs _2.0__	0	0	0	n	Y	N	
J. Sugden	Date 7/6 start 6:30 stop 8:30 total hrs 2.0	0	0	0	n	Y	N	
J. Sugden.	Date 7/17 start 6:30 stop 8:30 total hrs _2.0____	0	0	0	n	Y	N	

Overall Site Summary (Total only resident WIFLs)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? No
	1	0	0	0	If yes, report color combination(s) in the comments section on back of form
Total survey hrs___10.0___					

Name of Reporting Individual ____Dan Guthrie____________ Date Report Completed ___7/20/04________________

Submit the original of this form. Retain a copy for your records.

Fill in the following information completely. Submit original form. Retain copy for your records.

Name of Reporting Individual ___Dan Guthrie_______________________Phone # _909 607 2836_____________

Affiliation __Claremont Colleges__________________________ Email dguthrie@jsd.claremont.edu_______________

Site Name__South Fork, Santa Clara River____
Did you verify that this site name is consistent with that used in previous years? Yes No ? (circle one)
This is a section of site previously lumped as upper Santa Clara River
Management Authority for Survey Area (circle one):

Federal Municipal/County State Tribal **Private**

Name of Management Entity or Owner (e.g., Tonto National Forest) _Newhall Land Co.________________________

Length of area surveyed: _2 miles_____ (specify units, e.g., miles = mi, kilometers = km, meters = m)

Did you survey the same general area during each visit to this site this year? **Yes** / If no, summarize in comments below.

If site was surveyed last year, did you survey the same general area this year? **Yes** / If no, summarize in comments below.

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):
Native broadleaf plants
XX☐ Mixed native and exotic plants (mostly native)
(entirely or almost entirely, includes high-elevation willow)
☐ Mixed native and exotic plants (mostly exotic) ☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: __Cotrtonwood, willow, tamarisk___________________________________

Average height of canopy: __30t.____________________________ (specify units)

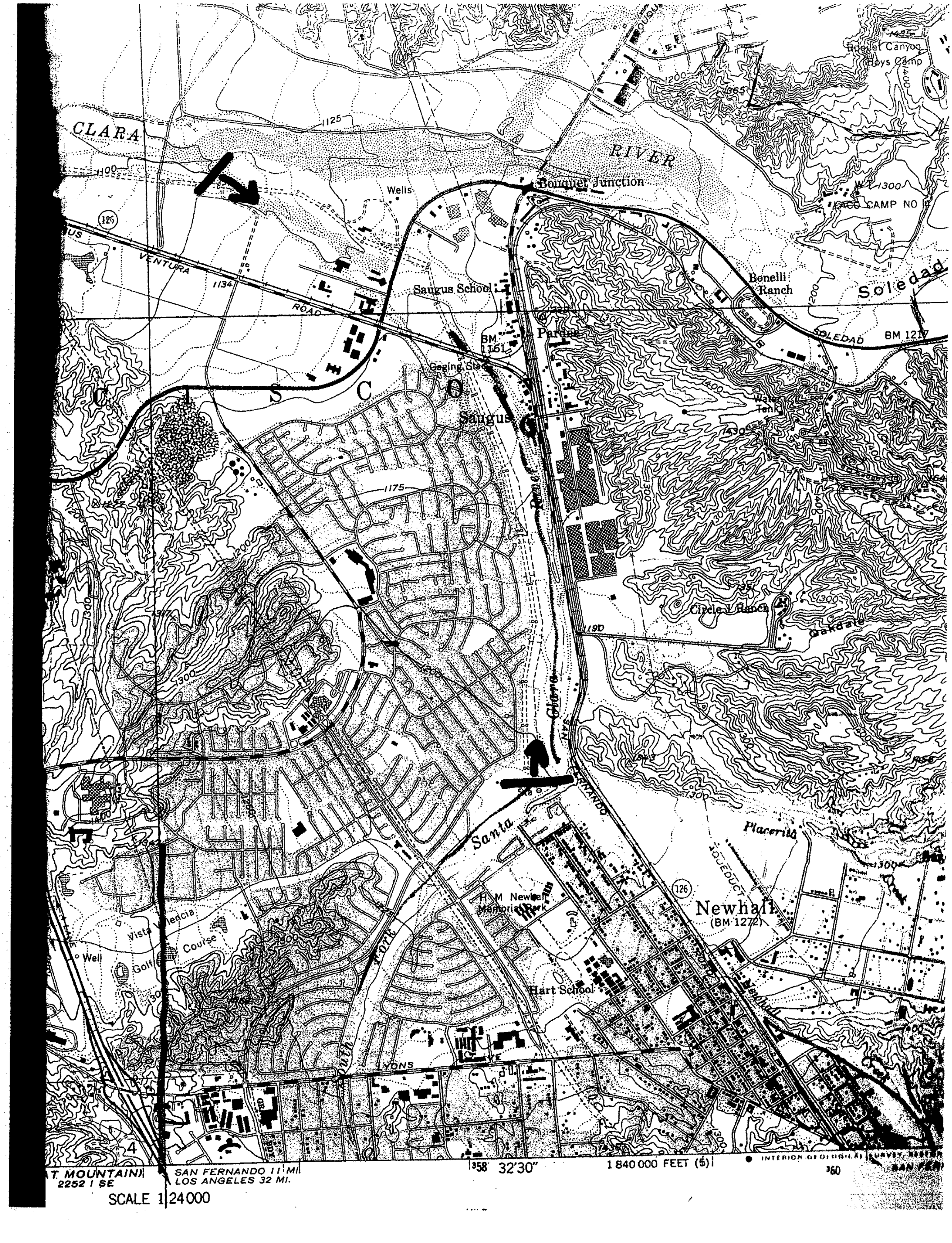
Was surface water or saturated soil present at or adjacent to site? **No** water present only in three spots due to suburban runoff.
Distance from the site to surface water or saturated soil: _____________ (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? No (circle one)
If yes, describe in comments section below. no water present except for 50 yd section trickle in center of section.

Remember to attach a xerox copy of a USGS quad/topographical map (REQUIRED) of the survey area, noting the survey site and location of WIFL detections. You may also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map.

Comments (attach additional sheets if necessary):____

No flowing water along this section. There were small puddles due to runoff from neighboring suburbs. These support stands of cottonwood where flycatcher was seen. Non singing and time of observation suggests a northern subspecies.


CLARA
RIVER
Bouquet Junction
Bouquet Canyon
Boys Camp
Wells
VENTURA
ROAD
Saugus School
Bonelli
Ranch
Soledad
SOLEDAD
BM 1217
Parma
Gaging Sta
S C O
Saugus
Circle J Ranch
Oakdale
Placerita
Santa
H M Newhall
Memorial Park
Newhall
(BM 1272)
Vista Valencia
Golf Course
Well
Hart School
FERNANDO
AQUEDUCT
LYONS
4
(T MOUNTAIN)
2252 I SE
SAN FERNANDO 11 MI
LOS ANGELES 32 MI.
358 32'30"
1 840 000 FEET (5)
INTERIOR GEOLOGICAL SURVEY
360
SCALE 1:24 000

Bird Observations for Spring 2004 in the Proposed Mesa East and West Development Near Valencia, California

BIRD OBSERVATIONS FOR SPRING 2004

IN THE PROPOSED MESA EAST AND WEST DEVELOPMENT

NEAR VALENCIA, CALIFORNIA

Prepared for:

Mark Subbotin
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Valencia, Ca. 91355

Prepared by:

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REVISED

August 24, 2004

Bird observations for Spring, 2004 in the proposed Mesas East and West Development near Valencia, California.

Prepared by: Daniel A. Guthrie
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Nature and Scope of Surveys

During the spring and early summer of 2004 surveys were conducted within the boundaries of the proposed Mesa Projects (Figure 1). Surveys were focused on determining presence or absence of California gnatcatcher, and followed U.S. Fish and Wildlife Service Guidelines for this species. Surveys followed the protocol for non-NCCP areas, involving 6 surveys of each area, occurring between March 15 and June 30 (see Table 1 for exact dates). Each survey involved two observers and lasted about 4 hours (6:30 to 10:30 a.m.), with each observer covering an area less than 80 acres of suitable habitat.

Each survey was conducted on foot by observers well acquainted with both visual and auditory characteristics of southern California birds. Tapes of calls of California gnatcatcher were played periodically along survey routes in an attempt to elicit a response. Survey routes were designed to visit all areas within the Proposed Project Area. However, routes for regular coverage were selected through preliminary surveys and were designed to cover all areas of appropriate habitat for the focus species. Personnel for all surveys were David Crawford, Guy Bruyea and Scott Cameron, working under Federal Fish and Wildlife Service Permit numbers TE-821229-4 (Crawford), TE-837439-4 (Bruyea) and TE-808242 (Cameron), issued under section 10(a)(1)(A) of the Endangered Species Act.

Habitat Condition and Bird Observations

The Mesa Project involves an irregular area bounded on the east by Magic Mountain and on the west by a steep ridge separating the study area from the drainage of Long Canyon. On the north the area is bordered by the Santa Clara River. The southern boundary of the area is marked by cattle gates on the property boundary but not by any topographic feature (Figure 1).

The area surveyed consists of a series of canyons trending in a southeast to northwest direction and running down to the Santa Clara River. Although there is no stream flow within these canyons, the more narrow canyons support a dry woodland of oak and sycamore which can be dense in places, forming a closed canopy over the canyon bottoms. Wider canyons have a sandy soil and support a Great Basin sage community.

Some of the mesa tops between the canyons have, at various times, been used as agricultural fields and some of these areas were under active cultivation during this study. Agriculture on the other mesas has been abandoned and these mesas now support introduced grasses and weeds, a few of the hardier coastal sage plants, and tree tobacco.

At one time the whole area, except for its westernmost portion, was an active oil field. The oil operations have been since removed and many pads and access roads plowed. These areas support grasses and non-native weeds.

Except for dry woodlands in the canyon bottoms, the whole area was probably once covered by sage scrub and chaparral communities. Today, due to cattle grazing, past agricultural activities and oil field road and pad construction, much of the area is pastureland covered with introduced grasses and weeds. Sage scrub grading into chaparral survives in dense stands on the steeper hillsides. On more gradual slopes grazing activities have broken the coastal sage community into more isolated and open patches containing many introduced grasses. Surveys concentrated on areas of sage scrub where species preferred by California gnatcatcher, California sage (*Artemesia californica*) and buckwheat (*Eriogonum sp.*) predominated and where the slope was less than 40%. (Federal Register, 2003).

The avifauna of the Mesa area (Table 1) consists of species common to the coastal sage community with mourning dove, California quail, Bewick's wren, western scrub jay, California and spotted towhee and rufous-crowned sparrow being the common species. Less abundant are species of a dry oak woodland (acorn and Nuttall's woodpecker) Swallows nesting on cliffs along the Santa Clara River were frequently observed foraging over the area. House finch, orioles and phainopepla were common in elderberry and tree tobacco. Pastureland supported lark sparrow and mourning dove.

Observations of all birds are shown in Table 1. The numbers shown are of birds seen and heard, with heard individuals forming the majority of the observations. Numbers vary between censuses for several reasons. Some censuses were not complete but, rather, were focused on particular places or areas. Also, bird activity varies with season. Different species breed at different times of the year. In general, species are most easily observed when they are actively defending territories by song during the establishment of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, numbers observed increase. Thus, for most resident species, numbers of adult birds are most accurately censused in April and May, when territorial activity is at a maximum. A few species such as Anna's hummingbird that nest early in the season may be underestimated. Many species that nest in the area also migrate through the area to more northern portions of their ranges. Thus, numbers of nesting species observed in May, which include migratory birds passing through the area, do not give an accurate count of actual resident birds.

Comments on Threatened and Endangered Species

California Gnatcatcher (*Polioptila californica)*

The California Gnatcatcher is listed as a Threatened species under the Federal Endangered Species Act. Survey routes were selected to cover prime habitat for California Gnatcatcher, namely, stands of dense Coastal Sage Scrub. Surveys followed the protocol for non-NCCP areas, involving 6 surveys of each area, occurring between March 15 and June 30 (see Table 1 for exact dates). Each survey involved two observers and lasted about 4 hours (6 to 10 am), with each observer covering an area containing about 80 acres of suitable habitat. Although all areas of coastal sage scrub habitat were surveyed, particular attention was placed on more open scrub areas dominated by California sage as this type of vegetation has been shown to be preferred by gnatcatchers (Federal Register, 2003). Tapes of California gnatcatcher calls were played at regular intervals along all survey routes. No California gnatcatchers were heard or observed during this study.

Comments on Sensitive Species

Cooper's Hawk (*Accipiter cooperi*)

Cooper's hawk is considered a Species of Special Concern by the State of California. Cooper's hawks nest in woodlands along the Santa Clara River immediately north of the Mesas area. A single Cooper's hawk was observed hunting in the Mesas area on April 13.

Loggerhead Shrike (*Lanius ludovicianus*)

This is a California Special Concern species. Shrikes are resident in the sage scrub areas and one was observed in suitable nesting habitat in the study area.

Southern California Rufous-crowned Sparrow (*Aimophila ruficeps canescens*)

This species is considered a California Special Concern species by the Department of Fish and Game and is also a Federal Special Concern species. Rufous-crowned sparrows are a fairly common resident and breeding species in coastal sage habitat throughout the study site.

Lawrence's Goldfinch *(Carduelis canescens*)

This species, which occurs sporadically in chaparral habitat, is a highest priority species on the Audubon Birds to Watch list for 1996 and is a Bird of Management

Concern for the Fish and Wildlife Service. A single Lawrence's goldfinch was observed on April 27th.

Summary

California gnatcatcher were not observed during this study. Four Species of Concern were observed. These species, the Southern California rufous-crowned sparrow, Cooper's hawk, Lawrence's goldfinch and loggerhead shrike, are all resident in the area in low density and breed either on the site or nearby.

References

Federal Register, 2003. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Coastal California Gnatcatcher (*Polioptila californica californica*) and Determination of Distinct Vertebrate Population for the California Gnatcatcher *Polioptila californica). Vol 68, no 79 April 24, 2003, p. 20228.*

Table 1. Bird Observations on the Mesa East and West Projects, near Valencia California, 2004:							
Endangered Species and Species of Concern Shaded							
			Dates of Surveys				
SPECIES	**STATUS**	**3/30**	**4/13**	**4/27**	**5/4**	**5/18**	**6/9**
Turkey Vulture	s	2	0	0	5	1	3
Cooper's Hawk	r	0	1	0	0	0	0
Red-tailed Hawk	r	3	2	1	1	3	2
American Kestrel	r	0	0	0	0	1	0
California Quail	r	24	30+	30+	18	30+	30+
Killdeer	r	0	1	0	0	0	0
Rock Dove	r	2	5	0	30+	11	0
Mourning Dove	r	8	9	11	6	8	11
Greater Roadrunner	r	0	0	2	0	0	0
White-th. Swift	r	0	2	0	0	0	0
Black-chinned Hummingbird	s	0	1	0	0	0	0
Anna's Hummingbird	r	4	3	3	2	3	6
Costa's Hummingbird	s	0	0	1	0	0	0
Acorn Woodpecker	r	4	0	0	1	1	0
Nuttall's Woodpecker	r	0	0	0	1	0	0
Northern Flicker	r	1	1	1	1	0	0
Black Phoebe	r	0	2	0	0	0	0
Say's Phoebe	r	0	1	0	0	0	0
Western Kingbird	s	7	2	4	1	3	3
Loggerhead Shrike	r	0	1	0	0	0	0
Western Scrub Jay	r	19	5	8	10	5	4
American Crow	r	4	6	3	7	7	9
Common Raven	r	1	1	2	0	1	2
Violet-green Swallow	s	0	0	2	0	0	0
N. Rough-winged Swallow	s	0	4	7	1	8	8
Cliff Swallow	s	0	6	6	5	8	12
Bushtit	r	6	7	4	2	1	0
Bewick's Wren	r	11	5	6	4	8	11
Blue-gray Gnatcatcher	r	0	1	0	0	0	0
Western Bluebird	r	0	2	2	0	0	0
Wrentit	r	6	4	4	2	4	5
Northern Mockingbird	r	2	2	2	2	3	9
California Thrasher	r	5	1	1	3	1	2
European Starling	r	3	0	0	0	0	0
Phainopepla	r	0	2	0	0	2	2
Yellow-rumped Warbler	w,m	2	0	0	0	0	0
Common Yellowthroat	r	0	0	1	1	1	0
Spotted Towhee	r	30+	7	10	7	18	24
California Towhee	r	30+	11	17	12	30+	30+
Rufous-crowned Sparrow	r	5	0	0	2	1	0
Lark Sparrow	r	0	0	2	0	1	3
Savannah Sparrow	w,	0	0	2	0	0	0
Song Sparrow	r	0	0	1	0	0	0

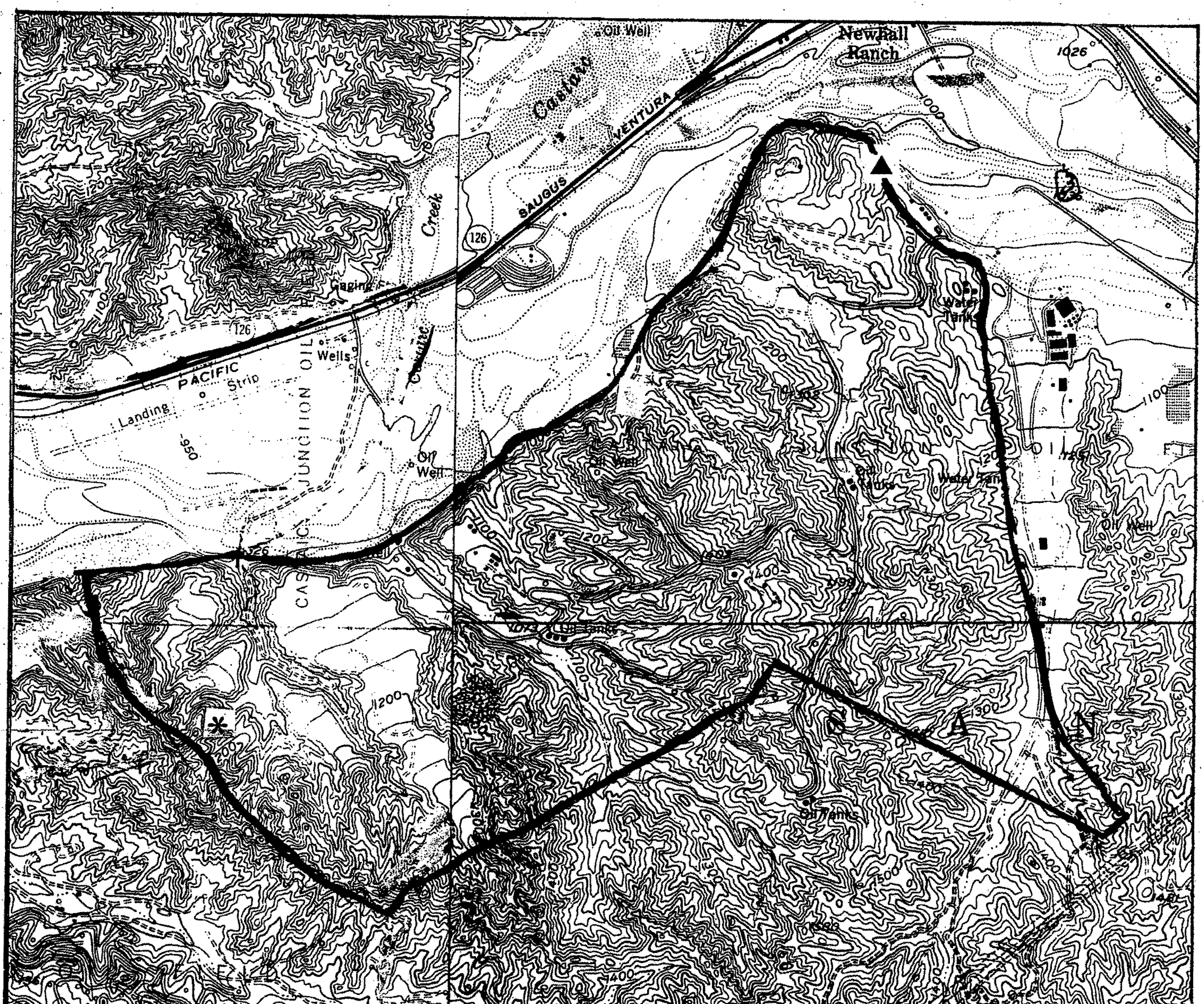
Table 1 (cont.). Bird Observations on the Mesa East and West Projects, near Valencia California, 2

SPECIES	STATUS	3/30	4/13	4/27	5/4	5/18	6/9
		Dates of Surveys					
White-crowned Sparrow	w,m	9	0	0	0	0	0
Red-winged Blackbird	s	0	4	2	1	2	1
Bullock's Oriole	s	0	0	1	1	3	3
House Finch	r	11	7	4	8	6	6
Lesser Goldfinch	r	0	1	3	0	3	0
Lawrence's Goldfinch	r	0	0	1	0	0	0

Status: m, migrant; r, resident; s, summer only; w, winter

Endangered Species and Species of Concern Shaded

Figure 1. Outline of Mesa Project, east and west.



Base Map: U.S.G.S. 7.5 minute topographic map for Newhall, 1952
and Val Verde, 1968, California, both photorevised 1988.

Bird Observations in the Proposed Magic Mountain Entertainment Project Area, Near Valencia, California, 2004

BIRD OBSERVATIONS IN THE PROPOSED MAGIC MOUNTAIN ENTERTAINMENT PROJECT AREA, NEAR VALENCIA, CALIFORNIA, 2004

Prepared for:

Mark Subbotin
Valencia Corporation
23823 Valencia Blvd.
Valencia, Ca. 91355

Prepared by:

Daniel A. Guthrie
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dguthrie@jsd.claremont.

REVISED

August 24, 2004

Bird Observations in the Proposed Magic Mountain Entertainment Project Area near Valencia, California, 2004

Prepared by: Daniel A. Guthrie
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925 N. Mills Ave
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(909) 607-2836

Nature and Scope of Surveys

During the spring and early summer of 2004 surveys were conducted within the boundaries of the proposed Magic Mountain Entertainment Project and adjacent Magic Mountain area. The area surveyed is roughly triangular in shape, bounded on the northeast by the Santa Clara River and the Old Road, on the southeast by Southern California Edison power lines, and on the west by a wide valley (Figure 1). The area includes the Six Flags Magic Mountain development (which was not surveyed) as well as undeveloped hillsides and some agricultural fields to the east and north of Magic Mountain.

Surveys were focused on determining presence or absence of California gnatcatcher, and followed U.S. Fish and Wildlife Service Guidelines for this species. Surveys followed the protocol for non-NCCP areas, involving 6 surveys of each area, occurring between March 15 and June 30 (see Table 1 for exact dates). Each survey involved two observers and lasted about 3 hours (6:30 to 9:30 a.m.), with each observer covering an area less than 80 acres of suitable habitat.

Each survey was conducted on foot by observers well acquainted with both visual and auditory characteristics of southern California birds. Tapes of calls of California gnatcatcher were played periodically along survey routes in an attempt to elicit a response. Survey routes were designed to visit all areas within the Proposed Project Area. However, routes for regular coverage were selected through preliminary surveys and were designed to cover all areas of appropriate habitat for the focus species. Personnel for all surveys were Daniel A. Guthrie and Judith A. Sugden, both working under Federal Fish and Wildlife Service Permit number TE810394-2, issued under section 10(a)(1)(A) of the Endangered Species Act.

On each survey, numbers of all species observed were noted and, in addition to the gnatcatcher, special attention was placed on locating species considered rare and endangered or of Special Concern, and on determining numbers of raptoral birds. Table 1 presents all observations during these surveys.

Habitat Condition and Bird Observations.

Immediately north of the Magic Mountain parking lots are agricultural fields that were actively cultivated during the study period. East of Magic Mountain are planted grassy mesas that have been cleared of most native vegetation and that were cut for hay in late June. The only trees in the study area are a few solitary oaks that dot this section and planted introduced trees within and along the edges of the Magic Mountain development and its main entrance. South of Magic Mountain is an area of native habitat. Hillsides are sage scrub, grading into chaparral in some of the deeper valleys. Wide valleys within the site contain deep sandy soil and support Great Basin sage as well as introduced tree tobacco. A portion of the hills just north of Magic Mountain were burned recently and supported mainly introduced grasses.

The avifauna (see Table 1) is dominated by sage scrub species, with mourning dove, California quail, Bewick's wren, California towhee, and rufous-crowned sparrow being the common species. Grassy areas support mourning dove and lark sparrow. Elderberry bushes in the area attracted orioles, mockingbird and phainopepla and numerous tree tobacco was attractive to orioles and hummingbirds. Food waste at Magic Mountain provided some attraction to starlings, house finch and ravens and trees around this developed area provided nest sites for orioles.

Observations of all birds are shown in Table 1. The numbers shown are of birds seen and heard, with heard individuals forming the majority of the observations. Numbers vary between censuses for several reasons. Some censuses were not complete but, rather, were focused on particular places or areas. Also, bird activity varies with season. Different species breed at different times of the year. In general, species are most easily observed when they are actively defending territories by song during the establishment of breeding pairs. Once pairs are established and nesting begins song often decreases and the numbers of birds observed, therefore, also decreases. After young leave the nest, numbers observed increase. Thus, for most resident species, numbers of adult birds are most accurately censused in April and May, when territorial activity is at a maximum. A few species such as Anna's hummingbird that nest early in the season may be underestimated. Many species that nest in the area also migrate through the area to more northern portions of their ranges. Thus, numbers of nesting species observed in May, which include migratory birds passing through the area, do not give an accurate count of actual resident birds.

Comments on Threatened and Endangered Species

California Gnatcatcher (*Polioptila californica*)

The California Gnatcatcher was listed as a Threatened species under the Federal Endangered Species Act in 1993. Preferred habitat includes various sage scrub communities, often dominated by California sage (*Artemesia californica*) and buckwheat (*Eriogonum sp.*) California gnatcatchers generally avoid nesting in areas with a slope of greater that 40% (Federal Register, 2003)

Survey routes were selected to cover prime habitat for California Gnatcatcher, namely, stands of dense Sage Scrub in canyon bottoms and on north facing hillsides. During all surveys no California gnatcatchers were heard or observed.

Comments on Sensitive Species

Raptors

The study site contained few suitable trees and no suitable cliffs for nesting. The only raptor nest found was of a red-tailed hawk (Figure 1) which nested on a telephone pole at the edge of the site.

Although the site contained few suitable trees or cliffs for nesting, several red-tailed hawks and a white-tailed kite regularly hunted on the site . Although no owls were seen on the site, barn owls and great horned owls regularly foraged on neighboring areas and can be expected to forage over this site as well.

White-tailed Kite (*Elanus leucurus*)

This species, formerly the black-shouldered kite, is considered a Species of Special Concern by the State of California. Kites nest in the riparian forest along the Santa Clara River and a single individual regularly hunted over the grassy sections of this area.

Loggerhead Shrike (*Lanius ludovicianus*)

This is a California Species of Special Concern. Shrikes are resident in the sage scrub and one pair, regularly observed, in the study area, probably nested just west of the property.

Southern California Rufous-crowned Sparrow (*Aimophila ruficeps canescens*)

This species is considered a California Special Concern species by the Department of Fish and Game and a Species of Concern by the Fish and Wildlife Service. Rufous-crowned sparrows are a fairly common resident and breeding species in denser sections of sage scrub habitat throughout the study site.

Summary

No California gnatcatcher, were observed on the site. Birds of the site are those typical of dry coastal sage scrub habitat and two of the observed species which probably nest on or near the site, loggerhead shrike and Southern California rufous-crowned sparrow, are considered Species of Concern. A third species of concern, the white-tailed kite, nests in riparian woodland along the Santa Clara River and regularly hunted over the area.

References

Federal Register, 2003. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Coastal California Gnatcatcher (*Polioptila californica californica*) and Determination of Distinct Vertebrate Population for the California Gnatcatcher *Polioptila californica). Vol 68, no 79 April 24, 2003, p. 20228.*

Table 1. Birds Observations on the Magic Entertainment Project Area, 2004							
Endangered Species and Species of Concern Shaded							
				Dates of Surveys			
SPECIES	**STATUS**	**23-Mar**	**28-Apr**	**11-May**	**2-Jun**	**15-Jun**	**28-Jun**
Turkey Vulture	s	5	0	3	0	1	1
White-tailed Kite	r	1	1	0	1	1	0
Red-tailed Hawk	r	0	1	2(2)	5	2	2
American Kestrel	r	0	0	0	0	0	1
California Quail	r	24	55	46	74	135	132
Killdeer	r	0	0	0	4	0	0
Mourning Dove	r	18	10	0	80	39	35
Greater Roadrunner	r	0	0	0	1	0	1
White-th. Swift	r	0	0	4	0	0	0
Black-chinned Hummingbird	s	0	0	0	2	2	6
Anna's Hummingbird	r	1	0	2	15	7	16
Costa's Hummingbird	s	0	0	0	0	0	6
Allen's Hummingbird	r,m	0	0	0	0	1	5
Nuttall's Woodpecker	r	0	0	0	0	0	1
Black Phoebe	r	0	0	0	0	1	1
Say's Phoebe	r	1	0	0	3	0	2
Ash-throated Flycatcher	s	0	0	0	8	2	0
Western Kingbird	s	0	0	0	9	9	4
Loggerhead Shrike	r	1	2	2	2	1	3
Western Scrub Jay	r	2	8	4	17	5	14
American Crow	r	0	1	0	2	0	2
Common Raven	r	4	2	2	13	27	10
Tree Swallow	s	4	0	0	0	0	0
Violet-green Swallow	s	0	0	0	0	3	0
N. Rough-winged Swallow	s	2	6	6	12	16	2
Cliff Swallow	s	0	0	0	6	5	0
Barn Swallow	s	0	0	0	0	2	0
Bushtit	r	0	0	0	2	0	2
Bewick's Wren	r	0	10	4	12	29	4
Blue-gray Gnatcatcher	r	0	0	0	2	0	0
Western Bluebird	r	0	0	0	0	0	4
American Robin	r	0	0	0	0	2	0
Wrentit	r	6	3	2	7	20	2
Northern Mockingbird	r	4	6	6	12	19	11
California Thrasher	r	2	1	0	0	0	2
European Starling	r	0	0	0	0	2	0
Phainopepla	r	0	0	6	6	5	9
Orange-crowned Warbler	w,m	0	0	0	2	0	0
Common Yellowthroat	r	0	1	0	0	0	0
Wilson's Warbler	m	0	0	1	0	0	0
Spotted Towhee	r	3	4	8	37	19	0

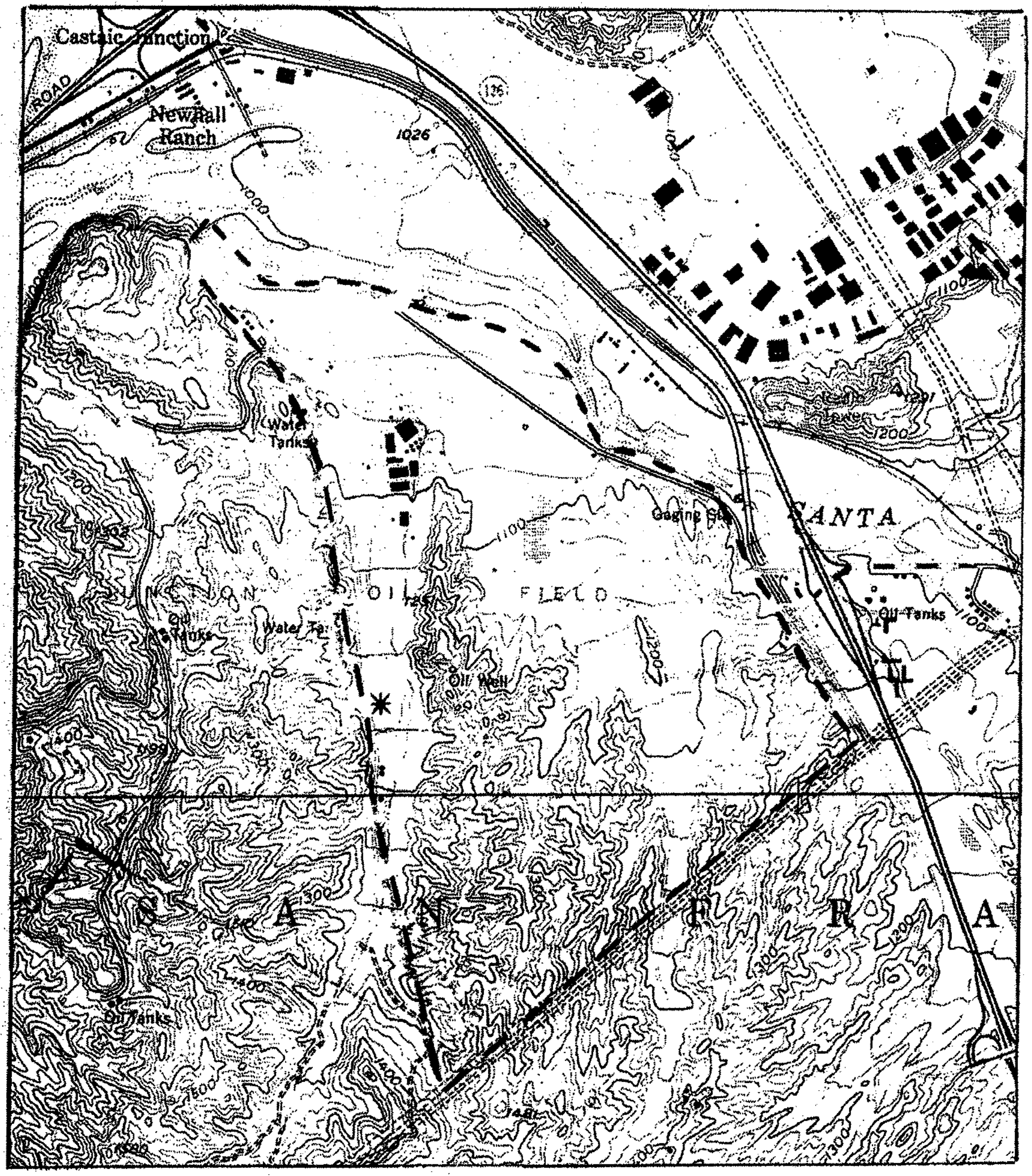
Table 1 (cont.). Birds Observations on the Magic Entertainment Project Area, 2004

Endangered Species and Species of Concern Shaded

		Dates of Surveys					
SPECIES	**STATUS**	**23-Mar**	**28-Apr**	**11-May**	**2-Jun**	**15-Jun**	**28-Jun**
California Towhee	r	8	26	24	48	61	37
Rufous-crowned Sparrow	r	1	0	0	0	5	3
Lark Sparrow	r	0	0	6	12	13	3
Black-headed Grosbeak	s	0	2	0	6	1	2
Lazuli Bunting	s	0	0	2	2	0	1
Red-winged Blackbird	s	0	80	0	0	0	0
Brewer's Blackbird	r	0	25	0	0	0	0
Hooded Oriole	s	0	0	0	3	0	0
Bullock's Oriole	s	0	10	0	14	10	4
House Finch	r	32	14	46	160	91	225
Lesser Goldfinch	r	0	0	4	14	33	9
House Sparrow	r	0	0	0	0	5	5

Status: m, migrant; r, resident; s, summer only; w, winter

Figure 1. Map of the proposed Magic Mountain Entertainment Project Area study site near Valencia, California



- - - - - Approximate boundary of survey area.

✳ - Red- tailed hawk nest

Base Map: U.S.G.S. 7.5 Minute topographic map for Newhall, California, 1952, photorevised 1988.

Impact Sciences, Results of Focused Surveys for Arroyo Toad and Special-Status Aquatic Reptiles and Amphibians

Results of Focused Surveys for Arroyo Toad and Special-Status Aquatic Reptiles and Amphibians Newhall Ranch, Valencia, California

Prepared for:

Newhall Ranch Company
23823 Valencia Boulevard
Valencia, California 91355

Prepared by:

Impact Sciences, Inc.
30343 Canwood Street, Suite 210
Agoura Hills, California 91301

May 21, 2002

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Results of Focused Surveys for Arroyo Toad and Special-Status Aquatic Reptiles and Amphibians Newhall Ranch Valencia, California

The following presents the findings of focused protocol surveys that were conducted to determine the presence / absence of the federally-listed Endangered arroyo toad (*Bufo californicus*) within portions of the Santa Clara River in Los Angeles County that comprise the Newhall Ranch Specific Plan area. This report is intended to provide project specific biological information to Newhall Ranch Company, U.S. Army Corps of Engineers (ACOE) and U.S. Fish and Wildlife Service (FWS) regarding results of focused surveys for arroyo toad and additional special-status amphibians and aquatic reptiles including southwestern pond turtle (*Clemmys marmorata pallida* – herein SPT) and two-striped garter snake (*Thamnophis hammondi* – herein TGS) conducted on the subject site.

INTRODUCTION

The Newhall Ranch Specific Plan survey reach is located in north Los Angeles County (**Figure 1**). Surveys were conducted in potentially suitable habitat in portions of the Santa Clara River from near the confluence with Castaic Creek, west (downstream) approximately four (4) miles to the Los Angeles County border (**Figure 2**). The survey area is situated within the Val Verde, California U.S. Geological Survey (USGS) 7.5-minute quadrangle map.

General Arroyo Toad Background

The arroyo toad is a small (generally 2 to 3 inches in snout to vent length), light greenish gray or tan toad with warty skin and dark spots. Its underside is white or buff colored without spots. A light-colored stripe crosses the head and eyelids, and a light area usually occurs on each sacral hump and in the middle of the back (FWS, 1994). The arroyo toad does not have the prominent white dorsal stripe characteristic of the western toad (*Bufo boreas*).

The arroyo toad was listed as a federally Endangered species by the Service on December 16, 1994 (50 CFR Part 17). The arroyo toad is also considered a Species of Special Concern by the California Department of Fish and Game and a Protected Amphibian under the state Fish and Game Code. A federal Recovery Plan was prepared in 1999 and critical habitat was defined in February 2001. Much of the information in the federal listing documents (FWS 1994, 1999, 2001a) regarding the biology of the

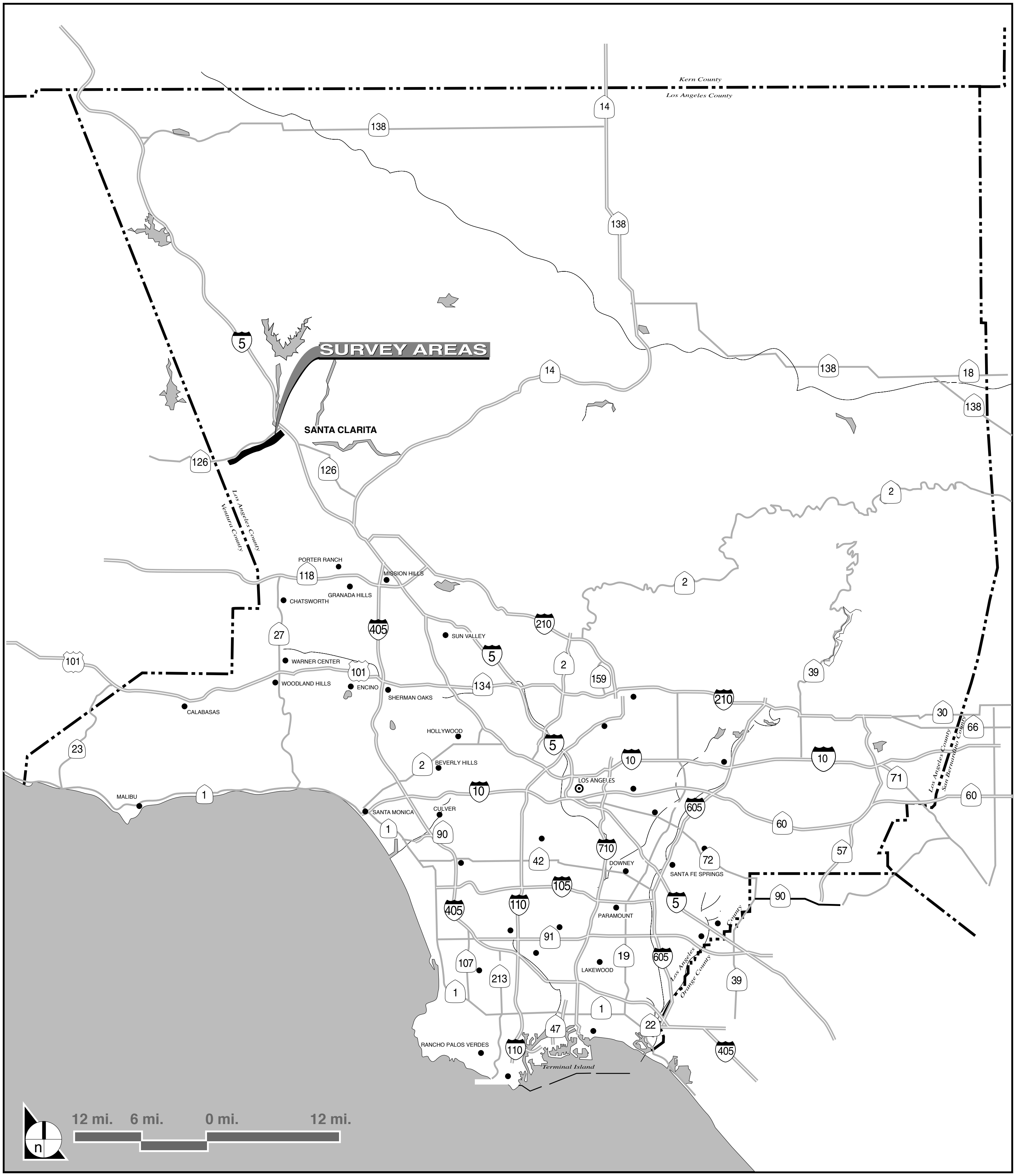

FIGURE 1

Regional Location

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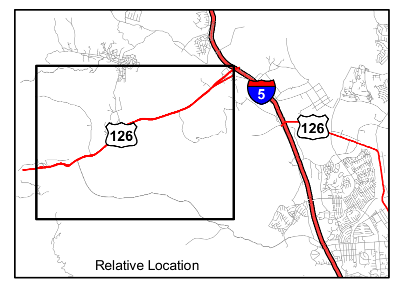
ARROYO TOAD SURVEY

Arroyo Toad Report

L E G E N D

Arroyo Toad Survey Reach

Newhall Ranch
Specific Plan Boundary



Feet
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Figure 2

SURVEY REACH

arroyo toad was derived from extensive research conducted by Dr. Samuel Sweet of the University of California, Santa Barbara (Sweet 1992, 1993). Additional detail is included in the Recovery Plan (FWS 1999) and a radio telemetry study conducted by Ruben Ramirez (2000).

Although considered a subspecies by some taxonomists, the nearest population of the arroyo toad's closest relatives is the Colorado River basin. Based on the separation from the other subspecies and results from recent genetic tests, it has been recommended that the arroyo toad be considered a separate species (FWS 2001a). For this reason, many biologists refer to arroyo toad as *Bufo californicus* and is, therefore, considered as such in this report.

Arroyo toad historically ranged from the upper Salinas River, south through the Santa Ynez, Santa Clara, and Los Angeles River basins and the coastal drainages of Orange, Riverside, and San Diego Counties to the Arroyo San Simeon system into Baja California, Mexico (FWS 1999). As of 1994 arroyo toad was known from only 22 populations (Ramirez 2000). Many areas that may have historically contained suitable breeding habitat for arroyo toad have been degraded by dam and flood control construction, off-road recreation, urbanization, mining, and introduced predators (FWS, 1999). This species is currently found in relatively small, isolated populations. Most remaining populations of arroyo toad occur on privately owned lands. Less than 50 percent of the known extant populations of arroyo toad occur on the Los Padres, San Bernardino, and Cleveland National Forests (FWS, 1994).

Overview of Arroyo Toad Habitat Characteristics

In general, arroyo toad requires habitat features that occur in drainages of a narrow, intermediate range of size that have a sufficient number of tributaries to produce an amount of alluvium necessary to decrease the gradient and form suitable breeding pools (Sweet 1992). Dr. Sweet's research in the Los Padres National Forest also suggests that "The late breeding season and long periods of dependence on surface water of arroyo toad larvae and juveniles restrict them from occurring in areas where the riverbed dries out by early summer (1992)."

Habitats utilized by arroyo toad include both breeding sites and over-wintering sites. Suitable breeding habitat features include shallow pools with a minimum of vegetation along one or both margins during the breeding season (Sweet 1992). Preferred pools occur adjacent to sand bars and sandy, stream terraces with vegetation that is mature enough to stabilize the terrace soils during all but the largest storm events. Eggs are deposited and larvae develop in shallow pools with minimal current, little or no emergent vegetation, and a sand or pea gravel substrate overlain with silt (FWS, 1994). As described by Sweet (1992), the following characteristics are relatively consistent with documented breeding pools: proximity to sandy terrace habitat; minimal current; the majority of the pool is less than 30 cm deep; substrate is sand, gravel, or pebbles; a gently sloping shoreline, or central sand bar; and bordering vegetation is low or set back such that most of the pool is open to the sky.

After metamorphosis (usually in June and July), juvenile toads commonly remain on the bordering gravel bars until the pool dries up (often between 3 and 8 weeks) (Sweet 1992). Juvenile and adult frogs feed on insects on sandy stream terraces with a sparse understory at ground level and a light to moderate overstory of riparian trees, including cottonwoods (*Populus* sp.), oaks (*Quercus* sp.), or willows (*Salix* sp.). Adult toads excavate shallow burrows on the terraces for shelter during the day when the surface is still damp or for longer intervals during the dry season (FWS, 1994).

Adult arroyo toad extensively utilize terraces and marginal zones (areas of mixed sediments that occur between the stream channel and mature riparian vegetation zone) outside the breeding season "and seem to have a critical dependence on terrace habitat in the late fall and winter months, when they are generally inactive" (Sweet 1992). Terraces utilized occur in the vicinity of breeding sites and are commonly characterized by sparse to moderate vegetation including mule fat (*Baccharis salicifolia*), California sycamore (*Platanus racemosa*), cottonwoods (*Populus* spp.), willow (*Salix* spp.), and coast live oak (*Quercus agrifolia*). The understory in these habitats may be bare or consist of scattered grasses herbs, and leaf litter (FWS 2001a). In order for any of these habitats to be suitable for arroyo toad use, several areas of open friable sand must be present where they can burrow (FWS 2001a).

Adult arroyo toads have also been documented in upland habitats outside of a stream channel, primarily outside of the breeding season. These 'uplands' are generally associated with accessible upper flood terraces that occur in the vicinity of breeding habitat. Upland habitats utilized by over-wintering arroyo toad include alluvial scrub, coastal sage scrub, chaparral, grassland and oak woodland (FWS 2001a). Soils are also important in these over-wintering habitats. Though individual arroyo toad have been documented from small mammal burrows, the majority of data suggests that they prefer sandy soils in which to burrow (Bloom, personal communication). Data collected by Ramirez (2000) suggest that arroyo toad may move burrow sites to follow soil moisture levels. Some arroyo toad have been documented to move back into the stream channel itself during the driest part of the season.

There is some variation in the timing of arroyo toad breeding based upon location and environmental conditions, but it generally takes place between February and late June. In the region that includes the subject survey area, breeding generally occurs between April and June. Adult males will select a breeding site generally based on the criteria described above, but may call from a variety of positions within the pools including the margins, edges of central bars, submerged bars, or occasionally from the surface of dense submerged vegetation (Sweet 1992). During courtship, males vocalize a high trill usually lasting 8 to 10 seconds (FWS 1999).

Critical Habitat Designation

Critical habitat is defined by the USFWS as: (1) the specific areas within the geographic area occupied by a species, at the time it is listed in accordance with the Endangered Species Act of 1973 as amended, on which are found those physical or biological features (a) essential to the conservation of the species and (b) that may require special management considerations or protection; and (2) specific areas outside the geographic area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. "Conservation" means the use of all methods and procedures that are necessary to bring an endangered or a threatened species to the point at which listing under the Act is no longer necessary (USFWS, 2001).

Criteria used by FWS to select critical habitat includes evaluation of an area to determine the presence of 'primary constituent elements,' as defined at 50 CFG 424.12(b) (FWS 2001a). These elements include physical and biological features that are essential to the conservation of the species, and that may require special management and protection (FWS 2001a). Primary constituent elements for the arroyo toad include aquatic breeding habitats and non-breeding upland habitats. These elements are discussed by Sweet (1992, 1993) and are specifically outlined in the Final Rule and include:

- A hydrologic regime that supplies sufficient flowing water of suitable quality and sufficient quantity to sustain eggs, tadpoles, metamorphosing juveniles, and adult breeding toads;
- Low-gradient stream segments (typically less than 4 percent) with sandy or fine gravel substrates which support the formation of shallow pools and sparsely vegetated sand and gravel bars for breeding and rearing of tadpoles and juveniles;
- A natural flooding regime or one sufficiently corresponding to a natural regime that will periodically scour riparian vegetation, rework stream channels and terraces, and redistribute sands and sediments, such that adequate numbers and sizes of breeding pools and sufficient terrace habitats with appropriate vegetation are maintained;
- Upland habitats (particularly alluvial streamside terraces and adjacent valley bottomlands that include areas of loose soil and dependable subsurface moisture where toads can burrow underground and avoid desiccation) of sufficient width and quality to provide foraging and living areas for subadult and adult arroyo toads;
- Few or no nonnative species that prey upon or compete with arroyo toads, or degrade their habitat;
- No manmade barriers that completely or substantially impede migration to over-wintering sites, dispersal between populations, or recolonization of areas that contain suitable habitat;
- Limited human-related disturbance.

It should be noted, and is discussed in the Final Rule that arroyo toad are not distributed uniformly throughout the designated critical habitat areas and that breeding and upland habitats are patchily distributed (FWS 2001a). The nature of breeding habitats is dynamic and may shift in structure and location from year to year depending upon seasonal rainfall and storm cycles. Similarly upland habitats, though more stable, can be affected by fire, storms, and other natural events.

Determination of whether an area was critical to the conservation of arroyo toad was accomplished by determining if an area 1) supports a substantial core population; 2) supports at least a small arroyo toad population and possesses favorable habitat conditions for population expansion and persistence; 3) suitable habitat situated in a location that appears to be crucial for maintaining the viability of a larger metapopulation; 4) occupied habitat on the periphery of the arroyo toad's geographic range; and 5) occupied habitat in atypical or underrepresented ecological environments (e.g., high elevation or desert-edge populations (FWS 2001a).

In order to preserve as much of the ecological and geographic diversity of arroyo toad distribution, three recovery units were selected. These are referred to as the Northern, Southern, and Desert recovery units. These units are based on ecological and geographic separation and the known and historic range of the species. The Service's goal is to stabilize and expand the populations in these units in order to preserve the species' genetic diversity as well as the environments in which the species is found (FWS 1999). The recovery units are based on the U.S. Geological Survey hydrologic subregion and accounting unit boundaries as delineated on the Hydrologic Unit Map. The objective of the recovery plan is to initially recover the arroyo toad sufficiently to warrant reclassification to Threatened status and finally to recover the species sufficiently to warrant delisting altogether (FWS 2001a).

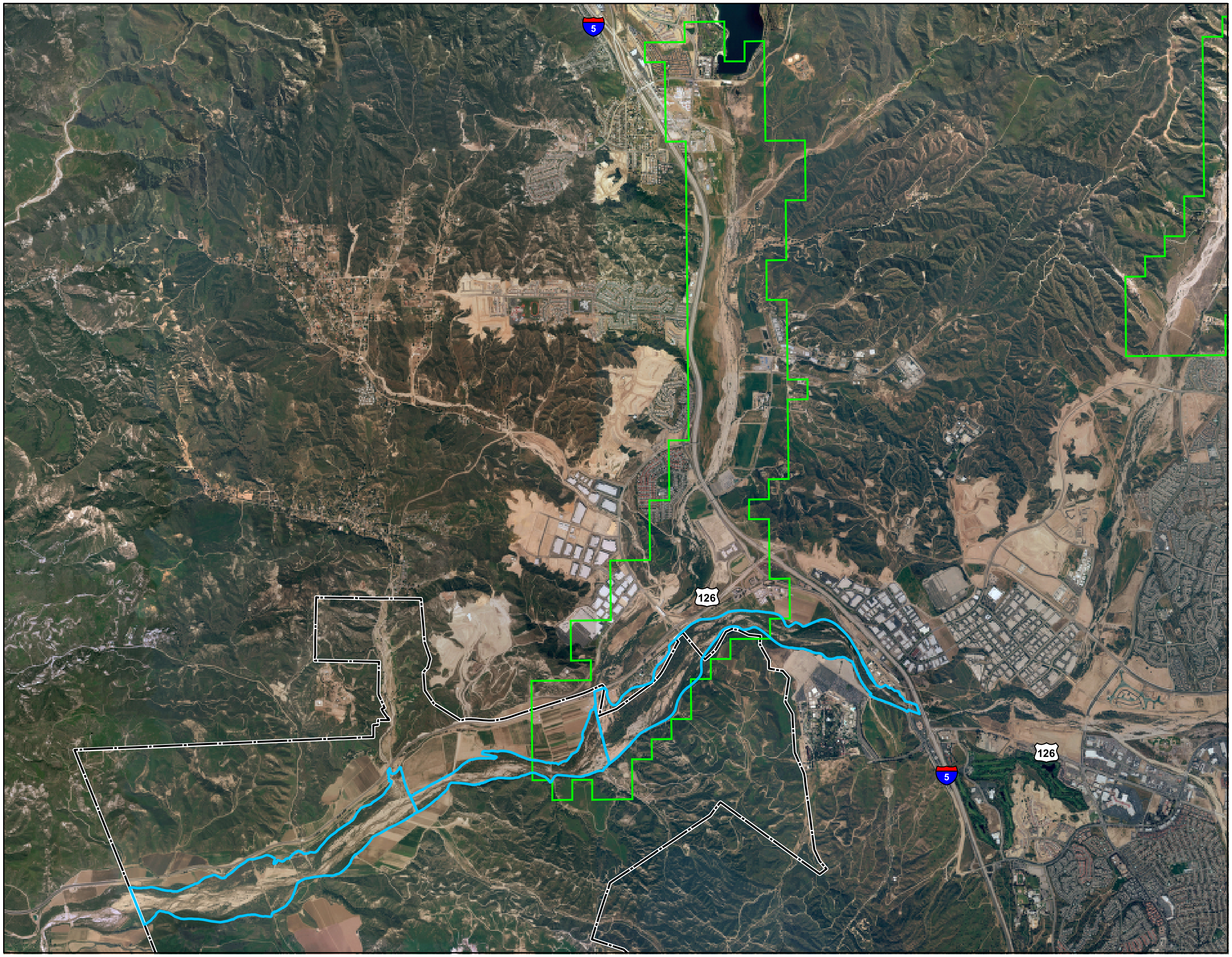
USFWS has identified 22 critical habitat units for the recovery of the arroyo toad. The unit nearest to Newhall Ranch is Unit 6, the Upper Santa Clara River Basin, which consists of portions of Castaic and San Francisquito Creeks, the Santa Clara River, and adjacent uplands, encompassing approximately 8,305 acres (**Figure 3**). Arroyo toads have been recorded at the following locations within critical habitat Unit 6, upstream of the subject Newhall Ranch survey area.

- <u>Castaic Creek</u> – both above and below the reservoir – occurrences documented on Department of Water Resources land and the Angeles National Forest both above and below the Castaic Lake reservoir (FWS 1999, FWS 2001a)

- <u>Upper San Francisquito Creek</u> – recent surveys (presumably on Forest Service land) "found evidence of the species" in this drainage within the designated critical habitat area (FWS 2001a).

- Santa Clara River – 2000 CNDDB report of 6 arroyo toad tadpoles observed by Dr. Lou Courtois in the river adjacent to Castaic Junction site.

Arroyo Toad Report



L E G E N D

- Arroyo Toad Critical Habitat
- Arroyo Toad Survey Reach
- Newhall Ranch Specific Plan Boundary

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Meters: 0 300 600 1,200

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Figure 3

CRITICAL HABITAT (UNIT 6)

The FWS (2001a) considers the Santa Clara River to be essential as a dispersal corridor for arroyo toads between Castaic Creek and upper San Francisquito Creek. FWS (2001a) believes the stability of the Upper Santa Clara River basin arroyo toad population will increase substantially with appropriate management of non-native plants and animals and habitat rehabilitation. These activities are already underway in the lower San Francisquito Creek area and include removal of giant cane and tamarisk from the streambed and supplemental plantings of willows and cottonwoods.

METHODOLOGY

Previous Studies In and Near the Newhall Ranch Project Area

Documentation pertinent to the biological resources in the vicinity of the site was reviewed and analyzed. Information reviewed included: (1) the Federal Register listing package for the federally listed Endangered arroyo toad potentially occurring on the project site; (2) literature pertaining to habitat requirements of sensitive species potentially occurring on the project site; (3) the California Natural Diversity Data Base (CNDDB 2001) information regarding special-status species potentially occurring on the project site for the Newhall, Val Verde, and Mint Canyon USGS 7.5-minute quadrangle maps, and (4) previous surveys for aquatic resources in the Newhall Ranch project area. A summary of the results are provided below.

- Federal Register – The December 16, 1994 Determination of Endangered Status for the Arroyo Southwestern Toad (50 CFG Part 17, RIN 1018-AB97) cited arroyo toad locations from Sespe and Piru Creeks and the Los Padres National Forest (FWS 1994). There were no records of any arroyo toad in the Newhall Ranch area mentioned in this report.

- The February 7, 2001 Final Designation of Critical Habitat for the Arroyo Toad; Final Rule (50 CFR Part 17, Vol. 66, No. 26), stated that arroyo toad have been reported from Castaic Creek above and below the reservoir and from San Francisquito Creek between the southern end of Section 34 and Bee Canyon. There were no records of any arroyo toad in the Newhall Ranch area mentioned in this report (FWS 2001a).

- Rare Plant and Animal Survey, Santa Clarita Water District Service Area (San Marino Environmental Associates, 1995) – Non-protocol reconnaissance surveys were conducted in the NMRP area, but the species was not observed. However, the author states that it could be present in low numbers.

- Sensitive Aquatic Species Survey for Newhall Land & Farming Company (San Marino Environmental Associates, 1995) – Non-protocol reconnaissance surveys were conducted of the Santa Clara River from Bouquet Canyon to Castaic Creek, and along San Francisquito. None were found.

- Newhall Ranch Biota Report (RECON, 1995) – Non-protocol surveys were conducted on the Santa Clara River for the Newhall Ranch Specific Plan EIR prepared by Los Angeles County. None were seen during the surveys, but there is a moderate potential for their occurrence on the main stem in Newhall Ranch.

- Survey for Arroyo Toad for Newhall Ranch (RECON, 1999) – Protocol surveys were conducted, but no toads were observed. However, appropriate habitat is present.

- Biota Report for SEATAC for West and East Creek Projects on San Francisquito Creek (Impact Sciences, 1998) – Report states that the species may travel periodically to project area from upstream population; cited Frank Hovore's report of anuran (frog or toad) eggs observed in the project area, but washed away by stream flows before an accurate identification could be made.

- Surveys on Tesoro del Valle (White and Leatherman Bioservices, 2001) – Arroyo toad habitat assessment for the Tesoro del Valle project located on San Francisquito Creek, immediately north of the NRMP project area. The assessment focused on the Tesoro project area, as well as approximately 9 linear miles of San Francisquito Creek habitat, north from its confluence with the Santa Clara River. The evaluation was based on the presence or absence of primary constituent habitat elements. The report concluded that the most critical primary constituent element is a hydrologic regime that supports habitat for breeding adults, eggs, tadpoles, and metamorphosing juveniles (Leatherman, 2000). As such, it was determined that the best potential habitat for the arroyo toad in San Francisquito Creek occurs north of the Tesoro del Valle project site on the National Forest. The report further stated that though the project area and other portions of San Francisquito Creek south of U.S. Forest Service lands supported many of the primary constituent elements, the hydrologic regime was not present. Therefore, it was concluded that this portion of San Francisquito Creek would only be useful for dispersing individuals if they were to occur in the immediate area.

- Sandburg Reconnaissance Surveys, NRMP project area – In April 2001, Ms. Nancy Sandburg conducted surveys in the Santa Clara River on Newhall Land and Farming property. In notes sent to the USFWS, Ms. Sandburg reported observations of a total of four adult toads from several survey efforts. Each was detected in the Santa Clara River in the near vicinity of the San Francisquito Creek confluence. A single adult was observed at night on April 18 and three adults were reported as observed in the same general vicinity on the following week although their exact location is unknown. Ms. Sandburg's notes did not include detection of any vocalizations or any other breeding behavior.

- Sandburg Reconnaissance Surveys, Soledad Canyon area – In May 2001, Ms. Sandburg conducted arroyo toad surveys in the Santa Clara River in the Soledad Canyon area. Arroyo toad tadpoles (three separate cohorts) were reported from three separate drying pools within the project reach which includes the portion of the Santa Clara River occurring between the River's End vacation park and the proposed Transit Mix Concrete company mine. This site is situated approximately 9 miles east of the NRMP. Ms. Sandburg noted that there was a potential for some of the tadpoles to be lost before metamorphosis due to the rapid evaporation of the remaining water in the pools (Sandburg 2001).

- Impact Sciences, Inc. protocol surveys in NRMP area, portions of Castaic Creek, San Francisquito Creek from the Santa Clara River to the Copper Hill Bridge, and the Santa Clara River east from the NRMP area to approximately 500 meters past the Los Angeles Aqueduct crossing, including portions of South Fork Santa Clara River and Bouquet Creek – In spring 2001 intensive surveys following FWS recommended survey protocol were conducted in the described area. A single arroyo toad was observed in the Santa Clara River adjacent to the San Francisquito Creek confluence.

Survey Scope and Methods

USFWS developed a survey protocol to determine the presence or absence of arroyo toad (FWS 2001b; see **Appendix A**). The protocol requires six focused surveys be conducted in suitable habitat between March 15 and July 1 with at least seven days between surveys. The surveys were timed such that at least one survey is conducted during the months of April, May, and June. Surveys should include both daytime and nighttime components conducted within the same 24-hour period. The surveys should not be conducted during adverse weather conditions because environmental conditions such as low temperatures, high winds, and rain may affect the behavior of arroyo toad. Full moon phases should also be avoided.

Impact Sciences conducted protocol surveys for arroyo toad beginning April 19, 2001 on approximately 4.0 total miles of the Santa Clara River. Surveyors included Impact Sciences Senior Biologist David Crawford, Mr. Scott Cameron of Ecological Sciences, Inc., Mr. Pete Bloom and Ms. Chris Neimela. Both Mr. Cameron and Mr. Bloom hold current FWS Section 10(a)(1)(A) Endangered Species Recovery permits to survey and handle this species. Ms. Neimela is named as an authorized assistant on Mr. Bloom's permit. Mr. Crawford has also had considerable experience surveying, trapping, and relocating arroyo toads with both Mr. Cameron and Mr. Bloom.

The primary purpose of the survey effort was to determine presence/absence of arroyo toad within the Newhall Ranch area. As such, pursuant to protocol, if and when any arroyo toads were observed or detected, surveys would cease in those specific areas. Surveys were continued in areas adjacent to observed toads in order to accurately map the specific locations of all occupied areas within the entire survey reach.

In order to cover the entire survey reach following FWS survey guidelines, the Newhall Ranch area was divided into two separate survey zones such that each zone could be fully evaluated by two biologists during a single survey effort. The limits of each survey zone are described as follows:

- **Newhall Ranch 1 (Survey Zone 1)** – The portion of the Santa Clara River that occurs between the confluence of Castaic Creek and the Chiquito Canyon crossing (**Figure 4a**). Six (6) focused surveys were conducted in this zone on April 19, May 1, May 21, June 7, June 14, and June 21, 2001.
- **Newhall Ranch 2 (Survey Zone 2)** – The portion of the Santa Clara River extending west from the Chiquito Canyon crossing to the Ventura County border (**Figure 4b**). Six (6) focused surveys were conducted in this zone on April 19, May 2, May 14, May 29, June 13, and June 20, 2001.

Arroyo Toad Report

L E G E N D

- Arroyo Toad Survey Reach
- Newhall Ranch Specific Plan Boundary

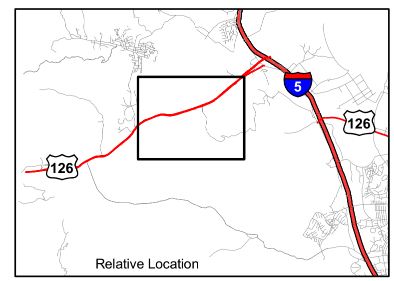

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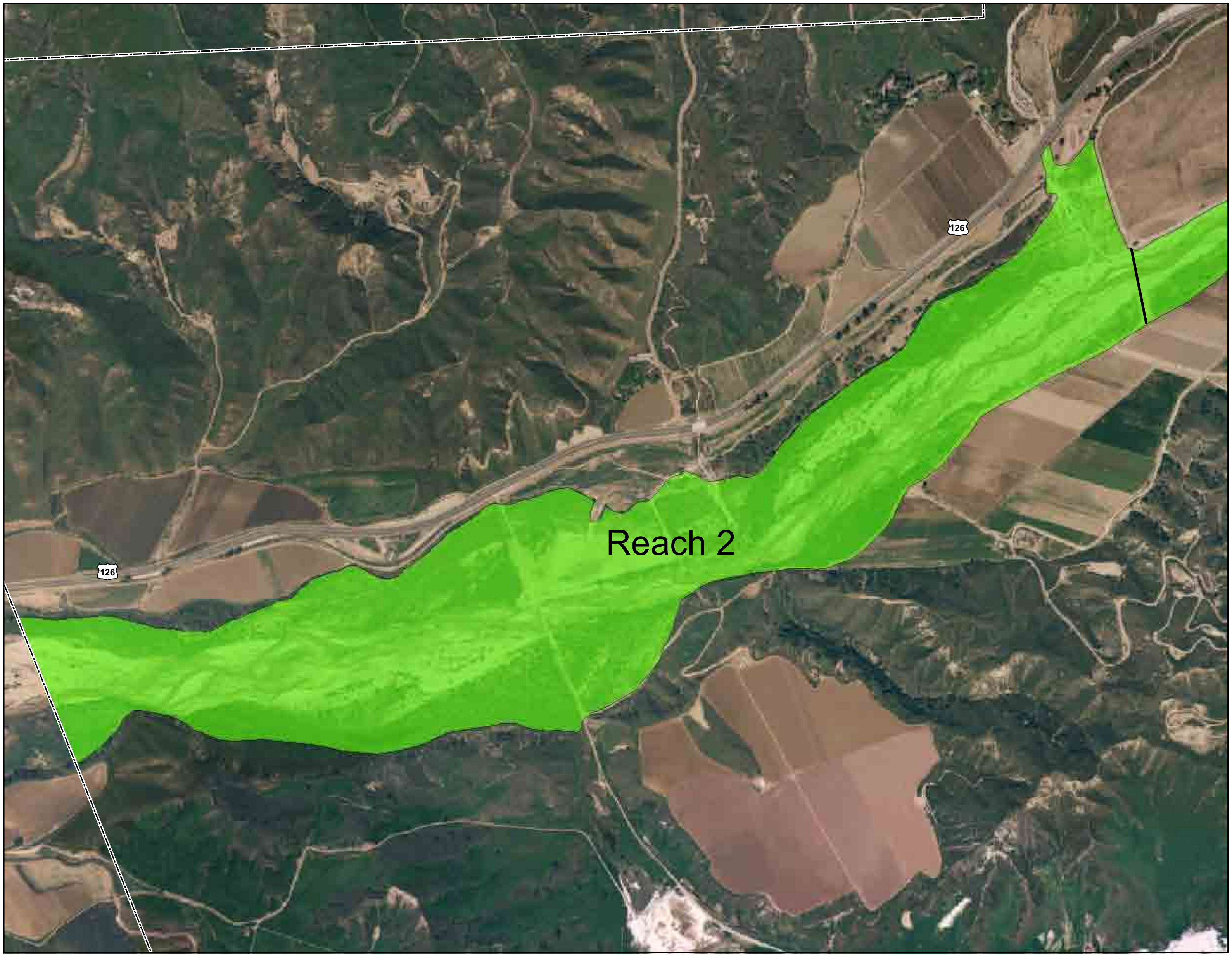
Figure 4a

NEWHALL RANCH
SURVEY REACH ZONE 1

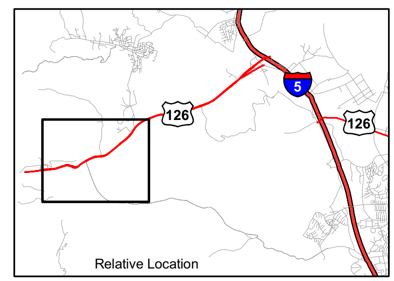


Arroyo Toad Report

L E G E N D

Arroyo Toad Survey Reach

Newhall Ranch
Specific Plan Boundary



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Meters
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Figure 4b

NEWHALL RANCH
SURVEY REACH ZONE 2

Pursuant to protocol methodologies (see **Appendix A**), a series of six day and night surveys (conducted within the same 24-hour period) were conducted at least seven days apart. Additionally, at least one survey was conducted in each of the months of April, May, and June. Each survey zone was systematically surveyed by at least two biologists at a time. Daytime surveys consisted of identifying suitable breeding pools to determine if egg masses, tadpoles, or metamorphosing juveniles were present, and for the purpose of identifying the most likely calling sites for any adult males that were potentially in the area. All nighttime surveys were conducted when air temperatures were at least 55 degrees Fahrenheit when they were initiated. Periods of full moon phases were generally avoided. Surveys were conducted each night from about 2030 to 0000 hours.

Weather conditions were generally calm and clear throughout the survey effort with a few nights of relatively overcast conditions. Each zone was surveyed by walking slowly and carefully along stream banks or within the stream itself when necessary. As with the daytime surveys, every precaution was taken not to disturb or create silt deposits within potential breeding pools, and care was taken not to disturb or injure potentially occurring arroyo toad adults, juveniles, tadpoles, or egg masses. Periodic stops were taken to listen for calling males at 15-minute intervals or as appropriate depending upon individual zone conditions. Survey were conducted as quietly as possible to maximize the potential to hear calling arroyo toads. Handheld flashlights and headlamps were utilized to visually locate toads within potential breeding areas and along stream banks. In addition to documenting arroyo toad data, all aquatic herpetofauna observed during both day and night surveys were recorded.

Additionally, Mr. Crawford and Mr. Cameron conducted two visits to an area known to be occupied by arroyo toad to determine if and when adult males were calling and what stages of development larval tadpoles would be in. The area surveyed was a portion of Castaic Creek that is situated approximately one mile north of the Castaic reservoir on U.S. Forest Service land.

During both visits, arroyo toad tadpoles were observed in relatively large numbers, but no adults were observed. This is likely based on the timing of the visits which occurred in early and mid-June when adult are likely to have returned to burrow sites. Mr. Pete Bloom, who also participated in the survey effort, was concurrently monitoring arroyo toad population activity on Camp Pendleton in San Diego County. Though it is understood that there is some variation in the timing of life history events between San Diego and Los Angeles County, the information was useful in calculating whether adults would be calling and when tadpoles began metamorphosing.

Following the completion of the protocol surveys, upland habitats adjacent to the river and creek channels were examined to determine their suitability for use as dispersal and over-wintering habitat.

Key elements indicating suitability include soils, connectivity, vegetation, slope, barriers, and land use.

PROTOCOL SURVEY RESULTS

No arroyo toads were observed or detected in the Newhall Ranch survey area and daytime surveys did not reveal the presence of any egg masses or larvae and no juvenile or adult toads were observed or otherwise detected. In addition, no available survey data indicates that the arroyo toad has been recently recorded within the Newhall Ranch survey areas.

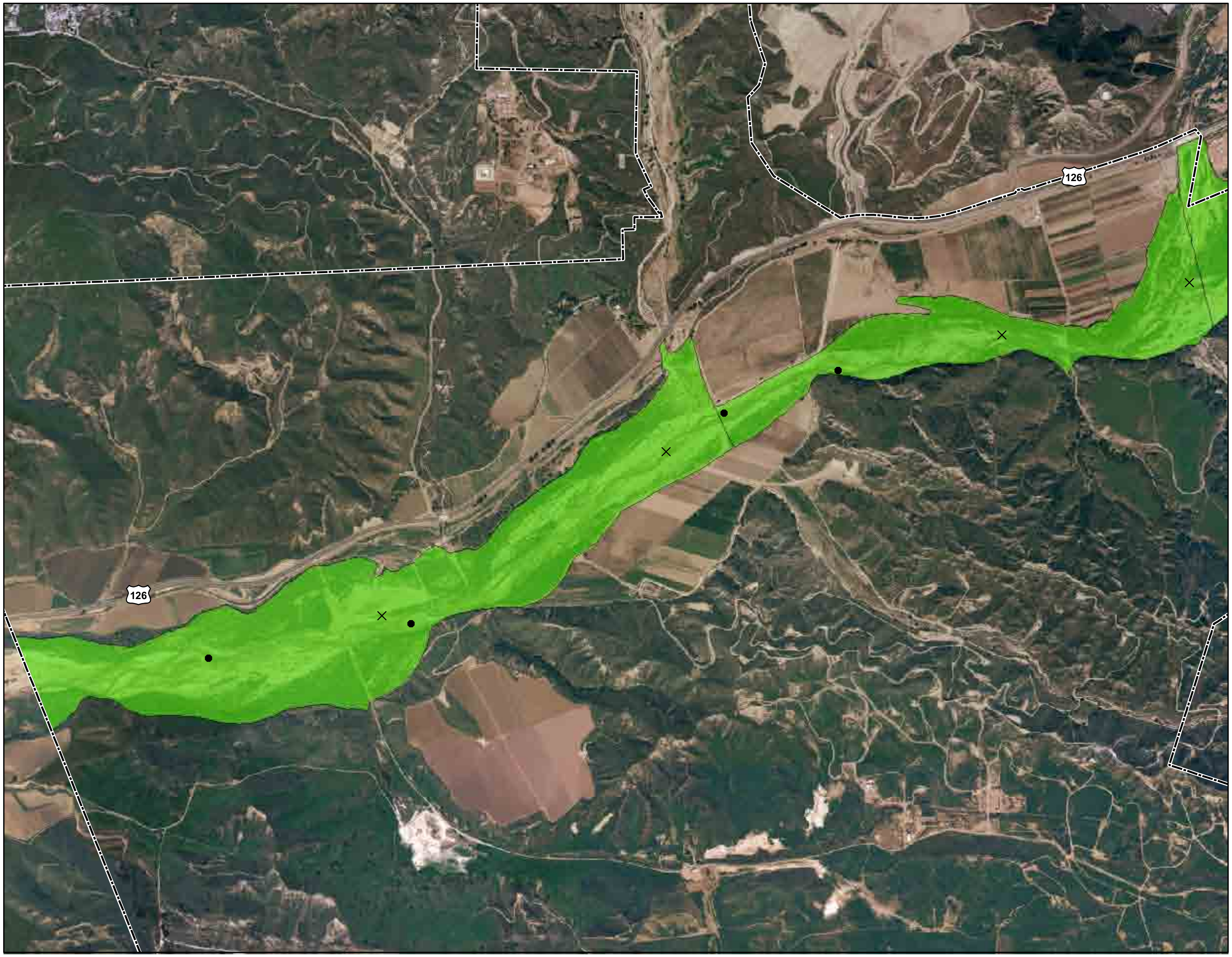
Though no arroyo toads were recorded, other amphibian and aquatic reptile species were detected. All life stages of western toad (*Bufo boreas*), Pacific chorus frog (*Pseudacris regilla*), California chorus frog (*Pseudacris cadaverina*), were recorded. An interesting note is that no bullfrogs (*Rana catesbeiana*) were detected during the entire survey effort. Several two-stripe garter snake (*Thamnophis hammondii*) and southwestern pond turtle (*Clemmys marmorata pallida*), both California protected species and state species of special concern, were also detected throughout the survey effort. Locations of these special-status species are also illustrated on **Figure 5**.

Most of the habitat covered by protocol surveys was considered to be of relatively high quality as most or all of the primary constituent elements of arroyo toad habitat were present. Habitat in the area included sparsely vegetated sandbars with gravelly to sandy substrates. As described, small clumps of giant cane were present as were scattered willow saplings, and non-native tamarisk (*Tamarix* sp.). The outer terraces that exist along the base of the north and south banks, supported patches of larger cottonwoods and willows, and other areas more dominated by mule fat. The vegetation in these areas was often very dense and included willows, cottonwoods, and dense patches of cattails. Existing agricultural uses characterize much of the adjacent uplands though some undeveloped areas are still present. Habitat characteristics for each survey zone were relatively similar throughout each reach of the two reaches that comprise the Newhall Ranch survey area.

HABITAT EVALUATION

Most of the habitat (within the river channel) covered by protocol surveys within the Newhall Ranch area was considered to be of relatively high quality as most or all of the primary constituent elements of arroyo toad habitat were present.

Arroyo Toad Report



L E G E N D

- Arroyo Toad Survey Reach
- Newhall Ranch Specific Plan Boundary
- Southwestern Pond Turtle.
- Two-Striped Garter Snake

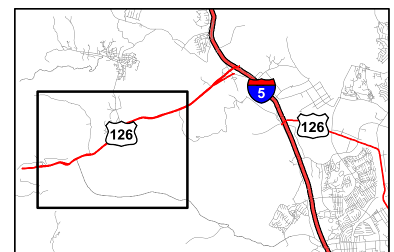


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Figure 5

Special - Status Species Locations

An additional habitat evaluation was conducted following completion of the protocol presence/absence surveys with the goal of more fully understanding the extent of arroyo toad habitat suitability within the Newhall Ranch area. As protocol surveys were primarily conducted in aquatic habitat, these additional evaluations were focused on upland habitat adjacent to the selected protocol survey zones. Methods used in the upland habitat evaluations included a combination of analyzing recent aerial photographs, USGS topographic maps, and USDA Soil Service maps, and then verifying preliminary conclusions in the field. As part of this evaluation, we attempted to delineate areas of high, medium, and low habitat quality based on the presence or absence of the primary constituent elements.

The primary constituent elements, by definition, are all required in order to support a sustainable population of arroyo toad. As such, only those areas that supported all of these habitat characteristics were considered to be of high quality. Habitat areas that supported most of the elements (lacking one or possibly two depending upon all environmental factors) were considered to be of moderate quality, and those areas missing two or more elements (especially where hydrologic regime was absent) were considered to be of low value as arroyo toad habitat.

Most data reported to date suggests that non-breeding and over-wintering adult arroyo toads will move to sandy terraces that support marginal zones and a variety of vegetation including cottonwood or oak woodlands, sage or saltbush scrub, and chaparral. The Final Rule for Critical Habitat cites results from a 1998 study by Paul Griffin and Ted Case that indicate average maximum movements perpendicularly from a streambed were approximately 240 feet for male arroyo toads and 443 feet for females. A maximum movement record of 984 feet was also cited in this study (FWS 2001a). The Recovery Plan cites data from one study suggesting perpendicular movement from 1580 to nearly 6350 feet. Another study in San Diego County involving upland pitfall trapping cited in the Final Rule for Critical Habitat indicated perpendicular movements ranging from 46 feet to nearly 3,600 feet. These latter two studies were conducted in San Diego County in drainages that are considerably broader and flatter than those found in the NRMP area, and are also subject to very different climatic conditions. The radio telemetry study by Ruben Ramirez (2000) reported upland terrace dispersal up to 121 feet at Little Rock Creek and up to 656 feet at Horsethief Canyon, which are both situated on the north side of the Transverse Ranges; an area more geographically and climatically similar to the Newhall Ranch area. Ramirez (2000) concluded that dispersal distance from breeding habitats to upland habitats are expected to be less in drier habitats than in moister areas. Factors which may be contributing to the decreased upland movement include limited rainfall, limited availability of late season surface water, reduction of soil moisture as distance to creek increases, and reduced shrub cover, which likely increases evaporation from upland soils (Ramirez 2000). Ramirez (2000) also notes that in the Transverse

Ranges, tall cliff faces (>60 degrees) and steep canyon slopes represent barriers to the movement of this species.

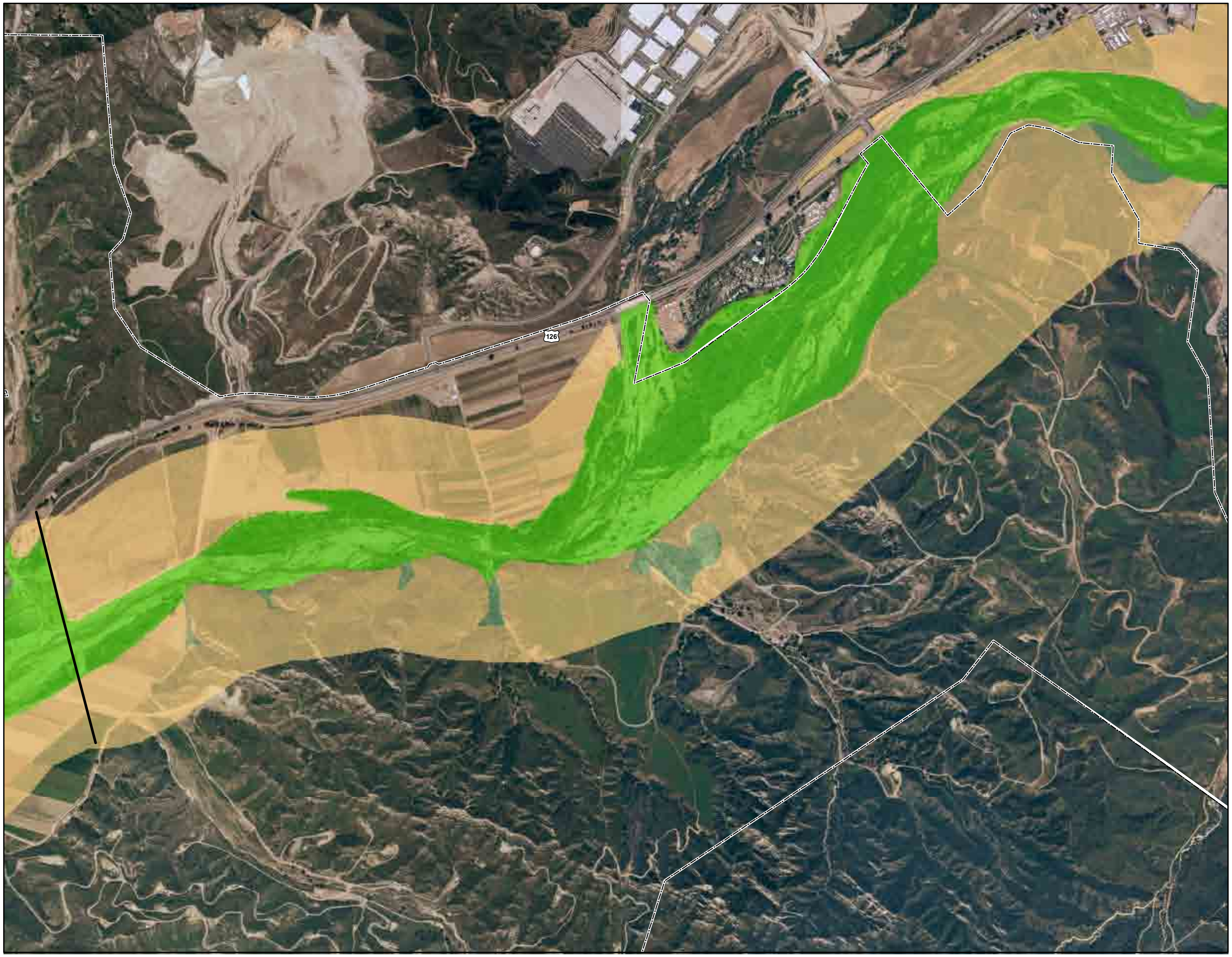
In the process of evaluating Critical Habitat for arroyo toad, the FWS determined that areas up to 80 feet in elevation above the stream channel were most likely to contain the primary constituent upland habitat elements (FWS 2001a). They utilized a 250-meter grid (conforming to a Universal Transverse Mercator [UTM] grid) to map the habitat areas. This method successfully included most documented occurrences and approximately 88 percent of the upland pit fall trapping study captures. This method minimized inclusion of existing development into designated Critical Habitat boundaries. However, some developed areas are still illustrated as occurring within Critical Habitat boundaries and the Final Rule specifically states: "Federal actions limited to these areas would not trigger a Section 7 consultation, unless they affect the species and/or the primary constituent elements in adjacent critical habitat" (FWS 2001a).

For the purposes of this evaluation, each habitat zone corresponds to the protocol survey zones previously described and also includes all upland habitat occurring within approximately 1,640 feet of either side of the outward boundaries of the protocol survey areas as illustrated. This limit was selected based on the literature regarding adult arroyo toad upland dispersal perpendicular to breeding habitats. Habitat quality can vary considerable throughout a survey zone and obviously boundaries do not occur in straight lines. However, for the purpose of illustration, areas evaluated are depicted in zones of existing development and low, moderate, and high quality habitats. Zones illustrated were conservatively delineated in favor of the higher grade of habitat. The following provides a description of the results of the habitat evaluation by survey zone.

Newhall Ranch Reach 1 (Figure 6a)

Within the Riverbanks

This reach supports a diverse mosaic of riparian and wetland habitats within the river channel, including open water, barren sandbars, and various densities of riparian scrub and woodland. Reach 1 supports multiple small channels that range from shallow open and braided to relatively deep (>1 meter) and under dense vegetative cover. Several sand bars and sandy/gravelly terraces are present between the stream banks. The channel ranges in width between its banks from approximately 400 feet to 1,600 feet. Perennial flow results from tertiary treated water released from the Los Angeles County Sanitation Districts' Water Reclamation Plant (No. 32) upstream of the reach, as well as from the upstream plant (No. 26).



Arroyo Toad Report

L E G E N D

- High Quality Habtiat
- Moderate Quality Habtiat
- Low Quality Habtiat
- Newhall Ranch Specific Plan Boundary

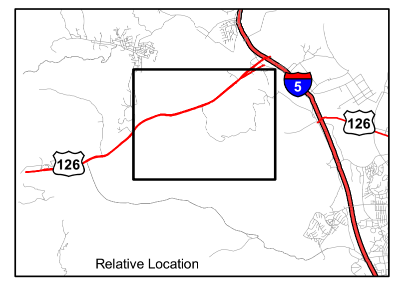


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Figure 6a

NEWHALL RANCH HABITAT EVALUATION ZONE 1

All of the primary constituent elements for arroyo toad habitat are present along most of this reach within the riverbanks. For example, there is sufficient water to sustain the life cycle of arroyo toad within the river channel as evidenced by the large numbers of western toad and chorus frog eggs, larvae, juveniles, and adults which were observed. Additionally, this portion of the river is of sufficiently low gradient and supports patches of sandy and fine gravel substrates. The primary source of water in this portion of the river are from upstream water reclamation plants, and at times, temporary releases from Castaic dam. During these temporary water releases, water flow immediately downstream of the Castaic Creek confluence (along the northern river channel) resulted in very high flow rates and was not conducive to the establishment of potential breeding pools. Overall, the stream bottom throughout the reach is characterized as sandy to gravelly with little accumulated silt. Braided, open low-flow channels, sandbars, and sparsely vegetated terraces are present in this zone. This zone supports areas characteristic of a sufficiently low gradient to support potential breeding pools. The reach is also subject to a natural flooding regime that will periodically scour riparian vegetation, rework stream channels and terraces, and redistribute sands and sediments, such that adequate numbers and sizes of breeding pools and sufficient terrace habitats with appropriate vegetation are maintained.

There are upland terraces within the river channel that could support over-wintering adult arroyo toad in this portion of the Newhall Ranch survey area. These terraces consist of sandy to gravelly soils with densities of vegetation varying from bare to dense, increasing with distance from the channel. Dominant vegetation includes willows, mule fat, cottonwood, arrow weed and patches of non-native giant cane and tamarisk. Terraces within the river channel are subject to major storm events that have the potential to scour the entire area between the banks, which could ultimately result in the loss or displacement of any arroyo toad present in the reach at the time. However, the presence of some mature willows and cottonwoods suggest that the ground may be stable enough to withstand such storm events.

No non-native predators were observed within this reach, although non-native fish, African clawed frogs, and bullfrogs are known from nearby portions of the Santa Clara River and Castaic Creek.

Outside of the Riverbanks

There are no manmade barriers present in this reach that could completely or substantially impede upland movement of arroyo toads. However, it should be noted that many stretches of stream bank in this zone are near vertical and of a height that would significantly impede migration out of the stream channel.

Most of the upper terraces and foothill slopes (beyond the stream banks) are highly disturbed from long-standing agricultural uses. Both the north and south sides of the river support areas of active agriculture. In fact, nearly all of the upland habitat present along the northern channel bank is currently under agricultural production. However, there are areas of upland habitat along the southern channel boundaries that have been designated as moderate quality due to the presence of sage scrub vegetation and absence of agriculture, although many upland areas present along the south bank are inaccessible due to the height and near vertical angle of the bank. Some of these upland areas support habitat features conducive to arroyo toad occupation, but there are only a few small areas where access would not be constrained due to the presence of dense vegetation and/or height and steepness of adjacent banks.

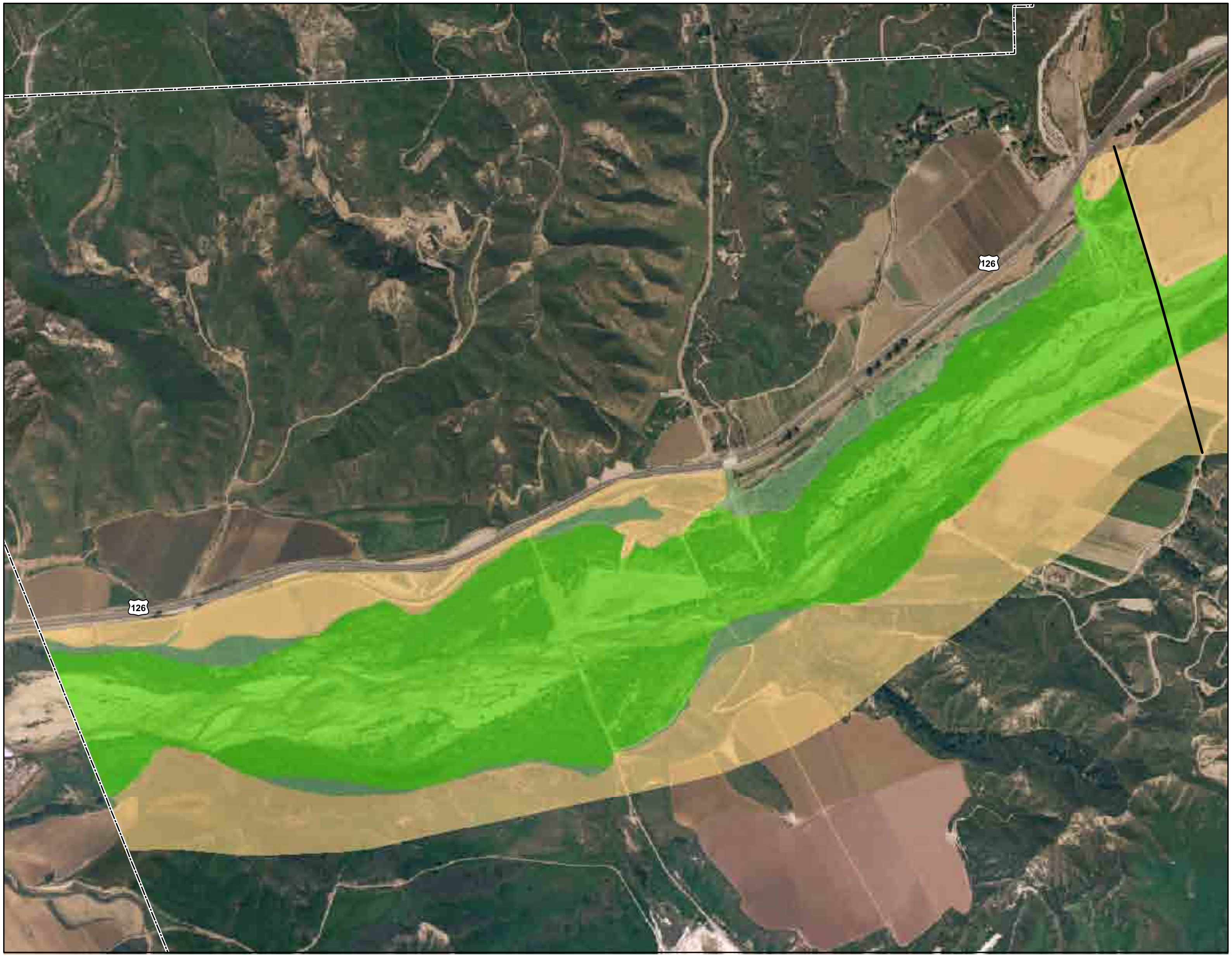
Conclusion

Newhall Ranch Reach 1 supports a mosaic of habitat types and qualities. Though most of the high quality habitat occurs between the banks, there are some areas of moderate quality upland terrace habitat associated with this portion of the Santa Clara River, primarily located above the southern riverbank where native sage scrub vegetation is present. However, most of the adjacent uplands consist primarily of agricultural fields, which are considered to be of low quality as most of these areas are difficult to access and they do not support habitat characteristics suitable for survival of over-wintering arroyo toads. As previously discussed, arroyo toads are periodically found in agricultural fields. However, due to the nature of land practices (i.e., tilling, disking, and pesticide use) it is expected that mortality rates in these areas exceed reproduction rates (FWS 2001a). No arroyo toads were found in agricultural fields during the subject survey. As such it is appropriate to consider these areas of low value as habitat for arroyo toads. The small areas that do support suitable upland habitat are characterized as moderate quality habitat, because overall, they would still be difficult for arroyo toads to access. As such, the best opportunities for over-wintering toad would be inside the stream banks where soil types are suitable and soil moisture is higher.

Newhall Ranch Reach 2 (Figure 6b)

Within the Riverbanks

This reach contains high quality habitat in the river channel, between riverbanks. The river exhibits a considerable diversity of sandbars, terraces, and riparian woodlands combined with shallow low-flow pools that have suitable substrate for the various life stages of the arroyo toad. The stream channel width ranges from approximately 400 feet to nearly 2,000 feet.



Arroyo Toad Report

L E G E N D

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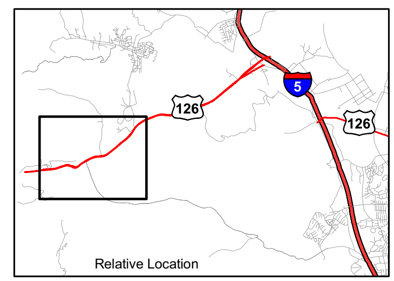

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Figure 6b

NEWHALL RANCH HABITAT EVALUATION ZONE 2

All of the primary constituent elements for arroyo toad habitat are present along most of this reach within the riverbanks. For example, there is sufficient water to sustain the life cycle of arroyo toad within the river channel as evidenced by the large numbers of western toad and chorus frog eggs, larvae, juveniles, and adults which were observed. Additionally, this portion of the river is of sufficiently low gradient and support patches of sandy and fine gravel substrates. The primary source of flows in this portion of the river is from upstream water reclamation plants and temporary water releases from Castaic dam. Overall, the stream bottom throughout the reach is characterized as sandy to gravelly with little accumulated silt. Braided, open low-flow channels, sandbars, and sparsely vegetated terraces are present in this zone. This zone supports areas characteristic of a sufficiently low gradient to support potential breeding pools. The reach is also subject to a natural flooding regime that will periodically scour riparian vegetation, rework stream channels and terraces, and redistribute sands and sediments, such that adequate numbers and sizes of breeding pools and sufficient terrace habitats with appropriate vegetation are maintained.

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Most of the upper terraces and foothill slopes (beyond the stream banks) are highly disturbed from long-standing agricultural uses. Both the north and south sides of the river support areas of active agriculture. In fact, nearly all of the upland habitat present along the northern channel bank is currently under agricultural production. However, there are areas up upland habitat along the southern channel boundaries that have been designated as moderate quality due to the presence of sage scrub vegetation and absence of agriculture, although many upland areas present along the south bank are inaccessible due to the height and near vertical angle of the bank. Some of these areas support habitat features conducive to arroyo toad occupation, but there are only a few small areas where access would not be constrained by the presence of dense vegetation and/or height and steepness of adjacent banks.

Conclusion

Newhall Ranch Reach 2 supports a mosaic of habitat types and qualities. Though most of the high quality habitat occurs between the banks, there are some areas of moderate quality upland terrace habitat associated with this portion of the Santa Clara River, primarily located along the southern river bank where native sage scrub vegetation is present. However, most of the adjacent uplands consist primarily of agricultural fields, which are considered to be of low quality as most of these areas are difficult to access and they do not support habitat characteristics suitable for survival of over-wintering arroyo toads. As previously discussed, arroyo toads are periodically found in agricultural fields. However, due to the nature of land practices (i.e., tilling, disking, and pesticide use) it is expected that mortality rates in these areas exceed reproduction rates (FWS 2001a). No arroyo toads were found in agricultural fields during the subject survey. As such it is appropriate to consider these areas of low value as habitat for arroyo toads. The small areas that do support suitable upland habitat are characterized as moderate quality habitat, because overall, they would still be difficult for arroyo toads to access. As such, the best opportunities for over-wintering toad would be inside the stream banks where soil types are suitable and soil moisture is higher.

DISCUSSION/CONCLUSION

Based on the results of the studies conducted by Impact Sciences and from other surveys conducted in the vicinity over the past several years, it is appears that arroyo toads are absent in this portion of the Santa Clara River watershed. Though speculative, there are a number of possible explanations for their apparent absence. As most of the major arroyo toad studies have described in detail, there are a number of factors that contribute to the reduction of arroyo toad populations, and nearly all of these factors are present within the subject survey area.

Habitat destruction and alteration has been described by most experts as being the primary cause for the decline in arroyo toad numbers. Sweet (1992) identifies dams as being responsible for greatest amount of suitable arroyo toad habitat and cites a number of examples. The Newhall Ranch area is affected both directly and indirectly by dams and other sources of flow regulation. Castaic Dam occurs between two contemporary documented populations of arroyo toad (FWS 2001a), which suggests it may have eliminated a considerable amount of suitable habitat for this species, in particular those areas located downstream of the dam.

Water flows along the Santa Clara River in the Newhall Ranch area during the survey period are largely attributable to the tertiary treated effluent releases from the WRP No. 32 and further upstream (adjacent to Bouquet Canyon Road Bridge) from WRP No. 26. Fluctuating flow rates and water levels from WRP releases may also be a factor in affecting suitable breeding habitat in the river.

Non-native predators can also be a contributing factor to the reduction of arroyo toad in the region. Though it was noted that bullfrogs and African clawed frogs were not recorded within the Newhall Ranch survey area. Ongoing eradication efforts may have temporarily reduced numbers of predatory amphibian species within the area. However, these predatory species are currently known from the immediate vicinity, and sometimes they can occur in great numbers, which results in adverse impacts to the arroyo toad (if historically present in the area). These frogs have been observed preying on various life stages of arroyo toad including eggs, larvae, and adults (Ramirez 2000). Non-native fishes feeding on larval and juvenile arroyo toad have also been recorded (Sweet 1992). Several predatory species of non-native fish are known from the Santa Clara River system. Though none was directly observed during the survey effort, it is likely they still occur and pose a threat to breeding toads.

Native predators also contribute to reduce numbers of arroyo toad in a given area. Two-striped garter snake and southwestern pond turtle were observed in both of the Newhall Ranch survey zones. Though declining in numbers themselves, when either of these two species encounters a breeding pool of arroyo toad tadpoles, they can significantly impact that population. Wading birds such as herons and egrets also have a potential to significantly impact tadpole populations.

Other land uses such as urbanization, agriculture, and mining can also contribute to the reduction of suitable habitat. Development reduces the amount of area available to locally occurring arroyo toads and factors such as increased human presence and non-native plants and animals, and alteration of water quality inevitably follow. Agriculture commonly includes regular tilling of soil and introduction of pesticides and herbicides, all contributing to the reduction of the amount of suitable habitat available to this species. Sand and gravel mining operations also directly impact river and streambeds and result in increased silt loads that can smother egg masses downstream.

The habitat evaluation portion of this study revealed that the majority of suitable arroyo toad habitat present within the Newhall Ranch area occurs between the banks of the Santa Clara River. Beyond the outer banks, both natural topography and human activities provide an inaccessible and/or inhospitable environment for any dispersing toads. However, it would appear that much of the upland habitat beyond the banks of the stream may not have historically provided suitable over-wintering habitat for adult arroyo toad due to the arid conditions and lack of constituent elements that characterize high quality arroyo toad habitat. As such, it is possible that arroyo toad numbers were never high (if historically present) in this portion of the Santa Clara River.

In summary, no arroyo toads were recorded within the portion of the Santa Clara River watershed included in the Newhall Ranch area, however this taxon does occur in very low numbers upstream. Whether one surmises that the upstream population(s) are a remnant of a once much larger population, or individuals from surviving upstream populations that may have been displaced during storm events from previous years, it is apparent that they are not breeding in the subject area and currently do not utilize habitats present within the Newhall Ranch survey areas.

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compliance•biology inc

November 3, 2004

Mr. Glenn Adamick
Newhall Land Company
23823 Valencia Boulevard
Valencia, CA 91355

Subject: Results of Focused Western Spadefoot Toad Surveys on the River Village Project Site and Associate Borrow Sites

Dear Mr. Adamick,

The purpose of this letter report is to provide you with the results of focused surveys for the western spadefoot (*Spea* [Scaphiopus] *hammondii*) conducted on the River Village project site and its associate borrow sites located in an unincorporated area of Los Angeles County, California.

BACKGROUND

The western spadefoot is a small toad that is currently considered by California Department of Fish and Game (CDFG) as a California Species of Special Concern. This status does not afford the species protection under the state Endangered Species Act, but impacts to the species from projects are considered when those projects are reviewed under the California Environmental Quality Act (CEQA).

Western spadefoot toad adults only enter aquatic habitats for breeding. They spend most of the year in a dormant to semi-dormant state in small mammal burrows in upland habitat adjacent to seasonal rainpools. This species requires seasonal rainpools that last a minimum of four weeks as eggs take from 1 to 6 days to hatch and metamorphosis can be completed within 3 to 11 weeks (Jennings and Hayes 1994). Breeding habitat must be seasonal such that predators including bullfrogs and predatory fish do not become established. Breeding adults typically emerge during and/or immediately following relatively warm rains in late winter to early spring. Female western spadefoot toads deposit small clusters of 10 to 42 eggs to plant stems or other debris in the pool (Jennings and Hayes 1994).

In spring 2004, around the time of these surveys, breeding populations of western spadefoot toads were identified in three areas of Newhall Land holdings. Three populations were identified on the River Park project site approximately 5.2 miles to the east, one population was identified on the West Creek project site approximately 4 miles to the northeast, and one population was identified on the Valencia Commerce Center site approximately 1.5 miles to the north.

In an effort to ensure impacts to this species are avoided or minimized, Newhall Land directed Compliance Biology to perform focused surveys throughout the remaining project areas within their holdings. The River Village project is one of those areas.

The concurrent surveys on the other Newhall project sites in the area suggest the likely presence of western spadefoot toad on the Mesas West project site approximately 0.5 miles to the east of the south borrow site and 0.25 miles south of the River Village site, on the Mesas East project site approximately one mile southeast of the River Village site and 1.5 miles east of the south borrow site, and approximately 1.5 miles south of the south borrow site on the Portrero Valley project site.

METHODOLOGY

On March 9, 2004 Compliance Biology biologists surveyed the River Village project site and on March 23, 2004 the associated borrow sites were systematically transected for the purpose of evaluating the potential presence of western spadefoot toad. All of the flat lowland portions of the site were methodically walked and hilltops were utilized as vantage points to survey remaining areas for standing water. Additionally, all dirt roads were surveyed as western spadefoot toads are known to utilize deep road ruts that fill with rainwater (personal observation).

Surveys were conducted during the known breeding season for this species as evidenced by the identification of other breeding populations in the region. Although temperatures following the last rain of the season had increased dramatically, resulting in the rapid evaporation of potentially suitable breeding pools, it is expected that if western spadefoot were present on site, there would still be visible evidence detectable at the time of surveys.

EXISTING CONDITIONS

The project area is located in Los Angeles County (**Exhibit 1**). The River Village project site is situated south of SR 126 along the north side of the Santa Clara River. The north borrow site is

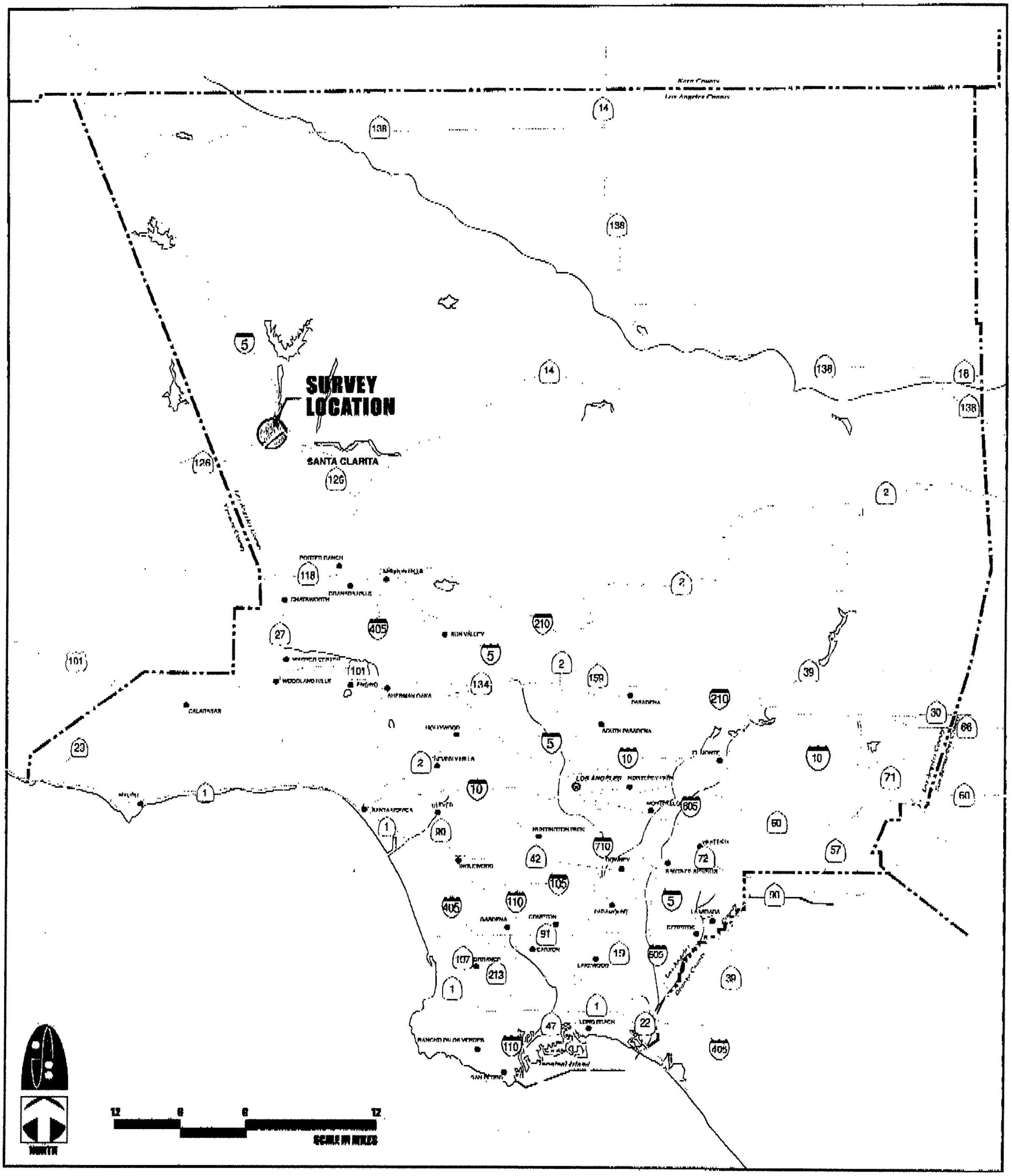


figure 1
Regional Location

situated northwest and adjacent to the River Village site, on the north side of SR 126 east of Chiquito Canyon Road. The south borrow site is located opposite the project site on the south side of the river (**Exhibit 2**).

The River Village project site totals approximately 292.5 acres and is currently under active agriculture with seasonal row crops. As a result, the majority of the land area within the project boundaries are regularly disked and planted. Topography is essentially flat and riparian vegetation occurs along the southern project boundary. A series of dirt roads provide access around and across the site.

The north borrow site totals approximately 25.2 acres and is characterized by variable topography including relatively steep slopes. Vegetation on the north borrow site includes a combination of coastal sage and chaparral scrub species.

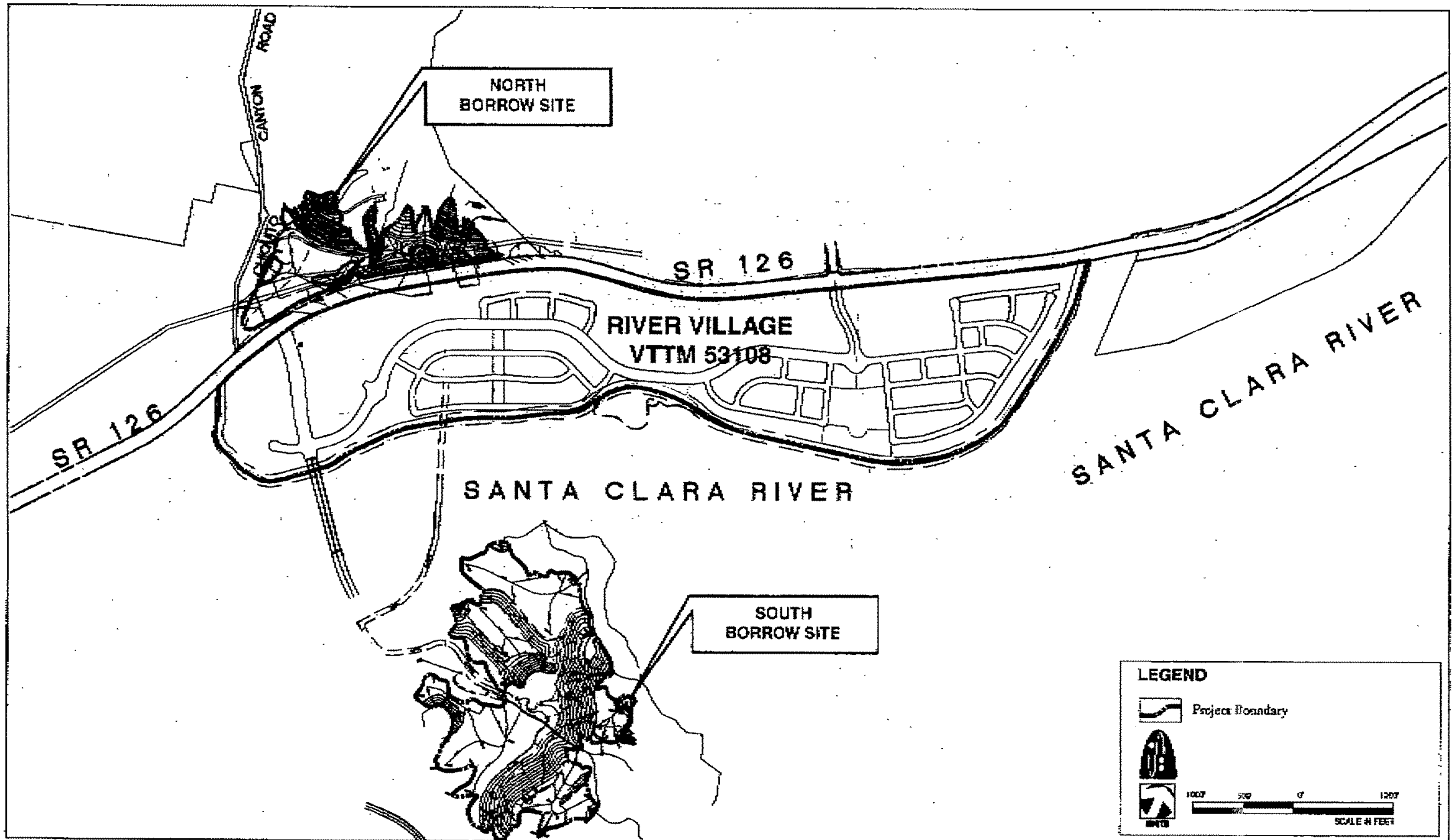
The south borrow site totals approximately 84.6 acres and also supports variable topography with steep slopes and scrub vegetation. Several dirt roads occur throughout this site and a flat mesa occurs near the central portion of site. Areas within this flat area appear to have been historically scraped and are devoid of vegetation.

RESULTS

Five depressions were observed on the River Village project site that either still supported standing water, or cryptogammic soils (crusting layer with indications of algae and silt sediments), suggesting that they held standing water in the recent past. All of the depressions occurred within existing dirt roads and those still supporting surface water appeared to be either a result of, or persistent because of the irrigation system that provided water for the agricultural crops. There were no direct observations or indications of the presence of western spadefoot at any of these depressions.

The north borrow site did not support any depressions that either still held surface water or that appeared to have recently supported surface water for any extended period of time. Soils in this area were mostly sandy and there was no evidence of any areas that would be expected to support seasonal rainpools suitable for breeding western spadefoot toads.

As described, the south borrow site has several dirt roads and a flat cleared area. One depression supporting cryptogammic soils was observed in a dirt road and two depressions with shallow surface water were observed within the flat mesa. There were no direct observations or indications of the presence of western spadefoot at any of these depressions.



SOURCE: PSOMAS- VTTM Proposed Borrow Site Haul Route 10/26/04

exhibit 2
PROJECT LOCATION

CONCLUSIONS

The results of the focused surveys indicate that the depressions occurring on the River Village project site and the south borrow site did not provide any evidence of breeding western spadefoot toads. There were no adults, egg masses, tadpoles, or new metamorphs observed and no indications that they have occurred on this site. Further no western spadefoot toads or suitable conditions for breeding spadefoot toads were apparent on the north borrow site. As such, the potential for spadefoot toad occurrence at the south borrow site is not expected.

Because of the recent documented occurrences of this species in the area, occurrence of western spadefoot toads on the River Village site and south borrow site cannot be entirely ruled out. However, because surveys were conducted during the peak breeding season and no evidence of their presence was detected, their potential for occurrence on these properties is considered low.

RECOMMENDED ACTIONS

To ensure no western spadefoot toads would be impacted by grading or other site preparations, a final focused survey should be conducted on the River Park site and south borrow site during the next late winter or early spring rains to fully determine presence or absence. Should the species be determined to be absent, no further action would be required. Should evidence of western spadefoot toad be discovered within either of the subject areas, the applicant should consult with CDFG regarding possible relocation of the animals to adjacent open space areas.

Please feel free to contact me if you have any questions regarding the information provided in this report.

Sincerely,

Dave Crawford
President/Principal Biologist

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Results of Focused Surveys for Arroyo Toad and Special-Status Aquatic Reptiles and Amphibians River Village Project; Newhall Ranch, Valencia, California

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October, 2004

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Results of Focused Surveys for Arroyo Toad and Special-Status Aquatic Reptiles and Amphibians River Village Project; Newhall Ranch Valencia, California

The following presents the findings of focused protocol surveys that were conducted to determine the presence/absence of the federally-listed Endangered arroyo toad (*Bufo californicus*) within portions of the Santa Clara River adjacent to the River Village project. This report is intended to provide project specific biological information to Newhall Ranch Company, U.S. Army Corps of Engineers (ACOE) and U.S. Fish and Wildlife Service (FWS) regarding results of focused surveys for arroyo toad and additional special-status amphibians and aquatic reptiles including southwestern pond turtle (*Clemmys marmorata pallida*) and two-striped garter snake (*Thamnophis hammondi*) conducted on the subject site.

INTRODUCTION

The survey reach is located in northwest Los Angeles County (**Figure 1**). The River Village project area that is the subject of this report was included as part of a larger scale protocol survey conducted in potentially suitable habitat in portions of the Santa Clara River and adjacent uplands from approximately 1200 feet east (upstream) from the confluence with Castaic Creek, west (downstream) approximately seven (7) miles to the Las Brisas Bridge crossing in eastern Ventura County. The area surveyed on and adjacent to the River Village project site is illustrated in **Figure 2**. The survey area is situated within the Newhall, California U.S. Geological Survey (USGS) 7.5-minute quadrangle map.

General Arroyo Toad Background

The arroyo toad is a small (generally 2 to 3 inches in snout to vent length), light greenish gray or tan toad with warty skin and dark spots. Its underside is white or buff colored without spots. A light-colored stripe crosses the head and eyelids, and a light area usually occurs on each sacral hump and in the middle of the back (FWS, 1994). The arroyo toad does not have the prominent white dorsal stripe characteristic of the commonly occurring western toad (*Bufo boreas*).

The arroyo toad was listed as a federally Endangered species by the FWS on December 16, 1994 (50 CFR Part 17). The arroyo toad is also considered a Species of Special Concern by the California Department of Fish and Game (DFG) and a Protected Amphibian under the state Fish and Game Code.

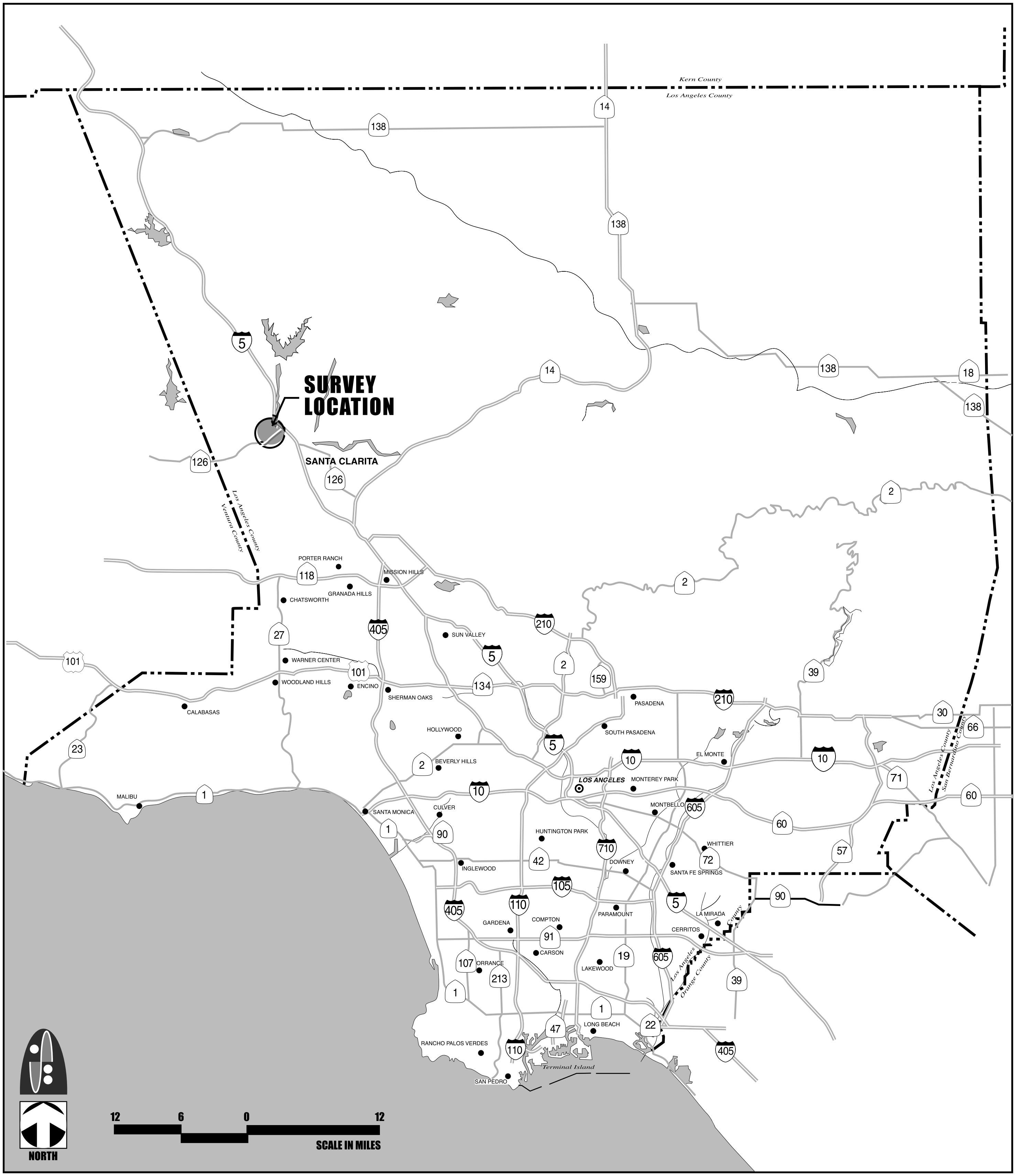


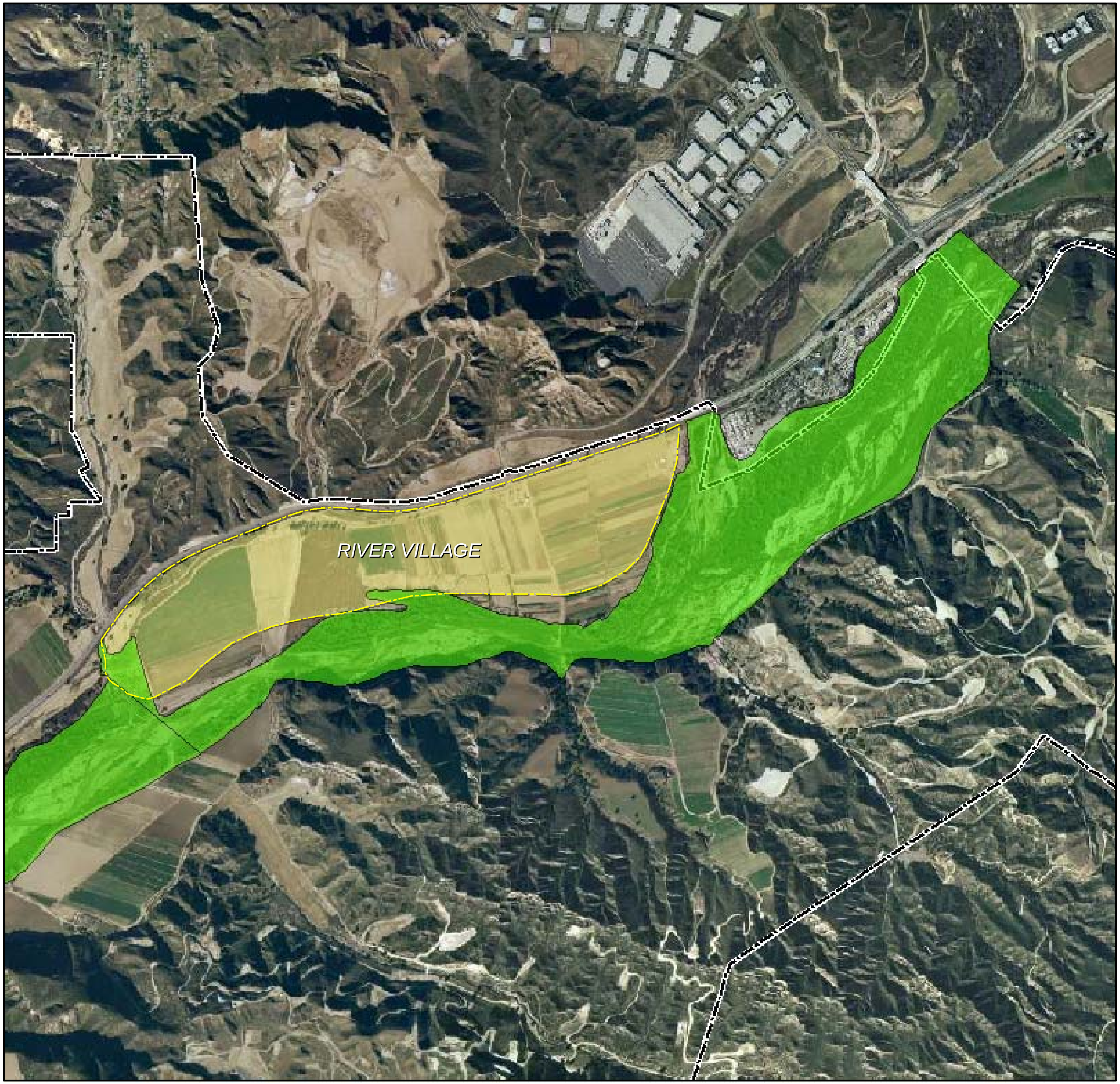
figure 1
Regional Location

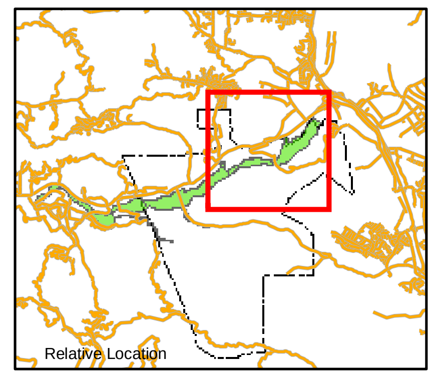
ARROYO TOAD REPORT

L E G E N D

Arroyo Toad Survey Reach

Newhall Ranch
Specific Plan Boundary





N

Feet: 0 1,000 2,000

Meters: 0 150 300 600

Figure 2

SURVEY REACH

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A federal Recovery Plan was prepared in 1999 and critical habitat was defined in February 2001. This critical habitat designation was rescinded by court order based on lack of economic impact considerations and has since been re-proposed in early 2004. The eastern portion of the survey reach lies within the newly proposed critical habitat area. Much of the information in the federal listing documents (FWS 1994, 1999, 2001) regarding the biology of the arroyo toad was derived from extensive research conducted by Dr. Samuel Sweet of the University of California, Santa Barbara (Sweet 1992, 1993). Additional detail is included in the Recovery Plan (FWS 1999) and a radio telemetry study conducted by Ruben Ramirez (2000).

Although considered a subspecies by some taxonomists, the nearest population of the arroyo toad's closest relatives is the Colorado River basin. Based on the separation from the other subspecies and results from recent genetic tests, it has been recommended that the arroyo toad be considered a separate species (FWS 2001). For this reason, many biologists refer to arroyo toad as *Bufo californicus* and it is therefore, considered as such in this report.

Arroyo toad historically ranged from the upper Salinas River, south through the Santa Ynez, Santa Clara, and Los Angeles River basins and the coastal drainages of Orange, Riverside, and San Diego Counties to the Arroyo San Simeon system into Baja California, Mexico (FWS 1999). As of 1994 arroyo toad was known from only 22 populations (Ramirez 2000). Many areas that may have historically contained suitable breeding habitat for arroyo toad have been degraded by dam and flood control construction, off-road recreation, urbanization, mining, and introduced predators (FWS, 1999). This species is currently found in relatively small, isolated populations. Most remaining populations of arroyo toad occur on privately owned lands. Less than 50 percent of the known extant populations of arroyo toad occur on the Los Padres, San Bernardino, and Cleveland National Forests (FWS, 1994).

Overview of Arroyo Toad Habitat Characteristics

In general, arroyo toad requires habitat features that occur in drainages of a narrow, intermediate range of size that have a sufficient number of tributaries to produce an amount of alluvium necessary to decrease the gradient and form suitable breeding pools (Sweet 1992). Dr. Sweet's research in the Los Padres National Forest also suggests that "The late breeding season and long periods of dependence on surface water of arroyo toad larvae and juveniles restrict them from occurring in areas where the riverbed dries out by early summer (1992)."

Habitats utilized by arroyo toad include both breeding sites and over-wintering sites. Suitable breeding habitat features include shallow pools with a minimum of vegetation along one or both margins during the breeding season (Sweet 1992). Preferred pools occur adjacent to sand bars and sandy, stream terraces with vegetation that is mature enough to stabilize the terrace soils during all but the largest storm events. Eggs are deposited and larvae develop in shallow pools with minimal current, little or no emergent vegetation, and a sand or pea gravel substrate overlain with silt (FWS, 1994). As described by Sweet (1992), the following characteristics are relatively consistent with documented breeding pools: proximity to sandy terrace habitat; minimal current; the majority of the pool is less than 30 cm deep; substrate is sand, gravel, or pebbles; a gently sloping shoreline, or central sand bar; and bordering vegetation is low or set back such that most of the pool is open to the sky.

After metamorphosis (usually in June and July), juvenile toads commonly remain on the bordering gravel bars until the natal pool dries up (often between 3 and 8 weeks) (Sweet 1992). Juvenile and adult toads feed on insects on sandy stream terraces with a sparse understory at ground level and a light to moderate overstory of riparian trees, including cottonwoods (*Populus* sp.), oaks (*Quercus* sp.), or willows (*Salix* sp.). Adult toads excavate shallow burrows on the terraces for shelter during the day when the surface is still damp or for longer intervals during the dry season (FWS, 1994).

Adult arroyo toads extensively utilize terraces and marginal zones (areas of mixed sediments that occur between the stream channel and mature riparian vegetation zone) outside the breeding season "and seem to have a critical dependence on terrace habitat in the late fall and winter months, when they are generally inactive" (Sweet 1992). Terraces utilized occur in the vicinity of breeding sites and are commonly characterized by sparse to moderate vegetation including mule fat (*Baccharis salicifolia*), California sycamore (*Platanus racemosa*), cottonwood, willow, and coast live oak (*Q. agrifolia*). The understory in these habitats may be bare or consist of scattered grasses herbs, and leaf litter (FWS 2001a). In order for any of these habitats to be suitable for arroyo toad use, several areas of open friable sand must be present where they can burrow (FWS 2001).

Adult arroyo toads have also been documented in upland habitats outside of a stream channel, primarily outside of the breeding season. These 'uplands' are generally associated with accessible upper flood terraces that occur in the vicinity of breeding habitat. Upland habitats utilized by over-wintering arroyo toad include alluvial scrub, coastal sage scrub, chaparral, grassland and oak woodland (FWS 2001). Soils are also important in these over-wintering habitats. Though individual arroyo toads have been documented from small mammal burrows, the majority of data suggests that they prefer sandy soils in which to burrow (Bloom, pers. com.). Data collected by Ramirez (2000) suggest that arroyo toad may move burrow sites to follow soil moisture levels. Some arroyo toads have been documented to move back into the stream channel itself during the driest part of the season.

There is some variation in the timing of arroyo toad breeding based upon location and environmental conditions, but it generally takes place between February and late June. In the region that includes the subject survey area, breeding generally occurs between April and June. Adult males will select a breeding site generally based on the criteria described above, but may call from a variety of positions within the pools including the margins, edges of central bars, submerged bars, or occasionally from the surface of dense submerged vegetation (Sweet 1992). During courtship, males vocalize a high trill usually lasting 8 to 10 seconds (FWS 1999).

Critical Habitat Designation

Critical habitat is defined by the USFWS as: (1) the specific areas within the geographic area occupied by a species, at the time it is listed in accordance with the Endangered Species Act of 1973 as amended, on which are found those physical or biological features (a) essential to the conservation of the species and (b) that may require special management considerations or protection; and (2) specific areas outside the geographic area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. "Conservation" means the use of all methods and procedures that are necessary to bring an endangered or a threatened species to the point at which listing under the Act is no longer necessary (FWS, 2004).

Criteria used by FWS to select critical habitat includes evaluation of an area to determine the presence of 'primary constituent elements,' as defined in the Proposed Rule (FWS 2004). These elements include physical and biological features that are essential to the conservation of the species, and that may require special management and protection (FWS 2004). Primary constituent elements for the arroyo toad include aquatic breeding habitats and non-breeding upland habitats. These elements are generally outlined by Sweet (1992, 1993) and were expanded and are specifically defined in the Proposed Rule including:

- <u>Space for Individual and Population Growth and for Normal Behavior</u>. "Essential habitat for the arroyo toad is created and maintained by the fluctuating hydrogeological, geological, and ecological processes operating in riparian ecosystems and the adjacent uplands. Periodic flooding that modifies stream channels, redistributes channel sediments, and alters pool location and form, coupled with upper terrace stabilization by vegetation, is required to keep a stream segment suitable for all life stages of the arroyo toad." "Eggs and tadpoles require aquatic habitat…"

"Riparian habitats used by subadults and adults for foraging and burrowing include sand bars, alluvial terraces, and streamside benches that lack vegetation, or are sparsely to moderately vegetated. Upland habitats used by arroyo toads during both the breeding and nonbreeding seasons include alluvial scrub, coastal sage scrub, chaparral…, grassland, and oak woodland. Arroyo toads have also been found in agricultural fields, but these lands may constitute sinks (areas where mortality rates are higher than reproduction rates) over the long term due to tilling, pesticide and fertilizer applications, and heavy equipment use." "The substrate in habitats preferred by arroyo toads consists primarily of sand, fine gravel, or pliable soils, with varying amounts of large gravel, cobble, and boulders. Areas that are damp and have less than 10 percent vegetation cover provide the best conditions for juvenile survival and rapid growth. Arroyo toads must be able to move between the stream and upland foraging sites, as well as up and down the stream corridor." (FWS 2004)

- Food, Water, and Physiological Requirements. Arroyo toad tadpoles eat microscopic algae, bacteria, and protozoans sucked up from the spaces among pebbles, gravel, and sand or abraded from stones. Juveniles and adults feed on insects, but specialize on ants. When foraging, arroyo toads are often found around the driplines of oak trees. These areas often lack vegetation, yet have sufficient levels of prey. When active at night, toads often can be observed near ant trails feeding on ants, beetles, and other prey." (FWS 2004)

- Cover or Shelter. During the day and other periods of inactivity, arroyo toads seek shelter by burrowing into the sand. Thus, areas of sandy or friable (readily crumbled) soils are necessary to burrow, but these soils can be interspersed with gravel or cobble deposits. Arroyo toads may also seek temporary shelter under rocks or debris and have been found in mammal burrows on occasion. Upland sites with extremely compact soils can also be used for foraging and dispersal." (FWS 2004)

- Sites for Breeding, Reproduction and Rearing of Offspring. Arroyo toads "favor shallow pools and open sand and gravel channels along low-gradient (Typically less than 6 percent) reaches of medium-to-large-sized streams. These streams can have either intermittent or perennial streamflow and typically experience periodic flooding that scours vegetation and replenishes fine sediments." "Breeding pools must persist long enough for the completion of larval development (at least in most years), which is generally March through June, depending on location and weather." "Peak metomorphosis occurs during June and July in the northern part of the toad's range, and from late April through June further south, although it may be later, particularly at higher elevations." (FWS 2004)

- Disturbance, Protection, and the Historical Geographical Distributions. Pursuant to federal regulations the FWS is required to identify the known physical and biological features (PCEs) essential to the conservation of the arroyo toad, together with a description of any critical habitat that is proposed. "The PCEs determined essential to the conservation of arroyo toad include, but are not limited to:

1. Rivers or streams with hydrologic regimes that supply water to provide space, food, and cover needed to sustain eggs, tadpoles, metamorphosing juveniles, and adult breeding toads. Specifically, the conditions necessary to allow for successful reproduction of arroyo toads are:
   a. breeding pools with areas less than 12 in (30cm) deep;
   b. areas of flowing water with current velocities less than 1.3 ft per second; and
   c. surface water that lasts for a minimum length of 2 months in most years, *i.e.*, a sufficient wet period in the spring months to allow arroyo toad larveae to hatch, mature, and metamorphose.
2. Low–gradient stream segments (typically less than 6 percent) with sandy or fine gravel substrates that support the formation of shallow pools and sparsely vegetated sand and gravel bars for breeding and rearing of tadpoles and juveniles.
3. A natural flooding regime, or one sufficiently corresponding to a natural regime, that will periodically scour riparian vegetation, rework stream channels and terraces, and redistribute sands and sediments, such that breeding pools and terrace habitats with scattered vegetation are maintained.
4. Riparian and adjacent upland habitats (particularly alluvial streamside terraces and adjacent valley bottomlands that include areas of loose soil where toads can burrow underground) to provide foraging and living areas for subadult and adult arroyo toads.
5. Stream channels and adjacent upland habitats that allow for migration to foraging areas, overwintering sites, dispersal between populations, and recolonization of areas that contain suitable habitat."

It should be noted, and is discussed in the Proposed Rule that arroyo toads are not distributed uniformly throughout the designated critical habitat areas and that breeding and upland habitats are patchily distributed (FWS 2004). The nature of breeding habitats is dynamic and may shift in structure and location from year to year depending upon seasonal rainfall and storm cycles. Similarly upland habitats, though more stable, can be affected by fire, storms, and other natural events.

In order to preserve as much of the ecological and geographic diversity of arroyo toad distribution, three recovery units were selected. These are referred to as the Northern, Southern, and Desert recovery units. These units are based on ecological and geographic separation and the known and historic range of the species. The FWS' goal is to stabilize and expand the populations in these units in order to preserve the species' genetic diversity as well as the environments in which the species is found (FWS 1999). The recovery units are based on the U.S. Geological Survey hydrologic subregion and accounting unit boundaries as delineated on the Hydrologic Unit Map. The objective of the recovery plan is to initially recover the arroyo toad sufficiently to warrant reclassification to Threatened status and finally to recover the species sufficiently to warrant delisting altogether (FWS 2001).

The FWS has identified 23 critical habitat units for the recovery of the arroyo toad. The unit nearest to Newhall Ranch is Unit 6, the Upper Santa Clara River Basin, which consists of portions of Castaic and San Francisquito Creeks, the Santa Clara River, and adjacent uplands, encompassing approximately 7,398 acres. Arroyo toads have been recorded at the following locations within critical habitat Unit 6, upstream of the subject Newhall Ranch survey area.

- Upper Castaic Creek (SubUnit 6a) –above the reservoir – occurrences documented the U.S. Forest Service above the Castaic Lake reservoir (FWS 2004)

- Santa Clara River (SubUnit 6b) – 2003 communication to FWS by Ruben Ramirez of Cadre Environmental reported "…recent observations of arroyo toads and eggs" in the Santa Clara River in the vicinity of the San Francisquito Creek confluence (FWS 2004).

- Santa Clara River – 2001, protocol surveys by Impact Sciences found a single adult arroyo toad near the confluence of San Francisquito Creek.

- Santa Clara River – 2001, Ms. Nancy Sandburg reports observance of 4 adult arroyo toads near the confluence of San Francisquito Creek to FWS.

- Upper San Francisquito Creek – Calling male arroyo toads heard in 1997 near the old St. Francis Dam (FWS 2004).

The FWS (2004) considers the Santa Clara River to be essential as a dispersal corridor for arroyo toads between Castaic Creek and upper San Francisquito Creek. FWS (2001a) believes the stability of the Upper Santa Clara River basin arroyo toad population will increase substantially with appropriate management of non-native plants and animals and habitat rehabilitation. These activities are already underway in the lower San Francisquito Creek area and include removal of giant cane and tamarisk from the streambed and supplemental plantings of willows and cottonwoods. Approximately two miles of the eastern portion of the River Village survey reach occurs within the proposed Critical Habitat Unit 6.

METHODOLOGY

Previous Studies In and Near the Newhall Ranch Project Area

Documentation pertinent to the biological resources in the vicinity of the site was reviewed and analyzed. Information reviewed included: (1) the Federal Register listing package for the federally listed Endangered arroyo toad potentially occurring on the project site; (2) literature pertaining to habitat requirements of sensitive species potentially occurring on the project site; (3) the California Natural Diversity Data Base (CNDDB 2004) information regarding special-status species potentially occurring on the project site for the Newhall, Val Verde, and Mint Canyon USGS 7.5-minute quadrangle maps, and (4) previous surveys for aquatic resources in the Newhall Ranch project area. A summary of the results are provided below.

- Federal Register – The December 16, 1994 Determination of Endangered Status for the Arroyo Southwestern Toad (50 CFG Part 17, RIN 1018-AB97) cited arroyo toad locations from Sespe and Piru Creeks and the Los Padres National Forest (FWS 1994). There were no records of any arroyo toad in the Newhall Ranch area mentioned in this report.

- The April 2004 Proposed Critical Habitat for the Arroyo Toad stated that arroyo toads have been reported from Castaic Creek above the reservoir, from San Francisquito Creek between the southern end of Section 34 and Bee Canyon, and in the Santa Clara river in the vicinity of the San Francisquito Creek confluence. There were no records of any arroyo toad in the Newhall Ranch area mentioned in this report (FWS 2004).

- Rare Plant and Animal Survey, Santa Clarita Water District Service Area (San Marino Environmental Associates, 1995) – Non-protocol reconnaissance surveys were conducted in the NMRP area, but the species was not observed. However, the author states that it could be present in low numbers.

- Sensitive Aquatic Species Survey for Newhall Land & Farming Company (San Marino Environmental Associates, 1995) – Non-protocol reconnaissance surveys were conducted of the Santa Clara River from Bouquet Canyon to Castaic Creek, and along San Francisquito. None were found.

- Newhall Ranch Biota Report (RECON, 1995) – Non-protocol surveys were conducted on the Santa Clara River for the Newhall Ranch Specific Plan EIR prepared by Los Angeles County. None was observed during the surveys, but the report states there is a moderate potential for their occurrence on the main stem in Newhall Ranch.

- Survey for Arroyo Toad for Newhall Ranch (RECON, 1999) – Protocol surveys were conducted, but no toads were observed. However, appropriate habitat is present.

- Biota Report for SEATAC for West and East Creek Projects on San Francisquito Creek (Impact Sciences, 1998) – Report states that the species may travel periodically to project area from upstream population; cited Frank Hovore's report of anuran (frog or toad) eggs observed in the project area, but washed away by stream flows before an accurate identification could be made.

- Surveys on Tesoro del Valle (White and Leatherman Bioservices, 2001) – Arroyo toad habitat assessment for the Tesoro del Valle project located on San Francisquito Creek, immediately north of the NRMP project area. The assessment focused on the Tesoro project area, as well as approximately 9 linear miles of San Francisquito Creek habitat, north from its confluence with the Santa Clara River. The evaluation was based on the presence or absence of primary constituent habitat elements. The report concluded that the most critical primary constituent element is a hydrologic regime that supports habitat for breeding adults, eggs, tadpoles, and metamorphosing juveniles (Leatherman, 2000). As such, it was determined that the best potential habitat for the arroyo toad in San Francisquito Creek occurs north of the Tesoro del Valle project site on the National Forest. The report further stated that though the project area and other portions of San Francisquito Creek south of U.S. Forest Service lands supported many of the primary constituent elements, the hydrologic regime was not present. Therefore, it was concluded that this portion of San Francisquito Creek would only be useful for dispersing individuals if they were to occur in the immediate area.

- Sandburg Reconnaissance Surveys, NRMP project area – In April 2001, Ms. Nancy Sandburg conducted surveys in the Santa Clara River on Newhall Land and Farming property. In notes sent to the FWS, Ms. Sandburg reported observations of a total of four adult toads from several survey efforts. Each was detected in the Santa Clara River in the near vicinity of the San Francisquito Creek confluence. Ms. Sandburg's notes did not include detection of any vocalizations or any other breeding behavior.

- Sandburg Reconnaissance Surveys, Soledad Canyon area – In May 2001, Ms. Sandburg conducted arroyo toad surveys in the Santa Clara River in the Soledad Canyon area. Arroyo toad tadpoles (three separate cohorts) were reported from three separate drying pools within the project reach which includes the portion of the Santa Clara River occurring between the River's End vacation park and the proposed Transit Mix Concrete Company mine. This site is situated approximately 9 miles east of the NRMP. Ms. Sandburg noted that there was a potential for some of the tadpoles to be lost before metamorphosis due to the rapid evaporation of the remaining water in the pools (Sandburg 2001).

- Impact Sciences, Inc. protocol surveys in NRMP area, portions of Castaic Creek, San Francisquito Creek from the Santa Clara River to the Copper Hill Bridge, and the Santa Clara River east from the NRMP area to approximately 500 meters past the Los Angeles Aqueduct crossing, including portions of South Fork Santa Clara River and Bouquet Creek – In spring 2001 intensive surveys following FWS recommended survey protocol were conducted in the described area. A single arroyo toad was observed in the Santa Clara River adjacent to the San Francisquito Creek confluence.

- Results of Focused Surveys for Arroyo Toad and Special-status Aquatic Reptiles and Amphibians; Newhall Ranch (Impact Sciences, Inc. 2002). Protocol surveys were conducted during the 2001 survey season in the Santa Clara River from near the confluence with Castaic Creek, west (downstream) to the Los Angeles-Ventura County boundary. No arroyo toads were observed or detected.

Survey Scope and Methods

FWS developed a survey protocol to determine the presence or absence of arroyo toad (FWS 2001; see **Appendix A**). The protocol requires six focused surveys be conducted in suitable habitat between March 15 and July 1 with at least seven days between surveys. The surveys were timed such that at least one survey is conducted during the months of April, May, and June. Protocol surveys include both daytime and nighttime components conducted within the same 24-hour period. Surveys are not to be conducted during adverse weather conditions because environmental conditions such as low temperatures, high winds, and rain may affect the behavior of arroyo toad. Full moon phases are also avoided.

Compliance Biology, Inc. conducted protocol surveys for arroyo toad beginning March 19, 2004 within the River Village project reach. David Crawford, principal biologist, conducted all surveys and was accompanied by Tim Rademaker, a current Environmental Science student at CSUCI. Mr. Crawford is a FWS authorized surveyor for arroyo toad and permission was granted from the FWS Ventura field office to conduct these specific surveys and utilize Mr. Rademaker as an assistant.

The primary purpose of the survey effort was to determine presence/absence of arroyo toad within the project area. As such, pursuant to protocol, if and when any arroyo toads were observed or detected, surveys would cease in those specific areas. Surveys would be continued in areas adjacent to observed toads in order to accurately map the specific locations of all occupied areas within the entire survey reach.

Pursuant to protocol methodologies, a series of six day and night surveys (conducted within the same 24-hour period) were conducted at least seven days apart. Additionally, at least one survey was conducted in April, May, and June as directed in the protocol guidelines. Survey dates for the River Village survey reach were March 19, April 23, May 7, May 21, June 11, and June 25, 2004. The entire survey reach was systematically surveyed by at least two authorized surveyors at a time. Daytime surveys consisted of searching for suitable breeding pools to determine if egg masses, tadpoles, or metamorphosing juveniles were present, and for the purpose of identifying the most likely calling sites for any adult males that were potentially in the area. All nighttime surveys were conducted when air temperatures were at least 55 degrees Fahrenheit when they were initiated. Periods of full moon phases were generally avoided. Surveys were conducted each night from about 2030 to 2330 hours.

Weather conditions were generally calm and clear throughout the survey effort with a few nights of relatively overcast conditions. The project area was surveyed by walking slowly and carefully along stream banks or within the stream itself when necessary. As with the daytime surveys, every precaution was taken not to disturb or create silt deposits within potential breeding pools, and care was taken not to disturb or injure potentially occurring arroyo toad adults, juveniles, tadpoles, or egg masses. Periodic stops were taken to listen for calling males at 15-minute intervals or as appropriate depending upon individual zone conditions. Surveys were conducted as quietly as possible to maximize the potential to hear calling arroyo toads. Handheld flashlights and headlamps were utilized to visually locate toads within potential breeding areas and along stream banks. In addition to documenting arroyo toad data, all aquatic herpetofauna observed during both day and night surveys were recorded.

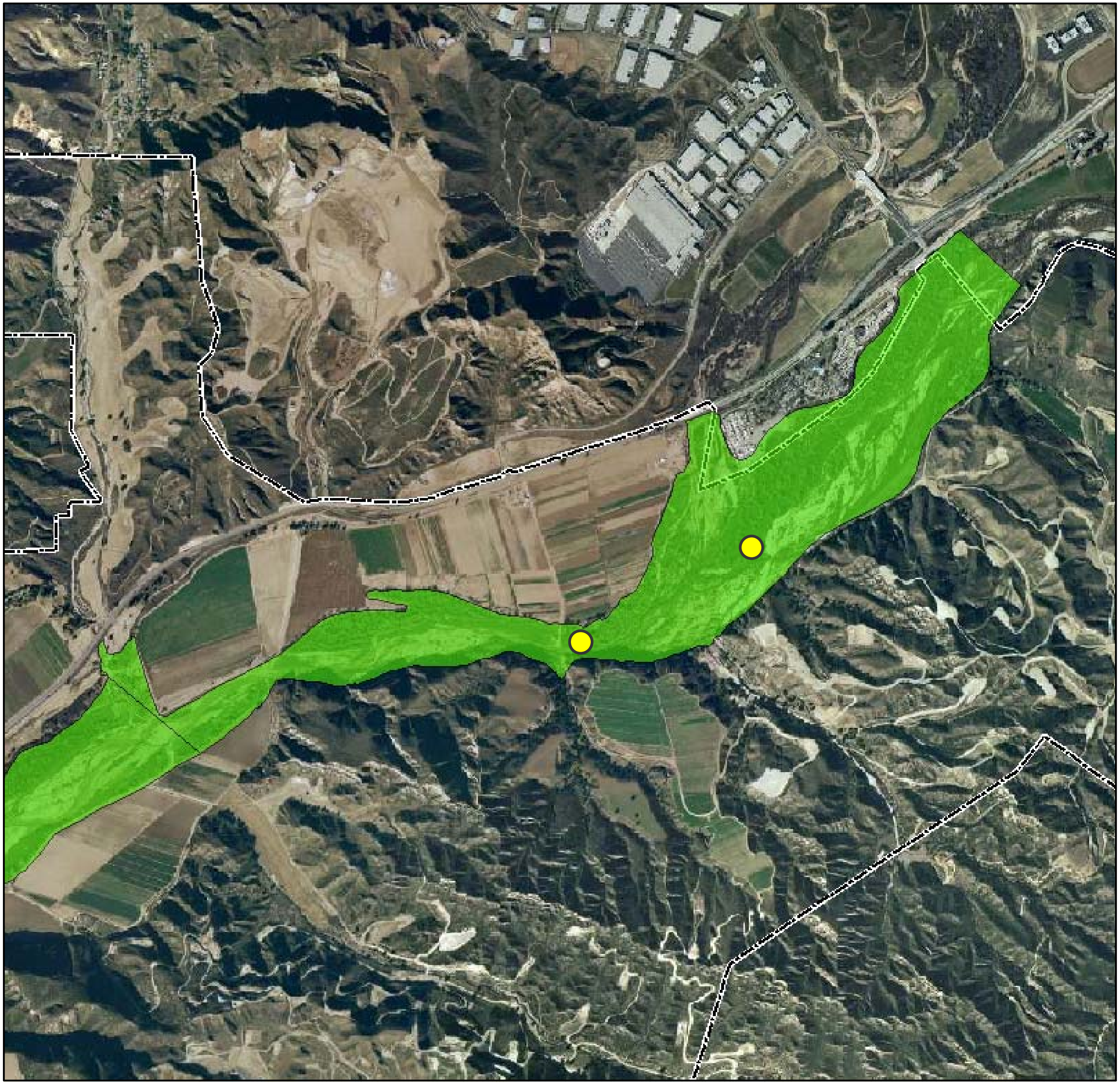
Three additional visits were made to an area known to be occupied by arroyo toad to determine if and when adult males were calling and what stages of development larval tadpoles would be in. The area surveyed was a portion of Castaic Creek that is situated approximately one mile north of the Castaic reservoir on U.S. Forest Service land, near the eastern terminus of Templin Highway.

PROTOCOL SURVEY RESULTS

No arroyo toads were observed or detected in or adjacent to the River Village survey area. Daytime surveys did not reveal the presence of any egg masses or larvae and no juvenile or adult toads were observed or otherwise detected during any of the survey efforts. In addition, no available survey data indicates that the arroyo toad has been recently recorded within or adjacent to the River Village project site.

Though no arroyo toads were recorded, other amphibian and aquatic reptile species were detected. All life stages of western toad (*Bufo boreas*), Pacific chorus frog (*Hyla regilla*), and California chorus frog (*Hyla cadaverina*), were recorded. Western toads and Pacific chorus frogs were very common while California chorus frogs were only detected during two of the surveys. An interesting note is that no bullfrogs (*Rana catesbeiana*) were detected during the entire survey effort. However, numerous tadpoles, juvenile and adult forms of the invasive African clawed frog (*Xenopus laevis*) were observed at various points within the survey reach during all but two of the surveys. Several southwestern pond turtles (*Clemmys marmorata pallida*), a California protected species and state species of special concern, were also observed in ponded areas of the river during many of the daytime surveys. Specific locations of pond turtles observed are illustrated on **Figure 3**. Curiously, no two-stripe garter snakes (*Thamnophis hammondii*) were detected during the survey effort despite their relatively common occurrence during the 2001 surveys conducted by Impact Sciences in this same area. There were no obvious changes to existing conditions in or adjacent to the river that would explain their lack of occurrence.

Most of the habitat covered by protocol surveys within the River Village reach was considered to be of relatively high quality as most or all of the primary constituent elements of arroyo toad habitat were present. Habitats in the survey reach included some densely wooded areas, as well as sparsely vegetated sandbars with gravelly to sandy substrates. Within the more open areas, scattered willow saplings were present as were, small clumps giant cane and non-native tamarisk (*Tamarix* sp.). In some areas, the outer terraces existing along the base of the north and south banks, supported patches of larger cottonwoods and willows, and other areas were more dominated by mule fat. Upland areas on the north side of much of the survey reach adjacent to the proposed River Village site lacked much vegetation as it is under active agriculture. The vegetation along the margins of the stream channel was sometimes characterized by very dense and included willows, cottonwoods, and dense patches of cattails. Other areas supported little vegetation other than sparsely scattered mule fat or tamarisk.



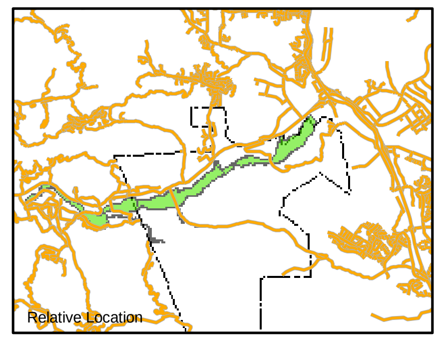
ARROYO TOAD REPORT

L E G E N D

Southwestern Pond Turtle.

Arroyo Toad Survey Reach

Newhall Ranch
Specific Plan Boundary



N

0 1,000 2,000 Feet

0 150 300 600 Meters

10-19-04

Figure 3

SPECIAL-STATUS SPECIES LOCATION

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As previously mentioned, three individual evening/nighttime site visits were made at a known occupied site north of Castaic Lake for the purpose of determining active calling periods, laying periods, and timing of metamorphosis. Site visits were conducted on April 7, April 20, and June 8. On April 7, several calling males were heard and three individual males were observed at the concrete crossing at the terminus of Templin Highway. None was heard or observed during the second visit though winds were relatively high and nighttime temperatures were cooler than usual for that month. During the third visit, there were also no indications of arroyo toad as the creek had stopped flowing and had dried with the exception of a few small pools. However, conversations with Mr. Chris Delith of FWS indicated that further downstream of the areas we visited, there were more pools and numerous arroyo toad tadpoles were observed during the same period of time we were in the area. Mr. Scott Cameron, who was concurrently surveying portions of the Santa Clara River east of the subject survey zones, conducted additional visits to the occupied sites north of Castaic Dam. This information, and the information received from Mr. Delith was useful in calculating if and when adults would be calling and when tadpoles would likely begin metamorphosing in the survey area if they were to be present.

DISCUSSION/CONCLUSIONS

Based on the results of the studies conducted by Compliance Biology, Inc. and from other surveys conducted in the vicinity over the past several years, it is appears that arroyo toads are absent in this portion of the Santa Clara River watershed. Though speculative, there are a number of possible explanations for their apparent absence. As most of the major arroyo toad studies have described in detail, there are a number of factors that contribute to the reduction of arroyo toad populations, and nearly all of these factors are present within the subject survey area.

Habitat destruction and alteration has been described by most experts as being the primary cause for the decline in arroyo toad numbers. Sweet (1992) identifies dams as being responsible for greatest amount of suitable arroyo toad habitat and cites a number of examples. The portion of river within the River Village project area is affected both directly and indirectly by dams and other sources of flow regulation. Castaic Dam occurs between two contemporary documented populations of arroyo toad (FWS 2001a), which suggests it may have eliminated a considerable amount of suitable habitat for this species, in particular those areas located downstream of the dam.

Water flows along the Santa Clara River in the River Village area during the survey period are largely attributable to the tertiary treated effluent releases from the WRP No. 32 and further upstream (adjacent to Bouquet Canyon Road Bridge) from WRP No. 26. Fluctuating flow rates and water levels from WRP releases may also be a factor in affecting suitable breeding habitat in the river.

Non-native predators can also be a contributing factor to the reduction of arroyo toad in the region. This year numerous African clawed frog tadpoles, juveniles and adults were observed in pools adjacent to flowing channels. This predatory species appears to be increasing in number in the Santa Clara River watershed. African clawed frogs have been observed preying on various life stages of arroyo toad including eggs, larvae, and adults (Ramirez 2000). Non-native fishes feeding on larval and juvenile arroyo toad have also been recorded (Sweet 1992). Several predatory species of non-native fish are known from the Santa Clara River system. Though none was directly observed during the survey effort, it is likely they still occur and pose a threat to breeding toads.

Native predators also contribute to reduce numbers of arroyo toad in a given area. Two-striped garter snake and southwestern pond turtle are both known from the Santa Clara River within the River Village vicinity. Though declining in numbers themselves, when either of these two species encounters a breeding pool of arroyo toad tadpoles, they can significantly impact that population. Wading birds such as herons and egrets also have a potential to significantly impact tadpole populations.

Other land uses such as urbanization, agriculture, and mining can also contribute to the reduction of suitable habitat. Development reduces the amount of area available to locally occurring arroyo toads and factors such as increased human presence and non-native plants and animals, and alteration of water quality inevitably follow. Agriculture commonly includes regular tilling of soil and introduction of pesticides and herbicides, all contributing to the reduction of the amount of suitable habitat available to this species. Sand and gravel mining operations also directly impact river and streambeds and result in increased silt loads that can smother egg masses downstream.

A previous habitat evaluation revealed that the majority of suitable arroyo toad habitat present within the Newhall Ranch area occurs between the banks of the Santa Clara River (Impact Sciences 2002). Beyond the outer banks, both natural topography and human activities provide an inaccessible and/or inhospitable environment for any dispersing toads. It was also noted that much of the upland habitat beyond the banks of the stream may not have historically provided suitable over-wintering habitat for adult arroyo toad due to the arid conditions and lack of constituent elements that characterize high quality arroyo toad habitat. As such, it is possible that arroyo toad numbers were never high (if historically present) in this portion of the Santa Clara River.

In summary, no arroyo toads were recorded within the portion of the Santa Clara River watershed included in the River Village project area, however this taxon has been recorded in very low numbers upstream (east) of the survey reach covered in this report. Whether one surmises that the upstream population(s) are a remnant of a once much larger population, or individuals from surviving upstream populations that may have been displaced during storm events from previous years, it is apparent that they are not breeding in the subject area and currently do not utilize habitats present within the River Village project survey area.

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APPENDIX A

Survey Protocol for the Arroyo Toad

compliance•biology

SURVEY PROTOCOL FOR THE ARROYO TOAD

May 19,1999

The following guidelines are provided to facilitate accurate assessments of the presence or absence of the federally listed endangered arroyo toad (Bufo microscaphus californicus). Accurate survey data are needed to provide the U.S. Fish and Wildlife Service (Service) with sufficient information to respond to requests for Federal permits and licenses. Currently, surveys performed in accordance with these guidelines will not require a permit under section 10(a)(1)(A) of the Endangered Species Act of 1973, as amended. However, permits to conduct arroyo toad surveys may be required in the future. In all cases, extreme care must be taken when conducting surveys to avoid inadvertently injuring or killing toads, or damaging their habitat. These guidelines are not meant to be used for long-term monitoring of projects or the overall status of populations; guidelines for such monitoring efforts should be developed with the assistance of the Service for specific cases.

The Service recommends that the following survey guidelines be used to determine if arroyo toads are present in the vicinity of proposed activities, but cautions that negative surveys during a year of severe weather (e.g., drought, extended rainy season, cold weather) may be inconclusive. Contact the appropriate field office (addresses and phone numbers below) before conducting surveys for additional information.

1) Areas within one kilometer (1 km) of arroyo toad sites (documented by the presence of eggs, larvae, juveniles, or adults) that have suitable habitat shall be presumed to have arroyo toads.

2) If the sole purpose of surveys is to determine the presence or absence of the arroyo toad, surveys shall cease immediately upon determination that arroyo toad eggs, larvae, juveniles, or adults are present in the survey area. The arroyo toad locations shall be recorded on a USGS 1:24,000 (7.5 minute) map

3) To be reasonably confident that arroyo toads are not present at a site, at least six (6) surveys must be conducted during the breeding season, which generally occurs from March 15 through July 1, with at least seven (7) days between surveys. Extreme weather conditions can cause variations in the breeding season; these conditions should be fully considered when developing a schedule of surveys. If uncertainty exists as to whether environmental conditions are suitable (see guideline #9 below), contact the appropriate field office for further information.

4) At least one survey shall be conducted per month during April, May, and June.

5) Surveys shall include both daytime and nighttime components conducted within the same 24-hour period (except when arroyo toads have been detected in the survey area).

6) Daytime surveys shall include an assessment and mapping of: a) arroyo toad habitat suitability, and b) the presence of arroyo toad eggs, larvae, or juveniles. Extreme caution must be used to avoid crushing arroyo toads that are burrowed into sand bars and banks, or lodged in depressions in the substrate (sand, gravel, soil). Arroyo toads will use trails and roads up to

several hundred meters from breeding sites while foraging; therefore, caution must be taken to not disturb, injure, or kill arroyo toads when using these roads and trails.

7) Daytime surveys shall be conducted by walking slowly along stream margins and in adjacent riparian habitat, visually searching for (but not disturbing) eggs, larvae, and juveniles. If necessary, surveyors may walk within the stream, taking care not to disturb or create silt deposits within breeding pools. If stream crossings are necessary, these should be on the downstream ends of potential breeding pools or in fast-flowing channels to minimize the likelihood of stirring up silt deposits. Arroyo toad eggs are usually laid in shallow water (less than four inches deep), and are susceptible to being smothered by silt that may be raised by walking in or across breeding pools.

8) Nighttime surveys (assuming eggs, larvae, and/or juveniles have not been detected) shall be conducted by walking slowly and carefully on stream banks. Surveyors should stop periodically and remain still and silent for approximately 15 minutes at appropriate sites to wait for arroyo toads to begin calling. The same cautions used for daytime surveys to avoid disturbing, injuring, or killing arroyo toads shall be incorporated.

9) Nighttime surveys must be conducted between one hour after dusk and midnight, when air temperature at dusk is 55 degrees Fahrenheit or greater. Surveys should not be conducted during nights when a full or near-full moon is illuminating the survey area or during adverse weather conditions such as rain, high winds, or flood flows.

10) Nighttime surveys must be conducted as silently as possible, because talking or other human-generated noises may cause arroyo toads to stop calling or leave the creek. Strong headlights or flashlights may be used to visually locate and identify adult arroyo toads, and flash photography may be used to document sightings of solitary individuals; otherwise lighting should be kept to a minimum.

11) Pairs of arroyo toads are very sensitive to disturbances, particularly waves or ripples (calling males are less easily disturbed). Therefore, surveyors must not enter the water near amplexing or courting pairs, and must immediately leave the vicinity upon their discovery.

12) A final report, to be submitted within 30 days of each field season or positive survey shall be prepared that includes survey dates and times, names of surveyor(s), air temperature, estimated wind speed, lighting conditions, a description of the survey methods used, and survey locations plotted on a USGS 1:24,000 (7.5 minute) map.

13) The results of a field survey may not be valid for any of the following reasons: a) surveys were conducted in a manner inconsistent with this protocol, b) surveys were incomplete, c) surveys were conducted during adverse conditions or during a season of severe weather conditions, or d) reporting requirements were not fulfilled. In such cases, the Service may request that additional surveys be conducted.

The final report should be provided to the appropriate Service field office:

For surveys in Monterey, San Luis Obispo, Santa Barbara, and Ventura Counties, Los Angeles County west of Highway 405, and the desert portions of Los Angeles and San Bernardino Counties, reports should be sent to the Ventura Fish and Wildlife Office, 2493 Portola Road, Suite B, Ventura, California 93003 (phone: (805) 644-1766).

For surveys in Los Angeles County east of Highway 405 and south of the desert, Orange, Riverside, Imperial, San Diego, and montane and cismontane San Bernardino Counties, reports should be sent to the Carlsbad Fish and Wildlife Office, 2730 Loker Avenue West, Carlsbad, California 92008 (phone: (760) 431-9440).

If a surveyor thinks that a specific project warrants alterations in this protocol, the Service should be contacted prior to the onset of surveys to discuss and possibly grant permission for proposed modifications. We would appreciate receiving any comments or ideas on these guidelines or recommendations for their improvement. For additional information, please contact the Ventura Fish and Wildlife Office at (805) 644-1766 or the Carlsbad Fish and Wildlife Office at (760) 431-9440.

Diane K. Noda

Diane K. Noda
Field Supervisor

ECOLOGICAL
SCIENCES, inc.

2529 Ironstone Street♦Oxnard, California 93030♦Tel 805.278.7718♦Fax 805.485.6788

August 2, 2001

Mr. Rick Farris
U.S. Fish and Wildlife Service
2493 Portola Road, Ste. B
Ventura, CA 93003

Subject: **Permit Submittal Requirement, TE-808242, Arroyo Toad Surveys, Los Angeles County, California**

Dear Rick:

This letter report summarizes the methodology and findings of surveys conducted for the federally-listed endangered (*Bufo microscaphus californicus-herein AT*) conducted by Ecological Sciences, Inc. under contract with Impact Sciences, Inc. The surveys were conducted to determine the presence and distribution of the AT within the subject study area.

Survey Location

The survey areas included portions of the Santa Clara River, Castaic Creek, San Francisquito Creek, Santa Clara River south fork, and Bouquet Creek, west to the County of Ventura border. A survey area location map (Plate 1) is attached to provide the U.S. Fish and Wildlife Service (Service) with more specific AT survey locality information. For the purposes of this study, the survey area was generally divided into seven separate zones as follows: **Zone 1**-Interstate 5 downstream to the confluence with Castaic Creek; **Zone 2**-Castaic Creek from the Interstate 5 bridge downstream to the confluence with the Santa Clara River; **Zone 3**-confluence of Castaic Creek and Santa Clara River to Chiquito Canyon; **Zone 4**-Chiquito Canyon to Ventura County border; **Zone 5**-Interstate 5 upstream to McBean Parkway, inclusive of San Francisquito Creek upstream to Newhall Ranch Road; **Zone 6**-McBean Parkway upstream to Bouquet Canyon Road, inclusive of South Fork to Magic Mountain Parkway and Bouquet Creek upstream to Newhall Ranch Road; and **Zone 7**-Castaic Afterbay area (downstream of lagoon) inclusive of a separate upland area located near the Interstate 15/ Highway 26 intersection.

Methodology

Guidelines for the AT do not presently require a permit under section 10 (a) (1) (A) of the Endangered Species Act of 1973, as amended. However, during the course of surveys conducted for AT, identification, and therefore direct examination, of AT juveniles and tadpoles may be necessary during spring/summer surveys of aquatic habitats. Accordingly, all field surveys for AT were conducted according to the most recent U.S. Fish and Wildlife Service (Service) guidelines under the authority of federal section 10(a) permit number TE-808242-4 issued to Scott Cameron. Only those surveyors with experience with AT biology were utilized during the survey effort, which also included David Crawford, Pete Bloom (separately permitted), and Chris Nemola. Two surveyors were present during each survey.

At least six (6) surveys were conducted along each zone, with at least seven (7) days between each survey. Additionally, AT surveys were conducted both during daylight hours and at night between one hour after dusk and midnight. Each day and nighttime *AT* survey was conducted within the same 24-hour period. Surveys were conducted between mid-April and late June. Daytime surveys included an

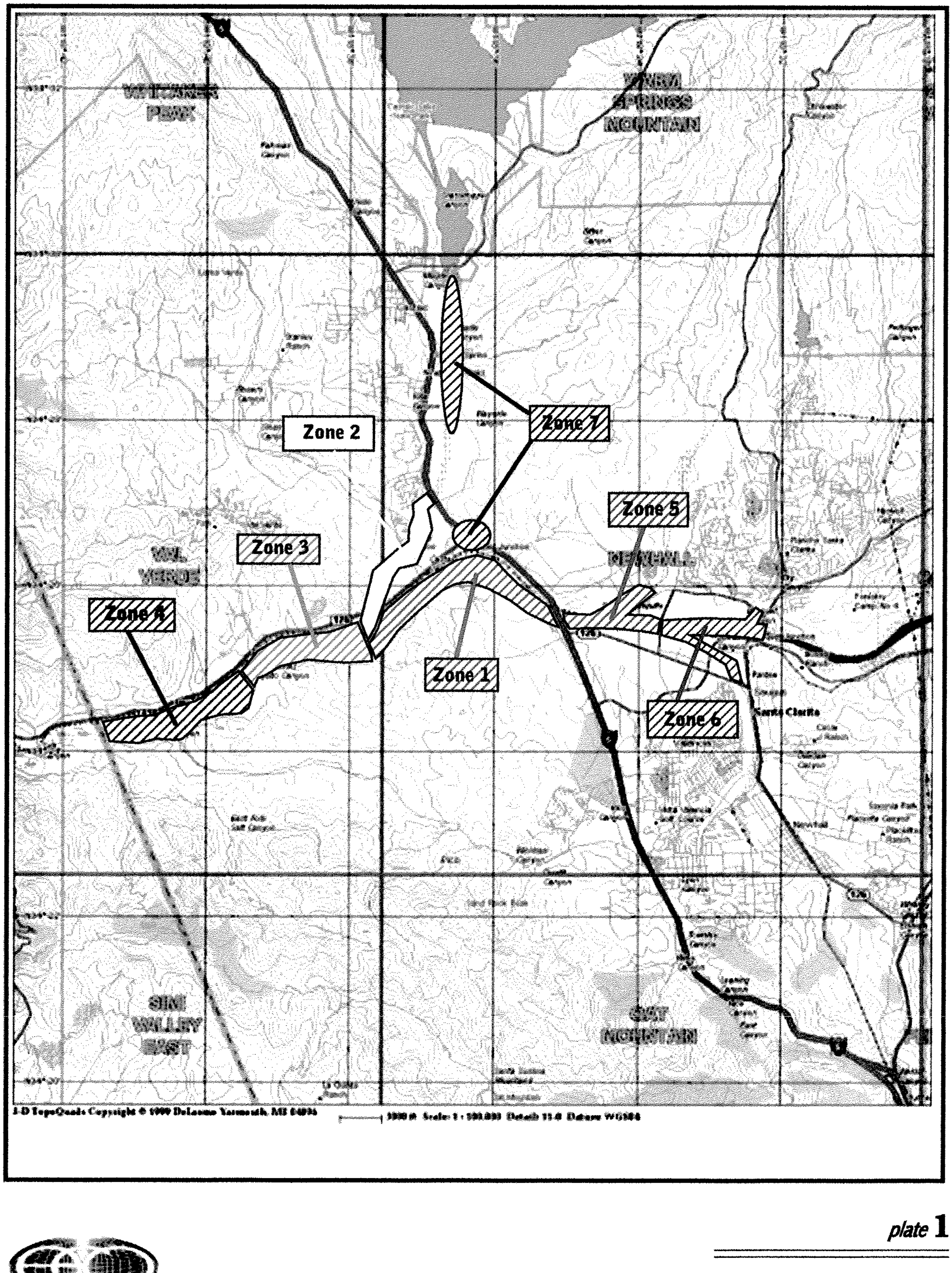


plate 1

Schematic of Focused Survey Locations

ECOLOGICAL SCIENCES

August 2001

assessment of arroyo toad habitat suitability as well as searches for sign of AT presence (e.g., eggs, larvae, or juveniles). Extreme caution was taken to avoid inadvertent disturbances to AT potentially presence within adjacent stream areas.

All nighttime surveys were conducted when air temperatures were at least 55 degrees Fahrenheit. Periods of full moon phases were generally avoided. Surveys were conducted each night from about 8:30 p.m. to approximately 12:00 a.m. Weather conditions were generally calm and clear throughout the survey effort with just a few days of relatively overcast conditions. Each zone was surveyed by walking slowly and carefully along stream banks or within the stream itself when necessary. As with the daytime surveys, every precaution was taken not to disturb or create silt deposits within potential breeding pools, and care was taken not to disturb or injure potentially occurring AT adults, juveniles, tadpoles, or egg masses. Periodic stops were taken to listen for calling AT at 15-minute intervals or as appropriate depending upon individual zone conditions. Surveys were conducted as quietly as possible to maximize the potential to hear calling AT. Handheld flashlights and headlamps were used to visually locate AT within potential breeding pools and along stream banks.

Surveys were initiated on April 17 and completed on June 26, 2001 as follows: April 17 (Zone 1), April 19 (Zone 3 and 4), April 22 (Zone 2), April 29 (Zone 7), April 26 (Zone 5), April 28 (Zone 6); May 1 (Zone 3), May 2 (Zone 4), May 3 (Zone 2 plus upper San Francisquito Creek), May 4 (Zone 5), May 8 (Zone 6), May 12 (Zone 7), May 14 (Zone 4), May 15 (Zone 1), May 18 (Zone 2 plus upper San Francisquito Creek), May 21 (Zone 3), May 24 (Zone 5), May 25 (Zone 6), May 26 (Zone 7), May 27 (Zone 1), May 28 (Zone 2), May 29 (Zone 4), May 31 (Zone 5); June 2 (Zone 7), June 7 (Zone 3), June 8 (Zone 5), June 9 (Zone 6), June 10 (Zone 7), June 11 (Zone 1), June 12 (Zone 2), June 13 (Zone 4), June 14 (Zone 3), June 15 (Zone 5), June 16 (Zone 6), June 17 (Zone 7), June 18 (Zone 1), June 19 (Zone 2), June 20 (Zone 4), June 21 (Zone 3), June 23 (Zone 6), June 26 (Zone 1).

Results

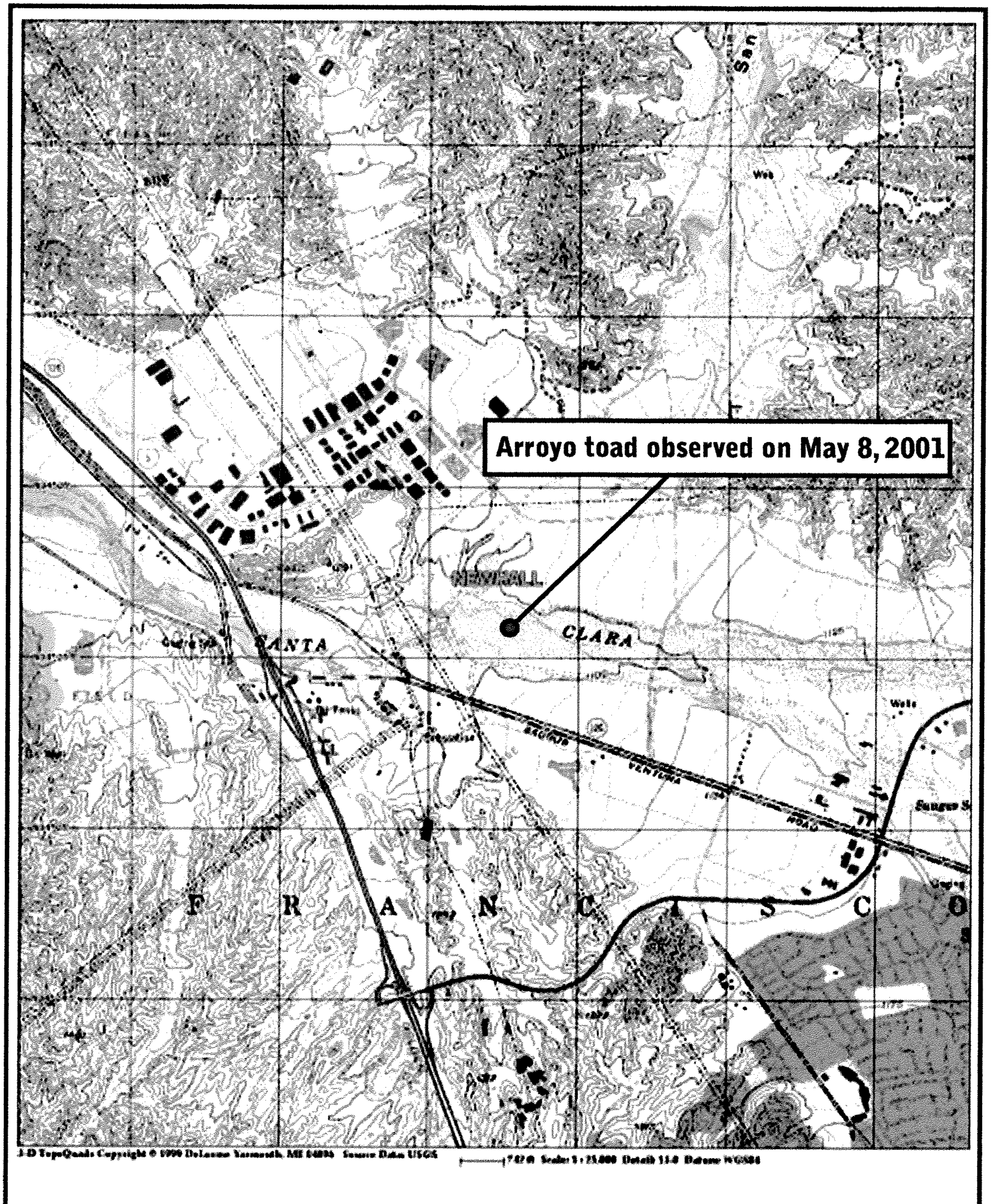
One adult male AT was observed during the survey effort on May 8, 2001. The toad was recorded by direct observation and was not heard vocalizing. The observation time was 10:31pm near the confluence of San Francisquito and downstream of the McBean bridge. Plate 2 illustrates the AT location point taken with a handheld GPS unit at the time of the observation. No other AT were recorded during the focused survey effort. Other amphibian species recorded during the focused AT survey effort included adults, juveniles, and tadpoles of the western toad (*Bufo boreas*), Pacific chorus frog (*Pseudacris regilla*), California chorus frog (*Pseudacris cadaverina*), and African clawed frog (*Xenopus laevis*). Aquatic reptile species recorded included the two-striped garter snake (*Thamnophis hammondii*) and western pond turtle (*Clemmys marmorata pallida*).

If you have any questions regarding results presented in this report, please don't hesitate to call.

Sincerely,

Ecological Sciences, Inc.

Scott D. Cameron
Principal Biologist



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August 2001

plate 2

Arroyo Toad Location

SURVEY FOR ARROYO SOUTHWESTERN TOAD
FOR
NEWHALL RANCH

Prepared for

NEWHALL RANCH COMPANY
23823 VALENCIA BOULEVARD
VALENCIA, CA 91355

Prepared by

GERALD A. SCHEID
SENIOR BIOLOGIST

RECON NUMBER 2599F
JULY 12, 1999

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FIGURES

TABLE

Introduction

Arroyo southwestern toad surveys were conducted within the Santa Clara River and Castiac Creek on the Newhall Ranch property in the spring of 1999. The Newhall Ranch property is located in the northwestern portion of Los Angeles County west of the city of Santa Clarita and south of Highway 126 (Figures 1 and 2). Major water courses on the property include a portion of the Santa Clara River and Castaic Creek. These two waterways were the focus of the arroyo toad surveys because they contain suitable habitat for the subspecies. Other smaller drainage courses on the property do not have suitable habitat for arroyo toads, primarily because they are ephemeral and do not support the pools necessary for successful breeding of the arroyo toad..

Arroyo Southwestern Toad Ecology and Distribution

The arroyo southwestern toad (*Bufo microscaphus californicus*) was listed as an endangered species by the U.S. Fish and Wildlife Service (USFWS) on January 17, 1995, and is a California species of special concern. This toad subspecies is restricted to the coastal slopes of southern California and northern Baja California, Mexico, except for one small, isolated population in the Mohave River (Jennings and Hayes 1994). Southern California populations occur on the Sisquoc River, Santa Ynez River, and Mono and Indian Creeks in Santa Barbara County; Sespe Creek, lower Piru Creek, and Agua Blanca Creek in Ventura County; upper Piru Creek, Castaic Creek, and Big Tujunga Canyon in Los Angeles County; and additional drainages in San Bernardino and San Diego Counties (Sweet 1992; USFWS 1998).

Near the proposed Newhall Ranch project, the arroyo southwestern toad has been recently recorded along Castaic Creek, both above and below the dam at Castaic Lake (USFWS 1998). Approximately 50 adult toads were found below the dam over a distance of about 3.2 kilometers (two miles) (USFWS 1998). Arroyo southwestern toads along Castaic Creek are likely affected by exotic aquatic predators (e.g., bull frog), off-road-vehicle activities, recreational activities, potential urban development, and water flow regulation below the dam.

The arroyo southwestern toad has very specific habitat requirements. It inhabits sandy banks of washes, streams, and arroyos with low currents and large, deciduous trees. Within these drainages, arroyo southwestern toads breed in pools with the majority of the pool greater than one foot deep with a substrate of sand, gravel, or pebbles. The pools tend to lack vegetation (Sweet 1992). Arroyo toads are nocturnal and breed from March to June depending on local climate. Females lay between 2,000 and 10,000 eggs in strings in the breeding pools. Larvae metamorphose from tadpoles to toads in 65 to 85 days. Adult toads estivate through the summer in burrows that they dig on sandbars (Jennings and Hayes 1994).

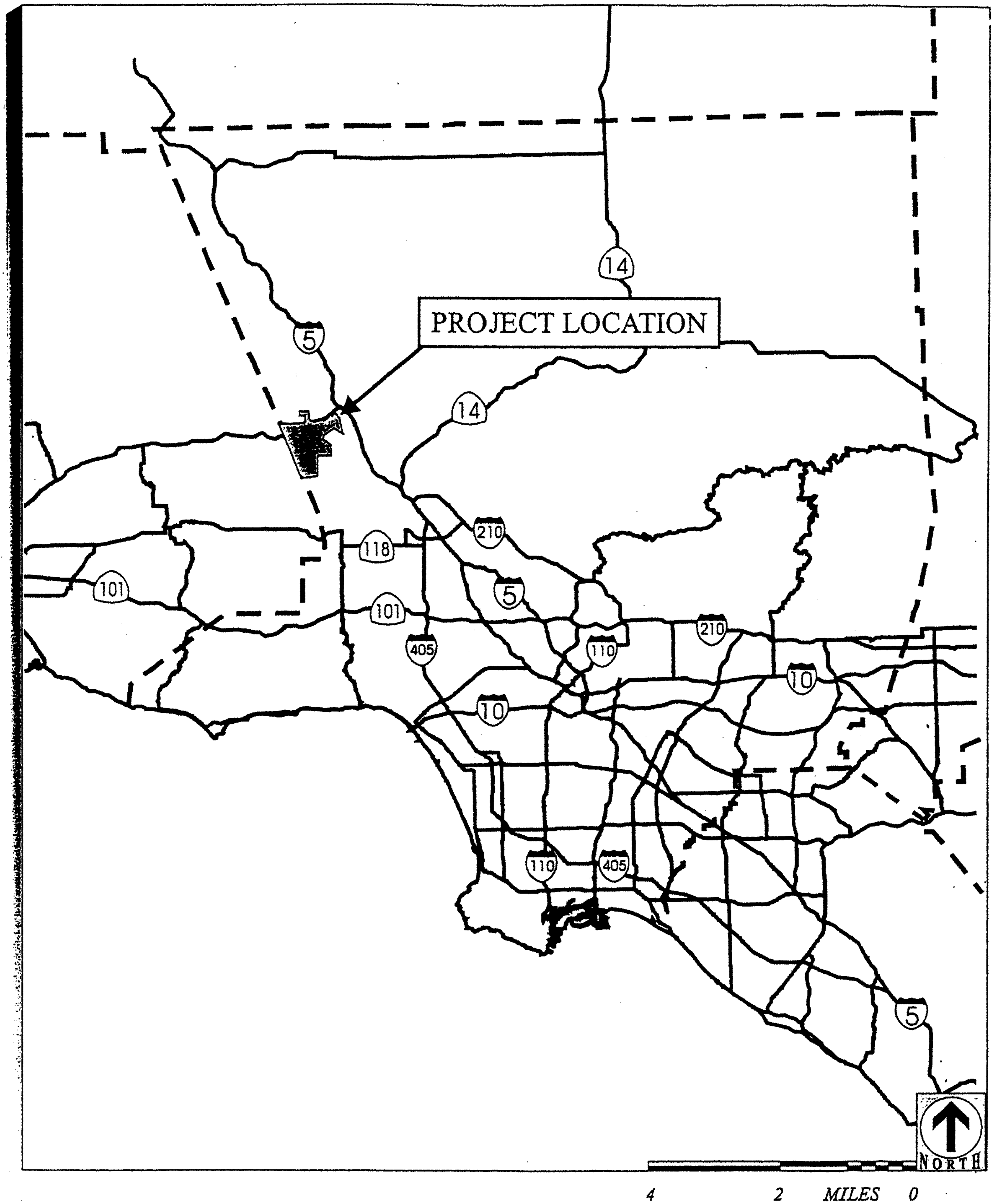

FIGURE 1

Regional Location of the Project

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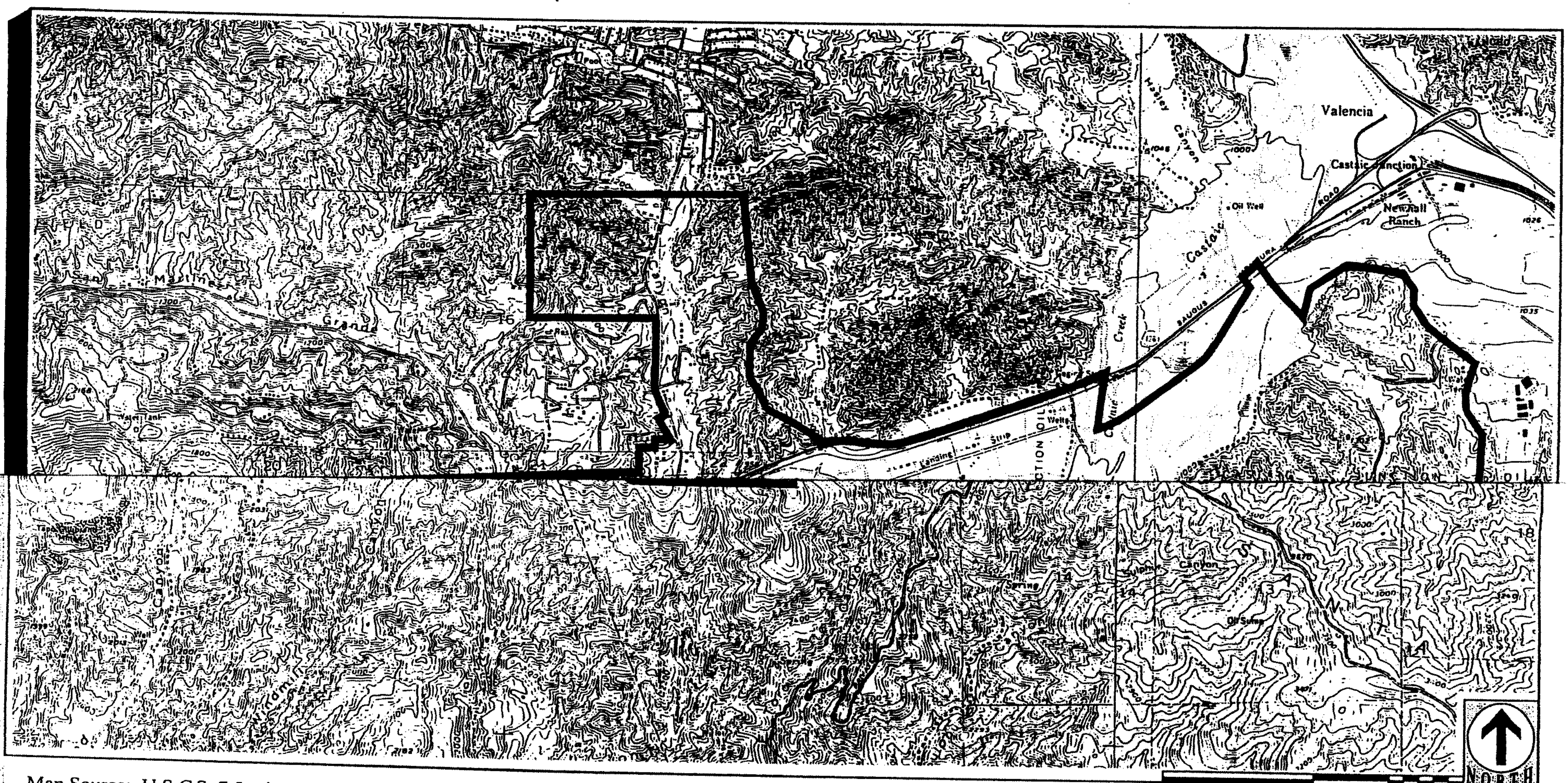

Map Source: U.S.G.S. 7.5 minute topographic maps, Newhall, Val Verde, Oat Mountain, and Simi Valley East

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FIGURE 2

Project Vicinity

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Threats to this species include dam construction, flood control, urbanization, and predation by introduced species including bullfrogs (*Rana catesbeiana*) and exotic fishes (50 CRF 17, December 16, 1994).

Survey Methods

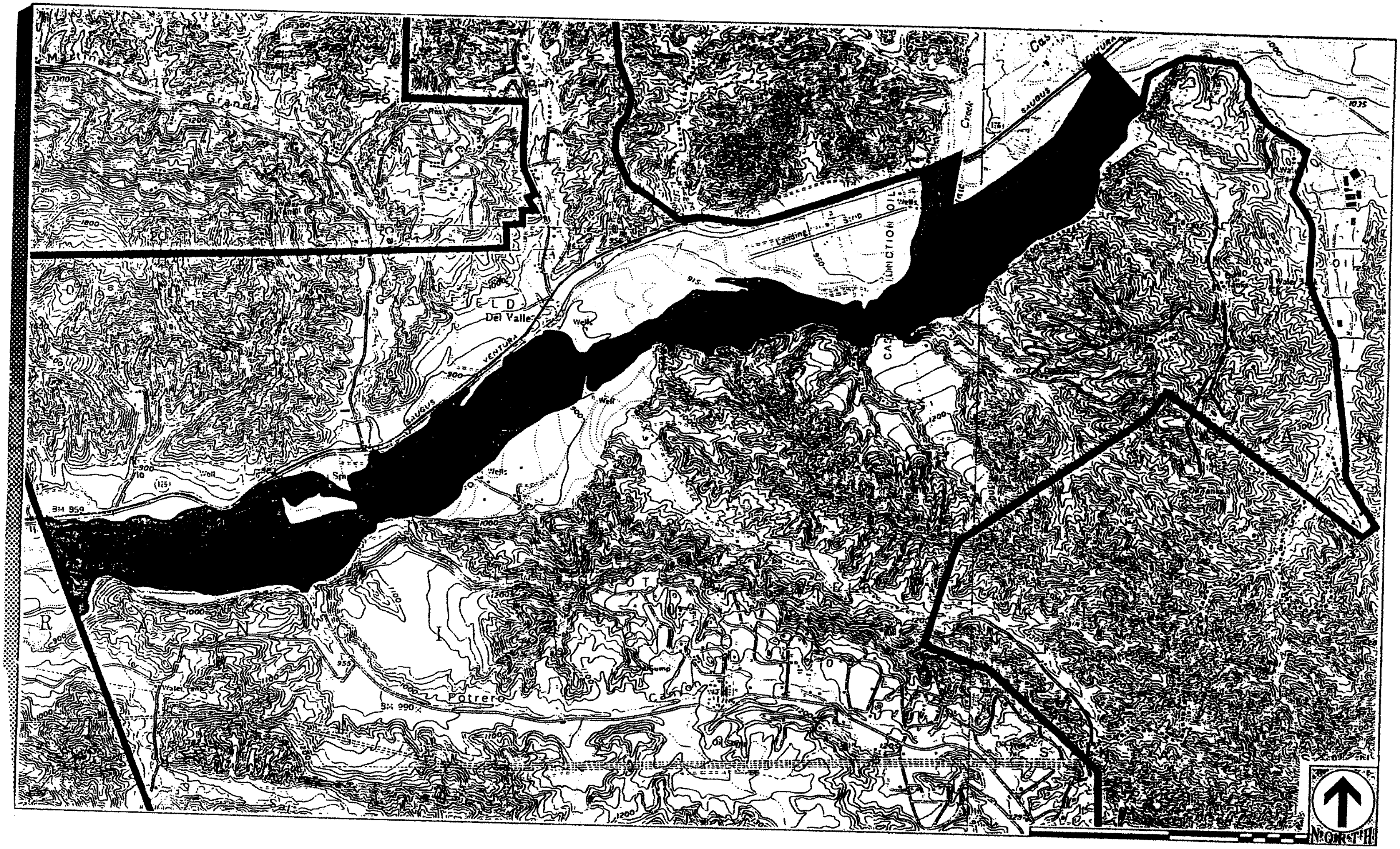
Surveys for arroyo southwestern toads along the portions of the Santa Clara River and Castaic Creek on the Newhall Ranch property were conducted according to the protocol issued by the USFWS in March 1995. All suitable habitat areas along the above-mentioned waterways were surveyed for calling adult male arroyo southwestern toads a minimum of three times during the 1999 breeding season (Table 1). The surveys were conducted between March 15 and May 30 in the evening hours between dusk and midnight. Nights with a full moon, air temperatures less than 55 degrees F., or with adverse weather conditions were avoided. Surveys attempted in mid-March and early April did not meet the survey protocol conditions due to low air temperatures and storm conditions.

Surveys were conducted by walking sections of the river or creek, remaining a safe distance (greater than 10 feet) away from potential breeding pools (Figure 3). Surveyors listened for calls of adult male toads at each location. Local weather conditions, date, time, and other notes were recorded on each visit (see Table 1).

Recent Surveys of Project Area and Results of 1999 Surveys

Surveys to detect arroyo southwestern toads on the Newhall Ranch property were conducted by RECON in March 1994 and April 1995. No arroyo toads were detected during these surveys of the Santa Clara River and Castaic Creek on the property. It was concluded that the potential for arroyo toads to occur in the area was moderate given the presence of suitable habitat, but that population numbers would likely be low.

Surveys conducted between March 15 and May 30, 1999, along the Santa Clara River and Castaic Creek on Newhall Ranch did not detect any calling male arroyo toads. Species that were heard calling or observed included Pacific treefrog (*Hyla regilla*), California treefrog (*Hyla cadaverina*), and California toad (= western toad) (*Bufo boreas halophilus*).



Arroyo southwestern toad survey area

FIGURE 3

Survey Area for Arroyo Southwestern Toad

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TABLE 1
1999 SURVEY INFORMATION FOR ARROYO TOAD ON NEWHALL RANCH

Surveyors	Date	Time	Wind Speed	Air Temperature (F) (dusk)	Water Temperature (F)
Gerry Scheid Wendy Loeffler	April 21, 22	8:00 P.M. – 12:00 A.M.	Calm 0 – 2 mph	58° – 62°	66°
Gerry Scheid Wendy Loeffler	May 16, 17	8:00 P.M. – 12:00 A.M.	Light breeze 5 – 10 mph	66° - 68°	70°
Gerry Scheid Wendy Loeffler	May 26, 27	8:30 P.M. – 12:00 A.M.	Light breeze 5 – 10 mph	68° – 72°	74°

Conclusion

Although habitat that appears appropriate to support arroyo southwestern toad on the property, none were detected during repeated surveys on the Santa Clara River and Castaic Creek on the Newhall Ranch property. Possible factors for the absence of this species include disturbance from cattle and agriculture along the Santa Clara River, and off-road-vehicle activity, human access, and the regulation of water flows in Castaic Creek. Low population numbers of arroyo toads in the vicinity of the property is also a factor because there is a low potential for dispersal to suitable habitats located downstream due to low overall numbers of individuals.

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compliance•biology inc

September 16, 2004

Results of Butterfly Surveys on the Newhall Ranch Project Site, Los Angeles County, California.

INTRODUCTION

At the request of Compliance Biology, Inc. (CBI), Guy P. Bruyea conducted a field survey of the above-referenced site in the Santa Clarita area of northwestern Los Angeles County, California. The specific goal of this survey was to assess potential suitability of the Newhall Ranch development area (Newhall Ranch) as habitat to support the San Emigdio blue butterfly (*Plebulina emigdionis*, herein referred to as SEB), a federal species of concern. Additional searches were conducted for habitat that may support the federally endangered Quino checkerspot butterfly (*Euphydryas editha quino*, herein QCB), historically known from other areas of Los Angeles County south of the project site. In addition to surveys for habitat that may support the aforementioned butterfly taxa, a general butterfly inventory was performed during a series of thirty-two site visits in April and May 2004. This report describes the relevant vegetation, topography, and present land use throughout the Newhall Ranch site in an effort to assess the overall quality of the habitat as it pertains to special-status butterfly species and general butterfly diversity on the site.

Survey Location

The ± 4000-acre Newhall Ranch site is generally located west of Six Flags Magic Mountain Park and west of Interstate Highway 5 (I-5) south of the Santa Clara River Basin and Highway 126 (**Exhibit 1**). The site contains a total of ten survey sub areas within the Newhall site, six of these sub areas are south of Highway 126: 1) Potrero Valley; 2) Oak Valley; 3) Onion Fields; 4) Long Canyon; 5) Mesas East; and 6) Mesas West, and four additional survey sub areas are north of Highway 126: 7) River Village; 8) Homestead; 9) Chiquito; and 10) WRP site.

SENSITIVE BUTTERFLY SPECIES BACKGROUND INFORMATION

There are approximately 135 recorded butterfly species from Los Angeles County, of which approximately 120 are considered resident. Some species have adapted well to ornamental landscapes, but many formerly common species have now become increasingly rare over the past few decades due to urban expansion and other factors. Several butterflies presently (and/or historically) found in Los Angeles County are now protected or are considered

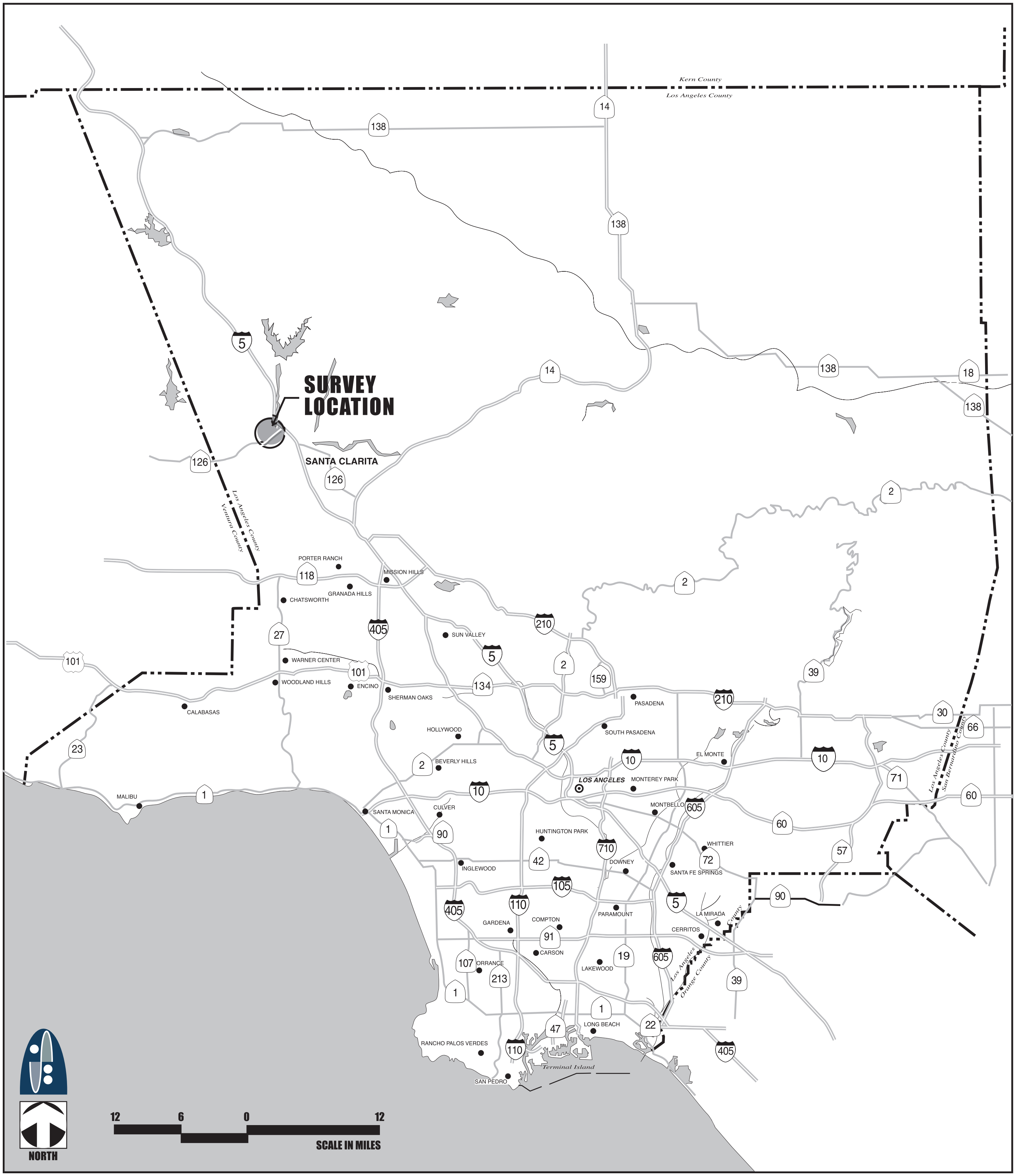

figure 1
Regional Location

species of special concern by federal agencies. Several additional species are considered to be rare by professional entomologists in the region, but are afforded no protection status by any regulatory agencies. A complete list of all sensitive butterfly species is provided in **Table 1**. At least three butterfly species that once occurred in Los Angeles County are now presumably extinct. These include, 1) the unsilvered fritillary (*Speyeria adiaste atossa*), which was last observed near Mt. Pinos in 1959, 2) a very localized race of the Sonoran blue (*Philotes sonorensis*) that once occurred in the upper San Gabriel wash above Azusa (to 1968), and 3) the Palos Verdes blue (*Glaucopsyche lygdamus palosverdesensis*, herein referred to as PVB), which was last observed on the Palos Verdes peninsula in 1983.

Table 1.
Los Angeles County Sensitive Butterflies

Common Name	Scientific Name	Status	Range*
Quino Checkerspot	*Euphydryas editha quino*	FE	N
El Segundo Blue	*Euphilotes battoides allyni*	FE	N
Palos Verdes Blue	*Glaucopsyche lygdamus palosverdesensis*	FE	N
San Emigdio Blue	*Plebulina emigdionis*	[FSC]	**Y**
Santa Monica Mountains Hairstreak	*Satyrium auretorum fumosum*	[FSC]	N
Emmel's Elfin	*Callophrys mossii hidakupa*	[FSC]	N
Wandering Skipper	*Panoquina errans*	[FSC]	N
Alkali Skipper	*Pseudocopaeodes eunus*	[FSC]	N
Tehachapi Mountains Silverspot	*Speyeria egleis tehachapina*	[FSC]	N
Monarch Butterfly	*Danaus plexippus*	**	**Y**
Comstock's Blue	*Euphilotes battoides comstocki*	r	N
Bright Blue Copper	*Lycaena heteronea clara*	r	N
Veined Blue	*Icaricia neurona*	r	N
Green (=Skinner's) Blue	*Icaricia lupini chlorina*	r	N
Unsilvered Fritillary	*Speyeria adiaste atossa*	X	N
San Gabriel Mountain Sonoran Blue	*Philotes sonorensis extinctus*	X	N

*Indicates whether survey area is within known historical range of indicated taxon (Y=yes, N=no)
FE=Federally endangered, [FSC]=Federal Species of Concern, r = species considered rare by professional entomologists (no status); X=Presumed extinct (no status), ** Over-wintering (or roosting) sites should be protected, butterfly probably not at risk currently

Three butterfly species known from Los Angeles County are now on the federal list of endangered wildlife. These include the El Segundo blue (*Euphilotes battoides allyni*, herein referred to as ESB), the QCB, and the PVB.

No recent records for QCB exist from Los Angeles County. Populations of QCB are historically known from two locations in the Santa Monica Mountains, 1) Tapia Camp (1947), and 2) Point Dume (1954). Both of these colonies appear to have been extirpated, as adults have not been observed at or in the vicinity of either location since the mid-1950's. Most extant populations of QCB are known from southwestern Riverside County in the vicinity of Temecula and Murrieta, and southern San Diego County in the vicinity of Otay Mountain.

The ESB is restricted to the coastal dune systems in southwestern Los Angeles County. The ESB is presently known from only three locations: 1) the dunes west of the Los Angeles International Airport (LAX); 2) the dunes west of the Chevron Oil refinery immediately south of LAX; and, 3) Malaga Cove north of the Palos Verdes peninsula. This butterfly is strongly associated with the flower heads of its host plant, coastal or dune buckwheat (*Eriogonum parviflorum*). Adults are active in a single brood from mid-July to early September.

The PVB was restricted to the Palos Verdes peninsula where it flew in a single generation during February and March. This butterfly was strongly associated with its principal host plant, milkvetch (*Astragalus trichopodus* var. *lonchus*). The closest relative of the PVB is the southern blue (*Glaucopsyche lygdamus australis*), which occurs throughout most of the remainder of southern California. The southern blue is known to feed in the larval stage primarily on deerweed (*Lotus scoparius*), although larvae occasionally have been found on milkvetch.

The PVB was believed to have become extinct in 1983 when the last known large stand (approximately 120 plants) of milkvetch was eliminated by construction of a baseball field at Hesse Park on the peninsula. In the spring of 1994, a colony of what is considered by some researchers to be the PVB was discovered at a slightly more inland locality on Navy property in San Pedro. At this locality the butterflies are associated with both milkvetch and deerweed. Some researchers maintain that it is possible that genetic differences exist between seaward-facing peninsular populations (PVB) and the extant Navy colony.

Several other butterfly species are considered uncommon in Los Angeles County, some having federal status (i.e., species of special concern), and others that warrant careful monitoring due to declining populations or extremely limited ranges within Los Angeles County. These include the San Emigdio blue (*Plebulina emigdionis*), the Santa Monica Mountains hairstreak (*Satyrium auretorum fumosum*), the wandering skipper (*Panoquina errans*), and the Tehachapi Mountain silverspot (*Speyeria egleis tehachapina*).

Several additional butterfly species that appear to be declining (or may be extirpated) in Los Angeles County, but remain common in other areas of their respective ranges include the purplish copper (*Lycaena helloides*), giant copper (*Lycaena xanthoides*), Columella hairstreak (*Strymon columella istapa*), southern sylvan hairstreak (*Satyrium sylvinum sylvinum*), western tailed blue (*Everes amyntula*), coastal arrowhead blue (*Glaucopsyche piasus sagittigera*), California ringlet (*Cenonympha tullia californica*), and sylvan satyr (*Cercyonis sthenele sylvestris*).

Sensitive butterflies considered to have potential for occurrence on the subject property, based on known ranges, the presence of associated vegetation communities, elevations on site, host plant availability within the general vicinity, and other requirements, are discussed in more detail below.

San Emigdio Blue Butterfly (*Plebulina emigdionis*)
The SEB is a federal species of concern and is restricted to southern California in lower Sonoran and riparian habitats from the Owens Valley south to the Mojave River and west to northern Ventura and Los Angeles Counties. This butterfly can be locally abundant in

association with its primary host plant, four-wing saltbush (*Atriplex canescens*). This butterfly has also been observed in association with quail bush (*Atriplex lentiformis*) at scattered locations. The limited distribution of SEB was perplexing to early researchers based on the abundance and widespread distribution of its host plant, which occurs throughout the western United States. SEB larvae have formed a symbiotic relationship with at least one ant species, *Formica pilicornis* (Ballmer *et al*, 1991). This may account for, at least in part, SEB's limited range. These ants presumably extract droplets (containing glucose and amino acids) from the nectary glands of SEB larvae and the ants offer the larvae protection from predators. This relationship is actually quite common among other members of the butterfly family Lycaenidae, to which the SEB belongs. The male butterfly is small (approximately 20-25 millimeters in wingspan) and is blue with a wide brown border on the dorsal wing surface. The slightly larger female is primarily brown with blue at the wing bases and orange bands on the edges of the dorsal wing surface. The ventral wing surface of both sexes is mostly white with small black dots, with smaller blue dots along the hind wing edges.

SEB adults are active from late April to early September. The SEB can have up to three broods per year with the first brood in late April to May, the second brood from late June to early July, and the third brood in August to early September (Emmel et al, 1973). Adults are generally observed perching on their host plant or on other plants in the immediate vicinity, and have also been observed nectaring on nearby flowers. The females deposit single echinoid eggs on the leaves of the host plant after mating. These eggs hatch in about eight to ten days and the larvae begin feeding on the leaves immediately. Diapause normally occurs in the late or last instar of larval development, presumably in the second and/or third broods depending on climatic conditions. The mature larva is variable in color from blue, green, brown, and combinations thereof, and is densely covered with fine white hairs. Retractile glands located on the eleventh larval segment can be protruded when stimulated. Researchers believe these organs are attractive to ants (Emmel et al, 1973).

There are several other Lycaenid butterflies classified as 'blues' (subfamily Polyommatinae) that occur with the SEB in portions of its range. Some of these species are similarly sized and have markings that can be easily confused with SEB. Commonly observed sympatric butterfly species include the blue copper (*Lycaena heteronea*), southern blue (*Glaucopsyche lygdamus australis*), Boisduval's blue (*Icaricia icaroides*), acmon blue (*Icaricia acmon*), western tailed-blue (*Everes amyntula*), marine blue (*Leptotes marina*), pigmy blue (*Brephidium exilis*), Bernardino blue (*Euphilotes bernardino*), and square-spotted blue (*Euphilotes battoides*). SEB can be initially distinguished from many of these species by its relatively large size and its strong association with four-wing saltbush or quail bush.

Due to its extremely limited distribution in southern California and its propensity for isolated small colonies, the SEB can be easily impacted by anthropogenic disturbances. Many colonies in the Mojave Desert and Owens Valley are isolated and are probably not under any immediate threat, but other colonies found closer to growing desert communities and suburban Los Angeles cities are situated near major roads, railroad tracks and other developments, which may contribute to further decline. Some of these populations have already been extirpated; others are threatened by these impacts.

Some of the known localities for this species include the Lower Haiwee Reservoir in Inyo County, Mojave River area near Victorville, and Bouquet and Mint Canyons in Los Angeles County. It is thought that populations in the Mint Canyon area near Santa Clarita were extirpated in the late 1980's and early 1990's. However, Guy Bruyea did observe one extant SEB population in nearby Soledad Canyon as recently as August 1999.

Quino Checkerspot Butterfly (*Euphydryas editha quino*)
The United States Fish and Wildlife Service (Service) added this rare butterfly to the federal list of endangered wildlife in early 1997. The QCB is a geographic race (subspecies) of *Euphydryas editha*, whose combined ranges extend from northern Baja California to Canada along the Pacific coast, and east to Colorado (Bauer, 1975). This subspecies is presently known to exist only as several, probably isolated, colonies in southwestern Riverside County, southern San Diego County and northern Baja California, Mexico.

This butterfly is associated with sparsely vegetated or bare areas usually characterized by clay or cryptobiotic soil deposits that develop a hard crust within southern California sage scrub vegetation communities. Low-growing herbaceous annuals including the QCB's primary larval host plant, dot-seed plantain, *Plantago erecta* (Plantaginaceae), typically inhabit these areas. Other potential QCB host plants (considered secondary) may occupy these areas and include owl's clover (*Castilleja exserta*) and white snapdragon (*Antirrhinum coulterianum*), both in the plant family Schrophulariaceae.

Focused surveys for the QCB were not conducted as part of this survey as they are not expected to occur. Mr. Bruyea currently holds a valid section 10(a)(1)(A) QCB recovery permit for QCB issued under the Endangered Species Act of 1973, as amended (Permit Number TE-837439-4).

Monarch Butterfly (*Danaus plexippus*)
The widespread monarch butterfly can be observed throughout southern California in the coastal, lowland, and foothill areas, and occasionally in desert and mountain areas where it larval host plant, various milkweeds (genus *Asclepias*), occurs. Monarchs are renowned migrants, and large numbers can be observed along the California coast in the fall months as they migrate to overwintering sites along the California coast and into Mexico. A few California sites (e.g. Pacific Grove) support concentrated numbers of the overwintering adults on trees; usually the adults hibernate as scattered individuals or in small clusters (Emmel et al, 1973).

Although the monarch butterfly may be declining due to land conversion and loss of larval host plant resources throughout its range, populations of this butterfly appear to be stable. However, existing and potential over-wintering sites along the southern California coast supporting large trees (primarily Eucalyptus and/or Pines) are considered important for the long-term survival of western United States populations.

METHODS

The Newhall Ranch site was surveyed for a total of thirty-two person-days by Guy Bruyea and CBI associate biologists Gregory Chatman, Bill Gendron, Andrew Carmichael, Jessica Turner, David Hawks, Patrick Luft, and Dean Wagner on April 10, 21, 25, 29, 30, May 2, 5, 6, 9, 16, 19, and 20, 2004. Date and times of the survey visits, weather conditions at the start and end of each survey period, and survey results are summarized in **Table 2.**

Table 2.
Newhall Ranch Site Butterfly Survey Information
April-May 2004

Date	Time PST	Weather	Wind	Biologists	Results
4/10	0900-1500	Sunny, 64-78 °F	0-3	AC, JT, PL, DW	No sensitive species observed
4/21	0900-1500	Ptly Cldy, 63-78 °F	0-2	GC, BG	No sensitive species observed
4/25	0900-1500	Sunny, 62-80 °F	0-2	GC, BG, DW, DH	No sensitive species observed
4/29	0900-1500	Sunny, 72-83 °F	1-2	GB, PL	No sensitive species observed
4/30	0900-1500	Sunny, 75-88 °F	1-3	GC, BG	No sensitive species observed
5/02	0900-1500	Sunny, 76-95 °F	1-3	AC, JT, GB	**SEB observed** Oak Valley
5/05	0900-1500	Sunny, 75-90 °F	0-2	GC, BG	No sensitive species observed
5/06	0900-1500	Sunny, 74-91 °F	0-2	GB, DW	No sensitive species observed
5/09	0900-1500	Sunny, 78-88 °F	0-3	AC, JT, GB, BG	No sensitive species observed
5/16	0900-1500	Sunny, 72-82 °F	0-1	GC, BG, GB	**SEB observed** Oak Valley
5/19	0900-1500	Sunny, 73-79 °F	0-3	GC, BG	No sensitive species observed
5/20	0900-1500	Ptly Cldy, 62-73 °F	1-2	GB, PL	No sensitive species observed

Biologists: GB (Guy Bruyea), GC (Gregory Chatman), BG (Bill Gendron), AC (Andrew Carmichael), JT (Jessica Turner), DH (David Hawks), PL (Patrick Luft), and DW (Dean Wagner)

The primary focus of this survey was to determine the presence or absence of SEB, QCB and their associated host plants. Special consideration was given to areas supporting native vegetation that may include specific larval host plant habitat requirements for any of the aforementioned sensitive species. The presence or absence of invasive, non-native plant species was noted in an effort to assess the level of previous disturbance in a given area. Other habitat requirements including the presence of potential nectar resources and the overall quality of the site as it pertains to potential QCB topographical resources (i.e., hilltops) were assessed.

This field survey was conducted during daylight hours from 0900 to 1500 Pacific Daylight (Savings) Time. Temperatures recorded during the survey ranged from 62 to 93 ºF (degrees Fahrenheit) and conditions varied from clear to partly cloudy with little or light winds (at or less than 1 Beaufort scale). Guy Bruyea and CBI associate biologists identified all butterfly species in the field. Other wildlife species (including other invertebrates) were identified in the field or later identified using various texts.

Daily weather data were noted on field forms and/or a digital audio recorder approximately once per hour during survey visits. Weather data were recorded using a digital anemometer (Beaufort scale of wind speed measurement), thermometer, and by visual observation and estimation of cloud cover and other pertinent daily weather characteristics (rain, drizzle, marine layer, etc.). Digital recordings were later transcribed to field forms.

Not all plants and/or associated butterfly species that may have been present on site were necessarily observable (or identified) during this survey. For an exhaustive assessment of the butterfly fauna of a given area, surveys would be required throughout the year. Guy Bruyea and CBI associate biologists general knowledge of the butterfly diversity for this area was utilized in an effort to locate specific habitats for some butterfly species. A California Natural Diversity Database (CNDDB) records search was conducted prior to the start of this survey to determine the probability that sensitive butterfly species may be present on the site.

Nomenclature used in this report was primarily derived from Hickman (1993) for plants; Emmel et al. (1973), Howe (1975), and Emmel (1998) for butterflies; and Arnett (2000) for other insects. Additional resources are listed at the end of this report.

Site Description

Much of the site supports a mixture of disturbed and relatively undisturbed coastal sage chaparral scrub and coastal sage scrub. Oil wells, pipelines, associated structures, access roads (primarily unimproved) and other associated disturbances are present throughout the Potrero Valley sub area, but these occupy a relatively small portion of the overall survey area.

Other undeveloped lands associated with the Newhall Ranch Project (Stevenson Ranch Phase V and Magic Mountain Entertainment sub areas) occur to the east of the subject property. Guy Bruyea and CBI biologists conducted special-status butterfly surveys on both of these sub areas of the Newhall Project in April and May 2004.

Topographically, the site is characterized by gently to steeply sloping hills and ridgelines with a mixture of shallow to steep canyons and flat mesa areas. Adjacent lands contain a mixture of flat areas associated with the Santa Clara River basin, or significant topographic relief in association with the Santa Susana Mountains. The Newhall Ranch site has a combined maximum vertical relief of roughly 900 feet between its highest and lowest on-site elevation points. Elevations on the site range from approximately 900 to 1800 feet above mean sea level.

Land use varies considerably within and adjacent to the survey area, and includes anthropogenic disturbances associated with Six Flags Magic Mountain Park east of the site, and other human-related disturbances such as actively cultivated in-use agricultural fields, oil fields, fallow fields, industrial and commercial areas, paved and unimproved roads, transmission lines, and other developments. Other less disturbed areas containing a mixture of coastal sage chaparral scrub and other vegetation communities are present surrounding the subject property. Areas to the southeast of the site (adjacent to the Phase V (not a part) sub area) contain recently constructed high-density residential developments.

Vegetation Characteristics

The subject property is mostly undisturbed away from roads (both improved and unimproved) and activities related to existing oil wells, although low-growing weedy annuals have invaded the native understory throughout the site, possibly out-competing many native low-growing forbs. The site is inhabited with a mixture of coastal sage scrub, coastal sage chaparral scrub, valley oak woodland, open coast live oak woodland, and riparian vegetation communities. Cleared or disturbed areas are present in association with farming, cattle grazing, existing roads and other developments, and disking was observed on a portion of the site during the current study. The northwestern portion of the site (primarily the Homestead sub area) is in various stages of recovery as a result of the "Verdale Fire," which burned approximately 8,700 acres in October 2003.

Coastal Sage Scrub (Holland Element Code 32200)

Coastal sage scrub (CSS) contains mostly drought-deciduous shrubs with small leaves. CSS is primarily defined by the presence of California buckwheat (*Eriogonum fasciculatum*) and/or California sagebrush (*Artemisia californica*). Several large patches of relatively undisturbed CSS occur in areas not historically cleared. Relatively few associated CSS shrubs and other plants were present, but did include white sage (*Salvia apiana*), blue elderberry (*Sambucus mexicana*), wooly aster (*Lessingia filaginifolia*), chaparral yucca (*Yucca whipplei*), and deerweed (*Lotus scoparius*).

Non-native grasses occurring abundantly in these areas of the site included slender wild oats (*Avena barbata*), ripgut (*Bromus diandrus*), and foxtail chess (*Bromus madritensis* ssp. *rubens*).

A matrix of open patches can be found throughout areas inhabited with CSS on site, containing a mixture of native and non-native low-growing annuals including owl's clover (*Castilleja exserta*), clarkia (*Clarkia* sp.), lupine (*Lupinus* sp.), and whispering bells (*Emmenanthe penduliflora*). Diversity of native annuals appeared relatively low on the subject property, probably due to the presence of invasive and dense non-native vegetation. However, due to the timing of the current survey, the presence or absence of many annual plant species within these open patches could not be adequately assessed.

Coastal Sage-Chaparral Scrub (Holland Element Code 37G00)
Coastal sage-chaparral scrub (CSCS) contains a mixture of sclerophyllous low chaparral shrubs and drought-deciduous sage scrub species, and is regarded as an ecotone between the two communities. These areas include floristic elements of both coastal sage scrub and lower chaparral, including shrubs such as California buckwheat, California sagebrush, chamise (*Adenostoma fasciculatum*), purple sage (*Salvia leucophylla*), and white sage (*Salvia apiana*).

Scattered throughout this vegetation community, within less dense (and open) areas, are native species including blue elderberry, sapphire woolstar (*Eriastrum sapphirinum*), tarplant (*Hemizonia* sp.), bush mallow (*Malacothamnus fasciculatus*), wooly aster (*Lessingia filaginifolia*), wishbone bush (*Mirabilis californica*), and other herbaceous annuals.

Open Coast Live Oak Woodland (Holland Element Code 71161)
This habitat type is consists of evergreen woodland dominated by low-density coast live oak (*Quercus agrifolia*) trees, found mostly on north-facing slopes and shaded ravines. A diverse shrub understory is usually present.

A small grove of mature coast live oak trees was observed at the extreme eastern portion of the Potrero Valley sub area. This grove continues offsite east into the Phase V sub area. Understory plants primarily consisted of non-native grasses and other weedy annuals.

Southern Cottonwood/Willow Riparian (Holland Element Code 61320)
Mulefat Scrub (Holland Element Code 63310)
Disturbed Wetland (Holland Element Code 11200)
Southern cottonwood/willow riparian and mulefat scrub are dependent on periodic flooding and are characterized by the presence of mostly winter deciduous trees, including willow (*Salix* species), mulefat (*Baccharis salicifolia*), and Fremont's cottonwood (*Populus fremontii*).

A mixture of intact and partially degraded riparian areas is located within Potrero Canyon and other areas of the site. The understory is inhabited with a mixture of native and non-native plants.

Disturbed / Ruderal Habitat (Holland Element Code 11300)
Disturbed/ruderal (weedy) habitat includes areas dominated with non-native plant species such as ornamental and invasive exotic species. Non-native, weedy species are predominant in most open areas of the site, especially within the Potrero Valley and Onion Fields sub areas. The most common invasive plants observed included short-pod mustard (*Hirschfeldia incana*), horehound (*Marrubium vulgare*), tocalote (*Centaurea melitensis*), cheeseweed (*Malva parviflora*), sourclover (*Melilotus indica*), Indian clover (*Lotus purshianus*), and filaree (*Erodium* sp.). Other plants including Russian thistle (*Salsola tragus*), doveweed (*Eremocarpus setigerus*), prickly lettuce (*Lactuca serriola*), jimsonweed (*Datura wrightii*), telegraph weed (*Heterotheca grandiflora*), and various non-native grasses including foxtail chess, slender wild oat, and other unidentified grass species. A few native species that are tolerant of disturbance such as fiddleneck (*Amsinckia menziesii*) and dove lupine (*Lupinus bicolor*) were locally abundant along road and trail margins, and in other open areas of the site.

Extensive Agriculture (Fields) (Holland Element Code 18300)
Portions of the survey area have been converted for agricultural use and contain a mixture of wheat, onion, and other crops. Some invasive plants were observed within these fields, including lamb's quarters (*Chenopodium* sp.), wild heliotrope (*Heliotropium curassavicum*), calabazilla (*Cucurbita foetidissima*), and knotweed (*Polygonum aviculare*). Agricultural areas are primarily located within the River Village sub area at the northern portion of the survey area just north of the Santa Clara River basin. Additionally, portions of the Oak Valley, Onion Fields, and Mesas West sub areas have lands converted for agricultural use.

RESULTS

No SEB were observed within the Potrero Valley, Onion Fields, Long Canyon, Mesas East, Mesas West, Homestead, River Village, Chiquito and WRP sub areas during the present study. This species is strongly associated with its larval host plant where it occurs, and no suitable patches of *Atriplex* were observed within the Potrero Valley, Long Canyon, Onion Fields, Mesas East, Mesas West, River Village, Chiquito and WRP sub areas. Patches of *Atriplex lentiformis* were observed lining the entire onsite portion of San Martinez Grande Canyon within the Homestead sub area, but no SEB were observed at this location after careful searching during four person-day visits on days suitable for potential SEB activity. Although suitable larval host plant habitat is present within the Homestead sub area, it appears that other SEB habitat requirements are not supported based on the results of this survey.

SEB was observed within Potrero Canyon at the north-central edge of the Oak Valley sub area on two dates (May 2 and May 16) during this study. This SEB colony is strongly associated with *Atriplex lentiformis* where two low-relief drainages converge just north of the Santa Clara River basin and gated site boundary (**Exhibit 2**). It is estimated that approximately twenty adult SEB were observed perched on *Atriplex* plants at this location during the present study.

Although historic records exist for areas southeast of the site in Bouquet, Soledad and Mint canyons, this species is presumed extirpated from most areas east of the site due to increased human-related activities including commercial and residential developments, agricultural operations, ORV use, and other disturbances. It is our understanding that the SEB colony observed within the Oak Valley sub area during this study may in fact represent one of the westernmost known occupied localities for this species (David Hawks, pers. comm.).

The present study indicates that most sub areas of the Newhall site, with the exception of the northern portion of Oak Valley, do not currently support potential habitat for SEB. This conclusion is primarily based on the absence of suitable *Atriplex* patches throughout a majority of the Newhall survey area, and the results of the current butterfly survey conducted during the SEB flight season. Additionally, the lack of historical SEB data from this region of Los Angeles County west of I-5 further illustrates its rarity in the region.

FORTHCOMING WILL BE INCLUDED UPON FINAL SUBMITTAL

Based on the results of the present study, it can be reasonably concluded that the Potrero Valley, Onion Fields, Long Canyon, Mesas East, Mesas West, River Village, Chiquito and WRP sub areas do not support suitable SEB habitat and that SEB is not expected to occur within these sub areas. Although suitable habitat appears to be present, SEB is not expected to occur within the Homestead sub area based on the results of this study. Additionally, SEB is not expected to occur within disturbed or sage scrub areas away from drainages and suitable *Atriplex* habitat within the Oak Valley sub area. SEB may occupy areas just offsite within the Salt Canyon area where extensive patches of *Atriplex* are known to occur.

The present study indicates that the property does not currently support high quality potential habitat for QCB. This conclusion is primarily based on the lack of historical QCB data from this region of Los Angeles County, and the apparent absence of its primary host plant, dot-seed plantain, which was not detected on site during this survey. Additionally, QCB was historically known from two locations in the Santa Monica Mountains approximately 25 to 30 miles south and southwest of the subject property, but has not been observed in those areas since 1954. Extant QCB populations are found much further south and southeast in Riverside and San Diego Counties. It is highly unlikely that QCB once occupied the Santa Clarita area due to a lack of records indicating its presence in the northern portion of Los Angeles County. Therefore, it can be reasonably concluded that the subject property does not support suitable QCB habitat and that QCB is not expected to occur on site.

Individual monarch butterflies were observed on the subject property during the present study. Milkweeds (*Asclepias* sp.) may be present on or near the subject property, and would be available as a potential oviposition site for passing females. However, due to the site's distance away from coastal areas, it is highly unlikely that the site would be utilized by large numbers of overwintering adults.

With the exception of the SEB colony observed within the Oak Valley sub area during this study, it is our understanding that no recent data suggest that occupied habitat exists on any other portion of the Newhall site for the sensitive butterfly species discussed in this report and based on the survey results, none are expected to occur.

Other Lepidoptera Observations

A total of thirty-seven (37) common butterfly species were observed on the property during the present survey (Table 3). In general the Newhall site appears to support habitat conducive to a good diversity of butterfly fauna. Many butterflies were uncommon, however, and other species expected to occur on the site were not observed. This may be due, in part, to relatively dry conditions throughout the late spring months just prior to the survey, and/or the time limits of the present study.

Table 3.
Newhall Ranch Site Lepidoptera Observations

Common Name / Scientific Name	Notes
Anise Swallowtail (*Papilio zelicaon*)	Uncommon on ridgelines and hilltops
Western Tiger Swallowtail (*Papilio rutulus*)	Uncommon; riparian areas
Checkered White (*Pontia protodice*)	Common; all areas
Cabbage White (*Pieris rapae*)	Common; riparian and shaded areas
Becker's White (*Pieris beckeri*)	Uncommon; associated with *Isomeris arborea*
Alfalfa Butterfly (*Colias eurytheme*)	Common; especially within or near agricultural areas
Harford's Sulfur (*Colias alexandria harfordii*)	Uncommon in native habitats only
Sara Orange-tip (*Anthocharis sara*)	Common; especially in canyons and small drainages
Painted Lady (*Vanessa cardui*)	Abundant throughout site; migratory
Red Admiral (*Vanessa atalanta*)	Common, especially near *Urtica* patches in riparian
West Coast Lady (*Vanessa annabella*)	Common throughout site
Chalcedon Checkerspot (*Euphydryas chalcedona*)	Common; especially on ridgelines and hilltops
Gabb's Checkerspot (*Charidryas gabbii*)	Uncommon; native areas inhabited with *L. filaginifolia*
Lorquin's Admiral (*Basalarchia lorquini*)	Uncommon; riparian areas inhabited with *Salix*
California Sister (*Adelpha bredowii californica*)	Common; strongly associated with oaks (*Quercus* sp.)
Buckeye (*Junonia coenia*)	Common throughout site
Monarch (*Danaus plexippus*)	Uncommon throughout site
California Ringlet (*Cenonympha tullia californica*)	Rare on site; associated with native grasslands
Funereal Duskywing (*Erynnis funeralis*)	Common throughout site
Mournful Duskywing (*Erynnis tristes*)	Uncommon; associated with oaks (*Quercus* sp.)
Western Checkered Skipper (*Pyrgus communis albescens*)	Common throughout site
Large White Skipper (*Heliopetes ericetorum*)	Common in native habitats
Rural Skipper (*Ochlodes agricola*)	Common in native habitats
Sandhill Skipper (*Polites sabuleti*)	Common; strongly associated with saltgrass (*Distichlis*)
Behr's Metalmark (*Apodemia mormo virgulti*)	Abundant; strongly associated with *E. fasciculatum*
Fatal Metalmark (*Calephelis nemesis*)	Uncommon; observed on Chiquito sub area only
Southern Blue (*Glaucopsyche lygdamus australis*)	Uncommon in 2004; usually common in canyons
Acmon Blue (*Icaricia acmon*)	Common throughout site including disturbed areas
Lupine Blue (*Icaricia lupini*)	Rare on site; associated with *Eriogonum*
San Emigdio Blue (*Plebulina emigdionis*)	Rare; strongly associated with *Atriplex* and certain ants
Bernardino Blue (*Euphilotes bernardino*)	Common; strongly associated with *E. fasciculatum*
Pigmy Blue (*Brephidium exilis*)	Abundant throughout site including disturbed areas
Western-tailed Blue (*Everes amyntula*)	Rare on site; associated with *Astragalus*
Great Copper (*Lycaena xanthoides*)	Uncommon; observed on Chiquito sub area
Common Hairstreak (*Strymon melinus*)	Common throughout site
Great Purple Hairstreak (*Atlides halesus*)	Uncommon; associated with mistletoe (*Phorodendron* sp.)
Western Elfin (*Incisalia augustinus iroides*)	Uncommon on site in native habitats only
37 Species Total	

Butterfly species commonly observed during the present study included painted lady (*Vanessa cardui*), California sister (*Adelpha bredowii californica*), sara orange-tip (*Anthocharis sara*), cabbage white (*Pieris rapae*), pigmy blue (*Brephidium exilis*), funereal duskywing (*Erynnis funeralis*), and large white skipper (*Heliopetes ericetorum*). Other butterflies frequently observed included alfalfa sulfur (*Colias eurytheme*), buckeye (*Junonia coenia*), west coast lady (*Vanessa annabella*), acmon blue (*Icaricia acmon*), and Behr's metalmark (*Apodemia mormo virgulti*). The site and survey area includes topographic features such as ridgelines and prominent hilltops, which can be considered significant as potential hilltopping sites for butterflies in the immediate area. Common hilltopping species observed on scattered hilltops throughout the Newhall site include chalcedon checkerspot (*Euphydryas chalcedona*), anise swallowtail (*Papilio zelicaon*), and checkered white (*Pontia protodice*).

Interestingly, California ringlet was observed on the Mesas East sub area within the Newhall Ranch site during this study. Although this species remains relatively common throughout portions of its range, populations are declining in Los Angeles County. Guy Bruyea observed one additional California ringlet on the Magic Mountain Entertainment site approximately 0.5 to 1 mile east of the subject property during 2004 butterfly surveys.

Several great copper (*Lycaena xanthoides*) were observed within the Chiquito sub area. Due to urban expansion and confinement of natural creek flow patterns throughout Los Angeles County, this butterfly has become increasingly uncommon in this region of southern California. The flight season of this single-brooded butterfly is typically in April and May, and into June and July at upper elevations. The larval host plant is various *Rumex* species, which were observed commonly on the subject property. This species is now mostly confined to the mountain foothills of the Santa Ana Mountains in Los Angeles County (Mattoni, 1990).

Additional butterfly species are expected to occur on site not observed during the present study due to seasonal restrictions and other factors. A complete list of butterfly species with potential for occurrence, based on the vegetation present, the site's location, and other factors, is included as part of this report (Appendix A).

CONCLUSIONS

During the thirty-two day survey effort, the entire Newhall Ranch site was specifically surveyed for the sensitive butterfly species described above. Additionally, a general butterfly inventory (both observed and expected to occur) was performed. Based on seasonal precipitation patterns in the late winter and spring months of 2004, butterfly activity was considered relatively 'productive' for most species based on the results of this study.

An SEB colony was observed at the northwest edge of the Oak Valley sub area during the present study in association with patches of its larval host plant, *Atriplex lentiformis*. Based on the absence of SEB larval host plant patches and the absence of SEB adult observations throughout all other sub areas of the Newhall Ranch site during the present study, and other information presented in the above report, it can be reasonably concluded that SEB is not currently present and is not expected to occur within the Potrero Valley, Onion Fields, Long Canyon, Mesas East, Mesas West, River Village, Homestead, Chiquito, and WRP sub areas.

Due to the lack of recent QCB observations for Los Angeles County, the apparent absence of primary larval host plants (i.e. *P. erecta*) and lack of suitable high quality habitat, and the site location (not known to be within the historical range of QCB), it is highly unlikely that a QCB breeding population or the occasional dispersing individual QCB would utilize the subject property.

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Certification and Signature Page

± 4000-acre Newhall Development Site
Los Angeles County, California
September 16, 2004

I hereby certify that the statements furnished above and in the attached exhibits present the data and information required for this biological evaluation, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief.

_________________________ Date _____________

Dave Crawford, Principal Biologist
Compliance Biology, Inc.
1936 N. Croydon Ave.
Camarillo, CA 93010

_________________________ Date _____________

Guy P. Bruyea, Principal Biologist
Bruyea Biological Consulting
43146 Sampson Court
Hemet, CA 92544

Appendix A

Butterfly Species with potential for occurrence on the **Newhall Ranch** Site
Los Angeles County, California
June 2004

Observed butterfly species (N=29) are indicated with an asterisk. Two asterisks indicate special status and/or narrow-endemic species. Butterfly species included on this list have varying degrees of potential for occurrence on the subject property. Potential for occurrence is based on a combination of known range (historical and present), host plant presence/absence, and other factors. Not all butterfly species that may be resident on the site were necessarily observed during this survey. For an exhaustive butterfly assessment, surveys are best performed from February to September to achieve a thorough inventory.

Family / Scientific Name	**Common Name**
Order Lepidoptera	Butterflies and Moths
Papilionidae	**Swallowtails**
Papilio rutulus	Western Tiger Swallowtail*
Papilio eurymedon	Pale Swallowtail*
Papilio zelicaon	Anise Swallowtail*
Nymphalidae	**Brush-footed Butterflies**
Danaus gilippus	Striated Queen
Danaus plexippus	Monarch*
Ceononympha tullia californica	California Ringlet
Agraulis vanillae incarnata	Gulf Fritillary
Basilarchia lorquini	Lorquin's Admiral*
Adelphia bredowii californica	California Sister*
Euphydryas chalcedona	Chalcedon Checkerspot*
Junonia coenia	Buckeye*
Charidryas gabbii	Gabb's Checkerspot*
Phyciodes mylitta	Mylitta Crescent
Polygonia satyrus	Satyr Anglewing
Nymphalis californica	California Tortoise-shell
Nymphalis milberti	Milbert's Tortoise-shell
Nymphalis antiopa	Mourning Cloak
Vanessa virginiensis	Virginia Lady
Vanessa atalanta	Red Admiral*
Vanessa cardui	Painted Lady *
Vanessa annabella	West Coast Lady*
Riodinidae	**Metalmarks**
Apodemia mormo	Mormon Metalmark*

Appendix A (continued)

Family / Scientific Name	Common Name
Order Lepidoptera	Butterflies and Moths
Lycaenidae	**Blue, Hairstreaks, Coppers**
Atlides halesus	Great Purple Hairstreak
Callophrys perplexa	Bramble Hairstreak
Euphilotes bernardino	Bernardino Blue*
Incisalia augustinus iroides	Western Elfin*
Icaricia acmon	Acmon Blue *
Icaricia lupini	Lupine Blue*
Plebulina emigdionis	San Emigdio Blue*
Everes amyntula	Western Tailed-blue*
Glaucopsyche lygdamus australis	Southern Blue*
Hemiargus ceraunus gyas	Edward's Blue
Hemiargus isola alce	Reakirt's Blue
Leptotes marina	Marine Blue
Brephidium exilis	Pigmy Blue *
Lycaena xanthoides	Great Copper
Satyrium californica	California Hairstreak
Satyrium sylvinus sylvinus (or *sylvinus dryope*)	Sylvan Hairstreak
Strymon melinus	Common Hairstreak*
Pieridae	**Whites and Sulfurs**
Colias eurydice	California Dogface
Colias alexandra harfordii	Harford's Sulfur*
Colias eurytheme	Alfalfa Sulfur *
Nathalis iole	Dwarf Yellow
Anthocharis cethura	Felder's Orange-tip
Anthocharis sara sara	Sara Orange-tip *
Eurema nicippe	Nicippe Yellow
Phoebis sennae	Cloudless Sulfur
Pontia protodice	Checkered White *
Artogeia rapae	Cabbage White *
Hesperiidae	**Skippers**
Lerodea eufala	Eufala Skipper
Paratrytone melane	Umber Skipper
Hylephila phyleus	Fiery Skipper
Atalopedes campestris	Field Skipper
Ochlodes agricola	Rural Skipper*
Polites sabuleti	Sandhill Skipper*
Erynnis funeralis	Funereal Duskywing*

Appendix A (continued)

Hesperiidae (Continued)	**Skippers**
Erynnis tristes	Mournful Duskywing*
Heliopetes ericetorum	Large White Skipper*
Pyrgus communis albescens	West. Checkered Skipper*

2002 Sensitive Plant Survey Results

for

Newhall Ranch Specific Plan Area
Los Angeles County, California

Prepared for:

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November 20, 2002

2002 Sensitive Plant Survey Results
Newhall Ranch Specific Plan Area

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1.0 INTRODUCTION

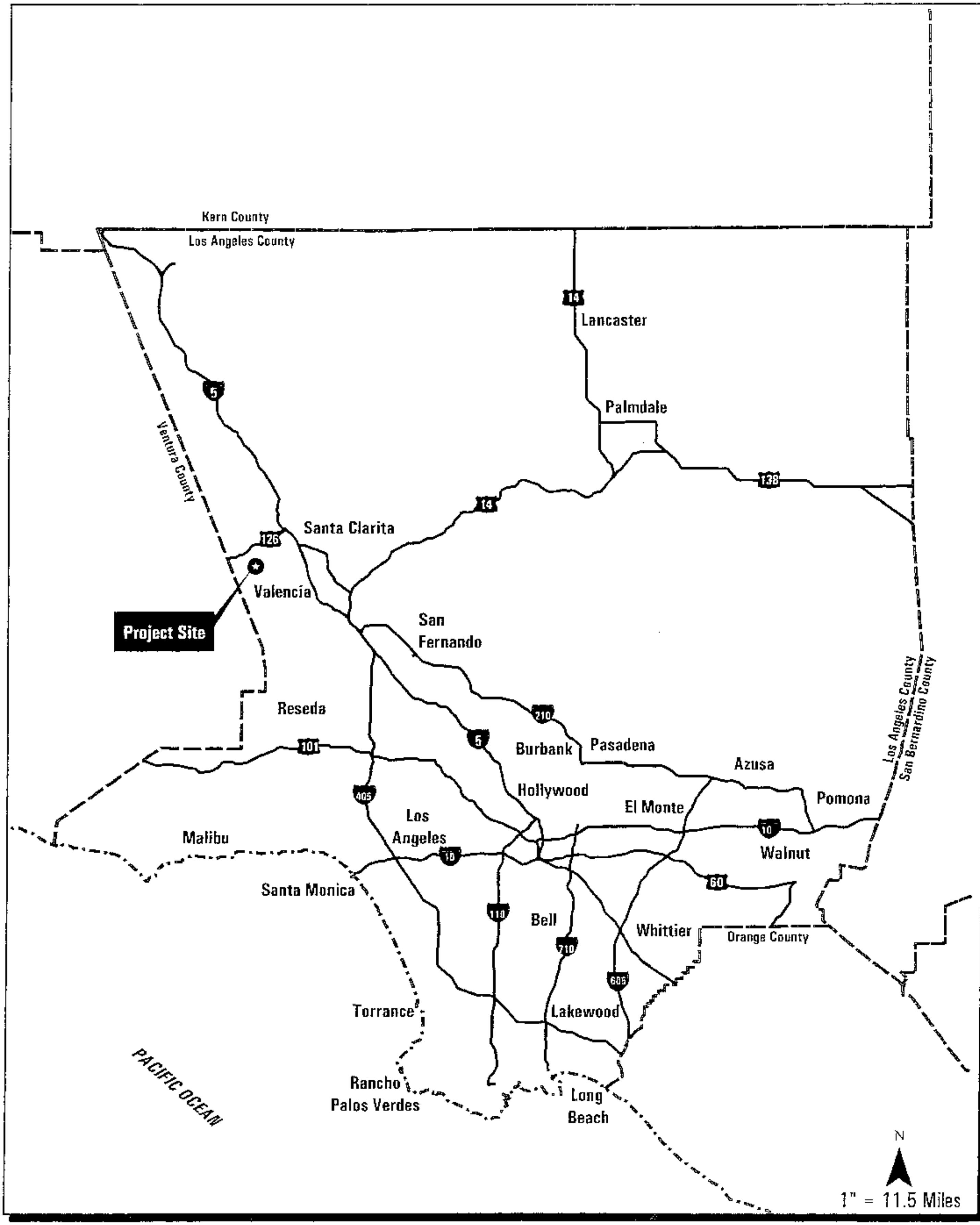
The purpose of this report is to document the results of surveys for sensitive plant species within the Newhall Ranch Specific Plan Area for the 2002 field season, with emphasis on the identification of populations of the state listed as endangered San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*; SFVS) and Los Angeles sunflower (*Helianthus nuttallii* ssp. *parishii*) (a plant thought to be extinct until this rediscovery, however, work is currently being conducted to verify the identity of this plant).

2.0 SITE DESCRIPTION

The majority of the information in this section is summarized from the biota report prepared for the Newhall Ranch Specific Plan by RECON and Impact Sciences (1996), with soils and geology information obtained from a geologic evaluation prepared by Allan E. Seward Engineering Geology, Inc. (2002).

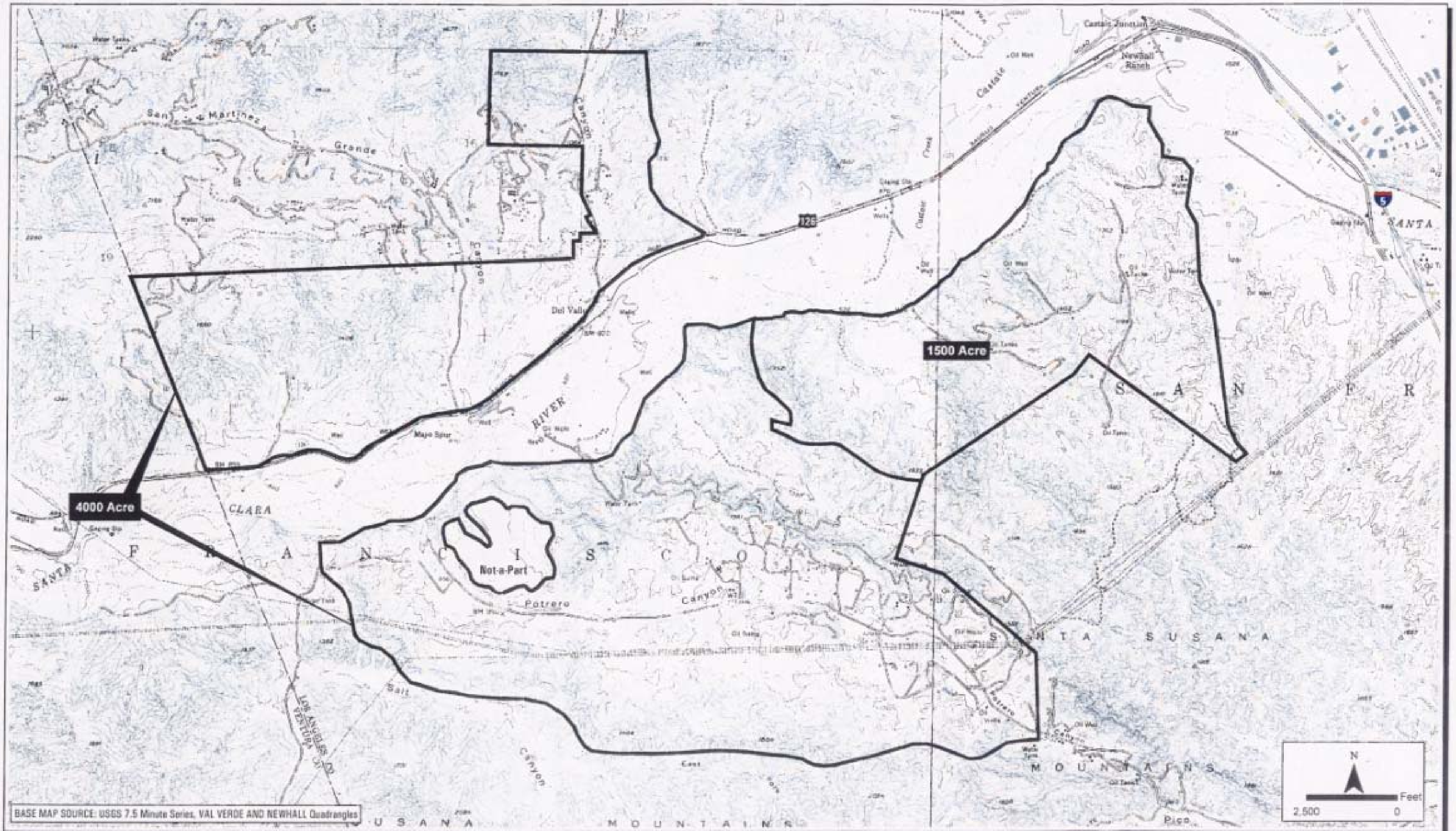
The Newhall Ranch Specific Plan study area is located in an unincorporated portion of the Santa Clara River Valley in northwestern Los Angeles County (*Figure 1*). It lies roughly one-half mile west of Interstate 5 and largely southwest of the junction of I-5 and State Route 126 (SR-126); with portions of the Specific Plan site located in San Martinez Grande and Chiquito canyons north of SR-126. The City of Santa Clarita is located to the east of the study area and its western border is the Ventura County/Los Angeles County line. Site elevations range from 825 feet above mean sea level (AMSL) in the Santa Clara River bottom at the Ventura County/Los Angeles County line to approximately 3,200 feet AMSL on the ridgeline of the Santa Susana Mountains along the southern boundary (*Figure 2*).

Dudek surveyed for sensitive plant species with varying levels of specificity within areas that are designated for development according to the approved Specific Plan. This area is approximately 6,229 acres and includes that area depicted as the "4,000-acre" and "1,500-acre" on *Figure 2*. For the most part, it includes all areas north of SR-126; however, it excludes the Santa Clara River, agriculture fields on Potrero Mesa, and areas proposed for conservation (most notably the "High Country" area). This study area is dominated by east-, west-, and northwest-trending primary ridges, with north- and south-trending secondary ridges. Site elevations range from approximately 850 feet AMSL in the Santa Clara River floodplain to approximately 2,000 feet AMSL along the ridgeline, which separates Potrero Canyon from Salt Creek Canyon and Grave Canyon. Slope gradients



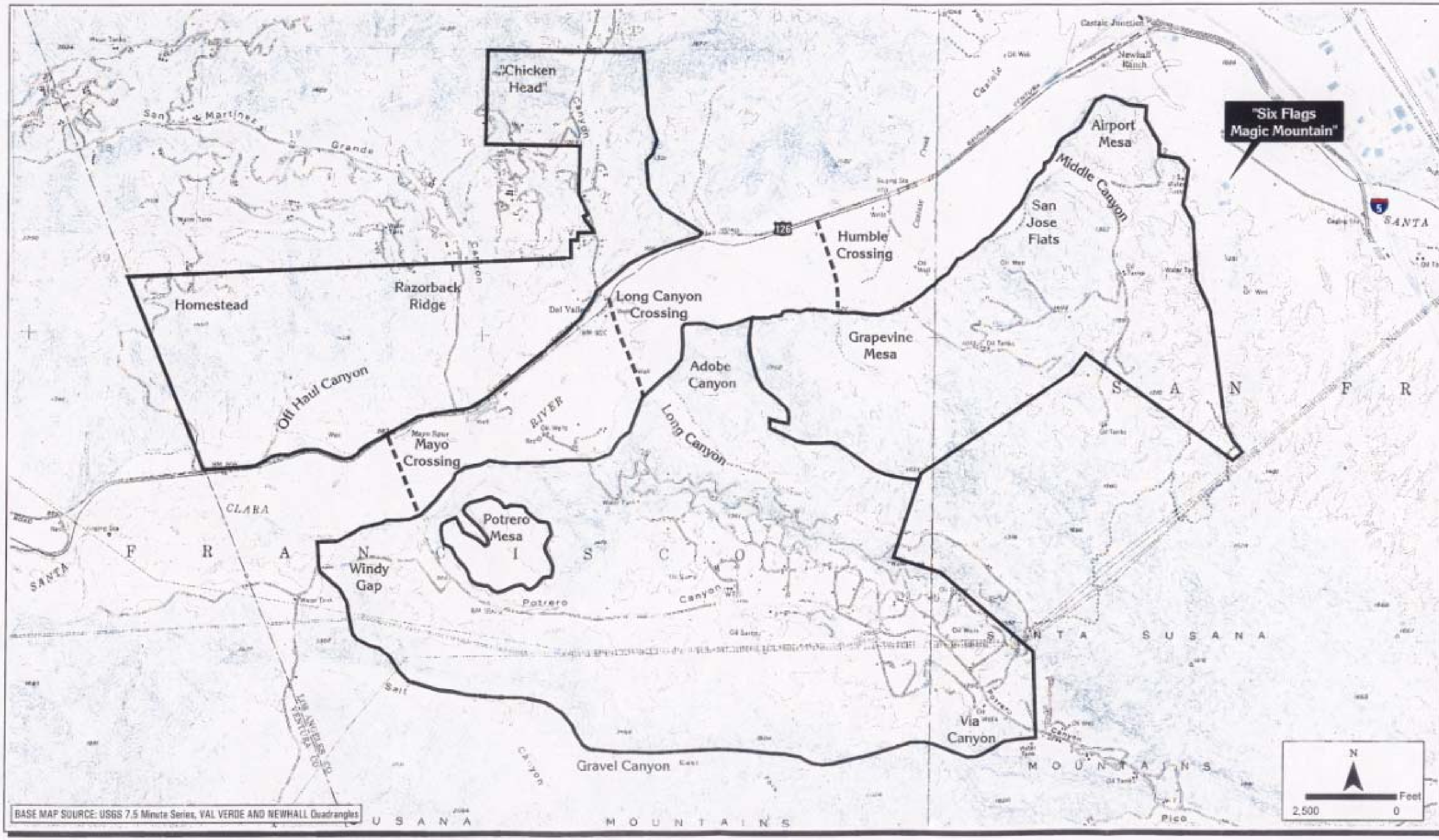
Newhall Ranch
Regional Map

FIGURE
1



Newhall Ranch
Vicinity Map

FIGURE 2



Newhall Ranch
Place Names

FIGURE 3

range from moderate to very steep in the hillside areas to very gentle within the Santa Clara River floodplain, tributary canyons and associated mesas. Distinctive elevated geographic features include Sawtooth Ridge; Razorback Ridge; Windy Gap; Ayers Rock; and Potrero, Grapevine, and Airport Mesas. Place names referenced in this report are depicted on *Figure 3*.

2.1 Plant Communities and Land Covers

Native and naturalized habitats within the study area are representative of those found in this region and provide high-quality examples of those plant communities found in the Santa Susana Mountains and the Santa Clara River ecosystems. Venturan coastal sage scrub, chamise and mixed chaparral, live and valley oak woodlands, and non-native grassland are the major upland plant communities both north and south of the Santa Clara River. Upland habitats dominate the landscape within the study area; however, the Santa Clara River supports a variety of riparian plant communities. These include southern cottonwood-willow riparian forest, southern willow scrub, mulefat scrub, arrow weed scrub, and freshwater marsh and seeps. Intermittent drainages onsite also provide habitat for alluvial and scalebroom scrubs.

The Newhall Land and Farming Company leases out portions of the study area for oil and natural gas production, as well as for cattle grazing and agricultural operations. All such operations are currently ongoing. Grazing activities have had a noticeable effect on much of the natural habitat onsite. Scrub habitats have been displaced by non-native grasslands as a result of grazing. Southern California Edison and Southern California Gas Company have distribution lines within easements onsite as well.

2.2 Geology and Soils

Geologically, the study area is located within the Transverse Ranges geomorphic province of southern California in the eastern portion of the Ventura depositional basin. This basin was produced by tectonic downwarping in the geologic past to produce a large-scale synclinal structure in which a thick sequence of Cenozoic sediments has accumulated. These sediments have been lithified into a sequence of sedimentary rock that has subsequently been uplifted, tilted, and tectonically deformed. They are cut by segments of the Del Valle and Salt Creek faults. Bedrock formations found onsite include the Modelo, Towsley, Pico, Saugus, and Pacoima formations, as well as Quaternary Terrace deposits. Surficial deposits include Quaternary alluvium, slopewash, soil, and artificial fill (Allan E. Seward 2002).

Information on soils contained herein is limited to that relevant to occurrences of SFVS and specifically excerpted from the Allen E. Seward letter report (2002) and will be discussed in *Section 4.3.4* below.

3.0 METHODS AND SURVEY LIMITATIONS

Data regarding botanical resources present on the project site were obtained through a review of the pertinent literature; field reconnaissance; and focused surveys for sensitive species, with varying levels of specificity; all of which are described below.

3.1 Literature Review

General floristic and sensitive botanical resources present or potentially present at Newhall Ranch were identified through a literature search using the following sources: the California Natural Diversity Database for the Newhall Santa Susana, Oat Mountain, Mint Canyon, San Fernando, Green Valley, Warm Springs Mountain, Whitaker Peak, Cobblestone Mountain, Piru, Simi, Thousand Oaks, and Val Verde quadrangle maps (CNDDB, September 2002); *Biological Resource Assessment of the Proposed Santa Susana Mountains/Simi Hills Significant Ecological Area* (PCR, November 2000); CalFlora (University of California, Berkeley, May 2002); U.S. Fish and Wildlife Service (USFWS 1999); California Department of Fish and Game (CDFG 2002); *Inventory of Rare and Endangered Plants of California* (CNPS 2001); *Vascular Flora of the Liebre Mountains, Western Transverse Ranges, California* (Boyd 1999); *Checklist of Rare Ventura County Plant Species* (Magney 2002); *A Flora of the Santa Barbara Region, California* (Smith 1976); *A Flora of the Santa Monica Mountains* (Raven *et al.* 1986); *Biology of the San Fernando Valley Spineflower, Ahmanson Ranch, Ventura County, California* (Glen Lukos Associates, Inc. and Sapphos Environmental, Inc. 2000); *Report to the Fish and Game Commission on the Status of San Fernando Valley Spineflower* (CDFG 2001); *Biota Report, Newhall Ranch Specific Plan* (RECON and Impact Sciences, Inc. 1996); and herbarium specimens from Rancho Santa Ana Botanic Garden (RSA) and the University of California, Riverside Herbarium (UCR). General information regarding vegetation communities was obtained from Holland (1986) and Sawyer and Keeler-Wolf (1995). Plant species nomenclature follows Hickman (1993).

3.2 Field Reconnaissance Methods

Botanical surveys were conducted by Dudek & Associates, Inc. (DUDEK) staff biologists, with assistance provided by Kim L. Marsden (California State Parks, Southern Service Center, San Diego), Rick Reifner (Glen Lukos Associates, Inc.), and Andrew C. Sanders (University of California, Riverside). All surveys were conducted on-foot and remote areas were accessed using four-wheel drive vehicles. Survey teams typically consisted of two people, at least one of whom was a senior-level botanist. Resumes for survey personnel are provided in *Appendix A*.

Botanical surveys of the site were conducted between May and August (and one day in September) of 2002 in accordance with the schedule provided in *Table 1*. A minimum of 1,064 person-hours (133 person-days) was spent conducting botanical surveys within the study area. These surveys were conducted with three separate goals and levels of specificity: (1) From May 24 through June 7, surveys were focused on the location of SFVS polygons in those areas which had been identified earlier in the month by staff from the California Department of Fish & Game (CDFG). These surveys were concentrated in the Grapevine Mesa and Airport Mesa areas (see *Figure 3*) where CDFG had focused their efforts (pers. comm. Crowder & Hee, May 2002). (2) Between June 18 and June 27, surveys were conducted within an approximately 1,500-acre area (see *Figure 2*) and included searches for all federally and state listed, proposed for listing, and candidate species and California Native Plant Society (CNPS) List 1A, 1B, and 2 species. This list of target species is found in *Table 2*; and (3) From July 16 to August 28, surveys were focused on the identification and location of populations of SFVS in the additional 4,000-acre area, which included areas north of SR-126 and south of SR-126 (see *Figure 2*). Other sensitive plants were recorded incidentally when observed.

TABLE 1
Survey Schedule & Personnel
Newhall Ranch Specific Plan Area

DATE	BIOLOGISTS	PURPOSE	GENERAL GEOGRAPHIC AREA
5-24-02	Mark Elvin, Andrew Thomson	Coordination with CDFG and Newhall regarding SFVS	Grapevine and Airport mesas
5-29-02	Mark Elvin, Julie Vanderwier, Tricia Wotipka, Andrew Thomson	Location of SFVS previously identified by CDFG	Grapevine Mesa area
5-30-02	Mark Elvin, Julie Vanderwier, Tricia Wotipka, Andrew Thomson	Location of SFVS previously identified by CDFG	Grapevine Mesa area
5-31-02	Mark Elvin, Julie Vanderwier, Tricia Wotipka, Andrew Thomson	Location of SFVS previously identified by CDFG	Grapevine Mesa area
6-5-02	Mark Elvin, Julie Vanderwier, Megan Enright, Scott Boczkiewicz	Location of SFVS previously identified by CDFG	Airport Mesa area
6-6-02	Mark Elvin, Julie Vanderwier, Megan Enright, Scott Boczkiewicz	Location of SFVS previously identified by CDFG	Airport Mesas area
6-7-02	Mark Elvin, Julie Vanderwier, Megan Enright, Scott Boczkiewicz	Location of SFVS previously identified by CDFG	Airport Mesa area
6-18-02	Mark Elvin, Julie Vanderwier, Andrew Sanders, Kim Marsden	Focused surveys for sensitive plant species – 1,500-acre study area	Canyon west of Grapevine Mesa; canyons and mesas east of Sawtooth Ridge

TABLE 1
Survey Schedule & Personnel
Newhall Ranch Specific Plan Area

DATE	BIOLOGISTS	PURPOSE	GENERAL GEOGRAPHIC AREA
6-19-02	Mark Elvin, Julie Vanderwier, Andrew Sanders, Kim Marsden	Focused surveys for sensitive plant species -- 1,500-acre study area	Slopes associated with Grapevine Mesa and smaller mesas and canyons to the west
6-20-02	Mark Elvin, Julie Vanderwier, Andrew Sanders, Kim Marsden	Focused surveys for sensitive plant species - 1,500-acre study area	Lion Canyon; canyon east of Grapevine Mesa; south side of Santa Clara River west of Humble Crossing
6-25-02	Mark Elvin, Julie Vanderwier, Megan Enright	Focused surveys for sensitive plant species - 1,500-acre study area	East of Airport Mesa; canyon east of Sawtooth Ridge, Castaic Spring
6-26-02	Mark Elvin, Julie Vanderwier, Megan Enright	Focused surveys for sensitive plant species -- 1,500-acre study area	Middle Canyon; San Jose Flats; canyons south and east of Grapevine Canyon
6-27-02	Mark Elvin, Julie Vanderwier, Megan Enright	Focused surveys for sensitive plant species - 1,500-acre study area	Long Canyon; canyon east of Grapevine Mesa
7-16-02	Mark Elvin, Julie Vanderwier	Focused surveys for SFVS -- 4,000-acre study area	Long Canyon; habitat overview
7-17-02	Mark Elvin, Julie Vanderwier	Focused surveys for SFVS -- 4,000-acre study area	Potrero and Long Canyons
7-18-02	Mark Elvin, Julie Vanderwier	Focused surveys for SFVS – 4,000-acre study area	Habitat and areas surrounding Potrero Mesa; ridgeline between Salt Creek Canyon and Potrero Canyon
7-26-02	Julie Vanderwier, Kim Marsden, Vipul Joshi	Focused surveys for SFVS -- 4,000-acre study area	Adobe Canyon and east side of Long Canyon
7-27-02	Julie Vanderwier, Kim Marsden, Vipul Joshi	Focused surveys for SFVS -- 4,000-acre study area	North side of lower Potrero Canyon
7-30-02	Mark Elvin, Andrew Sanders, Cathleen Weigand	Focused surveys for SFVS – 4,000-acre study area	North side of upper Potrero Canyon
7-31-02	Mark Elvin, Andrew Sanders, Cathleen Weigand	Focused surveys for SFVS – 4,000-acre study area	North side of Middle Potrero Canyon
8-1--02	Mark Elvin, Andrew Sanders, Cathleen Weigand	Focused surveys for SFVS -- 4,000-acre study area	North and south sides of middle Potrero Canyon; Adobe Canyon
8-6-02	Mark Elvin, Julie Vanderwier, Michelle Balk, Megan Enright, Andrew Sanders, Cathleen Weigand	Focused surveys for SFVS – 4,000-acre study area	Chiquito Canyon and upper eastern San Martinez Grande Canyon; Long Canyon
8-7-02	Mark Elvin, Julie Vanderwier, Michelle Balk, Megan Enright, Andrew Sanders, Cathleen Weigand	Focused surveys for SFVS – 4,000-acre study area	South side of Potrero Canyon; Long Canyon; between San Martinez Grande and Chiquito Canyons
8-8-02	Mark Elvin, Julie Vanderwier, Michelle Balk, Megan Enright, Andrew Sanders, Cathleen Weigand	Focused surveys for SFVS -- 4,000-acre study area	East side of San Martinez Grande Canon, south side of upper Potrero Canyon

TABLE 1
Survey Schedule & Personnel
Newhall Ranch Specific Plan Area

DATE	BIOLOGISTS	PURPOSE	GENERAL GEOGRAPHIC AREA
8-12-02	Mark Elvin, Julie Vanderwier, Scott Boczkiewicz, Tricia Wotipka, Michelle Balk, Cathleen Weigand	Focused surveys for SFVS – 4,000-acre study area	South side of upper Potrero Canyon; Via Canyon; ridgeline between Salt Creek and Potrero Canyons
8-13-02	Mark Elvin, Scott Boczkiewicz, Tricia Wotipka, Michelle Balk, Cathleen Weigand	Focused surveys for SFVS – 4,000-acre study area	South side of Lower Potrero Canyon; Peppertree Canyon
8-14-02	Mark Elvin, Scott Boczkiewicz, Tricia Wotipka, Michelle Balk, Cathleen Weigand	Focused surveys for SFVS – 4,000-acre study area	Upper and lower Potrero Canyon
8-20-02	Mark Elvin, Julie Vanderwier, Tricia Wotipka, Cathleen Weigand	Focused surveys for SFVS – 4,000-acre study area	East side of Chiquito Canyon; drainage on east side of road
8-21-02	Mark Elvin, Julie Vanderwier, Tricia Wotipka, Cathleen Weigand	Focused surveys for SFVS – 4,000-acre study area	Upper west side San Martinez Grande Canyon; east side Chiquito Canyon
8-22-02	Mark Elvin, Julie Vanderwier, Tricia Wotipka	Focused surveys for SFVS – 4,000-acre study area	West side of San Martinez Grande Canyon; Homestead Canyon
8-26-02	Mark Elvin, Julie Vanderwier, Andrew Sanders, Michelle Balk, Cathleen Weigand, Paul Lemons	Focused surveys for SFVS – 4,000-acre study area	East side of San Martinez Grande Canyon; Homestead Canyon
8-27-02	Mark Elvin, Julie Vanderwier, Andrew Sanders, Michelle Balk, Cathleen Weigand, Paul Lemons	Focused surveys for SFVS – 4,000-acre study area	East side of San Martinez Grande Canyon; Homestead and Off Haul Canyons
8-28-02	Mark Elvin, Julie Vanderwier, Andrew Sanders, Michelle Balk, Cathleen Weigand, Paul Lemons	Focused surveys for SFVS – 4,000-acre study area	Ridgeline area, north side of Potrero Canyon; Razorback Ridge; the "chicken head"
9-5-02	Mark Elvin, Tricia Wotipka	Mapping surveys for SFVS – 1,500-acre site	Grapevine and Airport Mesas

TABLE 2
Sensitive Plant Species Subject of Field Surveys

Scientific Name	Common Name
Arenaria paludicola	marsh sandwort
Astragalus brauntonii	Braunton's milk-vetch
Atriplex coulteri	Coulter's saltbush
Atriplex serenana var. *davidsonii*	Davidson's saltscale
Baccharis malibuensis	Malibu baccharis
Berberis nevinii	Nevin's barberry
Brodiaea filifolia	thread-leaved brodiaea
Calochortus clavatus var. *clavatus*	club-haired mariposa lily
Calochortus clavatus var. *gracilis*	slender mariposa lily
Calochortus plummerae	Plummer's mariposa lily
Calochortus weedii var. *vestus*	late-flowered mariposa lily
Calystegia peirsonii	Peirson's morning-glory
Calystegia sepium ssp. *binghamiae*	Santa Barbara morning-glory
Centromadia [=*hemizonia*] *parryi* ssp. *australis*	southern tarplant
Cercocarpus betuloides var. *blancheae*	island mountain-mahogany
Chorizanthe parryi var. *fernandina*	San Fernando Valley spineflower
Deinandra [=*Hemizonia*] *minthornii*	Santa Susana tarplant
Dodecahema leptoceras	slender-horned spineflower
Dudleya blochmaniae var. *blochmaniae*	Blochman's dudleya
Dudleya cymosa ssp. *agourensis*	Santa Monica Mountains dudleya
Dudleya cymosa ssp. *marcescens*	marcescent dudleya
Dudleya cymosa ssp. *ovatifolia*	Santa Monica Mountains dudleya
Dudleya multicaulis	Many-stemmed dudleya
Dudleya parva	Conejo dudleya
Erodium macrophyllum	round-leaved filaree
Helianthus nuttallii ssp. *parishii*	Los Angeles sunflower
Horkelia cuneata var. *puberula*	mesa horkelia
Juglans californica	southern California black walnut
Malacothamnus davidsonii	Davidson's bush mallow
Nama stenocarpum	mud nama
Nolina cismontane	chaparral nolina
Opuntia basilaris var. *brachyclada*	short-joint beavertail
Oxytheca parishii var. *abramsii*	Abram's oxytheca
Pentachaeta lyonii	Lyon's pentachaeta
Rorippa gambellii	Gambel's water cress
Senecio aphanactis	rayless ragwort
Sidalcea neomexicana	salt spring checkerbloom
Thelypteris puberula var. *sonorensis*	Sonoran maiden fern

All plant species encountered during the field surveys were identified and recorded for inclusion in *Appendix B*. The majority of these were vouchered and will be reposited at the herbarium at the University of California, Riverside. Latin and common names of plants follow *The Jepson Manual* (Hickman 1993) or other recent published taxonomic treatments. Where not listed in Hickman (1993), common names were taken from Abrams (1923). Where not found in this reference, a variety of sources were used (*e.g.*, Abrams 1923, Dale 1986, or Roberts 1998).

Surveys for those additional sensitive plant species within the 1,500-acre study area (*Table 2*) were conducted based upon the habitat preference, habit, and phenology for each species, and using professional experience and information gathered from those sources discussed in *Section 2.1* above. Surveys for SFVS in the 1,500-acre and 4,000-acre study areas were focused in open areas of Venturan coastal sage scrub (purple sage series) and non-native grassland (California annual grassland series) on ridgelines, slopes, and escarpments with a southern, southwestern, or southeastern exposure based on information gathered during the documentation of SFVS populations flagged by CDFG; information contained in the report prepared by Glen Lukos Associates, Inc. (2002); the status report prepared for the Fish and Game Commission (CDFG 2000); and conversations with Rick Reifner, the botanist who re-discovered SFVS at Ahmanson Ranch in 1999. Chaparral and riparian communities, including the Santa Clara River floodplain, were not surveyed. Information regarding co-occurring plant species, general soils observations, and population estimates (based on counts of small areas and extrapolating an estimate for the polygon as a whole) were noted at those locations where SFVS was found, along with whether the plants were from the current year or before (pre-2002).

3.2.1 Sensitive Plant Species

Sensitive plant species are those species that have been given special recognition by federal, state, or local conservation agencies and organizations due to limited, declining, or threatened population sizes. This includes those species listed by the state and federal government as threatened or endangered, those species proposed for state and/or federal listing or candidates, those plant species found on Lists 1A, 1B or 2 of the California Native Plant Society's *Inventory of Rare and Endangered Plants of California* (CNPS 2001; *Inventory*), and those plant species which are found on the list of "Threatened and Endangered Species and Species of Concern, Los Angeles County" (http://www.losangelesalmanac.com/topics/Environment/ ev14b.htm). CNPS List 3 or List 4 species were included in discussions only when encountered during the field surveys.

3.2.2 Survey Limitations

Surveys were conducted in late spring and summer of 2002, which was the driest year in recorded history for Los Angeles County (It began keeping records in 1877). Less than 4.5" of rain fell on the County, which is less than a third of the "normal" amount (Los Angeles Times, June 30, 2002; Western Regional Climate Center 2002; www.wrcc.edu). Some surveys were conducted late in the season (*e.g.*, surveys for the 4,000-acre site ran until September). These factors affected the detection of annual plants and geophytic perennials more than most plants because few annuals or geophytes were observed growing this year (compared to the many stalks and/or dried remains of plants from the previous year). A number of the sensitive plants on our focused survey list were either annuals or geophytes and they either had a poor rate of detection or were not observed.

The few annual and geophyte species that were observed during the field work at Newhall Ranch represent a very small fraction of the density and/or diversity of these species which are known or are likely to occur onsite (Vanderwier 1995; RECON and Impact Sciences 1996). This may also be true of other perennial plants. Spring surveys during a year with a "normal" amount of rainfall will provide better conditions to determine the diversity of species (including sensitive plants) onsite and map their distributions more accurately (when necessary).

Additionally, the entire study area was not surveyed at an equal level of specificity. Within the 1,500-acre study area, surveys were directed towards the detection of all of the species identified in *Table 2*; however, within the remaining acreage, focused surveys were conducted for current-year SFVS plants. Other sensitive species were recorded when incidentally observed.

The focused surveys for SFVS concentrated on locating additional populations within the study area in order to determine the taxon's gross distribution within the Newhall Ranch Specific Plan boundaries. As SFVS populations were identified in an area, the occurrence/polygon was mapped using a GPS and then efforts were redirected to new areas. The predominant observations of SFVS on south-facing slopes may be an artifact of the search parameters used in this survey. We concentrated our efforts in areas that we felt had the highest likelihood to have SFVS. Focused spring surveys for SFVS (and other sensitive species) during a year with average rainfall will be needed to provide the detailed mapping necessary to determine impacts for project-specific plans as part of the environmental review for each implementing map.

4.0 RESULTS OF SURVEYS

4.1 Botany - Floral Diversity

The study area is situated at the nexus of the Transverse Ranges, Coast Ranges, Sierra Nevada, Mojave Desert, and coastal plains (Hickman 1993). Ecotone areas such as this are often characterized by higher biological diversity than similar-sized areas within the core of a physiographic region (Boyd 1999). As such, a high diversity of plant species is expected during a year of average rainfall for the area.

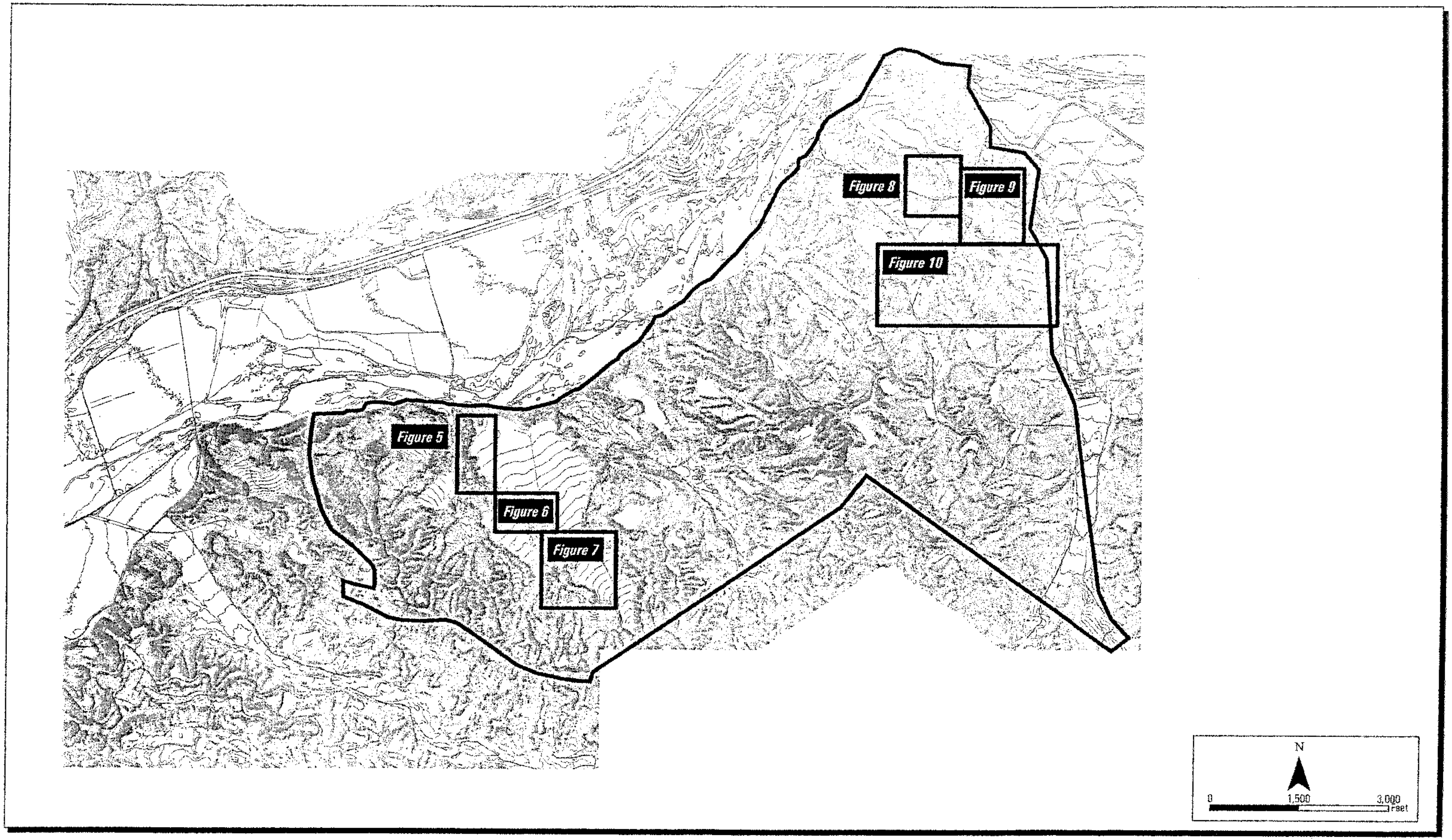
At least 431 plant species were identified within the Newhall Ranch study area. Of these, 291 species (or 68 percent) are native to the region and 140 species (or 32 percent) are non-native. It should be noted that agricultural or clearly disturbed areas were not thoroughly searched. The list of plant species identified within the study area in 2002 is provided as *Appendix B*.

4.2 Sensitive Plant Species

Eight sensitive plant species were identified within the study area. These and other sensitive species that have the potential to occur within the Newhall Ranch project area, based on the presence of suitable habitat and soils, are listed in *Table 3*. This list is confined primarily to those species listed by the state and federal government as threatened or endangered, those species proposed for state and/or federal listing or candidates, those plant species found on Lists 1A, 1B, or 2 of the California Native Plant Society's *Inventory of Rare and Endangered Plants of California* (CNPS 2001). Those species that were observed during the 2002 field surveys are discussed in greater detail. A number of species found on CNPS Lists 3 or 4 also have the potential to occur onsite (*e.g.*, *Calochortus catalinae*, *Acanthomintha obovata* ssp. *cordata*, *Mucronea californica*); however, due to their relatively low sensitivity level, they are only discussed in the following sections if observed onsite.

Figures 4 through *11* depict the locations of SFVS on Grapevine Mesa, Airport Mesa, and in San Martinez Grande Canyon, respectively. *Figures 12* through *15* depict other sensitive species identified in the 1,500-acre study area while *Figures 16* through *21* depict those sensitive species found in the 4,000-acre study area.

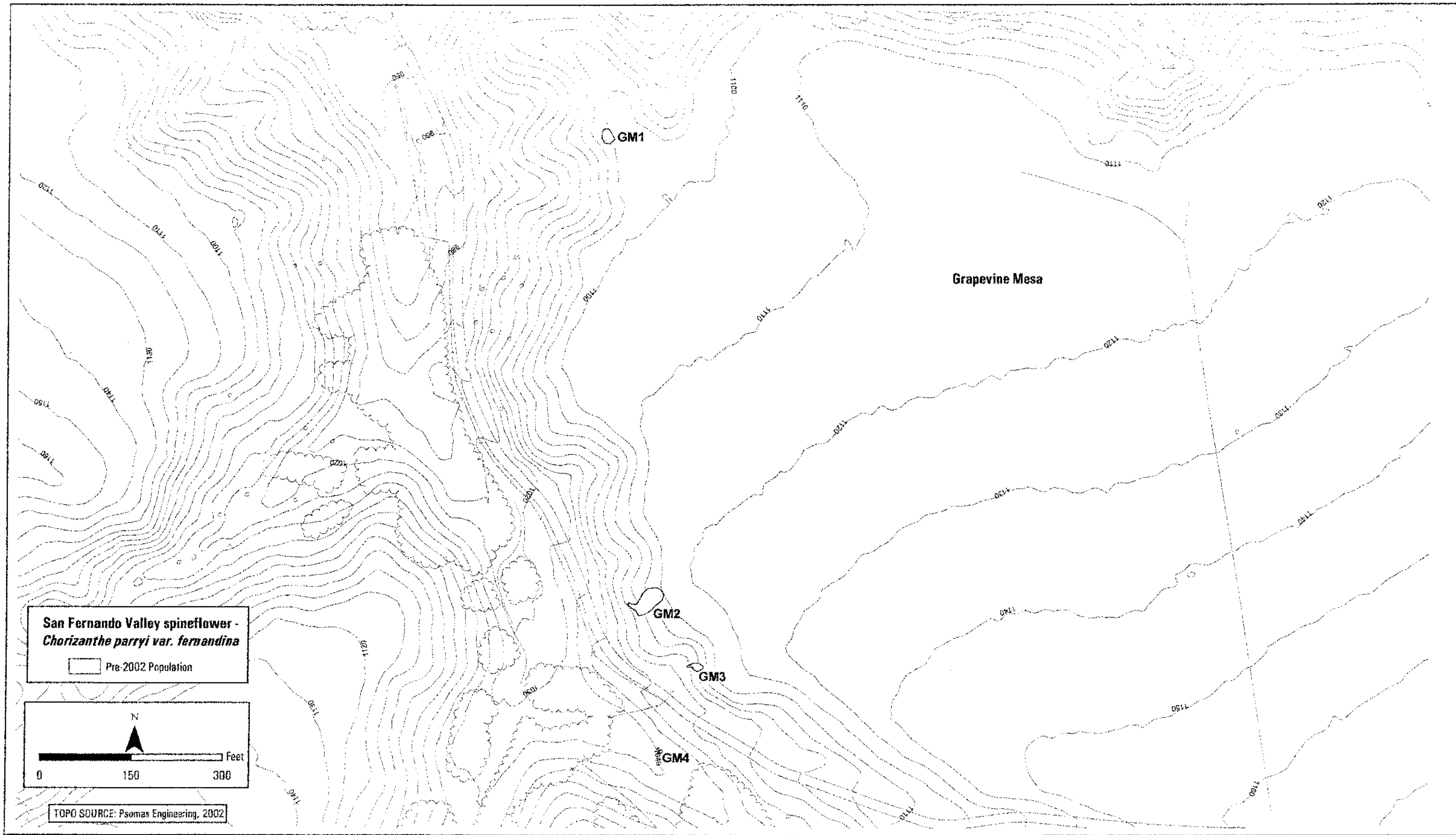
While surveying in the field and mapping SFVS, DUDEK used a 4-meter (13.1 feet) rule to separate polygons. We chose this distance based on the topography, vegetation, detectability of the plants, general accuracy of the GPS that we used, and time constraints. This distance does not have any known relevance to SFVS biology (*i.e.*,



Newhall Ranch

San Fernando Valley spineflower Index - 1500-acre Survey Area

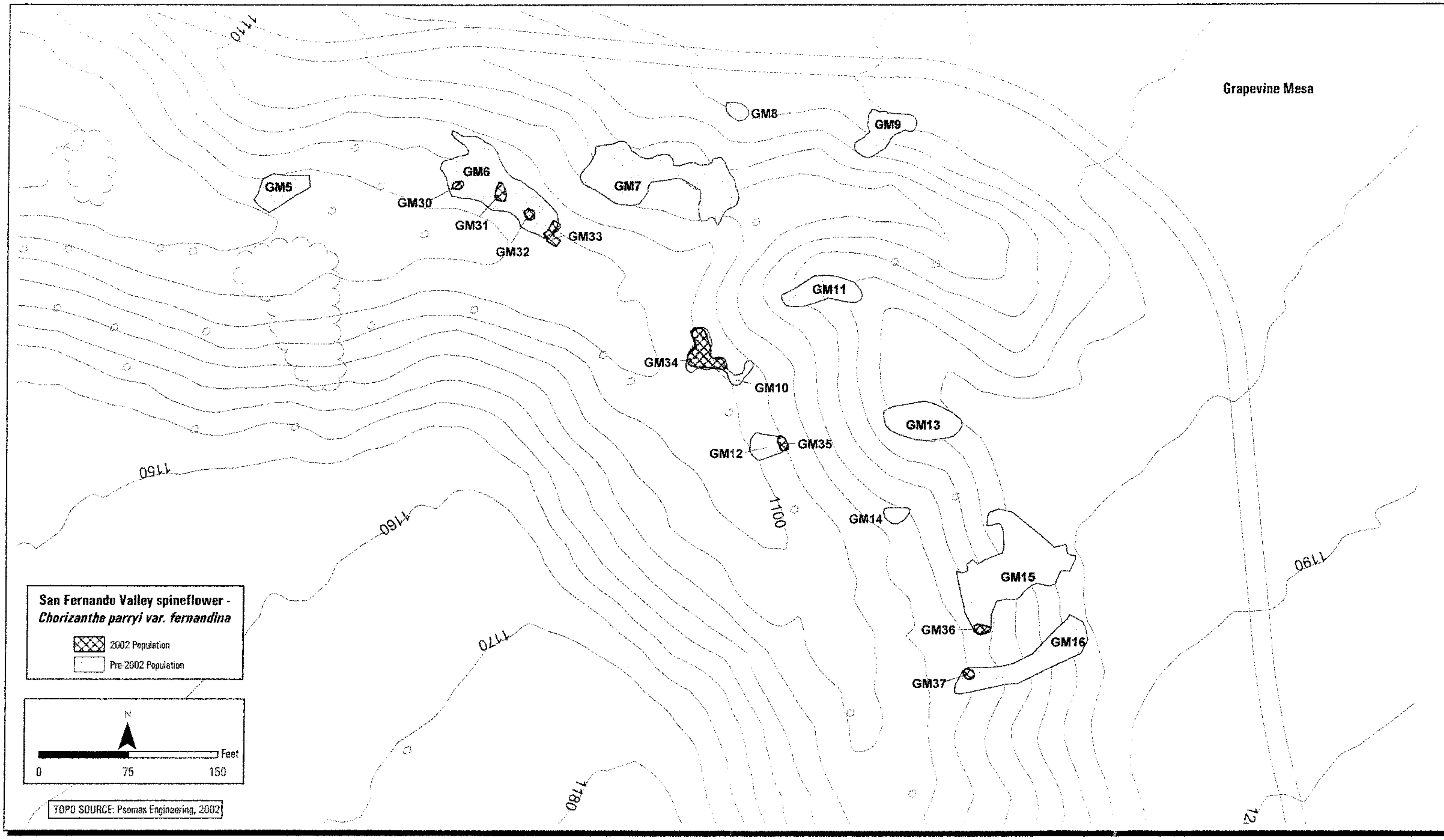
FIGURE 4



Newhall Ranch

San Fernando Valley spineflower - Grapevine Mesa Area

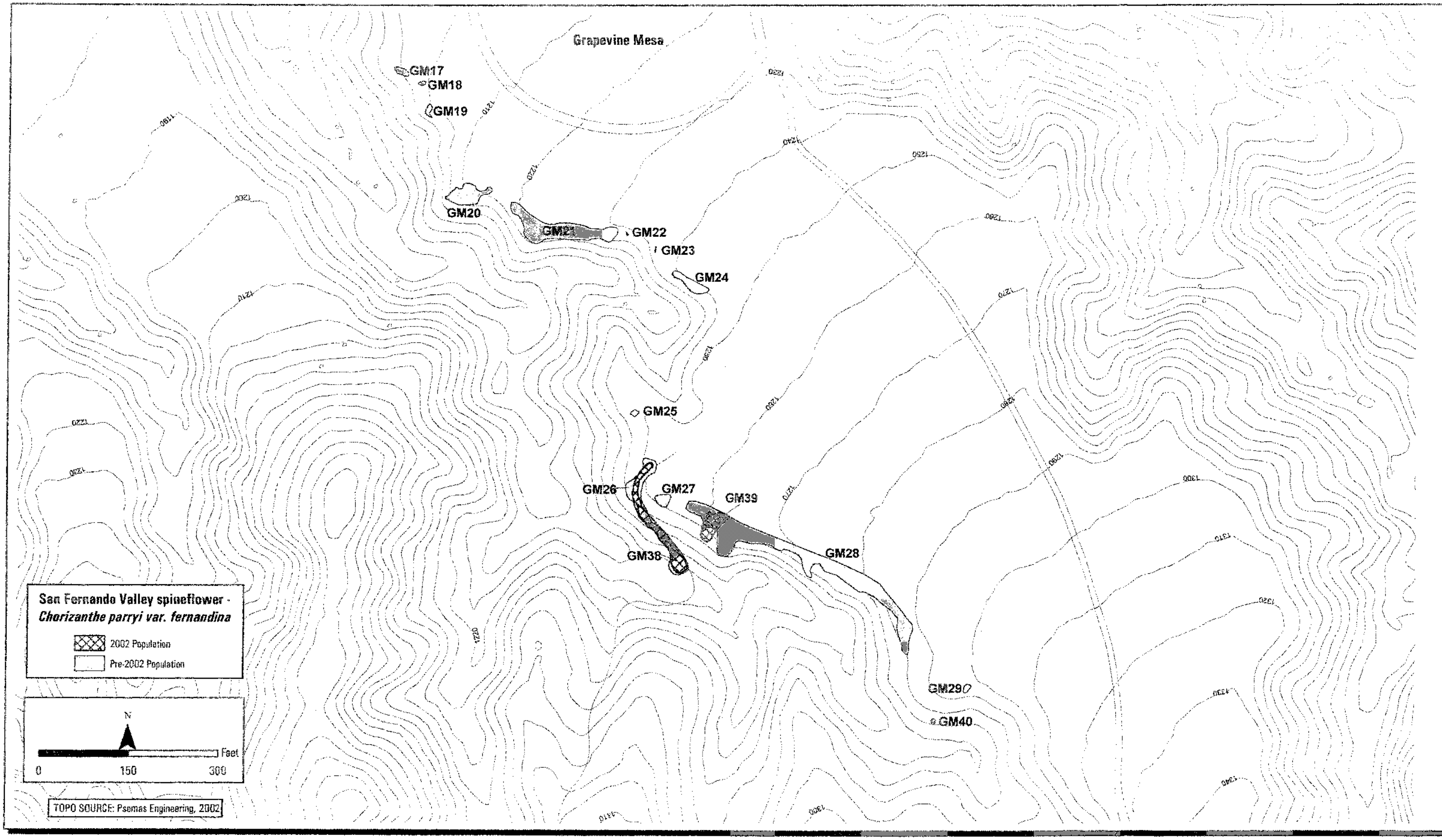
FIGURE 5



Newhall Ranch

San Fernando Valley spineflower - Grapevine Mesa Area

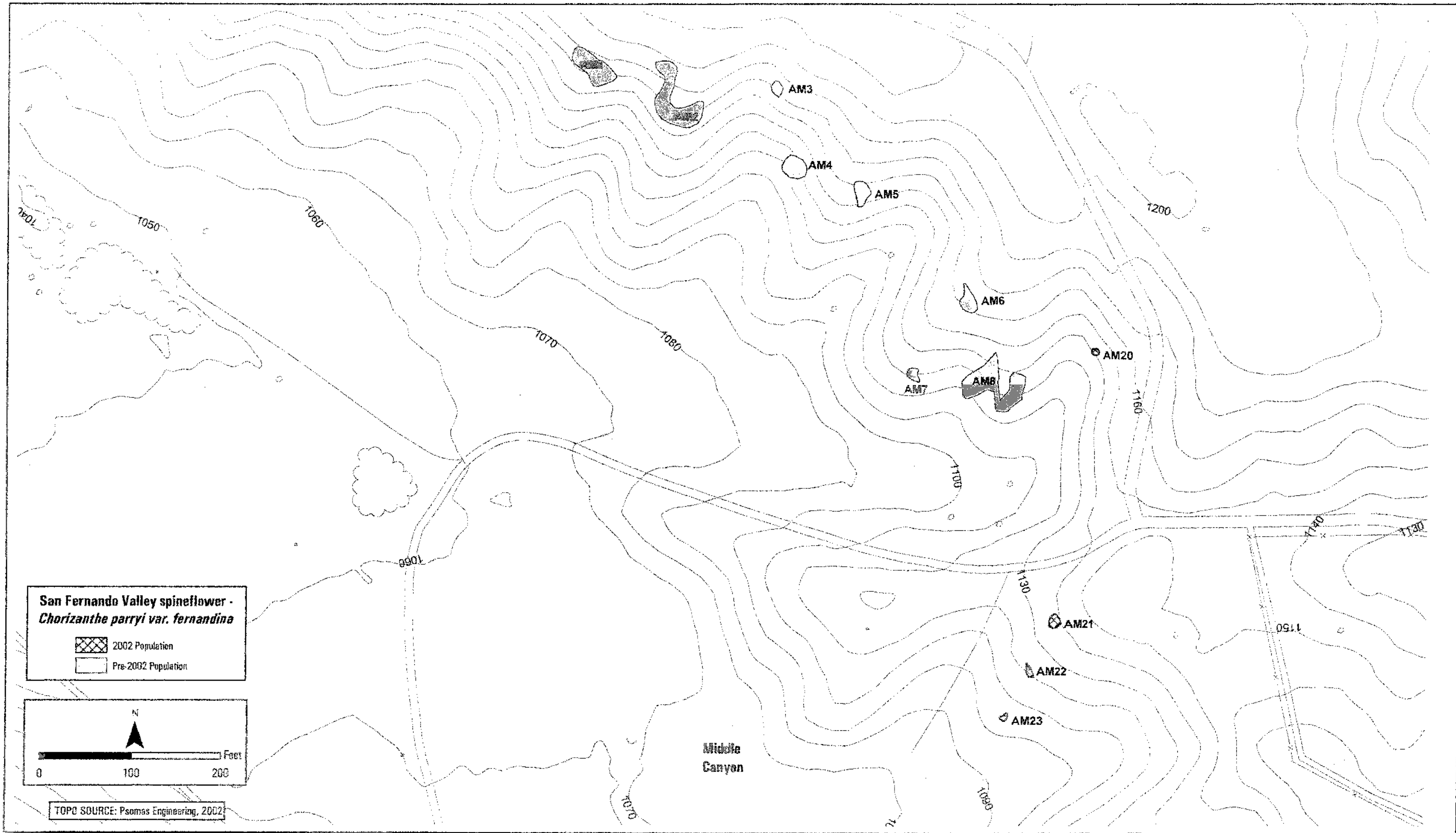
FIGURE 6



Newhall Ranch

San Fernando Valley spineflower - Grapevine Mesa Area

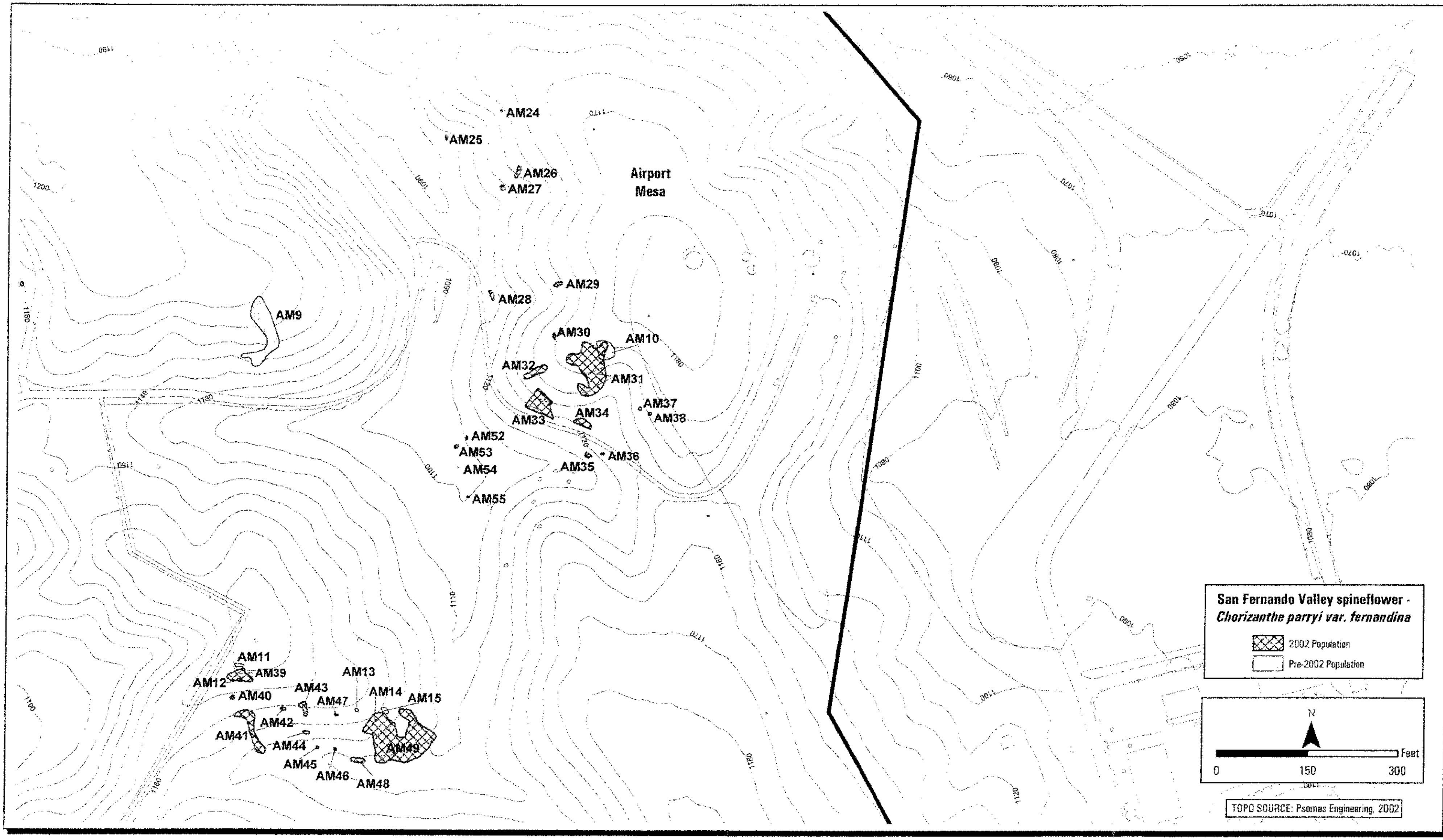
FIGURE 7



Newhall Ranch

San Fernando Valley spineflower - Airport Mesa Area

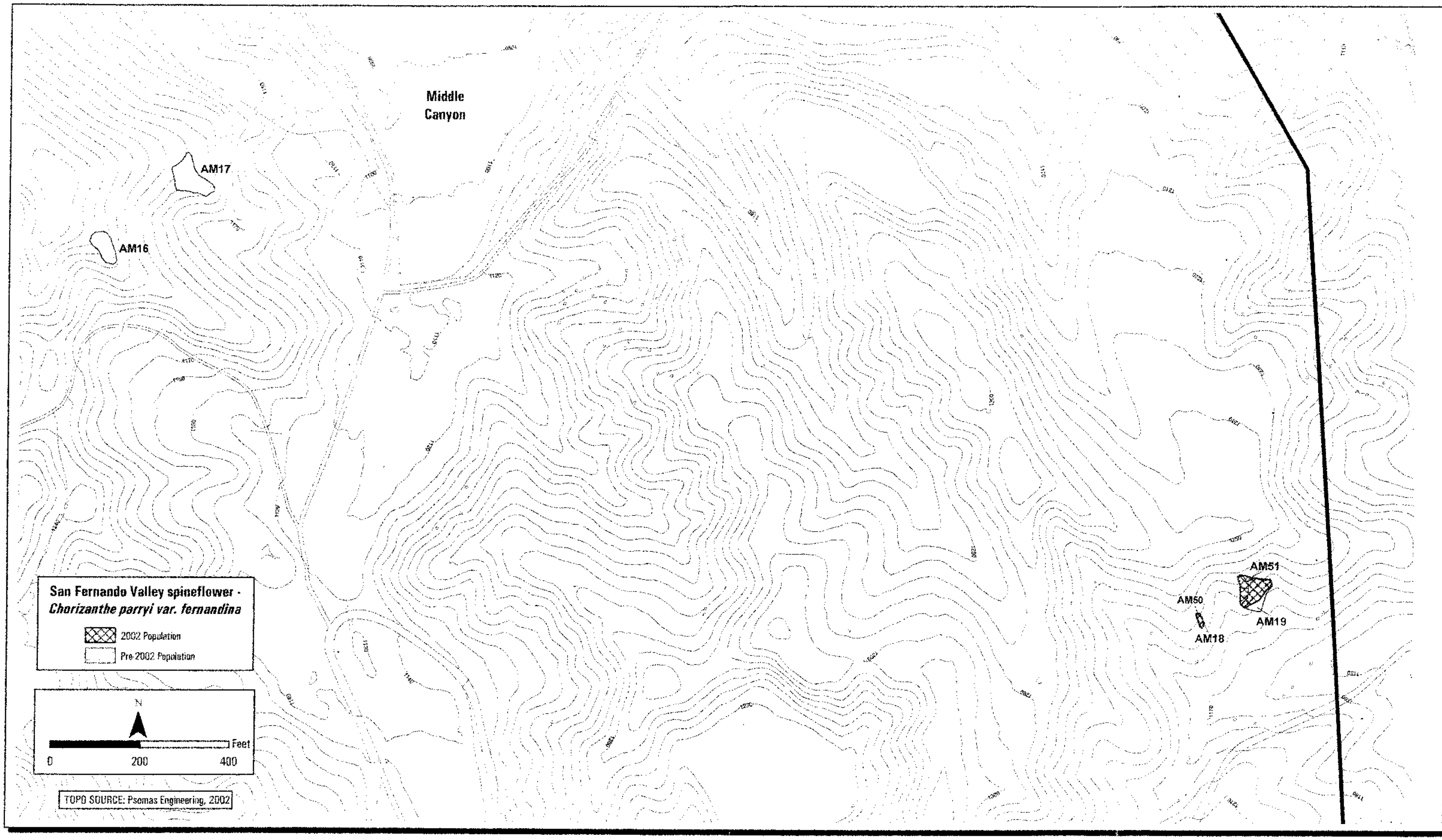
FIGURE 8



Newhall Ranch

San Fernando Valley spineflower - Airport Mesa Area

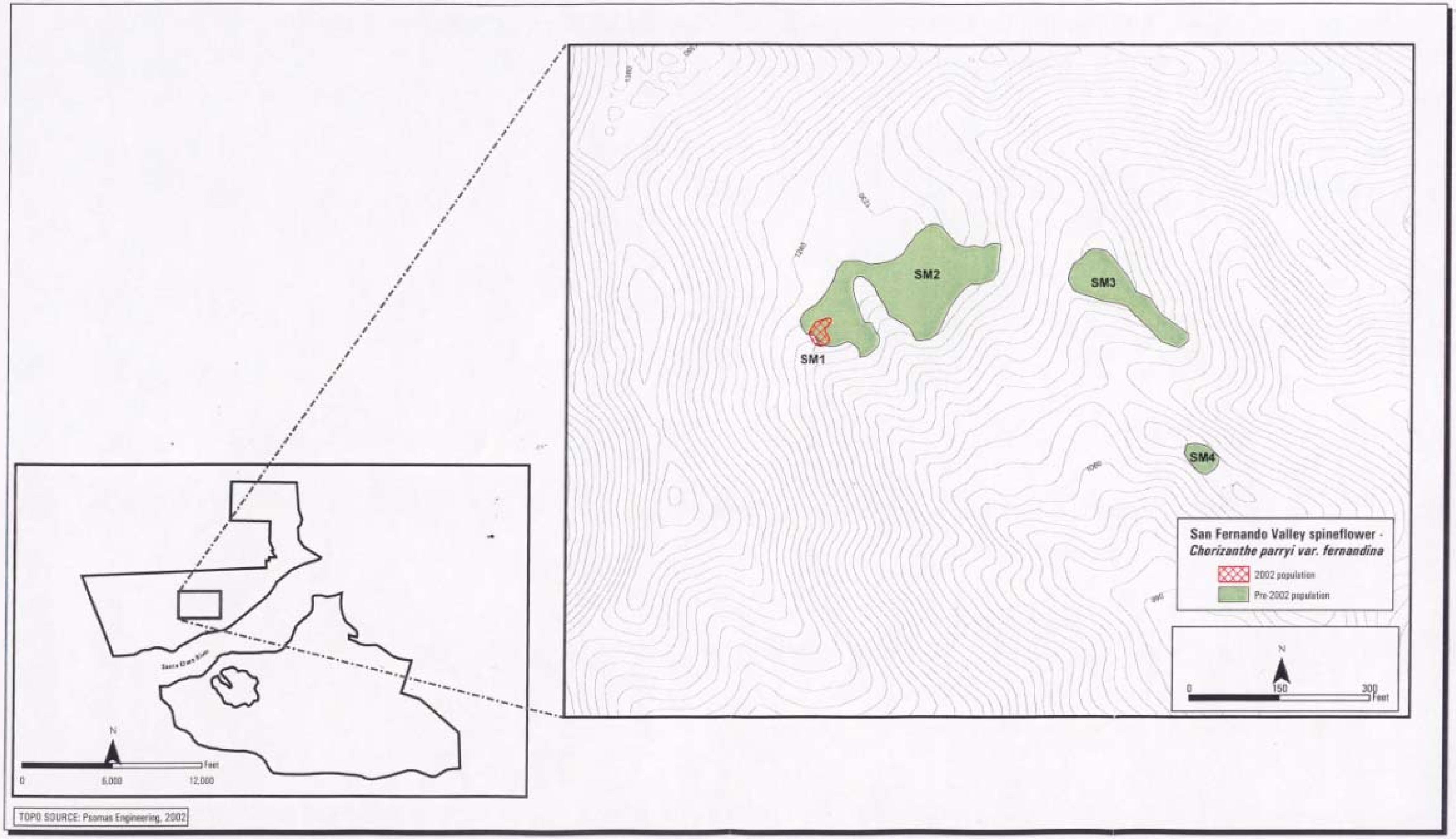
FIGURE 9



Newhall Ranch

San Fernando Valley spineflower - Airport Mesa Area

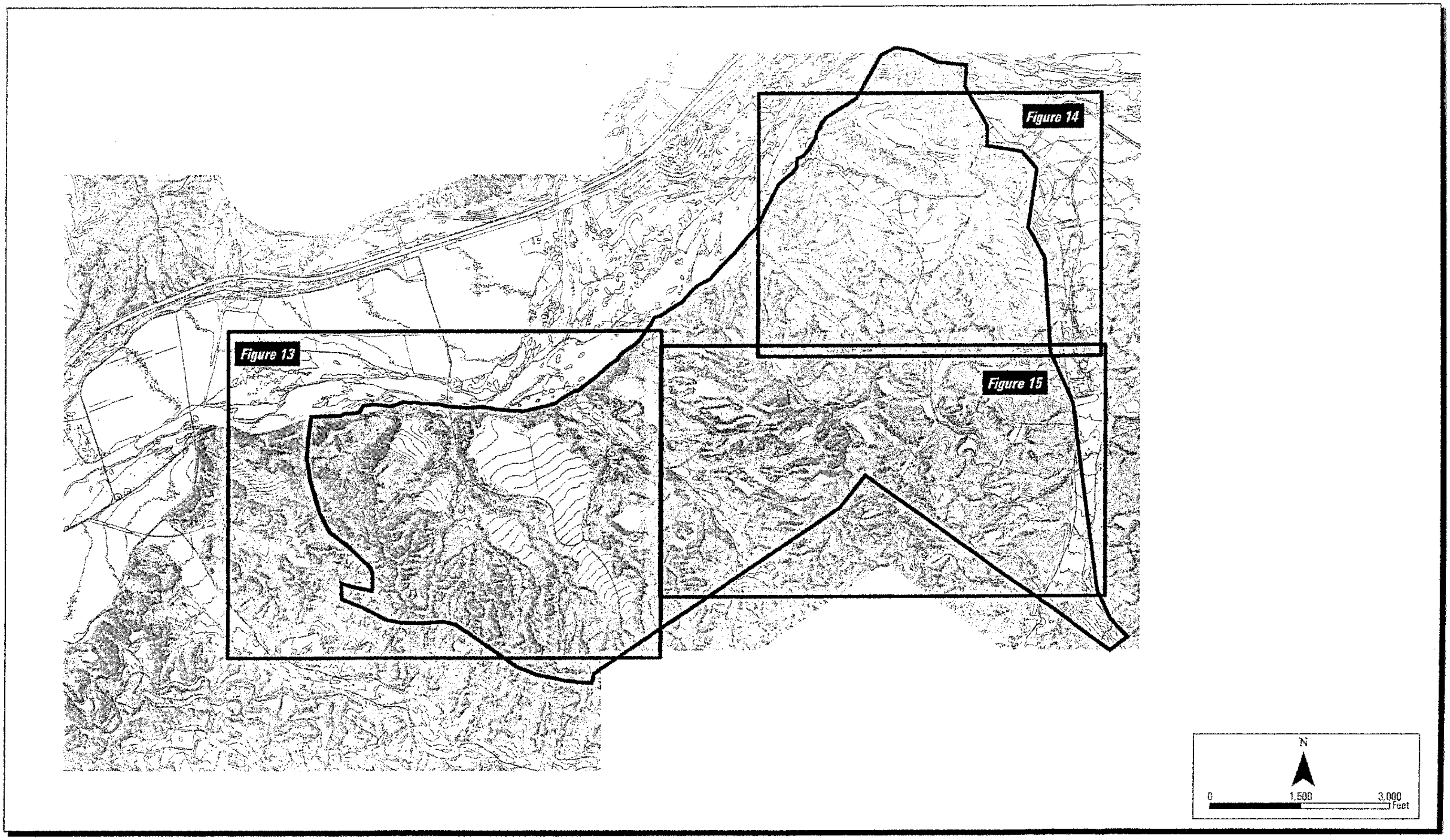
FIGURE 10



Newhall Ranch

San Fernando Valley spineflower - San Martinez Grande Canyon Area

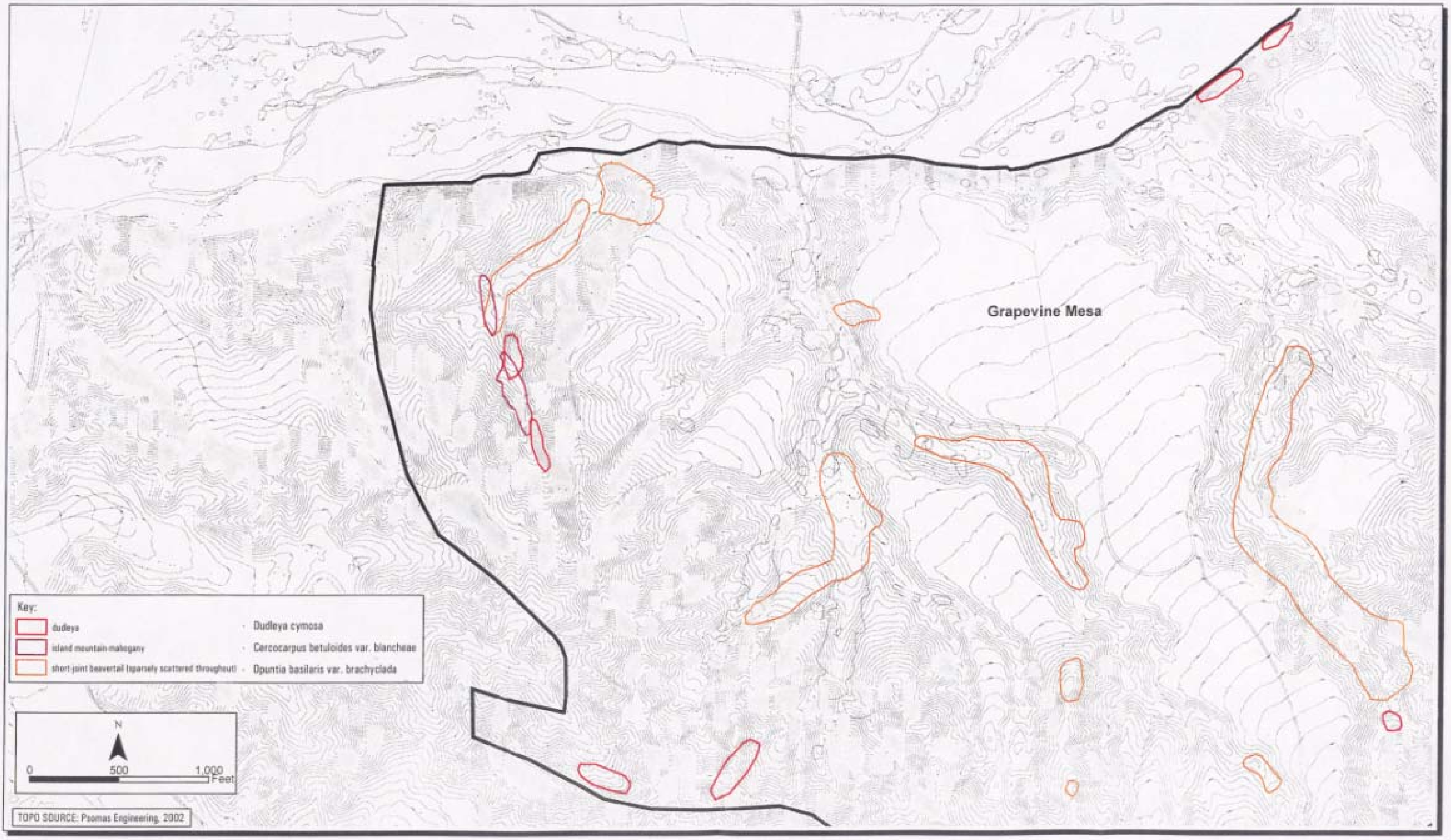
FIGURE 11



Newhall Ranch

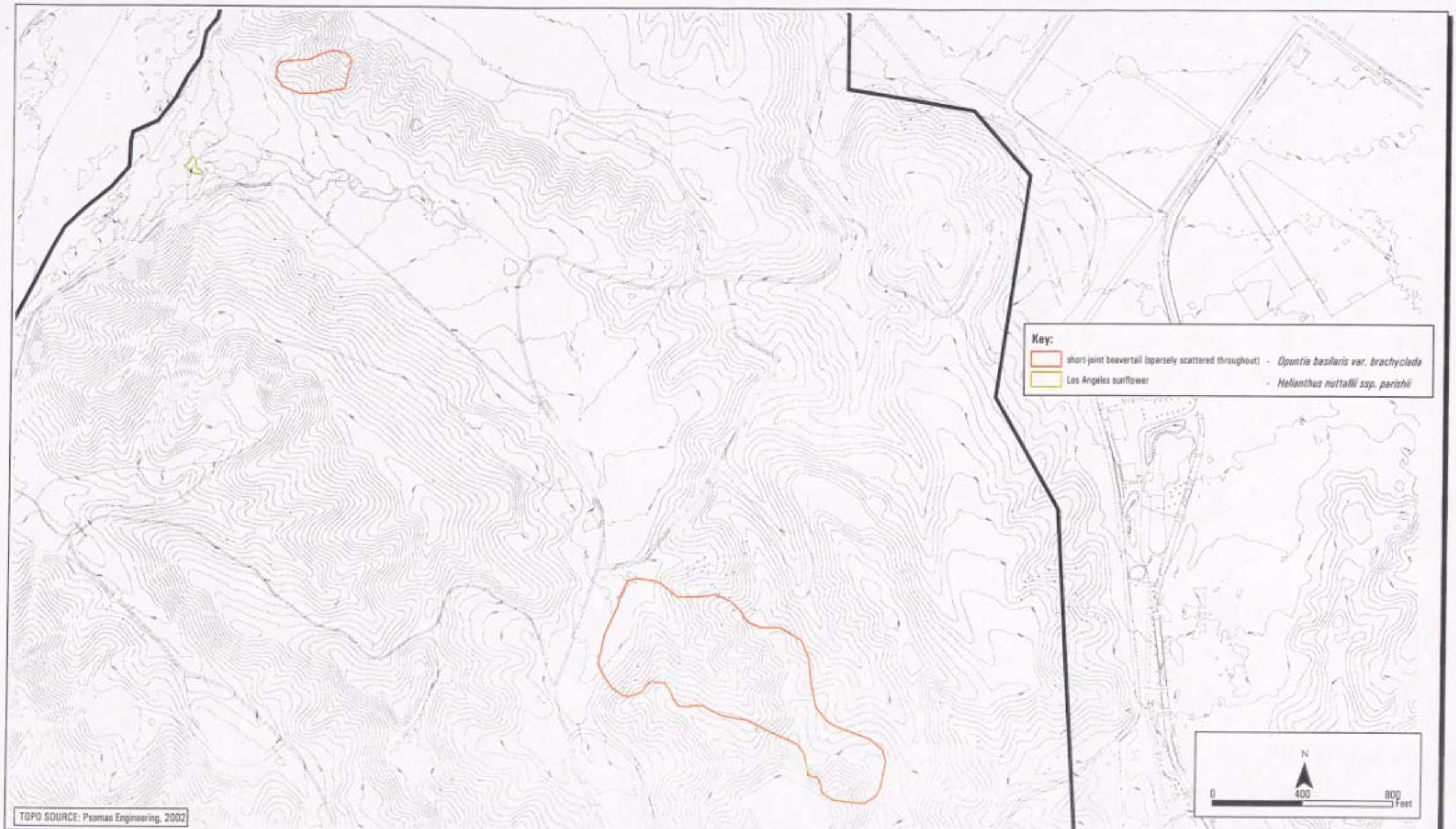
2002 Sensitive Plant Species Survey Index - 1500-acre Survey Area

FIGURE 12



Newhall Ranch
2002 Sensitive Plant Species Results - 1500-acre Survey Area

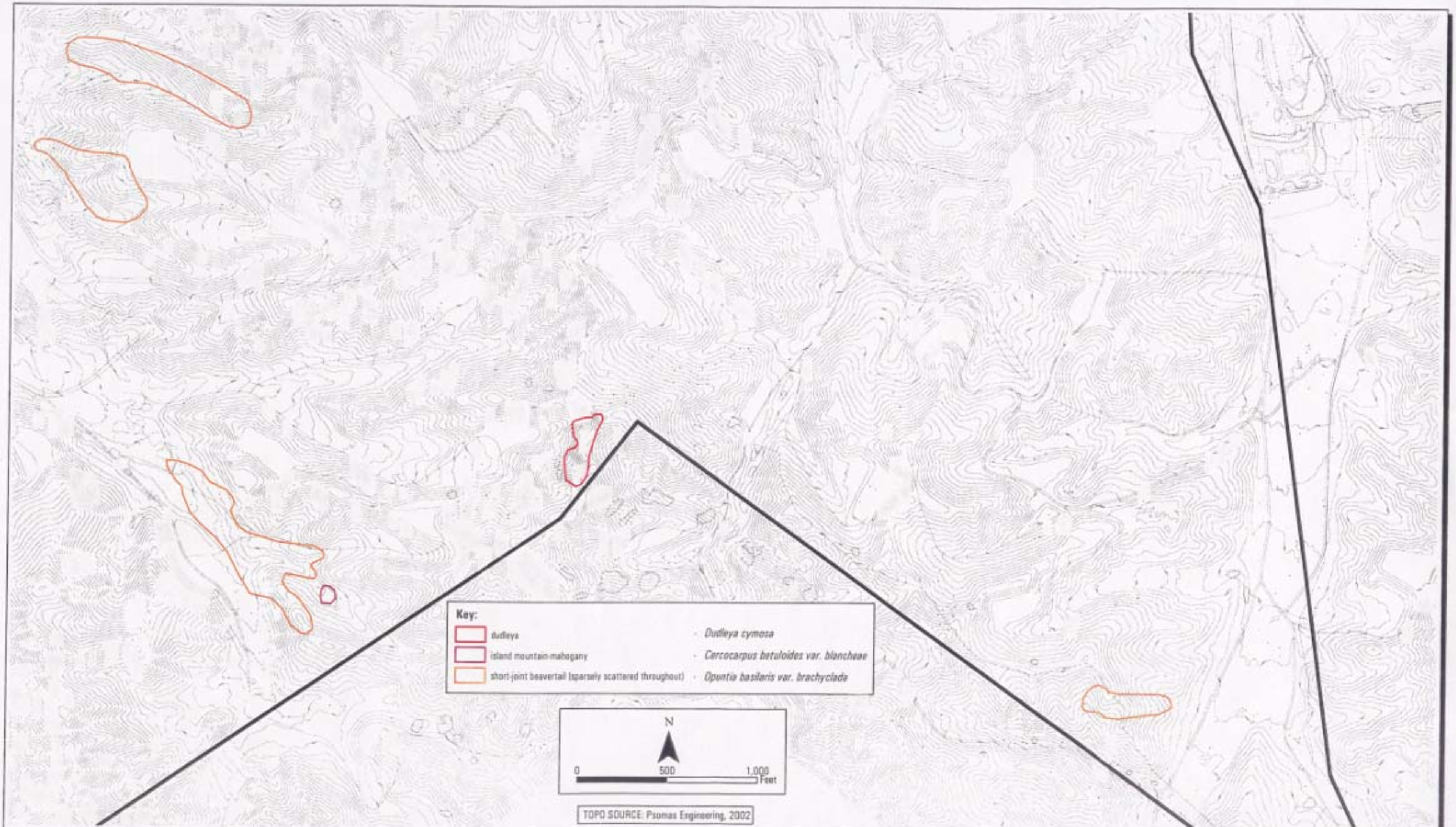
FIGURE
13



Newhall Ranch

2002 Sensitive Plant Species Results - 1500-acre Survey Area

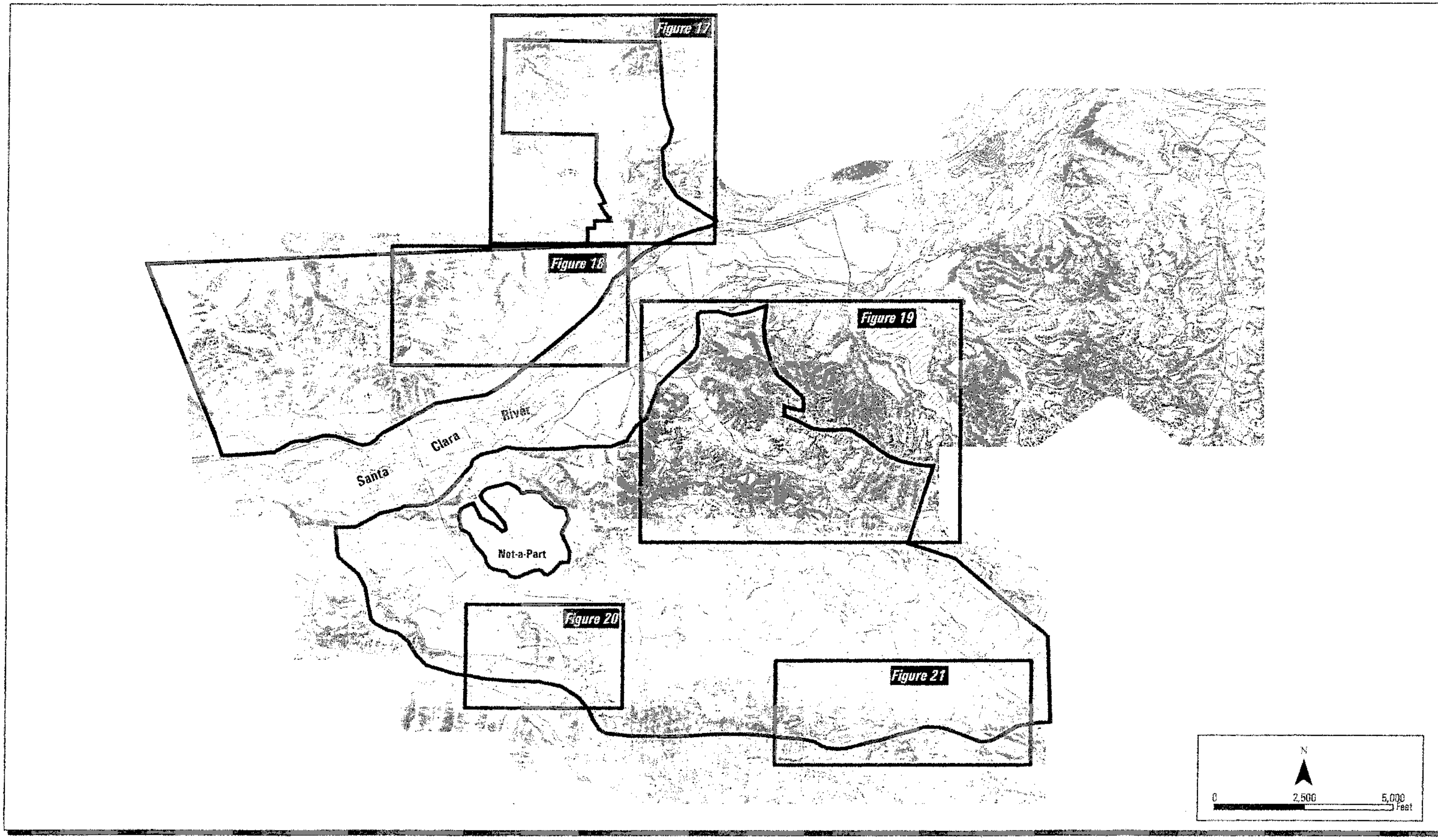
FIGURE 14



Newhall Ranch

2002 Sensitive Plant Species Results - 1500-acre Survey Area

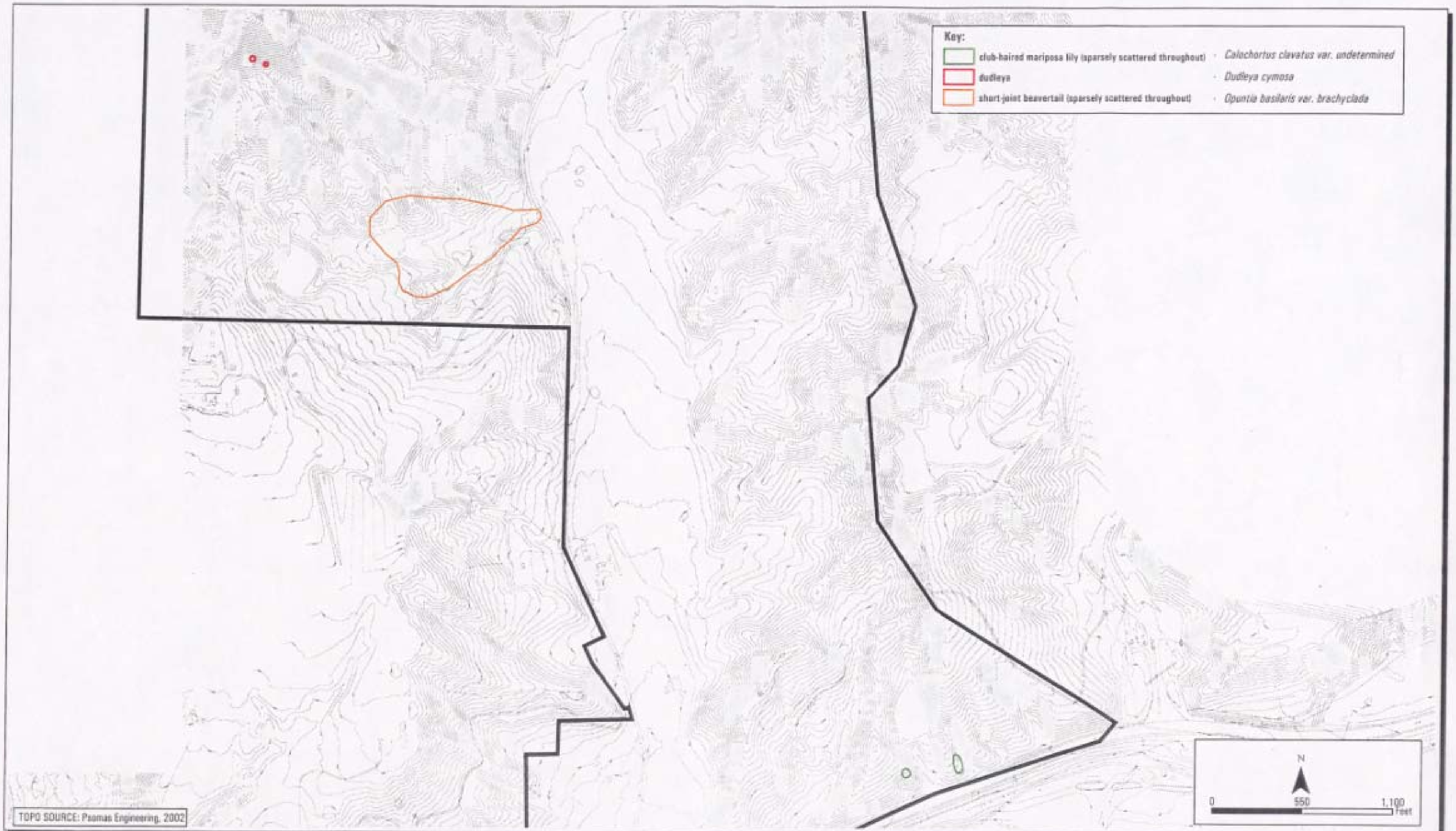
FIGURE 15



Newhall Ranch

FIGURE 16

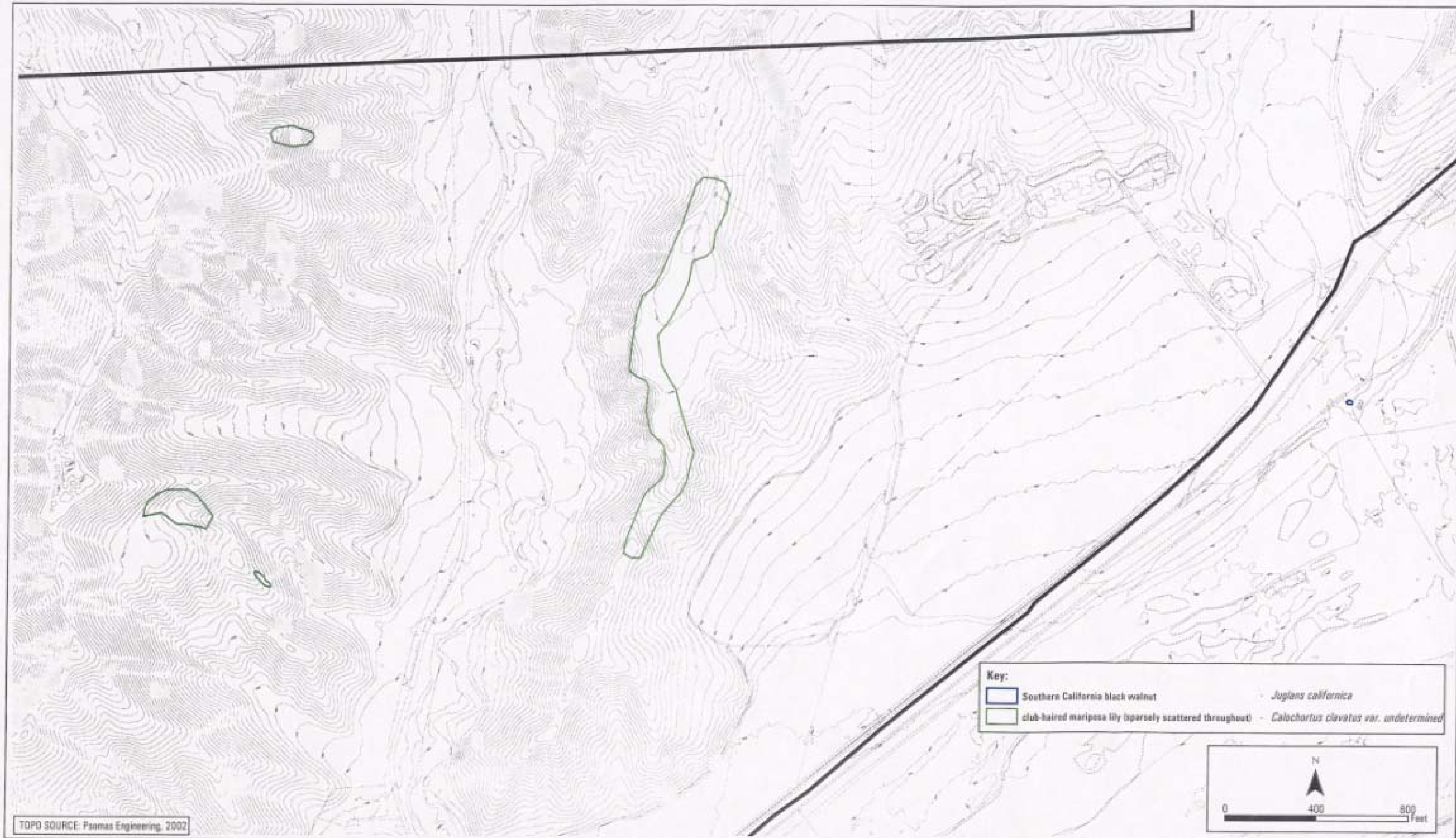
2002 Sensitive Plant Species Survey Index - 4000-acre Survey Area



Newhall Ranch

2002 Sensitive Plant Species Results - 4000-acre Survey Area

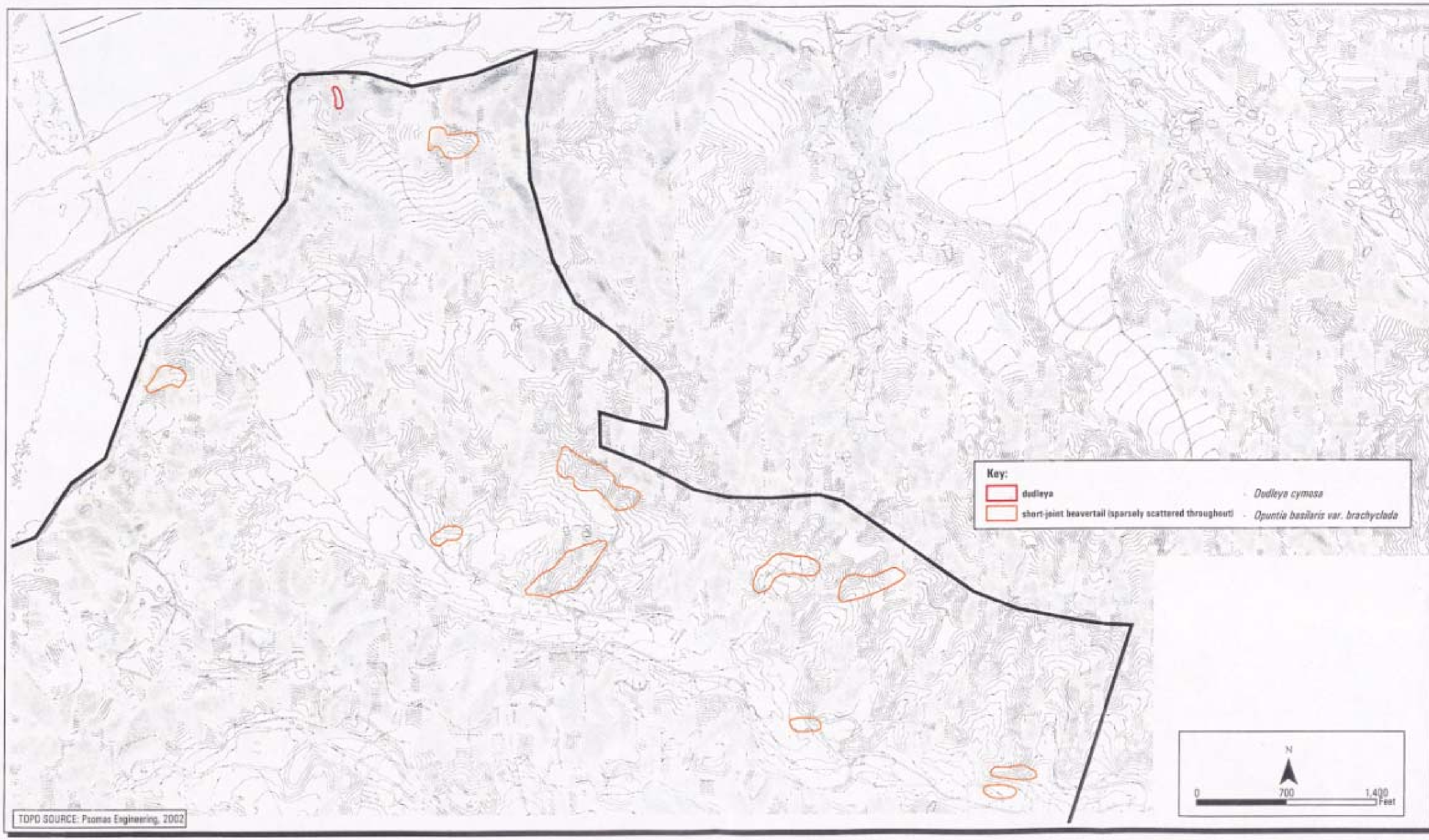
FIGURE 17



Newhall Ranch

2002 Sensitive Plant Species Results - 4000-acre Survey Area

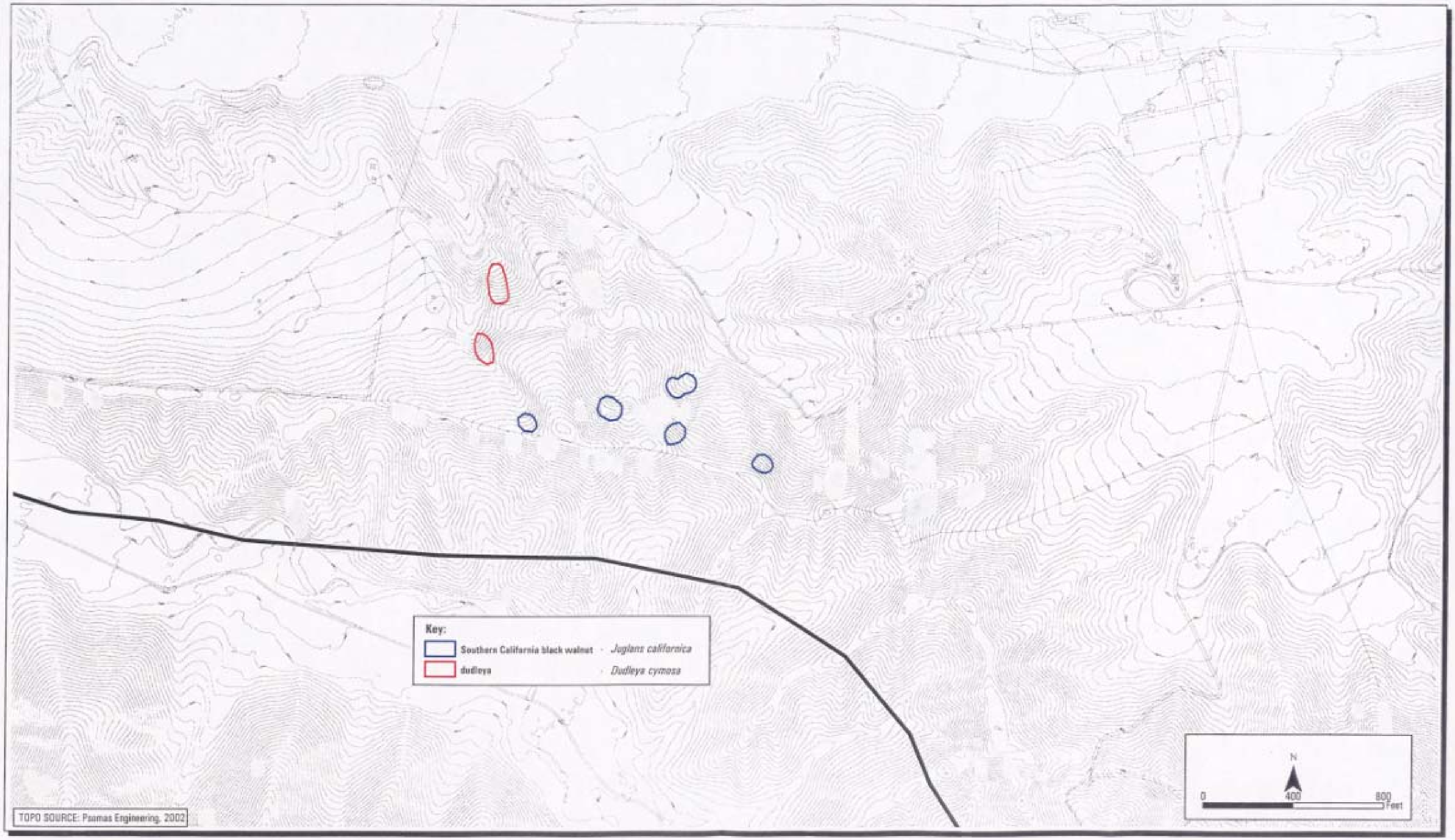
FIGURE 18



Newhall Ranch

2002 Sensitive Plant Species Results - 4000-acre Survey Area

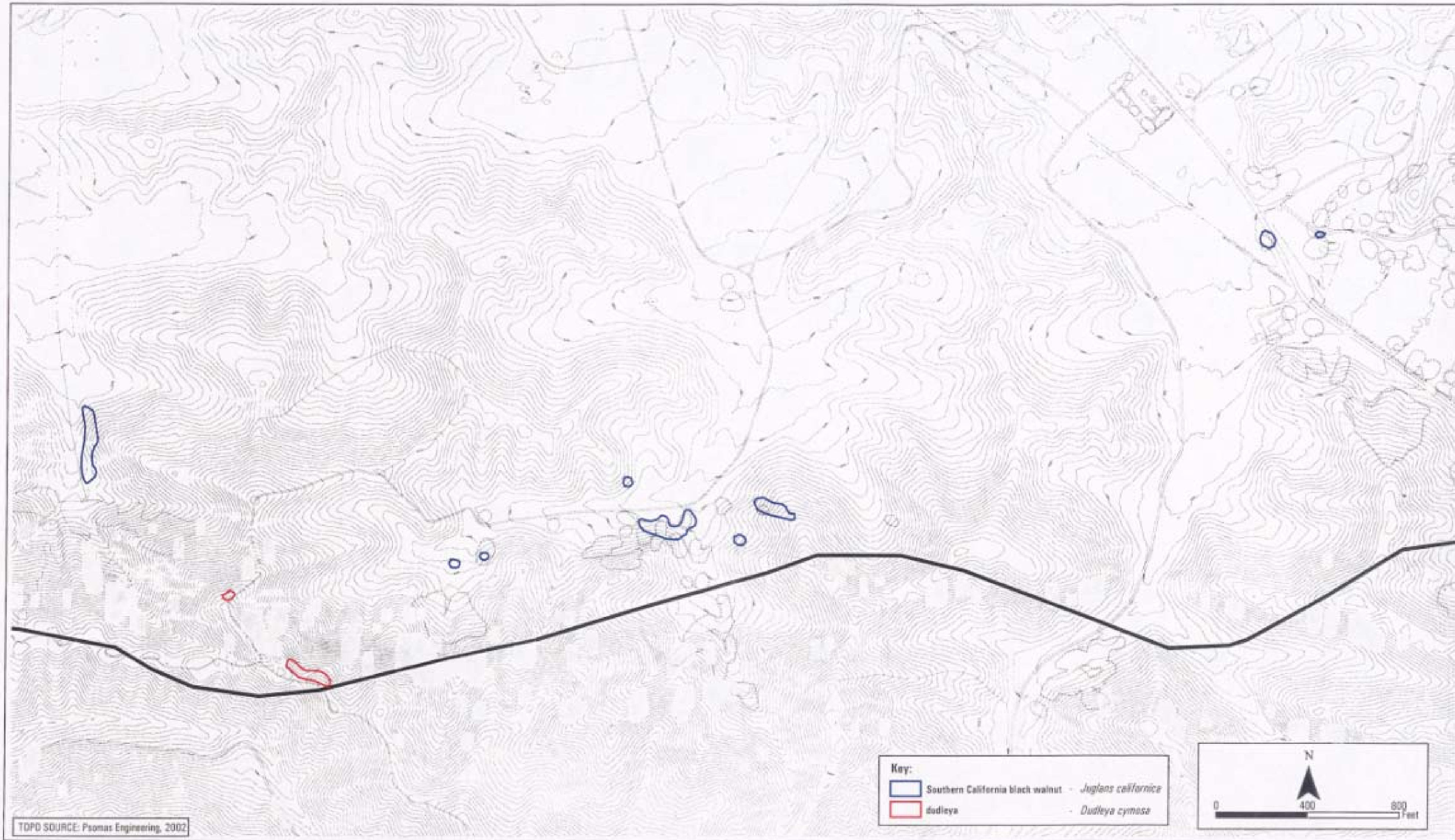
FIGURE 19



Newhall Ranch

2002 Sensitive Plant Species Results - 4000-acre Survey Area

FIGURE 20



Newhall Ranch

2002 Sensitive Plant Species Results - 4000-acre Survey Area

FIGURE 21

TABLE 3
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Arenaria paludicola	marsh sandwort	FE/SE	1B	dense freshwater marsh/perennial herb/May-August	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout entire study area. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrence is in the Santa Ana River. Limited suitable habitat onsite; very low likelihood of occurrence within the study area.
Astragalus brauntonii	Braunton's milk-vetch	FE/None	1B	chaparral, coastal sage scrub, grasslands; often on carbonate substrates/perennial herb/March-July	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout entire study area. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrence is in the Simi Hills. Suitable habitat exists onsite. Moderate likelihood of occurrence within study area.
Atriplex coulteri	Coulter's saltbush	None/None	1B	coastal sage scrub and grasslands on alkaline or clay substrate/perennial herb/March-October	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout entire study area No CNDDB records exist for the Newhall or Val Verde quads; however, suitable habitat present onsite. Moderate likelihood of occurrence within study area.

TABLE 3
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Atriplex serenana var. davidsonii	Davidson's saltscale	None/None	1B	coastal bluff scrub and coastal sage scrub on alkaline substrate/annual herb/May-October	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout entire study area. No CNDDB records exist for the Newhall or Val Verde quads. *Atriplex serenana var. serenana* observed onsite. Low likelihood of occurrence within the study area.
Baccharis malibuensis	Malibu baccharis	None/None	1B	chaparral, coastal sage scrub, cismontane woodland/deciduous shrub/August	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout entire study area. No CNDDB records exist for the Newhall or Val Verde quads; closest known populations in the western Santa Monica Mountains near Malibu. Not expected to occur within the study area.
Berberis nevinii	Nevin's barberry	FE/SE	1B	chaparral, coastal sage scrub, riparian scrub, cismontane woodland on sandy or gravelly substrate/evergreen shrub/March-April	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout entire study area. CNDDB records exist for San Francisquito Canyon at confluence with Santa Clara River; suitable habitat present onsite. Moderate likelihood of occurrence within study area.

TABLE 3
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Brodiaea filifolia	Thread-leaved brodiaea	FT/SE	1B	clay substrate openings in chaparral, sage scrub, and grasslands/perennial herb (geophyte)/March-June	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout entire study area. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrence is in San Dimas. Suitable habitat present onsite. Low likelihood of occurrence within study area.
Calochortus clavatus var. clavatus	club-haired mariposa lily	None/None	4	chaparral and coastal sage scrub/ perennial herb (geophyte)/March-May	No CNDDB records exist for Newhall and Val Verde quads. Unidentified *Calochortus clavatus* subspecies observed in the 1,500-acre survey area. Need current year flowers to determine. Moderate to high likelihood of occurrence in study area.
Calochortus clavatus var. gracilis	slender mariposa lily	None/None	1B	chaparral and coastal sage scrub/perennial herb (geophyte)/March-May	CNDDB records for mouth of Pico Canyon. Unidentified *Calochortus clavatus* subspecies observed in the 1,500-acre survey area. Need current year flowers to determine. Moderate to high likelihood of occurrence in study area.
Calochortus plummerae	Plummer's mariposa lily	None/None	1B	chaparral, coastal sage scrub, cismontane woodland, grasslands on rocky granitic substrate/perennial herb (geophyte)/May-July	Not observed within study area during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout study area No CNDDB records exist for the Newhall or Val Verde quads; however, records exist for the Santa Susana Mountains and Simi Hills. Suitable habitat exists onsite. High likelihood of occurrence within study area.

TABLE 3
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Calochortus weedii var. vestus	late-flowered mariposa lily	None/None	1B	chaparral, cismontane & riparian woodland/perennial herb (geophyte)/ June-August	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout study area. No CNDDB records exist for the Newhall or Val Verde quads; however, habitat similar to where species occurs in eastern Ventura County is present onsite. Moderate likelihood of occurrence within study area.
Calystegia peirsonii	Peirson's morning-glory	None/None	4	chaparral, coastal sage scrub, cismontane woodland, grassland/ perennial herb/May-June	Observed in chaparral and Venturan sage scrub throughout the survey area.
Calystegia sepium ssp. binghamiae	Santa Barbara morning-glory	None/None	1A	marshes and swamps/perennial herb/ April-May	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout study area. No CNDDB records exist for the Newhall or Val Verde quads; however, limited suitable habitat present onsite. Low likelihood of occurrence within study area.
Centromadia [=Hemizonia] parryi ssp. australis	southern tarplant	None/None	1B	mesic edges of marshes in grasslands/annual herb/May-November	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout study area. No CNDDB records exist for the Newhall or Val Verde quads; however, suitable habitat present onsite. Low likelihood of occurrence within study area.

TABLE 3
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Cercocarpus betuloides var. *blancheae*	island mountain-mahogany	None/None	4	chaparral, closed-cone coniferous forest/evergreen shrub/February-May	Observed in mixed chaparral in the study area.
Chorizanthe parryi var. *fernandina*	San Fernando Valley spineflower	FC/SE	1B	Coastal sage scrub, sandy soils/annual herb/April-June	Observed in three general areas within the survey area: Grapevine Mesa, Airport Mesa, and San Martinez Grande Canyon.
Deinandra (=*Hemizonia*) *minthornii*	Santa Susana tarplant	None/SR	1B	chaparral and coastal sage scrub on rocky substrate/deciduous shrub/July-November	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout study area. No CNDDB records exist for the Newhall or Val Verde quads; however, records exist for the Simi Hills and Oat Mountain. Suitable habitat exists onsite. Moderate likelihood of occurrence within study area.
Dodecahema leptoceras	slender-horned spineflower	FE/SE	1B	alluvial scrub on sandy substrate/annual herb/April-June	Not observed during 2002 field season; however, Santa Clara River bottom excluded from survey area. Historic CNDDB records exist for the Newhall or Val Verde quads in alluvial habitat similar to those present onsite. Moderate likelihood of occurrence within study area.
Dudleya blochmaniae var. *blochmaniae*	Blochman's dudleya	None/None	1B	clay openings in chaparral and coastal sage scrub, grasslands/perennial herb/April-June	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout study area. No CNDDB records exist for the Newhall or Val Verde quads. Suitable habitat present onsite. Low likelihood of occurrence within study area.

TABLE 3
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Dudleya cymosa ssp. marcescens	marcescent dudleya	FT/CR	1B	chaparral, often on volcanic substrate/perennial herb (geophyte)/ April-June	No CNDDB records exist for Newhall and Val Verde quads. Unidentified *Dudleya cymosa* observed on vertical sandstone cliffs and slopewash throughout study area. Need current year flowers to determine.
Dudleya cymosa ssp. ovatifolia	Santa Monica Mountains dudleya	FT/None	1B	chaparral and coastal sage scrub, often on volcanic substrate/perennial herb (geophyte)/April-June	No CNDDB records exist for Newhall and Val Verde quads. Unidentified *Dudleya cymosa* observed on vertical sandstone cliffs and slopewash throughout study area. Need current year flowers to determine.
Dudleya multicaulis	Many-stemmed dudleya	None/None	1B	coastal bluff scrub, coastal sage scrub, valley and foothill grassland, rocky, often clay substrate/perennial herb/ April-June	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout study area. No CNDDB records exist for the Newhall or Val Verde quads; closest known occurrences are in Calabasas and San Dimas. Suitable habitat exists onsite. Moderate likelihood of occurrence within study area.
Dudleya parva	Conejo dudleya	FT/None	1B	coastal sage scrub and grassland on rocky, gravelly clays/perennial herb/May-June	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout study area. No CNDDB records exist for the Newhall or Val Verde quads. Suitable habitat exists onsite. Low likelihood of occurrence within study area.

TABLE 3
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Erodium macrophyllum	round-leaved filaree	None/None	2	cismontane woodland and grasslands on clay substrate/annual herb/March-May	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout study area. No CNDDB records exist for the Newhall or Val Verde quads; however records exist for Simi Valley. Suitable habitat present onsite; moderate likelihood of occurrence in study area.
Helianthus nuttallii ssp. parishii	Los Angeles sunflower	None/None	1A	marshes and swamps/perennial herb/ August-October	A *Helianthus* population, discovered in 2002 by Elvin and Sanders at Castaic Spring, on the south side of the Santa Clara River between Middle Canyon and San Jose Flats, was determined to be this species. The final determination of the identity of this species is still being worked on.
Horkelia cuneata var. puberula	Mesa horkelia	None/None	1B	chaparral, cismontane woodland, coastal sage scrub on sandy or gravelly substrate/perennial herb/February-December	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout study area. No CNDDB records exist for the Newhall or Val Verde quads. Suitable habitat present onsite. Low likelihood of occurrence within study area.
Juglans californica	southern California black walnut	None/None	4	chaparral, cismontane woodland, coastal sage scrub, alluvial scrub/ deciduous tree/March-May	Observed in Venturan coastal sage scrub and chaparral onsite.

TABLE 3
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Malacothamnus davidsonii	Davidson's bush mallow	None/None	1B	chaparral, coastal sage scrub, riparian woodland/ deciduous scrub/June-January	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout study area. Nearest occurrences are in San Fernando and Sunland. Suitable habitat present onsite. Moderate likelihood of occurrence within study area.
Nama stenocarpum	mud nama	None/None	2	edges of lakes, rivers, ponds, vernal pools/annual/January-July	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout study area. Moderate likelihood of occurrence on banks of Santa Clara River and other mesic areas onsite. No CNDDB records exist for the Newhall or Val Verde quads. Limited suitable habitat present onsite. Low likelihood of occurrence within study area.
Nolina cismontane	chaparral nolina	None/None	1B	chaparral, coastal sage scrub on sandstone or gabbro substrate/ perennial shrub/May-July	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout study area. No CNDDB records exist for the Newhall or Val Verde quads. Suitable habitat present onsite. Low likelihood of occurrence within study area.
Opuntia basilaris var. brachyclada	Short-joint beavertail	None/None	1B	chaparral, Joshua tree woodland, Mojavean desert scrub/succulent shrub/ April-June	Small groups observed in chaparral and coastal sage scrub throughout the site.

TABLE 3

Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Oxytheca parishii var. abramsii	Abram's oxytheca	None/None	1B	chaparral (sandy or shale)/June-August	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout study area. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrences are in the Topatopa Mountains. Suitable habitat present onsite. Moderate likelihood of occurrence within study area.
Pentachaeta lyonii	Lyon's pentachaeta	FE/SE	1B	openings in chaparral and coastal sage scrub, grasslands/annual herb/March-August	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout study area. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrences are in the Simi Valley. Suitable habitat present onsite. Moderate likelihood of occurrence within study area.
Rorippa gambellii	Gambel's watercress	FE/ST	1B	Marsh and swamps (freshwater and brackish)/ perennial herb/April-June	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout study area. No CNDDB records exist for the Newhall or Val Verde quads. Limited suitable habitat present onsite. Low likelihood of occurrence within study area.
Senecio aphanactis	rayless ragwort	None/None	2	chaparral, coastal sage scrub, cismontane woodland on alkaline substrate/annual herb/January-April	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout study area. Historic CNDDB record for Saugus, south of Santa Clara River. Suitable habitat onsite. Moderate likelihood of occurrence within study area.

TABLE 3
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Sidalcea neomexicana	Salt spring checkerbloom	None/None	2	chaparral, coastal sage scrub, and playas on alkaline substrate/perennial herb/March-June	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout study area. No CNDDB records exist for the Newhall or Val Verde quads; suitable habitat present onsite. Moderate likelihood of occurrence within study area.
Thelypteris puberula var. sonorensis	Sonoran maiden fern	None/None	2	meadows and seeps/perennial herb/ fertile January-September	Not observed during 2002 field season; however, all acreage not subject to similar level of survey effort for this species throughout study area. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrence at Point Dume. Limited suitable habitat present onsite. Low likelihood of occurrence within study area.

Legend

FE: Federally-listed as endangered
FT: Federally-listed as threatened
FC: Federal candidate for listing
SC: State candidate for listing
SE: State-listed as endangered
ST: State-listed as threatened
SR: State-listed as rare

CNPS List 1A: Plants presumed extinct in California
CNPS List 1B: Plants rare, threatened, or endangered in California and elsewhere
CNPS List 2: Plants rare, threatened, or endangered in California but more common elsewhere
CNPS List 3: Plants about which we need more information – a review list
CNPS List 4: Plants of limited distribution – a watch list

reproductive biology, dispersal). *Figures 5* through *11* contain labels for each of the polygons to correlate with *Tables 4, 5, 6*, and *7*, which contain estimates for the numbers of individuals within each polygon. To obtain these estimates, we either directly counted all individuals in a polygon or conducted a clumped counting and extrapolation method, which involved counting individual plants in small areas of a polygon, then extrapolating out over other areas of the polygon, until a total was obtained. Most of the polygon estimates were conducted by two botanists, independently, then compared for consistency.

Polygons for other sensitive species were mapped either with a GPS unit or by drawing polygons on 7.5-minute USGS quadrangle maps. Dudek used professional judgment to delineate these polygons based on the detectability of the species, topography, and vegetation. Information regarding the mapping for each sensitive species is included in the sections below (*Sections 4.2.1* through *4.2.8*).

TABLE 4
SFVS Estimates for the Airport Mesa Vicinity

Polygon Name	Plant Year	Estimate # Individuals	
		Minimum	Maximum
AM1	Pre-2002	150	350
AM10	Pre-2002	250	500
AM11	Pre-2002	10	3
AM13	Pre-2002	25	25
AM14	Pre-2002	25	26
AM15	Pre-2002	25	25
AM16	Pre-2002	2500	5000
AM17	Pre-2002	500	1,000
AM19	Pre-2002	250	500
AM19	Pre-2002	750	1,500
AM2	Pre-2002	1,000	1,500
AM3	Pre-2002	50	100
AM4	Pre-2002	500	750
AM5	Pre-2002	5	5
AM6	Pre-2002	300	600
AM7	Pre-2002	500	750
AM8	Pre-2002	6,500	10,000
AM9	Pre-2002	6,000	8,750
AM20	2002	1	1
AM21	2002	10	25
AM22	2002	1	1
AM23	2002	1	1
AM24	2002	2	2
AM25	2002	2	2
AM26	2002	4	4
AM27	2002	2	2
AM28	2002	3	3
AM29	2002	7	7

TABLE 4
SFVS Estimates for the Airport Mesa Vicinity

Polygon Name	Plant Year	Estimate # Individuals	
		Minimum	Maximum
AM30	2002	1	1
AM31	2002	40	50
AM32	2002	6	6
AM33	2002	11	11
AM34	2002	8	8
AM35	2002	2	2
AM36	2002	1	1
AM37	2002	1	1
AM38	2002	1	1
AM39	2002	9	9
AM40	2002	1	1
AM41	2002	11	11
AM42	2002	3	3
AM43	2002	4	4
AM44	2002	3	3
AM45	2002	1	1
AM46	2002	1	1
AM47	2002	4	4
AM48	2002	7	7
AM49	2002	159	159
AM50	2002	10	25
AM51	2002	50	100
AM52	2002	2	2
AM53	2002	1	1
AM54	2002	2	2
AM55	2002	1	1

TABLE 5
SFVS Estimates for the Grapevine Mesa Vicinity

Polygon Name	Plant Year	Estimate # Individuals	
		Minimum	Maximum
GM1	Pre-2002	1,000	1,000
GM10	Pre-2002	3,000	20,000
GM11	Pre-2002	3,000	5,000
GM12	Pre-2002	500	900
GM13	Pre-2002	2,000	4,000
GM14	Pre-2002	500	1,000
GM15	Pre-2002	75,000	250,000
GM16	Pre-2002	5,000	10,000
GM17	Pre-2002	500	1,000
GM18	Pre-2002	100	200
GM19	Pre-2002	250	500
GM2	Pre-2002	1,000	1,000
GM20	Pre-2002	3,000	5,000
GM21	Pre-2002	15,000	30,000

TABLE 5
SFVS Estimates for the Grapevine Mesa Vicinity

Polygon Name	Plant Year	Estimate # Individuals	
		Minimum	Maximum
GM22	Pre-2002	400	600
GM23	Pre-2002	500	700
GM24	Pre-2002	500	500
GM25	Pre-2002	20	50
GM26	Pre-2002	2,000	3,000
GM27	Pre-2002	500	500
GM28	Pre-2002	5,000	20,000
GM29	Pre-2002	200	500
GM3	Pre-2002	250	350
GM4	Pre-2002	50	50
GM5	Pre-2002	1,200	1,200
GM6	Pre-2002	10,000	15,000
GM7	Pre-2002	50	100
GM8	Pre-2002	100	200
GM9	Pre-2002	500	500
GM30	2002	50	50
GM31	2002	20	25
GM32	2002	25	50
GM33	2002	300	300
GM34	2002	3,000	5,000
GM35	2002	10	10
GM36	2002	100	150
GM37	2002	250	500
GM38	2002	420	420
GM39	2002	650	750
GM40	2002	1	1

TABLE 6
SFVS Estimates for the San Martinez Grande Canyon Vicinity

Polygon Name	Plant Year	Estimate # Individuals	
		Minimum	Maximum
SM1	2002	50	75
SM2	Pre-2002	950,000	1,250,000
SM3	Pre-2002	50,000	100,000
SM4	Pre-2002	200	500

TABLE 7
SFVS Estimate Totals

Polygon Name	Plant Year	Estimate # Individuals	
		Minimum	Maximum
Airport Mesa	Pre-2002	19,343	31,393
Airport Mesa	2002	373	463
Grapevine Mesa	Pre-2002	131,120	371,751
Grapevine Mesa	2002	4,826	7,256
San Martinez Grande Canyon	Pre-2002	1,000,200	1,350,500
San Martinez Grande Canyon	2002	50	75

4.2.1 *Calochortus clavatus* (mariposa lily)

One of the mariposa lilies observed within the study area was identified to species level from parts still in evidence from a previous year (*i.e.*, capsule, bulb coat). It is likely that it is one of two varieties: *Calochortus clavatus* var. *clavatus* (club-haired mariposa lily) or *C. clavatus* var. *gracilis* (slender mariposa lily). *Calochortus clavatus* var. *gracilis* is found on List 1B of the CNPS Inventory and *C. clavatus* var. *clavatus* is found on List 4 of the CNPS. Slender mariposa lily has been documented to occur at the mouth of Pico Canyon and other canyons in the vicinity (Newhall Quad; CNDDB 2002). Both varieties are typically found in chaparral, coastal scrub, and grasslands, often on clay, and/or rocky soils. The club-haired mariposa lily is usually found on serpentine soils.

Within the 4,000-acre study area, the unidentifiable variety of *Calochortus clavatus* found by DUDEK occurs on ridges and slopes in Venturan coastal sage scrub and grasslands, most often north of SR-126 (see *Figures 12* and *13*). The likelihood is greater that it is the slender mariposa lily, due to its presence within nearby habitat and the plant stalks were generally smaller in habit than the larger club-haired mariposa lily. Focused surveys were not conducted in the 4,000-acre study area for this species. DUDEK mapped *C. Clavatus* either with a GPS unit or by drawing polygons on USGS 7.5-minute quadrangle maps or aerial photography with topographic contours printed at a 1 inch = 200 feet scale. Discontinuous groupings of *Calochortus* plants were mapped as discrete/separate polygons. *Calochortus* plants were randomly scattered within these polygons. *Calochortus* varied in densities within and among the different locations/polygons from widely scattered to dense clusters. Population sizes were not determined for each location. CNDDB forms were not completed for this species because we were not able to determine which taxon, *Calochortus clavatus* var. *clavatus* or *C. clavatus* var. *gracilis*, is present due to the lack of flowering material.

4.2.2 *Calystegia peirsonii* (Peirson's morning glory)

Peirson's morning-glory has no state or federal status, but is found on List 4 of the CNPS *Inventory*. This morning-glory is rhizomatous perennial that typically is found in more desert-like areas (*e.g.*, creosote bush scrub, Joshua tree woodland) at elevations which exceed 3,000 feet AMSL, although there are records in the CNDDB for lower elevations in the local area. It was RECON's opinion (1996) that chaparral morning-glory (*Calystegia macrostegia* ssp. *cyclostegia*) was the more common species; however, after reviewing the floral bracts, leaf shape, and its glabrous nature, it is DUDEK's opinion that the morning-glory observed in the study area is Peirson's morning-glory. This species was also recorded onsite during limited focused surveys for sensitive plant species conducted in 1992 (Dames and Moore 1993).

While never abundant, Peirson's morning-glory is widespread onsite and was observed on virtually all ridges and slopes, weakly climbing over mixed chaparral, Venturan coastal sage scrub, and in grasslands throughout the 1,500-acre study area. It also occurs within the 4,000-acre study site, although it was not the subject of focused surveys. Due to the widespread nature of Peirson's morning-glory at Newhall Ranch, it is not specifically depicted on the report figures. CNDDB forms were not completed for this species because of the widespread and sparse nature of its distribution onsite and the relatively low sensitivity of this species.

4.2.3 *Cercocarpus betuloides* var. *blancheae* (island mountain-mahogany)

Island mountain-mahogany has no state or federal status, but is found on List 4 of the CNPS *Inventory*. It is an evergreen shrub that occurs as part of the chaparral in Los Angeles and Ventura counties, as well as on several of the Channel Islands (CNPS 2001). This species was not observed during limited focused surveys for sensitive plant species conducted in 1992 (Dames and Moore 1993) or general botany surveys conducted in 1995 (RECON and Impact Sciences 1996).

Onsite, island mountain-mahogany occurs as an occasional component of chaparral at the base of north-facing slopes in the 1,500-acre survey area (see *Figures 8* and *10*). Focused surveys were not conducted in the 4,000-acre study area for this species. DUDEK mapped *Cercocarpus betuloides var. blancheae* locations by drawing polygons on USGS 7.5-minute quadrangle maps or aerial photography with topographic contours printed at a 1 inch = 200 feet scale. Discontinuous *Cercocarpus* groupings were mapped as discrete/separate polygons. *Cercocarpus* polygons typically represent the canopy cover of an undetermined number of individuals._CNDDB forms were not completed for this species because of the relatively low sensitivity of this species.

4.2.4 *Chorizanthe parryi* var. *fernandina* (San Fernando Valley spineflower)

San Fernando Valley spineflower is state-listed as endangered, a candidate for federal listing, and found on List 1B of the CNPS *Inventory*. Until its rediscovery in 1999 at Laskey Mesa on Ahmanson Ranch in Ventura County, it was thought to be extinct. A review of information of historic occurrence of SFVS in the CNDDB indicate that it was previously thought to occur in sandy to gravelly soils of washes, riverbeds, and upland areas primarily on the margins of the San Fernando Valley at the base of the Santa Susana Mountains, San Gabriel Mountains, and the Simi Hills. Munz (1974) provides distribution information to include Orange and San Diego counties. SFVS was not observed onsite during limited focused surveys for sensitive plant species conducted in 1992 (Dames and Moore 1993) or general botany surveys conducted in 1995 (RECON and Impact Sciences 1996).

Populations of SFVS were identified in three areas of the study area for the Newhall Ranch Specific Plan. Two of these are located south of SR-126 in the vicinities of Grapevine and Airport mesas, and the third is located north of SR-126 in San Martinez Grande Canyon. These locations are depicted on *Figures 4, 5,* and *6*, along with the distribution of observed polygons of SFVS within the generalized areas. While surveying in the field and mapping SFVS, DUDEK used a 4-meter (13.1 feet) rule to separate polygons. We chose this distance based on the topography, vegetation, detectability of the plants, general accuracy of the GPS that we used, and time constraints. This distance does not have any known relevance to SFVS biology (*i.e.*, reproductive biology, dispersal). *Figures x, y,* and *z* contain labels for each of the polygons to correlate with *Tables 4, 5, 6,* and *7*, which contain estimates for the numbers of individuals within each polygon. To obtain these estimates, we either directly counted all individuals in a polygon or conducted a clumped counting and extrapolation method, which involved counting individual plants in small areas of a polygon, then extrapolating out over other areas of the polygon, until a total was obtained. Most of the polygon estimates were conducted by two botanists, independently, then compared for consistency. For the Airport Mesa vicinity, we estimated that there were approximately between 373 and 463 individual plants from the 2002 cohort and between 19,343 and 31,393 individual plants from the pre-2002 cohort. For the Grapevine Mesa vicinity, we estimated that there were between 4,826 and 7,256 individual plants from the 2002 cohort and between 131,120 and 371,751 individual plants from the pre-2002 cohort. For the San Martinez Grande Canyon vicinity, we estimated that there were between 50 and 75 individual plants from the 2002 cohort and between 1,000,200 and 1,350,500 individual plants from the pre-2002 cohort. Approximately 99.5 percent of the SFVS observed during DUDEK's 2002 surveys were the remnants of pre-2002 plants indicating that the germination and flowering of this species was very poor in 2002.

Most of the SFVS were found on slopes with a south-facing component in habitat that was either open Venturan coastal sage scrub, ecotone between Venturan coastal sage scrub and grasslands, or at the edge of agricultural fields on mesas. Nearly all of the observed SFVS were found on soils mapped by the USDA (1969) as slightly eroded to eroded Castaic-Balcom silty clay loam (30-50 percent slopes) or Terrace Escarpments. Plants in the vicinities of Grapevine and Airport mesas were observed down slope of terrace surfaces capped by Zamora clay loam (2-9 percent slopes). Elevations at SFVS locations onsite range from approximately 1,000 to 1,300 feet AMSL. CNDDB forms are included in *Appendix C*.

4.2.5 *Dudleya cymosa* (dudleya)

An unidentifiable subspecies of *Dudleya cymosa* was found at numerous locations within the study area (see *Figures 8, 10, 12, 14, 15* and *16*). These plants could not be identified to subspecies level due to their current condition after this record dry year. The poor material from this year keyed, with difficulty, to *Dudleya cymosa* ssp. *marcescens* (federally listed as threatened and state listed as rare); however, positive identification is not possible at this time. This dudleya could be one of the several *Dudleya* taxa known from the area, such as *D. cymosa* ssp. *ovatifolia* (federally listed as threatened) or it could also be a new species that has not been described. The locations of the dudleya are noted and should be checked in the future in order to make a positive identification. Population sizes were not determined for each location, but were estimated to generally range between 10-50 (100) individuals. DUDEK mapped *Dudleya cymosa* locations by drawing polygons on USGS 7.5-minute quadrangle maps or aerial photography with topographic contours printed at a 1 inch = 200 feet scale. Discontinuous *Dudleya cymosa* groupings were mapped as discrete/separate polygons. CNDDB forms were not completed for this species because the precise taxon has not been determined yet.

4.2.6 *Helianthus nuttallii* ssp. *parishii* (Los Angeles sunflower)

The Los Angeles sunflower was last seen in 1937 and had been thought to be extinct since that time (CNPS 2001). It is currently a CNPS list 1A plant with no state or federal status. Historic information indicates that this sunflower was only known to occur at five locations in Los Angeles, Orange, and San Bernardino counties (CNPS 2001, CNDDB

2002, and RSA). Los Angeles sunflower is considered to have been extirpated from each of these sites.

On June 25, 2002, DUDEK botanist Mark A. Elvin, accompanied by Andrew C. Sanders (UCR), discovered vegetative plants growing in a seep area south of the Santa Clara River between Middle Canyon and San Jose Flats (see *Figure 9*). Periodic checks were conducted to obtain flowers, which are necessary to confirm the identity of this taxon. Once the plants began to flower in the last week of August 2002, Elvin and Sanders identified the plants as Los Angeles sunflower. A specimen was collected independently by a representative of The Newhall Ranch Land and Farming Company and sent to the Herbarium at the University of California, Berkeley, where it was subsequently determined to be consistent with the taxon known as the Los Angeles sunflower by Dr. John Strother (Barbara Errter, memo to Ken Koch; September 12, 2002). This specimen, along with others, were sent to Drs. Loren Rieseberg and Charles Heiser at the University of Indiana, Bloomington and were identified as *Helianthus nuttallii ssp. nuttallii*. Work is currently ongoing to verify the identity of this plant.

The population of Los Angeles sunflower occurs on the edge of a slight rise in the middle of a one-acre spring/marsh complex ("Castaic Spring") that drains into the south side of the Santa Clara River just upstream of its confluence with Castaic Creek. This rhizomatous perennial grows to a height of up to sixteen feet and there appears to be three to five clumps of this species. The sunflower inflorescences are taller than the adjacent vegetation and remain in the sun throughout most of the day. Within these groups, there appear to be multiple individuals based on observed differences in leaf and bract lengths, widths, shape, and hairiness (Elvin and Sanders, pers. obs. 2002). Sanders estimated that there are more than 300 flower stems (see attached CNDDB form, *Appendix C*). Honey bees, cabbage white butterflies, and damsel flies have been observed visiting the flowers (Elvin and Weigand, DUDEK, pers. obs. 2002). The ground was cool and completely wet in September of the driest year in recorded history; therefore, the area is likely to be wet all year long. A CNDDB form is included in *Appendix C*. DUDEK mapped a minimum convex polygon around all of the sunflower clumps using a Trimble GeoExplorer 3 GPS unit. Focused surveys were not conducted in the 4,000-acre study area for this species.

4.2.7 *Juglans californica* (southern California black walnut)

Southern California black walnut has no state or federal status, but is found on List 4 of the CNPS *Inventory*. Within its distributional range in southern California, this species is found as scattered occurrences throughout chaparral, cismontane woodlands, and coastal and alluvial scrub habitats (CNPS 2001). Southern California walnut was not observed during limited focused sensitive plant surveys conducted in 1992 (Dames and Moore 1993) or general botany surveys conducted in 1995 (RECON and Impact Sciences 1996).

This large shrub to tree was incidentally observed as an occasional component of mixed chaparral, Venturan coastal sage scrub, and alluvial scrub primarily along the north slope of the ridge between Potrero Canyon and Graves/Salt Creek Canyons (see *Figures 13, 15,* and *16*). Focused surveys were not conducted in the 4,000-acre study area for this species. DUDEK mapped *Juglans californica* locations with a Trimble Geo Explorer 3 GPS unit or by drawing polygons on USGS 7.5-minute quadrangle maps or aerial photography with topographic contours printed at a 1 inch = 200 feet scale. *Juglans* polygons typically represent the canopy cover of an undetermined number of individuals. Some polygons represent one tree and some represent multiple trees (up to twenty). Discontinuous *Juglans californica* groupings were mapped as discrete/separate polygons. CNDDB forms were not completed for this species because of the relatively low sensitivity of this species.

4.2.8 *Opuntia basilaris* var. *brachyclada* (short-joint beavertail)

Short-joint beavertail has no state or federal status but is found on List 1B of the CNPS *Inventory*. Throughout its range, it is found in a variety of scrub and woodland habitats on the north side of the Transverse Range along the edge of the Mojave Desert. The beavertail cactus identified within the study area keys to *Opuntia basilaris* var. *brachyclada* in *The Jepson Manual* (Hickman 1993), which identifies pad lengths as more than twice as long as their width. Pads on the observed beavertail cactus in the study area range in length from 3-15 inches, which was considerably longer than the pad width of 1-4 inches. It should be noted that in the past, beavertail cactus in the Newhall area that were of this size were ascribed to *O. basilaris* var. *ramosa*; however, this variety was subsumed into variety *O. basilaris* var. *brachyclada* in *The Jepson Manual* (Hickman 1993). Further attention is likely warranted to determine the taxonomic classification of the beavertail cactus at Newhall Ranch.

Within the study area, short-joint beavertail was observed in sparsely scattered clumps/patches on ridges, slopes, and in alluvial areas. DUDEK mapped these locations by drawing polygons on USGS 7.5-minute quadrangle maps or aerial photography with topographic contours printed at a 1 inch = 200 feet scale or occasionally with a Trimble Geo Explorer 3 GPS unit. Discontinuous beavertail groupings were mapped as discrete/separate polygons. The polygons depicting the distribution of short-joint beavertail (see *Figures 8, 9, 10, 12,* and *14*) represent single to multiple (~25-50) individuals, regardless of the size of the polygon.

It should also be noted that a few beavertail clumps were found in Long Canyon that were problematic in terms of identification. These plants appear to be some form of *Opuntia basilaris*, possibly a hybrid or mutant. Some of the plants have spines in the areoles, which is a characteristic of *Opuntia basilaris* var. *treleasei* (Bakersfield cactus), a state and federally listed taxon. Focused surveys were not conducted in the 4,000-acre study area for *Opuntia basilaris*. CNDDB forms are included in Appendix C.

5.0 ACKNOWLEDGMENTS

Mark A. Elvin and Julie M. Vanderwier prepared this report, with review by Sherri L. Miller, Philip R. Behrends Ph.D., and staff at The Newhall Land and Farming Company. Mark McGinnis provided graphics and GIS mapping analyses. Tonette S. Foster provided word processing.

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APPENDIX A
RESUMES OF SURVEY PERSONNEL

MICHELLE L. BALK
Environmental Specialist

EDUCATION / REGISTRATION

- University of Akron
  M.S., Biology with emphasis Ecology and Evolution, 1999

- Iowa State University
  B.S., Zoology, 1997

PROFESSIONAL CERTIFICATIONS

- Quino Checkerspot Butterfly 10a Survey Permit
  (USFWS Federal Permit)

EXPERIENCE SUMMARY

Ms. Balk has over a year of experience in environmental document preparation and resource conservation planning. Project experience includes biological resource surveys, data collection and analysis, environmental assessments, wetland delineations, permitting, mitigation design and monitoring, and endangered species surveys. Ms. Balk has engaged in interagency coordination and public outreach efforts due to the complexities of each project. Ms. Balk has also participated in the development of habitat conservation plans pursuant to Section 10 of the Federal Endangered Species Act.

PROFESSIONAL ASSIGNMENTS

- **Residential Development**. Irvine, California. Assisted in USFWS protocol surveys for the Coastal California Gnatcatcher.

- **Conservation Planning**. Assisted in the development of the MSHCP for western Riverside County. Project involvement included reserve design, document preparation, interagency coordination and public outreach.

- **Residential Development**. Riverside County, California. Conducted wetland delineation and prepared permit applications for 51-unit housing development.

- **Public University Student Housing Project**. San Marcos, California. Conducted vegetation mapping and wetland delineation, prepared permit applications, and coordinated with resource agencies for student housing project.

- **Residential Development**. Rancho Santa Fe, California. Performed environmental assessments and prepared encroachment permit applications for open space encroachments.

- **Creek Maintenance Project**. Poway, California. Performed wetland delineation and vegetation mapping for creek maintenance project.

- **Sewer Realignment**. Carlsbad, California. Assisted in the wetland delineation and vegetation mapping for sewer realignment project.

- **Residential Developments**. Laguna Beach and Oxnard, California. Mapped vegetation, surveyed for sensitive plants, and wrote biological resources reports for residential developments.

- **Utility Pole Maintenance Project**. San Bernardino Mountains, California. Conducted botanical surveys and surveyed for sensitive plants at pole replacement locations.

- **Salt Marsh Restoration Project**. San Diego, California. Performed vegetation mapping and prepared biological resources report for marsh restoration project.

- **Focused Botanical Survey**. Newhall Ranch, Los Angeles County, California. As team botanist, performed focused survey for San Fernando Valley spineflower on a 6,000-acre project site.

PUBLICATIONS

- "Phenotypic effects of leptin in an ectotherm: a new tool to study the evolution of life histories and endothermy?", with P.H. Niewiarowski and R.L. Londraville. The Journal of Experimental Biology 203:295-300, 2000.

- "Sprint speed variation in hatchling fence lizards as a function of ontogenetic stage and population," with P.H. Niewiarowski and J.M. Engelhardt. In preparation.

- "Phylogenetic Analysis of Reaction Norm Evolution in North American Softshell Turtles," with F.J. Janzen. In preparation.

RELEVANT EXPERIENCE

- Volunteer, Project Wildlife, San Diego, CA. Cared for injured wildlife and reared baby birds at wildlife rescue organization.

- "Sunday Birds" field ornithology course with San Dieguito Adult School, Encinitas, CA.

SCOTT BOCZKIEWICZ
BIOLOGIST/ENVIRONMENTAL SPECIALIST

EDUCATION

- B.S. / 1994 / Biological Conservation
- B.F.A. / 1994 / Painting and Drawing

PROFESSIONAL AFFILIATIONS

- Member of the Society for Wetland Scientists
- Member of the Society for Conservation Biology
- Member of the Society for Ecological Restoration

EXPERIENCE SUMMARY

Scott has a diverse range of work experience in the biological sciences, with emphasis in conservation biology, wetland science, and restoration ecology. He has experience in many ecosystems including riparian, wetland, grassland, prairie, desert, and montane forested areas. Scott has progressive experience evaluating impacts to sensitive, rare, threatened and endangered plant and wildlife species in Southern California. He has conducted sensitive species assessments, biological resource inventories, vegetation mapping, and wetland delineations for large public and private land holdings, and also has experience conducting focused surveys for botanical and wildlife species. Scott conducts biological monitoring of construction and infrastructure maintenance projects occurring in environmentally sensitive and/or protected areas throughout San Diego and Orange County. Scott has produced assessments of wetlands and uplands to support management plans and planning studies, designed mitigation plans and habitat restoration and monitoring plans for riparian, wetland, and upland habitats, identified regulatory issues for development and infrastructure projects to guide project designs, and completed permit applications supporting project compliance with federal, state, and local environmental regulations.

PROFESSIONAL ASSIGNMENTS

- **SR-56 Wetlands Mitigation and Environmental Permitting - San Diego, CA.**
  Provided mitigation site analysis including an HGM-based wetland assessment and designed a conceptual wetland creation and enhancement plan to mitigate impacts to jurisdictional wetlands resulting from construction of State Route 56 (SR-56). The 25-acre El Cuervo Norte riparian creation and enhancement project will occur in the west end of the Los Peñasquitos Canyon Preserve beginning in March of 2003. Secured an ACOE 404 Individual Permit, USFWS Take Authorization for least Bell's Vireo, RWQCB 401 Water Quality Certification, and CDFG 1601 Streambed Alteration Agreement for Phase 2 of SR-56 construction.

- **Biological Resource Surveys - Escondido Creek Conservancy, CA.** Conducted biological resources surveys and a wetland delineation to provide baseline biological site information supporting development of a long-term management plan for a 75-acre preserve property along Escondido Creek in unincorporated San Diego County.

- **Adobe Falls Supplemental Environmental Project - San Diego, CA.** Provided a biological resources assessment and designed a restoration plan including streambank erosion control for a 4-acre riparian wetland site along Alvarado Creek in San Diego. The restoration plan was designed to fit a predetermined budget amount of $310,000, and to meet all federal and state regulatory requirements.

- **Laborde Canyon OHV Park Study - Riverside, CA.** Assisted with herptile trap array installation and monitoring on a 2600 acre site in the badlands of western Riverside county. The data supported a biological constraints analysis for development of an Off Highway Vehicle Park.

- **Rare Plant Surveys - Newhall Ranch, Valencia, CA.** Assisted with focused rare plant surveys for San Fernando Valley Spine flower (*Chorizanthe parryi* var. *fernandina*) and a general botanical inventory on portions of Newhall Ranch.

- **Rare Plant Surveys - Great Oak Ranch, Western Riverside County, CA.** Assisted with rare plant surveys and a general botanical inventory of the San Diego Pipeline #6 alignment through the Great Oak Ranch.

- **Collier Marsh Wetland Delineation - Western Riverside County, CA.** Conducted a wetland delineation and plant inventory of Collier Marsh, a 50+ acre wetland site immediately north of Lake Elsinore in Riverside County.

MARK ELVIN
SENIOR BIOLOGIST/BOTANIST

EDUCATION

- University of California, Irvine
  M.S. Ecology and Evolutionary Biology, 1992

- University of North Carolina, Chapel Hill
  B.A. Biology and Philosophy, 1986

PROFESSIONAL CERTIFICATIONS

- California Department of Fish and Game State listed plants collecting permit

PROFESSIONAL AFFILIATIONS

- California Native Plant Society
- Southern California Botanists

EXPERIENCE SUMMARY

Mr. Elvin has 16 years experience as a biological resource specialist in southern California. As a Fish and Wildlife Biologist at the U.S. Fish and Wildlife Service (USFWS) he was responsible for conducting scientific reviews and analyses of species statuses for proposing and designating critical habitat within court ordered deadlines for listed fauna and flora; conducting scientific reviews and analyses of species statuses and developing recovery plans for listed species; and was the lead staff biologist for the USFWS for the implementation of the City of San Diego Multiple Species Conservation Plan (MSCP). In addition, he was the lead staff biologist at the USFWS for Quino checkerspot butterfly survey work conducted within San Diego County. Through his years of experience he has conducted sensitive species surveys in various habitat types throughout central and southern California including coastal strand, dune, coastal marsh, estuarine, coastal bluff scrub, coastal sage scrub, maritime succulent scrub, southern maritime chaparral, chaparral, valley grass lands, vernal pools, riparian scrub, riparian woodland, southern oak woodlands, alluvial fan sage scrub, montane coniferous forest, pebble plains, montane meadows, pinyon-juniper woodland, joshua tree woodland, sagebrush scrub, creosote bush scrub, alkali flats, desert mountains, creosote bush scrub, Mojavean desert scrub, and Sonoran desert scrub.

Mr. Elvin has also worked as a seed and conservation program coordinator, seed technologist, museum scientist, and conservation collection manager.

PROFESSIONAL ASSIGNMENTS

- Serves on the DUDEK project team preparing the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) that covers approximately 1.2 million acres. Mr. Elvin primarily is responsible for the adaptive management plan of the reserve system. Mr. Elvin also provides input on the sensitive plants component of the plan that addresses 59 plants, including 13 that are state and/or federally listed, and species monitoring studies.

- Conducted onsite ecological and biological investigations and surveys of complex development proposals to determine their effects on flora and fauna throughout southern California.

- Conducted field surveys for state and federally listed and MSCP-covered plant species for the City of San Diego's Multiple Species Conservation Program (MSCP).

- Conducted surveys for and collections of plants throughout Orange, San Diego, Riverside, San Bernardino, and Los Angeles counties and Baja California, Mexico.

- Conduct onsite ecological and biological investigations and surveys for threatened and endangered plant species throughout Los Angeles, Orange, San Diego, San Bernardino, Riverside, Imperial, Baja California (Mexico), Ventura, Monterey, San Benito, and San Luis Obispo counties.

- Participated in surveys for sensitive plants (including *Delphinium variegatum* ssp. *kinkiense* (San Clemente Island larkspur), *Lithophragma maximum* (San Clemente Island woodland star), *Lotus dendroideus* var. *traskiae* (San Clemente Island lotus), *Malacothamnus clementinus* (San Clemente Island bush mallow), *Sibara filifolia* (Santa Cruz Island rock cress)) on San Clemente and Santa Catalina Islands Los Angeles County.

Monitoring Programs

- Conducted demographic and ecological data collection surveys for the federally listed as threatened *Deinandra conjugens* (Otay tarplant) and the federally proposed as endangered *Ambrosia pumila* (San Diego ambrosia) and focused surveys for the federally listed as endangered Quino checkerspot butterfly (*Euphydryas editha quino*) in San Diego County for the MSCP.

Threatened and Endangered Species

- Conducted many surveys for State and/or federally listed plants in San Diego, Orange, Los Angeles, Riverside, and San Bernardino counties.

SELECTED PUBLICATIONS

Elvin, M. 2002. Endangered and Threatened Wildlife and Plants; Proposed Designation of Critical Habitat for Five Carbonate Plants From the San Bernardino Mountains in Southern California. 67 FR 6577.

Elvin, M. 2001. Endangered and Threatened Wildlife and Plants; Proposed Designation of Critical Habitat for Deinandra conjugens (Otay tarplant). 66 FR 32052.

Koopowitz, H., M. Elvin, and L. Keenan. (1996). In vivo visualization of living flatworm neurons using Lucifer Yellow intracellular injections. J. Neurosci. Meth. 69: 83-89.

Koopowitz, H., M. Elvin, and T. Bae. (1995). Comparison of the nervous system of the rhabdocoel, Mesostoma ehrenbergii, with that of the polyclad, Notoplana acticola. Hydrobiologia. 305: 127-133.

Elvin, M., H. Koopowitz (1994). Neuroanatomy of the rhabdocoel flatworm *Mesostoma ehrenbergii* (Focke, 1836) I: Neuronal diversity in the brain. J. Comp. Neurol. 343: 319-331.

MEGAN S. ENRIGHT

Environmental Analyst / Biologist

EDUCATION

- University of California, San Diego
  Bachelor's of Science in Biology-Ecology, Behavior and Evolution, 1997

PROFESSIONAL AFFILIATIONS

- Member, California Native Plant Society
- Member, Women's Environmental Council

EXPERIENCE SUMMARY

Ms. Enright is a biologist with five years experience in habitat restoration and biological assessments. She participated in coastal sage scrub restoration at the City of San Diego Miramar Landfill. The project included restoration design, native plant nursery management, and revegetation monitoring. Her current role at Dudek & Associates includes biological resources assessments and impact analyses, wetland delineations and permitting, vegetation mapping and rare plant surveys.

PROFESSIONAL ASSIGNMENTS

Wetlands Delineation, Wetlands Permitting and Biological Resources Reports

- **Transportation Corridor**. North County Transportation District - Oceanside to Escondido Rail Project, City of Oceanside, California. Delineated wetlands and prepared vegetation map within the Loma Alta Creek, Buena Vista Creek, Buena Creek, Agua Hedionda Creek, San Marcos Creek, and Escondido Creek Watersheds. Prepared Section 401 and Section 404 permit applications and 1601 Streambed Alteration Agreement for impacts to non-tidal, adjacent wetlands; impacts were associated with the rail system. Prepared alternatives analysis, functional values assessment, and Conceptual Wetlands Mitigation Plan. Assisted in the preparation of the biological resources report and CEQA documentation.

- **Roadway Corridor**. Camino Ruiz Road Alignment, San Diego-Future Urbanizing Area Subarea IV, California. Delineated wetlands, prepared vegetation map, and conducted rare plant surveys. Prepared Section 401 and Section 404 permit applications and 1603 Streambed Alteration Agreement for impacts to non-tidal, adjacent wetlands; impacts were associated with the roadway corridor. Prepared functional values assessment.

- **Roadway Improvements and Flood Protection Project.** City of San Marcos, California. Delineated wetlands, prepared vegetation map, and conducted rare plant surveys along San Marcos Creek from State Route 78 to Lake San Marcos.

- **Residential Subdivision.** The Irvine Company Planning Area 1, County of Orange, California. Prepared vegetation map and conducted rare plant surveys within the 4,000-acre project site. Prepared biological resources report for CEQA purposes.

- **Residential Subdivision and Commercial** Development. The Irvine Company Planning Areas 18 and 39, City of Irvine, California. Delineated wetlands and prepared vegetation map within the 1,200-acre project site. Developed wetlands permitting strategies with client.

- **Constraints Analyses**. Vista Unified School District, City of Vista and County of San Diego, California. Delineated wetlands and prepared vegetation map for three potential school sites. Other field investigations included surveys for state- and federally-listed threatened or endangered plant and wildlife species. Field investigations were incorporated into reports discussing biological constraints on the three potential school sites.

- **Landfill Closure and Embankment and Scour Protection**. Kern Valley Sanitary Landfill Closure Project, Kern County, California. Delineated wetlands and prepared Section 401 and Section 404 Letter of Permission permit applications and 1601 Streambed Alteration Agreement for impacts to non-tidal, adjacent wetlands; impacts were associated with the embankment and scour protection. Prepared functional values assessment.

- **Dredging Impact Analysis**. Old Mission Dam, San Diego, California. Prepared wetland delineation and vegetation map upstream of the historic Old Mission Dam. Prepared biological resources report for CEQA purposes. Coordinated with regulatory agencies regarding proposed dredging.

- **Focused Rare Plant Surveys.** Newhall Ranch, Los Angeles County, California. Conducted focused surveys for the state-listed endangered San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina)* on approximately 6,000 acres.

Habitat Restoration and Enhancement

- Monitored salt marsh and riparian creation and enhancement efforts at Rancho Santa Fe Road Bridge, Sorrento Valley Utilities Improvement (City of San Diego, Tijuana River Emergency Channel Mitigation, Green Valley Mobile Home Park Slope Stabilization and North Metro Interceptor Sewer Projects in San Diego, California. Conducted data analysis to determine success of restoration and enhancement efforts in terms of predetermined performance standards. Prepared subsequent monitoring reports which included the assessment of revegetation efforts and recommendations for further remedial actions.

- Monitored upland vegetative communities including coastal sage scrub revegetation efforts at Top of the World Reservoir and Pump Station, Laguna Beach, California. Prepared subsequent monitoring reports.

- Prepared Conceptual Wetland Mitigation Plan for the Emergency Sewer Repairs at various sites along Escondido Creek and for the Hale Avenue Resource Recovery Facility (HARRF) for the City of Escondido, California. Prepared Conceptual Wetland Mitigation and Revegetation Plan for the Torrey Del Mar Project within the City of San Diego Future Urbanizing Area Subarea I, California.

- Prepared Conceptual Vernal Pool Mitigation Plan including restoration and enhancement for the Manzanita Partners Property in Carlsbad, California. Project included delineating existing vernal pools for enhancement and mapping historical vernal pools for restoration.

- Assisted in the research and documentation for mitigation alternatives for SR-125-Caltrans. Focused on mitigation through the restoration of habitat for the federally-endangered Quino Checkerspot Butterfly (*Euphydryas editha quino*).

Construction and Erosion Control Monitoring

- Performed construction monitoring for the Sorrento Valley Utilities Improvement Project which included precise grading for the restoration of salt marsh and other riparian habitats.

- Inspected the North Reservoir Project which includes erosion/sediment methods to verify the project was in accordance with the Storm Water Pollution Prevention Program for the Laguna Beach County Water District in the City of Laguna Beach, California. Project included weekly monitoring visits to assess the function of the installed Best Management Practices for erosion control and subsequent observation reports, water quality sampling, and storm event monitoring.

Conservation Planning

- Assisted in the development of the Multiple Species Habitat Conservation Plan (MSHCP) for western Riverside County. Project involvement included research on potentially covered plant species followed by syntheses of ecological information.

PAUL LEMONS
Biologist

EDUCATION

- San Diego State University
  B.S. Biological Sciences, Emphasis in Ecology 2001

PROFESSIONAL CERTIFICATIONS

- Quino Checkerspot Butterfly Section 10(a)(1)(A) Recovery Permit
  (USFWS Federal Permit # TE051248-0)

EXPERIENCE SUMMARY

Mr. Lemons has a background in biology and environmental policy and regulation. As an undergraduate he worked as an intern at Mission Trails Regional Park in San Diego County. Paul assisted in the creation of a Habitat Conservation Plan for Mission Trails Regional Park in accordance with the City of San Diego and state guidelines.

Before working at Dudek and Associates, Inc. (DUDEK), Mr. Lemons worked as an intern for the San Diego Regional Water Quality Control Board where his duties included processing and review of Section 401 Water Quality Certification Applications and California Environmental Quality Act (CEQA) documents.

Since joining DUDEK, Mr. Lemons has been primarily involved with Biological monitoring and the preparation of Biological Technical Reports, Wetlands Mitigation and Monitoring Plans, and Environmental Permit Packages. Mr. Lemons was recently permitted to survey for the federally endangered Quino checkerspot butterfly, and will therefore be carrying out these surveys for future Dudek projects.

PROFESSIONAL ASSIGNMENTS

Mr. Lemons is currently providing monitoring, report writing, and/or support on the following projects:

- **University Commons Development Project, Biological monitoring, Carlsbad, CA.** Responsible for monitoring the clearing of native habitat to ensure clearing activities only occur within approved boundaries and that Best Management Practices are implemented.
- **Requeza Street Project, Encinitas, CA** Assisted in identifying plant species and mapping vegetation communities onsite.
- **Gordon Property, Vista, CA.** Project manager. Wrote Biological Constraints Analysis. Assisted with vegetation mapping and general wildlife surveys.
- **Torrey Ranch Project, San Diego, CA.** Responsible for preparation of the environmental permit package for this project. Prepared and submitted complete permit applications to the Regional Water Quality Control Board for section 401 Water Quality Certification, California Department of Fish and Game Section 1600 Streambed Alteration Agreement, and to the Army Corps of Engineers for Section 404.

- **Otay Ranch Village Two Biological Resources Report & Impact Analysis, Chula Vista, CA.** Conducted Quino checkerspot butterfly surveys within the project area.

Kim L. Marsden
4243 Copeland Avenue #3
San Diego, California 92105-1234
Phone (619) 563-6492

Kim L. Marsden

Botanist/Biologist

As a biologist with ten years of experience, Ms. Marsden has successfully conducted a diverse range of botanical and zoological surveys, including focused searches for rare and endangered species in coastal, mountain and desert plant communities. She has developed excellent botanical skills from not only a broad range of field identification experiences throughout the southwestern United States and northwestern Mexico, but training in botanical laboratory techniques used for plant identification, as well. Ms. Marsden has extensive experience in the analyses of potential impacts to species and habitats from proposed development projects. She prepares and reviews technical reports, which provide alternatives recommendations to mitigate these impacts. She has a thorough working knowledge of regulatory issues and applicable laws including the California Environmental Quality Act (CEQA), National Environmental Policy Act (NEPA), Federal Endangered Species Act (FESA), California Endangered Species Act (CESA), and the Clean Water Act as part of her resource agency experience working as a Botanist/Biologist for the California Department of Fish and Game, U.S. Fish and Wildlife Service, and through her project manager experience in the regulatory branch of the U. S. Army Corps of Engineers. Ms. Marsden has reviewed and commented on numerous proposed mitigation and monitoring plans for sensitive species. She is knowledgeable of, and skilled in, vegetation mapping, mitigation monitoring, and the design of habitat restoration plans. She also has extensive experience in conducting rare, threatened, and endangered animal surveys.

EDUCATION

Completed all required coursework for the Master's Program in Systematic Botany, San Diego State University, 1992-1994. Master's Research Topic: Systematics, ecology and natural history of Northwest American *Eryngium* species (Apiaceae).
Bachelor of Science, Biology, San Diego State University, 1992.
Associate of Science, Medical Laboratory Technology, San Diego Mesa College, 1988.

PUBLICATIONS

Marsden, Kim L. and Michael G. Simpson. 1999. *Eryngium pendletonensis* (Apiaceae), A New Species from Southern California. *Madroño*, 46:1, 61-64.

EXPERIENCE

1/01-present Associate Resource Ecologist, California Department of Parks and Recreation, Southern Service Center, San Diego.

Design long-term monitoring studies to assess the status and condition of vegetation communities, exotic species infestations, and rare plant populations. Conduct vegetation and rare plant inventories within State Parks in southern California. Assess the impacts of maintenance and development projects on biological resources within state park units. Provide technical botanical expertise to Service Center staff when requested. Assist in project environmental clearance under CEQA, ESA, and CESA. Assist other resources section staff in biological survey work and data analysis when necessary.

1/00 –1/01 Associate Biologist in Botany, California Department of Fish and Game, Region 5, San Diego Office.

Provided technical assistance in developing Habitat Conservation Plans to applicants/jurisdictions seeking take authorization under Section 2835 of the Fish and Game Code (Natural Community Conservation Program). Coordinated with the U.S. Fish and Wildlife Service Habitat Conservation Program staff to ensure HCP conformity with the Federal Endangered Species Act and the California Fish and Game code and other state and federal laws.

9/97-1/00 Fish and Wildlife Biologist/Botanist-U.S. Fish and Wildlife Service, Branch of Habitat Conservation Planning, Ecological Services, Carlsbad Field Office.

Provided technical assistance in developing Habitat Conservation Plans to applicants/jurisdictions seeking take authorization under section 10 of the Endangered Species Act. Coordinated with California Department of Fish and Game Natural Community Conservation Program (NCCP) staff to ensure HCP conformity with the Endangered Species Act and the Fish and Game code.

Evaluated and commented on projects impacting U.S. Army Corps of Engineers' jurisdictional Waters of the United States pursuant to the Fish and Wildlife Coordination Act. Consulted and conferred with other federal agencies under section 7 of the Endangered Species Act (Act) to analyze effects of federal actions on species proposed for listing or listed as endangered, threatened under the Act.

Provided technical expertise to Field Office staff in evaluation of revegetation, restoration and enhancement projects of upland, riparian, and wetland habitats. Provided general botanical expertise to Field Office staff biologists when needed.

7/96-9/97 Botanist-U.S. Fish and Wildlife Service-Branch of Federal Projects, Ecological Services, Carlsbad Field Office.

Conducted complete biological surveys for plants and wildlife for impact assessments of proposed land and water development projects. Prepared biological technical reports, including analyses of project alternatives developed from the results of directed sensitive species and community surveys. Developed sampling protocols for vegetation communities; provided botanical expertise to staff biologists and made recommendations for resource protection and enhancement. Surveyed for, and monitored the status of, federal candidate, proposed, and listed plant and animal taxa. Assisted in amphibian and reptile pit-fall trapping survey efforts. Provided technical expertise to Field Office staff biologists for evaluation of revegetation, restoration and enhancement efforts of upland, riparian, and wetland habitats.

11/95-7/96 Biologist/Project Manager, U. S. Army Corps of Engineers, Regulatory Branch, San Diego Field Office.

Project management, including evaluation of impacts to jurisdictional Waters of the United States, including wetlands, associated with permit requests pursuant to section 404 of the Clean Water Act, section 10 of the Rivers and Harbors Act, and section 103 of the Marine Sanctuaries Act. Processed permit applications, composed letters to applicants, evaluated compliance with permit conditions and coordinated with other agencies regarding proposed permit activities affecting biological, historical and water resources.

3/95-10/97 Botanist (Seasonal), Lake Cuyamaca Recreation and Park District, Julian, CA.

Project Manager of the Lake Cuyamaca downingia, Lake Cuyamaca larkspur, and Parish's meadowfoam monitoring program. Developed sampling and monitoring protocols for sensitive plant species. Coordinated rare plant monitoring activities in accordance with interagency Memorandum of Understanding guidelines, including mapping of rare plant populations using Geographic Information System (GIS) technology to assess annual boundary changes of plant subpopulations; prepared annual biological technical reports. Supervised and trained field personnel in established survey methodology; ensured thorough documentation of survey and monitoring activities through complete field notes.

4/94-10/94 Research Assistant II, San Diego State University Foundation; Contract biologist for U.S. Air Force, Luke Air Force Base, Gila Bend, Arizona. Small mammal monitoring (Dr. Lee McClenaghan).

Live-trapped small mammals, recorded life history data, tagged/marked animals, and recorded animal locations for home range determination. This project assessed the effects of low-altitude jet noise on predator-prey (kit foxes/rodents) relationships in a desert scrub community.

4/94-12/94 Environmental Services Intern, California Department of Parks and Recreation, Southern Service Center, San Diego, CA

Performed vegetation sampling, and conducted reptile, bird (including least Bell's vireo), and small mammal surveys for incorporation into a GIS database for the Anza Borrego Desert State Park General Plan. Developed sampling protocols for sensitive plant species; mapped vegetation, evaluated plant community composition and classified vegetation types according to several classification schemes; identified unknown plant species using dichotomous plant keys; conducted literature searches on sensitive plant, wildlife, and vegetation communities; entered vegetation/wildlife data into databases.

6/93-11/96 Research Assistant II, San Diego State University Foundation; Contract biologist for CALTRANS District 11, San Diego, CA

Conducted biological field surveys for plant, wildlife, and vegetation inventories within proposed transportation project corridors, including focused surveys for sensitive plant and animal taxa. Supervised and coordinated other field personnel, evaluated proposed projects for impacts to biological resources; used microscope and dichotomous plant keys to identify unknown plant species; mapped and evaluated plant communities for classification using several vegetation classification schemes. Collected, prepared and cataloged plant voucher specimens, verified taxonomic status of plant specimens, and maintained the onsite herbarium. Mapped sensitive biological resources, prepared biological technical reports; monitored sensitive plants reintroduction projects including *Dudleya viscida*, *Dudleya variegata*, and *Muilla clevelandii;* monitored riparian mitigation projects. Performed literature and database searches for sensitive plants, wildlife and habitats.

5/93-10/95 Botanist (Seasonal)- Regional Environmental Consultants (RECON), San Diego.

Conducted focused surveys for vernal pools and their associated rare plant species. Mapped vernal pools and associated watersheds for incorporation into GIS database; collected baseline species inventory and ecological data for vernal pool restoration monitoring projects; performed literature and database searches;

and mapped exotic pest plant populations for the Fallbrook Naval Weapons Center Noxious Weed Management Program.

8/92-6/93 Graduate Teaching Assistant, San Diego State University, Department of Biology.

Taught bi-weekly laboratory classes in Human Anatomy, supervised two undergraduate teaching assistants, developed study aids, wrote and graded practical exams.

4/92-10/92 Botanist-Research Assistant II, San Diego State University Foundation (for Dr. Paul Zedler).

Mapped sensitive plant species, monitored rare plant growth and distribution; collected, prepared and cataloged plant voucher specimens, verified taxonomic status of plant specimens, wrote species accounts and created botanical illustrations for final report.

6/91-6/92 Botanical Research Assistant II, San Diego State University Foundation (for Dr. Michael Simpson).

Prepared plant materials using histological techniques including plant dissection, paraffin embedding, and sectioning of plant floral material for preparation and mounting on microscope slides. Other duties included botanical illustration, data entry on PC and MacIntosh computers, computerized video image analysis, photographic darkroom work, including developing and printing of black and white film.

PERM

ITS & SURVEY EXPERIENCE

California Department of Fish and Game, Rare, Threatened, and Endangered Plant Collection Permit.

Extensive field work as a U.S. Fish and Wildlife Service employee participating in field surveys for rare, threatened and endangered species including plants, invertebrates (e.g., fairy shrimp species and Delhi Sands flower-loving fly), birds (e.g., light-footed clapper rail, coastal California gnatcatcher, and least Bell's vireo), and mammals (e.g., pacific pocket mouse).

RICK RIEFNER
Biologist/Botanist
Wetlands Specialist And Habitat Restoration Ecologist

SUMMARY OF QUALIFICATIONS:

Mr. Riefner is a field and research biologist, botanist, and wetlands specialist with additional advanced training in habitat restoration and the geomorphology of vernal pools. In the course of his professional experience, Mr. Riefner has published numerous peer-reviewed articles for scientific journals and professional conferences. He has most recently been studying the ecology of Mediterranean-type climates, describing altered fire regime impacts to late-succession species, soil-landform indicators of ephemeral wetlands, habitat ecologies isolating vegetation in California's white oak savannas, nitrate immobilization to control exotic plants, and the role of biological soil crusts in maximizing biodiversity of endangered/threatened species habitats, such as coastal bluff outcrops for Verity's Dudleya, and open-habitat soils for the Quino Checkerspot Butterfly. As a botanist, Mr. Riefner has diverse field experience in both the cryptogamic and phanerogamic vegetation communities of cismontane southern California. He is an expert on the lichens of California, and has discovered and characterized species new to science, reported taxa new to North America, and discovered a new population of an extremely rare species, *Texosporium santi-jacobi*. With the vascular plants, he has discovered a native annual presumed extinct, *Chorizanthe parryi* var. *fernandina*, an African grass new to North America, *Dinebra retroflexa*, and a disjunct population of an extremely rare shrub, *Baccharis malibuensis*. As a restoration ecologist, he was the first to utilize land imprinting and mycorrhizal inoculum in southern California for large-scale restoration of coastal sage scrub, and also was the first to incorporate biological pollution control techniques using submerged aquatic plants, without chemicals, in order to establish and maintain aquatic functions in constructed lakes for wetland mitigation programs in golf courses. He has also designed and implemented a successful large-scale eradication of giant reed (*Arundo donax)* using an hydroax to restore native riparian and alluvial scrub vegetation. Mr. Riefner has particular expertise in the geomorphology/ecology of southern California vernal pools and playas, and has described fluctuations in vegetation, new interpretation of mima mound landforms, and nutrient cycling in these ecosystems that have not been previously studied. He has also served as project manager for numerous wetland delineations, permitting for Section 404 of the Clean Water Act and Section 1600 of the California Fish and Game Code, biological assessment of endangered species, and the design and implementation of mitigation and habitat monitoring programs for clients throughout southern California.

SELECTED RECENT PROFESSIONAL EXPERIENCE:

The 3M Corona Plant Project: Task manager for wetland delineation, vegetation mapping, and assessment of impacts to coastal sage scrub and Stephens' kangaroo rat (*Dipodomys stephensii*); prepared riparian mitigation design and implementation, application for a Department of the Army 404 individual permit, 401 and 1603 regulatory permitting, Section 7 nexus for the threatened California gnatcatcher (*Polioptila californica californica*), and environmental alternatives analysis for a quarry development project at the 1,321-acre 3M Corona Plant in Riverside County.

Owens Lake Project: Conducted an inventory of algae, cyanobacteria, and biological crusts at Owens Lake to assess potential use of soil-binding organisms to reduce erosion, control particulate emissions, and restore element cycling functions to the dry lake for the Great Basin Unified Air Pollution Control District.

North Peak Project: Task manager for wetland delineation, application for a Department of the Army individual permit and 401 water quality certification pursuant to Section 404 of the Clean Water Act, and State of California 1603 streambed alteration agreement; helped design a chemical-free lake management program utilizing submerged aquatic plants to control pollutants, and designed a riparian forest mitigation plan for a 1,800-acre golf course community / 800-acre conservation bank project near Lake Elsinore, Riverside County.

Liberty Project: Task manager for preparing 404 permits, 401 certification and 1603 Streambed Alteration Agreement, and environmental alternatives analysis for a master-planned community in Lake Elsinore, western Riverside County. Prepared a 120-acre wetlands habitat enhancement project consisting of an operations and management plan, a multi-habitat planting plan, and a monitoring plan incorporating technical aspects of HGM and an ecosystem functional analysis for the back basin of Lake Elsinore. Performed and defended a wetland delineation of potential wetland/jurisdictional habitats associated with the back basin of Lake Elsinore. Delineation defended non-hydric lakebed soils and potentially jurisdictional features including: micro-depressions, desiccation cracks, algal crusts, playa-like habitat, and historic watershed analysis.

California Department of Parks and Recreation - Orange Coast District: Assisted Dr. Roy Shlemon (R.J. Shlemon Associates) and Gerald G. Kuhn (International Foundation for Applied Research in the Natural Sciences) with geotechnical field investigations of a mima mound field at San Clemente State Park, Orange County, to study the formation of mounds and identify features effecting the formation of vernal pools.

- Prepared a bio-technical report and CEQA analysis for a coastal bluff revegetation project / rare plant management program for Blochman's dudleya (*Dudleya blochmaniae*) at San Clemente State Beach.

- Conducted protocol presence/absence and nest monitoring surveys for the coastal California gnatcatcher on the 2,676-acre San Onofre State Park lands in Orange and San Diego counties, and Crystal Cove State Park and San Clemente State Beach in Orange County.

Land Imprinting to Restore Coastal Sage Scrub: Designed, implemented, and monitored approximately 50 acres of coastal sage scrub restoration in Orange, Riverside, and San Diego counties using a land imprinter and mycorrhizal inoculum.

Arundo Removal: Designed and implemented a successful large-scale eradication of giant reed (*Arundo donax)* using an hydroax, nitrate immobilization techniques, a multi-habitat planting palette, and creation of micro-topographic diversity in order to restore riparian and alluvial scrub habitats along Temescal Wash at the 3M Plant in Corona, Riverside County.

NCCP North Ranch Policy Plan Area in Orange County: Helped to design and implement a drift-fence/pitfall trapping study to document the herpteofauna, and conducted focused surveys and a habitat assessment for the federally listed Arroyo Toad and Red-Legged Frog at this 9,500-acre property.

Botanical Surveys: Performed numerous focused surveys for sensitive and endangered plant species in southern and central California such as (but not limited to) Lyon's pentachaeta (*Pentachaeta lyonii*), Braunton's milk-vetch (*Astragalus brauntonii*), ditch navarretia (*Navarretia fossalis*), Laguna Beach dudleya (*Dudleya stolonifera*), big-leaved crown beard (*Verbesina dissita*), Orcutt's grass (*Orcuttia californica*), salt marsh bird's-beak (*Cordylanthus maritimus* & *C. palustris*), slender-horned spine-flower (*Dodecahema leptoceras*), Parish's meadowfoam (*Limnanthes gracilis parishii*), Conejo buckwheat (*Eriogonum crocatum*); and the many-stemmed dudleya (*Dudleya multicaulis*), beargrass (*Nolina cismontana*), and Coulter's saltbush (*Atriplex coulteri*) for the NCCP's Southern Subregion Reserve, the 9,500-acre North Ranch Policy Plan Area, and the 13,000-acre East Orange Project.

California Environmental Quality Act Project: Prepared a CEQA analysis of indirect impacts, and designed mitigation measures that would reduce potentially significant secondary impacts to the federally-listed threatened Conejo Dudleya (*Dudleya parva*) to a level of insignificance at a single-family dwelling site in the City of Thousand Oaks, Ventura County.

Mr. Riefner has also conducted numerous wetland delineations, provided regulatory services, and/or designed and implemented bio-tech surveys, and mitigation and habitat monitoring programs for clients throughout southern California, including: the Carlsberg Project, Oak Park, Ahmanson Ranch, Big Sky, and Stevenson Ranch in Ventura County; Paloma del Sol, Audi Murphy Ranch, Greer Ranch in Riverside County; and Sunny Creek and Sunny Terraces, Del Mar Highlands Estates, the Future Urban Planning Areas in San Diego County, the Irvine Ranch Water District in Orange County, and the Inland Feeder Project in Riverside County and San Bernardino County for the Metropolitan Water District of Southern California.

PROFESSIONAL EMPLOYMENT HISTORY:

10/2001 - Present	Botanist, Wetland Specialist, and Habitat Restoration Ecologist; Glenn Lukos Associates, 29 Orchard, Lake Forest, CA 92630-8300.
1/2001 - 10/200	Consulting Biologist; Rick Riefner Associates, Tustin, CA 92780.
9/2000 - 1/2001	Senior Biologist; Psomas Inc., 3187 Red Hill Ave, Coasta Mesa, CA 92626.
11/1999 - 8/2000	Senior Botanist & Wetlands Specialist; Harmsworth Associates, Dove Canyon, CA.
8/1995 - 10/1999	Habitat Restoration Specialist; Glenn Lukos Associates, 23441 South Pointe Dr., Laguna Hills, CA 92653.

4/1994 - 7/1999	Environmental Services Intern; California Park Service, Orange coast District, San Clemente, CA 92672.
5/1992 - 8/1992	Museum Scientist; Museum of Systematic Biology, University of California, Irvine, CA 92679.
1982 - 1990	Night Manager-Bartender; Crazy Horse Steakhouse, Santa Ana, CA.
1977 - 1981	Lab Technician: Analytical Chemistry & Microbiology; Joseph E. Seagram & Sons, Relay, Maryland.
1976 - 1977	Biologist; Maryland Department of Natural Resources, Land Planning Services, Annapolis, Maryland.

EDUCATION:

1981	Post graduate studies - University of Michigan Biological Station
1980	Post graduate studies - University of Maryland, College Park
1975	B.S. - Biology - Towson State University, Maryland

AWARDS:

1999. *Outstanding Contribution to Field Botany in Southern California: Rediscovery of Chorizanthe parryi var. fernandina.* Presented by Southern California Botanists, Biodiversity Conference, California State University, Fullerton, 23 October 1999.

SPECIAL PERMITS:

U.S. Fish and Wildlife Service Endangered Species Permit 10(a)1(A) PRT-827494, renewal: TE-827494-1; presence/absence surveys and nest monitoring of Coastal California Gnatcatcher (*Polioptila californica californica*); expires 10-19-2003.

CA Department of Fish and Game, State Resident Scientific Collecting Permit; marine algae - tidal invertebrates, and special concern reptiles and amphibians; PRT No. 801029-05; renewal 801046-01, expires 4-11-03.

PROFESSIONAL AFFILIATIONS:

American Geophysical Union
CalEPPC
California Botanical Society
California Native Plant Society
California Lichen Society
Natural Areas Association
Rancho Santa Ana Botanic Garden - *Research Associate*

Sigma Xi, The Scientific Research Society – *University of California, Riverside*
Society for Ecological Restoration
Southern California Botanists

SYMPOSIA / CONFERENCE PARTICIPANT:

2000. *Trends and Lessons in Ecological Restoration.* SERCAL Conference 2000. "Biological Crusts and Rock-Loving Lichens Enhance Seedling Establishment of Rare *Dudleya* Species [Crassulaceae] in Southern California." Poster presented October 26-29, Santa Barbara. R.E. Riefner, Jr. and Carl Wishner.

2000. *Exotic Plants in the Landscape: Processes and Patterns.* CalEPPC Symposium 2000. "Biological Exclusion of Exotic Weeds from Open-Soil Habitats and the Conservation of Endangered Species." Poster presented October 6-8, Concord. R.E. Riefner, Jr. and T. St. John.

1997. *Restoration As Process.* SERCAL Sixth Conference, San Luis Obispo. "Native Grasses, Mycorrhizae, and Soil-Surface Processes Restore Ecosystem Function." T. St. John, R.E. Riefner, Jr., and D.R. Pryor.

1997. *Annual Association Of Engineering Geologists,* Portland. "Origin of Mima-Mound Fields." R. Shlemon, G. Kuhn, B. Boka, and R.E. Riefner, Jr.

1997. *Second Interface Between Ecology And Land Development In California,* Occidental College, Los Angeles. "Prescribed Burning Impacts to Late Succession Species." P.A. Bowler and R.E. Riefner, Jr.

1984. *Threatened And Endangered Plants And Animals Of Maryland.* Maryland Natural Heritage Program - The Nature Conservancy. "Ecology and Floristics of Limestone Habitats in Maryland." Baltimore, Maryland. R.E. Riefner, Jr. and S.R. Hill.

SELECTED ADDITIONAL TRAINING:

2002	*Invasive Plant School*: University of California, USDA Cooperative Extension, San Diego. Certificate of Completion.
2002	*Laboratory Methods for Identification of Mycorrhizal Infection*: St. John Consulting, Riverside.
2000	*CEQA and Strategic Planning*: UCLA Extension, Universal City.
2000	*Field Biology in the New Century: Changing roles for the public and private sector:* The Wildlife Society, Riverside.

1999 *Neotectonics in North Coastal San Diego County, California*: American Geological Society, Carlsbad; and South Coast Geological Society, Santa Ana.

1998 *Declining Amphibians in California*: San Diego Natural History Museum.

1997 *The Elfin Forest: Southern California Chaparral*: Southern California Botanists, California State University, Fullerton.

1997 *California Coastal Geology*: International Foundation for Applied Research in the Natural Sciences, Carlsbad.

1996 *CalEPPC Symposium '96*: California Exotic Pest Plant Council, San Diego.

1996 *Ecology, Conservation, and Management of Vernal Pool Ecosystems*: CNPS, Society for Ecological Restoration, and The Wildlife Society, Sacramento.

1996 *Wetland Delineation*: Army Corps of Engineers, 1987 Manual. The Wetland Training Institute, Sacramento. Certificate of Completion.

1995 *Native Grassland Vegetation*: California Native Grass Association. Santa Ana Botanic Garden, Claremont. Certificate of Completion.

1994 *Brushfires in California Wildlands: Ecology and Resource Management*. Southern California Academy of Sciences, University of California, Irvine.

1994 *Habitat Restoration Case Studies*: University of California, Riverside.

PUBLICATIONS:

Riefner, R.E., Jr. and D.R. Windler. 1979. *Polygonum perfoliatum* L. established in Maryland. *Castanea* 44:19-23.

Riefner, R.E., Jr. 1979a. *Leucothoe axillaris* var. *editorum* (Fern. & Schub.) Ahles new to Maryland. *Castanea* 44: 59.

Riefner, R.E., Jr. 1979b. Additions to the vascular flora of Maryland. *Castanea* 44: 186-187.

Riefner, R.E., Jr. and J. Tremper. 1980. *Magnolia macrophylla* Michaux naturalized in Maryland. *Phytologia* 46: 283-284.

Riefner, R.E., Jr. and D.R. Windler. 1980. Devil's tail invades Maryland. *Maryland Conservationist* 56: 8-11.

Riefner, R.E., Jr. 1981a. Notes on some proposed rare and endangered vascular plant species in Maryland. *Phytologia* 47: 397-403.

Riefner, R.E., Jr. 1981b. Studies on the Maryland flora VII: Addition of *Cyperus houghtonii* Torrey and *Juncus trifidus* var. *monanthos* (Jacq.) Bluff & Fing. to the state flora. *Phytologia* 48: 146-150.

Riefner, R.E., Jr. 1981c. Studies on the Maryland flora VIII: Range extensions of *Polygonum perfoliatum* L., with notes on introduction and dispersal in North America. *Phytologia* 50: 152-159.

Riefner, R.E., Jr. 1982. Studies on the Maryland flora IX: *Cakile maritima* Scop. naturalized in the Chesapeake Bay region. *Phytologia* 50: 207-208.

Hill, S.R. and R.E. Riefner, Jr. 1982. New records and distributional notes on Maryland pteridophytes. *American Fern Journal* 72: 45-58.

Riefner, R.E., Jr. and S.R. Hill. 1983. Notes on infrequent and threatened plants of Maryland including new state records. *Castanea* 48: 117-137.

Voss, E.G. and R.E. Riefner, Jr. 1983. A pyralid moth (Lepidoptera) as pollinator of blunt-leaf orchid. *Great Lakes Entomologist* 16: 57-60.

Riefner, R.E., Jr. and S.R. Hill. 1984. Ecology and floristics of limestone areas: An important habitat for Maryland plants. *In*: Norden A.D., D. Forester and G.H. Fenwick (eds.). Threatened and endangered plants and animals of Maryland. *Maryland Natural Heritage Program Special Pub*. 84-1: 161-193. Maryland Dept. of Natural Resources.

Riefner, R.E., Jr. 1989. *Punctelia punctilla* (Hale) Krog new to North America. *Phytologia* 67: 254-257.

Riefner, R.E., Jr. 1990. *Pertusaria pseudocorallina* and *Ramalina fastigiata* new to North America. *Mycotaxon* 39: 31-41.

Bowler, P.A. and R.E. Riefner, Jr. 1990. A preliminary lichen checklist of the University of California, Irvine campus and the San Joaquin Wetlands. *Crossosoma* 16(6): 1-10.

Riefner, R.E., Jr. and P.A. Bowler. 1994. *Ramalina baltica* and *Ramalina canariensis* in North America. *Mycotaxon* 51: 495-501.

Riefner, R.E., Jr. and P.A. Bowler. 1994. *Ramalina puberulenta*: A new lichen from California. *Mycotaxon* 52: 247-257.

Bowler, P.A., R.E. Riefner, Jr., J. Marsh, T.H. Nash III, and P. Rundel. 1994. New species of *Niebla* (Ramalinaceae) from North America. *Phytologia* 77: 23-37.

Riefner, R.E., Jr. and P.A. Bowler. 1995. Cushion-like fruticose lichens as *Dudleya* seed traps and nurseries in coastal communities. *Madroño* 42: 81-82.

Riefner, R.E., Jr., P.A. Bowler, J. Marsh, and T.H. Nash III. 1995. *Niebla tuberculata* (Ramalinaceae): A new lichen from California. *Mycotaxon* 54: 397-401.

Bowler, P.A. and R.E. Riefner, Jr. 1995. Notes on the *Ramalinaceae* and current related research in California, U.S.A. *Bulletin of the California Lichen Society* 2: 1-5.

Riefner, R.E., Jr., P.A. Bowler, and B. Ryan. 1995. New and interesting records of lichens from California. *Bulletin of the California Lichen Society* 2: 1-11.

Bowler, P.A., W.A. Weber, and R.E. Riefner, Jr. 1996. A lichen checklist of San Clemente Island, California. *Bulletin of the California Lichen Society* 3:1-8.

Riefner, R.E., Jr. and D. Pryor. 1996. New locations and interpretation of vernal pools in southern California. *Phytologia* 80: 296-327.

Shlemon, R.J., G.G. Kuhn, B. Boka, and R.E. Riefner, Jr. 1997. Origin of a mima-mound field, San Clemente State Park, Orange County, California: A test of the seismic hypothesis. *In*: Program with Abstracts - *40th Annual Association of Engineering Geologists* - pages 148-149, Portland.

Bowler, P.A. and R.E. Riefner, Jr. 1997. Prescribed burning impacts to late successional species. J. Keeley (ed.) Proceedings for the *Second Interface Between Ecology and Land Development in California*. Poster presented: Occidental College, Los Angeles.

St. John, T., R.E. Riefner, Jr., and D.R. Pryor. 1997. Native grasses, mycorrhizae, and soil-surface processes restore ecosystem function. *In*: Program with Abstracts - *Restoration as Process through Philosophy, Ecology and Community* - page 70, SERCAL Sixth Annual Conference, San Luis Obispo.

Riefner, R.E., Jr., D.R. Pryor, and T. St. John. 1998. Effects of Mycorrhizae: Restoration at San Onofre State Beach, California. *Land and Water* 42: 15-18.

Riefner, R.E., Jr., J. Tiszler, and S. Boyd. 1999. Noteworthy Collection: *Navarretia mellita* in Ventura County, CA. *Crossosoma* 25: 83-84.

Riefner, R.E., Jr. 1999. [Cover Photograph]. *CalEPPC News*. Spring 7: 1

Riefner, R.E., Jr. and C. Wishner. 2000. Biological crusts and rock-loving lichens enhance seedling establishment of rare *Dudleya* species (Crassulaceae) in southern California. J. St. John and S. Clark (eds.). Trends & Lessons in Ecological Restoration. *In:* Program with Abstracts, pg. 39, *The Seventh Annual Conference of SERCAL*. Poster Presented: October 26-29, 2000, University of California at Santa Barbara.

Riefner, R.E., Jr. 2000. Noteworthy Collection: *Xanthoparmelia angustiphylla* in the Santa Ana Mountains, Orange County, CA. *Crossosoma* 26: 15-16.

Bowler, P.A. and R.E. Riefner, Jr. 2000. Prescribed burning impacts to late successional species. Pp 71-73. J. Keeley, M. Baer-Keeley, and C.J. Fotheringham (eds.) *Second Interface Between Ecology and Land Development in California*. U.S. Geological Survey Open-File Report 00-62.

Riefner, R.E., Jr. 2002. [Cover Photograph]. Nature's perfect erosion control plants. *CyanoNet,* BioNet LLC, Marina, CA.

Riefner, R.E., Jr., S. Boyd, and R.J. Shlemon. 2002. *Eleocharis obtusa* var. *engelmannii* new to southern California. *Crossosoma* 27: 52-54.

Riefner, R.E., Jr. and T. St. John. In press. Biological exclusion of exotic weeds from open-soils habitats and the conservation of endangered species. J. DiTomaso (ed.). Exotic Plants in the Landscape: Patterns and Process. *In*: Proceedings for the *California Exotic Pest Plant Council Symposium 2000.* Poster presented October 6-8, 2000, Concord.

Riefner, R.E., Jr., and S. Boyd. In Press. *Malacothrix saxatilis* var. *saxatilis* discovered in Orange County, southern California. *Crossosoma*.

Riefner, R.E., Jr., C. Wishner, P.A. Bowler, and T. Mulroy. In press. Rock-inhabiting lichens and biological crusts enhance recruitment success of rare *Dudleya* species [Crassulaceae] in southern California. *Crossosoma.*

Riefner, R.E., Jr., G. Pratt, R. J. Shlemon. In review. *Texosporium santi-jacobi*, a new record of a rare soil lichen and the importance of preserving open-habitat soils in southern California. *Madroño.*

Columbus, J.T., R.E. Riefner, Jr., and S. Boyd. In Preparation. *Dinebra retroflexa*, an African grass new to North America. *Madroño.*

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Education

B.Sc. in Biology, specializing in Botany;
University of California, Riverside. June 1975.

Employment

1. U.S. Department of the Interior, Bureau of Land Management (Riverside and Bakersfield Districts and California Desert Plan Staff). Aug. 1975 to Apr. 1978 During this period I held positions as a Wildlife Biologist, Natural Resource Technician, and Range Conservationist and worked on the following projects:

   California Desert Plan
   Geothermal Energy Leasing Environmental Impact Statements
      East Mesa
      N. Salton Sea
      Red Mountain
      Yuha Basin
   McCain Valley Habitat Management Plan
   Owens Valley Range Program
   Sun Desert Transmission Line E.I.S.

In the course of these projects I conducted extensive field surveys of vegetation and wildlife in the desert of southern California and in the Owens Valley.

2. University of California, Riverside. Dept. of Biology. Staff Research Associate and resident biologist at the James Reserve in the San Jacinto Mountains of Riverside County California. April 1978 to Sept. 1979. While at the James Reserve I surveyed the flora and fauna of the San Jacinto Mtns. and began the compilation of a list of the plants of the reserve, which was later completed in cooperation with Ken Berg, my successor.

3. University of California, Riverside. Dept. of Botany & Plant Sciences. Since September 1979 I have been Museum Scientist and curator of the Herbarium. This has involved extensive work with the flora of the southwestern U.S. and adjacent areas. I have identified literally tens of thousands of plant specimens and have enlarged the UCR

collection to ten times its former size. I have personally collected over 24,000 plant specimens in western North America. As a result of my work at the herbarium, I have come to be extremely familiar with the flora of southern California and can identify the overwhelming majority of plant species from this area on sight.

Additional Experience

I have contributed botanical/biological inventories for the following projects in California. This list is not comprehensive, but is representative.

Imperial Co.
Botanical Survey for U.S. Navy, Chocolate Mtns. Aerial Gunnery Range. 1988-1991.

Kern Co.
Biological Survey for a parcel near Rosamond, prepared for Land Concepts, Inc. 1988.

Botanical Survey for Silver Peak Mine Expansion, prepared for Weber & Weber Mining Consultants. 1989.

Botanical Survey of the Wind Wolves Preserve (San Emigdio Ranch), prepared for the Wildlands Conservancy. In progress.

Los Angeles Co.
Botanical Survey for Portuguese Bend Land Use Plan, prepared for England and Nelson Environmental Consultants. 1976.

Botanical survey of El Segundo Dunes, for L.A. International Airport, through Agresearch, Inc. 1987-1988.

Botanical surveys for several projects in the Lancaster vegetation management zone, prepared for the Dept. of Community Development, City of Lancaster. 1988-1989.

Orange Co.
Botanical survey for Land Use Plan for the Silverado-Santiago area of the Santa Ana Mtns., prepared for England & Nelson Environmental Consultants. 1976.

Riverside Co.
Botanical survey for the Riverside Co. Southwest Territory General Plan, for Riverside Co. Planning Dept. 1977.

Botanical survey for the Army Corps of Engineers Whitewater Flood Control Project. 1980.

Botanical Survey for Kacor Realty Wolf Valley Development, prepared through L. LaPré, consultant. 1981.

Botanical survey of the U. C. Motte Reserve near Perris. 1982.

Botanical survey of 500 ac. property near Murrieta, prepared for P. Principe, consultant. 1988.

Botanical survey of the Nature Conservancy Oasis de Los Osos Preserve. 1985-1988.

Biological Survey for Proposed Sanderson Ave. Bridge and Realignment, near San Jacinto, prepared for Myra L. Frank and Associates. 1990.

Rare plant Survey for the Coachella Valley Multi-Species Habitat Conservation Plan, prepared through Thomas Olson & Associates. 1995.

Botanical Survey of a pipeline route along the San Jacinto River, prepared through KDJ and Associates. 1996.

Botanical Survey of the Shipley Multi-species Reserve at Lake Skinner. In progress.

San Bernardino Co.
Biological survey for Big River Development, Colorado River near Parker. 1980.

Botanical Survey for Cactus Hill Mine, Ivanpah Mtns, prepared for J. McMains, consultant. 1985.

Biological survey of 640 ac. parcel near Pioneertown prepared for The Nature Conservancy. 1986.

Botanical Survey for Don Brown Racing Facility, Cajon Pass area. 1986.

Botanical Survey for Hart Mine expansion, Mojave Desert, prepared for J. McMains, consultant. 1986.

Scoping Report for Santa Ana River Resource Management Plan, prepared for the County of San Bernardino Dept. of Environmental Public Works. 1987.

Biological survey for Devil Canyon Powerplant expansion, prepared for the California Dept. of Water Resources. 1987.

Botanical survey for Glen Helen Sheriff's Academy expansion, prepared for the San Bernardino County Sheriff's Dept. 1987.

Biological Survey for the Daley Transit Mix Property near Ft. Irwin, Mojave Desert. 1988

Botanical Survey for proposed Davis Ranch Mine, Cajon Pass, prepared for Weber & Weber Mining Consultants. 1989.

Botanical Survey for Silver Peak Mine Expansion, prepared for Weber & Weber Mining Consultants. 1990.

Botanical Survey for Cajon East (Cleghorn) Mine Expansion, prepared for Weber & Weber Mining Consultants. 1990.

Botanical Survey for National Can Parcel, Verdemont, prepared for McClelland Associates. 1990.

Biological Survey of Birmingham Ranch, prepared for the City of Yucaipa. 1992.

Biological Survey of Porter Ranch, prepared for the City of Yucaipa. 1993.

Biological Survey of the Yount/Mitchell property near Yucaipa, prepared for Robin Isakson & Associates. 1993.

Biological Survey of 100 acre property in Yucaipa, prepared for George Polycrates and Associates. 1996.

Botanical Survey of the central Avawatz Mtns., Mojave Desert, prepared for Gordon F. Pratt, consulting entomologist. 1997.

Outside of California I have done extensive field work and made numerous plant collections throughout the southwestern U.S., but particularly in Nevada and Arizona. I have also worked extensively in Mexico and am presently involved in three floristic projects in that country. I spent 12 weeks doing botanical survey work in Costa Rica during 1995 and 1996.

In addition to the above, I regularly make plant identifications (including fossils) for professional biological consultants, for scientific researchers, and for the general public. I commonly make plant identifications for biological consultants, and over the years have literally made thousands of such determinations. I have identified plants on one or more occasions for the following Riverside County Qualified Environmental Consulting Firms and have done so regularly for several of them (*):

AMEC Earth & Envir., Inc.*
Beaman Biological Consulting
Biological Resource Specialists
Campbell Biological Consulting
CH2M Hill*
David E. Bramlet
Glen Lukos Assoc.
Harmsworth Assoc.
James Cornett Ecol. Cons
Joan R. Callahan
Kelly Volansky*

Ken Osborne
LSA Assoc.*
Natural Resource Assessment, Inc.*
P. & D. Environmental*
PCR Inc.
Principe and Assoc.
San Bernardino Co., Museum
Statistical Research Inc.
Ted Rado
TeraCor Resource Mgmt.*
TetraTech
Thomas Olsen & Assoc. *
Tierra Madre Connsultants*
Tom Dodson & Assoc.*
VHBC Consulting
W.D. Wagner
White & Leatherman*

I am generally recognized as one of the foremost authorities on the flora of Southern California and am regularly contacted by the US Fish & Wildlife Service and California Dept. of Fish and Game for information on the status and distribution of threatened and endangered plant species. In particular, I was queried regularly about species covered by the Riverside County MSHCP. I am regularly called upon to identify plant fragments which represent evidence in criminal cases.

Publications

Boyd, S. and A.C. Sanders. 1999. "Noteworthy Collections, California – Dicentra chrysantha, Euphorbia anramsiana, Holocarpha heermannii, Madroño 46 (2): 112.

Costea, M., A.C. Sanders & J. G. Waines. 2001. Preliminary results toward a revision of the Amaranthus hybridus species complex (Amaranthaceae) Sida 19 (4): 931-974

Costea, M., A.C. Sanders & J. G. Waines. 2001 Notes on some little known Amaranthus taxa (Amaranthaceae) in the United States Sida 19 (4): 975-992.

Costea, M., A.C. Sanders & J. G. Waines. 2002? Amaranthus Aliso In press

Cudney, D., C. Bell & A. C. Sanders. 1997. Weedy spurges in California, U. C. Extension Circular. Revised 2002.

Friedman, S. L., T. R. Van Devender, V. W. Steinmann, A. C. Sanders, P. D. Jenkins, S. A. Meyer, A. L. Reina Guerrero, D. A. Yetman, R. S. Felger & R. A. Lopez Estudillo. 1996. "Noteworthy Collections, Sonora, Mexico -- Brickellia brandegei, Cordia globosa, Bromelia alsodes, Selenicereus vagans, Capparis flexuosa, Ipomoea imperati, Operculina pennatifida, Doyera emetocathartica, Momordica charantia, Bergia texana, Caesalpinia sclerocarpa, Mimosa asperata, Pholisma culiacanum, Nesaea longipes, Malpighia glabra, Bastardia viscosa, Okenia hypogea, Oenothera drummondii var. thalassaphila, Ophioglossum nudicaule, Luziola gracillima, Panicum antidotale, Tridens eragrostoides, Amyris balsamifera, Capraria biflora, Solanum azureum, Citharexylum scabrum, Lippia graveolens", Madroño 43(4):532-538.

Hrusa, F., B. Ertter, A. Sanders, G. Leppig, E. Dean. 2002? Catalogue of non-native vascular plants occurring spontaneously in California beyond those addressed in The Jepson Manual, Part 1. Madrono, in press.

Jones, C. E., A. C. Sanders, et al. 1979. "Noteworthy Collections, California -- Physalis lobata, Madroño 29 (2): 101.

Krantz, T. P., R. F. Thorne & A. C. Sanders. 2003?, A Flora of the San Bernardino Mountains, California, nearing completion.

Minnich, R. A. and A. C. Sanders, 2000, Sahara Mustard (Brassica tournefortii), in California's Wildland Weeds: Identification and Control, C. Bossard, J. Randall, & M. Hoshovsky, eds, University of California Press

Sanders, A. C., 1996. "Noteworthy Collections, California -- Acrachne racemosa, Aegilops cylindrica, Atriplex mulleri, Baileya multiradiata, Bromus secalinus, Cenchrus ciliaris, Centaurea diffusa, Centaurea maculosa, Ceratonia siliqua, Chloris truncata, Cynanchum louiseae, Ephedra funerea, Eragrostis curvula var. conferta, Fatoua villosa, Linanthus orcuttii, Matricaria globifera, Melica californica, Melissa officinalis, Panicum antidotale, Panicum maximum, Pistacia atlantica, Schinus polygamus, Schoenus nigricans, Scribneria bolanderi, Senna obtusifolia, Solanum mauritianum, Triteleia hyacinthina", Madroño 43(4):524-532.

Sanders, A. C., 1997. "Noteworthy Collections, California -- Gaura parviflora, Crepis tectorum", Madroño 44 (3) 306-307.

Sanders, A.C. 1998. Polygonaceae in Martin, P., et al (revised & ed.). 1998. Gentry's Río Mayo Plants: the tropical deciduous forest & environs of northwest Mexico, University of Arizona Press.

Sanders, A.C. 1999. Invasive Exotics in California: a Perspective from Inland Southern California. In: M. Kelly, E. Wagner, and P. Warner (eds.). Proceedings of the California Exotic Pest Plant Council Symposium. Vol 4: 1998. Pp. 7-10.

Sanders, A. C. 2003?, "A Flora of the Box Springs Mountains and Vicinity, Riverside and San Bernardino Counties, California", Crossosoma, in preparation.

Sanders, A. C., 2003?. "Noteworthy Collections, California --Allium vineale, Celtis sinensis, Cestrum nocturnum, Colutea arborescens, Crepis nana, Cynosurus echinatus, Desmodium tortuosum, Eruca vesicaria var. sativa, Gilia maculata, Gnaphalium purpureum, Gypsophila elegans, Horkelia cuneata ssp. puberula, Leonotus nepetifolia, Nerium oleander, Phaseolus filiformis, Pinus attenuata, Pinus jeffreyi, Rhamnus alaternus, Salvia reflexa, Ziziphus obtusifolia", Madroño, submitted.

Sanders, A. C., D. L. Banks & S. Boyd , 1997 "Rediscovery of Hemizonia mohavensis Keck (Asteraceae) and addition of two new localities", Madroño 44 (2): 203-210.

Sanders, A. C. and S. Boyd, 1996. "Noteworthy Collections, California, -- Brassica fruticulosa", Madroño 43(4):523-524.

Sanders, A.C. and S. Boyd. 1999. "Noteworthy Collections, California, -- Chloris truncata, Galium parisiense, Ranunculus testiculatus", Madroño 46(2):113.

Sanders, A. C. and D. Cudney, 1991. "Key to the Families of Weeds of the West", in Weeds of the West, T. D. Whitson, ed., Western Society of Weed Science.

Sanders, A. C. and D. Koutnik, 1997. "Noteworthy Collections, California, -- Euphorbia dendroides, E. esula, E. hirta, E. nutans, E. oblongata, E. revoluta, E. terracina", Madroño 44(2): 203-210.

Skinner, M. W., D. P. Tibor, R. L. Bittman, B. Ertter, T. S. Ross, S. Boyd, A. C. Sanders, J. R. Shevock & D. W. Taylor, 1995. "Research Needs for Conserving California's Rare Plants", Madroño 42(2): 211-241.

Van Devender, T. R., A. C. Sanders, R. K. Wilson, & S. A. Meyer. "Vegetation, Flora, and Seasons of the Rio Cuchujaqui, A Tropical Deciduous Forest near Alamos, Sonora, Mexico", in The Tropical Deciduous Forest of the Alamos, Sonora, Region: Ecology and Conservation of a Threatened Ecosystem, ed. by R. H. Robichaux.

Van Devender, T. R., A. C. Sanders, V. W. Steinmann, R. K. Van Devender, S. A. Meyer, S. L. Friedman, J. F. Wiens, D. A. Yetman, P. D. Jenkins, E. Lopez-Saavedra, R. A. Lopez-Estudillo & J. D. Freeh, 1995. "Noteworthy Collections, Sonora, Mexico -- Blechum pyramidatum, Begonia palmeri, Acmella oppositifolia, Blumea viscosa, Elephantopus spicatus, Eupatorium odoratum, Pectis uniaristata, Cuscuts boldinghii, C. potosina, Ipomoea meyeri, Merremia quinquefolia, Cyperus difformis, Euphorbia ocymoidea, Bothriochloa pertusa, Bouteloua alamosana, Desmodium scopulorum, D. scorpiurus, Mimosa diplotricha, Phaseolus lunatus, Polypremum procumbens, Passiflora suberosa, Piper jaliscanum, Crusea coronata, C. psyllioides, Diodia sarmentosa, Hedyotis vegrandis, Anemia affinis, Nicotiana plumbaginifolia, Phylla strigulosa", Madroño 42 (3): 411-418.

Vasek, F. C. & A. C. Sanders, 1983. "Distribution of Polygala acanthoclada", Madroño 30 (3): 193-194.

White, S. and A. C. Sanders, 1997. "Clarification of Three Camissonia Boothii Subspecies' Distributions in California", Madroño 44 (1): 106-112

White, S., A. C. Sanders & M. Wilcox 1996. "Noteworthy Collections, California, -- Androstephium breviflorum, Claytonia lanceolata, Nicotiana acuminata, Ranunculus scleratus, Madroño 43 (2): 334-335.

ANDREW THOMSON
ENVIRONMENTAL SPECIALIST

EDUCATION

- Washington State University
M.S., Environmental Science, 2000

- Utah State University
B.S., Biology, 1997

EXPERIENCE SUMMARY

Mr. Thomson has a Master of Science degree in Environmental Science and a Bachelor's degree in Biology. He has worked on a variety of habitat restoration projects with the U.S. Forest Service and has been involved with threatened and endangered plant species surveys and sensitive habitat protection in the Big Bear area. He is currently working on a variety of habitat restoration projects with various responsibilities at DUDEK.

PROFESSIONAL ASSIGNMENTS

Sensitive Plant Habitat Projects

Mr. Thomson is currently involved with three separate sensitive plant habitat projects. He has been responsible for monitoring the progress of the following projects as well as documenting that progress in annual project reports:

- **4S Ranch Thread-Leaved Brodiaea and San Diego Goldenstars Mitigation/Transplantation Program, Rancho Bernardo, CA.** Mr. Thomson assisted with the plant monitoring and was responsible for preparing the annual progress report for this project.

- **Kumeyaay Campground San Diego Ambrosia Transplantation Project, San Diego County, CA.** Mr. Thomson was responsible for the biological monitoring and the preparation of a status report for this project.

- **State Route 125 Otay Tarplant Salvage and Habitat Replacement Project, San Diego County, CA.** Mr. Thomson is involved with ensuring successful plant salvage and relocation of Otay tarplant for the construction of SR125. He is also assisting with the determination of suitable receptor sites for salvaged Otay tarplant seed and accompanying soil.

Habitat Restoration and Habitat Monitoring Plan Writing

- **Arroyo Trabuco Golf Course Coastal Sage Scrub and Valley Needlegrass Grassland Revegetation Plan, Orange County, CA.** Mr. Thomson was responsible for drafting the habitat restoration plan for the 230-acre Arroyo Trabuco Golf Course project in Orange County. For this project he prepared a revegetation plan that included both coastal sage scrub and Valley needlegrass grassland restoration.

- **Sorrento Creek Flood Control Channel Monitoring Plan, City of San Diego, CA.** Mr. Thomson assisted with the preparation of the Sorrento Creek Flood Control Channel Monitoring Plan for the City of San Diego, California. The Plan included methodology and rationale for monitoring adverse effects resulting from the creation and maintenance of the Sorrento Creek flood control channel.

Vegetation Mapping and Rare Plant Surveys

Mr. Thomson has been involved with both vegetation mapping and rare plant surveying in the following projects:

- **Finger Canyon Vegetation Mapping, San Diego County, CA.** Mr. Thomson was involved with mapping habitat types including coastal sage scrub, southern maritime chaparral, willow woodland, and fresh water marsh within the preserved habitat in Finger Canyon.

- **Irvine Ranch Housing Development Project, Orange County, CA.** Mr. Thomson assisted in the rare plant surveys for the sensitive plant, intermediate mariposa lily.

Vegetation Monitoring and Reporting

Mr. Thomson has been involved in a number of projects requiring vegetation monitoring and reporting. He has been responsible for setting up monitoring transects and gathering qualitative and quantitative biological data for use in reporting in the following projects:

- **North City Raw Sludge and Water Pipelines Revegetation Project, San Diego County, CA.** Responsible for biological monitoring and report preparation.

- **Sorrento Valley Utilities Improvement Revegetation Project, San Diego County, CA.** Assisted with biological monitoring, data management, and report preparation.

- **North Metro Revegetation Project, San Diego County, CA.** Assisted with biological monitoring.

- **Rolling Hills Ranch Wetland Mitigation Project, Chula Vista, CA.** Assisted with biological monitoring and report preparation.

- **Encinitas Ranch Golf Course Revegetation, Permitting & Chaparral Revegetation, Encinitas, CA.** Assisted with biological monitoring.

Construction and plant installation monitoring

Mr. Thomson has been involved with monitoring construction activities in sensitive habitats and installation of plants for the following restoration projects:

- **Brookview Senior Housing Project, Poway, CA.** Assisted with construction monitoring during the plant installation and seed application processes.

- **Ocean Trails Golf Course Revegetation Project, Los Angeles County, CA.** Assisted with plant installation monitoring and quantitative analysis for coastal sage scrub habitat.

- **City of San Diego Metropolitan Wastewater Department (MWWD) as Needed Biologist, City of San Diego, CA.** Assisted with construction monitoring, impact analyses, biological report preparation and mitigation recommendations for MWWD projects involving necessary sewer line maintenance and emergency sewer break repair.

PRIOR WORK EXPERIENCE

Biological Technician

Mr. Thomson provided ecological restoration work for the U.S. Forest Service involving native seed collection and germination, plant propagation and pest management, outplanting to damaged sites; designing experimental plots, maintaining records and monitoring restoration success, adapting methods as necessary; organizing and supervising volunteer groups that contribute time to wildlife and plant habitat improvement projects; participating as a crew member to complete biological surveys including threatened, endangered, and sensitive plant species; mapping locations using Global Positioning System (GPS) units, entering points and creating maps with Geographic Information System (GIS); and writing ecological restoration program grants.

Field Research Assistant

As a field research assistant in the Biology Department at Utah State University, Mr. Thomson was responsible for surveying plant populations for research site selection; setting up research plots; sampling and mapping a noxious weed species, using GPS technology; processing GPS field data using Pathfinder software; preparing statistical summaries and maps using Excel and ArcView software for review by other team members on the biological control project; and working with team members to monitor and record study results.

Field Technician Assistant

As a field technician assistant with the U.S. Department of Agriculture and Utah State University, Mr. Thomson was responsible for germinating several varieties of grasses and legumes utilizing various scarification techniques; propagating plants in greenhouses; caring for plants including pest control and fertilization; collecting and analyzing field data; operating machinery; maintaining plots through cultivation of grasses and control of weeds; and preparing samples for nutrient analysis.

JULIE M. VANDERWIER
Senior Biologist

EDUCATION

- California Polytechnic State University,
  San Luis Obispo
  M.S. Biological Sciences (Plant Ecology and Taxonomy) 1987

- California Polytechnic State University,
  San Luis Obispo
  B.S. Biological Sciences (Field Biology) 1977

EXPERIENCE SUMMARY

Ms. Vanderwier has 20 years of experience as a field ecologist and regulatory biologist in central and southern California. Although trained as a plant ecologist, she also has considerable field experience with a number of sensitive and listed animal species, particularly those which occur in vernal pools, coastal salt marsh, and sage scrub habitats. Plant communities with which she has specific expertise include coastal sage scrub, maritime chaparral, coastal salt marsh, and vernal pools, as well as the flora of the California Channel Islands and the Baja California peninsula. In 1991, she was the lead botanist on a five-week survey throughout Baja to determine the presence and distribution of the California gnatcatcher and its habitat. In concert with her field experience, Ms. Vanderwier has 16 years of regulatory experience, and has prepared numerous technical documents, including biological constraints reports, environmental and biological assessments, biological opinions, and habitat conservation plans. Work experience with the Department of Defense, California Department of Fish and Game, local jurisdictions, University of California Natural Reserve System, U.S. Fish and Wildlife Service, and the private sector has provided Ms. Vanderwier with an extremely diverse biological background.

At DUDEK, Ms. Vanderwier serves as a senior biologist in the Environmental Sciences Division. In that capacity, she is responsible for conducting sensitive plant surveys, plant community identification and mapping, preparation of biological biological constraints and technical reports, and conservation analyses for target species as part of the preparation of large-scale conservation plans. She is also responsible for quality assurance and review of work completed by other DUDEK biologists, and for technical training of staff.

Ms. Vanderwier is authorized by the California Department of Fish and Game (pursuant to Sections 1907a and 2081a of the Fish and Game Code) to collect state-designated endangered, threatened, and rare plants .

PROFESSIONAL ASSIGNMENTS

Focused Surveys and Plant Community Mapping

- Botanist, and one of two team leaders, responsible for the coordination and conducting of focused surveys for the state-listed endangered San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina)* on approximately 6,000 acres at Newhall Ranch, Los Angeles County.

- Conducted field surveys and mapping of native grasslands on approximately 4,800 acres of Rancho Mission Viejo lands in Orange County. Surveys were concentrated in the areas of Chiquita, Cristianitos, and Upper and Lower Gabino Canyons.

- Conducted field surveys for state and federally listed, and MSCP-covered plant species, along with vegetation mapping, for over 1,000 acres of coastal sage and chaparral at Black Mountain City Park, Paraiso Cumbres, and Montaña Mirador, City of San Diego, Multiple Species Conservation Program (MSCP).

- Lead botanist responsible for conducting field surveys for sensitive, proposed, or listed plant species and the classification and mapping of vegetation for hundreds of projects throughout central and southern California (San Luis Obispo, Santa Barbara, Kern, Ventura, Orange, San Diego, Riverside, and Imperial counties).

- Conducted protocol surveys for listed plant and anostracan species as part of data collection for numerous vernal pool projects in San Diego and Riverside counties.

- Botanist, and one of two team leaders, providing botanical support during a five-week presence-absence survey for California gnatcatchers in Baja California, Mexico. Vegetation transect data were collected and analyzed for over 100 sites throughout the northern two-thirds of the peninsula.

- Conducted demographic studies and ecological data collection and analysis for the federally-listed endangered salt marsh bird's beak (*Cordylanthus maritimus* ssp. *maritimus*) at Mugu Lagoon, Ventura County, pursuant to a section 7 consultation with the U.S. Fish & Wildlife Service. Additional data was collected at Newport Back Bay, Orange County; Ormond Beach, Ventura County; Carpinteria Marsh, Santa Barbara County; and Sweetwater Marsh, San Luis Obispo County.

- Conducted protocol-level presence-absence surveys for the federally threatened coastal California gnatcatcher (*Polioptila californica californica*) and other sensitive coastal sage scrub species for numerous projects throughout Los Angeles, Orange, San Diego, San Bernardino, and Riverside Counties, and Baja California, Mexico.

- Conducted rare plant surveys, desert tortoise presence-absence surveys, and tortoise movement studies (radio-tracking) at Eagle Mountain and on Chuckawalla Bench (BLM lands), Riverside County.

- Participated in surveys for sensitive plants and wildlife (including island fox and island night lizard) on San Nicolas Island, and listed saltmarsh birds (including light-footed clapper, California least tern, and Belding's savannah sparrow) at Mugu Lagoon, Ventura County.

- Conducted field work and participated in the preparation of vegetation maps for the City of San Diego's pilot vegetation mapping for the Clean Water program.

Habitat Conservation Planning

- Lead staff biologist responsible for federal resource agency oversight in the preparation of the Multiple Habitats Conservation Plan (MHCP) and the City of Carlsbad's Habitat Management Plan (HMP).

- Assisted in the conservation analysis for 87 target species proposed for coverage in the MSCP (City and County of San Diego) pursuant to criteria necessary for the issuance of a section 10(a)(1)(B) permit pursuant to the federal Endangered Species Act (ESA).

- Participated in data collection and analysis in support of the identification of critical habitat for the coastal California gnatcatcher, San Diego fairy shrimp, Riverside fairy shrimp, and southern maritime chaparral plants. Provided input regarding existing conservation areas and strategies.

- Lead staff biologist responsible for resource agency oversight and permit processing for a single-species (California gnatcatcher) section 10(a)(1)(B) permit for a residential project in San Marcos, including preparation of all necessary NEPA documentation (*e.g.*, biological opinion, finding of no significant impact, statement of findings).

Habitat Restoration and Monitoring

- Assisted in the development of revegetation and monitoring programs for the First San Diego River Improvement Project (FSDRIP) as compensation for impacts to riparian and freshwater marsh habitats as a result of flood control measures along a one-mile reach of the San Diego River.
- Assisted in the collection and analysis of floral, faunal, and hydrological data for the Brown Parcel (Lopez Ridge) Vernal Pool Remediation Plan in Peñasquitos Canyon, Parcel C (Beazer) Vernal Pool Restoration Plan on Marine Corps Air Station (MCAS) Miramar, and vernal pools created by Caltrans along Highway 163 adjacent to MCAS Miramar.

TRAINING

Vegetation Rapid Assessment Method
California Native Plant Society
Julie Evens, CNPS Vegetation Ecologist
Location: Volcan Mountain, San Diego County, CA
Date: June 29, 2001

Measuring and Monitoring Plant Populations
Bureau of Land Management Course 1730-05
Drs. Caryl Elzinga, Dan Salzer, and John Willoughby
Location: Lake Tahoe, CA
Date: July 2000

Habitat Conservation Planning for Endangered Species
U.S. Fish & Wildlife Service
Location: Carlsbad, CA
Date: February 2000

Interagency Consultation (Section 7) for Endangered Species
U.S. Fish & Wildlife Service
Location: Carlsbad, CA
Date: January 2000

Anostracan (Fairy Shrimp) Identification Course Dr. Denton Belk
Location: Jones & Stokes, Sacramento, CA
Date: November, 1995

PUBLICATIONS

"Scrub Descriptions of the Baja California Peninsula, Mexico." Zippin, David B. and Vanderwier, Julie M. *Madroño* 41(2):85-119, 1994.

"Observations of Haustoria and Host Preference in *Cordylanthus maritimus* ssp. *maritimus* (Scrophulariaceae) at Mugu Lagoon, Ventura County, California." Newman, Judith C. and Vanderwier, Julie M. *Madroño* 31(1):185-186, 1984.

CATHLEEN M. WEIGAND
Botanist / Biologist

EDUCATION/REGISTRATION

- Humboldt State University
  B.S., Botany and Biology, 2000

- New Dawn Center (Finca Alba Nueva), San Isidro, Costa Rica
  Senior Thesis Study, 1997

PROFESSIONAL CERTIFICATIONS

- Certified Wetland Delineator (#2133) - Army Corps of Engineers Wetland Delineation & Management Training Program - 2002

- U.S.F.S. Wildland Firefighter Red Card Certified

EXPERIENCE SUMMARY

Ms. Weigand is a botanist/biologist with over three years experience in field studies, environmental document preparation, and habitat restoration and conservation. Project experience includes biological resource surveys, data collection and analysis, environmental assessments, wetland delineations, permitting, mitigation design, implementation and monitoring, and endangered and sensitive plant species surveys. Projects include issues relative to the California Coastal Act, the California Department of Fish and Game Code (Sections 1601 and 1603), and the federal Clean Water Act (Sections 401 and 404). Ms. Weigand has engaged in interagency coordination and public outreach efforts due to the complexities of each project. Her current role at Dudek & Associates includes biological resources assessment and impact analysis, wetland delineations and permitting, and habitat restoration and monitoring.

PROFESSIONAL ASSIGNMENTS

- Experience with seed and plant propagation.

- Greenhouse work (Humboldt State University- volunteer): watering, caring and maintenance of plants, re-potting/propagation, nomenclature of species housed in greenhouse, and preparation of species used for classroom and experimental purposes.

- Horticulture and nursery experience: watering, fertilizing, caring and maintenance of plants, propagation (plant cuttings, roots, and seeds), re-potting, installation and design of irrigation systems.

- Experience with growth chambers, preparation and implementation of fertilizers and composts, and the irrigation of greenhouses and farm properties.

- Riparian and wetland revegetation implementation.

- Seed and pollen collection.

- Supervising of farm and revegetation crews.
- Implementation of farm crops, community and personal gardens using sustainable agricultural practices.
- Revegetation and landscape design and implementation, monitoring, maintenance, and data collection.

TRICIA L. WOTIPKA
Environmental Specialist

EDUCATION

- Pennsylvania State University
  B.S. Wildlife and Fisheries Science (2000)
  (Dean's Honor List, Fall 1998 - Spring 2000)

PROFESSIONAL AFFILIATIONS

- Audobon Society, 2000
- Women's Environmental Council, past Secretary, 2001 and Newsletter Chair, 2002

EXPERIENCE SUMMARY

Ms. Wotipka has over two years experience in environmental document preparation and resource conservation planning. Project experience includes rare plant surveys, biological resource surveys, data collection and analysis, environmental assessments, wetlands delineations, permitting, mitigation design and monitoring, and endangered species surveys. Projects include issues relative to the California Fish and Game Code, the federal Clean Water Act (Sections 401 and 404), the National Environmental Policy Act (NEPA), the Migratory Bird Treaty Act, and the Endangered Species Act (ESA). Ms. Wotipka has also trained with the Wetlands Training Institute, Inc. and has successfully completed a course in basic wetlands delineation.

PROFESSIONAL ASSIGNMENTS

- **Sewer Line Relocation and Park Improvements.** Aliso Creek Emergency Sewer and Park Improvements Project, Orange County, California. Assisted in focused rare plant surveys for the federally-listed threatened and state-listed endangered thread-leaved brodiaea (*Brodiaea filifolia*). Prepared a Section 404 and 401 permit application in accordance with the federal Clean Water Act and a 1603 Streambed Alteration Agreement in accordance with California Fish and Game Code. Prepared and processed a Section 404 and 401 permit application in accordance with the federal Clean Water Act and a 1603 Streambed Alteration Agreement in accordance with California Fish and Game Code. Negotiated with resource agencies to identify appropriate mitigation measures, including the creation and enhancement of southern willow scrub and mule fat scrub wetlands within the reserve.

- **Railway Expansion Project.** Sorrento-Miramar Curve Realignment and Second Main Track Project. City of San Diego, California. Conducted field surveys for sensitive, state- and federally-listed plant species on approximately 190 acres.

- **Church Development Project.** St. Jerome's Catholic Church Project. City of San Diego, California. Conducted field surveys for state- and federally-listed species on approximately 18 acres.

- **Residential Subdivision and Roadway Improvements Project.** University Commons Development Project, City of San Marcos, California. Performed a delineation of "waters of the United States" and wetlands under the jurisdiction of the U.S. Army Corps of Engineers and California Department of Fish and Game. Prepared and processed a Section 404 and 401 permit application in accordance with the federal Clean Water Act and a 1603 Streambed Alteration Agreement in accordance with California Fish and Game Code.

- **Residential Subdivision.** Goodwin Drive Residential Development, City of Vista, California. Conducted a delineation of "waters of the United States" and wetlands under the jurisdiction of the U. S. Army Corps of Engineers (ACOE) and California Department of Fish and Game (CDFG). Obtained a Section 401 permit application in accordance with the federal Clean Water Act and a 1603 Streambed Alteration Agreement in accordance with California Fish and Game Code. Negotiated with resource agencies to identify appropriate mitigation measures, including the creation of southern willow scrub wetlands.

- **Conservation Planning.** Assisted in the development of the Multiple Species Habitat Conservation Plan (MSHCP) for western Riverside County. Project involvement included research on potentially covered plant species followed by syntheses of ecological information and the preparation of sensitive species conservation analysis.

RELEVANT EXPERIENCE

- Restoration/Maintenance volunteer - Habitat West, Vista, California. Assisted in the restoration and management of native habitats for the coastal California gnatcatcher.

- Restoration/Maintenance volunteer - Habitat West, Vista, California. Evaluated the health of newly planted vegetation; identified and removed pestilent species when necessary; identified shrubs and native scrub communities.

- Pennsylvania Cooperative Fish & Wildlife Service Unit. Flushed and recorded the location of ruffed grouse to note the effects of timber harvest on grouse management.

- Pennsylvania Wildlife Habitat Evaluation Project. Judged over 60 kids aged 8-18 years old in a multi-county wildlife evaluation competition in Pennsylvania.

- Pennsylvania Wildlife Habitat Evaluation Project. Evaluated students based on their knowledge of PA wildlife habitats, correct identification of wildlife foods, oral presentations, and on-site written management plans.

PUBLICATIONS

- Researched and prepared the introduction of the "Spring Creek Watershed Water Sampling Protocol" for the Clearwater Conservancy - Fall 1999.

- Designed and produced a web page in Spring 2000 (now out of service) entitled "Beaks and Buds". It was located at http://www.personal.psu. edu/tlw188.

APPENDIX B

VASCULAR PLANT SPECIES OBSERVED
AT NEWHALL RANCH (2002)

APPENDIX B

VASCULAR PLANT SPECIES - NEWHALL RANCH

LYCOPODIAE

SELAGINELLACEAE - SPIKE-MOSS FAMILY
Selaginella bigelovii - Bigelow's spike-moss

EQUISETAE

EQUISETACEAE - HORSETAIL FAMILY
Equisetum laevigatum - smooth scouring-rush
Equisetum telmateia - giant horsetail

FILACEAE

AZOLLACEAE - MOSQUITO FERN FAMILY
Azolla filiculoides - duckweed fern

DENNSTAEDTIACEAE - BRAKEN FAMILY
Adiantum jordani - California maiden-hair
Pellaea andromedifolia var. *andromedifolia* - coffee fern
Pellaea mucronata var. *mucronata* - bird's-foot fern
Pentagramma triangularis - goldenback fern

POLYPODIACEAE - POLYPODY FAMILY
Polypodium californicum - California polypody

CONIFERAE

CUPRESSACEAE - CYPRESS FAMILY
* *Cedrus deodara* - Deodar cedar
Juniperus californica - California juniper

APPENDIX B (*Continued*)

PINACEAE - PINE FAMILY

* *Pinus halepensis* - Aleppo pine
* *Pinus pinea* – stone pine

ANGIOSPERMAE (DICOTYLEDONES)

AIZOACEAE - FIG-MARIGOLD FAMILY

* *Aptenia cordifolia* - baby sun-rose
* *Carpobrotus* sp. - sea-fig

AMARANTHACEAE - AMARANTH FAMILY

* *Amaranthus albus* - tumbleweed
Amaranthus blitoides - prostrate amaranth
* *Amaranthus hybridus* - amaranth
Amaranthus palmeri - Palmer's amaranth
Amaranthus powellii - Powell's amaranth
* *Amaranthus retroflexus* - rough pigweed

ANACARDIACEAE - SUMAC FAMILY

Malosma laurina - laurel sumac
Rhus ovata - sugar-bush
Rhus trilobata - squaw bush
* *Schinus molle* - Peruvian pepper-tree
Toxicodendron diversilobum - poison-oak

APIACEAE - CARROT FAMILY

* *Anethum graveolens* - dill
Apiastrum angustifolium - wild celery
* *Apium graveolens* - celery
Berula erecta - cutleaf water-parsnip
* *Coriandrum sativum* - cilantro
Lomatium utriculatum - common lomatium

APOCYNACEAE - DOGBANE FAMILY

Apocynum cannabinum - Indian hemp
* *Vinca major* - periwinkle

APPENDIX B (*Continued*)

ASCLEPIADACEAE - MILKWEED FAMILY

Asclepias fascicularis - narrow-leaf milkweed

ASTERACEAE - SUNFLOWER FAMILY

Achillea millefolium - yarrow
Acourtia microcephala - sacapellote
Ambrosia acanthicarpa - annual burweed
Ambrosia confertifolia - weak-leaved burweed
Ambrosia psilostachya - western ragweed
Artemisia californica - coastal sagebrush
Artemisia douglasiana - California mugwort
Artemisia dracunculus - tarragon
Artemisia tridentata - Great Basin sagebrush
Baccharis douglasii - marsh baccharis
Baccharis pilularis - coyote brush
Baccharis salicifolia - mule fat
Baccharis sarothroides - chaparral broom
Brickellia californica - California brickellbush
Brickellia nevinii - Nevin's brickellbush
* *Carduus pycnocephalus* - Italian thistle
* *Centaurea melitensis* - star thistle
Chaenactis glabriuscula - yellow pincushion
* *Chrysothamnus nauseosus* - rubber rabbitbrush
Cirsium occidentale var. *californicum*- California thistle
Cirsium occidentale var. *occidentale*- cobwebby thistle
* *Cirsium vulgare* - bull thistle
* *Cnicus benedictus* - blessed thistle
Conyza canadensis - horseweed
Conyza coulteri - Coulter's conyza
* *Cotula coronopifolia* - African brass-buttons
Encelia actoni - Acton's encelia
Encelia californica - California bush sunflower
Encelia farinosa - brittlebush, incensio
Ericameria palmeri var. *pachylepis* - goldenbush
Ericameria pinifolia - pine-bush

APPENDIX B (*Continued*)

Erigeron foliosus - leafy daisy
Eriophyllum confertiflorum - long-stem golden yarrow
Euthamia occidentalis - western goldenrod
Filago californica - California fluffweed
* *Filago gallica* - narrow-leaf filago
Gnaphalium bicolor - bicolor cudweed
Gnaphalium californicum - California everlasting
Gnaphalium canescens ssp. *microcephalum* - white everlasting
* *Gnaphalium luteo-album* - white cudweed
Gnaphalium palustre - lowland cudweed
Hazardia squarrosa ssp. *grindelioides* - saw-toothed goldenbush
Helianthus annuus - common sunflower
Helianthus nuttallii c.f. ssp. *parishii* - Los Angeles sunflower
Hemizonia fasciculata - fascicled tarweed
Heterotheca grandiflora - telegraph weed
Heterotheca sessiliflora - golden aster
Isocoma menziesii - goldenbush
Iva axillaris - poverty weed
* *Lactuca serriola* - prickly lettuce
Lasthenia californica - coast goldfields
Lepidospartum squamatum - scale-broom
Lessingia filaginifolia - virgate cudweed aster
Lessingia glandulifera - lessingia
Malacothrix saxatilis - cliff malacothrix
* *Matricaria matricarioides* - pineapple weed
Micropus californicus - slender cottonweed
Pluchea odorata - marsh-fleabane
Pluchea sericea - arrow weed
* *Pulicaria paludosa* - Spanish sunflower
Rafinesquia californica - California chicory
Senecio flaccidus var. *douglasii* - butterweed
* *Senecio vulgaris* - common groundsel
* *Silybum marianum* - milk thistle
* *Sonchus asper* - prickly sow-thistle
* *Sonchus oleraceus* - common sow-thistle

APPENDIX B (*Continued*)

Stephanomeria exigua - small wreathplant
Stephanomeria pauciflora - wire-lettuce
Stephanomeria virgata - twiggy wreathplant
Stylocline gnaphaloides - everlasting nest-straw
Wyethia ovata - mule ears
Xanthium spinosum - spiny cocklebur
Xanthium strumarium - cocklebur

BORAGINACEAE - BORAGE FAMILY

Amsinckia menziesii - yellow fiddleneck
Cryptantha sp. - forget-me-not
Cryptantha intermedia - common forget-me-not
Heliotropium curassavicum - wild heliotrope
Pectocarya linearis - slender pectocarya
Pectocarya penincillata - pectocarya
Pectocarya setosa - pectocarya
Plagiobothrys arizonicus - popcorn flower
Plagiobothrys canescens - rusty popcorn flower

BRASSICACEAE - MUSTARD FAMILY

* *Brassica nigra* - black mustard
* *Capsella bursa-pastoris* - shepard's purse
* *Hirschfeldia incana* - short-podded mustard
Lepidium lasiocarpum - peppergrass
* *Lepidium latifolium* - peppergrass
Lepidium virginicum - wild peppergrass
* *Raphanus sativus* - wild radish
* *Rorippa nasturtium-aquaticum* - water cress
* *Sisymbrium altissimum* - tumble mustard
* *Sisymbrium irio* - London rocket
* *Sisymbrium officinale* - hedge mustard
* *Sisymbrium orientale* - Oriental mustard
Thysanocarpus curvipes - fringepod

APPENDIX B (*Continued*)

CACTACEAE - CACTUS FAMILY

* *Cereus peruvianus* - Peruvian apple cactus
Opuntia basilaris var. *brachyclada* - short-joint beavertail
Opuntia californica var. *parkeri* - cane cholla
Opuntia littoralis - coastal prickly-pear
* *Trichocereus spachianus* - golden torch cactus

CAPPARACEAE - CAPER FAMILY

Isomeris arborea - bladderpod

CAPRIFOLIACEAE - HONEYSUCKLE FAMILY

Lonicera subspicata - southern honeysuckle
Sambucus mexicana - Mexican elderberry
Symphoricarpos c.f. mollis - spreading snowberry

CARYOPHYLLACEAE - PINK FAMILY

* *Cerastium glomeratum* - sticky mouse-ear
* *Herniaria cinerea* - gray herniaria
Loeflingia squarrosa - no common name
* *Silene gallica* - common catchfly
Spergularia sp. - stickwort, starwort
* *Spergularia rubra* - sand-spurrey
* *Spergularia c.f. villosa* - villous sand-spurrey
* *Stellaria media* - common chickweed

CASURINACEAE – SHEET OAK FAMILY

* *Casuarina cunninghamiana* - Austrailian Pine

CHENOPODIACEAE - GOOSEFOOT FAMILY

Atriplex canescens - four-winged saltbush
* *Atriplex heterosperma* - weedy orache
Atriplex lentiformis- big saltbush, quail brush
* *Atriplex rosea* - tumbling oracle
* *Atriplex semibaccata* - Australian saltbush
Atriplex serenana var. *serenana* - bractscale

APPENDIX B (*Continued*)

Atriplex suberecta - Australian saltbush
Atriplex triangularis - spearscale
* *Bassia hyssopifolia* - five-hooked bassia
* *Chenopodium album* - lamb's-quarters
* *Chenopodium ambrosioides* - Mexican tea
Chenopodium berlandieri - pitseed goosefoot
* *Chenopodium botrys* - goosefoot
Chenopodium californicum - California goosefoot
* *Chenopodium murale* - nettle-leaved goosefoot
Chenopodium rubrum - red goosefoot
* *Salsola tragus* - Russian-thistle

CONVOLVULACEAE - MORNING-GLORY FAMILY

Calystegia peirsonii - Peirson's morning-glory
* *Convolvulus arvensis* - bindweed

CRASSULACEAE - STONECROP FAMILY

Crassula connata - dwarf stonecrop
Dudleya cymosa - unidentified dudleya
Dudleya lanceolata - lanceleaf dudleya

CUCURBITACEAE - GOURD FAMILY

Cucurbita foetidissima - coyote-melon, calabazilla
Marah macrocarpus - wild cucumber

CUSCUTACEAE - DODDER FAMILY

Cuscuta californica - California dodder
Cuscuta subinclusa - dodder

DATISCACEAE - DASTICA FAMILY

Dastica glomerata - Durango root

ERICACEAE - HEATH FAMILY

Arctostaphylos glauca - bigberry manzanita

APPENDIX B (*Continued*)

EUPHORBIACEAE - SPURGE FAMILY

Chamaesyce albomarginata - rattlesnake spurge
Chamaesyce polycarpa - small-seed sand mat
Croton californicus - California croton
Eremocarpus setigerus - doveweed
* *Ricinus communis* - castor-bean
Stillingia linearifolia - linear-leaved stillingia

FABACEAE - PEA FAMILY

* *Acacia baileyana* - golden wattle
Astragalus trichopodus - Santa Barbara locoweed
Glycyrrhiza lepidota - wild licorice
Lathyrus laetiflorus - wild sweet pea
Lathyrus vestitus - wild pea
* *Lotus corniculatus* - bird's-foot lotus
Lotus humistratus - lotus
Lotus purshianus - Spanish-clover
Lotus salsuginosus - coastal lotus
Lotus scoparius - deerweed
Lotus strigosus - strigose deerweed
Lupinus bicolor - Lindley's annual lupine
Lupinus excubitus var. *hallii* - grape soda lupine
Lupinus hirsutissimus - stinging lupine
Lupinus microcarpus - chick lupine
Lupinus sparsiflorus - Coulter's lupine
Lupinus succulentis - arroyo lupine
Lupinus truncatus - collar lupine
* *Medicago polymorpha* - California burclover
* *Medicago polymorpha* var. *brevispina* - short-spined California burclover
* *Medicago sativa* - alfalfa
* *Melilotus alba* - white sweet-clover
* *Melilotus indica* - yellow sweet-clover
* *Robinia pseudoacacia* - black locust
Trifolium sp. - clover
* *Trifolium fragiferum* - strawberry clover

APPENDIX B (*Continued*)

* *Trifolium hirtum* - rose clover
* *Trifolium repens* - white clover

FAGACEAE - BEECH FAMILY

Quercus agrifolia - coast live oak
Quercus berberidifolia - scrub oak
Quercus douglasii - blue oak
Quercus lobata - valley oak

GERANIACEAE - GERANIUM FAMILY

* *Erodium cicutarium* - red-stemmed filaree
* *Erodium botrys* - filaree

GROSSULARIACEAE - CURRANT FAMILY

Ribes aureum - golden currant
Ribes malvaceum - chaparral currant

HYDROPHYLLACEAE - WATERLEAF FAMILY

Emmenanthe penduliflora - whispering bells
Eriodictyon crassifolium var. *nigrescens* - yerba santa
Eucrypta chrysanthemifolia - common eucrypta
Phacelia cicutaria - caterpillar phacelia
Phacelia distans - blue fiddleneck
Phacelia imbricata - imbricate phacelia
Phacelia minor - wild canterbury-bell
Phacelia ramosissima - shrubby phacelia

JUGLANDACEAE - WALNUT FAMILY

Juglans californica - southern California black walnut

LAMIACEAE - MINT FAMILY

* *Marrubium vulgare* - horehound
Mentha citrata – orange mint
Salvia apiana - white sage
Salvia columbariae - chia

APPENDIX B (*Continued*)

Salvia leucophylla - purple sage
Salvia mellifera - black sage
Stachys ajugoides var. *rigida* - rigid hedge-nettle
Stachys albens - white hedge-nettle
Trichostema lanceolatum - vinegar weed

LAURACEAE - LAUREL FAMILY
Umbellularia californica - California laurel

LOASACEAE - STICK-LEAF FAMILY
Mentzelia laevicaulis - blazing star
Mentzelia micrantha - small-flowered stick-leaf

LYTHRACEAE - LOOSESTRIFE FAMILY
Lythrum californicum - California loosestrife

MALVACEAE - MALLOW FAMILY
Malacothamnus fasciculatus - mesa bushmallow
* *Malva neglecta* - common mallow
* *Malva parviflora* - cheeseweed

MELIACEAE - MAHOGANY FAMILY
* *Melia azedarach* - China berry

MORACEAE - FIG FAMILY
* *Ficus carica* - fig

MYRTACEAE - MYRTLE FAMILY
* *Eucalyptus globulus* - blue gum
* *Eucalyptus leucoxylon* - white ironbark
* *Eucalyptus sideroxylon* - red ironbark

NYCTAGINACEAE - FOUR O'CLOCK FAMILY
Mirabilis californica - California wishbone-bush

APPENDIX B (*Continued*)

OLEACEAE - OLIVE FAMILY

Fraxinus dipetala - California ash
* *Fraxinus uhdei* – tropical ash
* *Ligustrum lucidum* - glossy privet
* *Olea europaea* - mission olive

ONAGRACEAE - EVENING-PRIMROSE FAMILY

Camissonia boothii - sun cup
Camissonia californica - mustard primrose
Camissonia hirtella - sun cup
Camissonia strigulosa - sun cup
Clarkia purpurea - winecup clarkia
Clarkia speciosa - clarkia
Clarkia unguiculata - elegant clarkia
Epilobium brachycarpum - willow herb
Epilobium canum - California fuchsia
Epilobium ciliatum - California cottonweed
Ludwigia peploides - yellow waterweed
Ludwigia repens - water primrose
Oenothera elata - evening primrose

OROBANCHACEAE - BROOM-RAPE FAMILY

Orobanche parishii - broom-rape

PAEONIACEAE - PEONY FAMILY

Paeonia californica - California peony

PAPAVERACEAE - POPPY FAMILY

Eschscholzia californica - California poppy

PLANTAGINACEAE - PLANTAIN FAMILY

Plantago erecta - dot-seed plantain
* *Plantago indica* - plantain
* *Plantago lanceolata* - English plantain
* *Plantago major* - common plantain

APPENDIX B (*Continued*)

PLATANACEAE - SYCAMORE FAMILY

Platanus racemosa - western sycamore

POLEMONIACEAE - PHLOX FAMILY

Eriastrum densifolium ssp. *mohavense* - Mohave eriastrum
Eriastrum sapphirinum - sapphire eriastrum
Gilia angelensis - angel gilia
Leptodactylon californicum - prickly phlox
Linanthus pygmaeus - linanthus
Navarretia atractyloides - holly-leaf skunkweed

POLYGONACEAE - BUCKWHEAT FAMILY

Chorizanthe parryi var. *fernandina* - San Fernando Valley spineflower
Chorizanthe staticoides - turkish rugging
Eriogonum sp. #1 - buckwheat
Eriogonum sp. #2 - buckwheat
Eriogonum elongatum - long-stemmed buckwheat
Eriogonum fasciculatum ssp. *foliolosum* - California buckwheat
Eriogonum gracile - slender woolly buckwheat
Eriogonum viridescens - buckwheat
Lastarriaea coriacea - lastarriaea
* *Polygonum arenastrum* - common knotweed
* *Polygonum argyrocoleon* - smartweed
Polygonum lapathifolium - willow weed
Polygonum punctatum - perennial smartweed
* *Rumex conglomeratus* - whorled dock
* *Rumex crispus* - curly dock
Rumex hymenosepalus - wild rhubarb
Rumex obtusifolius - dock
Rumex salicifolius - willow dock

PORTULACACEAE - PURSLANE FAMILY

Calandrinia ciliata - redmaids
Claytonia parviflora - small-leaved montia
* *Portulaca oleracea* - common purslane

APPENDIX B (*Continued*)

RANUNUCULACEAE - BUTTERCUP FAMILY
Clematis ligusticifolia - yerba de chiva

RHAMNACEAE - BUCKTHORN FAMILY
Ceanothus crassifolius - hoary-leaved ceanothus
Rhamnus crocea - redberry
Rhamnus ilicifolia - holly-leaf redberry

ROSACEAE - ROSE FAMILY
Adenostoma fasciculatum - chamise
Cercocarpus betuloides var. *betuloides* - birch-leaf mountain-mahogany
Cercocarpus betuloides var. *blancheae* - island mountain-mahogany
Heteromeles arbutifolia - toyon
Prunus ilicifolia - holly-leaf cherry
Rosa californica - California rose
Rubus ursinus - California blackberry
* *Sangwisorba minor* – garden burnet

RUBIACEAE - MADDER FAMILY
Galium angustifolium - narrow-leaved bedstraw
* *Galium aparine* - goose grass
Galium porrigens - climbing bedstraw

SALICACEAE - WILLOW FAMILY
Populus fremontii - Fremont's cottonwood
Salix exigua - narrow-leaved willow
Salix gooddingii - black willow
Salix laevigata - red willow
Salix lasiolepis - arroyo willow
Salix lucida ssp. *lasiandra* - golden willow

SAURURACEAE - LIZARD'S-TAIL FAMILY
Anemopsis californica - yerba mansa

APPENDIX B (*Continued*)

SCROPHULARIACEAE - FIGWORT FAMILY

Antirrhinum coulterianum - white snapdragon
Castilleja affinis - coast paintbrush
Castilleja densiflora - dense-flowered owl's-clover
Castilleja exserta - common owl's-clover
Castilleja foliolosa - woolly Indian paintbrush
Keckiella cordifolia - heart-leaf penstemon
Linaria canadensis - toadflax
Mimulus aurantiacus - bush monkeyflower
Mimulus guttatus - seep monkeyflower
Penstemon centranthifolius - scarlet bugler
* *Verbascum thapsus* - woolly mullein
* *Verbascum virgatum* - wand mullein
* *Veronica anagallis-aquatica* - water speedwell

SIMAROUBACEAE - QUASSIA FAMILY

* *Ailanthus altissima* - tree of heaven

SOLANACEAE - NIGHTSHADE FAMILY

* *Datura wrightii* - western jimsonweed
* *Nicotiana glauca* - tree tobacco
* *Solanum americanum* - small-flowered nightshade
Solanum douglasii - white nightshade
* *Solanum eleagnifolium* - silver leaf horse-nettle
* *Solanum sarrachoides* - hairy nightshade
Solanum xanti - chaparral nightshade

TAMARICACEAE - TAMARISK FAMILY

* *Tamarix* sp. - tamarisk

ULMACEAE - ELM FAMILY

* *Ulmus pumila* - Siberian elm

APPENDIX B (*Continued*)

URTICACEAE - NETTLE FAMILY

Urtica dioica - giant creek nettle
* *Urtica urens* - dwarf nettle

VERBENACEAE - VERVAIN FAMILY

Verbena lasiostachys - western verbena

VISCACEAE - MISTLETOE FAMILY

Phoradendron macrophyllum - big leaf mistletoe
Phoradendron villosum - oak mistletoe

VITACEAE - GRAPE FAMILY

Parthenocissus vitacea - woodbine, Virginia creeper
Vitis girdiana - desert wild grape

ZYGOPHYLLACEAE - CALTROP FAMILY

* *Tribulus terrestris* - puncture vine

ANGIOSPERMAE (MONOCOTYLEDONES)

ARECACEAE - PALM FAMILY

* *Washingtonia robusta* - Mexican fan palm

CYPERACEAE - SEDGE FAMILY

Carex sp. - sedge
Cyperus eragrostis - tall cyperus
Cyperus esculentus - yellow nut-grass
* *Cyperus involucratus* - nutsedge
Cyperus odoratus - coarse cyperus
Eleocharis montevidensis - slender creeping spike-rush
Eleocharis parishii - spike-rush
Scirpus acutus - hard-stemmed bulrush
Scirpus americanus - winged three-square
Scirpus microcarpus - bulrush
Scirpus robustus - Pacific coast bulrush

APPENDIX B (*Continued*)

JUNCACEAE - RUSH FAMILY

Juncus balticus - wire rush
Juncus bufonius - toad rush
Juncus longistylis - rush
Juncus rugulosus - wrinkled rush
Juncus textilis - Indian rush
Juncus torreyi - rush
Juncus xiphioides - iris-leaved rush

LEMNACEAE - DUCKWEED FAMILY

Lemna valdiviana - duckweed

LILIACEAE - LILY FAMILY

* *Allium cepa* - onion
Allium porrum - onion
* *Amaryllis bella-donna* - naked lady
* *Asparagus officinalis* - asparagus
Brodiaea terrestris ssp. *kernensis* - brodiaea
Calochortus clavatus - club-haired mariposa lily
Calochortus venustus - mariposa lily
Dichelostemma capitatum - blue dicks
Muilla maritima - common muilla
Yucca whipplei – Our Lord's candle

POACEAE - GRASS FAMILY

Achnatherum coronatum - giant needlegrass
* *Agrostis* sp. - bentgrass
* *Agrostis viridis* - water bent
* *Arundo donax* - giant reed
* *Avena barbata* - slender oat
* *Avena fatua* - wild oat
Bromus catharticus - California brome
* *Bromus diandrus* - ripgut grass
* *Bromus hordeaceus* - soft chess
* *Bromus madritensis* ssp. *rubens* - foxtail chess

APPENDIX B (*Continued*)

*	*Bromus tectorum* - cheat grass
*	*Cortaderia jubata* - pampas grass
*	*Crypsis schoenoides* - prickle grass
*	*Cynodon dactylon* - Bermuda grass
*	*Digitaria sanguinalis* - hairy crabgrass
	Distichlis spicata - salt grass
*	*Echinochloa colonum* - jungle-rice
*	*Echinochloa crus-galli* - barnyard grass
	Elymus glaucus - western wild rye
	Eragrostis mexicana - lovegrass
*	*Festuca arundinacea* - tall fescue
*	*Hordeum marinum* - Mediterranean barley
*	*Hordeum murinum* - glaucous foxtail barley
*	*Lamarckia aurea* - goldentop
*	*Leptochloa uninerva* - Mexican sprangletop
	Leymus condensatus - giant ryegrass
	Leymus triticoides - beardless wild rye
	Leptichloa uninervia - Mexican sprangletop
*	*Lolium perenne* - perennial ryegrass
	Melica imperfecta - California melic
	Muhlenbergia microsperma - littleseed muhly
	Nassella cernua - nodding needlegrass
	Nassella lepida - foothill needlegrass
	Paspalum distichum - knotgrass
*	*Phalaris minor* - Mediterranean canary grass
*	*Piptatherum miliaceum* - smilo grass
*	*Poa annua* - annual bluegrass
	Poa secunda - Malpais bluegrass
*	*Polypogon interruptus* - ditch beard grass
*	*Polypogon monspeliensis* - rabbit's-foot grass
*	*Schismus barbatus* - abumashi
*	*Sorghum halepense* - Johnsongrass
*	*Vulpia myuros* - rattail fescue
	Vulpia octoflora - six-weeks fescue

APPENDIX B (*Continued*)

POTAMOGETONACEAE - PONDWEED FAMILY
Potamogeton foliosus - leafy pondweed

TYPHACEAE - CATTAIL FAMILY
Typha domingensis - slender cattail
Typha latifolia - broad-leaved cattail

* signifies introduced (non-native) species

APPENDIX C

CALIFORNIA NATURAL DIVERSITY DATABASE FORMS

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ______	Quad Code ______
Index Code ______	Occurrence # ______
Copy Sent To ______	

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. *PLEASE ATTACH OR DRAW A MAP ON BACK.*

Scientific name (no codes): *Chorizanthe parryi* var. *fernandina*

Reporter: Mark A. Elvin, Julie Vanderwier Phone: (760) 942.5147

Address: DUDEK & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: 06 Jun 2002 County: Los Angeles Collection: If yes, # Mus./Herb:

Location: Northern Santa Susana Mountains, Newhall Ranch, southeast of confluence of the Santa Clara River and Castaic Creek, east, south, and west edges of Airport Mesa and adjacent mesas.

Quad Name: Newhall T 4N R 16W W ¼ of W ¼ Sec3
X 7½' __ 15' Elevation: 1075-1250' T 4N R 17W E ¼ of E ¼ Sec3

Landowner/Manager: The Newhall Land and Farming Company, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? X Yes ____ No If not, reason:

Is this a new location record? ____ Yes X* No ____ Unknown * surveys performed here in 2001 by FLx; species believed identified during those surveys

Total # of Individuals = ~300 plants (2002); ~20,000 plants (pre-2002) Is this a subsequent visit? __ Yes X No Compared to your last visit: __ more __ same __ fewer

Phenology (plants): ____ % vegetative 2 % flowering 98 % fruiting

Population Age Structure (animals): ____ # adults ____ # juveniles ____ # others

Site Function for Species (animals): ____ breeding ____ foraging ____ wintering ____ roosting ____ denning ____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

Zamora clay loam and terrace escarpment soils; ridges and slopes down from mesa tops and from agricultural areas. Primarily on southeast- to south- to southwest-facing slopes with macro-slope gradients typically ranging between 5 degrees and 35 degrees; micro-slope gradients are typically slightly shallower (2 degrees to 20 degrees), but are locally steeper. Soils color is generally brown (10YR 5/3). Venturan coastal sage scrub with *Artemisia californica, Eriogonum fasciculatum, E. elongatum, E. gracile, Salvia leucophylla, Ericameria palmeri* var. *pachypus, Mirabilis californica.*

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, farming, grading/clearing; Possible Threats: proposed residential/commercial development.

Overall Site Quality: ____ Excellent X Good ____ Fair ____ Poor

Comments: Surveys were conducted until September 2002. The rainfall for this growing year was ~one-third of the normal.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

X Keyed in a site reference:

X Compared with specimen housed at: UCR

____ Compared with photo/drawing in:

X By another person (name): Andy Sanders, Rick Riefner

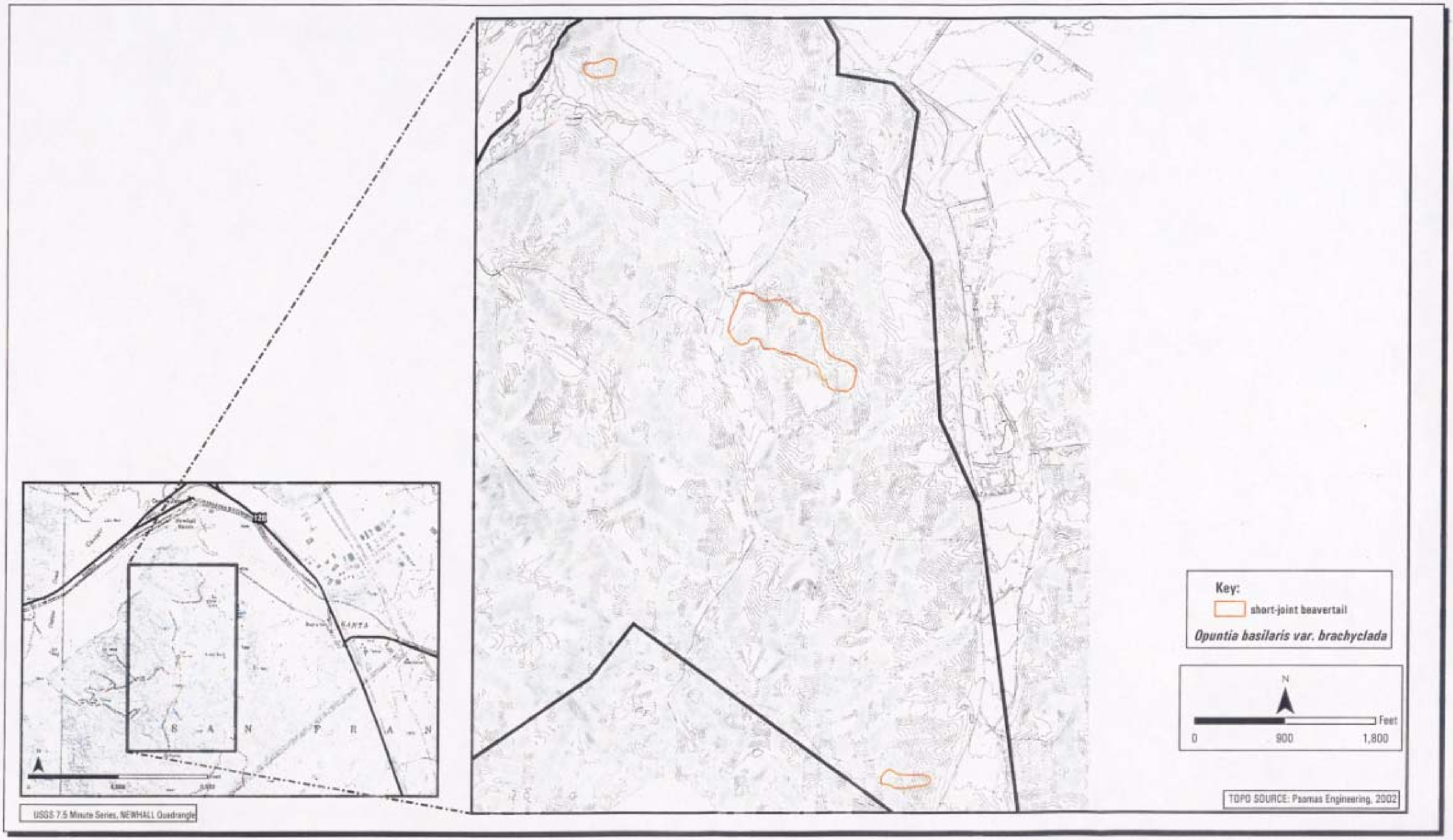
X Other: compared with materials identified by CDFG in May 2002 and documented occurrence on Grapevine Mesa [EO 14]

OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone) Kim Marsden

PHOTOGRAPHS (Check one or more)

Subject	Type
X Plant/Animal	X Slide
X Habitat	____ Print
X Diagnostic Feature	
____ Other	

May we obtain duplicates at our cost?
X Yes ____ No



Newhall Ranch

2002 short-joint beavertail - Airport Mesa Area

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ______________ Quad Code ____________
Index Code ______________ Occurrence # ____________
Copy Sent To ________________________________

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. *PLEASE ATTACH OR DRAW A MAP ON BACK.*

Scientific name (no codes): *Chorizanthe parryi* var. *fernandina*

Reporter: Mark Elvin & Julie Vanderwier Phone: (760) 942-5147

Address: DUDEK & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: County: Los Angeles Collection: yes If yes, # Mus./Herb:

Location: Northern Santa Susana Mountains, Newhall Ranch, south of confluence of the Santa Clara River and Castaic Creek, south and western edge of Grapevine Mesa.

Quad Name: Val Verde
_X_ 7½' __ 15' Elevation: 1040-1290' T 17W R 4N _____ ¼ o _____ ¼ Sec_____

Landowner/Manager: The Newhall Land and Farming Company, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? _X_ Yes ____ No If not, reason:

Is this a new location record? _X*_ Yes ____ No ____ Unknown [*some new polygons were located near extant EO 14]

Total # of Individuals = ˜5,000plants (2002); ˜200,000 plants (pre-2002) Is this a subsequent visit?__ Yes _X_ No Compared to your last visit: __ more __ same __ fewer

Phenology (plants): ____ % vegetative _˜3_ % flowering* _˜97_ % fruiting** *2002 plants ** pre-2002 plants

Population Age Structure (animals): ____ # adults ____ # juveniles ____ # others

Site Function for Species (animals): ____ breeding ____ foraging ____ wintering ____ roosting ____ denning ____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

Zamora clay loam and terrace escarpment soils; west side of the mesa immediately adjacent to, and downslope of, agricultural areas. Primarily on south- to southwest-facing slopes with macro-slope gradients typically ranging between 8 degrees and 35 degrees; micro-slope gradients are typically slightly shallower (2 degrees to 16 degrees), but are locally steeper, particularly at two locations where plants were observed on the eroded banks of a dry creek (slope gradients 60 to 68 degrees). Soils color is generally brown (10YR 5/3)Venturan coastal sage scrub with *Artemisia californica, Eriogonum fasciculatum, E. elongatum, E. gracile, Salvia leucophylla, Ericameria palmeri* var. *pachypus, Mirabilis californica*

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, farming; Possible Threats: proposed residential/commercial development.

Overall Site Quality: ____ Excellent _X_ Good ____ Fair ____ Poor

Comments: Surveys were conducted until September 2002. The rainfall for this growing year was ˜one-third of the normal.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

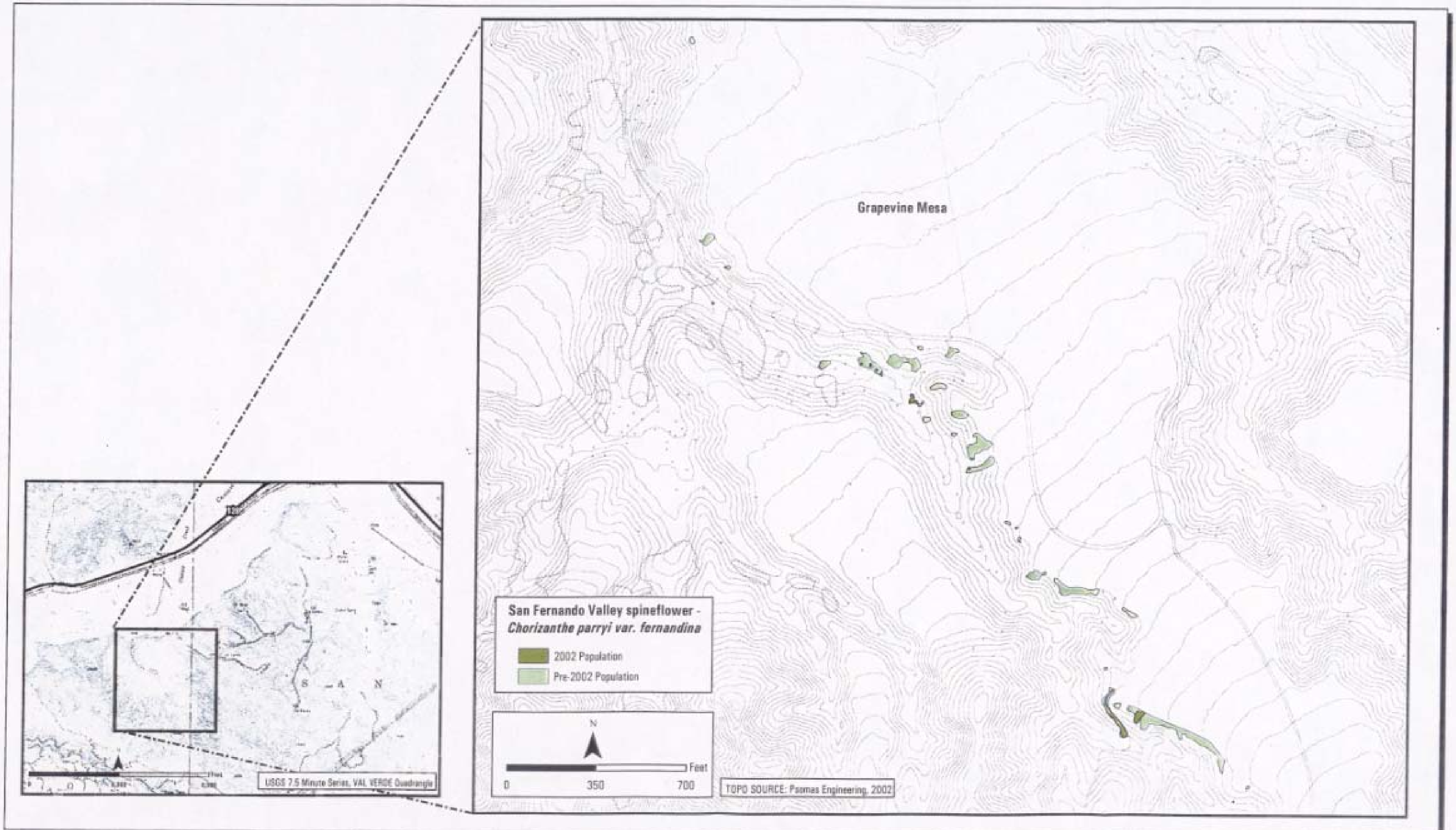
_X_ Keyed in a site reference:
_X_ Compared with specimen housed at:
____ Compared with photo/drawing in:
_X_ By another person (name): Andy Sanders, Rick Riefner
_X_ Other: compared with materials identified by CDFG in May 2002 and documented occurrence on Grapevine Mesa [EO 14]

PHOTOGRAPHS (Check one or more)

Subject	Type
_X_ Plant/Animal	_X_ Slide
_X_ Habitat	____ Print
_X_ Diagnostic Feature	
____ Other	

OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone) Kim Marsden, Rick Riefner

May we obtain duplicates **at our cost?** _X_ Yes ____ No



Newhall Ranch

2002 San Fernando Valley spineflower - Grapevine Mesa Area

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ______________ Quad Code ______________
Index Code ______________ Occurrence # ______________
Copy Sent To ______________

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. *PLEASE ATTACH OR DRAW A MAP ON BACK.*

Scientific name (no codes): *Chorizanthe parryi* var. *fernandina*

Reporter: Mark A. Elvin, Julie Vanderwier Phone: (760) 942.5147

Address: DUDEK & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: July & August 2002 County: Los Angeles Collection: yes If yes, # Elvin 2138 Mus./Herb: UCR

Location: Northern Santa Susana Mountains, Newhall Ranch: north of State Route 126, west of San Martinez Grande Canyon Road

Quad Name: Val Verde T 17W R 4W ____ ¼ of____ ¼ Sec 20
_X_ 7½' __ 15' Elevation: 1090-1235' T ____ R ____ ____ ¼ o ____ ¼ Sec____

Landowner/Manager: The Newhall Land and Farming Company, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? _X_ Yes ____ No If not, reason:

Is this a new location record? _X*_ Yes ___ No ____ Unknown * surveys performed here in 2001 by FLx; species believed identified during those surveys

Total # of Individuals = ~50 plants (2002); ~1,050,000 plants (pre-2002) Is this a subsequent visit? __ Yes X No Compared to your last visit: __ more __ same __ fewer

Phenology (plants): ____ % vegetative _<1_ % flowering _99_ % fruiting (pre-2002 inflorescences)

Population Age Structure (animals): ____ # adults ____ # juveniles ____ # others

Site Function for Species (animals): ____ breeding ____ foraging ____ wintering ____ roosting ____ denning ____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

Elevated slopes and rounded ridge tops underlain by a large ancient landslide that involves bedrock of the marine Pico Formation; soil unit (per Antelope Valley Soil Survey (USDA 1969) is eroded Castaic-Balcom silty clay loam (CmF2), with the organic (O) soil horizon generally absent. Dry Munsell soil color is typically brown (10YR 5/3) and varies from grayish-brown (10YR 5/2) to pale brown (10YR 6/3). Slopes faced to the south or east with bearing ranging from S80W to N78E. Macro-slope gradients range from 5 degrees to 33 degrees, with micro-slope gradients being generally shallower (1 degree to 20 degrees). The substrate is undisturbed; however, extensive cattle grazing has occurred in the past. Vegetation is open Venturan coastal scrub composed of *Salvia leucophylla, Artemisia californica, Eriogonum fasciculatum, E. elongatum, E. gracile, Sambucus mexicana.*

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, fire in recent past (5-10 years); Possible Threats: Currently proposed for estate residential development.

Overall Site Quality: ____ Excellent _X_ Good ____ Fair ____ Poor

Comments: Surveys were conducted until September 2002. The rainfall for this growing year was ~one-third of the normal.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

_X_ Keyed in a site reference: Hickman 1993

_X_ Compared with specimen housed at: UCR

____ Compared with photo/drawing in:

_X_ By another person (name): Andy Sanders

_X_ Other: compared with materials identified by CDFG in May 2002 and documented occurrence on Grapevine Mesa (EO 14)

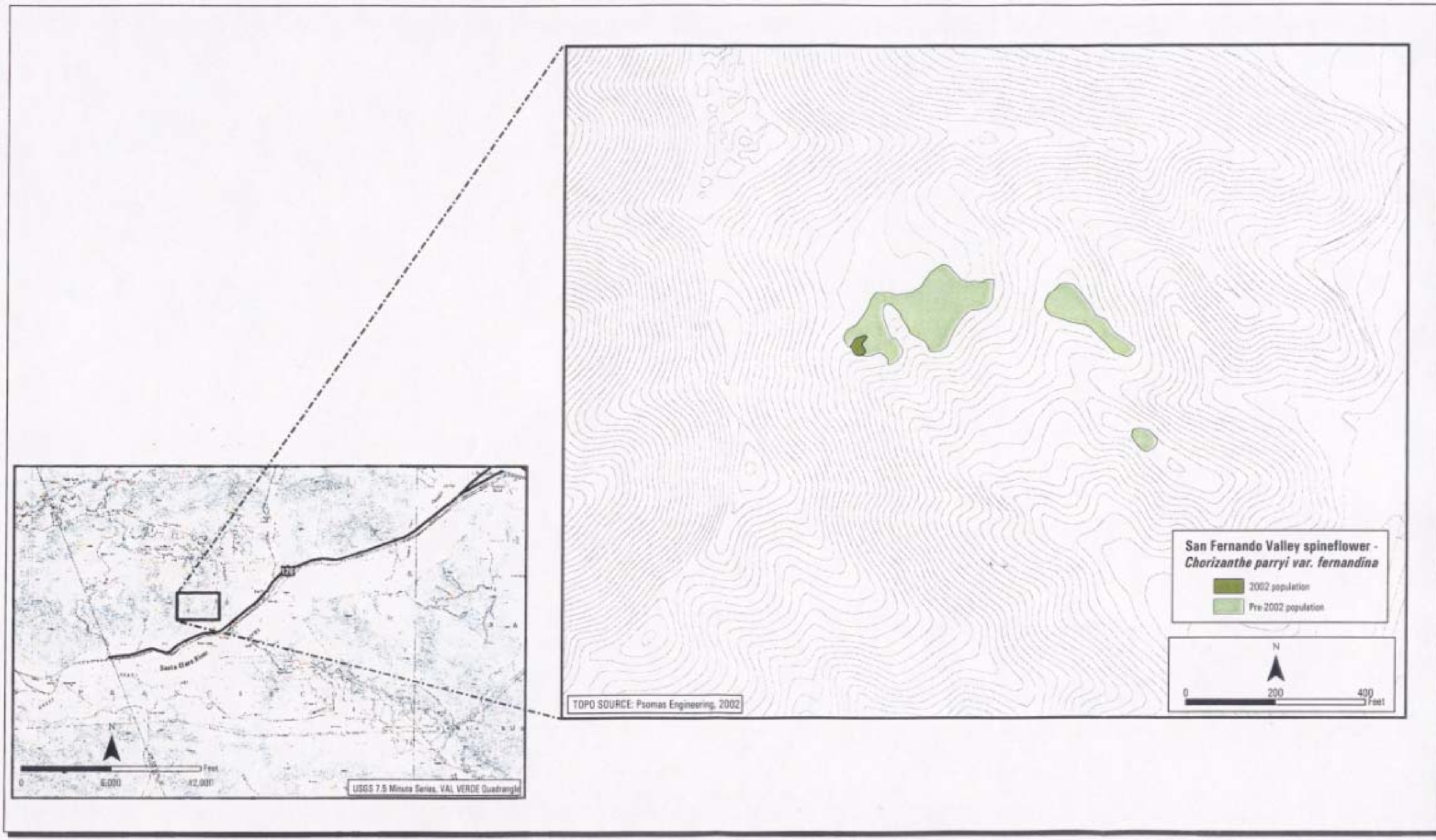
OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)
Julie M. Vanderwier

PHOTOGRAPHS (Check one or more)

Subject: _X_ Plant/Animal; _X_ Habitat; _X_ Diagnostic Feature; ____ Other

Type: _X_ Slide; ____ Print

May we obtain duplicates at our cost?
_X_ Yes ____ No



Newhall Ranch

2002 San Fernando Valley spineflower - San Martinez Grande Canyon Area

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ______	Quad Code ______
Index Code ______	Occurrence # ______
Copy Sent To ______	

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. *PLEASE ATTACH OR DRAW A MAP ON BACK.*

Scientific name (no codes): *Helianthus nuttallii* ssp. *parishii*

Reporter: Mark A. Elvin, Julie Vanderwier Phone: (760) 942.5147

Address: DUDEK & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: 29 Aug 2002 County: Los Angeles Collection: If yes, #25257 AC Sanders and MA Elvin Mus./Herb: UCR

Location: Northern Santa Susana Mountains, Newhall Ranch, southeast of confluence of the Santa Clara River and Castaic Creek, in a seep area south of the Santa Clara River between Middle Canyon and San Jose Flats on the edge of a slight rise in the middle of a one-acre spring/marsh complex ("Castaic Spring").

Quad Name: Newhall _X_ 7½' __ 15' Elevation: 990-1010' T 4N R 17W E ¼ of E ¼ Sec3

Landowner/Manager: The Newhall Land and Farming Company, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? _X_ Yes ____ No If not, reason:

Is this a new location record? _X*_ Yes __ No ____ Unknown * see Comments below

Total # of Individuals = ~5-20 plants Is this a subsequent visit? __ Yes X No Compared to your last visit: __ more __ same __ fewer

Phenology (plants): _5_ % vegetative _90_ % flowering _5_ % fruiting

Population Age Structure (animals): ____ # adults ____ # juveniles ____ # others

Site Function for Species (animals): ____ breeding ____ foraging ____ wintering ____ roosting ____ denning ____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

slight n aspect (1 to 5 degrees); soils dark-brown to black loamy on base of pebbly alluvial; in an opening of fresh water marsh surrounded by southern willow riparian woodland with *Urtica dioica, Salix lasiolepis, S. laevigata, Vitis girdiana, Mimulus guttatus, Berula erecta, Juncus balticus.*

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing; Visible Disturbances: trampling (human); Possible Threats: over-collection, apparent continued expansion of the *Vitis girdiana*, proposed nearby residential/commercial development, potential changes in groundwater hydrology.

Overall Site Quality: ____ Excellent _X_ Good ____ Fair ____ Poor

Comments: A specimen was collected independently by a representative of The Newhall Ranch Land and Farming Company and sent to the Herbarium at the University of California, Berkeley, where Dr. John Strother determined it to be consistent with *Helianthus nuttallii* ssp. *parishii* by (Barbara Errter, memo to Ken Koch; September 12, 2002). This specimen, along with others, were sent to Drs. Loren Rieseberg and Charles Heiser at the University of Indiana, Bloomington. They questioned the previous determination of *Helianthus nuttallii* ssp. *parishii*. Work is currently ongoing to verify the identity of this plant.

Should/Could this site be protected? How? This site and its hydrology should be protected.

Other comments:

DETERMINATION (Check one or more, fill in blanks)

_X_ Keyed in a site reference: Hickman 1993, Heiser 1969

_X_ Compared with specimen housed at: RSA

____ Compared with photo/drawing in:

_X_ By another person (name): Andy Sanders, Steve Boyd, John Strother

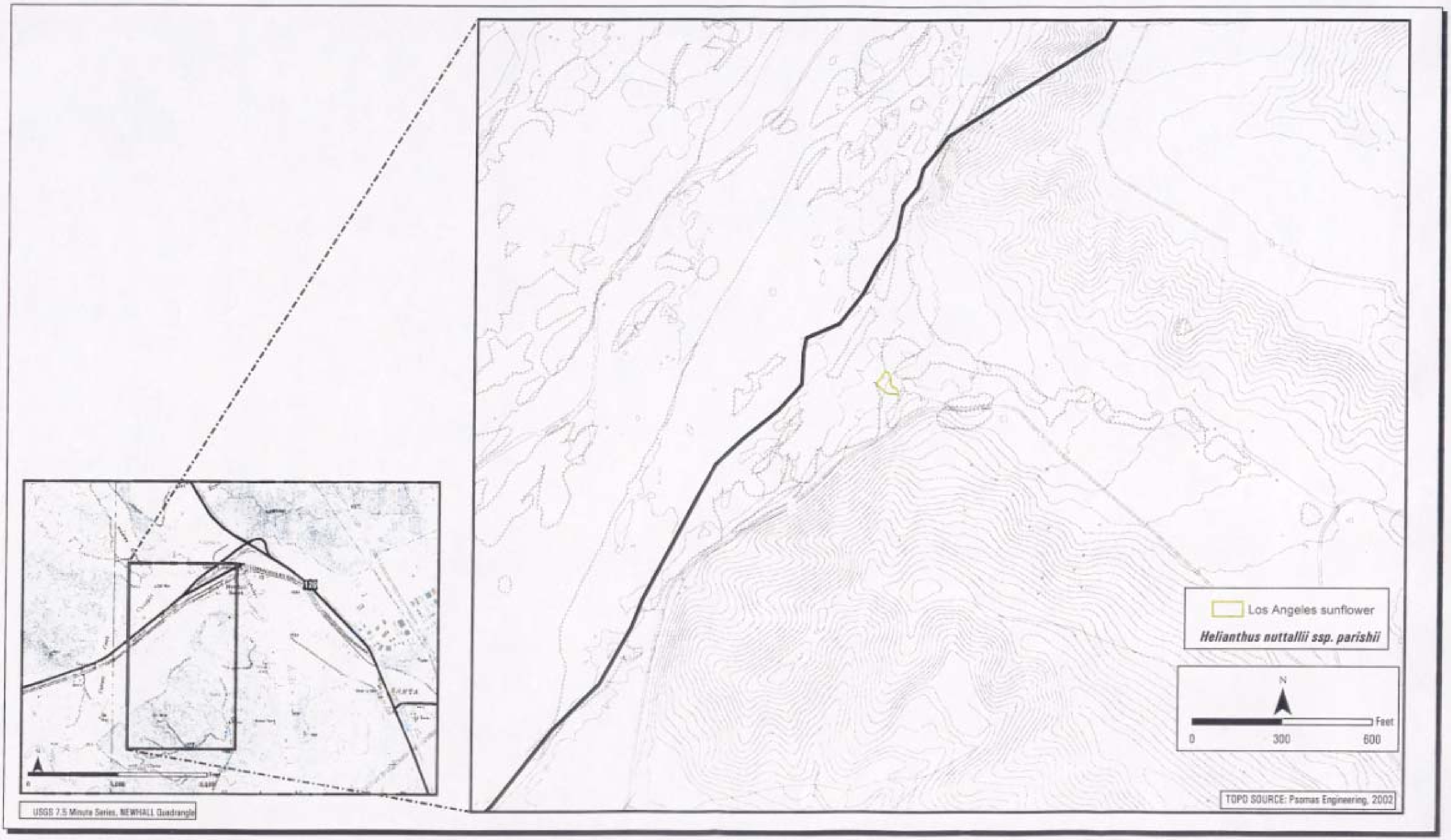
____ Other:

PHOTOGRAPHS (Check one or more)

Subject	Type
_X_ Plant/Animal	_X_ Slide
_X_ Habitat	____ Print
_X_ Diagnostic Feature	
____ Other	

OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone) Daryl Koutnik, Mary Meyer,

May we obtain duplicates at our cost? _X_ Yes ____ No



Newhall Ranch

Los Angeles sunflower

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. *PLEASE ATTACH OR DRAW A MAP ON BACK.*

OFFICE USE ONLY

Document Code ______ Quad Code ______
Index Code ______ Occurrence # ______
Copy Sent To ______

Scientific name (no codes): *Opuntia basilaris* var. *brachyclada*

Reporter: Mark Elvin & Julie Vanderwier   Phone: (760) 942-5147

Address: DUDEK & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: June-July 2002   County: Los Angeles   Collection: yes   If yes, #   Mus./Herb:

Location: Northern Santa Susana Mountains, Newhall Ranch, southeast of confluence of the Santa Clara River and Castaic Creek, east, south, and west edges of Airport Mesa and adjacent mesas.

Quad Name: Newhall
_X_ 7½' __ 15'   Elevation: 1000-1300'   T 4N   R 16W   W   ¼ of W ¼ Sec3
T 4N   R 17W   E   ¼ of E ¼ Sec3

Landowner/Manager: The Newhall Land and Farming Company, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? _X_ Yes ___ No   If not, reason:

Is this a new location record? _X_ Yes ___ No ___ Unknown

Total # of Individuals = 200-1,000 Is this a subsequent visit? __ Yes _X_ No   Compared to your last visit: __ more __ same __ fewer

Phenology (plants): 90 % vegetative ~5 % flowering* ~5 % fruiting

Population Age Structure (animals): ___ # adults ___ # juveniles ___ # others

Site Function for Species (animals): ___ breeding ___ foraging ___ wintering ___ roosting ___ denning ___ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

Venturan coastal sage scrub with *Artemisia californica, Eriogonum fasciculatum, E. elongatum, E. gracile, Salvia leucophylla, Ericameria palmeri* var. *pachypus, Mirabilis californica*

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, farming, grading/clearing; Possible Threats: proposed residential/commercial development.

Overall Site Quality: ___ Excellent _X_ Good ___ Fair ___ Poor

Comments: Plants were sparsely distributed with the polygons.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

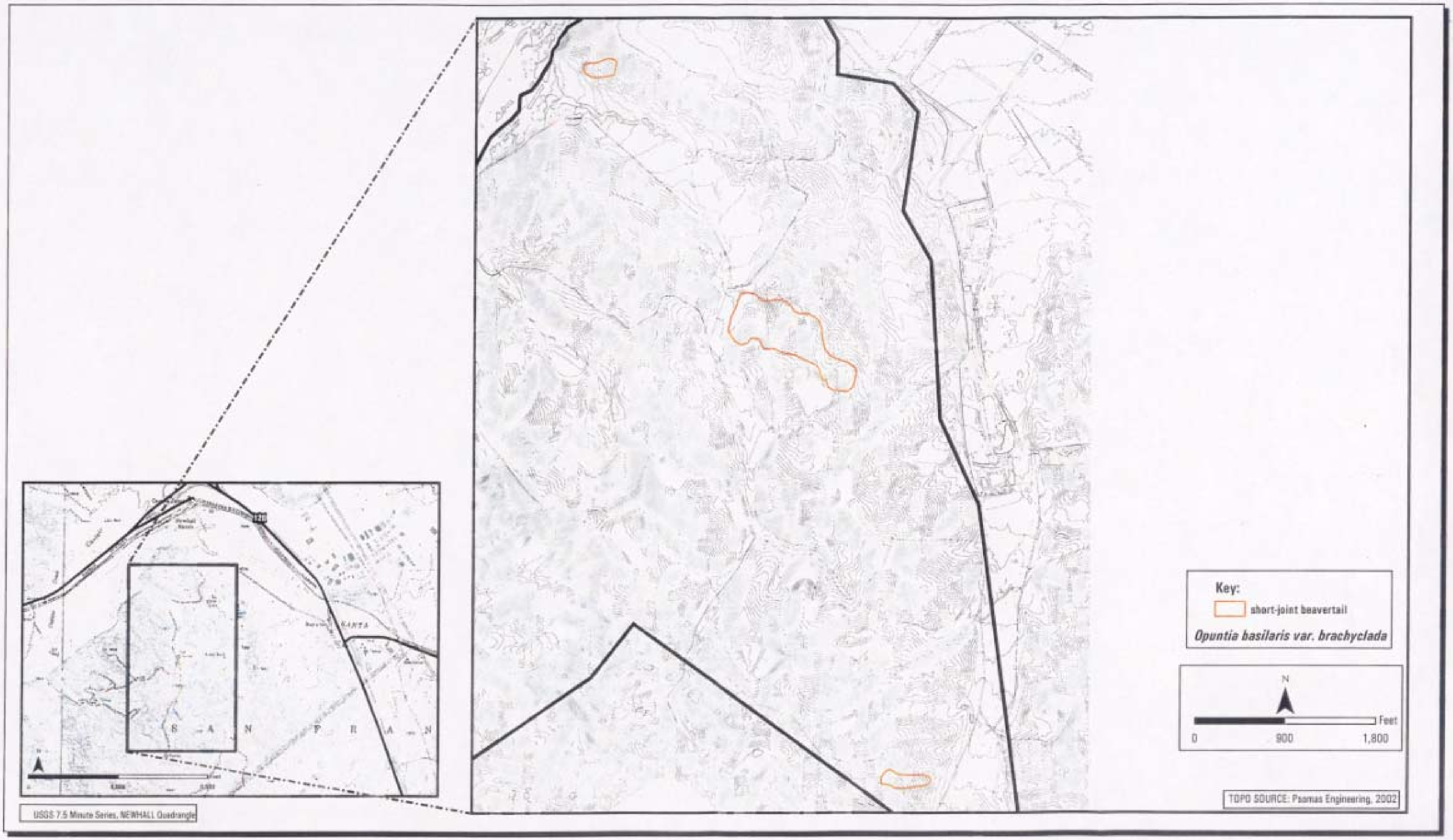
_X_ Keyed in a site reference: Hickman 1993
_X_ Compared with specimen housed at: RSA
___ Compared with photo/drawing in:
___ By another person (name):
___ Other:

OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone) Kim Marsden

PHOTOGRAPHS (Check one or more)

Subject: _X_ Plant/Animal; _X_ Habitat; _X_ Diagnostic Feature; ___ Other
Type: _X_ Slide; ___ Print

May we obtain duplicates at our cost?
_X_ Yes ___ No



Newhall Ranch

2002 short-joint beavertail - Airport Mesa Area

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

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Document Code ________ Quad Code ________
Index Code ________ Occurrence # ________
Copy Sent To ________

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. *PLEASE ATTACH OR DRAW A MAP ON BACK.*

Scientific name (no codes): *Opuntia basilaris* var. *brachyclada*

Reporter: Mark Elvin & Julie Vanderwier Phone: (760) 942-5147

Address: DUDEK & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: June-July 2002 County: Los Angeles Collection: yes If yes, # Mus./Herb:

Location: Northern Santa Susana Mountains, Newhall Ranch, south of confluence of the Santa Clara River and Castaic Creek, the vicinity of Grapevine Mesa.

Quad Name: Val Verde
_X_ 7½' __ 15' Elevation: 1000-1300' T 17W R 4N ____ ¼ o ____ ¼ Sec____

Landowner/Manager: The Newhall Land and Farming Company, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? _X_ Yes ____ No If not, reason:

Is this a new location record? _X_ Yes ____ No ____ Unknown

Total # of Individuals = 200-1,000 Is this a subsequent visit? __ Yes _X_ No Compared to your last visit: __ more __ same __ fewer

Phenology (plants): 90 % vegetative ~5 % flowering* ~5 % fruiting

Population Age Structure (animals): ____ # adults ____ # juveniles ____ # others

Site Function for Species (animals): ____ breeding ____ foraging ____ wintering ____ roosting ____ denning ____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

Venturan coastal sage scrub with *Artemisia californica, Eriogonum fasciculatum, E. elongatum, E. gracile, Salvia leucophylla, Ericameria palmeri* var. *pachypus, Mirabilis californica*

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, farming; Possible Threats: proposed residential/commercial development.

Overall Site Quality: ____ Excellent _X_ Good ____ Fair ____ Poor

Comments: Plants were sparsely distributed with the polygons.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

_X_ Keyed in a site reference: Hickman 1993
_X_ Compared with specimen housed at: RSA
____ Compared with photo/drawing in:
____ By another person (name):
____ Other:

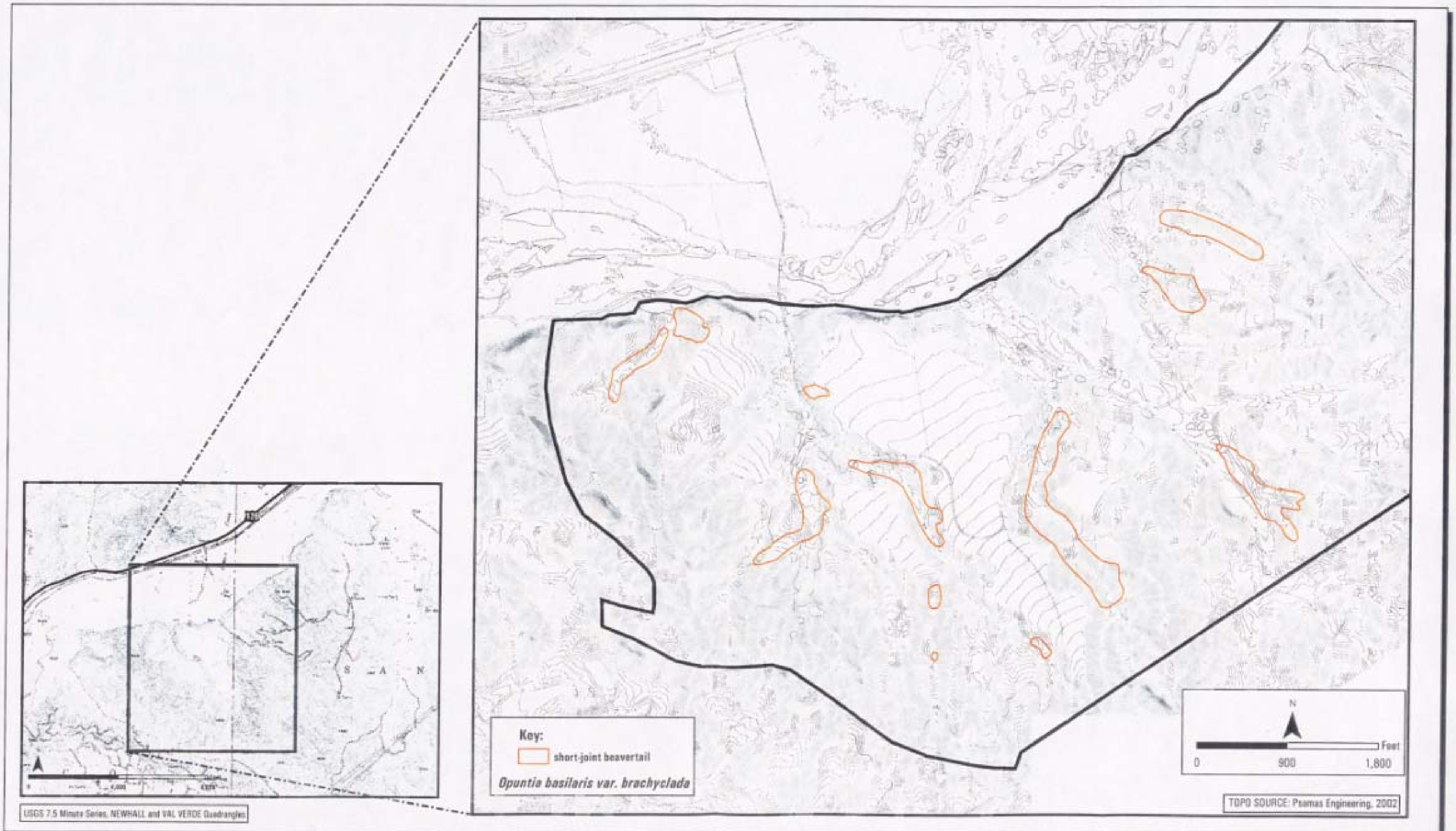
OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone) Kim Marsden

PHOTOGRAPHS (Check one or more)

Subject
_X_ Plant/Animal
_X_ Habitat
_X_ Diagnostic Feature
____ Other

Type
_X_ Slide
____ Print

May we obtain duplicates at our cost?
_X_ Yes ____ No



Newhall Ranch

2002 short-joint beavertail - Grapevine Mesa Area

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

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Index Code ________ Occurrence # ________
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PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. *PLEASE ATTACH OR DRAW A MAP ON BACK.*

Scientific name (no codes): *Opuntia basilaris* var. *brachyclada*

Reporter: Mark Elvin & Julie Vanderwier Phone: (760) 942-5147

Address: DUDEK & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: June-July 2002 County: Los Angeles Collection: yes If yes, # Mus./Herb:

Location: Northern Santa Susana Mountains, Newhall Ranch, southwest of confluence of the Santa Clara River and Castaic Creek, scattered in Long Canyon.

Quad Name: Val Verde
_X_ 7½' __ 15' Elevation: 1000-1300' T 4N R 17W ___ ¼ of ___ ¼ Sec 3

Landowner/Manager: The Newhall Land and Farming Company, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? _X_ Yes ___ No If not, reason:

Is this a new location record? _X_ Yes ___ No ___ Unknown

Total # of Individuals = 250-1250 Is this a subsequent visit? __ Yes _X_ No Compared to your last visit: __ more __ same __ fewer

Phenology (plants): 90 % vegetative ~5 % flowering* ~5 % fruiting

Population Age Structure (animals): ___ # adults ___ # juveniles ___ # others

Site Function for Species (animals): ___ breeding ___ foraging ___ wintering ___ roosting ___ denning ___ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

Venturan coastal sage scrub with *Artemisia californica, Eriogonum fasciculatum, E. elongatum, E. gracile, Salvia leucophylla, Ericameria palmeri* var. *pachypus, Mirabilis californica*

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, oil well operations; Possible Threats: proposed residential/commercial development.

Overall Site Quality: ___ Excellent _X_ Good ___ Fair ___ Poor

Comments: Plants were sparsely distributed with the polygons.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

_X_ Keyed in a site reference: Hickman 1993
_X_ Compared with specimen housed at: RSA
___ Compared with photo/drawing in:
___ By another person (name):
___ Other:

OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject
_X_ Plant/Animal
_X_ Habitat
_X_ Diagnostic Feature
___ Other

Type
_X_ Slide
___ Print

May we obtain duplicates at our cost?
_X_ Yes ___ No

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ______________ Quad Code ____________
Index Code ______________ Occurrence # ____________
Copy Sent To ______________________________

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Opuntia basilaris* var. *brachyclada*

Reporter: Mark Elvin & Julie Vanderwier Phone: (760) 942-5147

Address: DUDEK & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: June-July 2002 County: Los Angeles Collection: yes If yes, # Mus./Herb:

Location: Northern Santa Susana Mountains, Newhall Ranch, northwest of confluence of the Santa Clara River and Castaic Creek, scattered in Chiquito Canyon.

Quad Name: Val Verde
_X_ 7½' __ 15' Elevation: 1000-1300' T 4N R 17W ___ ¼ of ___ ¼ Sec 15 and 16

Landowner/Manager: The Newhall Land and Farming Company, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? _X_ Yes ____ No If not, reason:

Is this a new location record? _X_ Yes ____ No ____ Unknown

Total # of Individuals = 100-750 Is this a subsequent visit? __ Yes _X_ No Compared to your last visit: __ more __ same __ fewer

Phenology (plants): 90 % vegetative ~5 % flowering* ~5 % fruiting

Population Age Structure (animals): ____ # adults ____ # juveniles ____ # others

Site Function for Species (animals): ____ breeding ____ foraging ____ wintering ____ roosting ____ denning ____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

Venturan coastal sage scrub with *Artemisia californica, Eriogonum fasciculatum, E. elongatum, E. gracile, Salvia leucophylla, Ericameria palmeri* var. *pachypus, Mirabilis californica*

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing; Possible Threats: proposed residential/commercial development.

Overall Site Quality: ____ Excellent _X_ Good ____ Fair ____ Poor

Comments: Plants were sparsely distributed with the polygons.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

_X_ Keyed in a site reference: Hickman 1993
_X_ Compared with specimen housed at: RSA
____ Compared with photo/drawing in:
____ By another person (name):
____ Other:

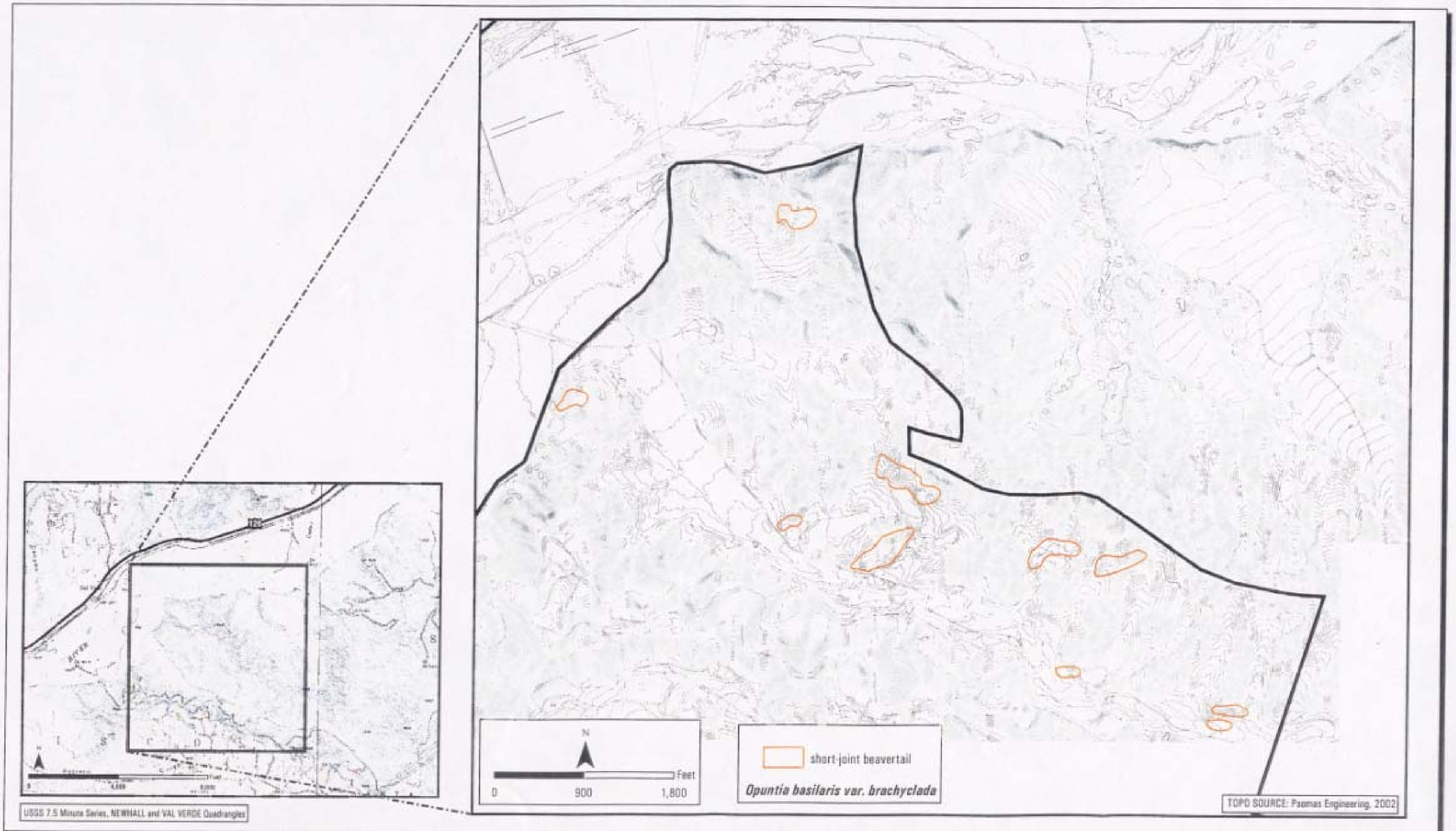
OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject
_X_ Plant/Animal
_X_ Habitat
_X_ Diagnostic Feature
____ Other

Type
_X_ Slide
____ Print

May we obtain duplicates at our cost?
_X_ Yes ____ No



Newhall Ranch

2002 short-joint beavertail - Long Canyon Area

2004 Sensitive Plant Survey Results

for

Newhall Ranch Specific Plan Area
Los Angeles County, California

Prepared for:

The Newhall Land and Farming Company

23823 Valencia Boulevard
Valencia, CA 91355
Contact: Mark Subbotin

Prepared by:

DUDEK & ASSOCIATES, INC.
Professional Teams for Complex Projects

605 Third Street
Encinitas, CA 92024
Contact: Sherri L. Miller
(760) 479-4244

October 2004

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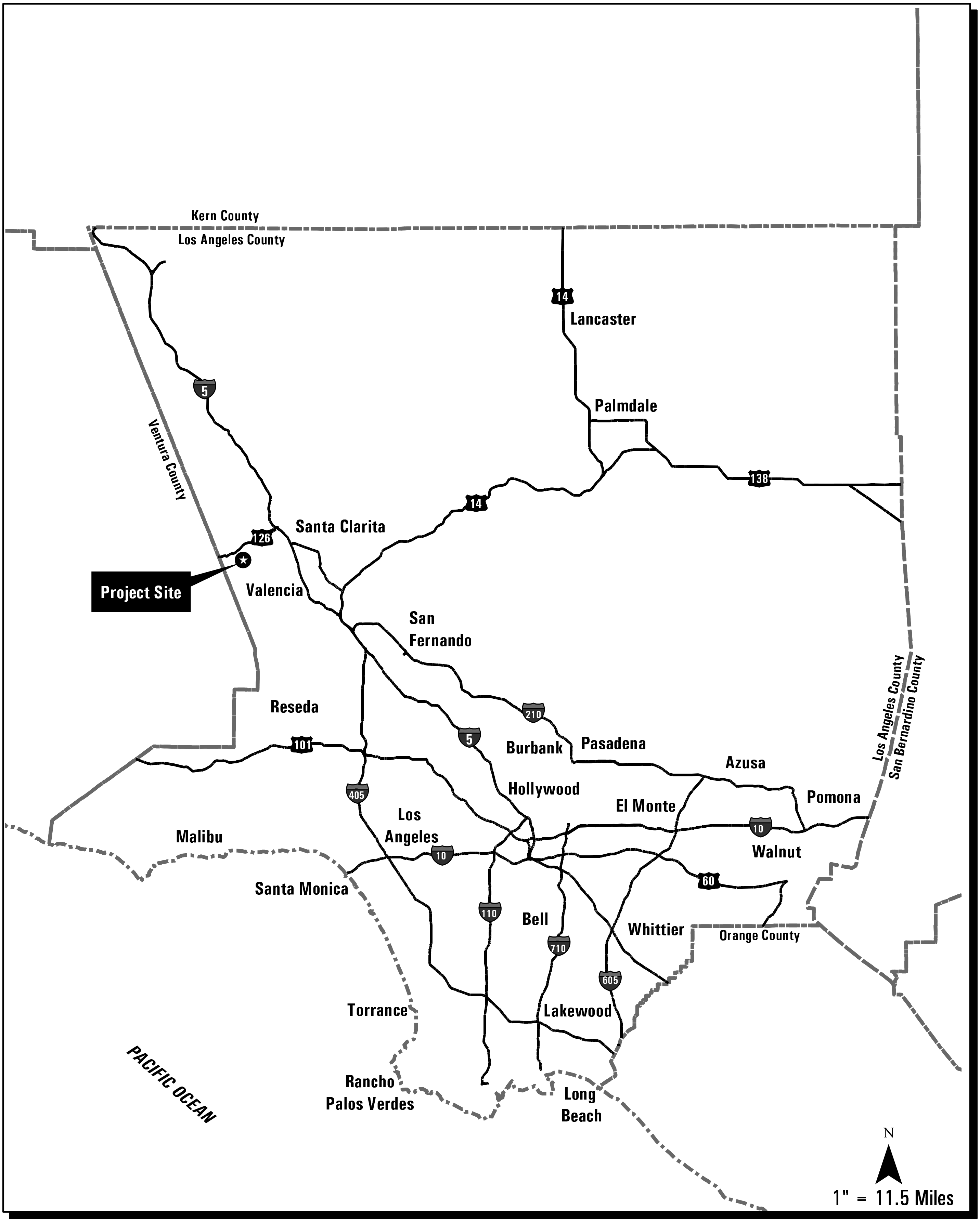
1.0 INTRODUCTION

The purpose of this report is to document the results of surveys for sensitive plant species within the approximately 7,778-acre study area, a subset of the 11,963-acre Newhall Ranch Specific Plan Area (NR SPA), for the 2004 field season. Surveys placed an equal emphasis on the identification of populations of the state-listed endangered San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina;* SFVS) and other sensitive plant species.

2.0 SITE DESCRIPTION

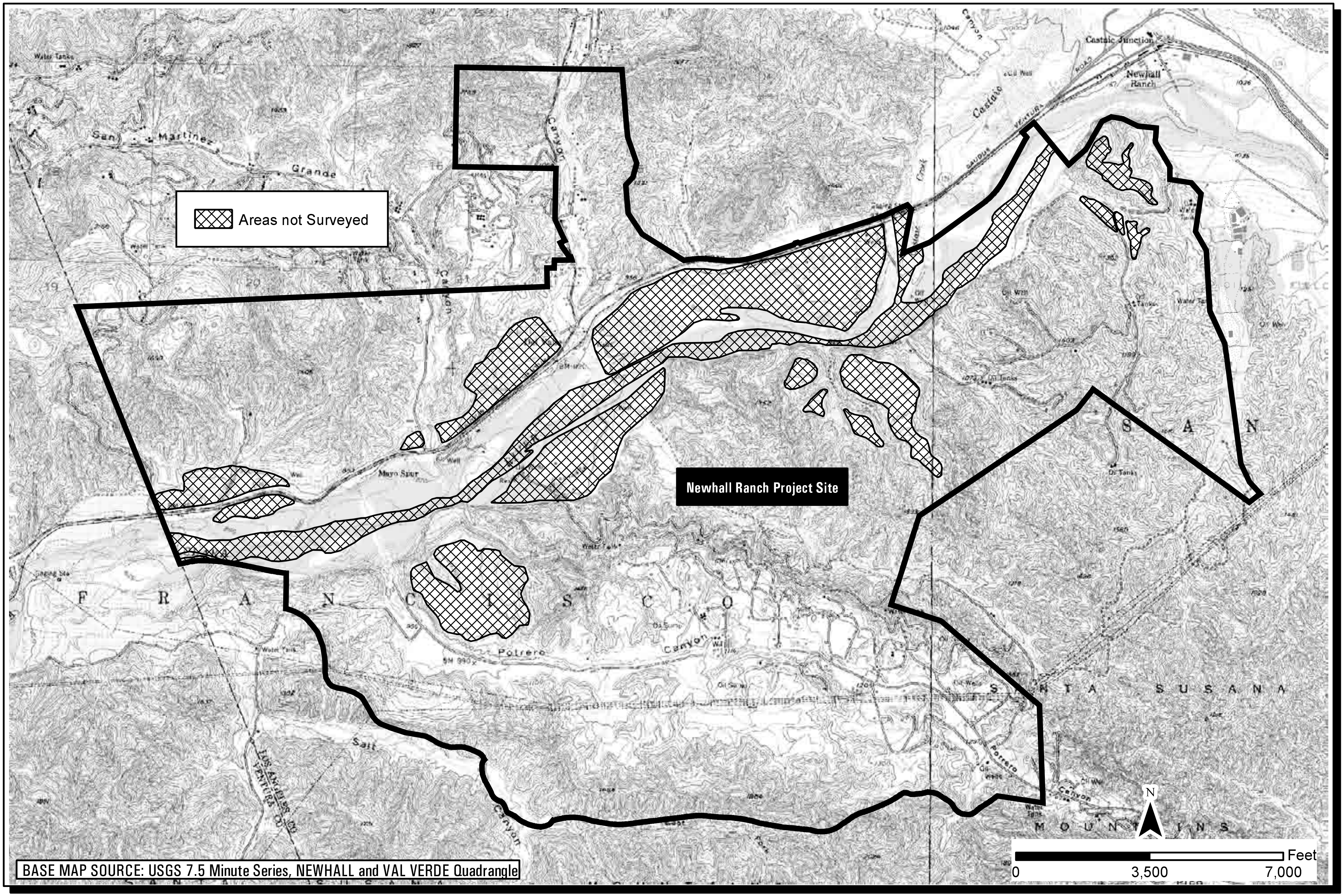
The NR SPA study area is located in an unincorporated portion of the Santa Clara River Valley in northwestern Los Angeles County (*Figure 1*). It lies roughly one-half mile west of Interstate 5 and largely southwest of the junction of I-5 and State Route 126 (SR-126), with portions of the Specific Plan site located in San Martinez Grande and Chiquito canyons north of SR-126. The City of Santa Clarita is located to the east of the study area and the Ventura County/Los Angeles County line lies along the western boundary. Site elevations range from 825 feet above mean sea level (AMSL) in the Santa Clara River bottom at the Ventura County/Los Angeles County line to approximately 3,200 feet AMSL on the ridgeline of the Santa Susana Mountains along the southern boundary (*Figure 2*).

Dudek & Associates, Inc. (Dudek) surveyed for sensitive plant species with varying levels of specificity within areas that are designated for development according to the approved Specific Plan. The NR SPA study area consists of approximately 7,778 acres, with the actual area surveyed containing approximately 6,644 acres. The study area includes areas north of SR-126 between Chiquito Canyon west to the Ventura County line; south of SR-126, it includes areas between the Airport Mesa and Potrero Canyon, including Middle, Dead-End, Lion, Humble, and Long canyons. However, the active channel in the Santa Clara River, agriculture fields (e.g., Potrero Mesa) and areas currently proposed for conservation (most notably the "High Country" area) were excluded from the study area. This study area is dominated by east-, west-, and northwest-trending primary ridges, with north- and south-trending secondary ridges. Site elevations range from approximately 850 feet AMSL in the Santa Clara River floodplain to approximately 2,000 feet AMSL along the ridgeline, which separates Potrero Canyon from Salt Creek Canyon and Grave Canyon.



Newhall Ranch
Regional Map

FIGURE
1



Newhall Ranch
Vicinity Map

FIGURE
2

Slope gradients range from moderate to very steep in the hillside areas to very gentle within the Santa Clara River floodplain, tributary canyons and associated mesas. Distinctive elevated geographic features include Sawtooth Ridge; Razorback Ridge; Windy Gap; Ayers Rock; and Potrero, Grapevine, and Airport Mesas.

2.1 Plant Communities and Land Covers

Native and naturalized habitats within the study area are representative of those found in this region and provide examples of those plant communities found in the Santa Susana Mountains and the Santa Clara River ecosystems. Upland habitats dominate the landscape within the study area both north and south of the Santa Clara River. The majority of the site consists of the following upland plant communities: California sagebrush, California buckwheat, chamise, chamise-mission manzanita- woolyleaf ceanothus, coast live oak, valley oak, and California annual grassland series. The Santa Clara River supports a variety of riparian plant communities. These include southern Fremont cottonwood, arroyo willow, mulefat, and arrow weed series along with freshwater marsh and seeps. Intermittent and ephemeral drainages onsite also provide habitat for scalebroom and Great Basin series and alluvial scrubs.

The Newhall Land and Farming Company (Newhall) leases out portions of the study area for oil and natural gas production, as well as for cattle grazing and agricultural operations (e.g., food crop production, dryland farming, honey farming). All such operations are currently ongoing. Grazing activities and oil and natural gas production have had a noticeable effect on much of the natural habitat onsite. Scrub habitats have been displaced by non-native grasslands as a result of grazing. Southern California Edison and Southern California Gas Company have distribution lines within easements onsite as well.

2.2 Geology and Soils

Geologically, the study area is located within the Transverse Ranges geomorphic province of southern California in the eastern portion of the Ventura depositional basin. This basin “was produced by tectonic downwarping in the geologic past to produce a large-scale synclinal structure in which a thick sequence of Cenozoic sediments has accumulated. These sediments have been lithified into a sequence of sedimentary rock that has subsequently been uplifted, tilted, and tectonically deformed (Allan E. Seward 2002, 2004).” They are cut by segments of the Del Valle and Salt Creek faults. Bedrock formations found onsite include the Modelo, Towsley, Pico, Saugus, and Pacoima formations, as well as Quaternary Terrace deposits. Surficial deposits include Quaternary alluvium, slopewash, soil, and artificial fill (Allan E. Seward 2002, 2004).

3.0 SURVEY METHODS

Data regarding botanical resources present on the project site were obtained through a review of the pertinent literature; field reconnaissance; and focused surveys for sensitive species, with varying levels of specificity; all of which are described below.

3.1 Literature Review

General floristic and sensitive botanical resources present or potentially present at West Ranch were identified through a literature search using the following sources: the California Natural Diversity Database (CDFG 2004b); 2002 and 2003 Sensitive Plant Survey Results for Newhall Ranch Specific Plan Area (Dudek 2002, 2004a); 2003 Sensitive Plant Survey Results for Valencia Commerce Center, Castaic Mesa, Isola and Ventura Homestead Sites, Magic Mountain Entertainment Center Site, Castaic Junction Site, and Salt Creek (Dudek 2004b-g); *Biological Resource Assessment of the Proposed Santa Susana Mountains/Simi Hills Significant Ecological Area* (PCR, November 2000); CalFlora (University of California, Berkeley, September 2004); U.S. Fish and Wildlife Service (USFWS 1999); California Department of Fish and Game (CDFG 2004a); *Inventory of Rare and Endangered Plants of California* (CNPS 2001); *Vascular Flora of the Liebre Mountains, Western Transverse Ranges, California* (Boyd 1999); *Checklist of Rare Ventura County Plant Species* (Magney 2002); *A Flora of the Santa Barbara Region, California* (Smith 1976); *A Flora of the Santa Monica Mountains* (Raven *et al.* 1986); *Biology of the San Fernando Valley Spineflower, Ahmanson Ranch, Ventura County, California* (Glenn Lukos Associates, Inc. and Sapphos Environmental, Inc. 2000); *Report to the Fish and Game Commission on the Status of San Fernando Valley Spineflower* (CDFG 2001); *Biota Report, Newhall Ranch Specific Plan* (RECON and Impact Sciences, Inc. 1996); and herbarium specimens from Rancho Santa Ana Botanic Garden (RSA) and the University of California, Riverside Herbarium (UCR). General information regarding vegetation communities were obtained from Holland (1986) and Sawyer and Keeler-Wolf (1995). Plant species nomenclature follows Hickman (1993).

3.2 Field Reconnaissance Methods

Botanical surveys were conducted by Dudek staff biologists, with assistance provided by Anuja Parikh and Nathan Gale of FL*x*. All surveys were conducted on-foot. Surveys were conducted in teams of two or more biologists, with at least one senior-level biologist included with each team. Resumes for survey personnel are provided in *Appendix A.*

Botanical surveys of the site were conducted between April and July of 2004 in accordance with the schedule provided in *Table 1*. A minimum of 1,360 person-hours (136 person-days) was spent conducting botanical surveys within the study area. Biologists were able to observe reference populations of SFVS and other sensitive species in order to develop a search-image prior to conducting surveys of the project site. Surveys focused on the identification and location of all federally- and state-listed (including SFVS), proposed for listing, and candidate species and CNPS List 1A, 1B, and 2 species (see the list of target species in *Table 2*).

TABLE 1
Survey Schedule & Personnel
Newhall Ranch Specific Plan Area

DATE	BIOLOGISTS	PURPOSE	GENERAL GEOGRAPHIC AREA
4/27/04-4/30/04	David Flietner, Kamurul Muri	Focused survey for SFVS and other sensitive plant species	Airport Mesa area
5/03/04-5/06/04	Chris Oesch, Tricia Wotipka, Megan Enright, Michelle Balk	Focused survey for SFVS and other sensitive plant species	Airport Mesa area and Homestead, Off-Haul, San Martinez Grande, and Homestead canyons
5/10/04	Cathleen Weigand, Doug Gettinger, Paul Lemons	Focused survey for SFVS and other sensitive plant species	San Martinez Grande and Mid-Martinez canyons
5/11/04-5/13/04	Cathleen Weigand, Doug Gettinger, Paul Lemons, David Flietner	Focused survey for SFVS and other sensitive plant species	Mid-Martinez, San Martinez Grande, and Chiquito canyons
6/17/04-6/19/04	FLx	Focused survey for SFVS and other sensitive plant species	Santa Clara River Corridor
6/21/04-6/23/04	FLx	Focused survey for SFVS and other sensitive plant species	Santa Clara River Corridor
6/21/04	Chris Oesch, Tricia Wotipka, Vipul Joshi	Focused survey for SFVS and other sensitive plant species	Chiquito, Homestead, and Off-Haul canyons

TABLE 1
Survey Schedule & Personnel
Newhall Ranch Specific Plan Area

DATE	BIOLOGISTS	PURPOSE	GENERAL GEOGRAPHIC AREA
6/22/04	Chris Oesch, Tricia Wotipka, Vipul Joshi, David Flietner, Marc Doalson	Focused survey for SFVS and other sensitive plant species	Chiquito Canyon
6/23/04-6/24/04	Chris Oesch, Tricia Wotipka, David Flietner, Marc Doalson	Focused survey for SFVS and other sensitive plant species	Chiquito and Potrero canyons
6/25/04-6/26/04	FLx	Focused survey for SFVS and other sensitive plant species	West Potrero Canyon
6/25/04	David Flietner, Marc Doalson	Focused survey for SFVS and other sensitive plant species	Chiquito and Potrero canyons
6/28/04	Cathleen Weigand, Doug Gettinger, Scott Boczkiewicz, Megan Enright	Focused survey for SFVS and other sensitive plant species	Airport and Grapevine Mesa areas
6/28/04-6/30/04	FLx	Focused survey for SFVS and other sensitive plant species	North Potrero Canyon
6/29/04-6/30/04	Cathleen Weigand, Doug Gettinger, Scott Boczkiewicz, Megan Enright, Sparrow Serrano	Focused survey for SFVS and other sensitive plant species	Exxon and Grapevine Mesa areas
7/01/04	Cathleen Weigand, Doug Gettinger, Scott Boczkiewicz, Megan Enright	Focused survey for SFVS and other sensitive plant species	Grapevine Mesa area
7/06/04-7/08/04	David Flietner, Kamarul Muri, Marc Doalson	Focused survey for SFVS and other sensitive plant species	Grapevine Mesa area
7/12/04	Cathleen Weigand, Jeff Priest, Tricia Wotipka, Sparrow Serrano	Focused survey for SFVS and other sensitive plant species	Grapevine Mesa area
7/13/04-7/14/04	Kathy Rinlaub	Focused survey for SFVS and other sensitive plant species	Airport and Grapevine Mesa areas
7/20/04-7/23/04	Chris Oesch, David Flietner, Marc Doalson	Focused survey for SFVS and other sensitive plant species	Airport and Grapevine Mesa areas

TABLE 2
Sensitive Plant Species Subject of Field Surveys

Scientific Name	Common Name
Arenaria paludicola	marsh sandwort
Astragalus brauntonii	Braunton's milk-vetch
Atriplex coulteri	Coulter's saltbush
Atriplex serenana var. *davidsonii*	Davidson's saltscale
Baccharis malibuensis	Malibu baccharis
Berberis nevinii	Nevin's barberry
Brodiaea filifolia	thread-leaved brodiaea
Calochortus clavatus var. *clavatus*	club-haired mariposa lily
Calochortus clavatus var. *gracilis*	slender mariposa lily
Calochortus plummerae	Plummer's mariposa lily
Calochortus weedii var. *vestus*	late-flowered mariposa lily
Calystegia peirsonii	Peirson's morning-glory
Calystegia sepium ssp. *binghamiae*	Santa Barbara morning-glory
Centromadia [=*Hemizonia*] *parryi* ssp. *australis*	southern tarplant
Cercocarpus betuloides var. *blancheae*	island mountain-mahogany
Chorizanthe parryi var. *fernandina*	San Fernando Valley spineflower
Deinandra [=*Hemizonia*] *minthornii*	Santa Susana tarplant
Dodecahema leptoceras	slender-horned spineflower
Dudleya blochmaniae var. *blochmaniae*	Blochman's dudleya
Dudleya cymosa ssp. *marcescens*	marcescent dudleya
Dudleya cymosa ssp. *ovatifolia*	Santa Monica Mountains dudleya
Dudleya multicaulis	many-stemmed dudleya
Dudleya parva	Conejo dudleya
Erodium macrophyllum	round-leaved filaree
Helianthus nuttallii ssp. *parishii*	Los Angeles sunflower
Horkelia cuneata var. *puberula*	mesa horkelia
Juglans californica	southern California black walnut
Juncus acutus var. *leopoldii*	Southwestern spiny rush
Malacothamnus davidsonii	Davidson's bush mallow

TABLE 2
Sensitive Plant Species Subject of Field Surveys

Scientific Name	Common Name
Nama stenocarpum	mud nama
Nolina cismontana	chaparral nolina
Opuntia basilaris var. *brachyclada*	short-joint beavertail
Oxytheca parishii var. *abramsii*	Abram's oxytheca
Pentachaeta lyonii	Lyon's pentachaeta
Rorippa gambelii	Gambel's water cress
Senecio aphanactis	rayless ragwort
Sidalcea neomexicana	salt spring checkerbloom
Thelypteris puberula var. *sonorensis*	Sonoran maiden fern

All plant species encountered during the field surveys were identified and recorded for inclusion in *Appendix B*. The majority of these were vouchered and will be reposited at the herbarium at the University of California, Riverside. Latin and common names of plants follow *The Jepson Manual* (Hickman 1993) or other recent published taxonomic treatments. Where not listed in Hickman (1993), common names were taken from Abrams (1923). Where not found in this reference, a variety of sources were used (*e.g.*, Abrams 1923, Dale 1986, or Roberts 1998).

Surveys on the NR SPA during the 2004 field season focused on the observation of current year SFVS plants and observations of any other sensitive plants. Surveys for SFVS were focused in open areas of California sagebrush, California sagebrush-purple sage series, California buckwheat and California annual grassland series (Sawyer and Keeler-Wolf 1995) on ridgelines, slopes, and escarpments with a southern, southwestern, or southeastern exposure. This strategy was based on information gathered during the documentation of SFVS populations flagged by CDFG; information gathered during surveys by Dudek for SFVS populations on the Newhall Ranch project site during 2002 and 2003; information contained in the report prepared by Glenn Lukos Associates, Inc. and Sapphos Environmental, Inc. (2000); the status report prepared for the Fish and Game Commission (CDFG 2000); and conversations with Rick Reifner, the botanist who re-discovered SFVS at Ahmanson Ranch in 1999.

While surveying in the field and mapping SFVS, a four-meter (m) rule was used to separate polygons for mapping purposes. This distance is a heuristic mapping tool based on the topography, vegetation, detectability of the plants, the general accuracy of the GPS, and time constraints. This heuristic criterion is not specifically tied to SFVS biology (*i.e.*, reproductive biology, seed dispersal) and thus is not intended to reflect reproductively isolated sub-populations, the total extent of the SVFS seed bank, or any other feature of the species life history.

The outer perimeter of each spineflower polygon was searched in one continuous direction until returning to the starting point, with plants being located within at least every one to four m along the boundary, and points were stored with a Trimble GPS (that has sub-meter accuracy) manually to form the boundaries of the polygon. GPS points were taken every one to four meters. Each SFVS polygon was given a unique identifier (*i.e.*, numbers and/or letters) in the field. Field data sheets were completed for each of the spineflower polygons that include data on site conditions (*i.e.*, plant number estimates, associated species). Polygons were analyzed in the lab and delineated based on a four m minimum convex polygon rule (all polygons within four m of each other will be joined using GIS software (*e.g.*, ArcGIS, AutoCAD), then delineated as one polygon with the outer boundary represented by a minimum convex polygon.

A modified magnitude scale was used to arrive at an estimate of the number of spineflower individuals (or other sensitive species when observed) within each polygon. After mapping the boundaries of the polygon, the number of individuals were counted/estimated in a rectangular "sample estimation area" (to account for the "clumped" nature of this species), which is a subset of the total polygon. The sample estimation area was between 200 centimeter squared (cm^2)(10 by 20 cm) and two m^2 (one m by two m) depending on various factors regarding the polygon (*e.g.*, size of the polygon, plant densities, variations in plant densities within the polygon). The number of subsets within the total polygon was determined and added/multiplied, resulting in a total estimate of the number of individuals of the polygon (*e.g.*, 4x125=500, 8x12=96, 9x100=900). This number was then rounded to the nearest magnitude or multiple of a magnitude (*e.g.*, 500; 100; 1,000).

Polygons for other sensitive species were mapped with the GPS unit, by drawing polygons on maps with aerial photography and topographic lines, or by a combination of the two. Professional judgment and experience were used to delineate these polygons based on the detectability of the species, topography, and vegetation. Perennial sensitive plants were mapped at a 10 to 20 m scale due to their population dynamics (including seed dispersal and pollination range), observability, habit, habitat limitations, and mapping accuracy. Information regarding the mapping for each sensitive species is included in the sections below (*Sections 4.2.1* through *4.2.10*).

3.2.1 Sensitive Plant Species

Sensitive plant species are those species that have been given special recognition by federal, state, or local conservation agencies and organizations due to limited, declining, or threatened population sizes. This includes those species listed by the state and federal government as threatened or endangered, those species proposed for state and/or federal listing or candidates, those plant species found on Lists 1A, 1B or 2 of the CNPS *Inventory of Rare and Endangered Plants of California* (CNPS 2001; *Inventory*), and those plant species which are found on the list of "Threatened and Endangered Species and Species of Concern, Los Angeles County" (http://www.losangelesalmanac.com/topics/Environment/ ev14b.htm). CNPS List 3 or List 4 species were included in discussions only when encountered during the field surveys.

3.2.2 Survey Limitations

Surveys were conducted in the late spring and early summer of 2004. Surveys were conducted during a year with a less-than-average (Western Regional Climate Center 2004) amount of rainfall. Therefore, the survey conditions were not optimal for determining the diversity of species (including sensitive plants) onsite or mapping their presence, abundance, and distributions. The timing of the surveys was coincident with the blooming period for SFVS and other early blooming annual species. Surveys continued passed the peak bloom period for the SFVS into the summer when SFVS became a highly visible brick red while all of the other plants dried and faded to pale straw colors. Surveying during these two time periods maximized the potential for detection of SFVS during the survey effort.

Not all portions of the Santa Clara River were surveyed (see *Figure 2*) and areas of dense chaparral were surveyed where feasible. Surveys along the Santa Clara River were conducted in areas where bank stabilization projects may occur. Surveys for SFVS were concentrated in areas of suitable habitat, which was generally in openings in vegetation

and/or on south-facing slopes. Other sensitive species (particularly those identified in *Table 2*) were recorded when observed.
The focused surveys for SFVS were conducted during daylight hours under weather conditions that did not preclude observation of sensitive plant species (*e.g.*, surveys were not conducted during heavy fog or rain).

4.0 RESULTS OF SURVEYS

4.1 Botany - Floral Diversity

The study area is situated at the nexus of the Transverse Ranges, Coast Ranges, Sierra Nevada, Mojave Desert, and coastal plains (Hickman 1993). Ecotone areas such as this are often characterized by higher biological diversity than similar-sized areas within the core of a physiographic region (Boyd 1999). As such, a high diversity of plant species is expected during a year of average rainfall for the area.

At least 562 plant species were identified within the Newhall Ranch study area. Of these, 406 species (72 percent) are native to the region and 156 species (28 percent) are non-native. The cumulative list of plant species identified on the site in 2002, 2003, and 2004 is provided as *Appendix B*.

4.2 Sensitive Plant Species

A total of nine sensitive plant species (including potentially Los Angeles sunflower (*Helianthus nuttallii* ssp. *parishii*) was identified within the study area between 2002 and 2004. These and other sensitive species that have the potential to occur within the Newhall Ranch project area, based on the presence of suitable habitat and soils, are listed in *Table 3*. This list is confined primarily to those species listed by the state and federal government as threatened or endangered, those species proposed for state and/or federal listing or candidates, those plant species found on Lists 1A, 1B, or 2 of the CNPS *Inventory of Rare and Endangered Plants of California* (CNPS 2001). Those sensitive species that were observed during the 2004 field surveys are discussed in greater detail below. A number of species found on CNPS Lists 3 or 4 also have the potential to occur onsite (*e.g.*, *Calochortus catalinae*, *Acanthomintha obovata* ssp. *cordata*, *Mucronea californica*); however, due to their relatively low sensitivity level, they are only discussed in the following sections if observed onsite.

TABLE 3
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/ Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Arenaria paludicola	marsh sandwort	FE/SE	1B	dense freshwater marsh/perennial herb/May-August	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrence is in the Santa Ana River. Limited suitable habitat onsite; very low likelihood of occurrence within the study area.
Astragalus brauntonii	Braunton's milk-vetch	FE/None	1B	chaparral, coastal sage scrub, grasslands; often on carbonate substrates/perennial herb/March-July	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrence is in the Simi Hills. Suitable habitat exists onsite. Moderate likelihood of occurrence within study area.
Atriplex coulteri	Coulter's saltbush	None/None	1B	coastal sage scrub and grasslands on alkaline or clay substrate/perennial herb/March-October	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads; however, suitable habitat present onsite. Moderate likelihood of occurrence within study area.
Atriplex serenana var. *davidsonii*	Davidson's saltscale	None/None	1B	coastal bluff scrub and coastal sage scrub on alkaline substrate/annual herb/May-October	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads. *Atriplex serenana var. serenana* observed onsite. Low likelihood of occurrence within the study area.
Baccharis malibuensis	Malibu baccharis	None/None	1B	chaparral, coastal sage scrub, cismontane woodland/ deciduous shrub/August	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads; closest known populations in the western Santa Monica Mountains near Malibu. Not expected to occur within the study area.
Berberis nevinii	Nevin's barberry	FE/SE	1B	chaparral, coastal sage scrub, riparian scrub, cismontane woodland on sandy or gravelly substrate/evergreen shrub/March-April	Not observed during 2004 field season. CNDDB records exist for San Francisquito Canyon at confluence with Santa Clara River; suitable habitat present onsite. Moderate likelihood of occurrence within study area.

TABLE 3
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	**Common Name**	**Status Federal/State**	**CNPS List**	**Primary Habitat Associations/ Life Form/Blooming Period**	**Presence or Likelihood of Occurrence Onsite**
Brodiaea filifolia	thread-leaved Brodiaea	FT/SE	1B	clay substrate openings in chaparral, sage scrub, and grasslands/perennial herb (geophyte)/March-June	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrence is in San Dimas. Suitable habitat present onsite. Low likelihood of occurrence within study area.
Calochortus clavatus var. *clavatus*	club-haired mariposa lily	None/None	4	chaparral and coastal sage scrub/ perennial herb (geophyte)/March-May	Not observed during 2004 field season. No CNDDB records exist for Newhall and Val Verde quads. Very low likelihood of occurrence in study area.
Calochortus clavatus var. *gracilis*	slender mariposa lily	None/None	1B	chaparral and coastal sage scrub/perennial herb (geophyte)/March-May	Observed during the 2004 field season on north tending slopes throughout the study area. This species is locally abundant with a total of 204 polygons mapped , containing an estimated 68,888 individuals during the 2004 growing season. CNDDB records also exist for mouth of Pico Canyon.
Calochortus plummerae	Plummer's mariposa lily	None/None	1B	chaparral, coastal sage scrub, cismontane woodland, grasslands on rocky granitic substrate/perennial herb (geophyte)/May-July	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads; however, records exist for the Santa Susana Mountains and Simi Hills. Suitable habitat exists onsite. Moderate likelihood of occurrence within study area.
Calochortus weedii var. *vestus*	late-flowered mariposa lily	None/None	1B	chaparral, cismontane & riparian woodland/perennial herb (geophyte)/ June-August	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads; however, habitat similar to where species occurs in eastern Ventura County is present onsite. This species was observed at the head of the Salt Creek drainage in the Santa Susana Mountains to the southwest during the 2003 field season. Moderate likelihood of occurrence within study area.

TABLE 3
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/ Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Calystegia peirsonii	Peirson's morning-glory	None/None	4	chaparral, coastal sage scrub, cismontane woodland, grassland/ perennial herb/May-June	Observed in chaparral and California sagebrush throughout the survey area.
Calystegia sepium ssp. *binghamiae*	Santa Barbara morning-glory	None/None	1A	marshes and swamps/perennial herb/ April-May	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads; however, limited suitable habitat present onsite. Low likelihood of occurrence within study area.
Centromadia [=*Hemizonia*] *parryi* ssp. *australis*	southern tarplant	None/None	1B	mesic edges of marshes in grasslands/annual herb/May-November	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads; however, suitable habitat present onsite. Low likelihood of occurrence within study area.
Cercocarpus betuloides var. *blancheae*	island mountain-mahogany	None/None	4	chaparral, closed-cone coniferous forest/evergreen shrub/February-May	Observed in mixed chaparral in the study area.
Chorizanthe parryi var. *fernandina*	San Fernando Valley spineflower	FC/SE	1B	Coastal sage scrub, sandy soils/annual herb/April-June	Observed onsite in five general areas within the survey area: Airport Mesa, Grapevine Mesa, Long Canyon, Potrero Canyon, and San Martinez Grande Canyon. A total of 275 polygons were mapped with an estimated 478,184 individuals during the 2004 growing season.
Deinandra [=*Hemizonia*] *minthornii*	Santa Susana tarplant	None/SR	1B	chaparral and coastal sage scrub on rocky substrate/deciduous shrub/July-November	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads; however, records exist for the Simi Hills and Oat Mountain. Suitable habitat exists onsite. Moderate likelihood of occurrence within study area.
Delphinium parryi ssp. *blochmaniae*	dune larkspur	None/None	1B	maritime chaparral, coastal dunes/ perennial herb/ April-may	Not observed during 2004 field season. No likelihood of occurrence.
Dodecahema leptoceras	slender-horned spineflower	FE/SE	1B	Alluvial scrub on sandy substrate/annual herb/April-June	Not observed during 2004 field season; however, Santa Clara River bottom excluded from survey area. Historic

TABLE 3
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	**Common Name**	**Status Federal/State**	**CNPS List**	**Primary Habitat Associations/ Life Form/Blooming Period**	**Presence or Likelihood of Occurrence Onsite**
					CNDDB records exist for the Newhall or Val Verde quads in alluvial habitat similar to those present onsite. Moderate likelihood of occurrence within study area.
Dudleya blochmaniae var. *blochmaniae*	Blochman's dudleya	None/None	1B	clay openings in chaparral and coastal sage scrub, grasslands/perennial herb/April-June	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads. Suitable habitat present onsite. Low likelihood of occurrence within study area.
Dudleya cymosa ssp. *marcescens*	marcescent dudleya	FT/CR	1B	chaparral, often on volcanic substrate/perennial herb (geophyte)/ April-June	Not observed during 2004 field season. No CNDDB records exist for Newhall and Val Verde quads. Unidentified *Dudleya cymosa* observed on vertical sandstone cliffs and slopewash in 2002 are actually *D. lanceolata*, a common species. Low likelihood of occurrence within study area.
Dudleya cymosa ssp. *ovatifolia*	Santa Monica Mountains dudleya	FT/None	1B	chaparral and coastal sage scrub, often on volcanic substrate/perennial herb (geophyte)/April-June	Not observed during 2004 field season. No CNDDB records exist for Newhall and Val Verde quads. Unidentified *Dudleya cymosa* observed on vertical sandstone cliffs and slopewash in 2002 are actually *D. lanceolata*, a common species. Low likelihood of occurrence within study area.
Dudleya multicaulis	many-stemmed dudleya	None/None	1B	coastal bluff scrub, coastal sage scrub, valley and foothill grassland, rocky, often clay substrate/perennial herb/ April-June	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads; closest known occurrences are in Calabasas and San Dimas. Suitable habitat exists onsite. Moderate likelihood of occurrence within study area.
Dudleya parva	Conejo dudleya	FT/None	1B	coastal sage scrub and grassland on rocky, gravelly clays/perennial herb/May-June	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads. Suitable habitat exists onsite. Low likelihood of

TABLE 3
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	**Common Name**	**Status Federal/State**	**CNPS List**	**Primary Habitat Associations/ Life Form/Blooming Period**	**Presence or Likelihood of Occurrence Onsite**
					occurrence within study area.
Erodium macrophyllum	round-leaved filaree	None/None	2	cismontane woodland and grasslands on clay substrate/annual herb/March-May	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads; however records exist for Simi Valley and this plant was observed in the hills east of Castaic Lake in 2003. Suitable habitat present onsite; moderate likelihood of occurrence in study area.
Helianthus nuttallii ssp. *parishii*	Los Angeles sunflower	None/None	1A	marshes and swamps/perennial herb/ August-October	Not observed within study area during 2004 field season. A *Helianthus* population, discovered in 2002 at Castaic Spring, on the south side of the Santa Clara River between Middle Canyon and San Jose Flats, was determined by some experts to be this species, but determined by other experts not to be this species. Based on pollen electron microscopy and chromosome counts, it is likely that the Newhall *Helianthus* species is a hybrid between *H. nuttallii* and *H. californicus* or an intermediate evolutionary step between the two species (Porter and Fraga 2004). No suitable habitat observed in study area.
Horkelia cuneata var. *puberula*	mesa horkelia	None/None	1B	chaparral, cismontane woodland, coastal sage scrub on sandy or gravelly substrate/perennial herb/February-December	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads. Suitable habitat present onsite. Low likelihood of occurrence within study area.
Juglans californica	southern California black walnut	None/None	4	chaparral, cismontane woodland, coastal sage scrub, alluvial scrub/ deciduous tree/March-May	Observed in California sagebrush and chaparral onsite.
Juncus acutus ssp.	southwestern spiny	None/None	4	coastal dunes, meadows, seeps, marshes, and swamps/	Observed in mesic riparian areas onsite.

TABLE 3
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/ Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
leopoldii	rush			perennial herb/May-June	
Malacothamnus davidsonii	Davidson's bush mallow	None/None	1B	chaparral, coastal sage scrub, riparian woodland/ deciduous scrub/June-January	Not observed during 2004 field season. Nearest occurrences are in San Fernando and Sunland. Suitable habitat present onsite. Moderate likelihood of occurrence within study area.
Nama stenocarpum	mud nama	None/None	2	edges of lakes, rivers, ponds, vernal pools/annual/January-July	Not observed during 2004 field season. Moderate likelihood of occurrence on banks of Santa Clara River and other mesic areas onsite. No CNDDB records exist for the Newhall or Val Verde quads. Limited suitable habitat present onsite. Low likelihood of occurrence within study area.
Nemophila parviflora var. *quercifolia*	oak-leaved nemophila	None/None	4	cismontane woodland, lower montane coniferous forest/annual herb/may-June	Observed onsite in oak woodland east of Grapevine Mesa.
Nolina cismontana	chaparral nolina	None/None	1B	chaparral, coastal sage scrub on sandstone or gabbro substrate/ perennial shrub/May-July	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads. Suitable habitat present onsite. Low likelihood of occurrence within study area.
Opuntia basilaris var. *brachyclada*	short-joint beavertail	None/None	1B	chaparral, Joshua tree woodland, Mojavean desert scrub/succulent shrub/ April-June	Not observed during 2004 field season. This plant was identified as onsite by Dudek in 2002; however, recent investigations indicate that the *Opuntia basilaris* plants on Newhall Ranch are not *O. basilaris* var. *brachyclada*, but are *O. basilaris* var. *ramosa*.
Pentachaeta lyonii	Lyon's pentachaeta	FE/SE	1B	openings in chaparral and coastal sage scrub, grasslands/annual herb/March-August	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrences are in the Simi Valley. Suitable habitat present onsite. Moderate likelihood of occurrence within study area.

TABLE 3
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/ Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Rorippa gambelii	Gambel's watercress	FE/ST	1B	Marsh and swamps (freshwater and brackish)/ perennial herb/April-June	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads. Limited suitable habitat present onsite. Low likelihood of occurrence within study area.
Senecio aphanactis	rayless ragwort	None/None	2	chaparral, coastal sage scrub, cismontane woodland on alkaline substrate/annual herb/January-April	Not observed during 2004 field season. Historic CNDDB record for Saugus, south of Santa Clara River. Suitable habitat onsite. Moderate likelihood of occurrence within study area.
Sidalcea neomexicana	salt spring checkerbloom	None/None	2	chaparral, coastal sage scrub, and playas on alkaline substrate/perennial herb/March-June	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads; suitable habitat present onsite. Moderate likelihood of occurrence within study area.
Thelypteris puberula var. *sonorensis*	Sonoran maiden fern	None/None	2	meadows and seeps/perennial herb/ fertile January-September	Not observed during 2004 field season. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrence at Point Dume. Limited suitable habitat present onsite. Low likelihood of occurrence within study area.

Legend

FE:	Federally-listed as endangered	CNPS List 1A:	Plants presumed extinct in California
FT:	Federally-listed as threatened	CNPS List 1B:	Plants rare, threatened, or endangered in California and elsewhere
FC:	Federal candidate for listing	CNPS List 2:	Plants rare, threatened, or endangered in California but more common elsewhere
SC:	State candidate for listing	CNPS List 3:	Plants about which we need more information – a review list
SE:	State-listed as endangered	CNPS List 4:	Plants of limited distribution – a watch list
ST:	State-listed as threatened		
SR:	State-listed as rare		

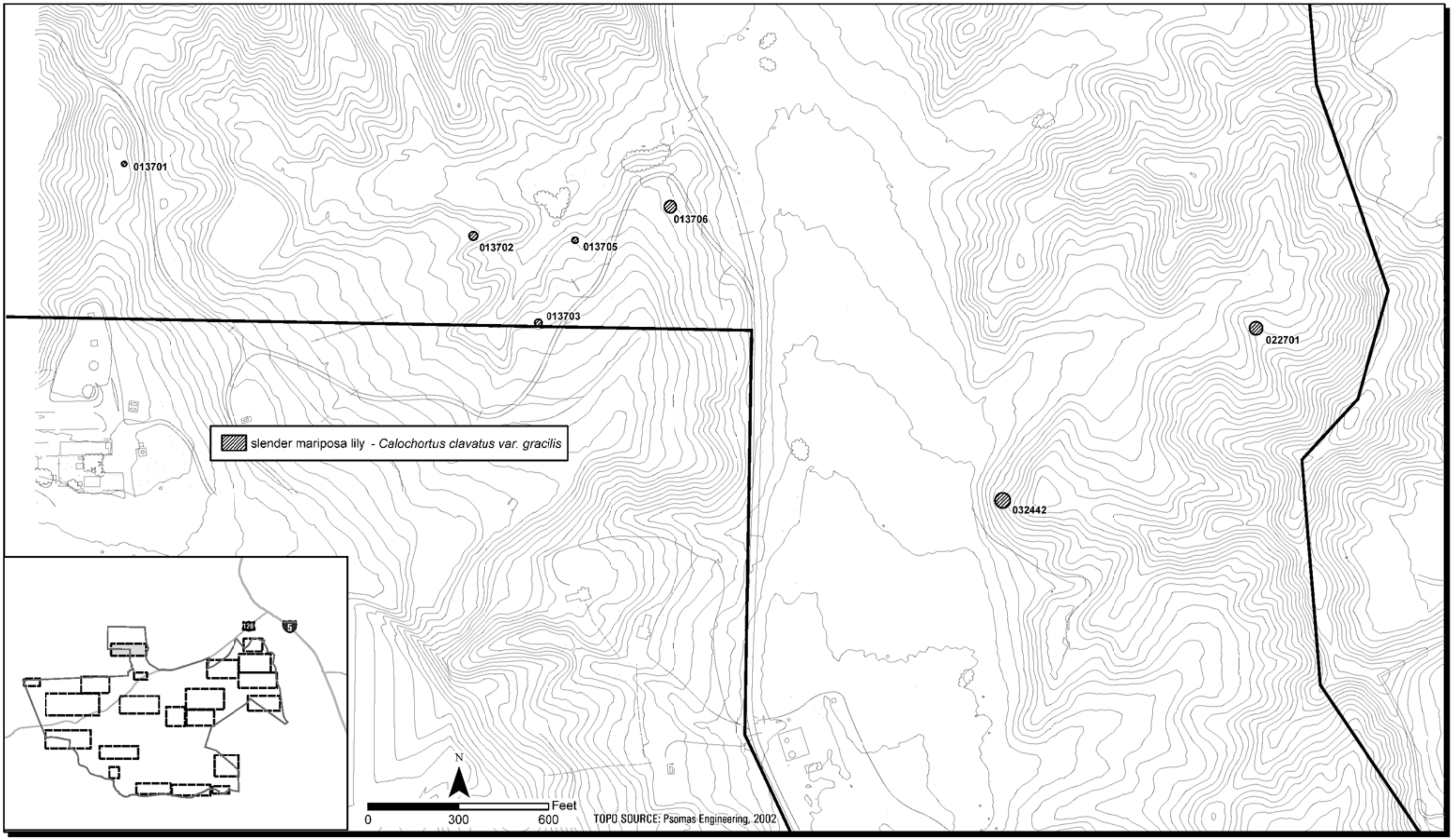
Figures 3 through *23* depict the locations of sensitive species, including SFVS, on the NR SPA. Labels for each of the polygons in the figures correlate with those in *Tables 4* through *9*, which contain estimates for the numbers of individuals within each polygon. Any additional information regarding the mapping for each sensitive species is included in the sections below (*Sections 4.2.1* through *4.2.10*).

4.2.1 *Calochortus clavatus* var. *gracilis* (slender mariposa lily)

Slender mariposa lily has no state or federal status but is a CNPS List 1B plant. It is typically found in chaparral, coastal sage scrub, and grasslands, often on clay, and/or rocky soils. It has been documented to occur at the mouth of Pico Canyon and other canyons in the vicinity (Newhall Quad; CNDDB 2002). Other varieties of this species documented from southern California include: club-haired mariposa lily (*Calochortus clavatus* var. *clavatus*) and pale mariposa lily (*C. clavatus* var. *pallidus*). The club-haired mariposa lily differs in that it is virtually a serpentine endemic (restricted to serpentine soils) and a very robust species, generally attaining a height of one m. Pale mariposa lily differs in that the petals are a paler yellow, the anthers are paler (yellow to pale purple), and the hairs on the petals are not as knobby or club shaped. Neither the club-haired mariposa lily nor pale mariposa have a prominent red line above the nectary on the petal, as is the case with the slender mariposa lily.

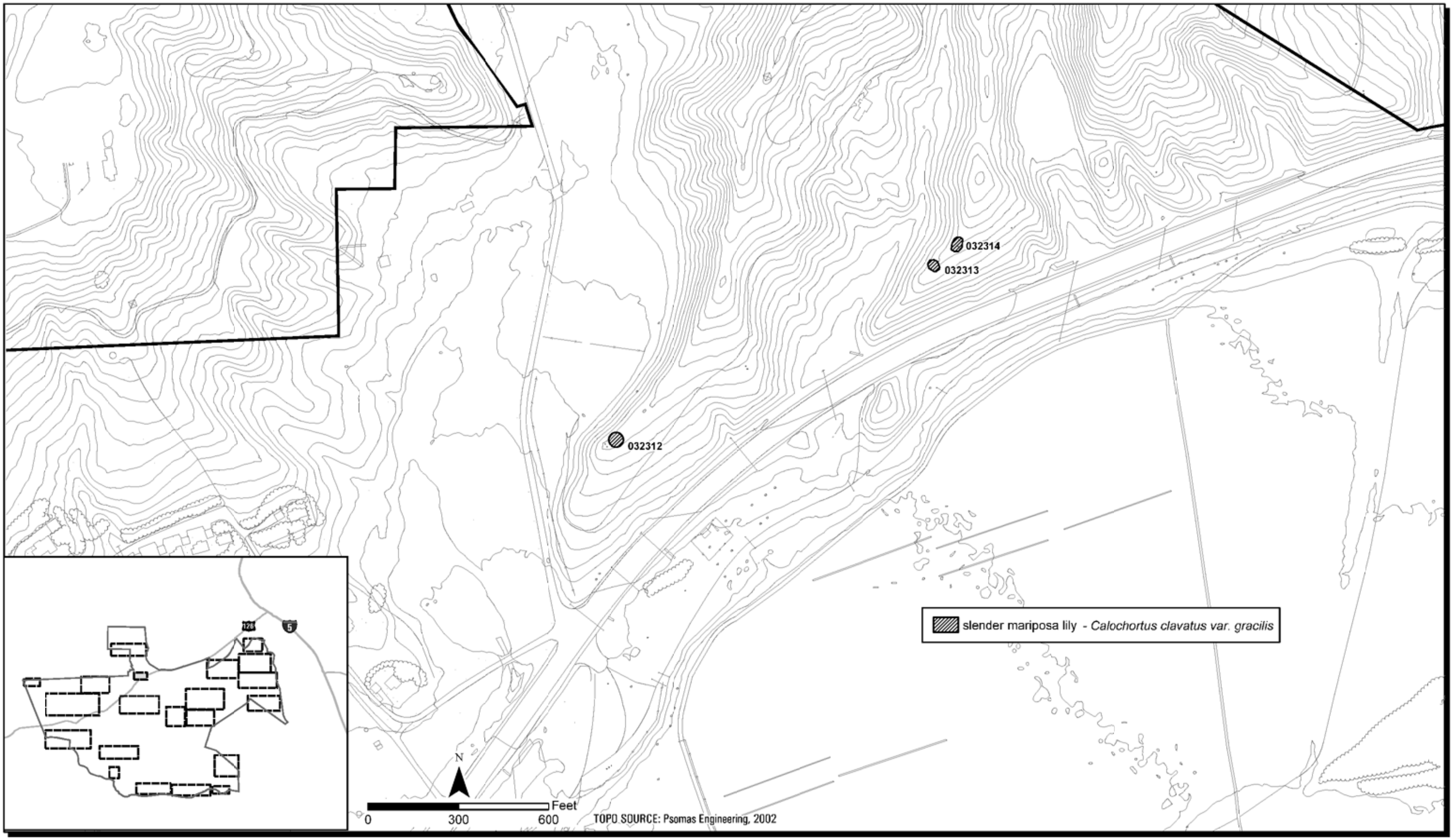
Multiple polygons of mariposa lily were mapped within the study area by drawing boundaries on aerial photograph field maps around the areas that contained the mariposa lily. Surveys within the study area were conducted after the blooming season for the slender mariposa lily. Surveys on the site were conducted while slender mariposa lily plants were in fruit; estimates of the number of fruiting individuals (not flowering or vegetative) were made based on visual estimations. The fruiting individuals were much more cryptic than the flowering plants; therefore, it is expected that only a portion of the plants that were in flower earlier were observed. It is not possible to estimate what portion was observed. Moreover, geophytes like *Calochortus* generally only have a percentage of the plants flower in any given year and the non-flowering individuals are generally not as visible.

Within the NR SPA study area, the slender mariposa lily was found primarily on east, northeast, and southwest-facing ridges and slopes in California sagebrush, California buckwheat and California annual grassland series (*Figures* 3 through *7; Figures 10* through *23*). The plants were generally mapped in areas of high vegetative cover and a variety of soil



Newhall Ranch
Sensitive Plant Occurrence Data

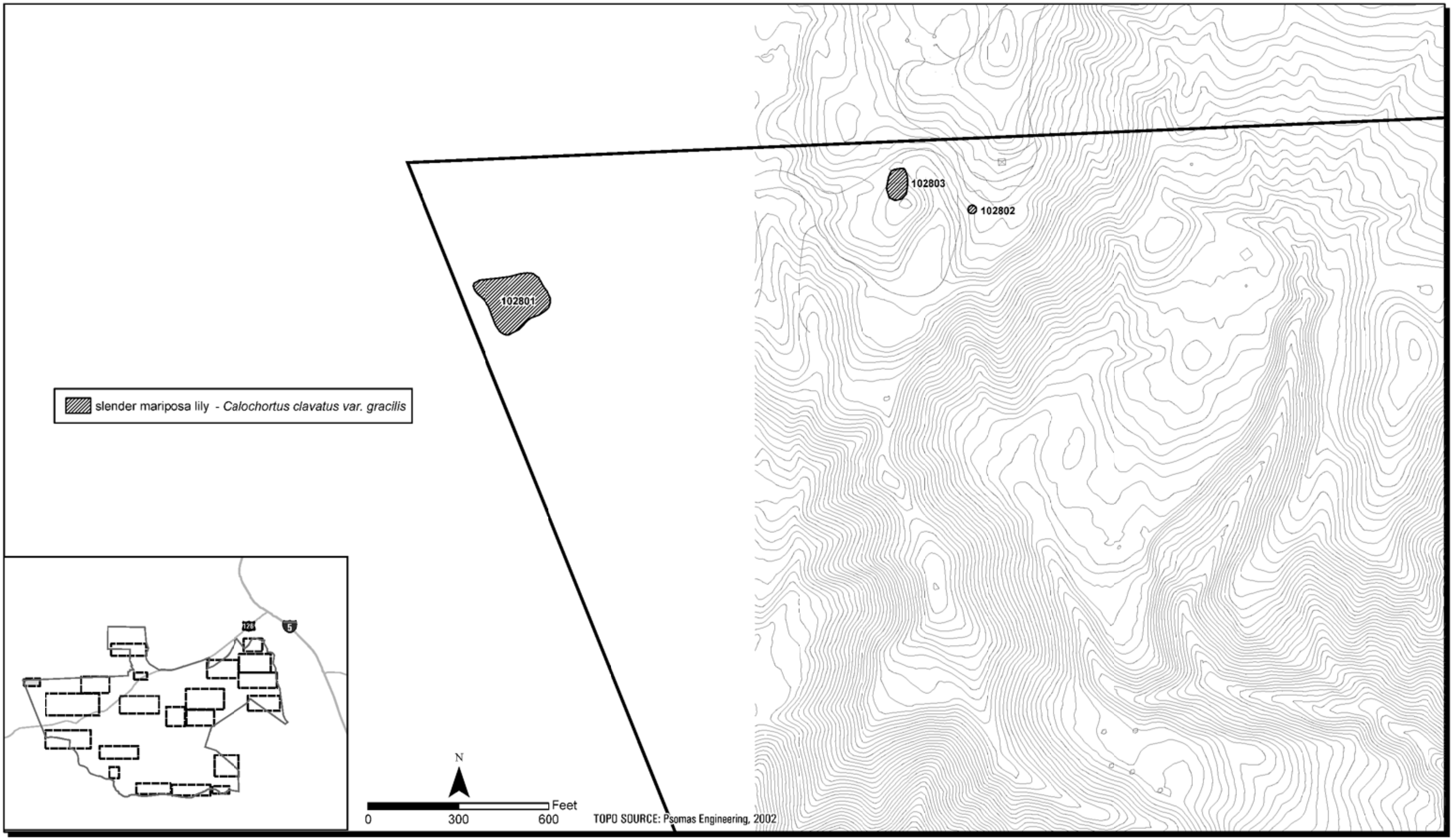
FIGURE
3



Newhall Ranch

Sensitive Plant Occurrence Data

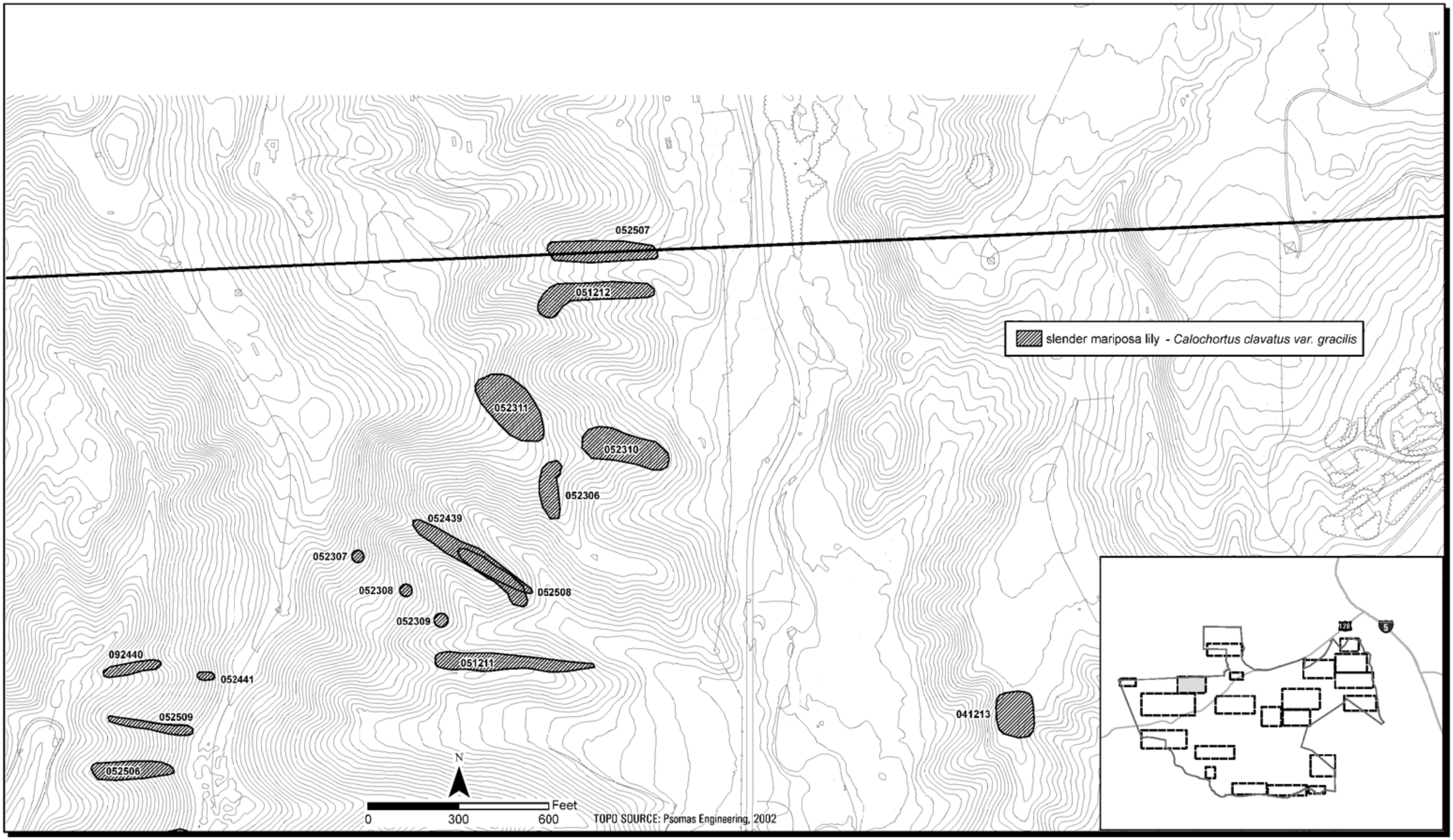
FIGURE 4



Newhall Ranch

Sensitive Plant Occurrence Data

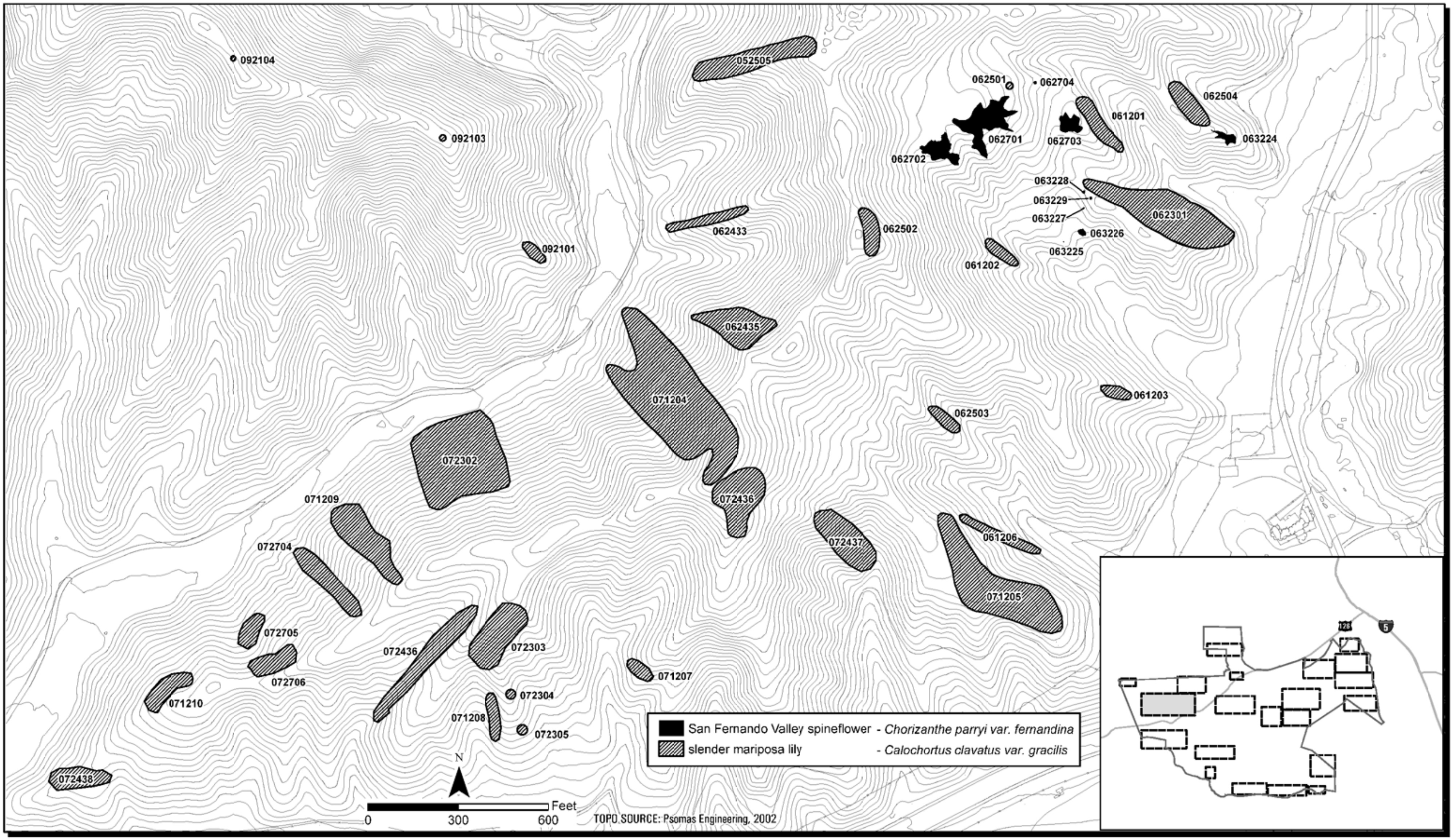
FIGURE 5



Newhall Ranch

Sensitive Plant Occurrence Data

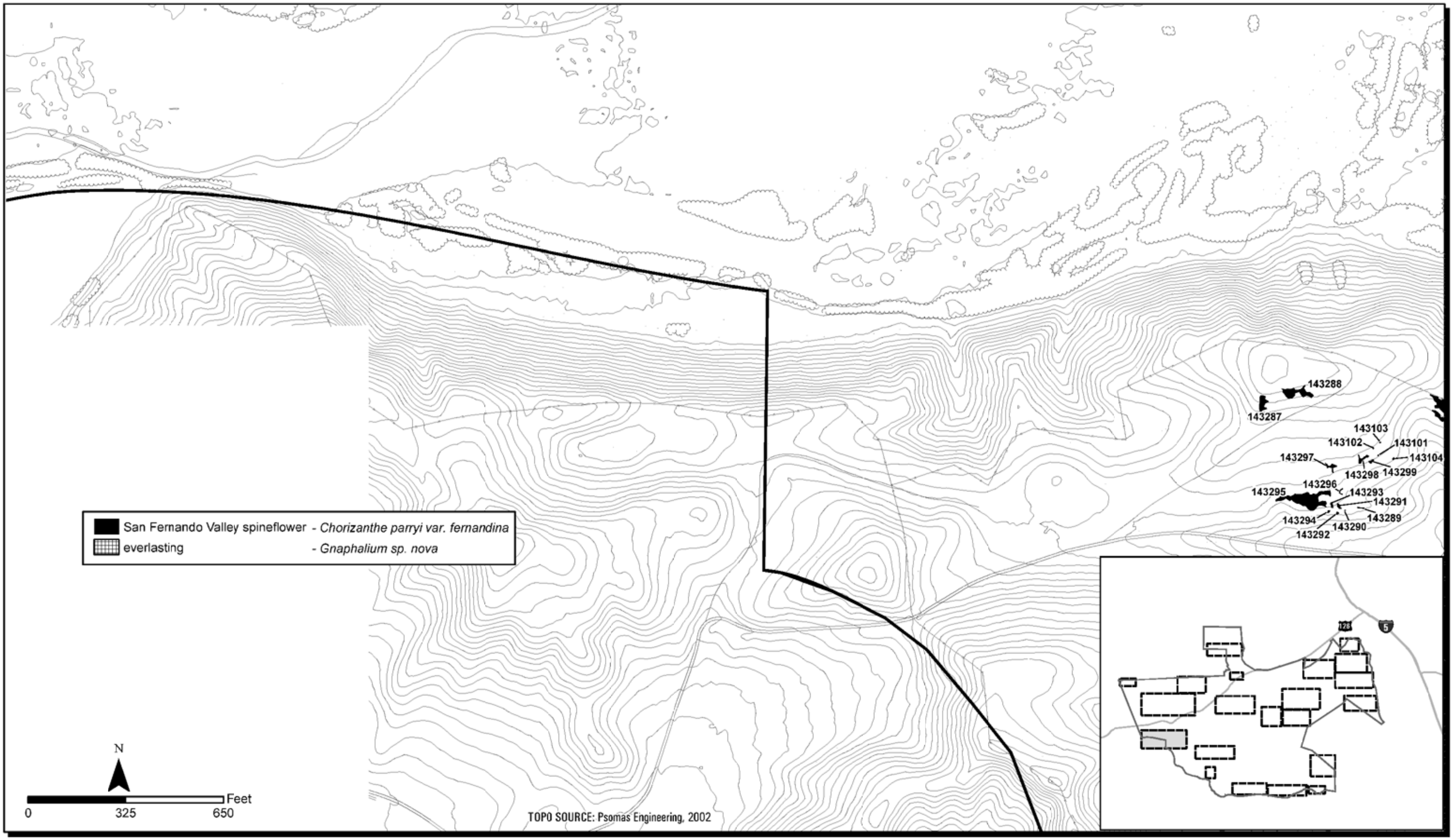
FIGURE
6



Newhall Ranch

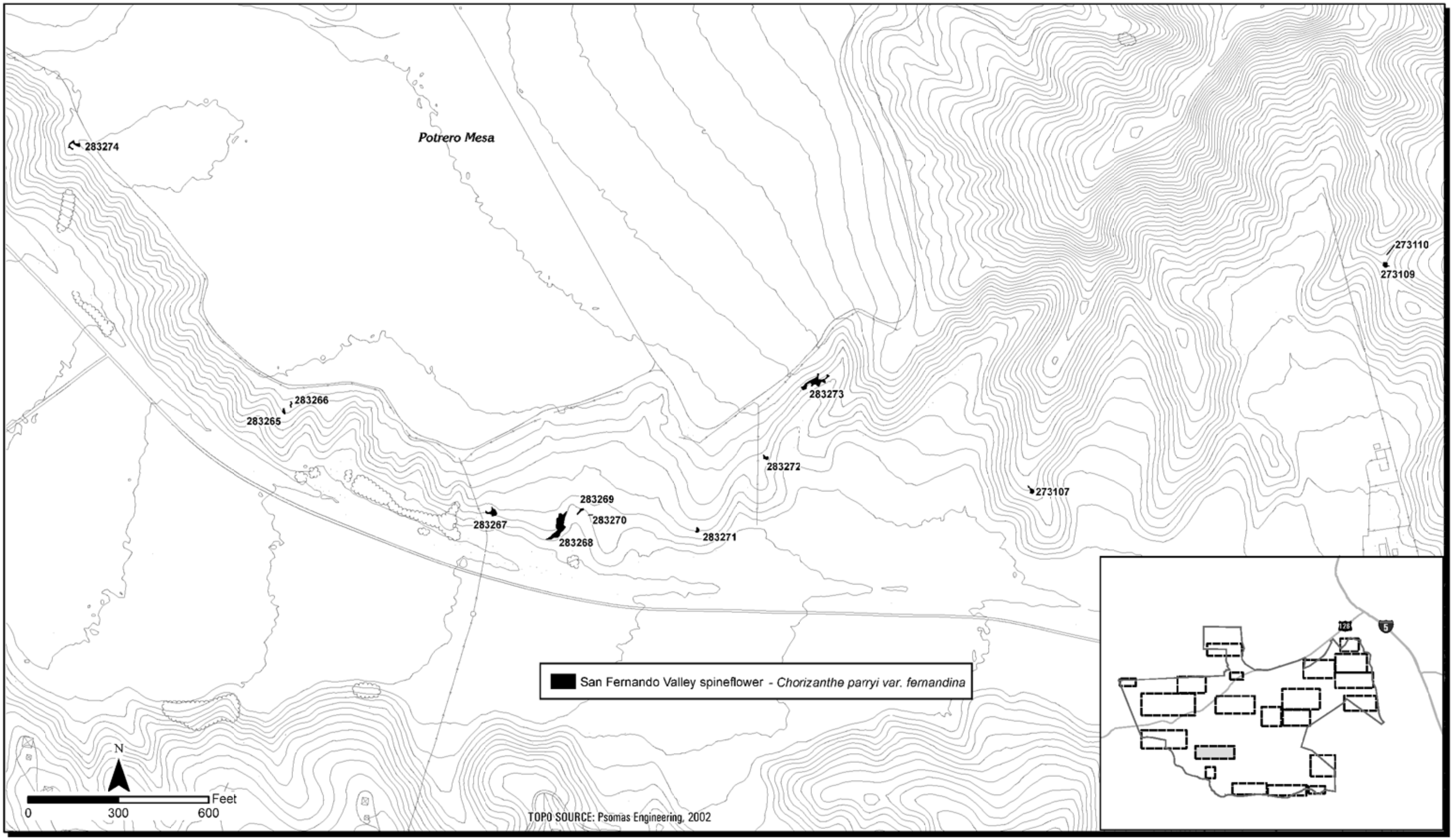
Sensitive Plant Occurrence Data

FIGURE 7



Newhall Ranch
Sensitive Plant Occurrence Data

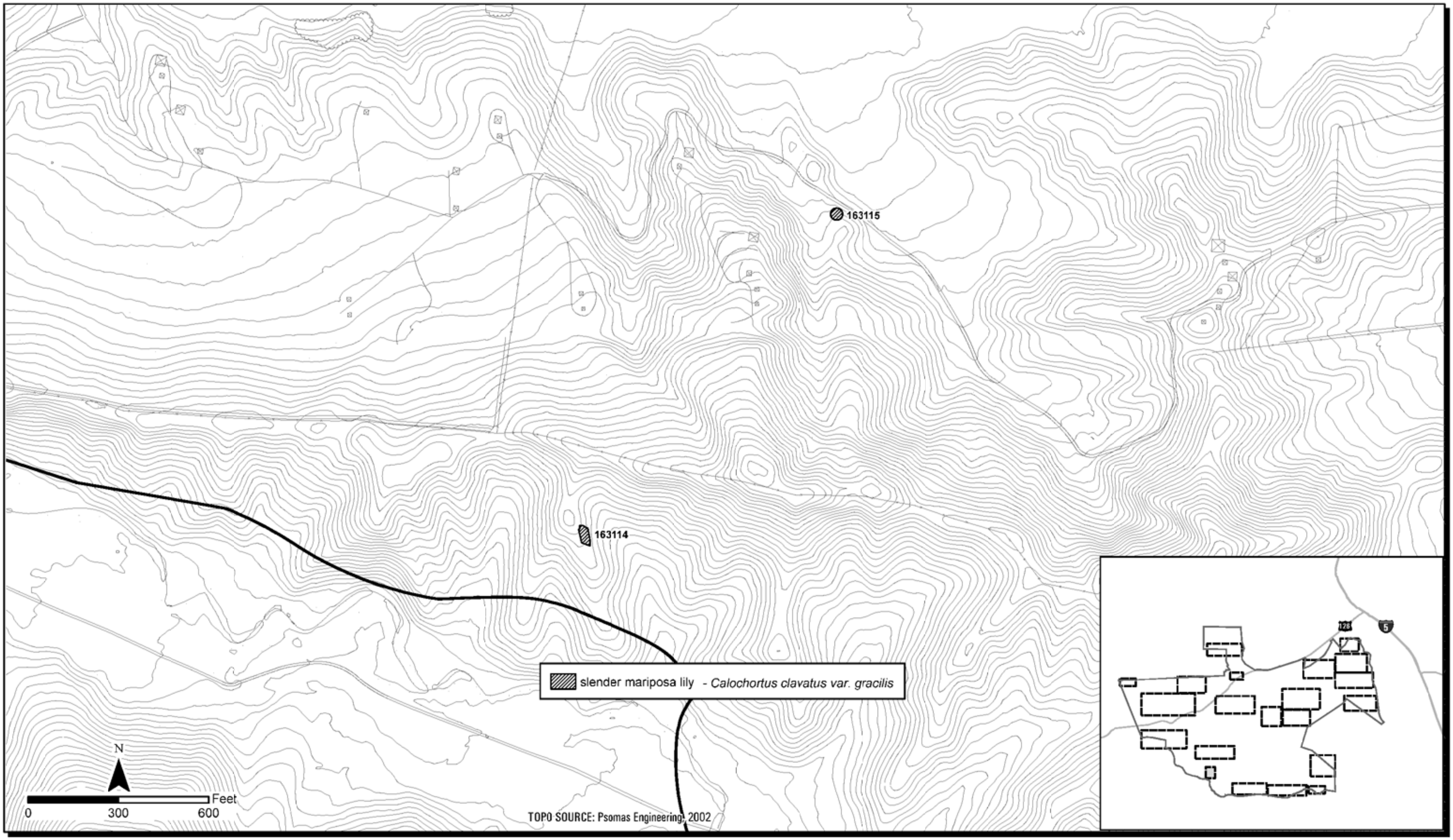
FIGURE
8



Newhall Ranch

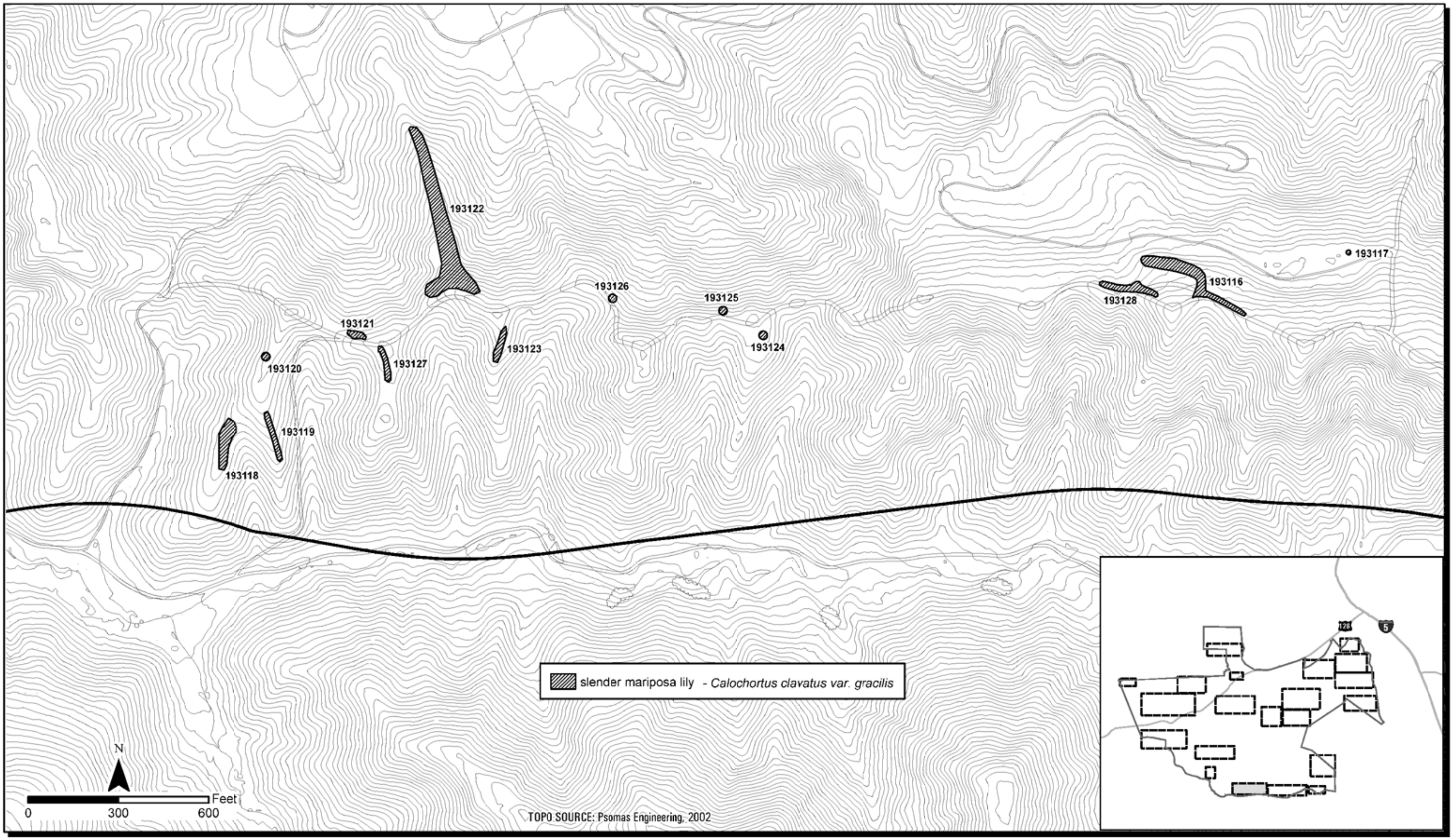
Sensitive Plant Occurrence Data

FIGURE 9



Newhall Ranch
Sensitive Plant Occurrence Data

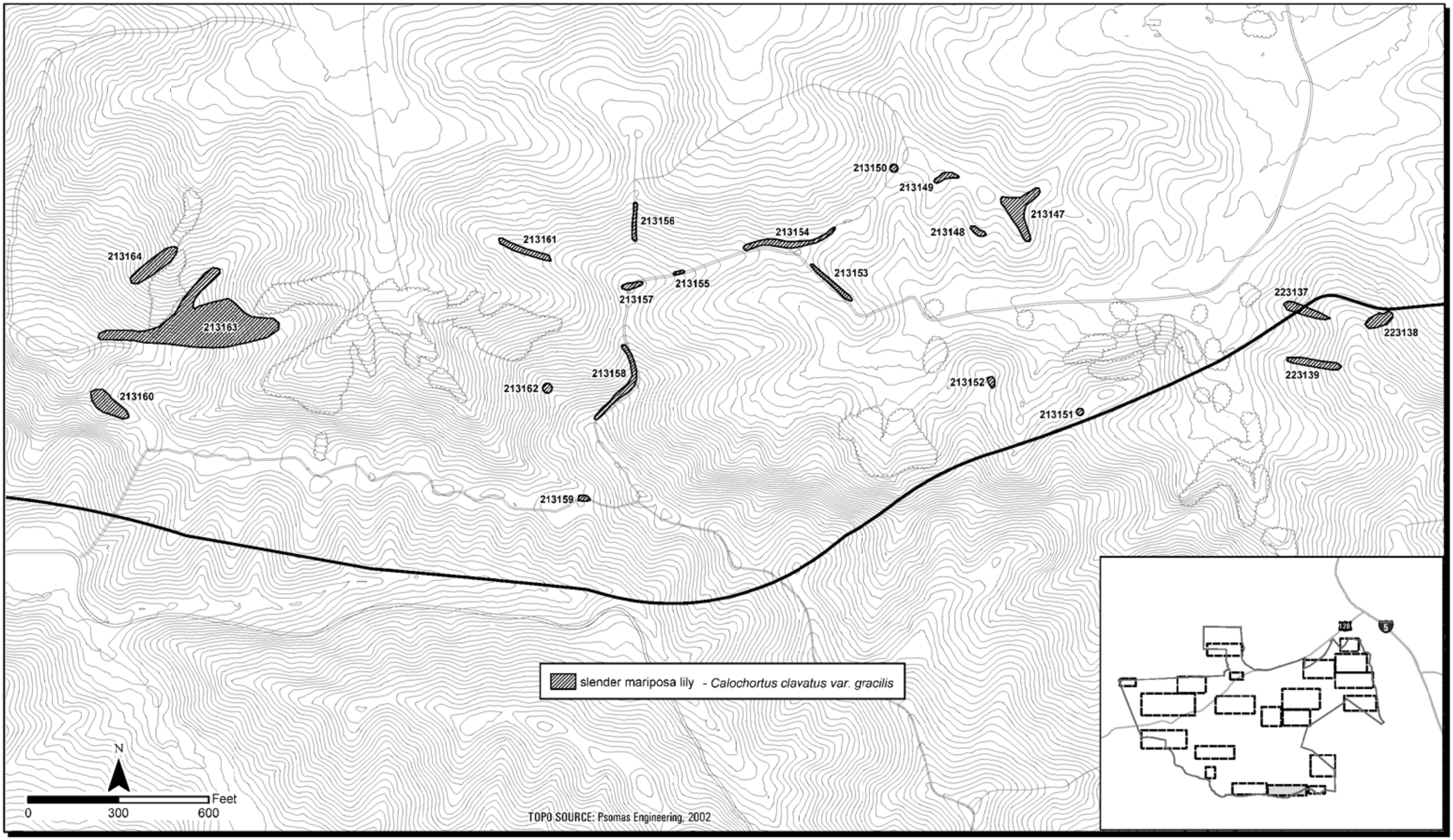
FIGURE 10



Newhall Ranch

Sensitive Plant Occurrence Data

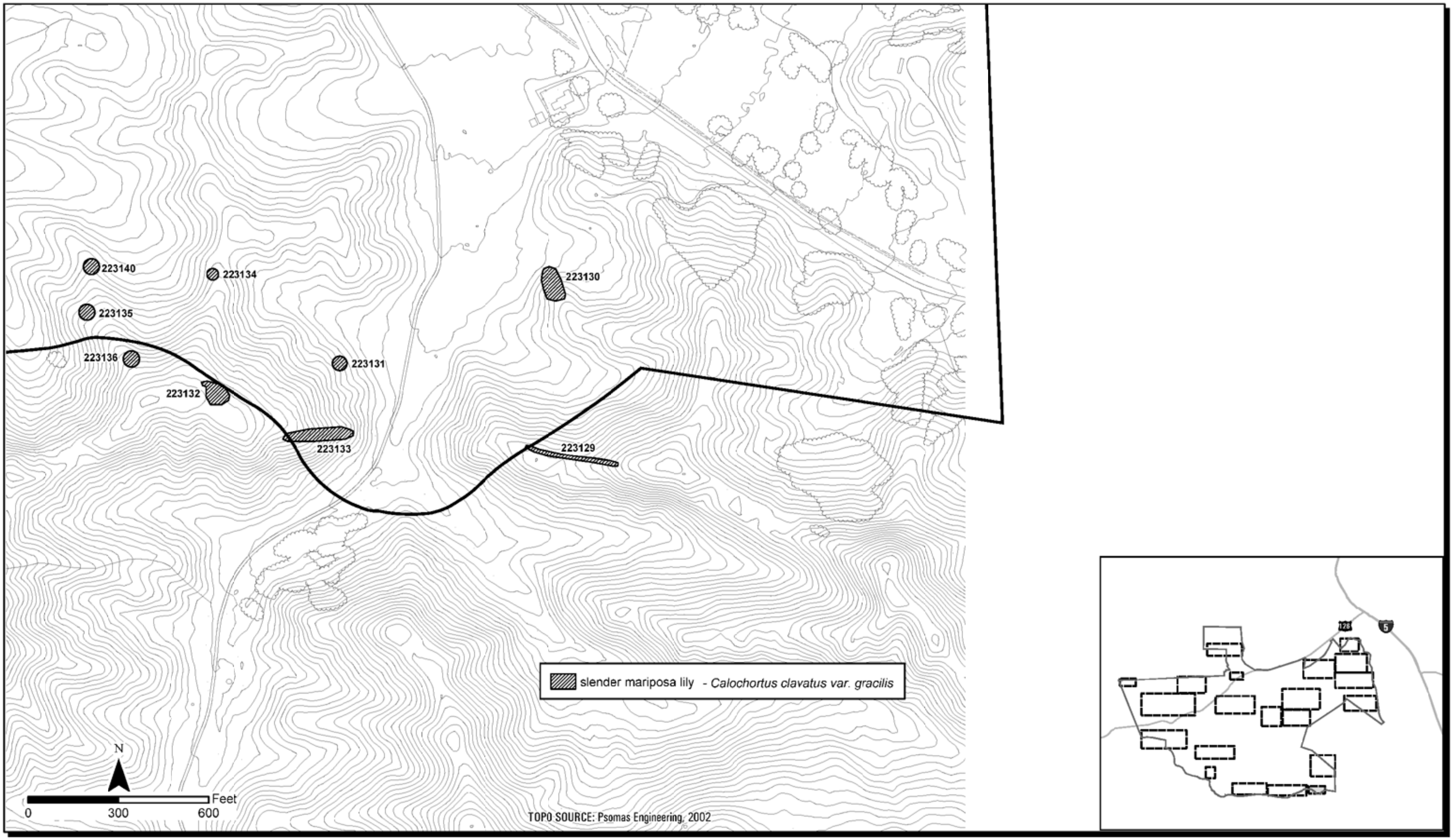
FIGURE 11



Newhall Ranch

Sensitive Plant Occurrence Data

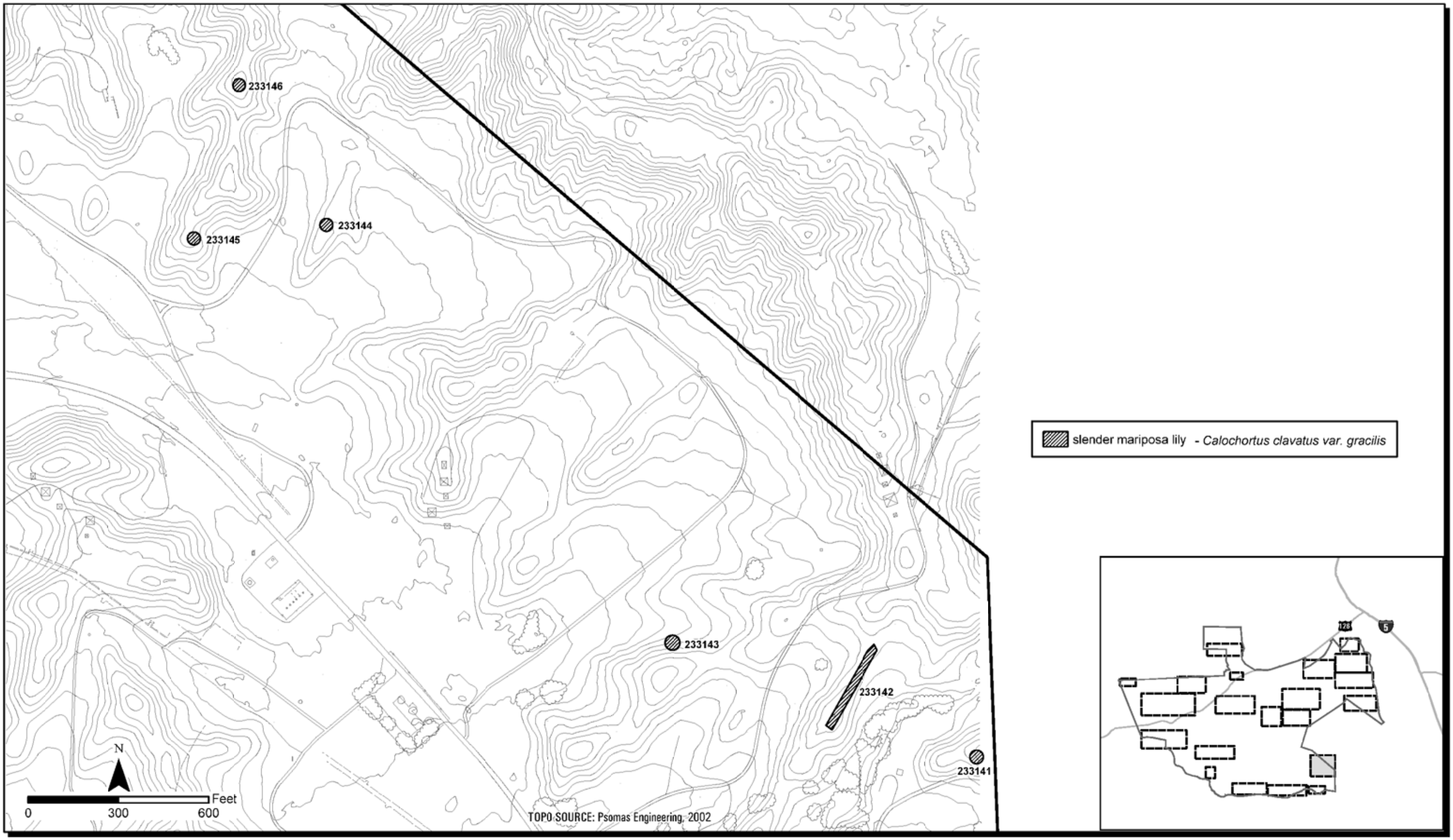
FIGURE 12



Newhall Ranch

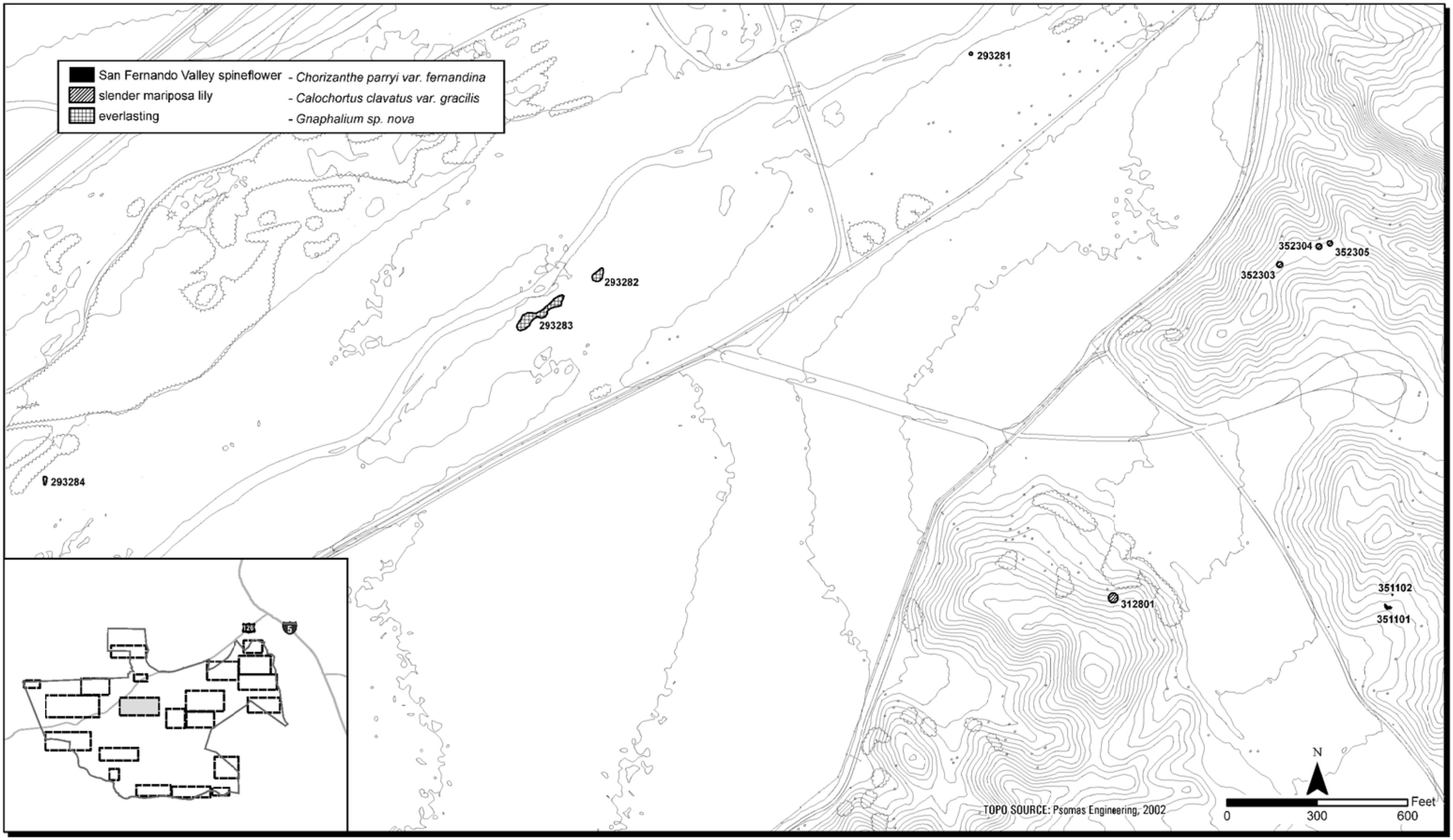
Sensitive Plant Occurrence Data

FIGURE 13



Newhall Ranch
Sensitive Plant Occurrence Data

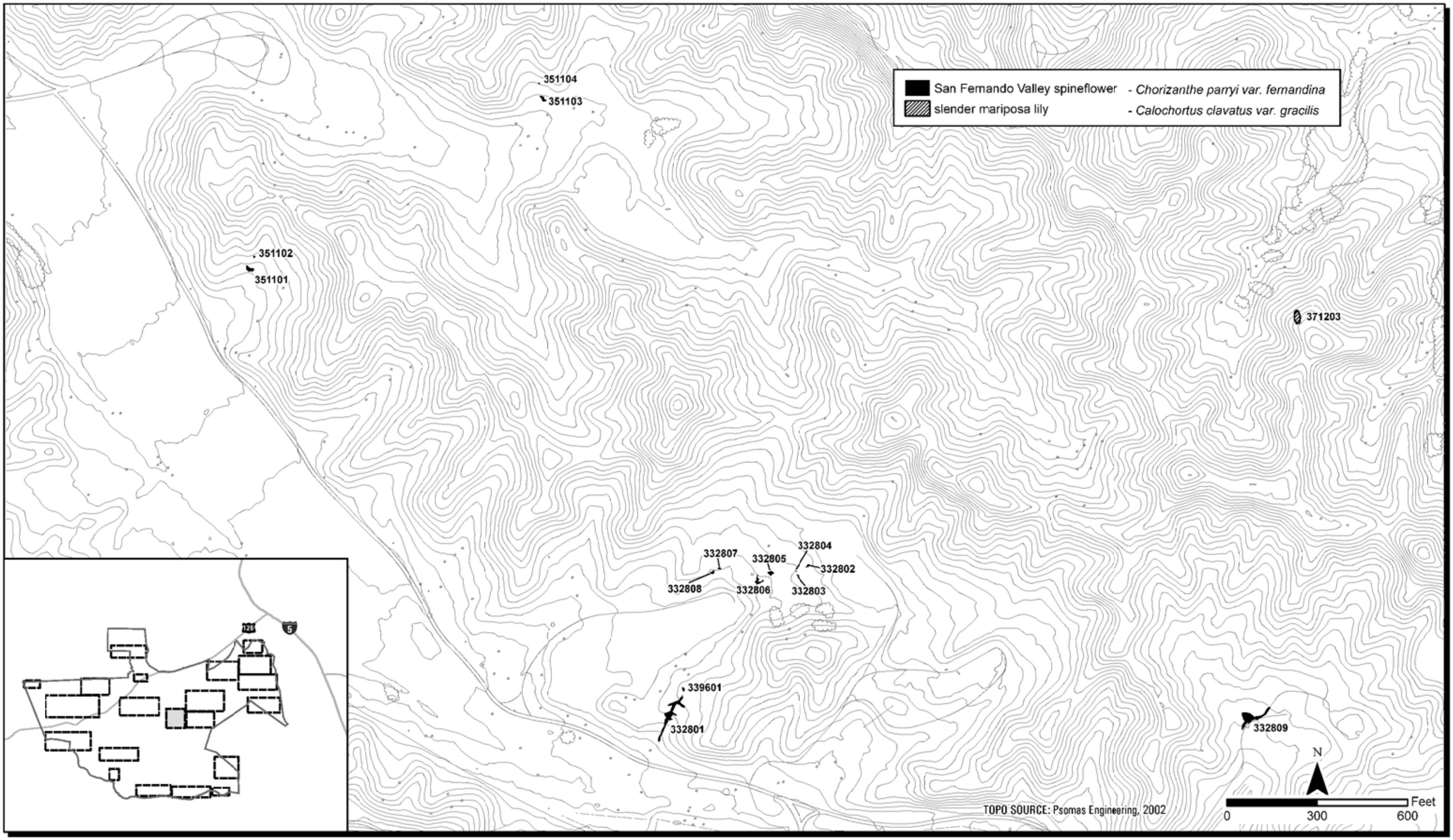
FIGURE
14



Newhall Ranch

Sensitive Plant Occurrence Data

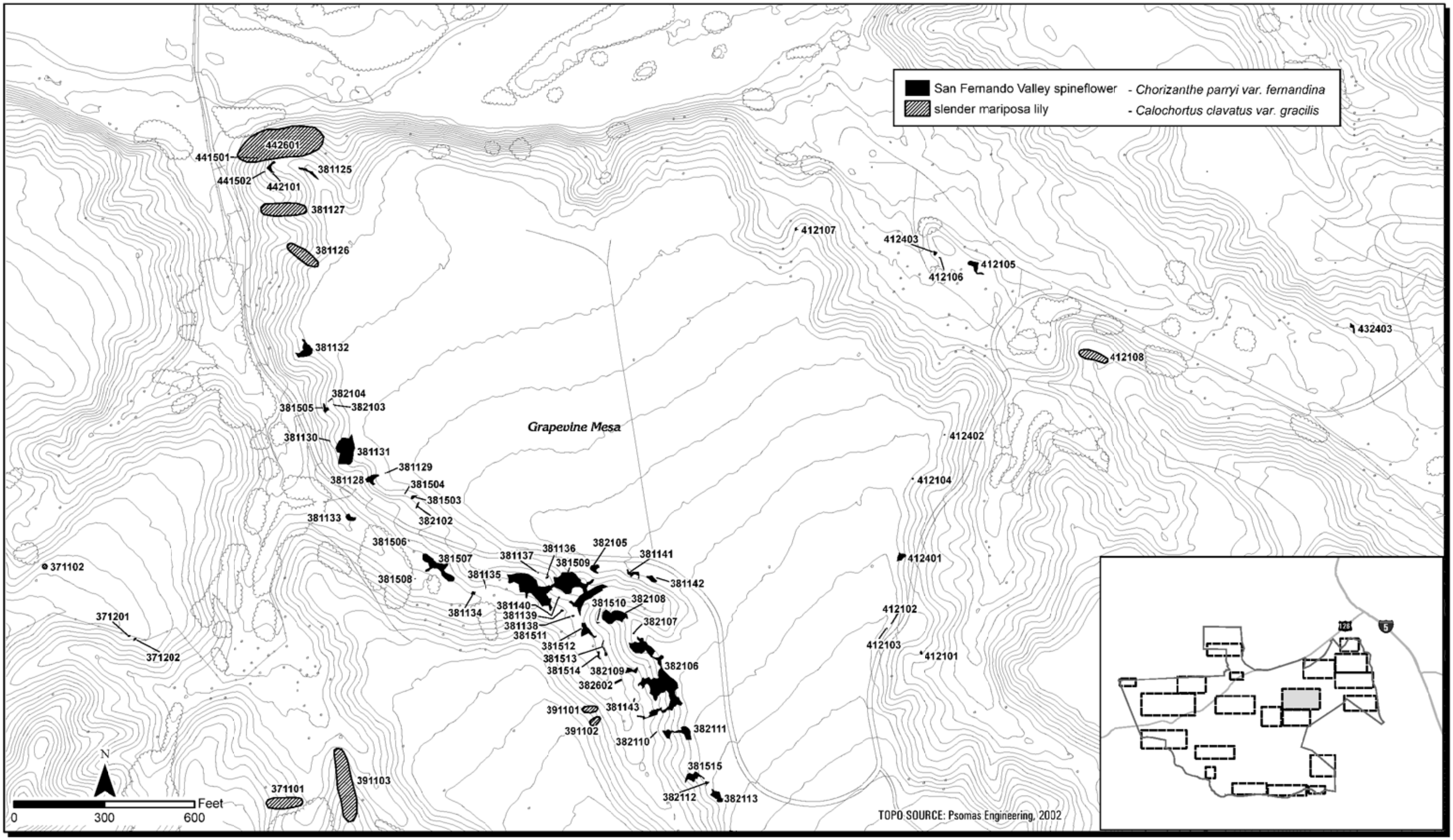
FIGURE 15



Newhall Ranch

Sensitive Plant Occurrence Data

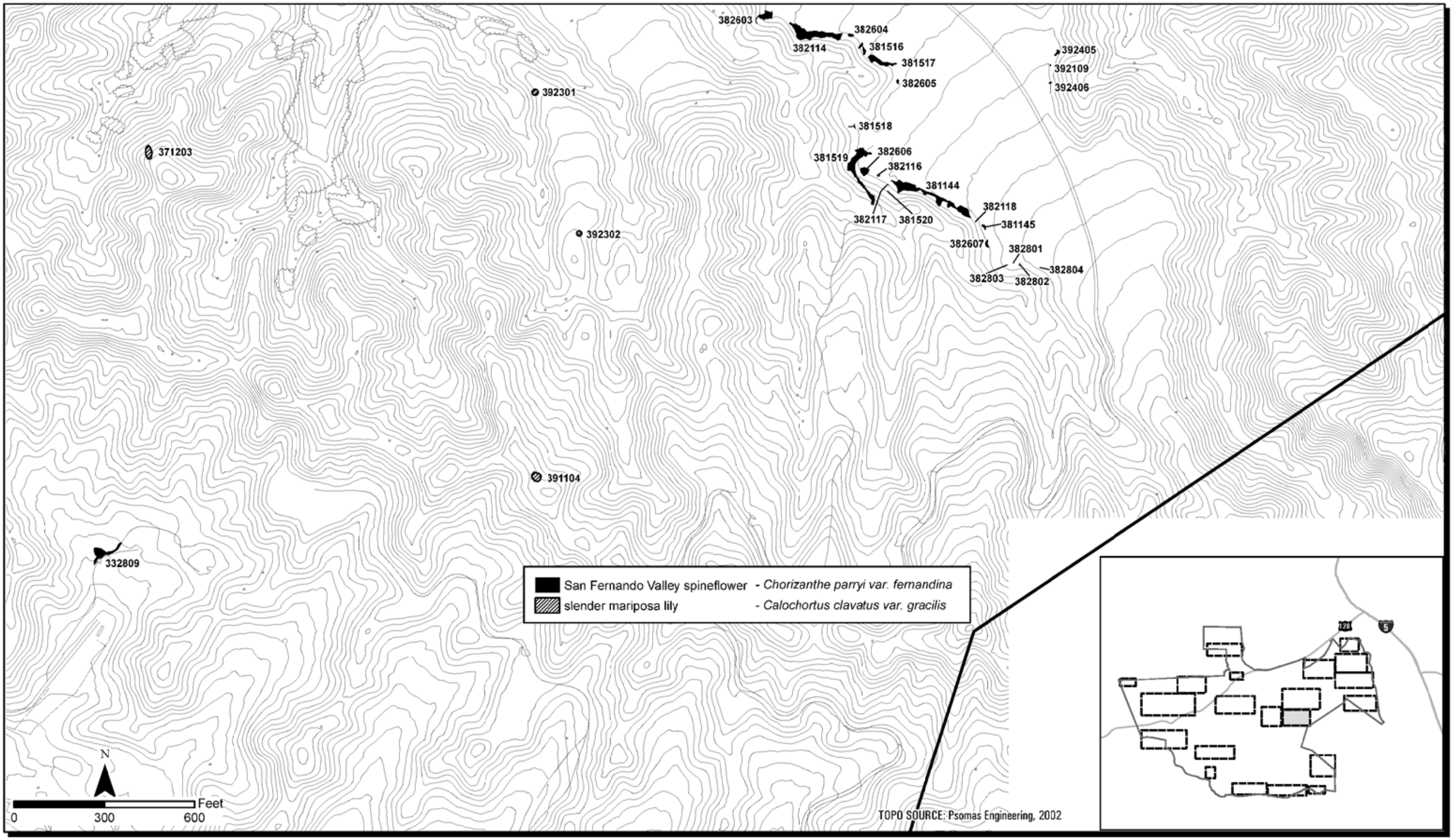
FIGURE 16



Newhall Ranch

Sensitive Plant Occurrence Data

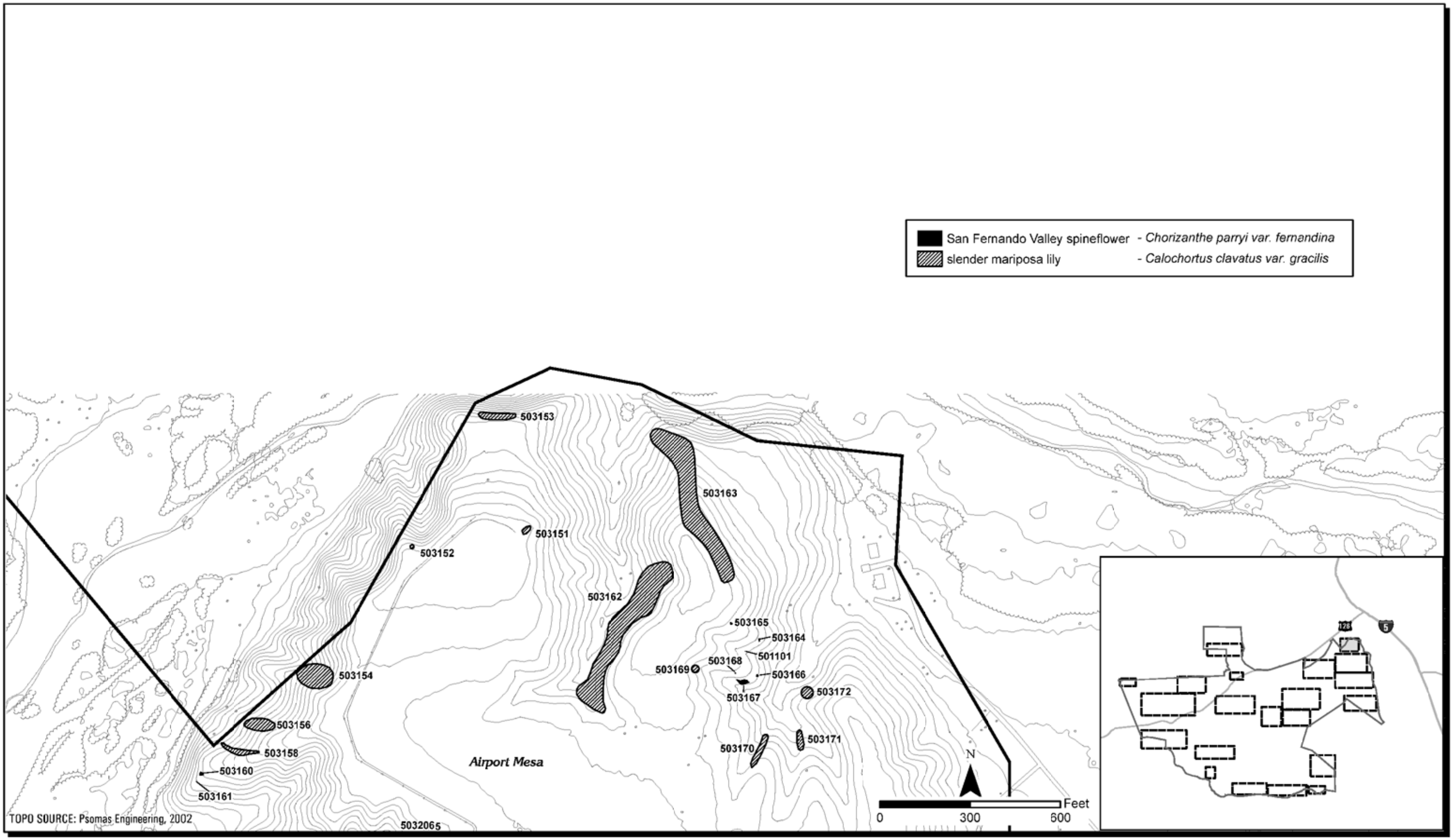
FIGURE 17



Newhall Ranch

Sensitive Plant Occurrence Data

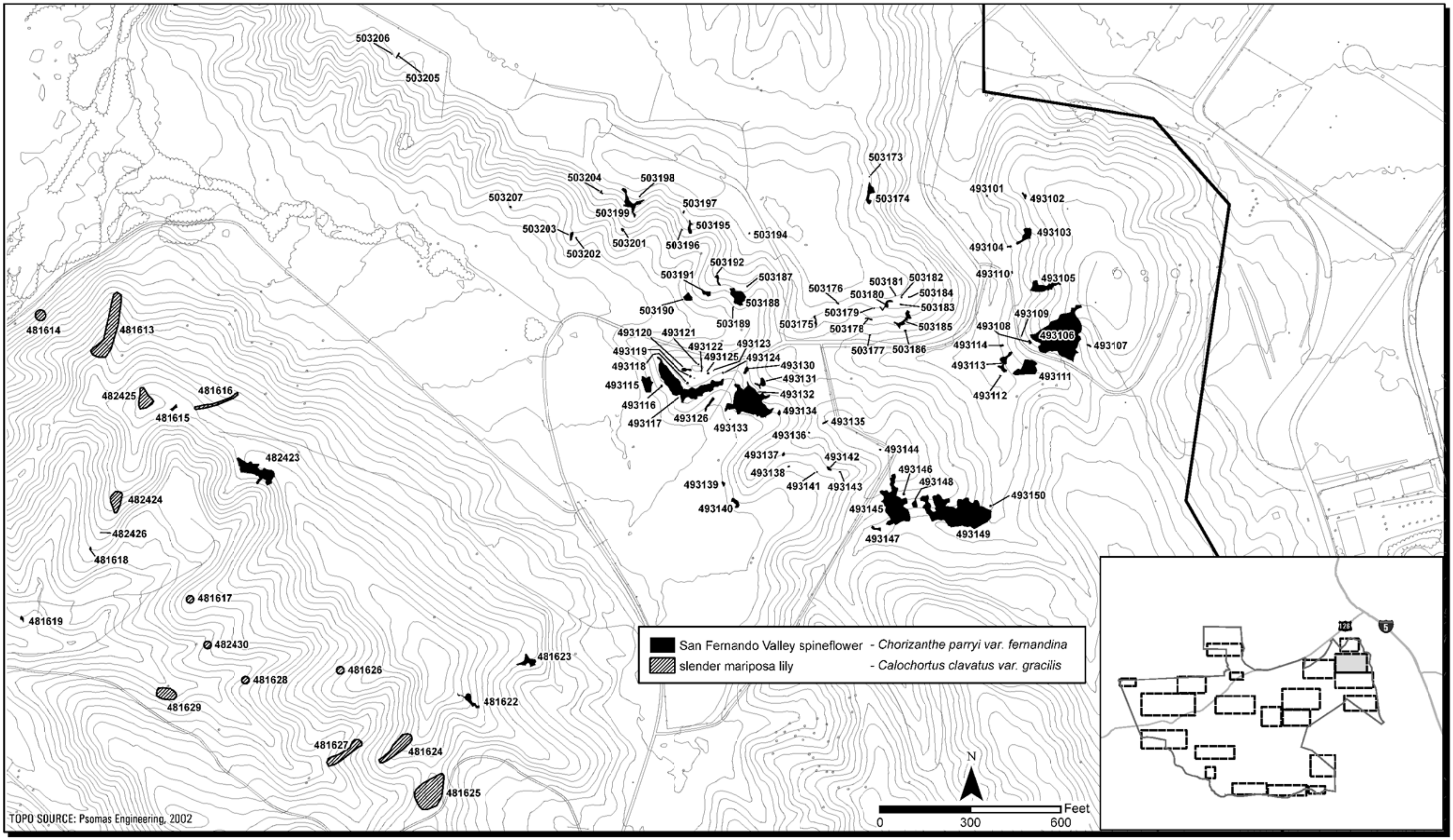
FIGURE 18



Newhall Ranch

Sensitive Plant Occurrence Data

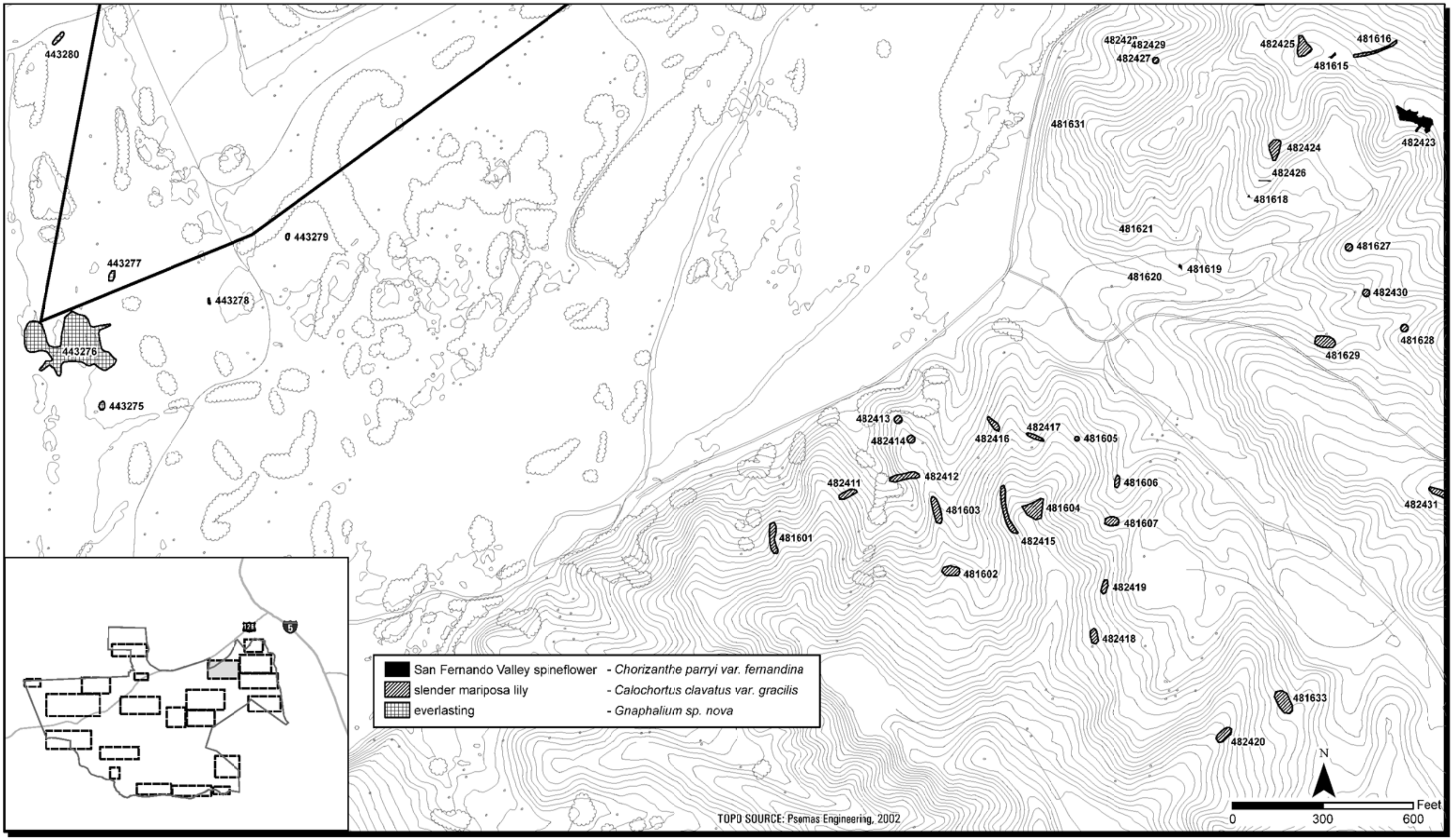
FIGURE 19



Newhall Ranch

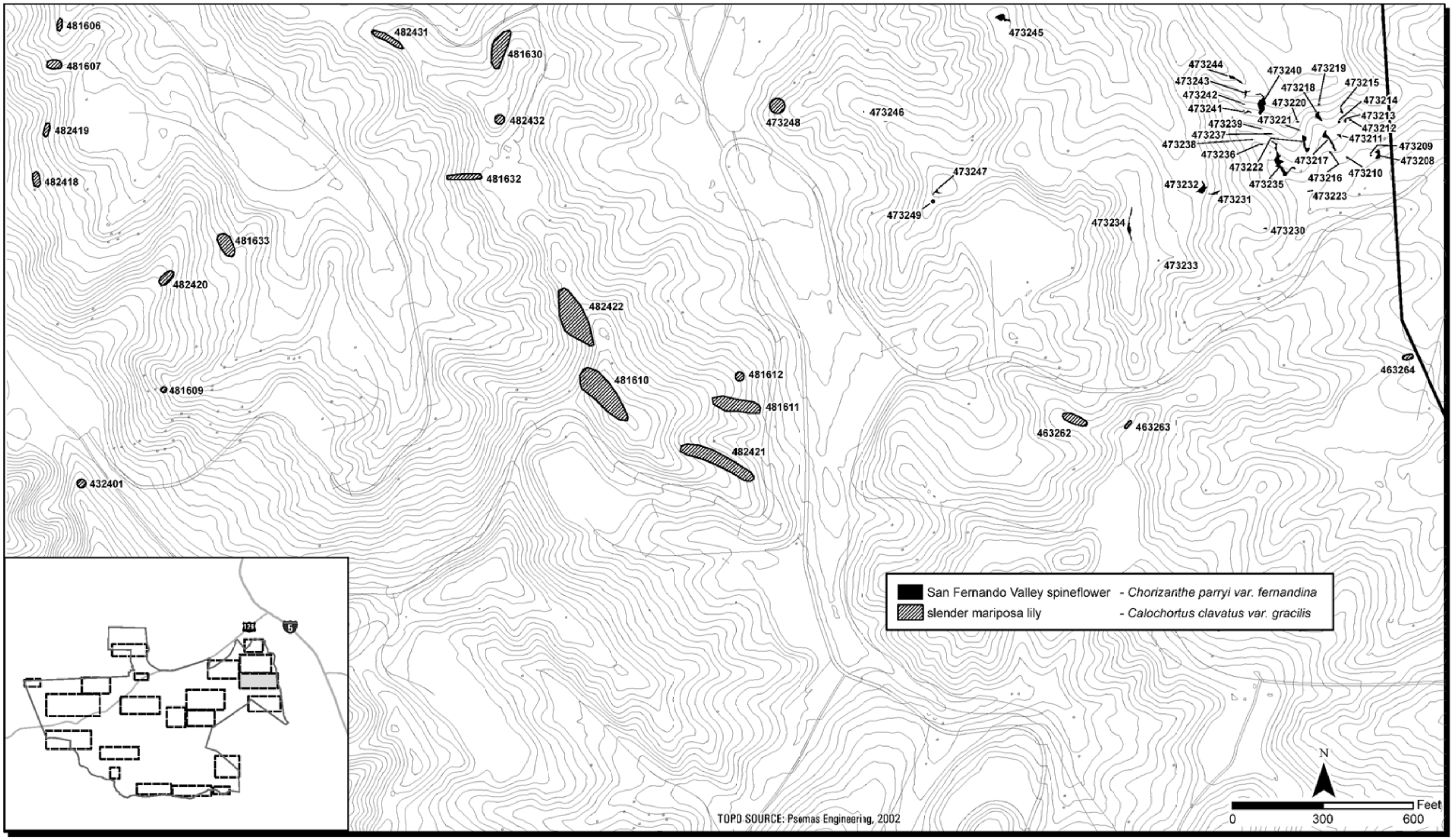
Sensitive Plant Occurrence Data

FIGURE 20



Newhall Ranch
Sensitive Plant Occurrence Data

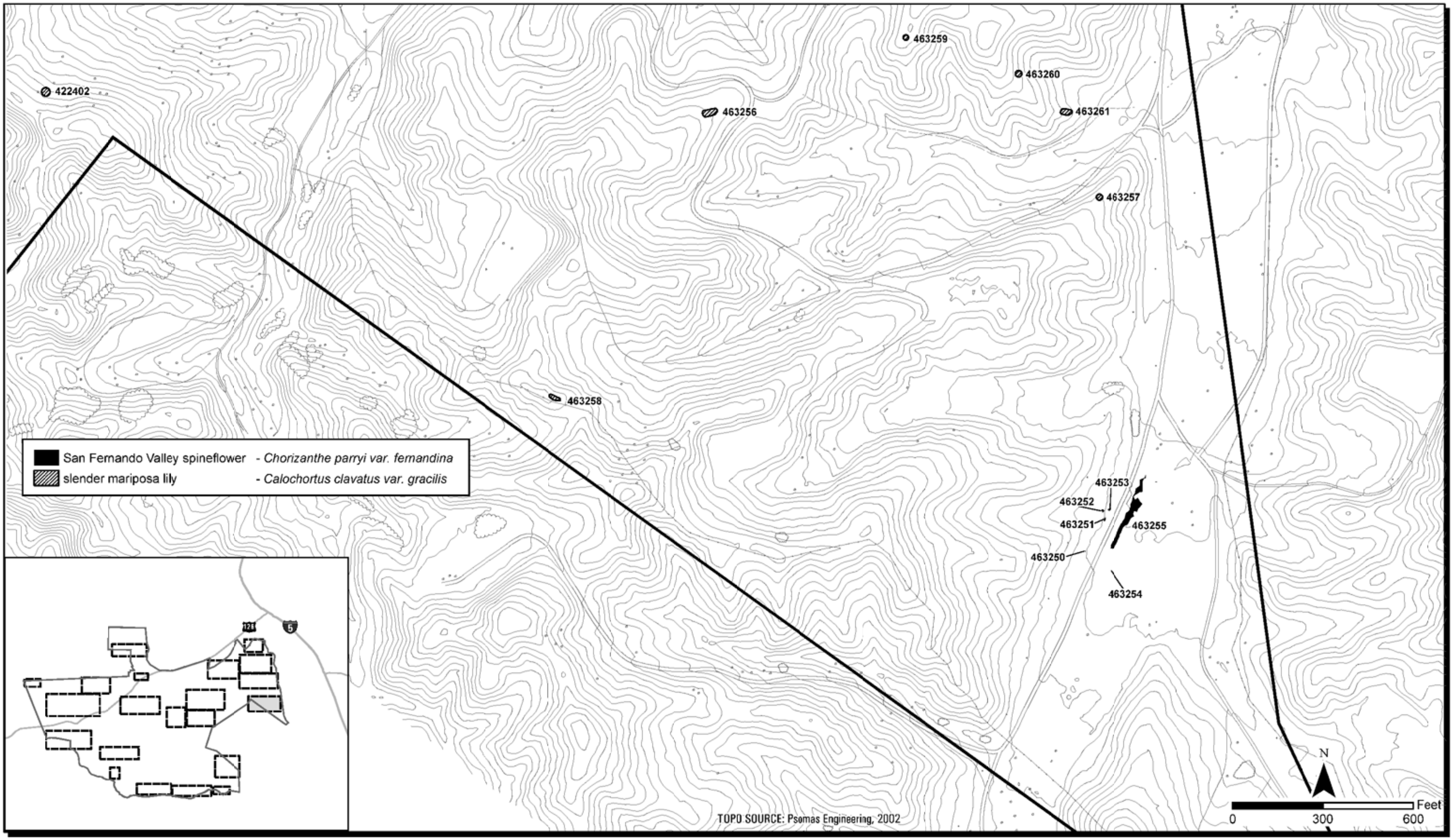
FIGURE
21



Newhall Ranch

Sensitive Plant Occurrence Data

FIGURE 22



Newhall Ranch

Sensitive Plant Occurrence Data

FIGURE 23

types (*e.g.,* gravelly loam, sandy loam, rocky clay). This species is locally abundant within the NR SPA study area: a total of 204 polygons were mapped with a polygon size ranging from 49 to 110,510 square feet. The estimated number of individuals within each polygon ranges from 1 to 30,000, with a total of approximately 68,888 individuals observed within the project site during the 2004 field season (see *Table 4*). CNDDB forms for each occurrence on this site and are included in *Appendix C*.

TABLE 4
Slender Mariposa Lily Summary of Occurrence Data for the Newhall Ranch SPA

Polygon Name	Polygon area (sq. ft.)	Estimated Number of Individuals
013701	207	3
013702	617	1
013703	444	7
013705	321	2
013706	1,289	1
022701	1,483	1
032312	1,878	2
032313	1,105	4
032314	1,358	14
032442	1,978	1
041213	16,736	55
051211	22,987	10,000
051212	23,198	6,000
052306	10,811	500
052307	1,254	1
052308	1,280	11
052309	1,600	1
052310	25,891	20
052311	31,794	290
052439	22,063	500
052441	1,271	38
052505	26,062	2,000
052506	13,940	1,000
052507	22,270	4,000
052508	13,451	1,000

TABLE 4
Slender Mariposa Lily Summary of Occurrence Data for the Newhall Ranch SPA

Polygon Name	Polygon area (sq. ft.)	Estimated Number of Individuals
052509	7,516	700
061201	9,608	1,700
061202	4,180	77
061203	3,467	50
061206	8,233	150
062301	50,427	1,300
062433	7,952	24
062435	21,890	2,000
062501	394	2
062502	7,747	115
062503	4,339	400
062504	9,652	900
071204	110,510	30,000
071205	59,927	600
071207	3,718	2
071208	5,393	25
071209	26,002	1
071210	9,678	26
072302	74,246	320
072303	23,841	40
072304	777	1
072305	872	1
072436	24,712	19
072436	25,266	19
072437	22,591	80
072438	11,615	100
072704	16,000	100
072705	6,276	3
072706	9,430	2
092101	2,871	25
092103	325	5
092104	234	15

TABLE 4
Slender Mariposa Lily Summary of Occurrence Data for the Newhall Ranch SPA

Polygon Name	Polygon area (sq. ft.)	Estimated Number of Individuals
092440	6,144	58
102801	32,899	800
102802	587	1
102803	5,862	150
122801	2,176	2
122802	4,762	20
153111	1,475	1
153112	1,223	2
153113	899	1
163114	1,734	8
163115	1,223	10
193116	12,140	85
193117	185	3
193118	5,669	50
193119	2,797	7
193120	585	1
193121	1,229	10
193122	32,745	200
193123	2,361	7
193124	585	1
193125	585	3
193126	585	2
193127	2,071	10
193128	4,330	45
213147	8,323	150
213148	880	7
213149	1,363	15
213150	509	15
213151	418	6
213152	663	15
213153	2,273	12
213154	5,309	80

TABLE 4
Slender Mariposa Lily Summary of Occurrence Data for the Newhall Ranch SPA

Polygon Name	Polygon area (sq. ft.)	Estimated Number of Individuals
213155	343	4
213156	1,543	16
213157	1,162	25
213158	4,925	75
213159	624	6
213160	6,350	100
213161	3,395	25
213162	818	5
213163	56,224	1,000
213164	7,114	100
233129	4,288	25
233130	6,622	85
233131	1,762	10
233132	4,802	30
233133	8,304	25
233134	1,120	1
233135	2,149	6
233136	2,235	10
233137	3,639	30
233138	3,153	5
233139	3,892	25
233140	2,149	4
233141	1,569	1
233142	7,817	23
233143	1,961	2
233144	1,412	1
233145	1,412	4
233146	1,412	1
312801	841	1
352303	273	1
352304	260	1
352305	214	1

TABLE 4
Slender Mariposa Lily Summary of Occurrence Data for the Newhall Ranch SPA

Polygon Name	Polygon area (sq. ft.)	Estimated Number of Individuals
371101	3,737	10
371102	167	1
371203	678	1
381126	3,523	200
381127	5,548	25
391101	901	4
391102	654	11
391103	10,785	13
391104	683	1
392301	295	1
392302	207	12
412108	2,381	50
422402	647	5
432401	623	1
442601	24,081	50
463256	936	2
463257	316	2
463258	427	5
463259	234	1
463260	357	4
463261	611	7
463262	1,984	15
463263	233	2
463264	501	12
473248	1,947	5
473249	49	3
481601	1,883	5
481602	1,540	9
481603	1,840	12
481604	2,958	14
481605	175	1
481606	534	2

**TABLE 4
Slender Mariposa Lily Summary of Occurrence Data
for the Newhall Ranch SPA**

Polygon Name	Polygon area (sq. ft.)	Estimated Number of Individuals
481607	1,199	4
481609	260	1
481610	12,665	28
481611	5,865	10
481612	682	1
481613	8,037	54
481614	958	2
481616	1,142	5
481617	2,809	7
481624	3,407	12
481625	7,789	15
481626	457	1
481627	457	7
481628	457	3
481629	2,139	13
481630	4,757	4
481631	314	3
481632	1,878	3
481633	2,909	5
482411	1,066	1
482412	1,858	4
482413	507	1
482414	507	1
482415	2,311	10
482416	819	2
482417	607	2
482418	983	3
482419	704	5
482420	1,466	5
482421	9,538	40
482422	12,332	19
482424	1,819	11

TABLE 4
Slender Mariposa Lily Summary of Occurrence Data for the Newhall Ranch SPA

Polygon Name	Polygon area (sq. ft.)	Estimated Number of Individuals
482425	2,082	11
482427	314	5
482428	314	2
482429	314	1
482430	457	2
482431	1,994	20
482432	751	4
503151	455	5
503152	122	1
503153	2,423	20
503154	7,772	75
503156	3,343	65
503158	1,760	20
503162	36,451	60
503163	35,240	125
503169	450	10
503170	1,995	5
503171	1,319	5
503172	1,177	5
Total	**1,366,210**	**68,888**

4.2.2 *Calystegia peirsonii* (Peirson's morning-glory)

Peirson's morning-glory has no state or federal status, but is found on List 4 of the CNPS *Inventory*. This morning-glory is rhizomatous perennial that typically is found in more desert-like areas (*e.g.*, creosote bush, Joshua tree series) at elevations which exceed 3,000 feet AMSL, although there are records in the CNDDB for lower elevations in the local area. It was RECON's opinion (1996) that chaparral morning-glory (*Calystegia macrostegia* ssp. *cyclostegia*) was the more common species; however, after reviewing the floral bracts, leaf shape, and its glabrous nature, it is Dudek's opinion that the morning-glory observed in the study area is Peirson's morning-glory. This species was also recorded onsite during limited focused surveys for sensitive plant species conducted in 1992 (Dames and Moore 1993).

While never abundant, Peirson's morning-glory is widespread onsite and was observed on virtually all ridges and slopes, weakly climbing over mixed chaparral, California sagebrush, California buckwheat, and in California annual grassland series throughout the study area. CNDDB forms were not completed for this species because of its relatively low sensitivity.

4.2.3 *Cercocarpus betuloides* var. *blancheae* (island mountain-mahogany)

Island mountain-mahogany has no state or federal status, but is found on List 4 of the CNPS *Inventory*. It is an evergreen shrub that occurs as part of the chaparral in Los Angeles and Ventura counties, as well as on several of the Channel Islands (CNPS 2001). This species was not observed during limited focused surveys for sensitive plant species conducted in 1992 (Dames and Moore 1993) or general botany surveys conducted in 1995 (RECON and Impact Sciences 1996).

Onsite, island mountain-mahogany occurs as an occasional component of chaparral series at the base of north-facing slopes. CNDDB forms were not completed for this species because of the relatively low sensitivity of this species.

4.2.4 *Chorizanthe parryi* var. *fernandina* (San Fernando Valley spineflower)

San Fernando Valley spineflower is state-listed as endangered, a candidate for federal listing, and found on List 1B of the CNPS *Inventory*. Until its rediscovery in 1999 at Laskey Mesa on Ahmanson Ranch in Ventura County, it was thought to be extinct. A review of information of historic occurrence of SFVS in the CNDDB indicate that it was previously thought to occur in sandy to gravelly soils of washes, riverbeds, and upland areas primarily on the margins of the San Fernando Valley at the base of the Santa Susana Mountains, San Gabriel Mountains, and the Simi Hills. Munz (1974) provides distribution information to include Orange and San Diego counties. SFVS was not observed onsite during limited focused surveys for sensitive plant species conducted in 1992 (Dames and Moore 1993) or general botany surveys conducted in 1995 (RECON and Impact Sciences 1996).

SFVS polygons were identified in several general locations of the study area for the Newhall Ranch Specific Plan including areas around Airport Mesa (including Dead-End Canyon), Grapevine Mesa (including Lion Canyon and Long Canyon), Potrero Canyon, and San Martinez Canyon. The polygons for these occurrences are depicted in *Figures 7* through *9* and *Figures 15* through *23*. Labels for each of the polygons in these figures correlate with those in *Table 5* through *9*, which contains estimates for the numbers of individuals within each polygon.

Most of the SFVS were found on slopes with a south-facing component in habitat that was open California sagebrush, California buckwheat, ecotonal California sagebrush/California buckwheat and California annual grassland series, or at the edge of agricultural fields on mesas. Most of the observed SFVS were found on soils mapped by the USDA (1969) as slightly eroded to eroded Castaic-Balcom silty clay loam (30-50 percent slopes) or Terrace Escarpments. Plants in the vicinities of Grapevine and Airport mesas were observed down slope of terrace surfaces capped by Zamora clay loam (2-9 percent slopes). Elevations at SFVS locations onsite range from approximately 1,000 to 1,300 feet AMSL.

Vegetative cover in the area of SFVS occurrences ranged from five to 100 percent, but was more commonly between 60 and 80 percent. The soil type for all mapped SFVS occurrences on the project site consisted of sandy loams.

A total of 275 SFVS polygons were mapped ranging in size from one to 16,470 square feet. The number of individuals within each polygon ranges from one (1) to approximately 221,000. At Airport Mesa there were an estimated 38,236 individuals in 137polygons (*Table 5*). At Grapevine Mesa there were an estimated 425,235 individuals in 96 polygons (*Table 6*). At Potrero Canyon there were 13,326 individuals in 32 polygons (*Table 7*) and at San Martinez Grande Canyon there were 1,387 individuals in 10 different polygons (*Table 8*). The entire Newhall Ranch SPA contained an estimated 478,184 SFVS individuals for the 2004 field season (*Table 9*). CNDDB forms are included in *Appendix C* for each of the four occurrences onsite.

TABLE 5
San Fernando Valley Spineflower
Summary of Occurrence Data for the Airport Mesa Vicinity

Polygon Name	Polygon Area (sq. ft.)	Estimated Number of Individuals
463250	3	12
463251	29	40
463252	31	300
463253	46	60
463254	< 1	1
463255	3,721	3,400
473208	292	25
473209	16	30
473210	30	25
473211	68	20
473212	36	1
473213	57	25
473214	36	1
473215	83	50
473216	36	8
473217	441	200
473218	292	15
473219	36	1
473220	21	3
473221	6	15
473222	440	200
473223	37	4
473230	37	50
473231	127	150
473232	459	500
473233	12	15
473234	370	500
473235	1,163	1,000
473236	35	100
473237	1	15
473238	< 1	7
473239	< 1	1

TABLE 5
San Fernando Valley Spineflower
Summary of Occurrence Data for the Airport Mesa Vicinity

Polygon Name	Polygon Area (sq. ft.)	Estimated Number of Individuals
473240	901	250
473241	72	25
473242	17	40
473243	126	50
473244	208	50
473245	532	250
473246	12	50
473247	106	50
481615	172	27
481618	31	23
481619	101	104
481620	327	200
481621	<1	1
481622	753	220
481623	984	290
482423	4,415	3,700
482426	4	7
493101	14	10
493102	130	100
493103	1,034	500
493104	57	15
493105	1,776	1,500
493106	16,470	6,100
493107	61	17
493108	79	10
493109	4	4
493110	22	5
493111	2,465	500
493112	17	25
493113	914	400
493114	60	100
493115	1,279	200
493116	36	2

TABLE 5
San Fernando Valley Spineflower
Summary of Occurrence Data for the Airport Mesa Vicinity

Polygon Name	Polygon Area (sq. ft.)	Estimated Number of Individuals
493117	8,036	1,490
493118	36	1
493119	36	2
493120	216	100
493121	16	50
493122	9	4
493123	5	5
493124	18	30
493125	36	1
493126	294	300
493130	208	150
493131	444	200
493132	9,331	1,730
493133	2	5
493134	102	15
493135	68	15
493136	10	7
493137	64	20
493138	20	15
493139	95	25
493140	402	150
493141	9	8
493142	107	30
493143	15	75
493144	20	30
493145	7,674	1,420
493146	36	2
493147	212	100
493148	292	50
493149	15,238	8,500
493150	36	35

TABLE 5
San Fernando Valley Spineflower
Summary of Occurrence Data for the Airport Mesa Vicinity

Polygon Name	Polygon Area (sq. ft.)	Estimated Number of Individuals
501101	1	3
503160	106	10
503161	2	1
503164	29	3
503165	47	30
503166	47	20
503167	437	100
503168	11	2
503173	3	1
503174	812	200
503175	150	30
503176	31	9
503177	19	10
503178	70	25
503179	7	4
503180	300	50
503181	7	4
503182	18	20
503183	18	20
503184	10	7
503185	717	270
503186	36	1
503187	11	7
503188	1,789	330
503189	11	5
503190	484	50
503191	322	100

TABLE 5
San Fernando Valley Spineflower
Summary of Occurrence Data for the Airport Mesa Vicinity

Polygon Name	Polygon Area (sq. ft.)	Estimated Number of Individuals
503192	199	30
503194	15	8
503195	303	55
503196	14	15
503197	26	4
503198	15	3
503199	1,321	490
503201	62	50
503202	13	15
503203	203	30
503204	46	15
503205	54	10
503206	5	10
503207	30	25
Totals	**92,034**	**38,236**

TABLE 6
San Fernando Valley Spineflower
Summary of Occurrence Data for the Grapevine Mesa Vicinity

Polygon Name	Polygon Area (sq. ft.)	Estimate # Individuals
332801	1,730	250
332802	55	12
332803	15	27
332804	4	20
332805	147	200
332806	201	300
332807	30	38
332808	71	100
332809	1,516	900
339601	62	50
351101	268	2,000
351102	24	15
351103	155	180
351104	12	9
371201	34	12
371202	43	4
381125	384	215
381128	702	4,200
381129	7	13
381130	1	3
381131	4,232	6,400
381132	1,460	11,100
381133	420	4,400
381134	99	17
381135	1	8
381136	49	3
381137	8	3
381138	33	2
381139	43	11
381140	17	18
381141	415	520
381142	374	280

TABLE 6
San Fernando Valley Spineflower
Summary of Occurrence Data for the Grapevine Mesa Vicinity

Polygon Name	Polygon Area (sq. ft.)	Estimate # Individuals
381143	31	2
381144	4,276	38,500
381145	103	100
381503	122	150
381504	2	1
381505	250	150
381506	2	4
381507	2,809	4,600
381508	3	2
381509	15,207	33,000
381510	25	10
381511	< 1	2
381512	906	4,500
381513	115	490
381514	127	110
381515	896	120
381516	323	30
381517	1,126	16,000
381518	55	30
381519	3,201	26,000
381520	< 1	1
382102	63	60
382103	1	1
382104	4	1
382105	490	120
382106	11,406	221,000
382107	13	5
382108	2,551	27,000
382109	416	5,300
382110	3	6
382111	1,610	1,100

TABLE 6
San Fernando Valley Spineflower
Summary of Occurrence Data for the Grapevine Mesa Vicinity

Polygon Name	Polygon Area (sq. ft.)	Estimate # Individuals
382112	72	20
382113	811	900
382114	3,679	13,000
382116	35	10
382117	9	3
382118	3	21
382602	126	20
382603	857	450
382604	122	32
382605	73	10
383606	571	150
382607	139	20
382801	3	5
382802	10	4
382803	1	1
382804	4	15
392109	12	11
392405	143	40
392406	33	16
412101	57	5
412102	5	2
412103	6	20
412104	15	6
412105	746	300
412106	10	11
412107	52	50
412401	460	150
412402	6	5
412403	105	87
432403	195	53
441501	8	2

TABLE 6
San Fernando Valley Spineflower
Summary of Occurrence Data for the Grapevine Mesa Vicinity

Polygon Name	Polygon Area (sq. ft.)	Estimate # Individuals
441502	6	11
442101	354	100
Totals	**67,475**	**425,235**

TABLE 7
San Fernando Valley Spineflower Summary of Occurrence Data for the Potrero Canyon Vicinity

Polygon Name	Polygon Area (sq. ft.)	Estimate # Individuals
143101	11	6
143102	16	60
143103	14	10
143104	25	50
143286	6,258	5,000
143287	966	500
143288	1,939	2,000
143289	57	75
143290	7	6
143291	114	25
143292	48	10
143293	111	50
143294	38	10
143295	4,937	5
143296	49	20
143297	311	75
143298	327	250
143299	85	25
273107	195	100
273108	2	3
273109	223	100

TABLE 7
San Fernando Valley Spineflower Summary of Occurrence Data for the Potrero Canyon Vicinity

Polygon Name	Polygon Area (sq. ft.)	Estimate # Individuals
273110	1	1
283265	114	40
283266	61	50
283267	476	500
283268	1,982	3,000
283269	112	100
283270	26	5
283271	118	500
283272	147	200
283273	1,221	500
283274	323	50
Totals	**20,312**	**13,326**

TABLE 8
San Fernando Valley Spineflower Summary of Occurrence Data for the San Martinez Grande Canyon Vicinity

Polygon Name	Polygon Area (sq. ft.)	Estimate # Individuals
062701	15,183	40
062702	6,926	550
062703	3,416	450
062704	65	1
063224	1,573	200
063225	3	22
063226	398	100
063227	44	8
063228	67	15
063229	65	1
Totals	**27,110**	**1,387**

TABLE 9
San Fernando Valley Spineflower
Summary of Occurrence Data for the Newhall Ranch SPA

Polygon Name	Estimate # Individuals
Airport Mesa	38,236
Grapevine Mesa	425,235
Potrero Canyon	13,326
San Martinez Grande Canyon	1,387
Totals for the Newhall Ranch SPA	**478,184**

4.2.5 *Gnaphalium sp. nova* (everlasting)

An undescribed species of *Gnaphalium* was documented within the study area during the 2003 field season. Plants of this unnamed everlasting were previously ascribed to the species *Gnaphalium leucocephalum*, which does not occur in California. Specimens of *Gnaphalium leucocephalum* within California are actually this undescribed taxon. Collections of this plant have been made in Riverside, Los Angeles, and San Diego counties (Andy Sanders, pers. comm., 2003). The *Gnaphalium* plants on the Newhall Ranch SPA differ from *Gnaphalium leucocephalum* in stature, pubescence, and phyllary characters. The California *Gnaphalium* plants have been collected relatively few times (perhaps less than 20, without having yet made an exhaustive search of the herbaria) and most collections are old. Many are from around 1900 from somewhat vague localities like "Hollywood" and "Pasadena" but which are in areas that have now been substantially urbanized. Modern collections, outside of the Castaic Mesas and Santa Clara River plants, have come mostly from the Santa Ana Mountains region and especially Temescal Wash, in western Riverside County with at least one collection from adjacent San Diego County. The California plants are almost always associated with alluvial soils, often being found on the benches along major washes. In 2004, the three occurrences on the Newhall Ranch SPA consist of approximately one individual (*Figure 8*), 192 individuals (*Figure 15*), and 525 individuals (*Figure 21*). These occurrences are primarily growing on secondary alluvial benches. The vegetation around these plants consists of open alluvial sage scrub habitats that are sparsely vegetated. CNDDB forms were completed for these occurrences and are included in Appendix C.

4.2.6 *Helianthus nuttallii* ssp. *parishii* (Los Angeles sunflower)

This species was not observed within the study area during the 2004 field season. A *Helianthus* sp. population, discovered in 2002 at Castaic Spring, on the south side of the Santa Clara River between Middle Canyon and San Jose Flats, was determined by some experts to be *Helianthus nuttallii* ssp. *parishii*, but determined by other experts not to be this species. Based on pollen electron microscopy and chromosome counts, it is likely that the Newhall *Helianthus* species is a hybrid between *H. nuttallii* and *H. californicus* or else an intermediate evolutionary step between the two species (Porter and Fraga 2004). No suitable habitat for this species was observed within the 2004 study area.

4.2.7 *Juglans californica* (southern California black walnut)

Southern California black walnut has no state or federal status, but is found on List 4 of the CNPS *Inventory*. Within its distributional range in southern California, this species is found as scattered occurrences throughout chaparral, cismontane woodlands, and coastal and alluvial scrub habitats (CNPS 2001). Southern California walnut was not observed during limited focused sensitive plant surveys conducted in 1992 (Dames and Moore 1993) or general botany surveys conducted in 1995 (RECON and Impact Sciences 1996).

This large shrub to tree was incidentally observed as an occasional component of mixed chaparral, California sagebrush and alluvial scrub primarily along the north slope of the ridge between Potrero Canyon and Grave/Salt Creek Canyons. CNDDB forms were not completed for this species because of its relatively low sensitivity.

4.2.8 *Juncus acutus* var. *leopoldii* (southwestern spiny rush)

Southwestern spiny rush has no state or federal status, but is found on List 4 of the CNPS *Inventory*. It is a perennial herb that grows in mesic areas such as meadows, marshes, and seeps. It is widespread occurring from San Louis Obispo to Baja California, Mexico (CNPS 2001). Southwestern spiny rush was occasional in mesic riparian areas such as along the Santa Clara River. CNDDB forms were not completed for this species because of its relatively low sensitivity.

4.2.9 *Nemophila parviflora* var. *quercifolia* (oak-leaved nemophila)

Oak-leaved nemophila has no state or federal status, but is found on List 4 of the CNPS *Inventory*. It is a small annual herb that occurs as an understory plant in forests and ravines from Los Angeles County through Kern County along the Sierras to Oregon (CNPS 2001). One occurrence of oak-leaved nemophila was found on a northeast facing slope in oak woodland east of Grapevine Mesa. CNDDB forms were not completed for this species because of its relatively low sensitivity.

4.2.10 Bryophytes and Lichens

Bryophytes (non-vascular plants including mosses, liverworts, and hornworts) are plants which lack true vascular tissues (specialized water and nutrient conducting vessicles) found in angiosperms (*i.e.* flowering plants) and gymnosperms (*i.e.* cone producing plants). Since these non-vascular plants lack water transporting tissues, their life histories require that they inhabit areas of high humidity or places where water is immediately available. These areas can be found adjacent to permanent or temporary water sources or in microhabitats which provide sufficient moisture. Overall, the Newhall Ranch site is typical of the Mediterranean climate in Southern California and does not exhibit conditions favorable for a diverse flora of bryophytes. However, bryophytes were detected during surveys along north facing slopes, shady areas in canyons, and along cut banks in ephemeral drainages.

Lichens are not classified as true plants but are rather a symbiotic relationship between fungi and green algae and/or cyanobacteria. The relationship between the organisms of these phyla have allowed for their colonization of diverse niches throughout the world. Lichens were detected in the surveys of the Newhall Ranch site, however, appropriate habitat for lichens was limited to scattered non-granitic rocks and soils and fallen wood of trees and shrubs.

No sensitive bryophytes or lichens are recorded as occurring in the proximity of the Newhall Ranch project site (CDFG 2004b).

5.0 ACKNOWLEDGMENTS

Megan Enright, Marc Doalson, and Sparrow Serrano prepared this report, with review by Sherri Miller and staff at Newhall. Mark McGinnis provided graphics and GIS mapping analyses. Rosella Anstine provided word processing.

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APPENDIX A

RESUMES OF SURVEY PERSONNEL

MICHELLE L. BALK
Environmental Specialist

EDUCATION

M.S., Biology with emphasis Ecology and Evolution, University of Akron (1999)
B.S., Zoology, Iowa State University (1997)

PROFESSIONAL AFFILIATIONS

California Native Plant Society
Southern California Botanists
California Botanical Society

PROFESSIONAL CERTIFICATIONS

Quino Checkerspot Butterfly 10a Survey Permit
(USFWS Federal Permit)
CDFG Rare, Threatened, and Endangered Plant Voucher Collection Permit

EXPERIENCE

Ms. Balk has over three years of experience in environmental document preparation and resource conservation planning. Project experience includes biological resource surveys, data collection and analysis, environmental assessments, wetlands delineations, permitting, mitigation design and monitoring, and sensitive species surveys. Ms. Balk has engaged in interagency coordination and public outreach efforts due to the complexities of each project. Ms. Balk has also participated in the development of habitat conservation plans pursuant to Section 10 of the Federal Endangered Species Act.

PROFESSIONAL ASSIGNMENTS

Miramar Trunk Sewer Replacement and Permanent Access Project, City of San Diego Metropolitan Waste Water Department, City of San Diego, California. Performed delineation of "waters of the United States" and wetlands under the jurisdiction of the U.S. Army Corps of Engineers and California Department of Fish and Game. Completed vegetation mapping and sensitive plant surveys on this 13-acre project site. Conducted focused plant surveys for the state- and federally-listed willowy monardella and Encinitas baccharis. Coordinated with others on specific project design and prepared biological resources report.

North Agua Hedionda Sewer Rehabilitation Project, City of Carlsbad, California. Performed wetlands delineation, rare plant surveys, and exotic species mapping for half-mile sewer rehabilitation and shoreline protection project adjacent to coastal lagoon.

60th Street Canyon Sewer Replacement and Permanent Access Project, City of San Diego Metropolitan Waste Water Department, City of San Diego, California. Completed vegetation mapping, floristic surveys, and sensitive plant surveys on this 7-acre project site. Coordinated with others on specific project design and prepared biological resources report.

Lexington/Manzanita Canyon Sewer Replacement and Permanent Access Project, City of San Diego Metropolitan Waste Water Department, City of San Diego, California. Completed vegetation mapping, floristic surveys, sensitive plant surveys, and potential revegetation site surveys on this project site. Coordinated with others on specific project design and prepared biological resources report.

State Route125 South, California Department of Transportation, City of San Diego, California. Conducted rare plant surveys and Quino checkerspot butterfly surveys for mitigation site alternatives.

Sorrento-Miramar Curve Realignment and Second Main Track Project, North County Transit District, City of San Diego, California. Conducted a focused plant survey for the CNPS List 1B Palmer's grapplinghook along the approximately 180-acre linear rail corridor.

Newhall Ranch Development Project, Newhall Land and Farming Company, Valencia, California. Served as team leader for botanical surveys on Newhall Land and Farming Company parcels. Directed field team in performing general sensitive plant surveys and focused surveys for the state-listed endangered San Fernando Valley spineflower on project sites totalling 14,500 acres in Los Angeles and Ventura Counties in 2003.

Planning Area 1 Project, The Irvine Company, County of Orange, California. Conducted potential native grassland mitigation site surveys and rare plant surveys for CNPS List 1B sensitive plant species including intermediate mariposa lily as a member of a team of botanists within a portion of the 4,200-acre project site.

Village 3 Project, Otay Ranch Company, City of Chula Vista, California. Conducted rare plant surveys, including focused surveys for the federally-listed threatened and state-listed endangered Otay tarplant, on 263 acres in 2003.

Fanita Ranch, Santee, California. Conducted rare plant surveys on 2,000 acres in 2003.

Nickel Creek Project, Ramona, California. Performed rare plant mapping for the CNPS List 1B smooth tarplant for 14-acre multi-family residential development on the Santa Maria River.

Quantum Estates II Project, Quantum Estates II, LLC, County of San Diego, California. Conducted wetlands delineation and floristic survey for 39-acre residential development.

Camelot Project, Western Pacific Housing, City of San Diego, California. Conducted a delineation of "waters of the United States" and wetlands under the jurisdiction of the U.S. Army Corps of Engineers, California Department Fish Game, and California Regional Water Quality Control Board for the approximately 39-acre site. Performed floristic and rare plant surveys for site.

Levatino Property Project, Marker Development, Inc., Carlsbad, California. Provided wetlands delineation and floristic surveys for 20-acre property.

Barracuda Property Project, Private Individual Land Owner, Laguna Beach, California. Performed focused survey for the CNPS List 4 western dichondra within conservation easement on the property.
Oxnard Shores Project, City of Oxnard, California (2.8 acres); Concho Circle Project, Oceanside, California (2.4 acres); Harbor Project, City of Oxnard, California (1.2 acres). Performed vegetation mapping, general floristic surveys, and focused sensitive plant surveys for residential subdivision properties throughout southern California. Prepared biological reports summarizing results and implications of site surveys.

Single Family Residence Projects for Individual Land Owners, Cities of Laguna Beach (Third Avenue Project, Stan Oak Drive Project, Crestview Drive Project, Zell Project) and City of San Diego (Paul Girdner Residence). Conducted vegetation mapping, general floristic surveys, and focused sensitive plant surveys for single family residence projects throughout southern California. Prepared biological reports summarizing results and implications of site surveys.

Pole Maintenance Project/Bark Beetle Project, Southern California Edison, San Bernardino and San Jacinto Mountains, California. Conducted botanical surveys and habitat assessments for sensitive plants at pole replacement locations and along electric lines at numerous locations in the San Bernardino and San Jacinto Mountains.

"Spring Flora across Kern County" presented by the Jepson Herbarium. May 6-9, 2004.

"Basic Wetland Delineation"presented by the Wetland Training Institute, Inc. August 2-6, 2004.

"Morphology and Identification of Flowering Plants" workshop at Jepson Herbarium, Berkeley, California. March, 2003.

"Summer Annuals and Fall-Blooming Shrubs of the Eastern Mojave Desert" class through the Jepson Herbarium, Berkeley, California. September 2003.

Volunteer, Project Wildlife, San Diego, California. Cared for injured wildlife and reared baby birds at wildlife rescue organization.

A Sunday Birds@ field ornithology course with San Dieguito Adult School, Encinitas, California.

PUBLICATIONS

"Phenotypic effects of leptin in an ectotherm: a new tool to study the evolution of life histories and endothermy¿" with P.H. Niewiarowski and R.L. Londraville. The Journal of Experimental Biology 203:295-300, 2000.

SCOTT BOCZKIEWICZ
Biologist/ Habitat Restoration Specialist

EDUCATION

University of Wisconsin, Madison
B.S. Biological Conservation, 1994
B.A. Painting and Drawing, 1994

PROFESSIONAL AFFILIATIONS

Member of the Society for Wetland Scientists (SWS)
Member of the Society for Conservation Biology (SCB)
Member of the Society for Ecological Restoration, California Chapter (SERCal)

EXPERIENCE

Mr. Boczkiewicz has a diverse range of work experience in the biological sciences, with emphasis in conservation biology, wetland science, and restoration ecology. He has eleven years of progressive experience as a biologist, and has been evaluating impacts to sensitive, rare, threatened and endangered plant and wildlife species throughout Southern California for approximately three years. He has conducted sensitive species assessments, biological resource inventories, vegetation mapping, and wetland delineations for large public and private land holdings, and also has experience conducting focused surveys for botanical and wildlife species throughout San Diego, Riverside, Orange, Los Angeles, and San Bernardino Counties. Scott has performed biological monitoring of construction and infrastructure maintenance projects occurring in environmentally sensitive and/or protected areas, produced assessments of wetlands and uplands to support management plans and planning studies, designed mitigation plans and habitat restoration and monitoring plans for riparian, wetland, and upland habitats, identified regulatory issues for development and infrastructure projects to guide project designs, and completed permit applications supporting project compliance with federal, state, and local environmental regulations.

As-Needed Biological Consultant - City of San Diego. Providing pre-construction biological resource surveys, nesting bird surveys, vegetation mapping, biological monitoring, revegetation designs, and ESL compliance documents for multiple projects requiring service of existing sewer mains within urban-canyons throughout the city of San Diego. Mr. Boczkiewicz is responsible for all phases of approximately 25 MWWD canyon projects.

Biological Resource Surveys – Escondido, California. Conducted sensitive biological resources surveys for a 75-acre preserve property along Escondido Creek in unincorporated San Diego County, to provide baseline biological site information supporting development of a long-term management plan for the Escondido Creek Conservancy.

Rare Plant and Biological Resource Surveys – Escondido, California. Assisted with a botanical inventory and rare plant surveys for a 65-acre property in Escondido.

Rare Plant and Sensitive Biological Resources Surveys – Temecula, California. Assisted with a botanical survey, rare plant surveys and habitat assessments for federally- and state-listed plant and wildlife species, for the Pipeline 6 project on the Pechanga Reservation in southern Riverside County.

Sensitive Biological Resources Surveys – San Bernardino, California. Conducting botanical surveys, wildlife surveys, and habitat assessments throughout the San Bernardino and San Gorgonio Mountains along Southern Con Edison power line routes. The surveys are supporting implementation of a Bark Beetle tree removal project along existing power lines within San Bernardino County.

Rare Plant Surveys and Biological Resource Surveys – Newhall, California. Assisted with botanical surveys, general sensitive plant surveys, and focused rare plant surveys for the state-listed endangered San Fernando Valley spineflower on Newhall Land and Farming Company parcels totaling 16,500 acres in Los Angeles and Ventura Counties.

Sensitive Biological Resource Surveys –San Diego, California. Conducted general botanical and wildlife surveys and rare plant surveys for the Murphy Canyon drainage in San Diego. Completed a biological resources impact analysis and a mitigation search for the City of San Diego Murphy Canyon Culvert Project.

Sensitive Amphibian Surveys –Rancho Santa Fe, California. Assisted with nocturnal relocation surveys for sensitive toad species on the 40-acre El Apajo development property located along the San Dieguito River in Rancho Santa Fe.

Wildlife Surveys and Herptile Trapping– Riverside, California. Completed raptor nest surveys, general wildlife surveys, and assisted with installation and implementation of 20 reptile trap arrays within the 2,600 acre LaBorde Canyon study area in Riverside County. The surveys and trapping supported a study to develop or site an off-highway vehicle park.

Sensitive Amphibian Surveys – San Bernardino, California. Assisted with nocturnal and diurnal surveys for sensitive amphibian species in selected drainages within the San Bernardino Mountains. The surveys supported placement and development of a hiking trail on lands owned and maintained by the U.S. Forest Service.

Riparian Wetland Delineation – Escondido, California. Conducted a jurisdictional wetland delineation to provide baseline biological site information supporting development of a long-term management plan for a 75-acre preserve property located along Escondido Creek in unincorporated San Diego County. The preserve is owned and operated by the Escondido Creek Conservancy.

Penasquitos Lagoon Wetland Delineation – San Diego, California. Conducted a jurisdictional wetland delineation of a riparian and salt marsh restoration site located in Penasquitos Lagoon for agency sign-off.

Collier Marsh Wetland Delineation – Lake Elsinore, California. Conducted a jurisdictional wetland delineation of an approximately 50-acre portion of Collier Marsh, located immediately north of Lake Elsinore in Riverside, California. The wetland delineation contributed to completion of a constraints report for the Eastern Municipal Water District.

SR-56 Wetlands Mitigation and Environmental Permitting - City of San Diego
Secured an ACOE 404 Individual Permit, USFWS Take Authorization for least Bell's Vireo, RWQCB 401 Water Quality Certification, and CDFG 1601 Streambed Alteration Agreement for Phase 2 of State Route 56 (SR-56) construction.

RELEVANT EXPERIENCE

- Received ArcView and ArcInfo training at the University of New Mexico, Albuquerque and GPS training from United States Army at the White Sands Missile Range, Las Cruces, New Mexico.
- Completed Wetland Hydrogeomorphic (HGM) classification training at the Division of State Lands, Salem, Oregon.
- Attended UC Jepson Exchange "*Carex*" class in July, 2003. The three-day course specialized in identification of over 120 *Carex* species from throughout California.
- Attended San Diego Natural History Museum class *"Sensitive Butterflies of San Diego County"* in December, 2003. The class specialized in identification of the nine most sensitive butterfly species in San Diego County.
- Attended Association of Environmental Professionals "CEQA" seminar in November, 2003.

PREVIOUS EXPERIENCE

With Adolfson Associates, Inc.

Sauvie Island/Newell Creek Canyon Biological Inventories. Metro Regional Open Spaces Division, Portland. Designed and conducted two biological resource inventories on County land acquisitions to provide baseline information for development of long-term management plans. Conducted comprehensive surveys for all plant, amphibian, reptile, avian, and mammal species on the Sauvie Island Complex, a 288-acre wetland site along the Multnomah Channel. Developed a map classifying all vegetative formations on the site to the level of alliance and association utilizing by the National Vegetation Classification (NVC). Also conducted electrofishing surveys of three miles of Newell Creek to determine presence/absence and population dynamics of threatened and endangered salmonid species. Developed management and restoration plans for this tributary of the Willamette River.

Johnson Creek Predesign Wetland Study. City of Portland Environmental Services. Conducted extensive wetland delineations, wildlife habitat assessments, and functional value assessments of publicly owned properties within the 100-year floodplain of Johnson Creek. The study supported development of flood mitigation projects and programs for rehabilitating Johnson Creek watershed's natural functions. Also evaluated flood storage capacity, identified habitat values, and assessed potential for restoration and enhancement of habitat, hydrologic, and flood storage functions for each property.

Willamette Greenway Wildlife and Habitat Inventory. Portland Planning Bureau. Conducted a comprehensive natural, scenic, and recreational resource inventory of the Willamette River Greenway. The planning area, which covers the entire length of the river passing through Portland, is approximately 17 miles long and up to 2 miles wide. Conducted natural resource inventories, including assessment of fish and wildlife habitats, special status species, significant natural areas, vegetative cover, and other natural features.

Western Painted Turtle Study. Port of Portland. Designed and conducted study to assess painted turtle population structure, nesting behavior and nest sites, habitat use (active-season), and over-wintering sites. Performed trapping and marking surveys, telemetry surveys, and data gathering and analysis for the Western Painted Turtle. Performed extensive winter resident avifauna surveys within the Painted Turtle study areas to assess wildlife habitat potential for mitigation areas.

Westside Stream Diversion, City of Portland Environmental Services, Oregon. Conducted Natural Resources Assessments of four large watersheds in Southwest Portland to support a cost/benefit analysis for separating stormwater and sanitary sewer flows within those watersheds. Identified sensitive natural areas and evaluated all watersheds for multiple objective amenity areas that may support stream restoration, wetland or upland habitat creation, or other projects that provide benefit to the community while reducing flow to the CSO system. Identified all regulatory issues associated with natural resource impacts from construction activities within environmentally sensitive or protected areas.

Wetland Mitigation and Floodplain Restoration Monitoring. HMG, Washington County, Oregon. Developed revegetation plans for a 3.52 acre wetland mitigation site in the Tualatin River 100-year floodplain in Washington County, Oregon. Conducted compensatory wetland mitigation monitoring of floodplain restoration activities, and produced an assessment of planted vegetation survival and functions of mitigation site hydrology.

DARREN SMITH

EDUCATION

San Diego State University, M.A. geography with an emphasis in biogeography 1996
Humboldt State University, B.A. geography 1989

EXPERIENCE

Darren Smith has twelve years experience in biological resource management. He has participated in a large number of biological research and production projects at San Diego State University (SDSU), working with Dr. John O'Leary and Dr. Janet Franklin. Mr. Smith worked for Dudek and Associates from 1997 to 2001 as an associate biologist working on a variety of conservation and development projects. He has also worked for the City of San Diego and the California Coastal Commission. Mr. Smith is currently working at California State Parks as an associate resource ecologist. His work experience in research, private consulting and government has encompassed a wide variety of projects involving intensive vegetation sampling, biological inventories and monitoring, and applying GIS and remote sensing technology to biological resource conservation and development problems. Mr. Smith has produced or played a significant role in five southern California regional vegetation mapping efforts, and participated in numerous post-burn, post-impact and revegetation monitoring projects. Mr. Smith has conducted field-based research in Mediterranean-type and tropical ecosystems, focusing on patterns of plant species composition and diversity and their relationship to physical environment and disturbance. The outcome of these skills and work experience has led to the production of timely, well-received research, technical reports, and data products.

PROFESSIONAL ASSIGNMENTS

Supervised field and GIS production of TJ River Watershed vegetation and landcover database in San Diego County, California and Baja California.

Produced vegetation maps for Fallbrook Naval Weapons Station, and Marine Corps Air Station.

Produced vegetation, and sensitive lands data layers for the City of San Diego Environmental Tier/Future Urbanizing Area project.

Conducted rare plant surveys and mapped vegetation for a variety of projects in San Diego, Orange, Riverside, San Bernardino, Los Angeles, Kern, Santa Barbara, and San Luis Obispo Counties (1997-current). A selection of projects include: Moreno-Lakeside Pipeline, Wilson Creek Mitigation Bank, SCE Power Pole maintenance and replacement, White Water golf Course, Canyon Vista Estates, MSCP Black Mountain Sensitive Plant Inventory, Santa Fe Pipeline project, NCTB Miramar Curve, Oceanside/Melrose, Lone Tree Estates, Santa Fe Valley Properties, Chula Vista SPA1 and Wolf Canyon, Chino

Hills State Park Inventory, Monitoring, and Assessment Program, La Purisima Visitor Center, Chino Hills Visitor Center, Red Rock-Last Chance Canyon Riparian Bypass, Piute Butte Bouldering Constraints, and Lower Topanga Canyon Rare Plant Inventory.

Monitored saltmarsh, and riparian revegetation efforts at Rancho Santa Fe Road Bridge, Sorrento Valley Utilities Improvements, Tijuana River Emergency Channel Mitigation Projects.

Conducted pre-burn vegetation surveys of Burton-Mesa chaparral, Santa Barbara County.

Monitored riparian vegetation for recovery following the removal of vehicular impacts in Coyote Canyon Anza-Borrego Desert State Park.

Conducted long-term regional monitoring of post-burn coastal sage scrub in San Diego, Riverside and Orange Counties.

Participated in a long-term California gnatcatcher habitat assessment including multi-year breeding and non-breeding season vegetation surveys in breeding pair home ranges and nesting sites, at MCAS Miramar, San Diego County.

Participated in long-term study of vegetation recovery on San Clemente Island in Los Angeles County.

MEGAN S. ENRIGHT
Biologist

EDUCATION

B.S., Biology-Ecology, Behavior and Evolution, University of California, San Diego (1997)

PROFESSIONAL AFFILIATIONS

Member, California Native Plant Society
Member, Women's Environmental Council
Member, Southern California Botanists

PERMITS

Federal Permit to conduct Fairy Shrimp Survey (permit number-TE022524-0)
CDFG Rare, Threatened, and Endangered Plant Voucher Collection Permit (05006)

EXPERIENCE

Ms. Enright is a biologist with seven years experience in habitat restoration and biological assessments. She participated in coastal sage scrub restoration at the City of San Diego Miramar Landfill. The project included restoration design, native plant nursery management, and revegetation monitoring. Her current role at Dudek & Associates includes biological resources assessments and impact analyses, wetland delineations and permitting, vegetation mapping, rare plant surveys, and vernal pool studies.

Pipeline 6 Project, Metropolitan Water District of Southern California, County of Riverside, California. Conducted wetlands delineation and assisted in permit coordination for the Section 401 and Section 404 permits and 1601 Streambed Alteration Agreement. Conducted initial site reconnaissance, rare plant survey, and fairy shrimp survey for the proposed alignment. In addition, assisted in siting geotechnical activities.

Yucaipa Non-Potable Water Distribution System, Yucaipa Valley Water District, Counties of San Bernardino and Riverside, California. Conducted biological surveys including vegetation mapping, wetlands delineation and rare plant surveys within a project study area, which included the construction of five reservoirs, four pump stations and 39,120 linear feet of pipelines. Focused surveys were conducted for the state- and federally-listed Santa Ana River woolly-star and slender-horned spineflower.

Oceanside to Escondido Rail Project, North County Transportation District, Cities of Oceanside, Vista, San Marcos, Escondido and County of San Diego, California. Delineated wetlands and prepared vegetation map within the Loma Alta Creek, Buena Vista Creek, Buena Creek, Agua Hedionda Creek, San Marcos Creek, and Escondido Creek Watersheds. Prepared Section 401 and Section 404 permit applications and 1601 Streambed Alteration Agreement for impacts to non-tidal, adjacent wetlands; impacts were associated with the rail system. Prepared alternatives analysis, functional values assessment, and Conceptual Wetlands Mitigation Plan. Assisted in the preparation of an Exotics Removal Plan, Uplands Mitigation Plan, Brown-Headed Cowbird Trapping Plan, and a California gnatcatcher and least Bell's vireo Habitat Management and Monitoring Plan in accordance with the Biological Opinion issued by the United States Fish and Wildlife Service. Assisted in the preparation of the biological resources report and California Environmental Quality Act and National Environmental Policy Act documentation.

Camino Ruiz Road Alignment, Western Pacific Housing, City of San Diego - Future Urbanizing Area Subarea IV, California. Delineated wetlands, prepared vegetation map, and conducted rare plant surveys. Prepared Section 401 and Section 404 permit applications and 1603 Streambed Alteration Agreement for impacts to non-tidal, adjacent wetlands; impacts were associated with the roadway corridor. Prepared functional values assessment.

San Marcos Creek Roadway Improvements Project, City of San Marcos, City of San Marcos, California. Delineated wetlands, prepared vegetation map, and conducted rare plant surveys along San Marcos Creek from State Route 78 to Lake San Marcos.

Buena Vista Creek Channel Maintenance Project, City of Carlsbad-Engineering Division, Cities of Carlsbad and Oceanside. Project Manager for preparation of technical reports for California Environmental Quality Act documentation and wetlands permitting. Delineated wetlands, prepared vegetation map, and conducted rare plant surveys. Prepared biological resources report for California Environmental Quality Act documentation. Facilitated pre-application agency meetings with the U.S. Army Corps of Engineers, California Department of Fish and Game, and the California Regional Water Quality Control Board. Prepared a 1601 Memorandum of Understanding in accordance with Section1600 of the California Fish and Game Code and assisted in the preparation of an Exotics Removal Plan.

Salt Creek Channel Stage 6 Channel Widening Project, Riverside County Flood Control and Water Conservation District, County of Riverside, California. Delineated wetlands, prepared vegetation map, and conducted rare plant surveys, which included a focused survey for smooth tarplant (Centromadia [Hemizonia] pungens). Prepared biological resources report for California Environmental Quality Act documentation.

Canada Gobernadora, Santa Margarita Water District, Orange County, California. Project Manager for preparation of technical reports for California Environmental Quality Act documentation and wetlands permitting. Delineated wetlands, prepared vegetation map, and conducted rare plant surveys, which included a focused survey for San Diego tarplant (Deinandra [Hemizonia] paniculata), southern tarplant (Centromadia parryi spp. Australis), and many-stemmed dudleya (Dudleya multicaulis). Project also included focused surveys for least Bell's vireo, southwestern willow flycatcher and southwestern arroyo toad. Biological constraints on the site during the due diligence phase of the project.

Rancho Santalina Project, City of San Marcos, City of San Marcos, California. Conducted a delineation of "waters of the United States" under the jurisdiction of the U.S. Army Corps of Engineers, California Department Fish Game, and California Regional Water Quality Control Board, prepared vegetation map, and conducted focused rare plant survey, which included the federally-listed threatened and state-listed endangered thread-leaved brodiae (Brodiae filifolia). Prepared biological resources report for California Environmental Quality Act documentation.

Planning Areas 18 and 39, The Irvine Company, City of Irvine, California. Conducted a delineation of "waters of the United States" and wetlands under the jurisdiction of the U.S. Army Corps of Engineers, California Department Fish Game, and California Regional Water Quality Control Board and prepared vegetation map within the 1,200-acre project site. Developed wetlands permitting strategies with client. In addition, Dudek conducted focused surveys for least Bell's vireo, southwestern willow flycatcher, and California gnatcatcher.

Planning Area 1, The Irvine Company, County of Orange, California. Project Manager for preparation of biological technical reports for California Environmental Quality Act documentation for the Planning Area 1 Project, which encompasses over 4,200 acres, within which the northern half (approximate) would be permanent open space as part of a larger natural resources preserve, and the southern half (approximate) would be developed as a new community that includes residential, commercial, institutional (i.e., schools), agricultural, and open space uses. Prepared vegetation map and conducted rare plant surveys within the 4,200-acre project site. Prepared biological resources report for California Environmental Quality Act documentation and assisted in the preparation of wetlands permitting data.

Surfer's Point, Surfer's Point, LLC, City of Encinitas, California. Conducted vegetation mapping and floristic surveys and prepared biological resources report for California Environmental Quality Act documentation for the 34-unit timeshare resort project. Project dealt with coastal issues because it was located directly adjacent to Batiquitos Lagoon just east of Coast Highway 101.

Newhall Ranch Project, Newhall Land and Farming Company, Los Angeles and Ventura County, California. Served as field task manager for botanical surveys on Newhall Land and Farming Company parcels. Directed field team in performing general sensitive plant surveys and focused surveys for the state-listed endangered San Fernando Valley spineflower (Chorizanthe parryi var. fernandina) and other sensitive plants on approximately 6,000 acres in 2002 and 14,500 acres in 2003. In addition, collected San Fernando Valley spineflower seed from nine occurrences on Newhall Ranch in 2003. Prepared vegetation mapping for San Fernando Valley spineflower occurrence areas and assisted in the preparation of the draft conservation and management plan for this species.

Quantum Estates II Projects, Quantum Estates II, LLC, County of San Diego, California. Conducted focused surveys for the state-listed endangered and federally-listed threatened Encinitas bacchairs (Baccharis vanessae) on approximately 40 acres in 2003.

Perris Valley Channel Lateral "B" State 2 Project, Riverside County Flood Control and Water Conservation District, County of Riverside, California. Conducted rare plant surveys along 9,600 linear feet of the Perris Valley Channel in 2003.

Village 3 Project, Otay Ranch Company, City of Chula Vista, California. Conducted rare plant surveys, including focused surveys for the federally-listed threatened and state-listed endangered Otay tarplant, on 263 acres in 2003.

Fanita Ranch, Santee, California. Conducted rare plant surveys on 2,000 acres in 2003.

DAVID FLIETNER
Biologist

EDUCATION

M.S., Botany, University of Florida (1987)
B.S., Plant Science, University of California, Davis (1983)
GIS Certificate, University of California, Riverside extension (1996)

REGISTRATION/CERTIFICATIONS

County of San Diego Certified Biologist
Quino checkerspot butterfly, USFWS Permit #TE-008031
Riverside fairy shrimp, conservancy fairy shrimp, longhorn fairy shrimp, vernal pool fairy shrimp, San Diego fairy shrimp, vernal pool tadpole shrimp, USFWS Permit #TE-797665
Licensed Agricultural Pest Control Advisor #4577 (weed control)
Qualified Applicator License #31356 (landscape, agriculture, and aquatic)
Certified for flat-tailed horned lizard surveys, BLM (2001)
Certificate of Educational Achievement in Revegetation/ Restoration Planning, California Society for Ecological Restoration (2001)
Certificate of Completion, Desert Tortoise Council Surveying, Monitoring and Handling Techniques Workshop (2002)

AFFILIATIONS

California Invasive Plant Council
California Native Plant Society
Southern California Botanists

EXPERIENCE

Mr. Flietner is a biologist with eight years experience conducting biological resource surveys, endangered species presence/absence surveys, wetland delineations, and construction and restoration monitoring. Biological resource survey experience includes vegetation mapping, floristic inventories, and focused surveys for sensitive plant species, arroyo toad, and flat-tailed horned lizard. He conducts surveys for Quino checkerspot butterfly and has conducted surveys San Diego fairy shrimp, and Riverside fairy shrimp. His experience includes wetlands delineations in accordance with U.S. Army Corps of Engineers guidelines and applications for Clean Water Act Section 401 and 404 permits and California Department of Fish and Game Streambed Alteration agreements. In addition, he performs qualitative and quantitative assessments of revegetation projects; writes biological technical reports, wetland delineation reports, habitat restoration plans and annual progress reports. He has conducted annual pesticide training for field applicators and nursery workers in Spanish and has written pest control recommendations for habitat restoration projects.

Los Angeles to San Diego Fiber-Optic Line, Southern Portion, San Diego County. San Diego Gas and Electric. Conducted floristic inventory, vegetation mapping, and focused surveys for quino checkerspot butterfly in vicinity of seven "pull sites" for line stringing operation. Prepared biological letter report summarizing results of surveys.

Potential Reservoir Sites, San Diego County, California. Otay Water District. Conducted focused presence/absence surveys for quino checkerspot butterfly at three potential reservoir sites for Otay Water District. Prepared report according to U.S. Fish and Wildlife Service requirements.

Oceanside Country Club Site, Oceanside California. City of Oceanside. Conducted vegetation mapping, floristic inventory, and post-impact assessment for sewer repair operations. Prepared biological technical report assessing impacts to wetland habitats, and conceptual wetlands mitigation and monitoring plan. Prepared Section 1601 Streambed Alteration Agreement, Section 404 Nationwide Permit application, and Section 401 Regional Water Quality Board permit application.

Rose and Tecolote Creek Clean Beaches Initiative Project, San Diego, California. City of San Diego Strom Water and Pollution Prevention Program. Conducted vegetation mapping, floristic inventory, and wetlands delineation for two pipeline projects to recirculate water in Mission Bay Regional Park. Prepared biological technical resources report, pre-construction notification under Nationwide Permit 12, Coastal Development Permit application to California Coastal Commission, and Section 401 application to Regional Water Quality Control Board.

Gavilan Hills/Smith Road Channel and Sediment Basin, Riverside County, California. Riverside County Flood Control and Water Conservation District. Mapped vegetation communities, conducted floristic inventory, and delineated wetlands in 71-acre project site. Prepared biological technical report including potential onsite mitigation for project impacts for Riverside County Flood Control and Water Conservation District.

County Line Channel Project, San Bernardino and Riverside Counties, California. Riverside County Flood Control and Water Conservation District. Mapped vegetation communities, conducted floristic inventory, identified potential Delhi sands flower-loving fly habitat, and identified occupied burrow owl habitat in approximately 2.5 linear mile project area. Prepared biological technical report including results of focused surveys for Delhi sands flower-loving fly surveys for Riverside

Santa Ana River Maintenance Project, Riverside, California. Riverside County Flood Control and Water Conservation District. Mapped vegetation communities in approximately 500-acre flood control channel project area. Identified potential habitat of Santa Ana woolly-star and slender-horned spineflower. Prepared biological technical report describing resources and avoidance, minimization, and mitigation measures to be implemented in long-term flood control channel maintenance program.

Wildrose Business Park Regional Drainage Facility, Riverside County, California. Ridge Properties, LLC. Mapped vegetation communities, conducted floristic inventory, and performed wetlands delineation for approximately 1700 linear feet storm drain project. Prepared biological technical report and 1601 Streambed Alteration Agreement for project.

Cloverdale Leasehold, Escondido, California. County of San Diego Water Department. Performed wetland delineation on 90-acre parcel adjacent to Escondido Creek for renewal of leased property. Wrote biological letter report describing results of wetlands delineation, property use plan, and conceptual wetlands mitigation plan, including recommendation for control of Lepidium latifolium.

Wilson Creek Crossing, San Diego County, California. County of San Diego Department of Public Works. Mapped vegetation communities, conducted floristic inventory, performed wetlands delineation, and conducted presence/absence surveys for arroyo toad. Prepared biological technical report, conceptual wetlands mitigation and monitoring plan, Nationwide Permit 39 notification, and Section 1601 Agreement for San Diego County Water Department.

Gird Road Crossing, San Diego County, California. County of San Diego Department of Public Works. Mapped vegetation communities, conducted arroyo toad habitat assessment, floristic inventory, and wetlands delineation for San Diego Public Works Department. Prepared biological technical report including conceptual mitigation plan for impacts to CDFG-jurisdictional riparian vegetation.

San Diego Jewish Academy, San Diego, California. San Diego Jewish Academy. Monitored habitat coastal sage scrub and riparian, and restoration and wart-stemmed ceanothus revegetation projects for first two years of five-year implementation plan. Conducted quantitative and qualitative analysis and prepared two annual progress reports comparing site conditions with performance criteria. Recommended and monitoring additional maintenance measures, seeding, and plantings.

Riverside County Agricultural Preserve, Riverside County, California. Conducted habitat mapping, and biological resource inventory, including potential Delhi sands flower-loving fly habitat for proposed mixed-use development of 8,000 acre area. Prepared constraints analysis report including recommendations to avoid impacts to least Bell's vireo and southern willow flycatcher critical habitat.

DOUGLAS GETTINGER
Habitat Restoration Specialist

EDUCATION

B.S. Landscape Architecture, California State Polytechnic University at Pomona (1979)
B.S. Ornamental Horticulture, California State Polytechnic University at Pomona (1980)

REGISTRATION/CERTIFICATIONS

California Agricultural Pest Control Adviser License No. 01369 (expires 12/31/04)

PROFESSIONAL AFFILIATIONS

Member, Society for Ecological Restoration
Member, California Invasive Plant Council
Member, California Agricultural Production Consultants Association

EXPERIENCE

Mr. Gettinger has more than a decade of experience in habitat restoration work, including biological construction monitoring, and the design, implementation, and monitoring of habitat restoration projects. His training in landscape architecture and ornamental horticulture, coupled with his experience working on large construction projects help bring habitat restoration and endangered species habitat creation projects to a successful conclusion. He holds a California Pest Control Adviser License, which allows him to legally act as an expert and make recommendations for the control of invasive plant species. His project experience includes restoration of chaparral, coastal sage scrub, coastal salt marsh, freshwater marsh, limestone forest, riparian woodland, southern willow scrub, and oak woodland habitats implemented under agreements with various federal, state, and local agencies. He has experience working safely around the large earth-moving equipment found at various construction projects and has worked at hazardous materials sites requiring OSHA 40-hour hazardous worker training.

Metropolitan Wastewater Department As-needed Biological Services Contract 2000-2005, San Diego Metropolitan Wastewater Department, City of San Diego, California. Served as a biological construction monitor on numerous emergency sewer repair and maintenance projects in sensitive habitat areas located in canyons for the City of San Diego Metropolitan Wastewater Department on the as-needed biological services contract 2000-2005. Many tasks included emergency sewer repair projects where sewage was flowing into live stream conditions, which required immediate response from DUDEK staff. Other tasks included monitoring emergency sewer cleaning activities where temporary equipment access was needed in sensitive habitat canyon areas. Scheduled and coordinated the work of other biological monitors, as needed. Initial assessment reports, biological resources reports, and/or impact assessment reports were then prepared for each task, depending on project requirements.

San Diego County Water Authority Emergency Storage Reservoir Program, San Diego County Water Authority, County of San Diego, California. Assisted in focused biological surveys and helped prepare alternatives analysis for the environmental impact report for the San Diego County Water Authority Emergency Storage Reservoir Program. Performed extensive tree inventory surveys and mapping of coast live oak (*Quercus agrifolia*) and mesa oak (*Q. engelmannii*) in proposed project alternative areas.

Metropolitan Water District Pipeline Project, Metropolitan Water District of Southern California, Hemet, California. Collected seed from several sensitive species, including San Jacinto Valley crownscale (*Atriplex coronata var. nutatior*), little mousetail (*Myosurus minimus ssp. apus*), dwarf peppergrass (*Lapidium latipes*), and woolly marbles (*Psilocarpus brevissumus*) on a Metropolitan Water District pipeline right-of-way prior to construction in Riverside County, California. Seed was sent to Rancho Santa Ana Botanic Garden for counting, cleaning, and storage. Later sewed seed in appropriate locations along right-of-way after pipeline construction was completed. Also counted population and collected seed for Parish's brittlescale (*Atriplex parishii*), a species formerly presumed extinct.

Cannon Road Extension Project, City of Carlsbad Engineering Department, City of Carlsbad, California. Biological construction monitor for Phase 2 of the Cannon Road Extension Project in Carlsbad, California through sensitive habitat containing wetlands habitat for the federally endangered least Bell's vireo (*Vireo bellii pusillus*), southwestern willow flycatcher (*Empidonax traillii extimus*), and western clapper rail (*Rallus longirostris*), as well as coastal sage scrub habitat for the federally-listed threatened coastal California gnatcatcher (*Polioptila californica*). Prepared monthly project progress reports and reported permit violations to the agencies. Project included oversight of subcontractors performing paleontological monitoring and recovery, and construction noise monitoring. Also monitored the installation and 120-day maintenance period for the temporary impacts wetland mitigation area.

Scripps Poway Parkway Extension Project, City of Poway Engineering Department, City of Poway, California. Biological monitor during two years of road construction through four miles of sensitive habitat for the Scripps Poway Parkway Extension Project in Poway, California. Located appropriate preserve habitat in the City and transplanted Coast Barrel Cactus (*Ferrocactus viridescens*) growing in the project right-of-way prior to impacts. Worked with City inspectors, surveyors, and the contractor to insure that impacts stayed within permitted limits. Monitored erosion and sediment control implementation and maintenance, and revegetation planting and seeding.

Puente Hills Landfill Wetland Mitigation Project, Sanitation Districts of Los Angeles County, City of Whittier, California. Provided horticultural and botanical monitoring for the wetland habitat restoration project associated with the Puente Hills Landfill in Whittier, California. Work was performed for the Sanitation Districts of Los Angeles County. The wetland restoration area is adjacent to the Puente Hills Landfill and also provides visual screening of the landfill for adjacent residents. Also directed staff performing the required wildlife monitoring and provided consultation for coast live oak (*Quercus agrifolia*) mitigation being implemented on weedy mustard covered slopes adjacent to the landfill, coastal sage scrub restoration being attempted on the landfill's canyon fill slopes, and ornamental buffer landscape to provide visual screening.

Rocketdyne Ecological Risk Assessment Project, Boeing Integrated Defense Systems, County of Ventura, California. Assisted with focused biological surveys to map vegetation communities and search for sensitive plant and wildlife species at a contaminated site. Surveys were the first stage in conducting an ecological risk assessment for the Santa Susana Field Laboratory, Ventura County, California.

Rancho Pacfifica Cottages Habitat Enhancement Plan, Taylor-Woodrow Homes, Inc., City of Encinitas, California. Prepared a plan to control invasive exotic plant species such as giant reed (*Arundo donax*) that infests the creek channel within a biological open space being preserved on the property. The plan provides for the removal and control of invasive plant species and the planting of native wetland and upland species in their place.

Village 11 Project, Brookfield Homes, Chula Vista, California. Biological construction monitor for grading of the Village 11) project in Otay Ranch in Chula Vista, California. Grading of the approximately 500-acre site in the eastern portion of the Otay Valley was adjacent to the Salt Creek Open Space Preserve containing wetlands and habitat for the federally-listed threatened coastal California gnatcatcher. Dudek directed and monitored soil and biomass salvaging from suitable habitat areas within the project footprint and is currently monitoring installation of the wetland mitigation area.

Rolling Hills Ranch Wetland Mitigation Monitoring Project, McMillin Land Development, City of Chula Vista, California. Biological construction monitor for the installation and long-term monitoring of Phases I and II of the wetland mitigation for the Rolling Hills Ranch development in Chula Vista, California. Rolling Hills Ranch is an approximately 300-acre mixed use project. The wetland mitigation program, involves expanding wetland habitat along Salt Creek and controlling invasive, exotic salt cedar on the project site. The wetland mitigation was installed in two phases, approximately two years apart. Oversaw the collection of botanical data and preparation of the annual reports for the two phases.

Henry Ranch Biological Construction Monitoring and Wetland Mitigation Project, William Lyon Homes, City of San Ramon, California. Directed staff performing pre-construction surveys for federally-listed threatened California red-legged frog (*Rana aurora draytonii*) and nesting birds, and biological construction monitoring for permitted wetland impacts and initial land clearing at the Henry Ranch Project in San Ramon, California. Also oversaw and directed implementation of conceptual wetland mitigation pond plan, as well as other required enhancement measures.

Fieldstone Brush Management and Summer Holly Preservation Project, The Fieldstone Company, City of San Diego, California. Supervised a brush management and summer holly (*Comarostaphylos diversifolia*) preservation program at a housing project on the rim of Los Peñasquitos Canyon Preserve, San Diego, California.

Baldwin *Brodiaea* Preserve, The Baldwin Company, City of San Marcos, California. Supervised the planting of native purple needlegrass (*Nasella pluchra*) plants in a preserve for the federal and State-listed endangered thread-leaf brodiaea (*Brodiaea filifolia*) in San Marcos, California.

Newhall Ranch, Newhall Land and Farming Company, County of Los Angeles, California. Assisted with focused surveys for the state-listed endangered San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina)* on the approximately 6,000 acres in 2002 and 14,500 acres in 2003 on Newhall Ranch in Los Angeles County, California.

Talone Lake Wetland Mitigation Project, Gatlin Development Company, City of Oceanside, California. Designed a wetland mitigation plan, oversaw construction impacts and mitigation installation for the loss of wetland habitat associated with a mixed use project development for the Rancho del Oro project around Talone Lake, in Oceanside, California. Project site includes habitat for the federally-listed endangered least Bell's vireo (*Vireo bellii pusillus*). Assisted in preparation of a draft habitat management plan for the project and processed the 404 application with the U.S. Army Corps of Engineers and 1603 Streambed Alteration Agreement with the California Department of Fish and Game. Project included coastal sage scrub buffer zone around a wetland.

Ocean Trails Habitat Restoration Project, Ocean Trails L.P., City of Rancho Palos Verdes, California. Biological and horticultural monitor at the 92 acres Ocean Trails Restoration Project in Rancho Palos Verdes, California. The Ocean Trails project is restoring coastal sage scrub, southern cactus scrub, and coastal bluff scrub in ruderal and degraded native habitat. The restoration program is creating additional habitat for the federally-listed threatened coastal California gnatcatcher (*Polioptila californica*), which is already expanding into the still developing habitat.

Potrero Canyon Wetland Mitigation Plan, City of Los Angeles Department of Recreation and Parks, City of Los Angeles, California. Developed a riparian mitigation plan for impacts in a coastal canyon being filled to stabilize landslides and prevent further property losses at Potrero Canyon in the Pacific Palisades neighborhood in Los Angeles, California. Made an extensive search for offsite mitigation alternatives in the area. Attended community workshops to explain mitigation and learn neighborhood concerns about the project. Plan was prepared for presentation to the California Coastal Commission.

VIPUL JOSHI
Biologist

EDUCATION

B.S., Evolution, Behavior, Ecology, University of California, San Diego (1997)

EXPERIENCE

Mr. Joshi has five years professional experience as a biological consultant specializing in botanical surveying, permit acquisition, permit compliance, and project management. Mr. Joshi is well experienced with southern California flora and environmental regulations. Mr. Joshi also has had experience managing constraints analysis, entitlement processing, permit acquisition, and biological construction monitoring for a variety of public and private projects.

Mr. Joshi has specific experience with CEQA processing with a variety of local jurisdictions, state and federal Endangered Species Act permit processing, wetlands permitting including Nationwide and Individual Permits from the U.S. Army Corps of Engineers, and management of permit compliance. Specific biological survey skills include full rare plant surveys, focused presence/absence surveys for the state- and federally-listed quino checkerspot butterfly and vernal pool fairy shrimp, project-level vegetation mapping, wetlands delineation, vernal pool identification, vernal pool watershed mapping, and general biological assessment of functions and values.

Cielo del Norte - San Diego County, California. Provided baseline vegetation and rare plant surveys for project in Harmony Grove area. Drafted biological technical report and endangered species permitting strategy for 500-acre development in a critical preserve planning area. Participated in multiple screencheck EIR processing with the County. Provide project management for ongoing entitlement process.

Nickel Creek – Ramona, California. Provided baseline vegetation, wetlands delineation, and rare plant mapping for 14-acre multi-family residential development on the Santa Maria River. Coordinated with architect on least impactive development design and coordinated with County of San Diego to design a multi-use trail connection along the river while avoiding impacts to jurisdictional waters. Provided Biological Resources Technical Report evaluating project impacts pursuant to CEQA.

Manchester Avenue Residential Development – Encinitas, California. Provided project management for entitlement processing of medium-scale residential subdivision on coastal property supporting numbers rare vegetation communities and plant species. Project capabilities included vegetation mapping, rare plant surveys, wetlands delineation, impact assessment pursuant to CEQA, and permitting strategy for impacts to jurisdictional wetlands, state- and federal endangered species.

Levatino Property – Carlsbad, California. Provided biological resource mapping, rare plant surveys, and wetlands delineation for 20-acre property. Evaluated development constraints in consideration of regional planning efforts, state and federal regulations.

Maldanado Property – Carlsbad, California. Provided biological resource mapping, rare plant surveys, and wetlands delineation for 50-acre property. Evaluated development constraints in consideration of regional planning efforts, state and federal regulations.

Santa Fe Meadows – Santa Fe Valley, California. Provided vegetation mapping, rare plant survey, and wetlands delineation for 40-acre residential development area.

Shaw Property – San Diego, California. Provided vegetation mapping, rare plant, and wetlands delineation for 40-acre property.

Via de la Valle – San Diego, California. Provided biological resources mapping, wetlands delineation, rare plants survey, and development constraints analysis for 20-acre property on

Our Lady of Mt. Carmel Catholic Church – San Diego, California. Conducted baseline vegetation surveys, wetlands delineation, rare plants survey, vernal pool identification, and vernal pool watershed mapping. Drafted Biological Resources Technical Report for Mitigated Negative Declaration and participated in community meetings and response to comments. Drafted Resource Management Plan for onsite open space management and avoidance of long-term impacts to adjacent USFWS National Wildlife Refuge property.

Lux Art Institute – Encinitas, California. Provided biological resource mapping, including vegetation mapping, wetlands delineation, and rare plant survey for 20-acre property. Provided constraints analysis, evaluation of project impacts pursuant to a Habitat Loss Permit under Section 4(d) of the federal Endangered Species Act, and management of permit compliance.

Fry's Electronics - San Marcos, California. Provided initial vernal pool identification and mapping, utilizing portable GPS system, wetlands delineation, and rare plant mapping. Rare plant mapping included pool by pool floral inventory and mapping of state- and federally-listed endemic vernal pool plant species.

San Jacinto Valley – Riverside County, California. Provided biological resource mapping, wetland delineation, and rare plant survey for endemic alkali species within San Jacinto River floodplain.

San Marcos Creek Roadway Improvements Project, City of San Marcos, City of San Marcos, California. Delineated wetlands, prepared vegetation map, and conducted rare plant surveys along San Marcos Creek from State Route 78 to Lake San Marcos.

Otay Ranch - Chula Vista, California. Provided biological resource surveys and documentation for various developments covering over 4,000 acres of vacant land. Tasks have included vegetation mapping, rare plants surveys, wetlands delineations, fairy shrimp surveys, and quino checkerspot surveys. Provided Biological Resource Technical Report pursuant to CEQA documentation, assisted in preparation of Second Tier EIR, development wetlands and endangered species permitting strategies, preparing and processing Section 404 Nationwide Permits 14 and 39, Section 401 Water Quality Certification, Section 1601 Streambed Alternation Agreement, and Section 7 Biological Opinion, and managing compliance with various permit conditions.

Irvine Company - Irvine, California. Provided vegetation mapping, wetlands delineation, and rare plant mapping for over 5,000 acres of vacant land.

Fanita Ranch – Santee, California. Provided vegetation mapping, rare plant, and wetlands delineation for 2,000 acre property.

Salt Creek Gravity Sewer - City of Chula Vista, California. Developed project alternatives permitting strategy with City and project engineers for 11-mile gravity sewer along north edge of Otay River Valley. Provided baseline vegetation mapping, wetlands delineation, and rare plant surveys. Prepared biological technical report and EIR biological evaluation for CEQA compliance. Submitted and coordinated acquisition of Section 404 Nationwide Permit 12, Section 401 Water Quality Certification, Section 1603 Streambed Alternation Agreement, and Section 7 Biological Opinion, including identification of mitigation alternatives. Coordinated construction monitoring and permit compliance.

North Agua Hedionda Sewer Rehabilitation - City of Carlsbad, California. Provided project management for half-mile sewer rehabilitation and shoreline protection project adjacent to coastal lagoon. Assignments included vegetation mapping, tidal wetlands delineation, rare plant surveys, development of engineering alternatives, permitting strategies, public scoping meetings, analysis of alternative impacts, EIR biological resources documentation, tidal wetlands mitigation identification, permit preparation for Section 404 Nationwide Permit 14, Section 401 Water Quality Certification, Section 1603 Streambed Alternation Agreement, Coastal Development Permit, Section 7 Biological Opinion, and project planning in terms of scheduling and budget.

Yucapia Non-Potable Water Distribution System, Yucapia Valley Water District, Counties of San Bernardino and Riverside, California. Provided baseline vegetation mapping, wetlands delineation, and rare plant surveys for 500-acre riparian study area.

Pipe 6, Metropolitan Water District – Riverside County, California. Conducted rare plant surveys and quino checkerspot butterfly surveys over approximately 20 mile long alignment.

Perris Valley Storm Drain, Lateral B – Riverside County Flood Control District, California. Provided wetlands delineation and focused rare plant surveys for the two mile long open flood control channel for deepening and widening project. Analyzed CEQA and wetlands permitting strategies and provided Biological Resources Technical Report and wetlands permit applications for Section 404 Nationwide Permits 3, 12, and 14, Section 1603 Streambed Alteration Agreement, and Section 401 Water Quality Certification. Met with ACOE staff to confirm wetlands delineation.

Canada Gobernadora, Santa Margarita Water District, Orange County, California. Conducted rare plant surveys, which included a focused survey for San Diego tarplant (Deinandra [Hemizonia] paniculata), southern tarplant (Centromadia parryi spp. australis), and many-stemmed dudleya (Dudleya multicaulis).

SR-125 South - Caltrans/CTV. Provided support in preparation of Section 7 Biological Assessment and permit compliance negotiations. Conducted vegetation mapping, rare plant, and quino checkerspot surveys for various mitigation site alternatives. Drafted conceptual revegetation and management plans for various mitigation sites including sites on south edge of Otay River Valley, Otay Mesa, and Otay Mountain..

LaBorde Canyon off-Highway Vehicle Park Study, County of Riverside, California. Provided baseline vegetation mapping and plant species inventory.

KIM L. MARSDEN
Botanist/Biologist

As a biologist with more than ten years of experience, Ms. Marsden has successfully conducted a diverse range of botanical and zoological surveys, including focused searches for rare and endangered species in coastal, mountain and desert plant communities. She has developed excellent botanical skills from not only a broad range of field identification experiences throughout the southwestern United States and northwestern Mexico, but training in botanical laboratory techniques used for plant identification, as well. Ms. Marsden has extensive experience in the analyses of potential impacts to species and habitats from proposed development projects. She prepares and reviews technical reports, which provide alternatives recommendations to mitigate these impacts. She has a thorough working knowledge of regulatory issues and applicable laws including the California Environmental Quality Act (CEQA), National Environmental Policy Act (NEPA), Federal Endangered Species Act (FESA), California Endangered Species Act (CESA), and the Clean Water Act as part of her resource agency experience working as a Botanist/Biologist for the California Department of Fish and Game, U.S. Fish and Wildlife Service, and through her project manager experience in the regulatory branch of the U. S. Army Corps of Engineers. Ms. Marsden has reviewed and commented on numerous proposed mitigation and monitoring plans for sensitive species. She is knowledgeable of, and skilled in, vegetation mapping, mitigation monitoring, and the design of habitat restoration plans. She also has extensive experience in conducting rare, threatened, and endangered animal surveys.

EDUCATION

Completed all required coursework for the Master's Program in Systematic Botany, San Diego State University, 1992-1994. Master's Research Topic: Systematics, ecology and natural history of Northwest American Eryngium species (Apiaceae).

Bachelor of Science, Biology, San Diego State University, 1992.
Associate of Science, Medical Laboratory Technology, San Diego Mesa College, 1988.

PUBLICATIONS

Marsden, Kim L. and Michael G. Simpson. 1999. Eryngium pendletonensis (Apiaceae), A New Species from Southern California. Madroño, 46:1, 61-64.

EXPERIENCE

1/01-present: Associate Resource Ecologist, California Department of Parks and Recreation, Southern Service Center, San Diego. Design long-term monitoring studies to assess the status and condition of vegetation communities, exotic species infestations, and rare plant populations. Conduct vegetation and rare plant inventories within State Parks in southern California. Assess the impacts of maintenance and development projects on biological resources within state park units. Provide technical botanical expertise to Service Center staff when requested. Assist in project environmental clearance under CEQA, ESA, and CESA. Assist other resources section staff in biological survey work and data analysis when necessary.

1/00 –1/01: Associate Biologist in Botany, California Department of Fish and Game, Region 5, San Diego Office. Provided technical assistance in developing Habitat Conservation Plans to applicants/jurisdictions seeking take authorization under Section 2835 of the Fish and Game Code (Natural Community Conservation Program). Coordinated with the U.S. Fish and Wildlife Service Habitat Conservation Program staff to ensure HCP conformity with the Federal Endangered Species Act and the California Fish and Game code and other state and federal laws.

9/97-1/00: Fish and Wildlife Biologist/Botanist-U.S. Fish and Wildlife Service, Branch of Habitat Conservation Planning, Ecological Services, Carlsbad Field Office. Provided technical assistance in developing Habitat Conservation Plans to applicants/jurisdictions seeking take authorization under section 10 of the Endangered Species Act. Coordinated with California Department of Fish and Game Natural Community Conservation Program (NCCP) staff to ensure HCP conformity with the Endangered Species Act and the Fish and Game code.

Evaluated and commented on projects impacting U.S. Army Corps of Engineers' jurisdictional Waters of the United States pursuant to the Fish and Wildlife Coordination Act. Consulted and conferred with other federal agencies under section 7 of the Endangered Species Act (Act) to analyze effects of federal actions on species proposed for listing or listed as endangered, threatened under the Act.

Provided technical expertise to Field Office staff in evaluation of revegetation, restoration and enhancement projects of upland, riparian, and wetland habitats. Provided general botanical expertise to Field Office staff biologists when needed.

7/96-9/97: Botanist-U.S. Fish and Wildlife Service-Branch of Federal Projects, Ecological Services, Carlsbad Field Office. Conducted complete biological surveys for plants and wildlife for impact assessments of proposed land and water development projects. Prepared biological technical reports, including analyses of project alternatives developed from the results of directed sensitive species and community surveys. Developed sampling protocols for vegetation communities; provided botanical expertise to staff biologists and made recommendations for resource protection and enhancement. Surveyed for, and monitored the status of, federal candidate, proposed, and listed plant and animal taxa. Assisted in amphibian and reptile pit-fall trapping survey efforts. Provided technical expertise to Field Office staff biologists for evaluation of revegetation, restoration and enhancement efforts of upland, riparian, and wetland habitats.

11/95-7/96: Biologist/Project Manager, U.S. Army Corps of Engineers, Regulatory Branch, San Diego Field Office. Project management, including evaluation of impacts to jurisdictional Waters of the United States, including wetlands, associated with permit requests pursuant to section 404 of the Clean Water Act, section 10 of the Rivers and Harbors Act, and section 103 of the Marine Sanctuaries Act. Processed permit applications, composed letters to applicants, evaluated compliance with permit conditions and coordinated with other agencies regarding proposed permit activities affecting biological, historical and water resources.

3/95-10/97: Botanist (Seasonal), Lake Cuyamaca Recreation and Park District, Julian, California. Project Manager of the Lake Cuyamaca downingia, Lake Cuyamaca larkspur, and Parish's meadowfoam monitoring program. Developed sampling and monitoring protocols for sensitive plant species. Coordinated rare plant monitoring activities in accordance with interagency Memorandum of Understanding guidelines, including mapping of rare plant populations using Geographic Information System (GIS) technology to assess annual boundary changes of plant subpopulations; prepared annual biological technical reports. Supervised and trained field personnel in established survey methodology; ensured thorough documentation of survey and monitoring activities through complete field notes.

KAMARUL MURI
Biologist/Environmental Specialist

EDUCATION

B.S., Ecology Behavior and Evolution, University of California, San Diego (2001)

REGISTRATION/CERTIFICATIONS

US Fish and Wildlife Service Quino checkerspot 10(a) Permit # TE051250-0; issued 3/04/2002, expires 03/03/2006
California Department of Fish and Game Rare, Threatened and Endangered Plant Voucher Collecting Permit # 05077; issued 3/10/2003, expires 3/10/2006.

EXPERIENCE

Mr. Muri has more than two years experience as a consultant and field biologist through involvement in a wide array of projects in San Diego, Riverside, Orange, Los Angeles and San Bernardino counties. Project experience includes biological resource surveys; data collection and analysis; California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) documentation; environmental assessments; wetlands permitting, mitigation design and monitoring; and endangered species surveys. Projects include issues relative to the California Coastal Act, the California Fish and Game Code, the federal Clean Water Act (Sections 401 and 404), the Rivers and Harbors Act, the Coastal Zone Management Act, the Migratory Bird Treaty Act, federal Endangered Species Act (fESA) and state Endangered Species Act (sESA). Mr. Muri currently holds a federal permit to conduct surveys for the federally-listed endangered adult Quino checkerspot butterfly and is working towards obtaining a permit to conduct surveys for the federally-listed threatened coastal California gnatcatcher.

Rancho Santa Fe Road Realignment and Bridge Construction Project, City of Carlsbad, California. Conducting biological monitoring of construction and ensuring compliance with resource permits during construction of the project. Resource permits issued for the project involve the federally-listed threatened coastal California gnatcatcher and wetlands regulated by the California Department of Fish and Game, the U.S. Army Corps of Engineers and the California Regional Water Quality Control Board. Also assisted with breeding season surveys to monitor nesting activity of gnatcatcher pairs located adjacent to the project.

Oceanside to Escondido Bikeway Project, North County Transit District. Cities of Vista and San Marcos, California. Monitored the removal of wetlands vegetation associated with construction activities for the project.

Salt Creek Channel Widening Project, Riverside County Flood Control and Water Conservation District, Riverside County, California. Conducted surveys of an existing smooth tarplant population to identify areas most suitable for translocation in support of a channel widening project. Helped to prepare specifications for the translocation effort and coordinated seed collection.

Perris Valley Lateral 'B' Stage 2 Project, Riverside County Flood Control and Water Conservation District, Riverside County, California. Conducted biological resource mapping, a delineation of jurisdictional wetlands and prepared a biological resources technical report in support of the channel widening project. Project impacts to jurisdictional areas were processed with a joint permit application for compliance with Section 1600 of the California Fish and Game Code, Sections 401and 404 of the federal Clean Water Act (CWA). Compliance with Section 404 of the federal CWA was achieved through the use of several Nationwide Permits for project-related improvements to roads and utilities.

Non-potable Water Distribution System Project, Yucaipa Valley Water District, Riverside and San Bernardino Counties, California. Conducted vegetation mapping and a jurisdictional wetlands delineation within a six-mile study area along San Timoteo Creek and evaluated impacts to undeveloped areas over approximately 200,000 linear feet of proposed non-potable water pipeline. Documents prepared in support of the project include a biological resources technical report and wetlands permit applications. Provided assistance in preparing the Draft Environmental Impact Report/ Environmental Impact Statement in accordance with the California Environmental Policy Act and the National Environmental Protection Act. Used aerial photographs to estimate historical vegetation density within San Timoteo Creek over a 42-year period to support the design of a Habitat Monitoring Program based on adaptive management principles.

San Diego Pipeline No. 6, Metropolitan Water District of Southern California, Riverside County, California. The project consists of a 30-mile nine-foot diameter water conveyance pipeline. Mr. Muri provided assistance in conducting habitat assessments for sensitive and federally-listed wildlife species.

Bark Beetle Tree Removal Project, Southern California Edison, San Bernardino, San Gabriel, and Santa Rosa Mountains, California. Conducting wildlife surveys, botanical surveys, habitat assessments and surveys for sensitive and U.S. Forest Service Threatened, Endangered, and Sensitive species throughout the San Bernardino, San Gabriel and Santa Rosa Mountains along Southern California Edison power line routes. The surveys are supporting implementation of a Bark Beetle tree removal project along existing power lines within Riverside and San Bernardino County.

Southern California Edison Utility Pole Maintenance Project. San Bernardino and San Gabriel Mountains, California. Monitored pole maintenance activities in biologically sensitive areas to ensure avoidance of impacts to potentially-occurring sensitive and U.S. Forest Service Threatened, Endangered and Sensitive species.

Cathedral High School Project, Catholic Diocese of San Diego, City of San Diego, California. Processed wetlands permitting package for the high school project to obtain authorization for impacts to jurisdictional waters under Section 401/404 of the federal Clean Water Act and Section 1603 of the California Fish and Game Code. Also responsible for monitoring construction and ensuring compliance with resource permits during construction of the project.

Beach Street Project, Taylor Woodrow Homes, City of Encinitas, California. Project manager for an 8.3-acre single- and multi-family residential development project on Requeza Street in the City of Encinitas. Conducted biological surveys and prepared a biological resources technical report to support environmental processing of the project pursuant to CEQA. Other tasks managed as part of the project included gaining approval from the City and the California Department of Fish and Game for encroachment into the 50-foot wetlands buffer required according to City guidelines, preparing an application for a Section 1603 Streambed Alteration Agreement to authorize habitat enhancement activities within wetlands onsite, and coordinating the completion of pre-construction nesting bird surveys.

El Apajo Estates Development Project Sensitive Amphibian Surveys. Rancho Santa Fe, California. Assisted with nocturnal relocation surveys for sensitive toad species on the 40-acre El Apajo development property located along the San Dieguito River in Rancho Santa Fe.

Mediterranean Village Residential Development, City of San Diego, California. Provided biological resource mapping, wetlands delineation, and impact analysis pursuant to CEQA.

Trabuco Canyon Private Residence Project, County of Orange, California. Conducted general biological reconnaissance surveys and focused surveys for California gnatcatcher within an undeveloped property near Trabuco Canyon in southern Orange County. Preparing a biological resources technical report to support development permit application.

Costa Del Sol Project, Barratt American, City of San Diego, California. Monitoring construction activities adjacent to sensitive native habitats to be preserved within the Multiple Habitat Planning Area of the City of San Diego's Multiple Species Conservation Program.

White Horse Estates Project, Barratt American, City of San Diego, California. Monitoring construction activities adjacent to sensitive native habitats to be preserved within the Multiple Habitat Planning Area of the City of San Diego's Multiple Species Conservation Program.

Newhall Ranch Rare Plant Surveys, Newhall Ranch and Farming Company, Los Angeles and Ventura Counties, California. Conducted focused surveys for the state-listed endangered San Fernando Valley spineflower and other sensitive plants on approximately 6,000 acres in 2002 and 14,500 acres in 2003. In addition, collected San Fernando Valley spineflower seed from nine occurrences on Newhall Ranch.

Western Riverside County Multiple Species and Habitat Conservation Plan, County of Riverside, Calfornia. Assisted in the document research and preparation of species accounts for endangered, threatened, sensitive and other key species in the County of Riverside.

RELEVANT EXPERIENCE

Attended San Diego Natural History Museum class "Sensitive Butterflies of San Diego County" in December, 2003. The class specialized in the biology and identification of the nine most sensitive butterfly species in San Diego County.

Attended Association of Environmental Professionals "CEQA Basics" seminar in November, 2003.

Attended Building Industry Association seminar on Storm Water Sampling and Analysis Strategy in March, 2003.

CHRISTOPHER E. OESCH
Habitat Restoration Specialist

EDUCATION

M.S., Environmental Systems; International Development Technology Humboldt State University Arcata, California (2003)
B.A., International Agriculture, Eastern Mennonite University (1998)

THESIS WORK

Mr. Oesch's thesis work focused on Hardscape Stream Channel Naturalization. The thesis examines modification of cement channelized stream sections, commonly found in urban settings, for mitigating their negative impacts to native plant and animal populations. This is achieved by incorporating aspects of natural stream hydrology and morphology into an existing hardscape channel. This approach is intended for improving habitat in existing hardscape channels when total removal of the hardscape structure is not an option. The thesis was modeled for the hardscape channel west of I-5 on Rose Creek, San Diego, California.

EXPERIENCE

Upon completing his Bachelors degree in International Agriculture, Mr. Oesch worked on sustainable agriculture restoration and development projects in Guatemala and Honduras. He has recently completed graduate research in hardscape urban wetland restoration modeled for Rose Creek in San Diego, California. He is currently working on a variety of habitat restoration projects at DUDEK involving freshwater marsh, salt marsh, riparian, urbanized/disturbed, chaparral, stream channel, and coastal sage scrub habitats.

Lake Val Sereno/ La Jolla Crossroads Off-Site Mitigation, Encinitas, California.
Mr. Oesch is the project monitor for the La Jolla Crossroads off-site mitigation located at Lake Val Sereno. This project involves the enhancement of 5.37 acres of freshwater wetland to fulfill the requirements of agency permits ACOE NWP-12, CDFG 1601 agreement and RWQCB 401 certification. His duties include advising on the removal of exotic and invasive plant species, documenting progress of planted native plants, collecting quantitative transect data, and recommending courses of action to improve site success in meeting performance standards.

Famosa Slough Saltmarsh/ Sorrento Creek Dredging Mitigation, San Diego, California. Mr. Oesch is the conceptual plan author for a .5 acre enhancement area of saltmarsh. This enhancement is to fulfill mitigation requirements from the Sorrento Creek Maintenance Dredging performed by City of San Diego, Engineering and Capital Projects Department. This project is designed to fulfill the criteria of permits CDFG 1601 and ACOE 404. The enhancement area will include middle and lower saltmarsh plant species, bordered by a coastal sage scrub habitat buffer strip.

Poggi Creek Streambed Modification, Chula Vista, California. Mr. Oesch is the conceptual plan designer for a streambed erosion control project. This grade control structure design uses a low-profile, biodegradable approach to avoid being classified as "channel fill". The intended purpose is to prevent streambed scour, encourage sediment deposition, and promote native freshwater plant species establishment.

Torrey Hills Basin Wetland Mitigation, San Diego, California. Mr. Oesch is project monitor for site involving the creation of approximately 3 acres of wetland habitat to mitigate for impacts of the adjacent Torrey Hills housing development. His duties include advising on the removal of exotic and invasive plant species, documenting progress of planted native plants, collecting quantitative transect data, and recommending courses of action to troubleshoot hydrologic adversities in the performance of the basin's morphology.

Meadowbrook Villages Development Wetland Mitigation Project, Escondido, California. Mr. Oesch assisted in design of the stormwater detention/ wetland creation basin for a retirement development. The basin created opportunity for onsite wetland mitigation as well as provided increased stormflow storage capacity along Reidy Creek to prevent flooding. He also assisted in preliminary soil sampling and biotic surveying.

Las Virginas Creek Hardscape Naturalization Proposal, Los Angeles, California. Mr. Oesch assisted in a proposal for the naturalization of a section of concrete hardscape channel along Los Virginas Creek (see thesis work). Goals of the naturalization would be to create sediment deposition sufficient to grow wetland plant species, add topography to the channel bottom and sides which would encourage a more natural hydrologic regime, and to achieve these goals while passing floodwater efficiently as to not promote flooding.

Vista Sorrento Parkway Alkali Marsh Mitigation Project, San Diego, California. Mr. Oesch is the biological monitor for the project. This includes collecting transect data, recommendations on weed removal and native plant mortality. The project entails creation/enhancement of 1 acre of coastal sage scrub, mulefat scrub, and salt marsh habitats as mitigation for impacts from the Caltrans ROW project.

Los Penasquitos Lagoon Saltmarsh Mitigation Project, San Diego, California.
Mr. Oesch assisted in the monitoring of native saltmarsh and coastal sage scrub habitat including transect data collection, advisement on remedial plantings, and non-native plant removal.

Rolling Hills Ranch Wetland Mitigation Project, Chula Vista, California. Mr. Oesch assisted in annual monitoring efforts and transect data collection for 2 acres of created wetland habitat. This creation area was in mitigation for the surrounding Rolling Hills Ranch housing development.

Green Valley Mobile Home Park Slope Stabilization Project, Vista, California. Mr. Oesch is project monitor for stream-side mitigation project which includes freshwater marsh, riparian and disturbed habitats. This project is designed to fulfill requirements of CDFG 1603 and ACOE 404 permits. Mitigation was triggered when the mobile home park owners placed riprap along the stream banks covering freshwater marsh habitat and disturbing hydrology. His monitor duties include recommendations on weed removal, native plantings and general maintenance.

Summit Ridge Business Park Mitigation Project, San Diego, California. Mr. Oesch is the biological monitor for 10 acres of coastal sage scrub, with a 1 acre freshwater marsh component. This project is mitigation for the development of the Summit Ridge Business Park. His monitoring duties include biotic surveys, transect data collection, weed removal recommendations, and native planted species survival.

Newhall Ranch *Chorizanthe* seed collection, Santa Clarita, California. Mr. Oesch participated with a team of biologists collecting seed of the rare and endangered *Chorizanthe perryi fernadina* (spineflower). Polygons of spineflower locations were GPSed and mapped. Teams then returned to collect seed.

Rose Creek/ Nature School Habitat Enhancement Plan, San Diego, California. Mr. Oesch mapped 13 acres of the Rose Creek riparian corridor directly east I-5. Plants, and habitat locations were GPSed and a biotic survey was taken.

Agricultural Support/ Development Project, El Peten, Guatemala. Mr. Oesch coordinated an agricultural support and development project for several Mayan Indigenous communities in the Peten region of Guatemala. This involved working with government officials for importation of agricultural supplies from Belize, traveling between site locations and exploring possibilities for reestablishing crops. The project was necessitated by crops lost to fire and drought.

Carroll Canyon Emergency Maintenance Sewer Project, San Diego, California. Mr. Oesch assisted in designating access routes around sensitive habitat for Metropolitan Wastewater vehicles to gain access to sewer clean-out locations.

Sorrento Valley Utilities Revegetation, San Diego County, California. Mr. Oesch monitored work crews in the removal of non-native plant species in biologically sensitive saltmarsh, freshwater marsh, and coastal sage scrub habitats.

Sorrento Creek Maintenance Dredging Project, San Diego, California. Mr. Oesch monitored City of San Diego work crews in removal of sediment from the channel bottoms of Carroll Canyon, Los Penasquitos, and Sorrento creeks. Monitoring was to insure the least possible impacts to surrounding vegetation, aquatic and terrestrial animal habitats. The project site contained potential Clapper rail (*Rallus longirostris*) habitat, which required flushing prior to beginning work in the channel areas. His duties also included, water samples taken daily and tested for total suspended solids (TSS) to ensure that discharge downstream of the project met TSS level requirements.

Tecolote Canyon Tree-of-Heaven Removal Project, San Diego, California. Mr. Oesch monitored work crews in removal of tree-of-heaven (*Ailanthus altissima*) and other exotics from a section of Tecolote Canyon. His monitoring duties included advisement of routes of least impact to surrounding native habitats, felling trees, and cut biomass dispersal.

KATHERINE RINDLAUB
Biologist

EDUCATION

B.A. Biology, Environmental Biology, Ecology and Evolution, University of California, Santa Barbara (1980)
M.A. Botany (In progress), Ecology and Evolution, University of California, Santa Barbara.

PROFESSIONAL AFFILIATIONS

Member, California Botanical Society
Member, California Invasive Plant Council
Member, Society for Ecological Restoration
Member, California Native Plant Society
Member, Sigma Xi
Member, Southern California Botanists

EXPERIENCE

Ms. Rindlaub is a biologist with more than 15 years experience in preparation of biological assessments, project supervision, compliance monitoring and evaluation, rare plant surveys, vegetation mapping, and habitat restoration. As a revegetation specialist, she oversaw and evaluated the status and effectiveness of habitat restoration programs for the County of Santa Barbara for more than ten years, emphasizing oak woodland restoration. She designed and conducted a 5-year monitoring program for a listed rare plant, followed by preparation of a management plan for a preserve deeded to the California Department of Fish and Game to conserve the same species. She has performed wetland delineations, designed, implemented, and monitored riparian restoration plans. Preparation of biological resource assessments has included development of mitigation measures.

Biological Resources Assessment, 16 Key Sites in Orcutt, Santa Barbara County, California.

Wetlands Delineation, Orcutt Key Site 22, Santa Barbara County, California.

Biological Resources Assessment, Las Positas Storm Drain, City of Santa Barbara, California.

Biological Resources Assessment, Texaco Pipeline Abandonment, Santa Barbara County, California.

Biological Resources Assessment, Harvest Gas Plant Abandonment, Santa Barbara County, California.

Rare Plant Surveys, Newhall Ranch, 2000, Los Angeles County, California.

Las Virgenes Municipal Water District, Los Angeles County, California. Conducted rare plant surveys, mapped vegetation, and evaluated downstream effects on several sites under consideration for reservoirs.

Tajiguas Landfill Expansion Alternatives, County of Santa Barbara. Botanical Resources Constraints Assessment.

Santa Barbara Shores County Park. Cleanup of contaminated soils dating from 1930s oil and gas development. .

Orcutt Community Plan, County of Santa Barbara Planning and Development Department. Prepared biological resources assessment for 16 'Key Sites'.

Las Positas Valley/Northside Pre-Annexation Study, City of Santa Barbara Community Development Department. Prepared biological resources assessment for lands west of city limits.

Pt. Sal Biological Resources Evaluation. Santa Barbara Land Trust, Santa Barbara County. Mapped vegetation and rare plant populations.

Rice Ranch, Orcutt Key Site 12, County of Santa Barbara. Evaluated weaknesses in development plan for effective mitigation measure proposals that included seed mixtures, setbacks, and restoration areas. Located additional wetland areas, assisted in red-legged frog habitat evaluation.

San Marcos Golf Course Habitat Restoration Program. Monitor and evaluate progress of riparian and oak woodland habitat restoration program.

Devereux Creek Restoration, Santa Barbara Shores County Park. Monitor effectiveness and progress toward achievement of restoration goals.

Atascadero Creek Habitat Creation and Restoration Mitigation Plan for County of Santa Barbara Flood Control District. Prepared planting plan, Monitored implementation of restoration plantings, maintenance contractor.

Exxon Santa Ynez Unit, Las Flores Canyon Habitat Restoration Program Evaluation for County of Santa Barbara. Monitor and evaluate effectiveness and progress toward achievement of restoration goals. Oak woodland, riparian, coastal sage scrub, and native grassland restoration.

Pt. Pedernales Pipeline Habitat Restoration Program Evaluation for County of Santa Barbara. Monitor and evaluate effectiveness and progress toward achievement of restoration goals by sampling habitats. Evaluation of oak replacement mitigation plan revision. Oak woodland, Bishop pine forest, and coastal sage scrub.

Pt. Arguello Pipeline Habitat Restoration Program Evaluation for County of Santa Barbara. Monitor progress toward achievement of restoration goals by sampling habitats. Oak woodland, riparian, and coastal sage scrub.

Las Positas Sewer Relocation, City of Santa Barbara, California. Provided and joined construction monitoring team to document implementation of mitigation measures for protection of Endangered Tidewater Goby and riparian habitats.

Level (3) Fiber Optics Cable Directional Drilling, for County of Santa Barbara, California. Supervised monitoring team on directional drilling sites for protection of Tidewater Goby, Red-legged Frog, Southwestern Pond Turtle, Gaviota tarplant, and wetlands.

Las Positas Park Storm Drain, City of Santa Barbara, California. Provided monitoring services during construction to document implementation of mitigation measures for special status species protection and wetland habitat loss.

Cachuma Lake Gabion Wall Construction for Department of Parks and Recreation, County of Santa Barbara. Evaluated impacts, planned and monitored implementation of habitat protection and restoration measures.

All American Pipeline Coastal Segment, Santa Barbara County, California. Monitored implementation of mitigation measures during construction in oak woodland and sensitive plant habitats.

All American Pipeline Company, Santa Barbara County, California. Gaviota Tarplant Mitigation Plan.

Molino Gas Project, Santa Barbara County, California. Gaviota Tarplant Mitigation Plan.

Texaco Pipeline Abandonment, Santa Barbara County, California. Red-legged frog, Tidewater goby, and others.

Pillar Point Air Force Station Management Plan, for Vandenberg AFB. Vegetation and habitat characterization and rare plant surveys on coastal Monterey County site.

Santa Rosa Island, Channel Islands National Park. Focused surveys to determine status, location, and population size of several species of rare plants prior to evaluation for listing.

Newhall Ranch, Los Angeles County, 2000. Focused surveys for San Fernando Valley Spineflower, Newhall Ranch, 2000. Organized, hired, and supervised survey team, and participated in surveys of all areas proposed for development.

Cajon Pipeline Project, Adelanto to Riverside, California. Surveys for rare plants and vegetation mapping.

California Jewelflower, Los Padres National Forest. Focused surveys of historic and potential sites.

Coastal Aqueduct, Devils Den to Avila Beach, California State Water Resources. Rare plant surveys in San Luis Obispo County. Included focused surveys for Hoover's eriastrum and other species located during pipeline route alternative walkovers.

Molino Gas Project, Santa Barbara County, California. Focused surveys for endangered Gaviota Tarplant.

Channel Islands State College Campus, Los Angeles County, California. Focused surveys for *Dudleya verityi, D. blochmaniae*, *Eriogonum crocatum*, and others.

Smith Quarry Expansion, Los Angeles County, California. Surveys for *Dudleya* species, *Eriogonum crocatum*, and others.

PAUL WALSH
Habitat Restoration Specialist/Landscape Architect

EDUCATION

B.S. Landscape Architecture, Cal Poly, San Luis Obispo, CA (1992)
A.A. Horticulture, Orange Coast College, Costa Mesa, CA (1988)

REGISTRATION/CERTIFICATIONS

Registered Landscape Architect #4446 (expires 7/31/05)

PROFESSIONAL AFFILIATIONS

Member, Society for Ecological Restoration
Member, California Native Plant Society
Member, California Invasive Plant Council

EXPERIENCE

Mr. Walsh is a registered landscape architect with specialized expertise in preparing construction documents, performing installation monitoring, and habitat restoration. He has specialized skills using portable global positioning system (GPS) equipment to map existing conditions and create as-built plans. He is experienced in performing site and biological inventories and preparing corresponding maps and reports for use in project design and planning. Mr. Walsh prepares project installation summary reports, wetland delineation reports and conceptual wetland mitigation plans on a regular basis. He has a strong horticultural background including familiarity with ornamental plants as well as California native plants. He is also adept at identifying weed species and control/eradication methods.

Oceanside to Escondido Sprinter Rail Project, North San Diego County Transit District, San Diego, California. Mr. Walsh prepared revegetation plans and specifications in CSI format for onsite and offsite wetlands mitigation. Revegetation plans were prepared for two offsite locations and onsite revegetation. The revegetation plans included wetland creation, enhancement, and restoration of over 30 acres of wetlands in northern San Diego County. The plans were prepared in accordance with the resource agency permits and the conceptual wetland mitigation and monitoring plan. Plans were posted on the project website as work progressed for review by NCTD and project engineers.

Lowe's Santee, Lowe's Home Improvement Warehouse, Santee, California.
Mr. Walsh located suitable mitigation acreage along the San Diego River and helped prepare the conceptual wetlands mitigation and monitoring plan for this project. Following preparation and approval of the conceptual plan by the resource agencies Mr.

Walsh prepared revegetation construction plans that included schematic grading plans, habitat enhancement, planting, seeding, and recycled water irrigation plans. Specifications wee prepared in CSI format for this project.

Lower Rosan-Arroyo Trabuco Revegetation Project, City of San Juan Capistrano Redevelopment Agency, City of Capistrano, California. As Mitigation for an offsite wetlands impact incurred by the City of San Juan Capistrano, Mr. Walsh prepared revegetation plans for a section of Arroyo Trabuco Creek located in the City of San Juan Capistrano. The mitigation area encompassed 9.72 acres and included the removal of several highly invasive plant species and restoring the area to native wetland habitat. Mr. Walsh prepared weed eradication/invasive removal plans, native planting and seeding plans and designed a temporary above-grade irrigation system. The site was recently documented by the California Department of Fish and Game to have Steelhead present which is the first time in recent history that this species has been documented in this area. Mr. Walsh currently oversees long-term biological monitoring and maintenance of the site.

Los Penasquitos Lagoon Salt Marsh Remedial Revegetation Plans, City of San Diego Metropolitan Wastewater Department, San Diego, California. Mr. Walsh and Mr. Sweesy were contacted by MWWD to review a 2.4 acre salt marsh mitigation site that was not meeting the agency required success criteria. The site had been designed and installed by others three years prior. Upon review and analysis of the site Mr. Walsh prepared a summary report detailing the reasons why the project was not performing adequately. Mr. Walsh subsequently prepared remedial revegetation construction plans which included a site grading plan, soil amending, site preparation plan and planting plan. Mr. Walsh monitored the remedial grading and installation work in 2003 and currently performs long-term biological monitoring.

El Apajo Estates Mitigation Plans, A.T. L.L.C., County of San Diego, California. Mr. Walsh worked closely with Dudek biologists to develop wetland mitigation plans for this project which included designing spawning ponds for spadefoot toads and locating protective exclusionary walls to keep the toads from entering into developed areas and streets. Mr. Walsh prepared schematic grading plans for the wetland creation area. The project engineers performed hydrological analyses and finalized the grading plans. Once the grading plans were completed and approved Mr. Walsh prepared the wetland enhancement and creation area construction plans and specifications. Mr. Walsh monitored exotics removal and habitat enhancement work in spring 2004.

Soledad Business Park Bank Protection Project, Newhall Land and Farming Company, Santa Clarita, California. Mr. Walsh mapped the site using GPS technology and the California Native Plant Society's (CNPS) Rapid Vegetation Assessment protocol. Following mapping, inventory and assessment Mr. Walsh prepared a conceptual habitat restoration plan for the project. The project is located within the Santa Clara River floodplain and includes restoring mule fat scrub, cottonwood woodland, and big sagebrush scrub habitats following bank stabilization work. The conceptual plan detailed restoration methods including plant salvaging, topsoil salvaging, seed and cutting collection, weed abatement, soil imprinting, maintenance, monitoring and several other aspects of habitat restoration.

Parkside Development Project, County of Riverside, California. Mr. Walsh prepared wetland mitigation-revegetation construction plans and specifications for this residential development project located in Riverside County, CA. Revegetation plans included creation and enhancement of 2.75 acres of southern willow scrub and oak riparian forest habitat. The wetlands mitigation was located within the overall project footprint and incorporated into the residential development as an aesthetic feature thereby increasing the value of the property and retaining habitat for local flora and fauna.

Torrey Ranch Project, Torrey Ranch II/Garden Communities, L.L.C., City of San Diego, California. Mr. Walsh prepared revegetation construction plans to restore 2.4 acres of coastal sage scrub located within the City of San Diego's Multiple Habitat Planning Area (MHPA). Part of the MHPA restoration area lies within the development's fuel modification zone which required designing a specialized native plant palette. Mr. Walsh also prepared wetland mitigation plans for this project which are located onsite and outside the MHPA area. The wetlands mitigation plans created 0.7 acres of southern willow scrub and includes a coastal sage scrub buffer zone.

Torrey Del Mar Project, D.R. Horton, City of San Diego, California. Mr. Walsh developed habitat restoration construction plans and specifications for this project in accordance with the resource agency permits, the conceptual wetlands mitigation and monitoring plan, and the City of San Diego's MMRP. Habitat restoration plans included the creation and enhancement of southern willow scrub and mule fat scrub habitat along an existing creek that is tributary to McGonigle Canyon Creek. The wetlands design included a coastal sage scrub buffer zone immediately adjacent to the wetlands mitigation area. The upland buffer was seed imprinted and non-irrigated. The overall mitigation area encompasses approximately 5.0 acres. Mr. Walsh currently oversees long-term monitoring and maintenance of the site. The project is progressing very well at this time including the non-irrigated coastal sage scrub buffer zone.

Student Housing Project, California State University at San Marcos, City of San Marcos, California. Mr. Walsh located an area on CSUSM property to mitigate for impacts associated with the development of CSUSM's Student Housing Project. Once the mitigation site was approved by the resource agencies Mr. Walsh worked closely with the project engineers to develop a wetlands creation area grading plan that would create the appropriate wetland hydrology. Calculations of the local watershed area indicated that proposed site could sustain approximately 2.4 acres of wetlands if properly graded. Geotechnical studies and soil analysis were performed in the proposed creation area as significant excavation would be necessary. Once the research and grading plans were complete Mr. Walsh prepared revegetation construction plans and monitored the installation which was completed in 2004. Mr. Walsh currently performs long-term biological and maintenance monitoring and prepares corresponding reports.

LJC Val Sereno Offsite Wetlands Mitigation Project, La Jolla Crossroads L.L.C./Garden Communities, City of Encinitas, California. Mr. Walsh prepared the conceptual wetlands mitigation and monitoring plan for this project that enhanced 5.2 acres of wetlands located within the Escondido Creek watershed. Once the conceptual plan was approved and resource agency permits obtained, Mr. Walsh prepared revegetation construction plans and specifications for the project. Mr. Walsh also coordinated with the City of Encinitas and performed public outreach tasks informing neighbors and home owner's associations of the creek enhancement project and anticipated scheduling.

Brookview Interfaith Housing Corporation, Brookview Senior Housing Wetlands Mitigation Project, City of Poway, California. Mr. Walsh prepared habitat restoration plans for this project in order to offset impacts associated with the development of the residential housing complex. Wetlands mitigation was performed onsite by incorporating the creek into the project design. The creek was realigned and included meanders and variable slopes to retain a natural feel. The creek is concrete lined immediately upstream which required lining the restoration site with articulated concrete block (Armorflex) due to the relatively high volume and velocity of the water entering the site. Mr. Walsh worked with the project civil engineers to design habitat restoration plans that would develop and sustain the required wetland habitat while safely conducting water during peak storm flows. The project has been a success and is heavily vegetated with native riparian species. It is anticipated that this project will meet the success criteria early.

Oceanside to Escondido Sprinter Rail Project, North County Transit District (NCTD), San Diego, California. Mr. Walsh performed vegetation mapping and a protocol wetland delineation for this 22 mile long railway project. Once the habitat impacts from the railroad / light-rail transit line were calculated, Mr. Walsh assisted NCTD in the selection of on-site and off-site wetland mitigation areas.

Mr. Walsh reviewed the civil engineer's plans and specifications for compliance with the wetland resource agencies conditions, restrictions, and CEQA biological documentation. Currently, Mr. Walsh is coordinating the design of on-site and offsite wetland mitigation areas with the project civil engineers.

Mr. Walsh performed vegetation mapping, sensitive plant surveys, and quino checkerspot butterfly (Euphydryas editha quino) focused habitat assessment surveys for the following projects:

- Quail Hills, San Marcos, California
- Otay Ranch, Otay, California
- University Commons, Carlsbad, California
- SPA 1, Chula Vista, California

Mr. Walsh also assisted senior DUDEK botanists in conducting endangered and narrow endemic plant surveys.

Moreno Lakeside Pipeline Project, County Water Authority (CWA), San Diego, California. Mr. Walsh performed a wetland delineation and waters of the U.S. analysis along the proposed pipeline alignment. All wetlands and waters of the U.S. under the jurisdiction of the Army Corps of Engineers and California Department of Fish and Game were identified and mapped using a portable GPS unit and topographic maps. Once the field work portion of the delineation was complete, the data were downloaded to a GIS work station and a wetland delineation coverage created. The proposed pipeline alignment, topography, vegetation, and wetland delineation coverages were combined and impacts to wetlands/waters analyzed and quantified by Dudek GIS personnel. Following the data analysis, Mr. Walsh prepared a wetland delineation summary report with delineation maps, graphics, and impact tables for submittal to the CWA and resource agencies. Mr. Walsh is currently performing environmental monitoring during the installation of this project.

Sun Vista Park, City of Encinitas, City of Encinitas, California. Mr. Walsh mapped the existing habitats on-site utilizing a portable GPS unit. Following vegetation mapping and species inventory, Mr. Walsh performed a wetland delineation following the Army Corps of Engineer's 1987 Wetland Delineation Manual protocol. Upon completion of the field work, Mr. Walsh prepared a habitat assessment and wetland delineation summary report that quantified wetland and vegetation resources present on the site. The report was submitted to the City to help them determine the feasibility of the site for development, and for use during the design phase to avoid impacts to natural resources.

CATHLEEN M. WEIGAND
Botanist / Biologist

EDUCATION

Humboldt State University
B.S., Botany and Biology, 2000

PROFESSIONAL CERTIFICATIONS/ REGISTRATION

Certified Wetland Delineator (#2133) - Army Corps of Engineers Wetland Delineation & Management Training Program - 2002
U.S.F.S. Wildland Firefighter Red Card Certified - 1999
California Department of Fish and Game Rare, Threatened and Endangered Plant Voucher Collecting Permit (#05005)
New Dawn Center (Finca Alba Nueva), San Isidro, Costa Rica
Senior Thesis Study, 1997

PROFESSIONAL AFFILIATIONS

California Native Plant Society
Southern California Botanists

EXPERIENCE

Cathleen Weigand is a botanist/biologist with over four years experience in field studies, environmental document preparation, habitat restoration and conservation, vegetation resource mapping, and biological assessments. Project experience includes biological resource surveys, data collection and analysis, environmental assessments, wetlands delineations, permitting, mitigation design, implementation and monitoring, and endangered and sensitive plant species surveys. Projects include issues relative to the California Coastal Act, the California Department of Fish and Game Code (Sections 1601 and 1603), and the federal Clean Water Act (Sections 401 and 404). Ms. Weigand has engaged in interagency coordination and public outreach efforts due to the complexities of each project.

Ms. Weigand's current role at Dudek & Associates includes biological resources assessment and impact analysis, preparation of biological reports, vegetation mapping, endangered and sensitive plant species surveys, wetlands delineations and permitting, permit preparation for projects located within the coastal zone in southern California, preparation of Conceptual Mitigation and Monitoring Plans, tree inventory studies, and habitat restoration and monitoring.

Focused Botanical Surveys. Newhall Ranch, Los Angeles County, California. Conducted rare plant surveys for the state-listed endangered San Fernando spineflower (*Chorizanthe parryi* var. *fernandina*) and other sensitive plants on approximately 6,000 acres in 2002 and 14,500 acres in 2003.

El Fuerte project, Carlsbad, California. Conducted rare plant surveys for Carlsbad Habitat Management Plan (HMP) listed, federal- and state-listed species on approximately 4 acres in 2003.

Ramblas de las Flores project, Rancho Santa Fe, California. Conducted rare plant surveys for federal- and state-listed species on approximately 47 acres in 2003.

Fanita Ranch project, Santee, California. Conducted rare plant surveys for federal- and state-listed species on approximately 2,592 acres in 2003.

Schindler and Johansen projects, Temecula, California. Conducted rare plant surveys for federal- and state-listed species on approximately 20 acres in 2003.

Metropolitan Water District of Southern California - San Diego Pipeline No. 6, San Diego, California. Conducted rare plant surveys for federal- and state-listed species within project area in 2003. Project consists of a 30 mile 9 foot diameter water conveyance pipeline.

Conservation Planning. Ms. Weigand serves on the Dudek project team preparing the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) which cover approximately 1.2 million acres. Ms. Weigand provides assistance with the adaptive management plan of the reserve system, research on potentially covered plant species, and document preparation.

Regional Resource Planning. Ms. Weigand serves on the Dudek project team preparing the Southern Orange County Natural Communities Conservation Planning (NCCP) effort covering an area of 131,000 acres, five local jurisdictions, and a portion of the Cleveland National Forest. Ms. Weigand provides assistance with resource inventory and evaluation of sensitive plant species habitat.

Utility Pole Maintenance Project. San Bernardino and San Gabriel Mountains, California. Conducted botanical surveys and surveyed for sensitive and U.S. Forest Service Threatened, Endangered, and Sensitive species at pole replacement locations.

Bark Beetle Tree Removal Project. San Bernardino and San Gabriel Mountains, California. Conducted botanical surveys and surveyed for sensitive and U.S. Forest Service Threatened, Endangered, and Sensitive species along Southern California Edison power lines.

Residential Development Projects. Conducted biological surveys, vegetation mapping, wetlands delineations and prepared wetlands permits, and coordinated with resource agencies for public and private development projects within San Diego, Orange, Riverside, and San Bernardino counties.

Sewer Realignment Project. Conducted biological surveys, vegetation mapping, and wetlands delineations for sewer realignment projects within the City of San Diego, California.

California Department of transportation Stormwater BMP Piolet Study and Statewide Wet Basin Projects. Statewide, California. Conducted botanical surveys for the BMP pilot study and wet basins projects to account for potential endangered species issues related to installation of the BMP's in Santa Barbara, San Luis Obispo and Monterey counties.

ADDITIONAL EXPERIENCE

Experience with seed and plant propagation

Greenhouse work (Humboldt State University- volunteer): watering, caring and maintenance of plants, re-potting/propagation, nomenclature of species housed in greenhouse, and preparation of species used for classroom and experimental purposes.

Horticulture and nursery experience: watering, fertilizing, caring and maintenance of plants, propagation (plant cuttings, roots, and seeds), re-potting, installation and design of irrigation systems.
Experience with growth chambers, preparation and implementation of fertilizers and composts, and the irrigation of greenhouses and farm properties.

Riparian and wetland revegetation implementation.

Seed and pollen collection.

Supervising of farm and revegetation crews.

Implementation of farm crops, community and personal gardens using sustainable agricultural practices.

Revegetation and landscape design and implementation, monitoring, maintenance, and data collection.

TRICIA WOTIPKA
Environmental Specialist / Biologist

EDUCATION

B.S., Wildlife and Fisheries Science, Pennsylvania State University (2000) -Dean's Honor List, Fall 1998 - Spring 2000

PROFESSIONAL AFFILIATIONS

Audubon Society, 2000
Member, Women's Environmental Council
Secretary, 2001
Newsletter Chair, 2002
Member, Southern California Botanists

PROFESSIONAL CERTIFICATIONS

CDFG Rare, Threatened, and Endangered Plant Voucher Collection Permit (05078)

EXPERIENCE

Ms. Wotipka has over three years experience in environmental document preparation and resource conservation planning. Project experience includes vegetation mapping, rare plant surveys, general wildlife surveys, biological resource surveys, data collection and analysis, environmental assessments, wetlands delineations, permitting, mitigation design and monitoring, and endangered species surveys. Projects include issues relative to the California Fish and Game Code, the federal Clean Water Act (Sections 401 and 404), the National Environmental Policy Act (NEPA), the Migratory Bird Treaty Act, and the Endangered Species Act (ESA). Ms. Wotipka has also trained with the Wetlands Training Institute, Inc. and has successfully completed a course in basic wetlands delineation.

PROFESSIONAL ASSIGNMENTS

Pipeline Relocation along Gird Road, Rainbow Municipal Water District, San Diego County, California. Conducted vegetation mapping and wetlands delineation for this pipeline relocation project, necessitated due to a bridge expansion along Gird Road. Prepared and processed permits from ACOE, CDFG and RWQCB and prepared Addendum to County of San Diego MND. The project involved the addition of relocating a pipeline in this bridge expansion project. Issues discussed include impacts to state and federal jurisdictional wetlands, community character and traffic.

Aliso Creek Emergency Sewer and Park Improvements, Moulton Niguel Water District, County of Orange, California. Conducted vegetation mapping and wetlands delineation for sewer pipeline relocation and trail relocation. Prepared and processed permits from ACOE, RWQCB and CDFG for impacts to non-tidal wetlands along Aliso Creek within the Aliso and Wood Canyons Wilderness Park. Assisted in conducting focused rare plant surveys for the federally-listed threatened and state-listed endangered thread-leaved brodiaea (Brodiaea filifolia). Prepared biological resources technical report in support of a CEQA document and assisted in the preparation of a conceptual wetlands mitigation and monitoring plan for onsite mitigation.

Railway Expansion Project. Sorrento-Miramar Curve Realignment and Second Main Track Project. City of San Diego, California. Conducted vegetation mapping and field surveys for sensitive, state- and federally-listed plant species on approximately 190 acres.

San Marcos Creek Roadway Improvements Project, City of San Marcos, City of San Marcos, California. Prepared a Section 404 and 401 permit application in accordance with the federal Clean Water Act and a 1601 Streambed Alteration Agreement in accordance with California Fish and Game Code.

Sorrento-Miramar Curve Realignment and Second Main Track, North County Transit District, City of San Diego. Conducted a delineation of "waters of the United States" under the jurisdiction of the ACOE, CDFG, and California RWQCB and assisted in conducting rare plant surveys within the project study area, which occupies approximately 180 acres along the linear rail corridor.

Telegraph Canyon Road Widening Project, City of Chula Vista, City of Chula Vista, California. Prepared and processed a Water Quality Certification application pursuant to Section 401 of the federal Clean Water Act and a Streambed Alteration Agreement pursuant to Section 1601 of the California Fish and Game Code.

San Marcos Creek Roadway Improvements and Flood Protection Project, City of San Marcos, City of San Marcos, California. Prepared a Section 404 and 401 permit application in accordance with the federal Clean Water Act and a 1601 Streambed Alteration Agreement in accordance with California Fish and Game Code.

Poway Creek Channel Maintenance Project - City of Poway, California. Provided baseline biological surveys for channel maintenance project consisting of silt removal affecting over three acres of riparian habitat.

Homestead Dam, Commanding General MCAS Miramar, County of San Diego, California. Conducted biological surveys including vegetation mapping, wetlands delineation and focused surveys for willowy monardella. Prepared BA for section 7 consultation between MCAS Miramar and FWS for coastal California gnatcatcher. Project included maintenance activities to an existing dam in accordance with the Dam Safety Maintenance and Repair program, including replacement of outlet pipe, installation of erosion control devices for bank stabilization, removal of woody vegetation from the dam surface and revegetation with non-woody native plants.

Old Mission Dam, City of San Diego Parks and Recreation Division, San Diego, California. Assisted in wetlands delineation and vegetation map upstream of the historic Old Mission Dam.

Salt Creek Channel Stage 6 Channel Widening Project, Riverside County Flood Control and Water Conservation District, County of Riverside, California. Delineated wetlands and prepared vegetation map along the approximately five-mile alignment.

El Cuervo Norte Project, City of San Diego, City of San Diego, California. Conducted a delineation of "waters of the United States" and wetlands under the jurisdiction of the U.S. Army Corps of Engineers, California Department Fish Game, and California Regional Water Quality Control Board for the 24-acre Wetlands Mitigation Site for State Route 56 located within the Los Penasquitos Canyon Preserve along Los Penasquitos Canyon Creek.

Valpreda Footbridge Crossing Project, City of San Marcos, City of San Marcos, California Conducted a delineation of "waters of the United States" and wetlands under the jurisdiction of the U.S. Army Corps of Engineers, California Department Fish Game, and California Regional Water Quality Control Board for the approximately two acre site. The jurisdictional delineation was conducted to determine the biological constraints on the site during the due diligence phase of the project.

La Jolla Crossroads, La Jolla Crossroads, LLC, City of San Diego, California. Prepared and processed wetlands permits from ACOE, RWQCB and CDFG for impacts to non-tidal wetlands for mixed-use, in-fill project. Prepared alternatives analysis and functional values assessment. Evaluated wetlands mitigation sites and prepared conceptual wetlands mitigation and monitoring plan. Prepared CEQA Addendum for CDFG and conducted community outreach meetings for wetlands mitigation site.

Newhall Specific Plan, Newhall Land and Farming, Inc., counties of Los Angeles and Ventura, California. Conducted focused surveys for sensitive plant species, including the state-listed San Fernando Valley spineflower and participated in San Fernando Valley spineflower seed collection.

East Grove, Lyon Homes, Inc., City of Escondido, California. Prepared alternatives analysis, Public Notice and EA for ACOE.

University Commons Development Project, Brookfield Homes, City of San Marcos, California. Performed a delineation of “waters of the United States” and wetlands under the jurisdiction of the U.S. Army Corps of Engineers and California Department of Fish and Game on approximately 400-acres. Prepared and processed a Section 404 and 401 permit application in accordance with the federal Clean Water Act and a 1603 Streambed Alteration Agreement in accordance with California Fish and Game Code. In addition, Dudek conducted focused surveys for least Bell’s vireo, quino checkerspot butterfly, arroyo toad, southwestern willow flycatcher, and California gnatcatcher.

Gateway Vista de Oro Residential Development, Gateway Vista de Oro, L.L.C., City of Vista, California. Conducted a delineation of “waters of the United States” and wetlands under the jurisdiction of the U. S. Army Corps of Engineers (ACOE) and California Department of Fish and Game (CDFG). Obtained a Section 401 permit application in accordance with the federal Clean Water Act and a 1603 Streambed Alteration Agreement in accordance with California Fish and Game Code. Conducted a pre-construction nesting bird survey within the wetlands habitat and coordinated with the client regarding tree removal and mitigation planting installation.

Lowe’s Retail Store, Lowe’s, Inc., City of Santee, California. Conducted biological surveys including vegetation mapping and wetlands delineation. Obtained permits from ACOE, RWQCB and CDFG for impacts to non-tidal wetlands. Conducted informal consultation with FWS for least Bell’s vireo. Prepared alternatives analysis and functional values assessment.

Western Riverside Multiple Species Habitat Conservation Plan (MSHCP), County of Riverside, County of Riverside, California. Research for potentially covered plant species followed by syntheses of ecological information into species accounts.

Newhall Ranch Project, Newhall Land and Farming Company, Los Angeles and Ventura County, California. Conducted focused surveys for the state-listed endangered San Fernando Valley spineflower (Chorizanthe parryi var. Fernandina) and other sensitive plants on approximately 6,000 acres in 2002 and 14,500 acres in 2003. In addition, collected San Fernando Valley spineflower seed from nine occurrences on Newhall Ranch.

PUBLICATIONS

Researched and prepared the introduction of the "Spring Creek Watershed Water Sampling Protocol" for the Clearwater Conservancy, State College, Pennsylvania - Fall 1999.

APPENDIX B

VASCULAR PLANT SPECIES OBSERVED AT NEWHALL RANCH (2002, 2003, 2004)

APPENDIX B
VASCULAR PLANT SPECIES - NEWHALL RANCH

LYCOPODIAE

SELAGINELLACEAE - SPIKE-MOSS FAMILY
Selaginella bigelovii - Bigelow's spike-moss

EQUISETAE

EQUISETACEAE - HORSETAIL FAMILY
Equisetum hyemale – common scouring-rush
Equisetum laevigatum - smooth scouring-rush
Equisetum telmateia - giant horsetail

FILACEAE

AZOLLACEAE - MOSQUITO FERN FAMILY
Azolla c.f. filiculoides - duckweed fern

DENNSTAEDTIACEAE - BRAKEN FAMILY
Adiantum jordani - California maiden-hair
Pellaea andromedifolia - coffee fern
Pellaea mucronata var. *mucronata* - bird's-foot fern
Pentagramma triangularis - goldenback fern

POLYPODIACEAE - POLYPODY FAMILY
Polypodium californicum - California polypody

CONIFERAE

CUPRESSACEAE - CYPRESS FAMILY
* *Cedrus deodara* - Deodar cedar
Juniperus californica - California juniper

PINACEAE - PINE FAMILY
* *Pinus halepensis* - Aleppo pine
* *Pinus pinea* – stone pine

APPENDIX B
VASCULAR PLANT SPECIES - NEWHALL RANCH

ANGIOSPERMAE (DICOTYLEDONES)

AIZOACEAE - FIG-MARIGOLD FAMILY
* *Aptenia cordifolia* - baby sun-rose
* *Carpobrotus* sp. - sea-fig

AMARANTHACEAE - AMARANTH FAMILY
* *Amaranthus albus* - tumbleweed
 Amaranthus blitoides - prostrate amaranth
* *Amaranthus hybridus* - amaranth
 Amaranthus palmeri – Palmer's amaranth
 Amaranthus powellii – Powell's amaranth
* *Amaranthus retroflexus* - rough pigweed

ANACARDIACEAE - SUMAC FAMILY
 Malosma laurina - laurel sumac
 Rhus ovata - sugar-bush
 Rhus trilobata - squaw bush
* *Schinus molle* - Peruvian pepper-tree
 Toxicodendron diversilobum - poison-oak

APIACEAE - CARROT FAMILY
* *Anethum graveolens* - dill
 Apiastrum angustifolium - wild celery
* *Apium graveolens* - celery
 Berula erecta - cutleaf water-parsnip
 Bowlesia incana – American Bowlesia
* *Conium maculatum* – poison hemlock
* *Coriandrum sativum* - cilantro
* *Daucus carota* – Queen Anne's lace
 Daucus pusillus – rattlesnake weed
 Lomatium utriculatum - common lomatium
 Sanicula bipinnata – poison sanicle

APOCYNACEAE - DOGBANE FAMILY
 Apocynum cannabinum - Indian hemp
* *Vinca major* - periwinkle

APPENDIX B
VASCULAR PLANT SPECIES - NEWHALL RANCH

ASCLEPIADACEAE - MILKWEED FAMILY

Asclepias californica – California milkweed
Asclepias fascicularis - narrow-leaf milkweed

ASTERACEAE - SUNFLOWER FAMILY

Achillea millefolium – yarrow
Achyrachaena mollis – blow-wives
Acourtia microcephala – sacapellote
Agoseris grandiflora – large-flowered agoseris
Ambrosia acanthicarpa - annual burweed
Ambrosia confertifolia - weak-leaved burweed
Ambrosia psilostachya - western ragweed
Artemisia californica - coastal sagebrush
Artemisia douglasiana - California mugwort
Artemisia dracunculus - tarragon
Artemisia tridentata - Great Basin sagebrush
Baccharis douglasii - marsh baccharis
Baccharis emoryi – Emory's baccharis
Baccharis pilularis - coyote brush
Baccharis salicifolia - mule fat
Baccharis sarothroides - chaparral broom
Brickellia californica - California brickellbush
Brickellia nevinii - Nevin's brickellbush
* *Carduus pycnocephalus* - Italian thistle
* *Centaurea melitensis* - star thistle
Chaenactis glabriuscula - yellow pincushion
* *Chrysothamnus nauseosus* - rubber rabbitbrush
Cirsium occidentale var. *californicum*- California thistle
Cirsium occidentale var. *occidentale*- cobwebby thistle
* *Cirsium vulgare* - bull thistle
* *Cnicus benedictus* - blessed thistle
Conyza canadensis - horseweed
Conyza coulteri - Coulter's conyza
Coreopsis bigelovii – Bigelow's coreopsis
* *Coreopsis tinctoria* – calliopsis
Corethrogyne filaginifolia - virgate cudweed aster
* *Cotula coronopifolia* - African brass-buttons

APPENDIX B
VASCULAR PLANT SPECIES - NEWHALL RANCH

Encelia actoni - Acton's encelia
Encelia californica - California bush sunflower
Encelia farinosa - brittlebush, incensio
Ericameria palmeri var. *pachylepis* - goldenbush
Ericameria pinifolia - pine-bush
Erigeron foliosus - leafy daisy
Eriophyllum confertiflorum - long-stem golden yarrow
Euthamia occidentalis - western goldenrod
Filago californica - California fluffweed
* *Filago gallica* - narrow-leaf filago
* *Gazania linearis* - gazania
Gnaphalium bicolor - bicolor cudweed
Gnaphalium californicum - California everlasting
Gnaphalium canescens ssp. *microcephalum* - white everlasting
Gnaphalium leucocephalum – Sonora everlasting
Gnaphalium luteo-album - white cudweed
Gnaphalium sp. *nova* - everlasting
Gnaphalium palustre - lowland cudweed
Hazardia squarrosa ssp. *grindelioides* - saw-toothed goldenbush
Helianthus annuus - common sunflower
Helianthus nuttallii c.f. ssp. *parishii* - Los Angeles sunflower
Hemizonia fasciculata - fascicled tarweed
Hemizonia kelloggii – Kellogg's tarweed
Heterotheca grandiflora - telegraph weed
Heterotheca sessiliflora - golden aster
Isocoma menziesii - goldenbush
Iva axillaris - poverty weed
* *Lactuca saligna* – willowleaf lettuce
* *Lactuca serriola* - prickly lettuce
Lagophylla ramosissima – common hareleaf
Lasthenia californica - coast goldfields
Lepidospartum squamatum - scale-broom
Lessingia filaginifolia – California aster
Lessingia glandulifera – lessingia
Malacothrix saxatilis - cliff malacothrix
* *Matricaria matricarioides* - pineapple weed
Micropus californicus - slender cottonweed

Pluchea odorata - marsh-fleabane
Pluchea sericea - arrow weed
* *Pulicaria paludosa* - Spanish sunflower
Rafinesquia californica - California chicory
Senecio californicus – California butterweed
Senecio flaccidus var. *douglasii* - butterweed
* *Senecio vulgaris* - common groundsel
Silybum marianum - milk thistle
* *Sonchus asper* - prickly sow-thistle
* *Sonchus oleraceus* - common sow-thistle
Stebbinoseris heterocarpa [*Microseris heterocarpa*] – brown puffs
Stephanomeria exigua - small wreathplant
Stephanomeria pauciflora - wire-lettuce
Stephanomeria virgata - twiggy wreathplant
Stylocline gnaphaloides - everlasting nest-straw
Uropappus lindleyi [*Microseris lindleyi*] – silver puffs
Wyethia ovata - mule ears
Xanthium spinosum - spiny cocklebur
Xanthium strumarium – cocklebur

BETULACEAE – BIRCH FAMILY
Alnus rhombifolia – white alder

BORAGINACEAE - BORAGE FAMILY
Amsinckia menziesii var. *intermedia* - yellow fiddleneck
Amsinckia menziesii var. *menziesii* - yellow fiddleneck
Amsinckia tessellata – devil's lettuce
Cryptantha sp. - forget-me-not
Cryptantha intermedia - common forget-me-not
Cryptantha micrantha – redroot cryptantha
Cryptantha microstachys – tejon cryptantha
Cryptantha muricata – prickly cryptantha
Heliotropium curassavicum - wild heliotrope
Pectocarya linearis - slender pectocarya
Pectocarya penincillata - pectocarya
Pectocarya setosa - pectocarya
Plagiobothrys arizonicus - popcorn flower

Plagiobothrys canescens - rusty popcorn flower
Plagiobothrys collinus - California popcorn flower
Plagiobothrys fulvus - *common popcorn flower*

BRASSICACEAE - MUSTARD FAMILY

Athysanus pusillus – dwarf athysanus
* *Brassica nigra* - black mustard
* *Capsella bursa-pastoris* - shepard's purse
Caulanthus lasiophyllus – California mustard
Descurainia pinnata ssp. *halictorum* – tansy mustard
* *Hirschfeldia incana* - short-podded mustard
Lepidium lasiocarpum - peppergrass
* *Lepidium latifolium* - peppergrass
Lepidium virginicum - wild peppergrass
* *Lobularia maritime* – sweet-alyssum
* *Raphanus sativus* - wild radish
* *Rorippa nasturtium-aquaticum* - water cress
* *Sisymbrium altissimum* - tumble mustard
* *Sisymbrium irio* - London rocket
* *Sisymbrium officinale* - hedge mustard
* *Sisymbrium orientale* - Oriental mustard
Stanleya pinnata var. *pinnata*– Prince's plume
Thysanocarpus curvipes – fringepod
Tropidocarpum gracile – slender dobie-pod

CACTACEAE - CACTUS FAMILY

* *Cereus peruvianus* - Peruvian apple cactus
Opuntia basilaris var. *ramosa* – beaver-tail cactus
Opuntia californica var. *parkeri* - cane cholla
Opuntia littoralis - coastal prickly-pear
Opuntia X vaseyi - prickly-pear cactus
* *Trichocereus spachianus* - golden torch cactus

CAPPARACEAE - CAPER FAMILY

Isomeris arborea - bladderpod

APPENDIX B
VASCULAR PLANT SPECIES - NEWHALL RANCH

CAPRIFOLIACEAE - HONEYSUCKLE FAMILY

Lonicera subspicata - southern honeysuckle
Sambucus mexicana - Mexican elderberry
Symphoricarpos sp. - snowberry
Symphoricarpos c.f. mollis - spreading snowberry

CARYOPHYLLACEAE - PINK FAMILY

* *Cerastium glomeratum* - sticky mouse-ear
* *Herniaria cinerea* - gray herniaria
Loeflingia squarrosa - no common name
* *Silene gallica* - common catchfly
Spergularia sp. - stickwort, starwort
* *Spergularia rubra* - sand-spurrey
* *Spergularia c.f. villosa* - villous sand-spurrey
* *Stellaria media* - common chickweed

CASURINACEAE – SHEET OAK FAMILY

* *Casuarina cunninghamiana* - Austrailian Pine

CHENOPODIACEAE - GOOSEFOOT FAMILY

Atriplex canescens - four-winged saltbush
* *Atriplex heterosperma* - weedy orache
Atriplex lentiformis- big saltbush, quail brush
* *Atriplex rosea* - tumbling oracle
* *Atriplex semibaccata* - Australian saltbush
Atriplex serenana var. *serenana* - bractscale
Atriplex suberecta - Australian saltbush
Atriplex triangularis – spearscale
* *Bassia hyssopifolia* - five-hooked bassia
* *Beta vulgaris* – garden beet
* *Chenopodium album* - lamb's-quarters
* *Chenopodium ambrosioides* - Mexican tea
Chenopodium berlandieri - pitseed goosefoot
* *Chenopodium botrys* - goosefoot
Chenopodium californicum - California goosefoot
* *Chenopodium murale* - nettle-leaved goosefoot
Chenopodium rubrum - red goosefoot

APPENDIX B
VASCULAR PLANT SPECIES - NEWHALL RANCH

* *Salsola tragus* - Russian-thistle
* *Spinacia oleracea* – spinach

CONVOLVULACEAE - MORNING-GLORY FAMILY

Calystegia macrostegia ssp. *cyclostegia* – morning-glory
Calystegia peirsonii - Peirson's morning-glory
* Convolvulus arvensis - bindweed

CRASSULACEAE - STONECROP FAMILY

Crassula connata - dwarf stonecrop
Dudleya cymosa - unidentified dudleya
Dudleya lanceolata - lanceleaf dudleya

CUCURBITACEAE - GOURD FAMILY

Cucurbita foetidissima - coyote-melon, calabazilla
Marah macrocarpus - wild cucumber

CUSCUTACEAE - DODDER FAMILY

Cuscuta californica - California dodder
Cuscuta pentagona – five-angled dodder
Cuscuta subinclusa – canyon dodder

DATISCACEAE - DASTICA FAMILY

Dastica glomerata - Durango root

ERICACEAE - HEATH FAMILY

Arctostaphylos glauca - bigberry manzanita

EUPHORBIACEAE - SPURGE FAMILY

Chamaesyce albomarginata - rattlesnake spurge
* *Chamaesyce maculata* – spotted spurge
Chamaesyce polycarpa - small-seed sand mat
Chamaesyce serpyllifolia – thyme-leafed spurge
Croton californicus - California croton
Eremocarpus setigerus - doveweed

Euphorbia spathulata - reticulate-seed spurge
* *Ricinus communis* - castor-bean
Stillingia linearifolia - linear-leaved stillingia

FABACEAE - PEA FAMILY
* *Acacia baileyana* - golden wattle
Astragalus didymocarpus – white dwarf locoweed
Astragalus gambelianus – Gambel's locoweed
Astragalus trichopodus - Santa Barbara locoweed
Glycyrrhiza lepidota - wild licorice
Lathyrus laetiflorus - wild sweet pea
Lathyrus vestitus - wild pea
Lotus corniculatus - bird's-foot lotus
Lotus hamatus – grab lotus
Lotus humistratus - lotus
Lotus purshianus - Spanish-clover
Lotus salsuginosus - coastal lotus
Lotus scoparius var. *scoparius* - deerweed
Lotus strigosus - strigose deerweed
Lupinus bicolor - Lindley's annual lupine
Lupinus excubitus – Mountain Springs bush lupine
Lupinus excubitus var. *hallii* - grape soda lupine
Lupinus hirsutissimus - stinging lupine
Lupinus microcarpus var. *densiflorus* - chick lupine
Lupinus microcarpus var. *microcarpus* - chick lupine
Lupinus sparsiflorus - Coulter's lupine
Lupinus succulentis - arroyo lupine
Lupinus truncatus - collar lupine
* *Medicago polymorpha* - California burclover
* *Medicago polymorpha* var. *brevispina* - short-spined California burclover
* *Medicago sativa* - alfalfa
* *Melilotus alba* - white sweet-clover
* *Melilotus indica* - yellow sweet-clover
* *Robinia pseudoacacia* - black locust
Trifolium sp. – clover
Trifolium albopurpureum – rancheria clover
Trifolium ciliolatum- tree clover

* *Trifolium fragiferum* - strawberry clover
Trifolium gracilentum – pin-point clover
* *Trifolium hirtum* - rose clover
Trifolium microcephalum – maiden clover
* *Trifolium repens* - white clover
Trifolium willdenovii – valley clover
Vicia hassei – Hesse's vetch
* *Vicia villosa* ssp. *villosa* – winter vetch

FAGACEAE - BEECH FAMILY
Quercus agrifolia - coast live oak
Quercus berberidifolia - scrub oak
Quercus douglasii - blue oak
Quercus lobata - valley oak

GERANIACEAE - GERANIUM FAMILY
* *Erodium brachycarpum* – shortfruit stork's bill
* *Erodium botrys* – long-beaked filaree
* *Erodium cicutarium* - red-stemmed filaree
* *Erodium moschatum* – white-stemmed filaree

GROSSULARIACEAE - CURRANT FAMILY
Ribes aureum - golden currant
Ribes malvaceum - chaparral currant

HYDROPHYLLACEAE - WATERLEAF FAMILY
Emmenanthe penduliflora - whispering bells
Eriodictyon crassifolium var. *nigrescens* - yerba santa
Eucrypta chrysanthemifolia - common eucrypta
Nemophila menziesii – baby blue-eyes
Nemophila parviflora var. *quercifolia* – oak-leaved nemophila
Phacelia cicutaria - caterpillar phacelia
Phacelia cicutaria var. *hispida* – caterpillar phacelia
Phacelia distans - blue fiddleneck
Phacelia imbricata ssp. *imbricata* - imbricate phacelia
Phacelia minor - wild canterbury-bell
Phacelia ramosissima - shrubby phacelia

APPENDIX B
VASCULAR PLANT SPECIES - NEWHALL RANCH

JUGLANDACEAE - WALNUT FAMILY

Juglans californica - southern California black walnut

LAMIACEAE - MINT FAMILY

* *Marrubium vulgare* - horehound
Mentha citrata – orange mint
Salvia apiana - white sage
Salvia columbariae - chia
Salvia leucophylla - purple sage
Salvia mellifera - black sage
Stachys ajugoides – bugle hedge-nettle
Stachys ajugoides var. *rigida* - rigid hedge-nettle
Stachys albens - white hedge-nettle
Trichostema lanceolatum - vinegar weed

LAURACEAE - LAUREL FAMILY

Umbellularia californica - California laurel

LOASACEAE - STICK-LEAF FAMILY

Mentzelia sp. – blazing star
Mentzelia laevicaulis - blazing star
Mentzelia micrantha - small-flowered stick-leaf

LYTHRACEAE - LOOSESTRIFE FAMILY

Lythrum californicum - California loosestrife

MALVACEAE - MALLOW FAMILY

Malacothamnus fasciculatus ssp. *laxiflorus* – chaparral bush mallow
Malacothamnus fremontii – bush mallow
Malacothamnus marrubioides - bush mallow
* *Malva neglecta* - common mallow
* *Malva parviflora* - cheeseweed

MELIACEAE - MAHOGANY FAMILY

* *Melia azedarach* - China berry

APPENDIX B
VASCULAR PLANT SPECIES - NEWHALL RANCH

MORACEAE - FIG FAMILY

* *Ficus carica* – edible fig

MYRTACEAE - MYRTLE FAMILY

* *Eucalyptus* sp. - eucalyptus
* *Eucalyptus camaldulensis* – red gum
* *Eucalyptus globulus* - blue gum
* *Eucalyptus leucoxylon* - white ironbark
* *Eucalyptus polyanthemos* – silver dollar gum
* *Eucalyptus sideroxylon* - red ironbark

NYCTAGINACEAE - FOUR O'CLOCK FAMILY

Mirabilis laevis var. *crassifolia* [*M. californica*]- California wishbone-bush

OLEACEAE - OLIVE FAMILY

Fraxinus dipetala - California ash
* *Fraxinus uhdei* – tropical ash
Fraxinus velutina – velvet ash
* *Ligustrum lucidum* - glossy privet
* *Olea europaea* - mission olive

ONAGRACEAE - EVENING-PRIMROSE FAMILY

Camissonia bistorta – southern sun cup
Camissonia boothii - sun cup
Camissonia boothii ssp. *decorticans* – shredding evening primrose
Camissonia californica - mustard primrose
Camissonia hirtella - sun cup
Camissonia strigulosa - sun cup
Clarkia purpurea - winecup clarkia
Clarkia speciosa - clarkia
Clarkia unguiculata - elegant clarkia
Epilobium brachycarpum - willow herb
Epilobium canum ssp. *canum* - California fuchsia
Epilobium ciliatum - California cottonweed
Ludwigia peploides - yellow waterweed

Ludwigia repens - water primrose
Oenothera elata - evening primrose
* *Oenothera laciniata* - evening primrose

OROBANCHACEAE - BROOM-RAPE FAMILY
Orobanche parishii ssp. *parishii* - broom-rape

PAEONIACEAE - PEONY FAMILY
Paeonia californica - California peony

PAPAVERACEAE - POPPY FAMILY
Argemone corymbosa – prickly poppy
Eschscholzia californica - California poppy
Platystemon californicus – California creamcups

PLANTAGINACEAE - PLANTAIN FAMILY
Plantago erecta - dot-seed plantain
* *Plantago indica* - plantain
* *Plantago lanceolata* - English plantain
* *Plantago major* - common plantain

PLATANACEAE - SYCAMORE FAMILY
Platanus racemosa - western sycamore

POLEMONIACEAE - PHLOX FAMILY
Allophyllum divaricatum - purple false gillyflower
Allophyllum glutinosum – sticky false gillyflower
Eriastrum densifolium – woollystar
Eriastrum densifolium ssp. *elongatum* - elongate eriastrum
Eriastrum densifolium ssp. *mohavense* - Mohave eriastrum
Eriastrum sapphirinum - sapphire eriastrum
Gilia angelensis - angel gilia
Gilia capitata – globe gilia
Leptodactylon californicum - prickly phlox
Linanthus androsaceus – common linanthus

Linanthus pygmaeus - linanthus
Navarretia atractyloides - holly-leaf skunkweed
Phlox gracilis – slender phlox

POLYGONACEAE - BUCKWHEAT FAMILY

Chorizanthe parryi var. *fernandina* - San Fernando Valley spineflower
Chorizanthe staticoides - turkish rugging
Eriogonum angulosum - angle-stem buckwheat
Eriogonum baileyi – Bailey's buckwheat
Eriogonum brachyanthum – short-flowered buckwheat
Eriogonum elongatum - long-stemmed buckwheat
Eriogonum fasciculatum ssp. *foliolosum* - California buckwheat
Eriogonum fasciculatum ssp. *polifolium* - California buckwheat
Eriogonum gracile var. gracile - slender woolly buckwheat
Eriogonum gracillimum – rose and white buckwheat
Eriogonum maculatum – spotted buckwheat
Eriogonum c.f. viridescens - buckwheat
Lastarriaea coriacea - lastarriaea
* *Polygonum arenastrum* - common knotweed
* *Polygonum argyrocoleon* - smartweed
Polygonum lapathifolium - willow weed
Polygonum punctatum - perennial smartweed
Pterostegia drymarioides - pterostegia
* *Rumex conglomeratus* - whorled dock
* *Rumex crispus* - curly dock
Rumex hymenosepalus - wild rhubarb
Rumex maritimus – golden dock
Rumex obtusifolius - dock
Rumex salicifolius - willow dock

PORTULACACEAE - PURSLANE FAMILY

Calandrinia ciliata - redmaids
Claytonia parviflora - small-leaved montia
Claytonia perfoliata – miner's lettuce
* *Portulaca oleracea* - common purslane

APPENDIX B
VASCULAR PLANT SPECIES - NEWHALL RANCH

RANUNUCULACEAE - BUTTERCUP FAMILY

Clematis ligusticifolia - yerba de chiva
Delphinium parryi ssp. *parryi* – Parry's larkspur

RHAMNACEAE - BUCKTHORN FAMILY

Ceanothus crassifolius - hoary-leaved ceanothus
Ceanothus tomentosus - woolyleaf ceanothus
Rhamnus crocea - redberry
Rhamnus ilicifolia - holly-leaf redberry

ROSACEAE - ROSE FAMILY

Adenostoma fasciculatum – chamise
Cercocarpus betuloides – mountain-mahogany
Cercocarpus betuloides var. *betuloides* - birch-leaf mountain-mahogany
Cercocarpus betuloides var. *blancheae* - island mountain-mahogany
Heteromeles arbutifolia - toyon
Prunus ilicifolia - holly-leaf cherry
Rosa californica - California rose
Rubus ursinus - California blackberry
* *Sangwisorba minor* – garden burnet

RUBIACEAE - MADDER FAMILY

Galium angustifolium - narrow-leaved bedstraw
* *Galium aparine* - goose grass
Galium nuttallii ssp. *nuttallii* – San Diego bedstraw
Galium porrigens - climbing bedstraw

SALICACEAE - WILLOW FAMILY

Populus fremontii - Fremont's cottonwood
Salix exigua - narrow-leaved willow
Salix gooddingii - black willow
Salix laevigata - red willow
Salix lasiolepis - arroyo willow
Salix lucida ssp. *lasiandra* - golden willow

APPENDIX B
VASCULAR PLANT SPECIES - NEWHALL RANCH

SAURURACEAE - LIZARD'S-TAIL FAMILY

Anemopsis californica - yerba mansa

SCROPHULARIACEAE - FIGWORT FAMILY

Antirrhinum coulterianum - white snapdragon
Antirrhinum multiflorum – withered snapdragon
Castilleja affinis - coast paintbrush
Castilleja densiflora - dense-flowered owl's-clover
Castilleja exserta - common owl's-clover
Castilleja foliolosa - woolly Indian paintbrush
Collinsia heterophylla – purple Chinese houses
Cordylanthus rigidus – bird's beak
Keckiella cordifolia - heart-leaf penstemon
Linaria canadensis - toadflax
Mimulus aurantiacus - bush monkeyflower
Mimulus aurantiacus var. *pubescens* - bush monkeyflower
Mimulus guttatus - seep monkeyflower
Mimulus pilosus – downy monkeyflower
Penstemon centranthifolius - scarlet bugler
* *Verbascum thapsus* - woolly mullein
* *Verbascum virgatum* - wand mullein
* *Veronica anagallis-aquatica* - water speedwell

SIMAROUBACEAE - QUASSIA FAMILY

* *Ailanthus altissima* - tree of heaven

SOLANACEAE - NIGHTSHADE FAMILY

Datura wrightii - western jimsonweed
* *Nicotiana glauca* - tree tobacco
Nicotiana quadrivalvis – Indian tobacco
* *Solanum americanum* - small-flowered nightshade
Solanum douglasii - white nightshade
* *Solanum eleagnifolium* - silver leaf horse-nettle
* *Solanum sarrachoides* - hairy nightshade
Solanum xanti - chaparral nightshade

APPENDIX B
VASCULAR PLANT SPECIES - NEWHALL RANCH

TAMARICACEAE - TAMARISK FAMILY

* *Tamarix* sp. – tamarisk
* *Tamarix ramoissima* - tamarisk

ULMACEAE - ELM FAMILY

* *Ulmus pumila* - Siberian elm

URTICACEAE - NETTLE FAMILY

Hesperocnide tenella – western nettle
Parietaria hespera – western pellitory
Urtica dioica - giant creek nettle
* *Urtica urens* - dwarf nettle

VERBENACEAE - VERVAIN FAMILY

Verbena lasiostachys - western verbena

VIOLACEAE – VIOLET FAMILY

Viola pedunculata – Johnny jump-ups

VISCACEAE - MISTLETOE FAMILY

Phoradendron macrophyllum - big leaf mistletoe
Phoradendron villosum - oak mistletoe

VITACEAE - GRAPE FAMILY

Parthenocissus vitacea - woodbine, Virginia creeper
Vitis girdiana - desert wild grape

ZYGOPHYLLACEAE - CALTROP FAMILY

* *Tribulus terrestris* - puncture vine

ANGIOSPERMAE (MONOCOTYLEDONES)

ARECACEAE - PALM FAMILY

* *Washingtonia robusta* - Mexican fan palm

CYPERACEAE - SEDGE FAMILY

Carex alma – sturdy sedge
Carex praegracilis – clustered field sedge

Carex sp. - sedge
Cyperus eragrostis - tall cyperus
Cyperus esculentus - yellow nut-grass
* *Cyperus involucratus* - nutsedge
Cyperus odoratus - coarse cyperus
Eleocharis montevidensis - slender creeping spike-rush
Eleocharis parishii – Parish's spikerush
Eleocharis rostellata – beaked spikerush
Scirpus acutus - hard-stemmed bulrush
Scirpus americanus - winged three-square
Scirpus maritimus – alkali bulrush
Scirpus microcarpus - bulrush
Scirpus robustus - Pacific coast bulrush

JUNCACEAE - RUSH FAMILY

Juncus sp. - rush
Juncus acutus ssp. *leopoldii* – southwestern spiny rush
Juncus balticus - wire rush
Juncus bufonius - toad rush
Juncus longistylis – rush
Juncus mexicanus – Mexican rush
Juncus rugulosus - wrinkled rush
Juncus textilis - Indian rush
Juncus torreyi – rush
Juncus triformis - Yosemite dwarf rush
Juncus xiphioides - iris-leaved rush

LEMNACEAE - DUCKWEED FAMILY

Lemna miniscula - duckweed
Lemna valdiviana - duckweed

LILIACEAE - LILY FAMILY

* *Allium cepa* - onion
Allium porrum - onion
* *Amaryllis bella-donna* - naked lady
* *Asparagus officinalis* – asparagus
Bloomeria crocea – common goldenstar

Brodiaea terrestris ssp. *kernensis* – dwarf brodiaea
Calochortus clavatus var. *gracilis*- slender mariposa lily
Calochortus venustus - mariposa lily
Dichelostemma capitatum - blue dicks
Muilla maritima - common muilla
Yucca whipplei – Our Lord's candle

POACEAE - GRASS FAMILY

Achnatherum coronatum - giant needlegrass
* *Agrostis* sp. - bentgrass
* *Agrostis viridis* - water bent
* *Arundo donax* - giant reed
* *Avena barbata* - slender oat
* *Avena fatua* - wild oat
Avena sativa – cultivated oat
Bromus catharticus - California brome
Bromus catharticus var. *catharticus* - California brome
* *Bromus diandrus* - ripgut grass
* *Bromus hordeaceus* - soft chess
* *Bromus madritensis* ssp. *rubens* - foxtail chess
* *Bromus sterilis* – sterile brome
* *Bromus tectorum* - cheat grass
* *Cortaderia jubata* - pampas grass
* *Crypsis schoenoides* - prickle grass
* *Cynodon dactylon* - Bermuda grass
* *Digitaria sanguinalis* - hairy crabgrass
Distichlis spicata - salt grass
* *Echinochloa colonum* - jungle-rice
Echinochloa crus-galli - barnyard grass
* *Eleusine indica* – goose grass
Elymus glaucus - western wild-rye
Elymus multisetus – big squirreltail
Eragrostis mexicana - lovegrass
* *Festuca arundinacea* - tall fescue
* *Hordeum marinum* - Mediterranean barley
* *Hordeum murinum* - glaucous foxtail barley
* *Lamarckia aurea* - goldentop

APPENDIX B
VASCULAR PLANT SPECIES - NEWHALL RANCH

* *Leptochloa uninerva* - Mexican sprangletop
Leymus condensatus - giant ryegrass
Leymus triticoides - beardless wild rye
Leptichloa uninervia - Mexican sprangletop
* *Lolium multiflorum* – Italian ryegrass
* *Lolium perenne* - perennial ryegrass
Melica imperfecta - California melic
Muhlenbergia asperifolia – scratch-grass
Muhlenbergia microsperma - littleseed muhly
Nassella cernua – nodding needlegrass
Nassella lepida – foothill needlegrass
Nassella pulchra – purple needlegrass
Panicum capillare – western witchgrass
* *Panicum miliaceum* – broom corn millet
* *Parapholis incurve* – sickle grass
Paspalum distichum – knotgrass
* *Phalaris aquatica* – Harding grass
* *Phalaris minor* - Mediterranean canary grass
* *Piptatherum miliaceum* - smilo grass
* *Poa annua* - annual bluegrass
Poa secunda - Malpais bluegrass
* *Polypogon interruptus* - ditch beard grass
* *Polypogon monspeliensis* - rabbit's-foot grass
Schismus barbatus – abumashi
Sorghum bicolor – sorghum
Sorghum halepense – Johnsongrass
Sporobolus airoides – alkali scation
* *Triticum aestivum* – cultivated wheat
Vulpia microstachys - fescue
* *Vulpia myuros* - rattail fescue
Vulpia octoflora - six-weeks fescue

POTAMOGETONACEAE - PONDWEED FAMILY
Potamogeton foliosus - leafy pondweed

APPENDIX B
VASCULAR PLANT SPECIES - NEWHALL RANCH

TYPHACEAE - CATTAIL FAMILY

Typha domingensis - slender cattail
Typha latifolia - broad-leaved cattail

* signifies introduced (non-native) species

APPENDIX C

CALIFORNIA NATURAL DIVERSITY DATABASE FORMS

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ________________ Quad Code ______________
Index Code ________________ Occurrence # ________________
Copy Sent To ____

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Chorizanthe parryi* var. *fernandina*

Reporter: Cathleen Weigand, Paul Lemons, and others Phone: (760) 942.5147

Address: Dudek & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: 11-13 May 2004 County: Los Angeles Collection: no If yes, # Mus./Herb:

Location: Santa Clarita Valley, Newhall Ranch: north of State Route 126, west of San Martinez Grande Canyon Road

Quad Name: Val Verde __X__ 7½' __ 15' Elevation: 1000-1700' T 4N R 17W _____ ¼ Sec 15,16,22

Landowner/Manager: Newhall Land and Farming Company, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? __X__ Yes _____ No If not, reason:

Is this a new location record? ___ Yes __X__ No _____ Unknown

Total # of Individuals = ~ 64,000 Is this a subsequent visit __X__ Yes_ No Compared to your last visi:__ mor __ same __X__ fewer

Phenology (plants): _____ % vegetative __10__ % flowering __90__ % fruiting

Population Age Structure (animals): _____ # adults _____ # juveniles _____ # others

Site Function for Species (animals): _____ breeding _____ foraging _____ wintering _____ roosting _____ denning _____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

Plant communities are predominantly California sagebrush series (55%of individuals) dominated by *Encelia californica, Salvia mellifera,* and *Artemisia californica* and California grassland series (45%) dominated by *Bromus madritensis rubens, Avena fatua,* and *Bromus diandrus.* Clay soils predominate, with some loam. Most plants are on northwest, northeast, or north-facing slopes of up to 30%, although some plants were found on up to 70% slopes.

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, fire in recent past (5-10 years); Possible Threats: Currently proposed for estate residential development.

Overall Site Quality: _____ Excellent ____ Good __X__ Fair _____ Poor

Comments: This report summarizes 43 discrete locations, each with from 1 to an estimated 30,000 individuals observed. Rainfall was below average and total population is likely greater.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

_____ Keyed in a site reference:
_____ Compared with specimen housed at:
_____ Compared with photo/drawing in:
____ By another person (name):
__X__ Other: Personal knowledge

OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject: ____ Plant/Animal; ____ Habitat; _____ Diagnostic Feature; _____ Other

Type: ____ Slide; _____ Print

May we obtain duplicates **at our cost**? ___ Yes __X__ No

Newhall Ranch

2004 Chorizanthe Survey Results - San Martinez Grande

FIGURE 1

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ________________ Quad Code ______________
Index Code ________________ Occurrence # ________________
Copy Sent To ____

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Chorizanthe parryi* var. *fernandina*

Reporter: Anuja Parikh, Nathan Gale Phone: (760) 942.5147

Address: Dudek & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: May27 - 28, June 25 - 29, 2004 County: Los Angeles Collection: no If yes, # Mus./Herb:

Location: Northern Santa Susana Mountains/Santa Clarita Valley, Newhall Ranch: south of State Route 126 just east of the Ventura County line, on ridges and north facing slopes throughout Potrero Canyon.

Quad Name: Val Verde and Newhall __X__ 7½' __ 15' Elevation: 1100-1400' 4N R 17W NW ¼ Sec 3

Landowner/Manager: Newhall Land and Farming Company, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? __X__ Yes _____ No If not, reason:

Is this a new location record? ___ Yes __X__ No _____ Unknown

Total # of Individuals = ~13,000 plants Is this a subsequent visit? X Yes _ No Compared to your last visit__more__ same __X__ fewer

Phenology (plants): _____ % vegetative ___ % flowering 100 % fruiting

Population Age Structure (animals): _____ # adults _____ # juveniles _____ # others

Site Function for Species (animals): _____ breeding _____ foraging _____ wintering _____ roosting _____ denning _____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

California sagebrush - black sage series, California grassland series, and California sagebrush - purple sage series, typically with 40% - 60%c non-native cover. Dominant plants asoociated withthe populations include *Artemisia californica, Salvia leucophylla, Centaurea melitensis, Erodium cicutarium, Bromus* spp. and *Eriogonum fasiculatum.* Soil texture is generally clay loam. Most plants are on southeast to south facing slopes, with some on southwestern aspects. Slopes were generally between 10% and 17%. Many areas have up to 50% bare ground.

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, fire in recent past (5-10 years); Possible Threats: Proposed for estate residential development.

Overall Site Quality: _____ Excellent _____ Good _____ Fair __X__ Poor (based on non-native plant cover)

Comments: This report summarizes 32 discrete locations, each with from 1 to an estimated 5000 individuals observed. The reduction in population from the previous year is likely due to below average rainfall, germination, and survival.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

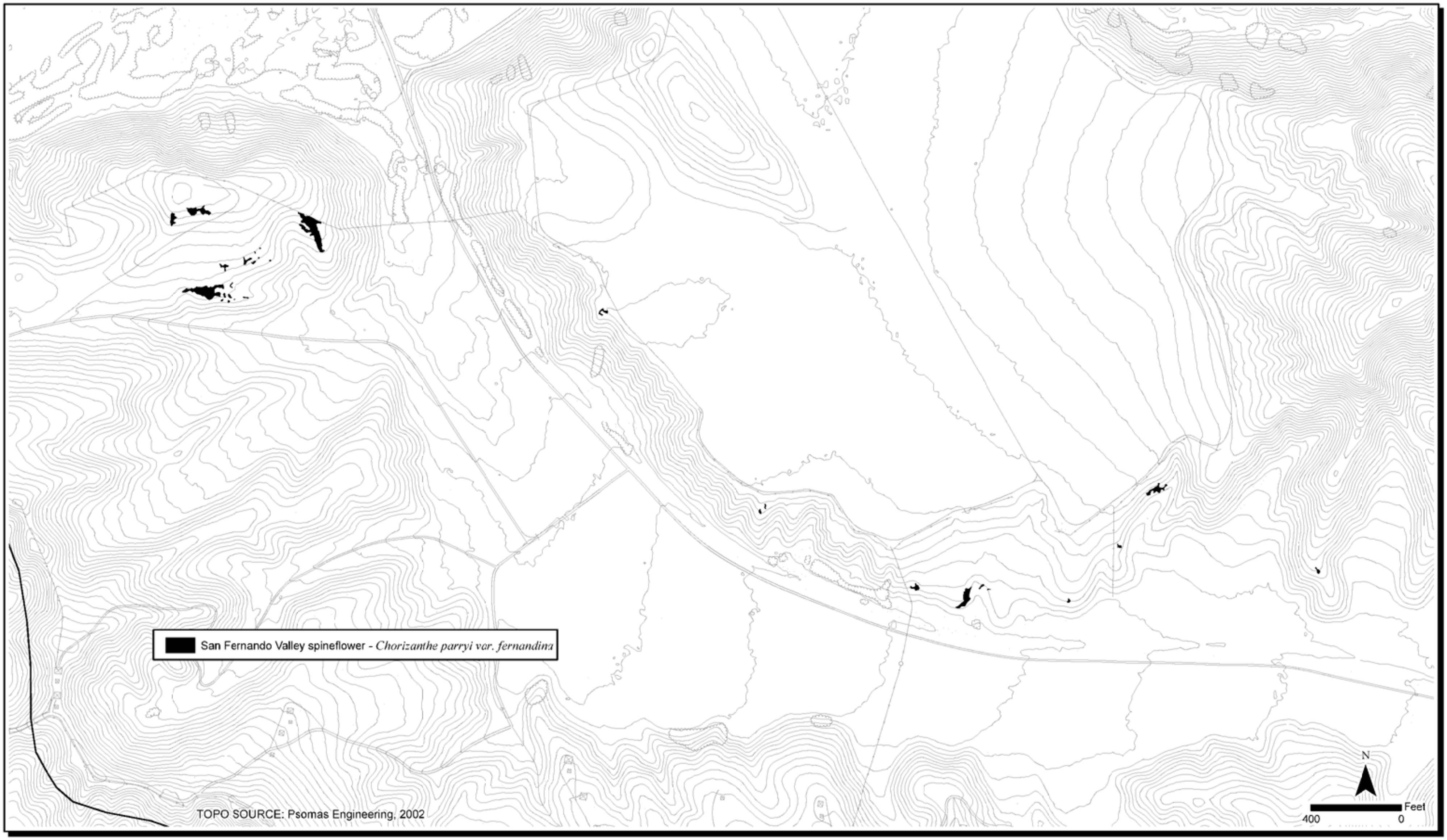
____ Keyed in a site reference: Jepson
____ Compared with specimen housed at: UCR, RSA
_____ Compared with photo/drawing in:
____ By another person (name):
__X__ Oher: personal knowledge

OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject	Type
____ Plant/Animal	____ Slide
___ Habitat	_____ Print
____ Diagnostic Feature	
_____ Other	

May we obtain duplicates **at our cost**?
___ Yes __X__ No



Newhall Ranch

2004 Chorizanthe Survey Results - Potrero Canyon

FIGURE
1

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ________________ Quad Code ______________
Index Code ________________ Occurrence # ________________
Copy Sent To ____

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Chorizanthe parryi* var. *fernandina*

Reporter: Michelle Balk, Megan Enright, and others   Phone: (760) 942-5147

Address: Dudek & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: May 3 - 6, May 24, June 23 - 30, 2004   County: Los Angeles   Collection: no   If yes, # Mus./Herb:

Location: Northern Santa Susana Mountains/Santa Clarita Valley, Newhall Ranch, south of confluence of the Santa Clara River and Castaic Creek, eastern, southern, and western edges of Grapevine Mesa and scattered ridges in the area.

Quad Name: Val Verde   _X_ 7½' __ 15'   Elevation: 1040-1290'   T _17W_   R _4N_   _N_ ¼ Sec _3_

Landowner/Manager: Newhall Land and Farming Company, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? _X_ Yes _____ No   If not, reason:

Is this a new location record? ____ Yes _X_ No _____ Unknown

Total # of Individuals = ~425,000   Is this a subsequent visit? _X_ Yes _ No   Compared to your last visit: __ more __ same _X_ fewer

Phenology (plants): _____ % vegetative _98_ % flowering _2_ % fruiting

Population Age Structure (animals): _____ # adults _____ # juveniles _____ # others

Site Function for Species (animals): _____ breeding _____ foraging _____ wintering _____ roosting _____ denning _____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

Mixed chaparral, California sagebrush - California buckwheat, and chamise series communities provided habitat for most plants, with non-native cover generally 40 - 70%. Dominant plants include Bromus spp., Avena fatua, Erodium cicutarium, and Salsola tragus. Associated native species include *Adenostema fasiculata, Ericameria* sp.and *Artemisia californica*. Slopes were generally southwest-facing and less than 30%, although plants were found on all slopes with all aspects. Soil texture is predominantly silt loam.

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, farming; Possible Threats: proposed residential/commercial development.

Overall Site Quality: _____ Excellent _X_ Good _____ Fair _____ Poor

Comments: This report summarizes 99 discrete locations, each with from 1 to an estimated 221,000 individuals observed. Reduced numbers from the previous year are likely due to below average rainfall, germination, and survival.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

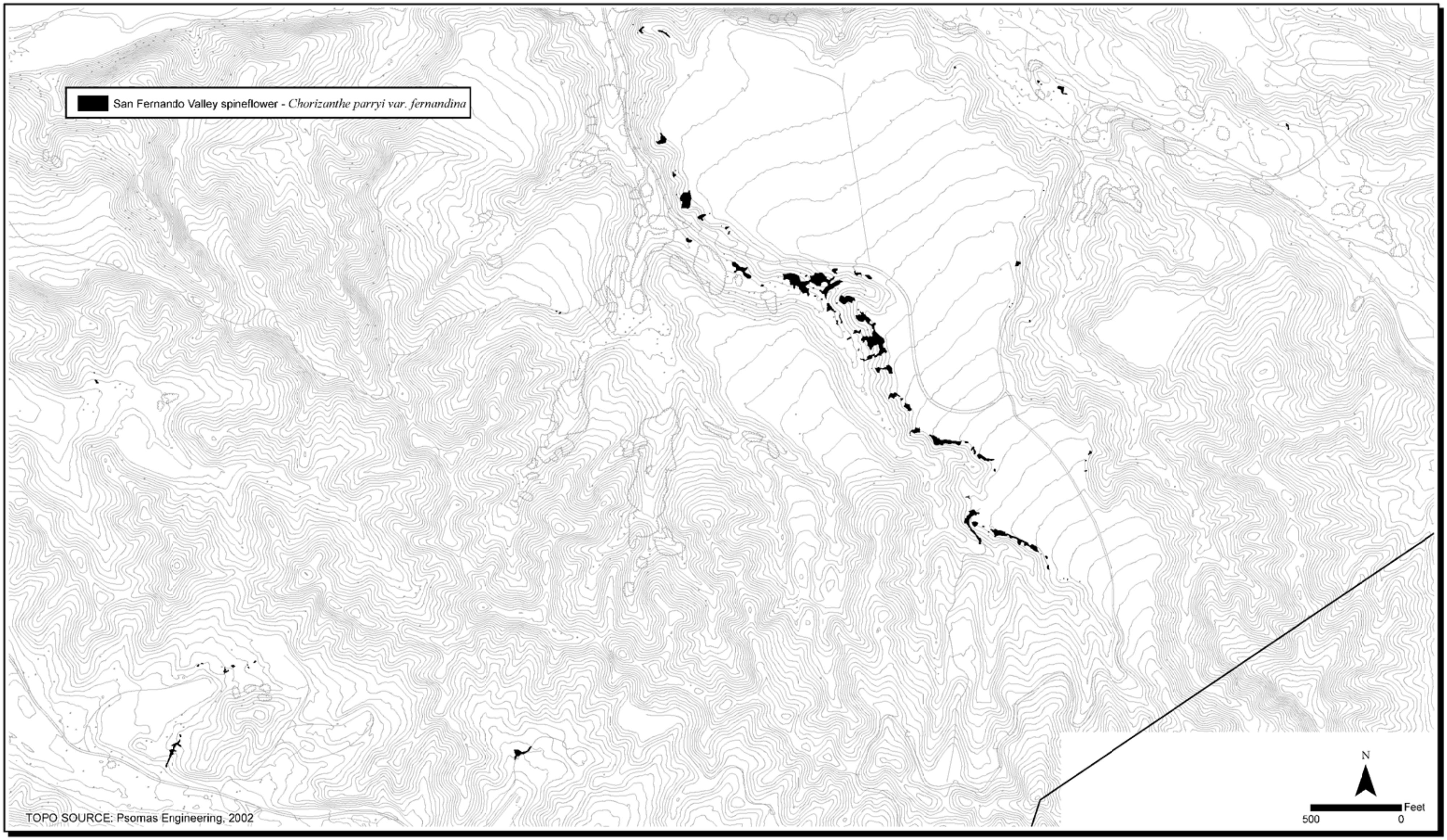
____ Keyed in a site reference:
____ Compared with specimen housed at:
_____ Compared with photo/drawing in:
____ By another person (name):
_X_ Oher: Personal knowledge

OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject	Type
____ Plant/Animal	____ Slide
___ Habitat	_____ Print
____ Diagnostic Feature	
_____ Other	

May we obtain duplicates **at our cost**?
__ Yes _X_ No



Newhall Ranch

2004 Chorizanthe Survey Results - Grapevine Mesa

FIGURE 1

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ________________ Quad Code ______________
Index Code ________________ Occurrence # ________________
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PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Chorizanthe parryi* var. *fernandina*

Reporter: Anuja Parikh, Nathan Gale, and others   Phone: (760) 942.5147

Address: Dudek & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: April 26 - May 13, 2004   County: Los Angeles   Collection: no   If yes, # Mus./Herb:

Location: Northern Santa Susana Mountains/Santa Clarita Valley, Newhall Ranch, southeast of confluence of the Santa Clara River and Castaic Creek, east, south, and west edges of Airport Mesa and adjacent mesas.

Quad Name: Newhall   T 4N   R 16W   W ¼ of W ¼ Sec 3
X 7½' __ 15'   Elevation: 1075-1250'   T 4N   R 17W   E ¼ of E ¼ Sec 3

Landowner/Manager: Newhall Land and Farming Company, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? X Yes ____ No   If not, reason:

Is this a new location record? ____ Yes X No ____ Unknown

Total # of Individuals = ~38,000 Is this a subsequent visit? X Yes __ No   Compared to your last visit: X more __ same __ fewer

Phenology (plants): ____ % vegetative 100 % flowering ____ % fruiting

Population Age Structure (animals): ____ # adults ____ # juveniles ____ # others

Site Function for Species (animals): ____ breeding ____ foraging ____ wintering ____ roosting ____ denning ____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

Most occurred in California grassland series, with some plants in California sagebrush communities (purple sage and California buckwheat series). Dominant plants include erod cic, *Bromus madritensis rubens, Erodicum cicutarium, Schismus barbatus, Bromus rubens, Artemisia californica,* and *Eriogonum fasiculatum.* Most plants were on up to 50% slopes with southwest, south, or southeast aspects.

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, farming, grading/clearing; Possible Threats: proposed residential/commercial development.

Overall Site Quality: ____ Excellent ____ Good X Fair ____ Poor

Comments: This report summarizes 91 discrete locations, each with from 1 to an estimated 125 individuals observed. Rainfall was below average and total population is likely greater.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

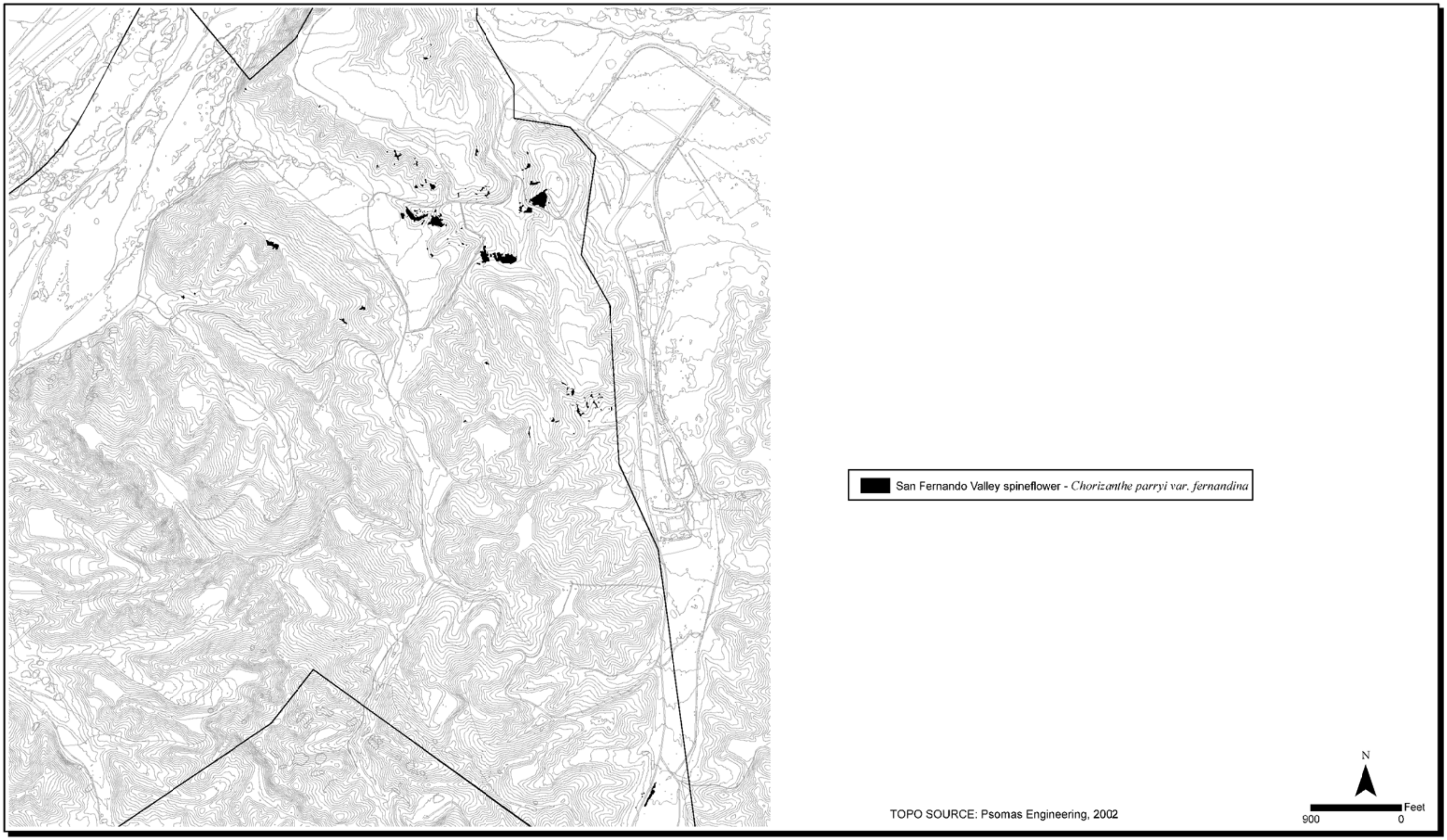
___ Keyed in a site reference:
___ Compared with specimen housed at:
___ Compared with photo/drawing in:
___ By another person (name):
X Oher: Personal knowledge

OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject	Type
___ Plant/Animal	___ Slide
___ Habitat	___ Print
___ Diagnostic Feature	
___ Other	

May we obtain duplicates **at our cost**?
___ Yes X No



Newhall Ranch

2004 Chorizanthe Survey Results - Airport Mesa

FIGURE 1

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code _______________	Quad Code _____________
Index Code ________________	Occurrence # _______________
Copy Sent To ____	

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Calochortus clavatus* var. *gracilis*

Reporter: Doug Gettinger, Kathy Rinlaub and others Phone: (760) 942-4240

Address: Dudek & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: May 13, July 13, 2004 County: Los Angeles Collection: no If yes, # Mus./Herb:

Location: Northern Santa Susana Mountains, Newhall Ranch, northwest of confluence of the Santa Clara River and Castaic Creek, scattered on both sides of Chiquito Canyon.

Quad Name: Val Verde _X_ 7½' __ 15' Elevation: 1000-1300' T 4N R 17W ___¼ of___¼ Sec 15 and 16

Landowner/Manager: Newhall Land and Farming Company, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? _X_ Yes ____ No If not, reason:

Is this a new location record? ____ Yes _X_ No ____ Unknown

Total # of Individuals = ~40 Is this a subsequent visit? _X_ Yes _ No Compared to your last visit: __ more __ same _X_ fewer

Phenology (plants): ___ % vegetative _50_ % flowering _50_ % fruiting

Population Age Structure (animals): ____ # adults ____ # juveniles ____ # others

Site Function for Species (animals): ____ breeding ____ foraging ____ wintering ____ roosting ____ denning ____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

California sagebrush is the predominant vegetation type with *Artemisia californica, Eriogonum fasciculatum,* and *Bromus diandrus* the most common associated species. Soils texture most commonly loam, silt loam, or clay loam. Primarily on north, northwest, and northeast facing slopes with slope gradients typically ranging between 20 degrees and 45 degrees.

Current Land Use/Visible Disturbances/Possible Threats: Land used for cattle grazing and farming. Proposed for commercial/residential development.

Overall Site Quality: ____ Excellent ____ Good _X_ Fair ____ Poor

Comments: This description summarizes 11 discrete locations, each with from 1 to 14 individuals observed. Rainfall was below normal and total population is likely higher.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

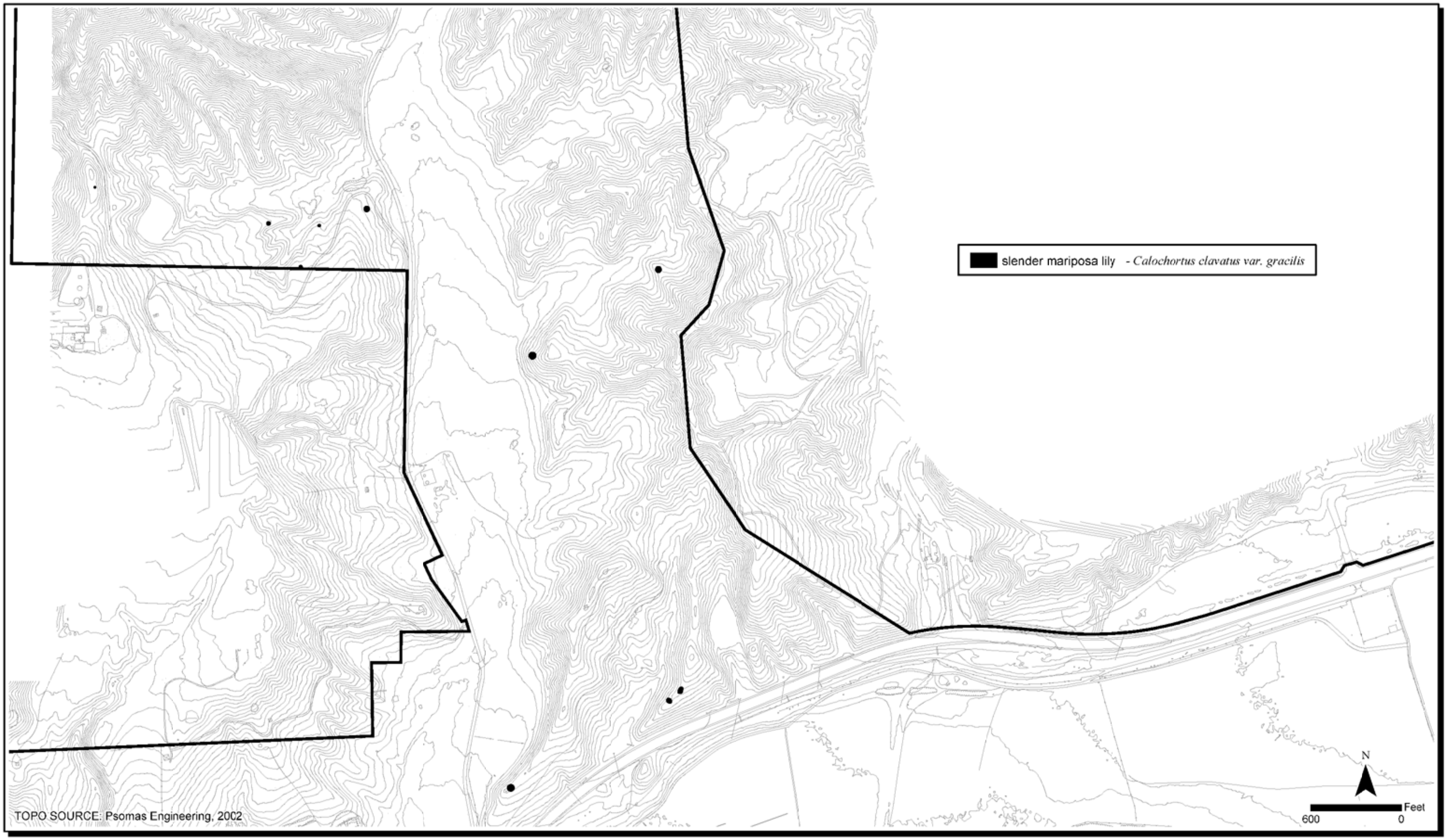
____ Keyed in a site reference:
____ Compared with specimen housed at: RSA
____ Compared with photo/drawing in:
____ By another person (name):
_X_ Other: personal knowledge

OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject	Type
____ Plant/Animal	____ Slide
____ Habitat	____ Print
____ Diagnostic Feature	
____ Other	

May we obtain duplicates **at our cost**?
____ Yes _X_ No



Newhall Ranch

2004 Calochortus Survey Results - San Martinez Grande

FIGURE 1

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ________________ Quad Code ______________
Index Code ________________ Occurrence # ________________
Copy Sent To ____

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Calochortus clavatus* var. *gracilis*

Reporter: Megan Enright and others Phone: (760) 942-5147

Address: Dudek & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: May 3, June 23 - July 7, 2004 County: Los Angeles Collection: no If yes, # Mus./Herb:

Location: Northern Santa Susana Mountains/Santa Clarita Valley, Newhall Ranch, south of confluence of the Santa Clara River and Castaic Creek, eastern, southern, and western edges of Grapevine Mesa and scattered ridges in the area.

Quad Name: Val Verde
_X_ 7½' __ 15' Elevation: 1040-1290' T 17W R 4N _N_ ¼ Sec 3

Landowner/Manager: Newhall Land and Farming Company, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? _X_ Yes ____ No If not, reason:

Is this a new location record? ____ Yes _X_ No ____ Unknown

Total # of Individuals = ~390 Is this a subsequent visit? _X_ Yes _ No Compared to your last visit: __ more __ same _X_ fewer

Phenology (plants): ____ % vegetative _~3_ % flowering _~97_ % fruiting

Population Age Structure (animals): ____ # adults ____ # juveniles ____ # others

Site Function for Species (animals): ____ breeding ____ foraging ____ wintering ____ roosting ____ denning ____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

California sagebrush communities predominate, including black sage, purple sage, and California buckwheat series. Aspect ranges from east to northwest, with most on north-east facing slopes of up to 45%. Soil texture is silt loam or loam.

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, farming; Possible Threats: proposed residential/commercial development.

Overall Site Quality: ____ Excellent ____ Good _X_ Fair ____ Poor

Comments: This report summarizes 19 discrete locations, each with from 1 to an estimated 200 individuals observed. Rainfall was below average and total population is likely greater.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

___ Keyed in a site reference:
___ Compared with specimen housed at:
___ Compared with photo/drawing in:
___ By another person (name):
_X_ Oher: personal knowledge

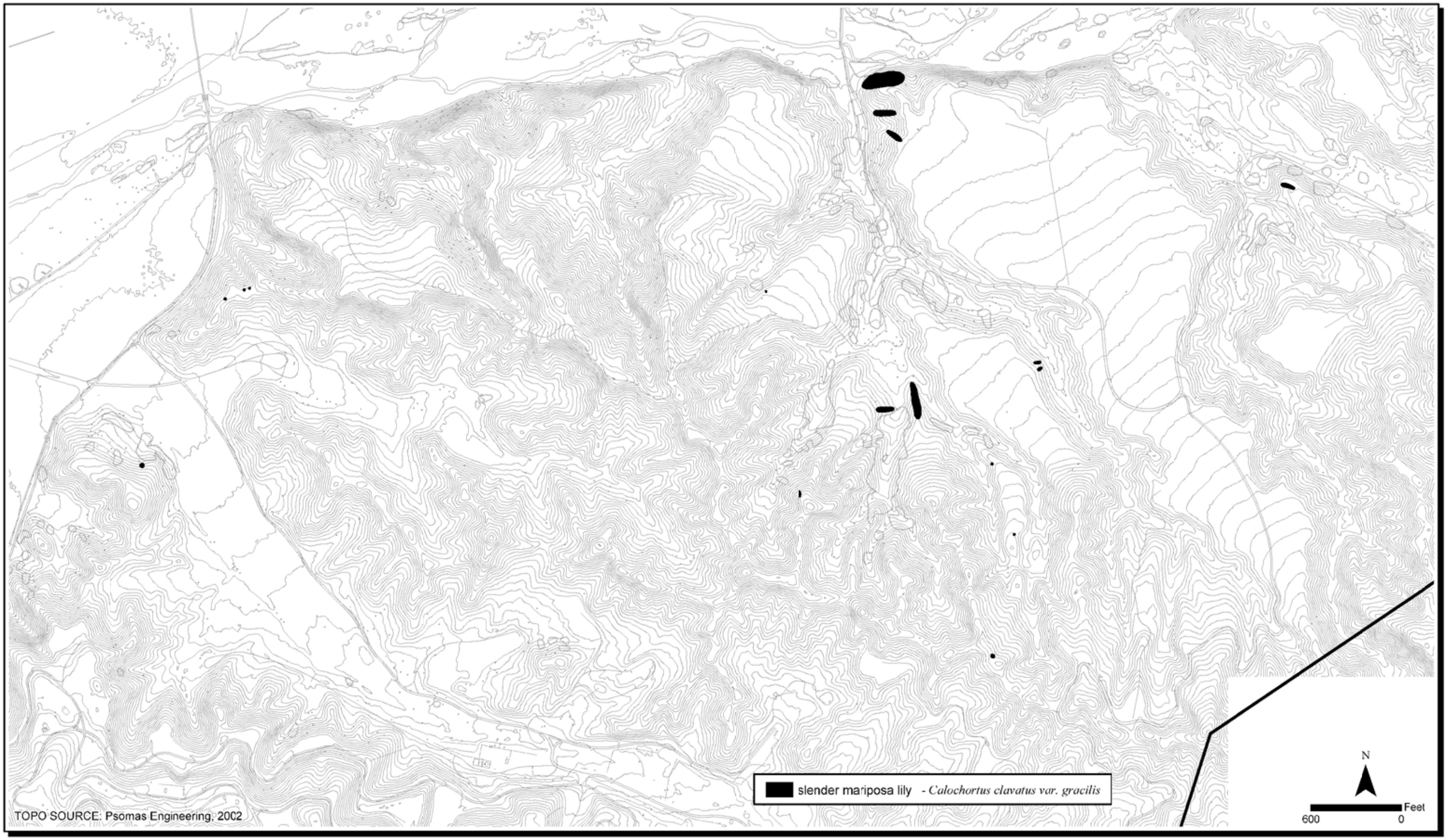
OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject: ___ Plant/Animal; ___ Habitat; ___ Diagnostic Feature; ___ Other

Type: ___ Slide; ___ Print

May we obtain duplicates **at our cost**?
___ Yes _X_ No



Newhall Ranch

2004 Calochortus Survey Results - Grapevine Mesa

FIGURE
1

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ________________ Quad Code ______________
Index Code ________________ Occurrence # ________________
Copy Sent To ____

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Calochortus clavatus* var. *gracilis*

Reporter: Cathleen Weigand, Paul Lemons, and others   Phone: (760) 942.5147

Address: Dudek & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: 11-13 May 2004 County: Los Angeles Collection: no If yes, # Mus./Herb:

Location: Santa Clarita Valley, Newhall Ranch: Homestead and off-Haul Canyons.

Quad Name: Val Verde _X_ 7½' __ 15' Elevation: 1100 - 1200' T 4 N R 17 W NW ¼ Sec 19, 20, 21

Landowner/Manager: Newhall Land and Farming Company, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? _X_ Yes ____ No If not, reason:

Is this a new location record? ___ Yes _X_ No ____ Unknown

Total # of Individuals = _~ 65,000_ Is this a subsequent visit? _X_ Yes_ No Compared to your last visit:__ more __ same _X_ fewer

Phenology (plants): ____ % vegetative _10_ % flowering _90_ % fruiting

Population Age Structure (animals): ____ # adults ____ # juveniles ____ # others

Site Function for Species (animals): ____ breeding ____ foraging ____ wintering ____ roosting ____ denning ____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

Plant communities are predominantly California sagebrush series (55%of individuals) dominated by *Encelia californica, Salvia mellifera,* and *Artemisia californica* and California grassland series (45%) dominated by *Bromus madritensis rubens, Avena fatua,* and *Bromus diandrus.* Clay soils predominate, with some loam. Most plants are on northwest, northeast, or north-facing slopes of up to 30%, although some plants were found on up to 70% slopes.

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, fire in recent past (5-10 years); Possible Threats: Currently proposed for estate residential development.

Overall Site Quality: ____ Excellent ____ Good _X_ Fair ____ Poor

Comments: This report summarizes 53 discrete locations, each with from 1 to an estimated 30,000 individuals observed. Rainfall was below average and total population is likely greater.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

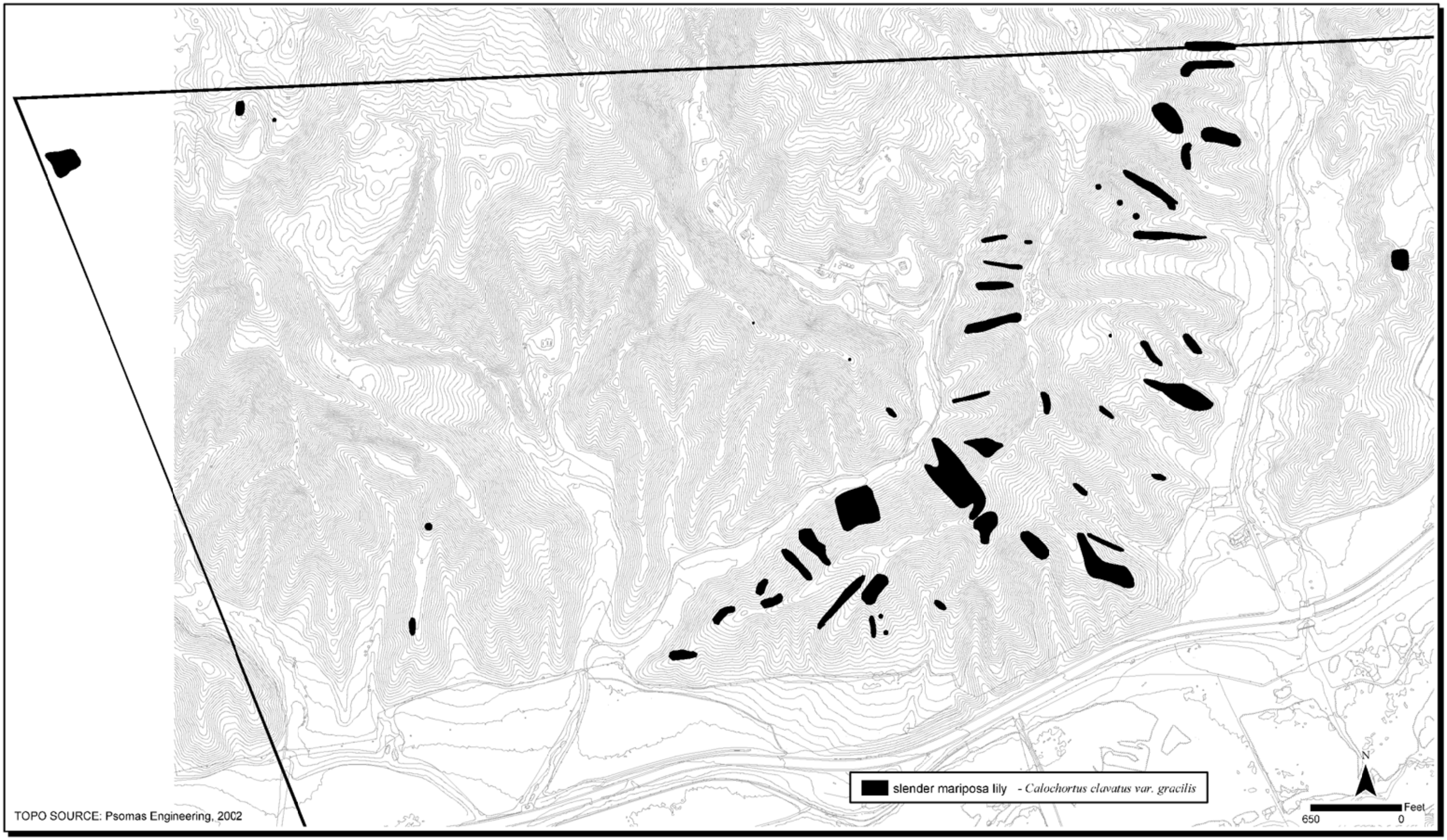
____ Keyed in a site reference:
____ Compared with specimen housed at:
____ Compared with photo/drawing in:
____ By another person (name):
_X_ Other: Personal knowledge

OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject	Type
____ Plant/Animal	____ Slide
____ Habitat	____ Print
____ Diagnostic Feature	
____ Other	

May we obtain duplicates **at our cost**?
___ Yes _X_ No



Newhall Ranch

2004 Calochortus Survey Results - Homestead Canyon

FIGURE 1

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ________________ Quad Code ______________
Index Code _________________ Occurrence # ________________
Copy Sent To ____

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU.
USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Calochortus clavatus* var. *gracilis*

Reporter: Anuja Parikh, Nathan Gale Phone: (760) 942.5147

Address: Dudek & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: July 8, 2004 County: Los Angeles Collection: no If yes, # Mus./Herb:

Location: Northern Santa Susana Mountains/Santa Clarita Valley, Newhall Ranch: south of State Route 126 just east of the Ventura County line, on ridges and north facing slopes throughout Potrero Canyon.

Quad Name: Val Verde and Newhall __X__ 7½' __ 15' Elevation: 1100-1400' 4N R 17W NW ¼ Sec 3

Landowner/Manager: Newhall Land and Farming Company, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? __X__ Yes _____ No If not, reason:

Is this a new location record? ___ Yes __X__ No _____ Unknown

Total # of Individuals = ~2,400 plants Is this a subsequent visit? X Yes__ No Compared to your last visit: X more __same__ fewer

Phenology (plants): _____ % vegetative ___ % flowering __100__ % fruiting

Population Age Structure (animals): _____ # adults _____ # juveniles _____ # others

Site Function for Species (animals): _____ breeding _____ foraging _____ wintering _____ roosting _____ denning _____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

California sagebrush plant communities predominate, with about 85% of the individuals on California sagebrush-blacksage series. Dominant plants include *Salvia leucophylla, Prunus illicifolia,* and *Rhus ovata.* Soil texture is clay loam. Most plants are on northwest, notheast or north facing - slopes, although they occurred on all aspects. Up to 45% slopes are common. Many areas have up to 50% bare ground.

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, fire in recent past (5-10 years); Possible Threats: Proposed for estate residential development.

Overall Site Quality: _____ Excellent _____ Good __X__ Fair _____ Poor

Comments: This report summarizes 56 discrete locations, each with from 1 to an estimated 1000 individuals observed. Rainfall was below average and total population is likely greater.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

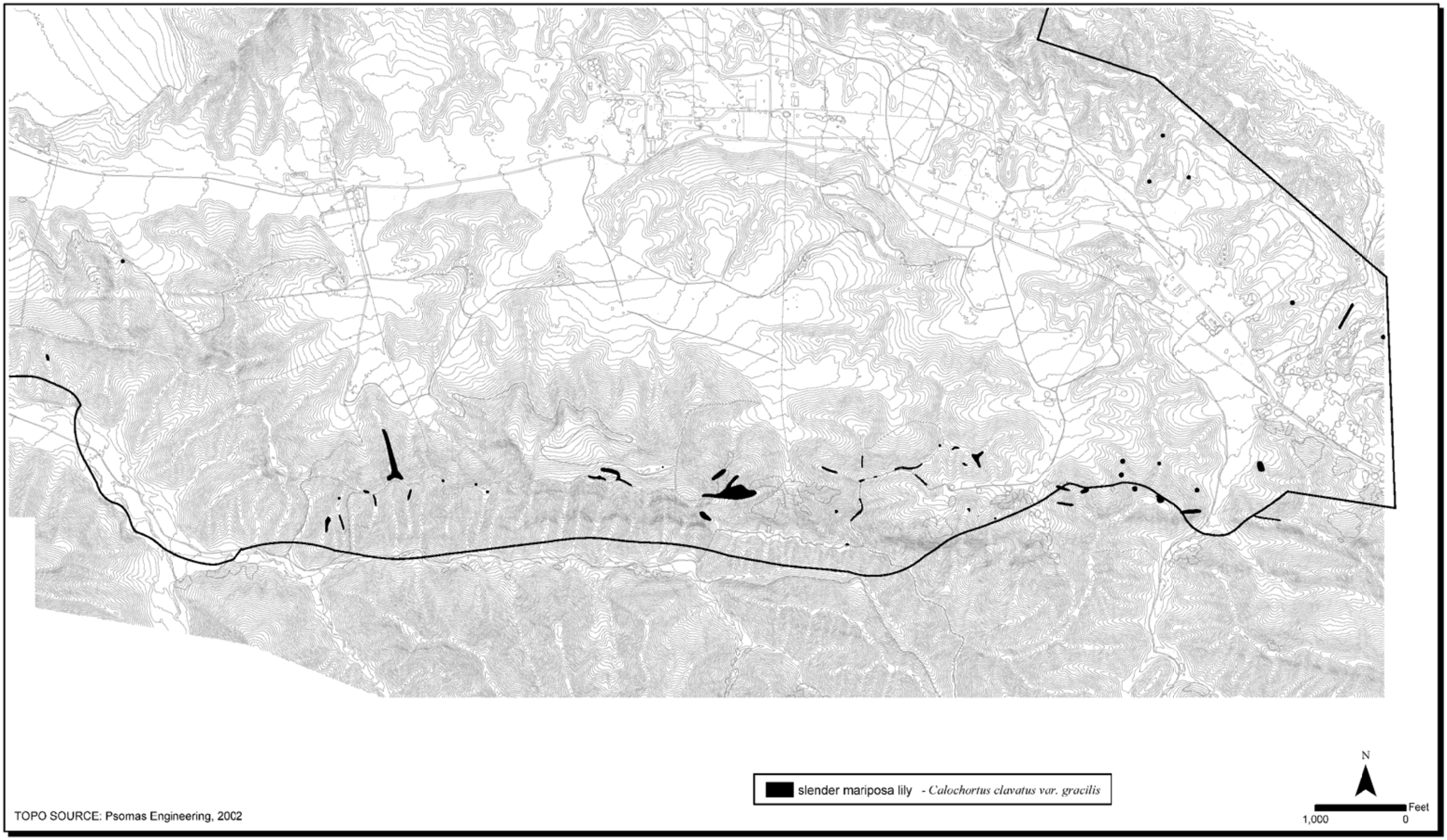
____ Keyed in a site reference: Jepson
____ Compared with specimen housed at: UCR, RSA
_____ Compared with photo/drawing in:
____ By another person (name):
__X__ Oher: personal knowledge

OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject	Type
____ Plant/Animal	____ Slide
___ Habitat	_____ Print
____ Diagnostic Feature	
____ Other	

May we obtain duplicates **at our cost**?
___ Yes __X__ No



Newhall Ranch

2004 Calochortus Survey Results - Potrero Canyon

FIGURE 1

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code _______________ Quad Code _____________
Index Code ________________ Occurrence # _______________
Copy Sent To ____

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Calochortus clavatus* var. *gracilis*

Reporter: Marc Doalson Phone: (760) 942-5147

Address: Dudek & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: July 8, 2004 County: Los Angeles Collection: no If yes, # Mus./Herb:

Location: Northern Santa Susana Mountains, Newhall Ranch, southwest of confluence of the Santa Clara River and Castaic Creek, west to northeastern side of Long Canyon.

Quad Name: Val Verde __X__ 7½' __ 15' Elevation: 1000-1300' T 4N R 17W W ¼ of Sec 3

Landowner/Manager: Newhall Land and Farming Company, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? __X__ Yes _____ No If not, reason:

Is this a new location record? _____ Yes _____ No _____ Unknown ??

Total # of Individuals = 1 Is this a subsequent visit? __X__ Yes __ No Compared to your last visit: __ more __ same __X__ fewer

Phenology (plants): ____ % vegetative _____ % flowering 100 % fruiting

Population Age Structure (animals): _____ # adults _____ # juveniles _____ # others

Site Function for Species (animals): _____ breeding _____ foraging _____ wintering _____ roosting _____ denning _____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

Growing in California sagebrush series, dominated by *Artemisia californica* on a north-facing sloe with a 10% slope and clay loam soil.

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use-Cattle grazing, farming, Visible Disturbances-removal of oil derricks, Possible Threats-proposed residential/commercial development.

Overall Site Quality: _____ Excellent __X__ Good _____ Fair _____ Poor

Comments:

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

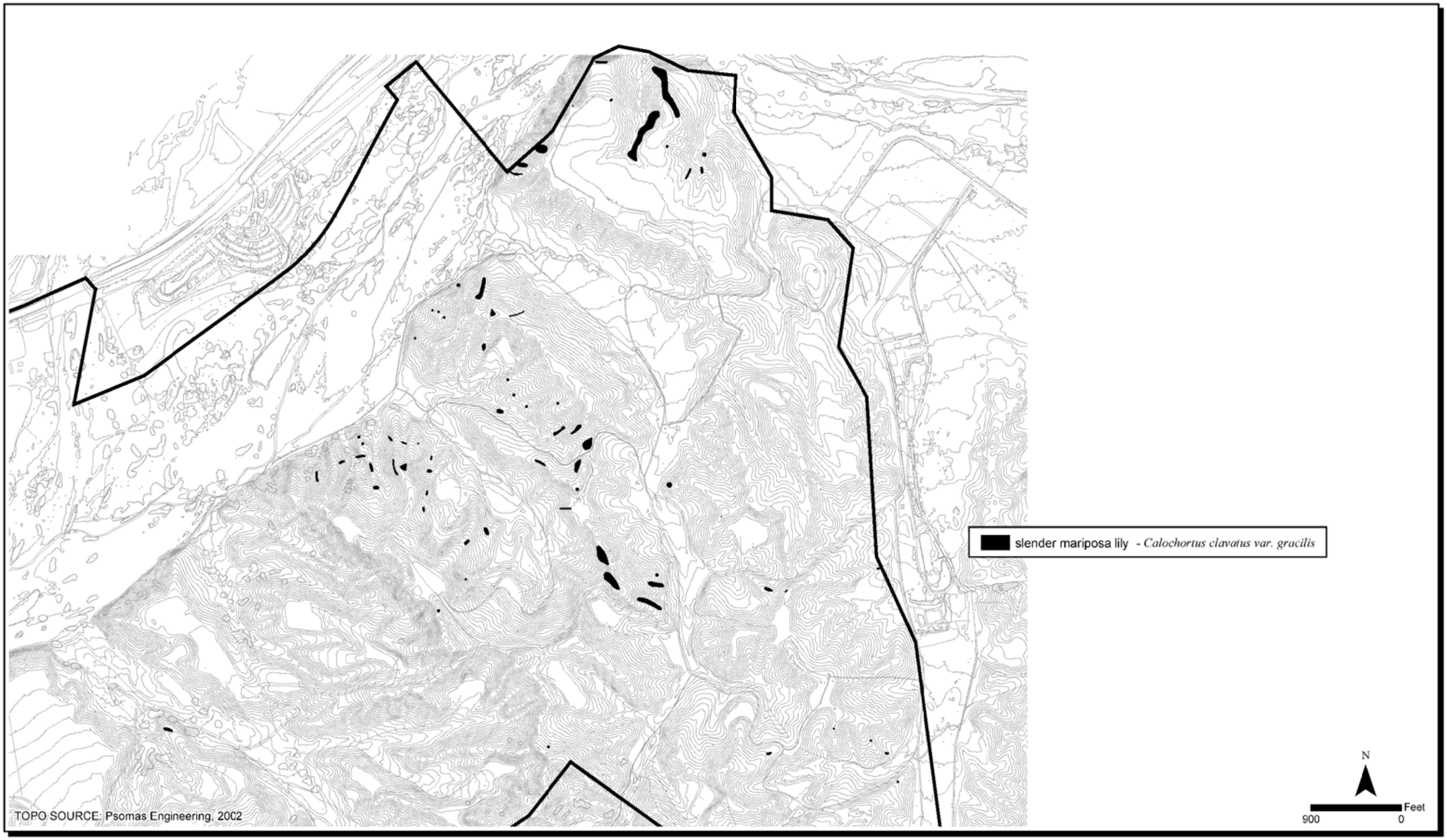
____ Keyed in a site reference:
____ Compared with specimen housed at:
____ Compared with photo/drawing in:
__X__ By another person (name): Andy Sanders
__X__ Other: personal knowledge

OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject	Type
__X__ Plant/Animal	__X__ Slide
__X__ Habitat	____ Print
__X__ Diagnostic Feature	
____ Other	

May we obtain duplicates **at our cost**?
__X__ Yes ____ No



Newhall Ranch

2004 Calochortus Survey Results - Airport Mesa

FIGURE 1

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ________________ Quad Code ______________
Index Code _________________ Occurrence # ________________
Copy Sent To ____

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Gnaphalium sp. nova*

Reporter: Anuja Parikh, Nathan Gale Phone: (760) 942.5147

Address: Dudek & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: June 17 and 19, 2004 County: Los Angeles Collection: no If yes, # Mus./Herb:

Location: Northern Santa Susana Mountains/Santa Clarita Valley, Newhall Ranch: south of State Route 126 just east of the Ventura County line, on ridges and north facing slopes throughout Potrero Canyon.

Quad Name: Val Verde and Newhall __X_ 7½' __ 15' Elevation: 1100-1400' 4N R 17W NW ¼ Sec 3

Landowner/Manager: Newhall Land and Farming Company, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? __X__ Yes _____ No If not, reason:

Is this a new location record? ___ Yes __X__ No _____ Unknown

Total # of Individuals = 726 plants Is this a subsequent visit? X Yes _ No Compared to your last visit___more___ same __X__ fewer

Phenology (plants): _____ % vegetative __100__ % flowering __% fruiting

Population Age Structure (animals): _____ # adults _____ # juveniles _____ # others

Site Function for Species (animals): _____ breeding _____ foraging _____ wintering _____ roosting _____ denning _____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

California sagebrush - black sage series, California grassland series, and California sagebrush - purple sage series, typically with 40% - 60%c non-native cover. Dominant plants asoociated withthe populations include *Artemisia californica, Salvia leucophylla, Centaurea melitensis, Erodium cicutarium, Bromus* spp. and *Eriogonum fasiculatum.* Soil texture is generally clay loam.

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, fire in recent past (5-10 years); Possible Threats: Proposed for estate residential development.

Overall Site Quality: _____ Excellent _____ Good __X__ Fair ___ Poor (based on non-native plant cover)

Comments: This report summarizes 11 discrete locations, each with from 1 to an estimated 500 individuals observed.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

____ Keyed in a site reference: Jepson
____ Compared with specimen housed at: UCR, RSA
_____ Compared with photo/drawing in:
____ By another person (name):
__X__ Other: personal knowledge

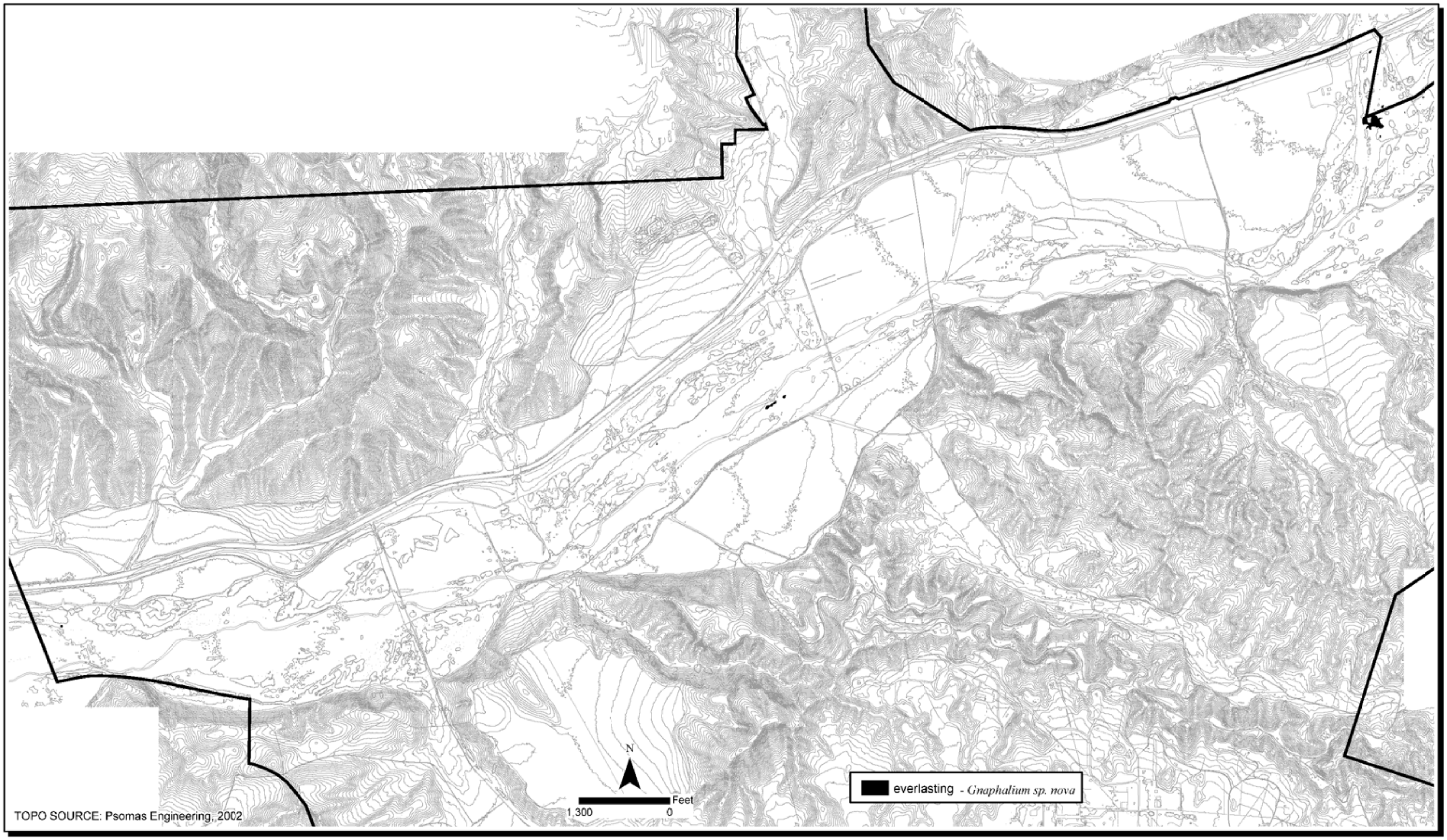
OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject: ____ Plant/Animal; ___ Habitat; ____ Diagnostic Feature; _____ Other

Type: ____ Slide; _____ Print

May we obtain duplicates **at our cost**?
____ Yes __X__ No



Newhall Ranch

2004 Gnaphalium Survey Results - Santa Clarita River

FIGURE 1

2005 Sensitive Plant Survey Results

for

Newhall Ranch Specific Plan Area Los Angeles County, California

Prepared for:

Newhall Land

23823 Valencia Boulevard
Valencia, CA 91355
Contact: Mark Subbotin

Prepared by:

DUDEK
& ASSOCIATES, INC.
Professional Teams for Complex Projects

605 Third Street
Encinitas, CA 92024
Contact: Sherri L. Miller
(760) 479-4244

October 2005

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Newhall Ranch Specific Plan Area

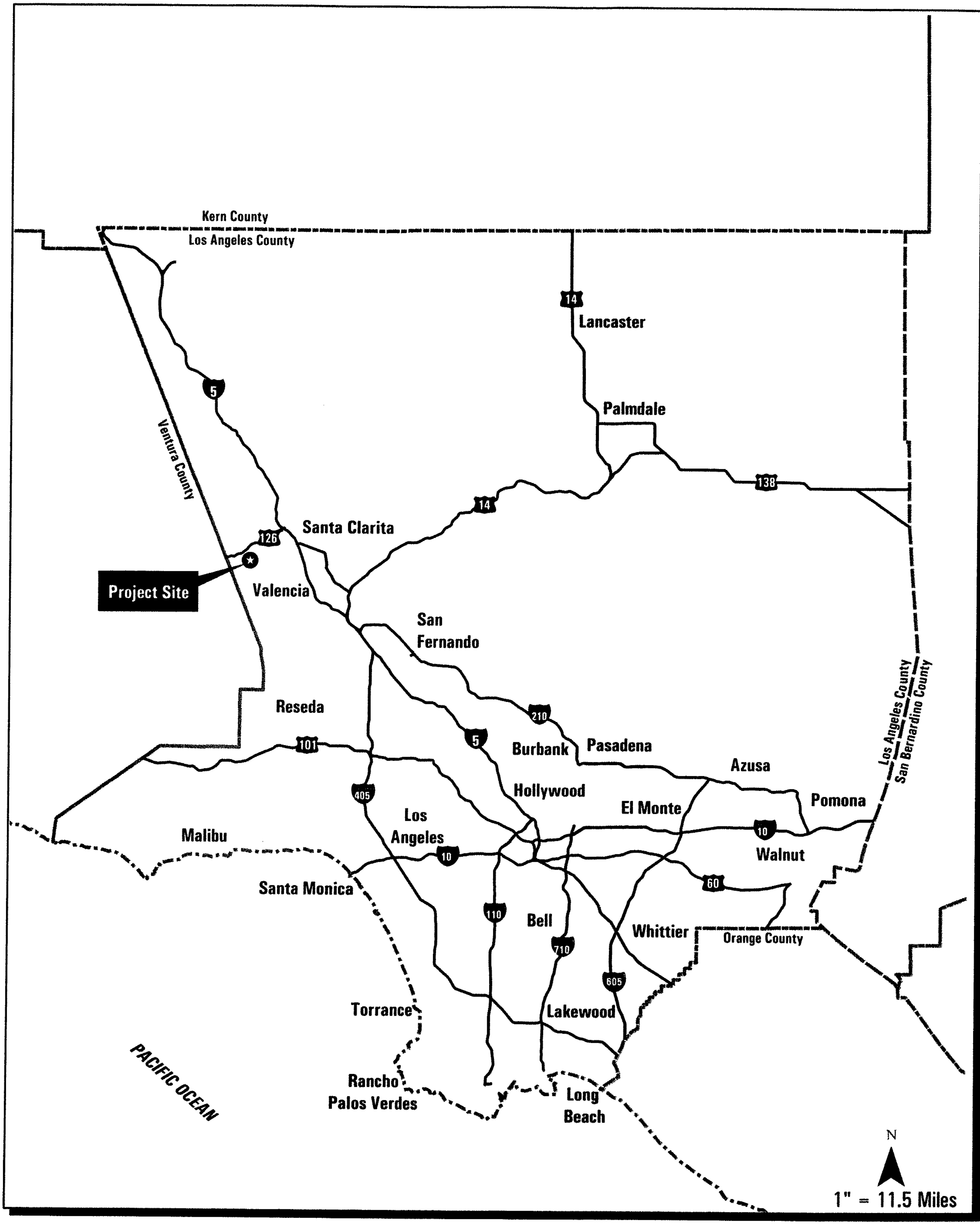
1.0 INTRODUCTION

The purpose of this report is to document the results of surveys for sensitive plant species within the approximately 7,778-acre study area, a subset of the 11,963-acre Newhall Ranch Specific Plan Area (NR SPA), for the 2005 field season. Surveys placed an emphasis on the identification of populations of the state-listed endangered San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina;* SFVS). Other sensitive plant species were recorded if observed onsite.

2.0 SITE DESCRIPTION

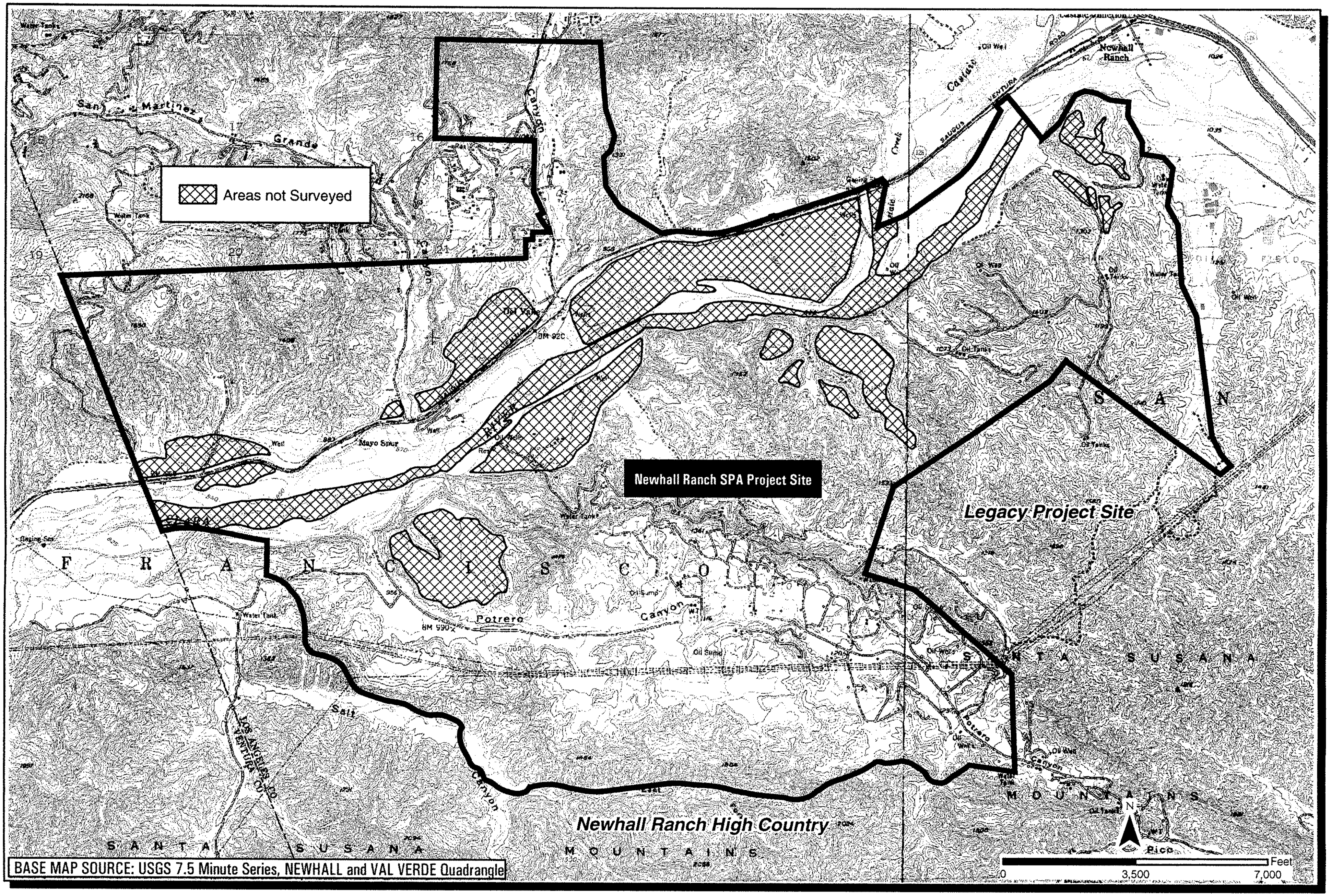
The NR SPA study area is located in an unincorporated portion of the Santa Clara River Valley in northwestern Los Angeles County (*Figure 1*). It lies roughly one-half mile west of Interstate 5 and largely southwest of the junction of I-5 and State Route 126 (SR-126), with portions of the Specific Plan site located in San Martinez Grande and Chiquito canyons north of SR-126. The City of Santa Clarita is located to the east of the study area and the Ventura County/Los Angeles County line lies along the western boundary. Site elevations range from 825 feet above mean sea level (AMSL) in the Santa Clara River bottom at the Ventura County/Los Angeles County line to approximately 3,200 feet AMSL on the ridgeline of the Santa Susana Mountains along the southern boundary (*Figure 2*).

Dudek & Associates, Inc. (Dudek) surveyed for sensitive plant species with varying levels of specificity within areas that are designated for development according to the approved Specific Plan. The NR SPA study area consists of approximately 7,778 acres, with the actual area surveyed containing approximately 6,644 acres. The study area includes areas north of SR-126 between Chiquito Canyon west to the Ventura County line; south of SR-126, it includes areas between the Airport Mesa and Potrero Canyon, including Middle, Dead-End, Lion, Humble, and Long canyons. However, the active channel in the Santa Clara River, agriculture fields (e.g., Potrero Mesa) and areas currently proposed for conservation (most notably the "High Country" area) were excluded from the study area. This study area is dominated by east-, west-, and northwest-trending primary ridges, with north- and south-trending secondary ridges. Site elevations range from approximately 850 feet AMSL in the Santa Clara River floodplain to approximately 2,000 feet AMSL along the ridgeline, which separates Potrero Canyon from Salt Creek Canyon and Grave Canyon.



Newhall Ranch
Regional Map

FIGURE 1



Newhall Ranch
Vicinity Map

FIGURE 2

Slope gradients range from moderate to very steep in the hillside areas to very gentle within the Santa Clara River floodplain, tributary canyons and associated mesas. Distinctive elevated geographic features include Sawtooth Ridge; Razorback Ridge; Windy Gap; Ayers Rock; and Potrero, Grapevine, and Airport Mesas.

2.1 Plant Communities and Land Covers

Native and naturalized habitats within the study area are representative of those found in this region and provide examples of those plant communities found in the Santa Susana Mountains and the Santa Clara River ecosystems. Upland habitats dominate the landscape within the study area both north and south of the Santa Clara River. The majority of the site consists of the following upland plant communities: California sagebrush, California buckwheat, chamise, chamise-mission manzanita- woolyleaf ceanothus, coast live oak, valley oak, and California annual grassland series. The Santa Clara River supports a variety of riparian plant communities. These include Fremont's cottonwood, arroyo willow, mulefat, and arrow weed series along with freshwater marsh and seeps. Intermittent and ephemeral drainages onsite also provide habitat for scalebroom and Great Basin series and alluvial scrubs.

Newhall Land (Newhall) leases out portions of the study area for oil and natural gas production, as well as for cattle grazing and agricultural operations (e.g., food crop production, dryland farming, honey farming). All such operations are currently ongoing. Grazing activities and oil and natural gas production have had a noticeable effect on much of the natural habitat onsite. Scrub habitats have been displaced by non-native grasslands as a result of grazing. Southern California Edison and Southern California Gas Company have distribution lines within easements onsite as well.

2.2 Geology and Soils

Geologically, the study area is located within the Transverse Ranges geomorphic province of southern California in the eastern portion of the Ventura depositional basin. This basin "was produced by tectonic downwarping in the geologic past to produce a large-scale synclinal structure in which a thick sequence of Cenozoic sediments has accumulated. These sediments have been lithified into a sequence of sedimentary rock that has subsequently been uplifted, tilted, and tectonically deformed (Allan E. Seward 2002, 2004)." They are cut by segments of the Del Valle and Salt Creek faults. Bedrock formations found onsite include the Modelo, Towsley, Pico, Saugus, and Pacoima formations, as well as Quaternary Terrace deposits.

Surficial deposits include Quaternary alluvium, slopewash, soil, and artificial fill (Allan E. Seward 2002, 2004).

3.0 SURVEY METHODS

Data regarding botanical resources present on the project site were obtained through a review of the pertinent literature; field reconnaissance; and focused surveys for sensitive species, with varying levels of specificity; all of which are described below.

3.1 Literature Review

General floristic and sensitive botanical resources present or potentially present on the Entrada site were identified through a literature search using the following sources: the California Natural Diversity Database for the Newhall, Santa Susana, Oat Mountain, Mint Canyon, San Fernando, Green Valley, Warm Springs Mountain, Whitaker Peak, Cobblestone Mountain, Piru, Simi, Thousand Oaks, and Val Verde quadrangle maps (CDFG 2004b); 2002 and 2003 Sensitive Plant Survey Results for Newhall Ranch Specific Plan Area (Dudek 2002, 2004a); 2003 Sensitive Plant Survey Results for Valencia Commerce Center, Castaic Mesa, Isola and Ventura Homestead Sites, Magic Mountain Entertainment Center (Entrada) Site, Castaic Junction Site, and Salt Creek (Dudek 2004b-g); 2004 Sensitive Plant Survey Results for Valencia Commerce Center, Entrada Site, Legacy, and Newhall Ranch Specific Plan Area (Dudek 2004h-k); *Biological Resource Assessment of the Proposed Santa Susana Mountains/Simi Hills Significant Ecological Area* (PCR, November 2000); CalFlora (University of California, Berkeley, May 2002); U.S. Fish and Wildlife Service (USFWS 1999); California Department of Fish and Game (CDFG 2002); *Inventory of Rare and Endangered Plants of California* (CNPS 2001); *Vascular Flora of the Liebre Mountains, Western Transverse Ranges, California* (Boyd 1999); *Checklist of Rare Ventura County Plant Species* (Magney 2002); *A Flora of the Santa Barbara Region, California* (Smith 1976); *A Flora of the Santa Monica Mountains* (Raven *et al.* 1986); *Biology of the San Fernando Valley Spineflower, Ahmanson Ranch, Ventura County, California* (Glenn Lukos Associates, Inc. and Sapphos Environmental, Inc. 2000); *Report to the Fish and Game Commission on the Status of San Fernando Valley Spineflower* (CDFG 2001); *Biota Report, Newhall Ranch Specific Plan* (RECON and Impact Sciences, Inc. 1996); and herbarium specimens from Rancho Santa Ana Botanic Garden (RSA) and the University of California, Riverside (UCR) Herbarium. General information regarding vegetation communities was obtained from Holland (1986) and Sawyer and Keeler-Wolf (1995). Plant species nomenclature follows Hickman (1993).

3.2 Field Reconnaissance Methods

Botanical surveys were conducted by Dudek staff biologists, with assistance provided by Anuja Parikh and Nathan Gale of FL*x*. All surveys were conducted on foot. Surveys were conducted in teams of two or more biologists, with at least one senior-level biologist included with each team. Resumes for survey personnel are provided in *Appendix A*.

Botanical surveys of the site were conducted between early May and mid-July of 2005 in accordance with the schedule provided in *Table 1*. A minimum of 880 person-hours (88 person-days) was spent conducting botanical surveys within the study area. Biologists were able to observe reference populations of the state-listed endangered San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*; SFVS) and other sensitive plant species in order to develop a search-image prior to conducting surveys of the project site. Surveys focused on the identification and location of SFVS. Additional sensitive plant species observed during SFVS surveys, including California Native Plant Society (CNPS) List 1B and 4 species, were also recorded.

TABLE 1
Survey Schedule & Personnel Newhall Ranch Specific Plan Area

	BIOLOGISTS	PURPOSE	GENERAL GEOGRAPHIC AREA
5-9-05 to 5-11-05	Nathan Gale, Anuja Parikh	Focused surveys for SFVS; other sensitive plant species noted as observed.	Airport Mesa
5-14-05	Nathan Gale, Anuja Parikh	Focused surveys for SFVS; other sensitive plant species noted as observed.	Airport Mesa
5-16-05	Nathan Gale, Anuja Parikh	Focused surveys for SFVS; other sensitive plant species noted as observed.	Airport Mesa
5-21-05	Nathan Gale, Anuja Parikh	Focused surveys for SFVS; other sensitive plant species noted as observed.	Airport Mesa
5-24-05 to 5-27-05	Nathan Gale, Anuja Parikh	Focused surveys for SFVS; other sensitive plant species noted as observed.	Airport Mesa
5-27-05 to 5-29-05	Sherri Miller, Andy Thomson, Darren Smith, Vipul Joshi	Focused surveys for SFVS; other sensitive plant species noted as observed.	Grapevine Mesa, San Martinez Grande Canyon
5-28-05	Nathan Gale, Anuja Parikh	Focused surveys for SFVS; other sensitive plant species noted as observed.	Airport Mesa

TABLE 1
Survey Schedule & Personnel Newhall Ranch Specific Plan Area

	BIOLOGISTS	PURPOSE	GENERAL GEOGRAPHIC AREA
5-31-05	Nathan Gale, Anuja Parikh	Focused surveys for SFVS; other sensitive plant species noted as observed.	Airport Mesa
6-1-05	Nathan Gale, Anuja Parikh	Focused surveys for SFVS; other sensitive plant species noted as observed.	Airport Mesa
6-2-05 to 6-4-05	Nathan Gale, Anuja Parikh	Focused surveys for SFVS; other sensitive plant species noted as observed.	Airport Mesa
6-6-05 to 6-8-05	Nathan Gale, Anuja Parikh	Focused surveys for SFVS; other sensitive plant species noted as observed.	Potrero Canyon
6-6-05 to 6-9-05	David Flietner, Rebekah Krebs	Focused surveys for SFVS; other sensitive plant species noted as observed.	Grapevine Mesa, Exxon Canyon
6-9-05	Nathan Gale, Anuja Parikh	Focused surveys for SFVS; other sensitive plant species noted as observed.	Potrero Canyon
6-14-05	Nathan Gale, Anuja Parikh	Focused surveys for SFVS; other sensitive plant species noted as observed.	Potrero Canyon
6-14-05	Colin Khoury, Chris Oesch	Focused surveys for SFVS; other sensitive plant species noted as observed.	Exxon Canyon
6-15-05	Sherri Miller, Colin Khoury, Chris Oesch	Focused surveys for SFVS; other sensitive plant species noted as observed.	Exxon Canyon
6-16-05, 6-17-05	Colin Khoury, Chris Oesch	Focused surveys for SFVS; other sensitive plant species noted as observed.	Long Canyon
6-20-05, 6-21-05	Doug Gettinger, Galen Hagen, Kamarul Muri	Focused surveys for SFVS; other sensitive plant species noted as observed.	Long Canyon, Grapevine Mesa
6-22-05, 6-23-05	Doug Gettinger, Galen Hagen	Focused surveys for SFVS; other sensitive plant species noted as observed.	Grapevine Mesa
6-24-05 to 6-26-05	Sherri Miller, Andy Thomson, Darren Smith	Focused surveys for SFVS; other sensitive plant species noted as observed.	Lion Canyon, Long Canyon
6-27-05	Nathan Gale, Anuja Parikh	Focused surveys for SFVS; other sensitive plant species noted as observed.	Potrero Canyon

TABLE 1
Survey Schedule & Personnel Newhall Ranch Specific Plan Area

	BIOLOGISTS	PURPOSE	GENERAL GEOGRAPHIC AREA
6-28-05 to 7-1-05	Colin Khoury, Galen Hagen, Megan Enright	Focused surveys for SFVS; other sensitive plant species noted as observed.	Long Canyon, Grapevine Mesa
6-29-05	Nathan Gale, Anuja Parikh	Focused surveys for SFVS; other sensitive plant species noted as observed.	Potrero Canyon
7-3-05	Nathan Gale, Anuja Parikh	Focused surveys for SFVS; other sensitive plant species noted as observed.	Potrero Canyon
7-5-05	Nathan Gale, Anuja Parikh	Focused surveys for SFVS; other sensitive plant species noted as observed.	Potrero Canyon
7-5-05 to 7-8-05	David Flietner, Galen Hagen, Michelle Balk	Focused surveys for SFVS; other sensitive plant species noted as observed.	Potrero Canyon, Chiquito Canyon
7-6-05	Nathan Gale, Anuja Parikh	Focused surveys for SFVS; other sensitive plant species noted as observed.	Santa Clara River
7-11-05 to 7-14-05	Colin Khoury, Galen Hagen, Marc Doalson	Focused surveys for SFVS; other sensitive plant species noted as observed.	Chiquito Canyon, San Martinez Grande Canyon, Off-Haul Canyon
7-13-05, 7-14-05	Nathan Gale, Anuja Parikh	Focused surveys for SFVS; other sensitive plant species noted as observed.	Potrero Canyon
7-18-05	Nathan Gale, Anuja Parikh	Focused surveys for SFVS; other sensitive plant species noted as observed.	Potrero Canyon
7-18-05 to 7-19-05	Tricia Wotipka, Doug Gettinger, Thomas Liddicoat	Focused surveys for SFVS; other sensitive plant species noted as observed.	Homestead Canyon, Off-Haul Canyons
7-20-05 to 7-22-05	Nathan Gale, Anuja Parikh	Focused surveys for SFVS; other sensitive plant species noted as observed.	Potrero Canyon

All plant species encountered during the field surveys were identified and recorded for inclusion in *Appendix B*. Latin and common names of plants follow *The Jepson Manual* (Hickman 1993) or other recent published taxonomic treatments. Where not listed in Hickman (1993), common names were taken from Abrams (1923). Where not found in this reference, a variety of sources were used (*e.g.*, Abrams 1923, Dale 1986, or Roberts 1998).

Surveys on the NR SPA during the 2005 field season focused on the observation of current year SFVS plants, with observations of other sensitive plant species noted when observed. Surveys for SFVS were focused in open areas of California sagebrush, California sagebrush-purple sage series, California buckwheat and California annual grassland series (Sawyer and Keeler-Wolf 1995) on ridgelines, slopes, and escarpments with a southern, southwestern, or southeastern exposure. This strategy was based on information gathered during the documentation of SFVS populations flagged by CDFG; information gathered during surveys by Dudek for SFVS populations on the Newhall Ranch project site during 2002, 2003 and 2004; information contained in the report prepared by Glenn Lukos Associates, Inc. and Sapphos Environmental, Inc. (2000); the status report prepared for the Fish and Game Commission (CDFG 2000); and conversations with Rick Reifner, the botanist who re-discovered SFVS at Ahmanson Ranch in 1999.

While surveying in the field and mapping SFVS, a four-meter (m) rule was used to separate polygons for mapping purposes. This distance is a heuristic mapping tool based on the topography, vegetation, detectability of the plants, the general accuracy of the GPS, and time constraints. This heuristic criterion is not specifically tied to SFVS biology (*i.e.*, reproductive biology, seed dispersal) and thus is not intended to reflect reproductively isolated sub-populations, the total extent of the SVFS seed bank, or any other feature of the species life history.

The outer perimeter of each spineflower polygon was searched in one continuous direction until returning to the starting point, with plants being located within at least every one to four m along the boundary, and points were stored with a Trimble GPS (that has sub-meter accuracy) manually to form the boundaries of the polygon. GPS points were taken every one to four meters. Each SFVS polygon was given a unique identifier (*i.e.*, numbers and/or letters) in the field. Field data sheets were completed for each of the spineflower polygons that include data on site conditions (*i.e.*, plant number estimates, associated species). Polygons were analyzed in the lab and delineated based on a four m minimum convex polygon rule (all polygons within four m of each other will be joined using GIS software (*e.g.*, ArcGIS, AutoCAD), then delineated as one polygon with the outer boundary represented by a minimum convex polygon.

A modified magnitude scale was used to arrive at an estimate of the number of spineflower individuals (or other sensitive species when observed) within each polygon. After mapping the boundaries of the polygon, the number of individuals were counted/estimated in a rectangular "sample estimation area" (to account for the "clumped" nature of this species), which is a subset of the total polygon. The sample estimation area was between 200 centimeter squared (cm^2)(10 by 20 cm) and two m^2 (one m by two m) depending on various factors regarding the polygon (*e.g.*, size of the polygon, plant densities, variations in plant densities within the polygon). The number of subsets within the total polygon was determined and added/multiplied, resulting in a total estimate of the number of individuals of the polygon (*e.g.*, 4x125=500, 8x12=96, 9x100=900). This number was then rounded to the nearest magnitude or multiple of a magnitude (*e.g.*, 500; 100; 1,000).

Polygons for other sensitive species were mapped with the GPS unit, by drawing polygons on maps with aerial photography and topographic lines, or by a combination of the two. Professional judgment and experience were used to delineate these polygons based on the detectability of the species, topography, and vegetation. Perennial sensitive plants were mapped at a 10 to 20 m scale due to their population dynamics (including seed dispersal and pollination range), observability, habit, habitat limitations, and mapping accuracy. Information regarding the mapping for each sensitive species is included in the sections below (*Sections 4.2.1* through *4.2.10*).

3.2.1 Sensitive Plant Species

Sensitive plant species are those species that have been given special recognition by federal, state, or local conservation agencies and organizations due to limited, declining, or threatened population sizes. This includes those species listed by the state and federal government as threatened or endangered, those species proposed for state and/or federal listing or candidates, those plant species found on Lists 1A, 1B or 2 of the CNPS *Inventory of Rare and Endangered Plants of California* (CNPS 2001; *Inventory*) or CNPS online inventory (http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi), and those plant species which are found on the list of "Threatened and Endangered Species and Species of Concern, Los Angeles County" (http://www.losangelesalmanac.com/topics/Environment/ ev14b.htm). CNPS List 3 or List 4 species were included in discussions only when encountered during the field surveys.

3.2.2 Survey Limitations

Surveys were conducted in the late spring and early summer of 2005. The timing of the surveys was coincident with the blooming period for SFVS and other early blooming annual species. Surveys continued passed the peak bloom period for the SFVS into the summer when SFVS became a highly visible brick red while all of the other plants dried and faded to pale straw colors. Surveying during these two time periods maximized the potential for detection of SFVS during the survey effort.

Surveys for SFVS were concentrated in areas of suitable habitat, which was generally in openings in vegetation and/or on south-facing slopes. Other sensitive species were recorded when observed.

The focused surveys for SFVS were conducted during daylight hours under weather conditions that did not preclude observation of sensitive plant species (*e.g.*, surveys were not conducted during heavy fog or rain).

4.0 RESULTS OF SURVEYS

4.1 Botany - Floral Diversity

The study area is situated at the nexus of the Transverse Ranges, Coast Ranges, Sierra Nevada, Mojave Desert, and coastal plains (Hickman 1993). Ecotone areas such as this are often characterized by higher biological diversity than similar-sized areas within the core of a physiographic region (Boyd 1999). As such, a high diversity of plant species is expected during a year of average rainfall for the area.

At least 562 plant species were identified within the Newhall Ranch study area. Of these, 406 species (72 percent) are native to the region and 156 species (28 percent) are non-native. The cumulative list of plant species identified on the site in 2002, 2003, 2004, and 2005 is provided as *Appendix B*.

4.2 Sensitive Plant Species

A total of eight sensitive plant species were identified within the study area between 2002 and 2005. These and other sensitive species that have the potential to occur within the Newhall Ranch project area, based on the presence of suitable habitat and soils, are listed in *Table 2*. This list is confined primarily to those species listed by the state and federal government as threatened or endangered, those species proposed for state and/or federal listing or candidates, those plant species found on Lists 1A, 1B, or 2 of the CNPS *Inventory of Rare and Endangered Plants of California* (CNPS 2001). Those sensitive species that were observed during the 2005 field surveys are discussed in greater detail below. A number of species found on CNPS Lists 3 or 4 also have the potential to occur onsite (*e.g.*, *Calochortus catalinae*, *Acanthomintha obovata* ssp. *cordata*, *Mucronea californica*); however, due to their relatively low sensitivity level, they are only discussed in the following sections if observed onsite.

TABLE 2
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/ Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Arenaria paludicola	marsh sandwort	FE/SE	1B	dense freshwater marsh/perennial herb/May-August	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrence is in the Santa Ana River. Limited suitable habitat onsite; very low likelihood of occurrence within the study area.
Astragalus brauntonii	Braunton's milk-vetch	FE/None	1B	chaparral, coastal sage scrub, grasslands; often on carbonate substrates/perennial herb/March-July	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrence is in the Simi Hills. Suitable habitat exists onsite. Moderate likelihood of occurrence within study area.
Atriplex coulteri	Coulter's saltbush	None/None	1B	coastal sage scrub and grasslands on alkaline or clay substrate/perennial herb/March-October	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads; however, suitable habitat present onsite. Moderate likelihood of occurrence within study area.
Atriplex serenana var. *davidsonii*	Davidson's saltscale	None/None	1B	coastal bluff scrub and coastal sage scrub on alkaline substrate/annual herb/May-October	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads. *Atriplex serenana var. serenana* observed onsite. Low likelihood of occurrence within the study area.
Baccharis malibuensis	Malibu baccharis	None/None	1B	chaparral, coastal sage scrub, cismontane woodland/ deciduous shrub/August	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads; closest known populations in the western Santa Monica Mountains near Malibu. Not expected to occur within the study area.
Berberis nevinii	Nevin's barberry	FE/SE	1B	chaparral, coastal sage scrub, riparian scrub, cismontane woodland on sandy or gravelly substrate/evergreen shrub/March-April	Not observed during 2005 field season. CNDDB records exist for San Francisquito Canyon at confluence with Santa Clara River; suitable habitat present onsite. Moderate likelihood of occurrence within study area.
Brodiaea filifolia	thread-leaved Brodiaea	FT/SE	1B	clay substrate openings in chaparral, sage scrub, and grasslands/perennial herb (geophyte)/March-June	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrence is in San Dimas. Suitable habitat present onsite. Low likelihood of occurrence within study area.
Calochortus clavatus var. *clavatus*	club-haired mariposa lily	None/None	4	chaparral and coastal sage scrub/ perennial herb (geophyte)/March-May	Not observed during 2005 field season. No CNDDB records exist for Newhall and Val Verde quads. Very low likelihood of occurrence in study area.

TABLE 2
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/ Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Calochortus clavatus var. *gracilis*	slender mariposa lily	None/None	1B	chaparral and coastal sage scrub/perennial herb (geophyte)/March-May	Observed during the 2005 field season on north tending slopes throughout the study area. This species is locally abundant with a total of 180 polygons mapped , containing an estimated 3,093 individuals during the 2005 growing season. CNDDB records also exist for mouth of Pico Canyon.
Calochortus plummerae	Plummer's mariposa lily	None/None	1B	chaparral, coastal sage scrub, cismontane woodland, grasslands on rocky granitic substrate/perennial herb (geophyte)/May-July	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads; however, records exist for the Santa Susana Mountains and Simi Hills. Suitable habitat exists onsite. Moderate likelihood of occurrence within study area.
Calochortus weedii var. *vestus*	late-flowered mariposa lily	None/None	1B	chaparral, cismontane & riparian woodland/perennial herb (geophyte)/ June-August	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads; however, habitat similar to where species occurs in eastern Ventura County is present onsite. This species was observed at the head of the Salt Creek drainage in the Santa Susana Mountains to the southwest during the 2003 field season. Moderate likelihood of occurrence within study area.
Calystegia peirsonii	Peirson's morning-glory	None/None	4	chaparral, coastal sage scrub, cismontane woodland, grassland/ perennial herb/May-June	Observed in chaparral and California sagebrush throughout the survey area.
Calystegia sepium ssp. *binghamiae*	Santa Barbara morning-glory	None/None	1A	marshes and swamps/perennial herb/ April-May	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads; however, limited suitable habitat present onsite. Low likelihood of occurrence within study area.
Centromadia [=*Hemizonia*] *parryi* ssp. *australis*	southern tarplant	None/None	1B	mesic edges of marshes in grasslands/annual herb/May-November	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads; however, suitable habitat present onsite. Low likelihood of occurrence within study area.
Cercocarpus betuloides var. *blancheae*	island mountain-mahogany	None/None	4	chaparral, closed-cone coniferous forest/evergreen shrub/February-May	Observed in mixed chaparral in the study area during the 2005 field season.

2004 Sensitive Plant Survey Results
Newhall Ranch Specific Plan Area

TABLE 2
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/ Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Chorizanthe parryi var. *fernandina*	San Fernando Valley spineflower	FC/SE	1B	Coastal sage scrub, sandy soils/annual herb/April-June	Observed onsite in five general areas within the survey area: Airport Mesa, Grapevine Mesa, Long Canyon, Potrero Canyon, and San Martinez Grande Canyon. A total of 301 polygons were mapped with an estimated 6,249,926 individuals during the 2005 growing season.
Deinandra [=*Hemizonia*] *minthornii*	Santa Susana tarplant	None/SR	1B	chaparral and coastal sage scrub on rocky substrate/deciduous shrub/July-November	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads; however, records exist for the Simi Hills and Oat Mountain. Suitable habitat exists onsite. Moderate likelihood of occurrence within study area.
Delphinium parryi ssp. *blochmaniae*	dune larkspur	None/None	1B	maritime chaparral, coastal dunes/ perennial herb/ April-may	Not observed during 2005 field season. No likelihood of occurrence.
Dodecahema leptoceras	slender-horned spineflower	FE/SE	1B	Alluvial scrub on sandy substrate/annual herb/April-June	Not observed during 2005 field season; however, Santa Clara River bottom excluded from survey area. Historic CNDDB records exist for the Newhall or Val Verde quads in alluvial habitat similar to those present onsite. Moderate likelihood of occurrence within study area.
Dudleya blochmaniae var. *blochmaniae*	Blochman's dudleya	None/None	1B	clay openings in chaparral and coastal sage scrub, grasslands/perennial herb/April-June	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads. Suitable habitat present onsite. Low likelihood of occurrence within study area.
Dudleya cymosa ssp. *marcescens*	marcescent dudleya	FT/CR	1B	chaparral, often on volcanic substrate/perennial herb (geophyte)/ April-June	Not observed during 2005 field season. No CNDDB records exist for Newhall and Val Verde quads. Unidentified *Dudleya cymosa* observed on vertical sandstone cliffs and slopewash in 2002 are actually *D. lanceolata*, a common species. Low likelihood of occurrence within study area.
Dudleya cymosa ssp. *Ovatifolia*	Santa Monica Mountains dudleya	FT/None	1B	chaparral and coastal sage scrub, often on volcanic substrate/perennial herb (geophyte)/April-June	Not observed during 2005 field season. No CNDDB records exist for Newhall and Val Verde quads. Unidentified *Dudleya cymosa* observed on vertical sandstone cliffs and slopewash in 2002 are actually *D. lanceolata*, a common species. Low likelihood of occurrence within study area.

TABLE 2
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/ Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Dudleya multicaulis	many-stemmed dudleya	None/None	1B	coastal bluff scrub, coastal sage scrub, valley and foothill grassland, rocky, often clay substrate/perennial herb/ April-June	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads; closest known occurrences are in Calabasas and San Dimas. Suitable habitat exists onsite. Moderate likelihood of occurrence within study area.
Dudleya parva	Conejo dudleya	FT/None	1B	coastal sage scrub and grassland on rocky, gravelly clays/perennial herb/May-June	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads. Suitable habitat exists onsite. Low likelihood of occurrence within study area.
Erodium macrophyllum	round-leaved filaree	None/None	2	cismontane woodland and grasslands on clay substrate/annual herb/March-May	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads; however records exist for Simi Valley, and this plant was observed in the hills east of Castaic Lake in 2003. Suitable habitat present onsite; moderate likelihood of occurrence in study area.
Helianthus nuttallii ssp. *parishii*	Los Angeles sunflower	None/None	1A	marshes and swamps/perennial herb/ August-October	Not observed within study area during 2005 field season. A *Helianthus* population, discovered in 2002 at Castaic Spring, on the south side of the Santa Clara River between Middle Canyon and San Jose Flats, was determined by some experts to be this species, but determined by other experts not to be this species. Based on pollen electron microscopy and chromosome counts, it is likely that the Newhall *Helianthus* species is a hybrid between *H. nuttallii* and *H. californicus* or an intermediate evolutionary step between the two species (Porter and Fraga 2004). No suitable habitat observed in study area.
Horkelia cuneata var. *puberula*	mesa horkelia	None/None	1B	chaparral, cismontane woodland, coastal sage scrub on sandy or gravelly substrate/perennial herb/February-December	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads. Suitable habitat present onsite. Low likelihood of occurrence within study area.

TABLE 2
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/ Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Juglans californica	southern California black walnut	None/None	4	chaparral, cismontane woodland, coastal sage scrub, alluvial scrub/ deciduous tree/March-May	Not observed onsite during 2005 field season. Observed in past years's surveys in California sagebrush and chaparral onsite. High likelihood of occurrence in study area.
Juncus acutus ssp. *leopoldii*	southwestern spiny rush	None/None	4	coastal dunes, meadows, seeps, marshes, and swamps/ perennial herb/May-June	Observed in mesic riparian areas onsite.
Malacothamnus davidsonii	Davidson's bush mallow	None/None	1B	chaparral, coastal sage scrub, riparian woodland/ deciduous scrub/June-January	Not observed during 2005 field season. Nearest occurrences are in San Fernando and Sunland. Suitable habitat present onsite. Moderate likelihood of occurrence within study area.
Nama stenocarpum	mud nama	None/None	2	edges of lakes, rivers, ponds, vernal pools/annual/January-July	Not observed during 2005 field season. Moderate likelihood of occurrence on banks of Santa Clara River and other mesic areas onsite. No CNDDB records exist for the Newhall or Val Verde quads. Limited suitable habitat present onsite. Low likelihood of occurrence within study area.
Nemophila parviflora var. *quercifolia*	oak-leaved nemophila	None/None	4	cismontane woodland, lower montane coniferous forest/annual herb/may-June	Not observed onsite during 2005 field season. Observed in past years's surveys in oak woodland east of Grapevine Mesa. High likelihood of occurrence in study area.
Nolina cismontana	chaparral nolina	None/None	1B	chaparral, coastal sage scrub on sandstone or gabbro substrate/ perennial shrub/May-July	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads. Suitable habitat present onsite. Low likelihood of occurrence within study area.
Opuntia basilaris var. *brachyclada*	short-joint beavertail	None/None	1B	chaparral, Joshua tree woodland, Mojavean desert scrub/succulent shrub/ April-June	Not observed during 2005 field season. This plant was identified as onsite by Dudek in 2002; however, recent investigations indicate that the *Opuntia basilaris* plants on Newhall Ranch are not *O. basilaris* var. *brachyclada*, but are *O. basilaris* var. *ramosa*.
Pentachaeta lyonii	Lyon's pentachaeta	FE/SE	1B	openings in chaparral and coastal sage scrub, grasslands/annual herb/March-August	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrences are in the Simi Valley. Suitable habitat present onsite. Moderate likelihood of occurrence within study area.
Rorippa gambelii	Gambel's watercress	FE/ST	1B	Marsh and swamps (freshwater and brackish)/ perennial herb/April-June	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads. Limited suitable

TABLE 2
Sensitive Plant Species Observed or Potentially Occurring at Newhall Ranch

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/ Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
					habitat present onsite. Low likelihood of occurrence within study area.
Senecio aphanactis	rayless ragwort	None/None	2	chaparral, coastal sage scrub, cismontane woodland on alkaline substrate/annual herb/January-April	Not observed during 2005 field season. Historic CNDDB record for Saugus, south of Santa Clara River. Suitable habitat onsite. Moderate likelihood of occurrence within study area.
Sidalcea neomexicana	salt spring checkerbloom	None/None	2	chaparral, coastal sage scrub, and playas on alkaline substrate/perennial herb/March-June	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads; suitable habitat present onsite. Moderate likelihood of occurrence within study area.
Thelypteris puberula var. *sonorensis*	Sonoran maiden fern	None/None	2	meadows and seeps/perennial herb/ fertile January-September	Not observed during 2005 field season. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrence at Point Dume. Limited suitable habitat present onsite. Low likelihood of occurrence within study area.

Legend

FE:	Federally-listed as endangered	CNPS List 1A:	Plants presumed extinct in California
FT:	Federally-listed as threatened	CNPS List 1B:	Plants rare, threatened, or endangered in California and elsewhere
FC:	Federal candidate for listing	CNPS List 2:	Plants rare, threatened, or endangered in California but more common elsewhere
SC:	State candidate for listing	CNPS List 3:	Plants about which we need more information – a review list
SE:	State-listed as endangered	CNPS List 4:	Plants of limited distribution – a watch list
ST:	State-listed as threatened		
SR:	State-listed as rare		

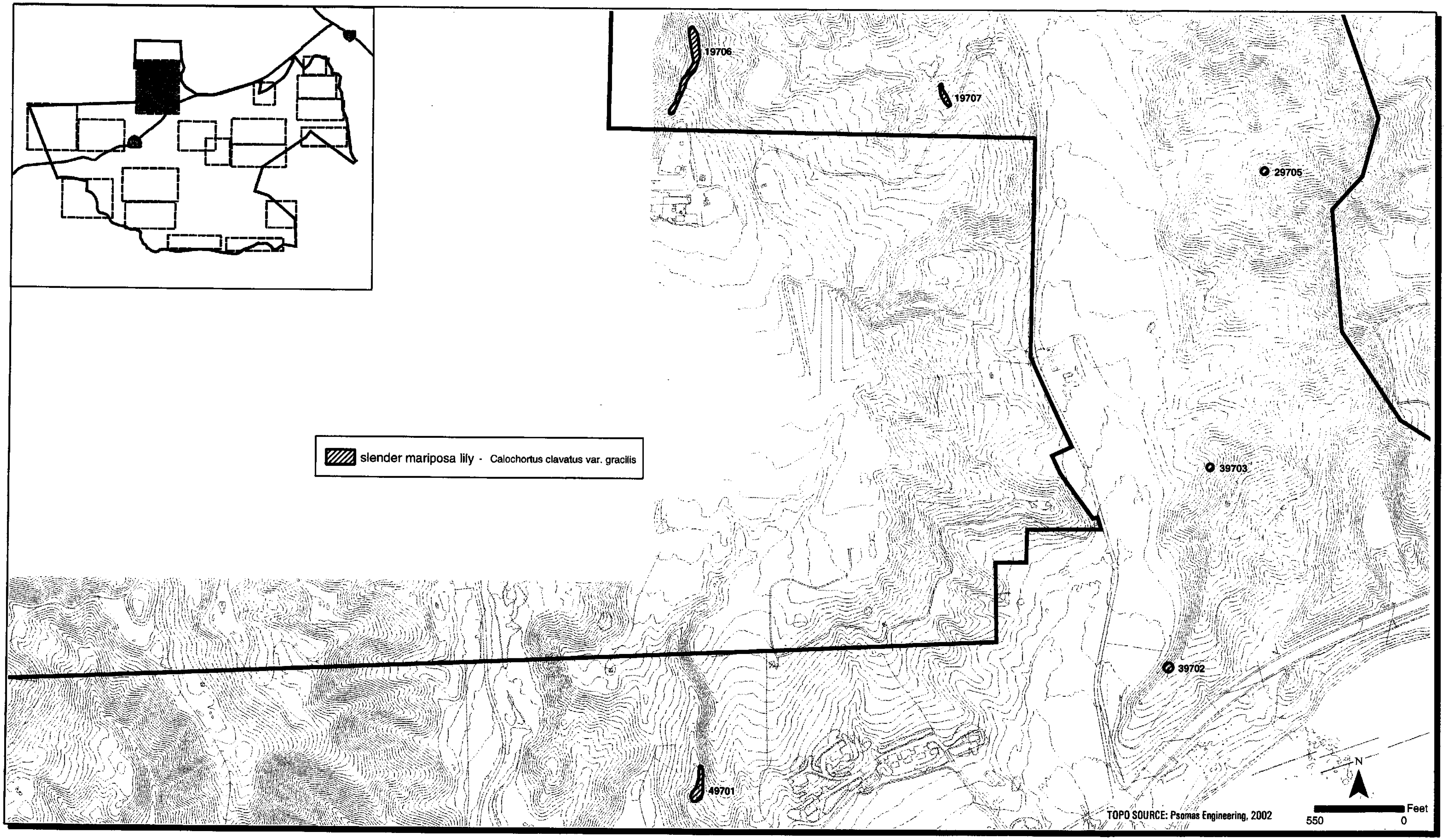
Figures 3 through 20 depict the locations of sensitive species, including SFVS, on the NR SPA. Labels for each of the polygons in the figures correlate with those in *Tables 3* through *8,* which contain estimates for the numbers of individuals within each polygon. Any additional information regarding the mapping for each sensitive species is included in the sections below (*Sections 4.2.1* through *4.2.6*).

4.2.1 Calochortus clavatus var. gracilis (slender mariposa lily)

Slender mariposa lily has no state or federal status but is a CNPS List 1B plant. It is typically found in chaparral, coastal sage scrub, and grasslands, often on clay, and/or rocky soils. It has been documented to occur at the mouth of Pico Canyon and other canyons in the vicinity (Newhall Quad; CNDDB 2002). Other varieties of this species documented from southern California include: club-haired mariposa lily (*Calochortus clavatus* var. *clavatus*) and pale mariposa lily (*C. clavatus* var. *pallidus*). The club-haired mariposa lily differs in that it is virtually a serpentine endemic (restricted to serpentine soils) and a very robust species, generally attaining a height of one m. Pale mariposa lily differs in that the petals are a paler yellow, the anthers are paler (yellow to pale purple), and the hairs on the petals are not as knobby or club shaped. Neither the club-haired mariposa lily nor pale mariposa have a prominent red line above the nectary on the petal, as is the case with the slender mariposa lily.

Multiple polygons of mariposa lily were mapped within the study area by drawing boundaries on aerial photograph field maps around the areas that contained the mariposa lily. Surveys within the study area were conducted during and after the blooming season for the slender mariposa lily; therefore, some estimates were made based on the number of fruiting individuals observed The fruiting individuals were much more cryptic than the flowering plants; therefore, it is expected that only a portion of the plants that were in flower earlier were observed. It is not possible to estimate what portion was observed. Moreover, geophytes like *Calochortus* generally only have a percentage of the plants flower in any given year, and the non-flowering individuals are generally not as visible.

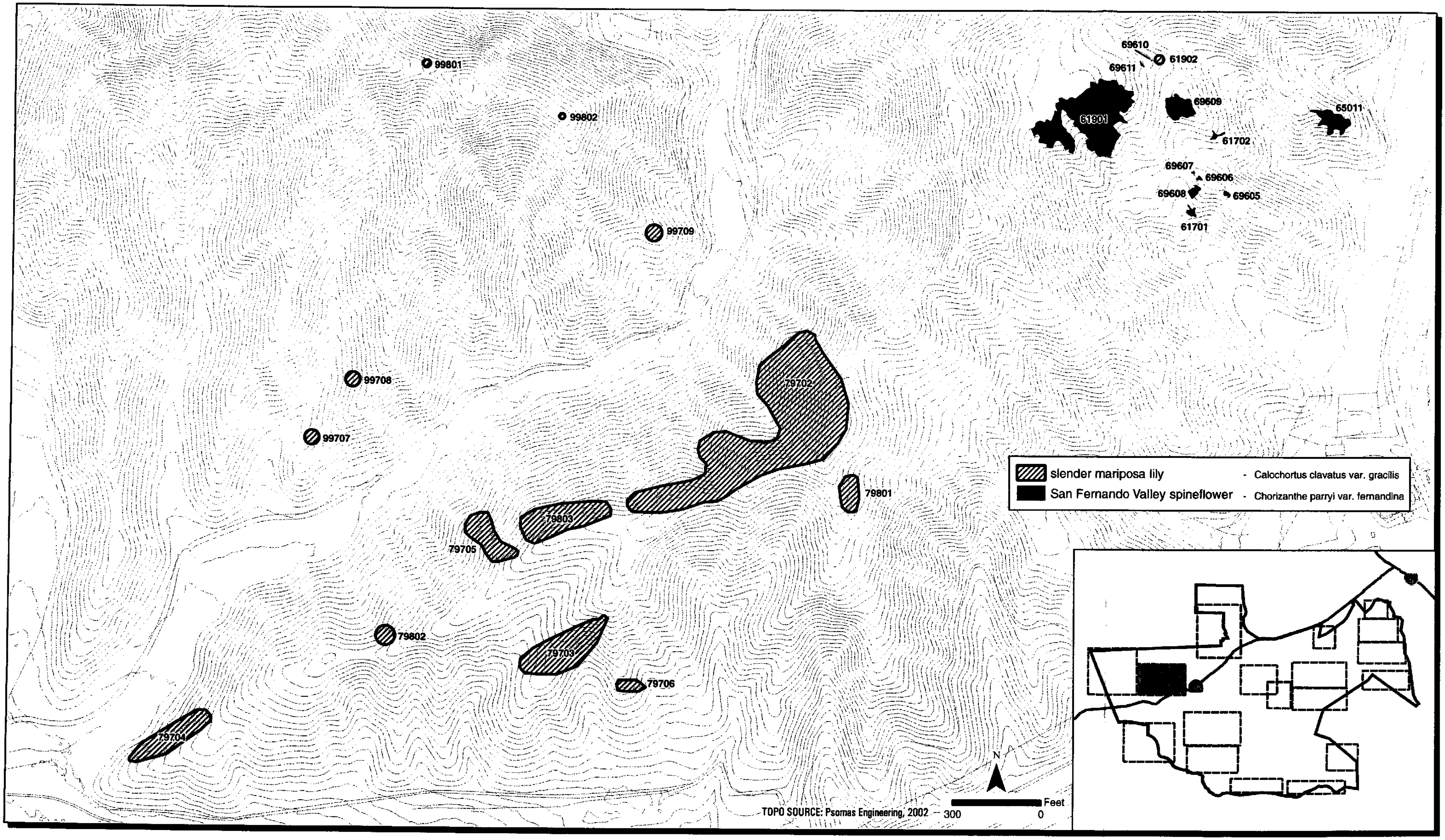
Within the NR SPA study area, the slender mariposa lily was found primarily on east, northeast, and southwest-facing ridges and slopes in California sagebrush, California buckwheat and California annual grassland series (*Figures 3* through *15* and *17* through *20*). The plants were generally mapped in areas of high vegetative cover and a variety of soil types (*e.g.,* gravelly loam, sandy loam, rocky clay). This species is locally abundant within the NR SPA study area: a total of 180 polygons were mapped with a polygon size ranging from 58 to 158,058 square feet. The estimated number of individuals within each polygon ranges from 1 to 700, with a total



Newhall Ranch

2005 Sensitive Plant Survey Results

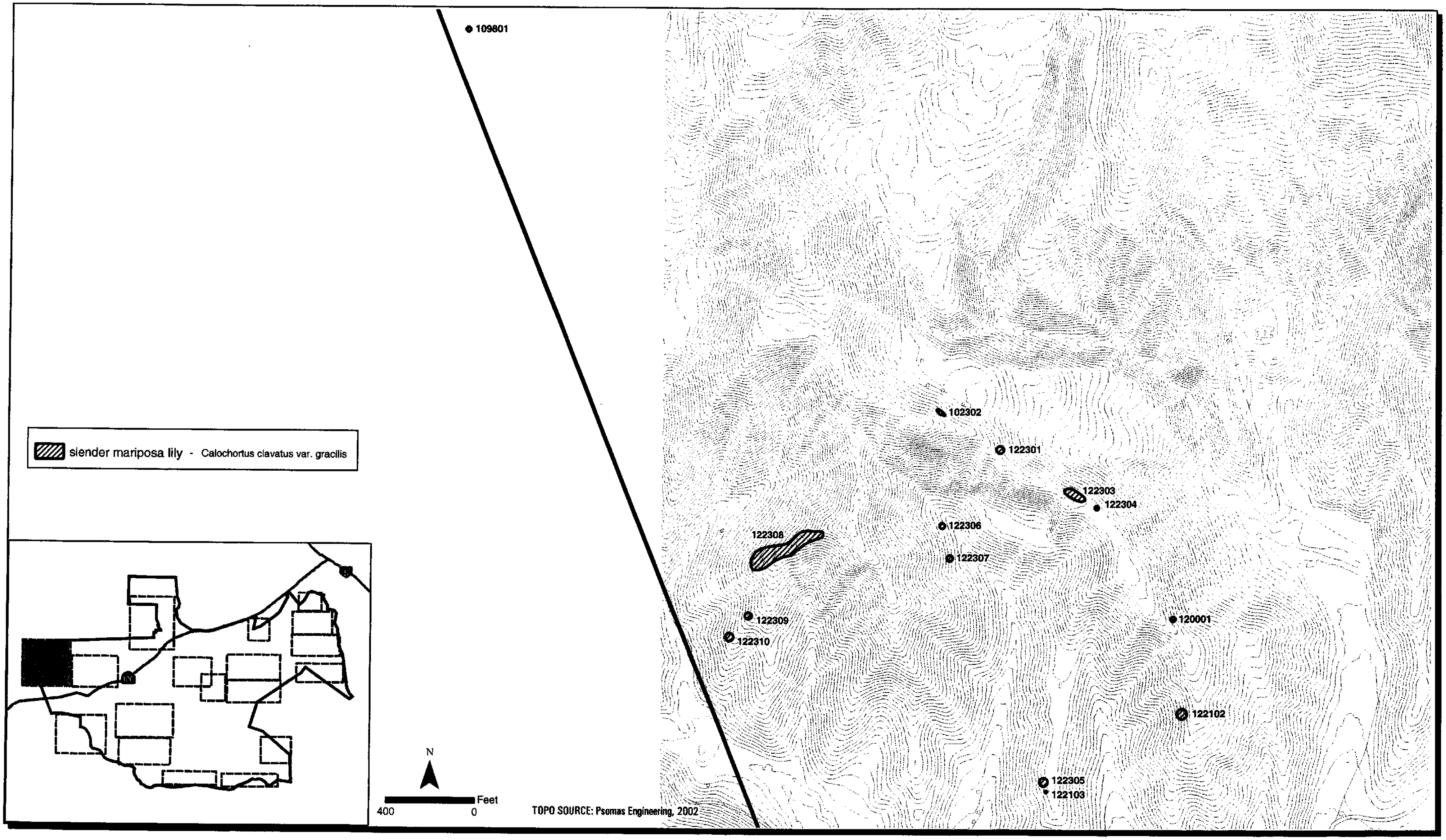
FIGURE 3



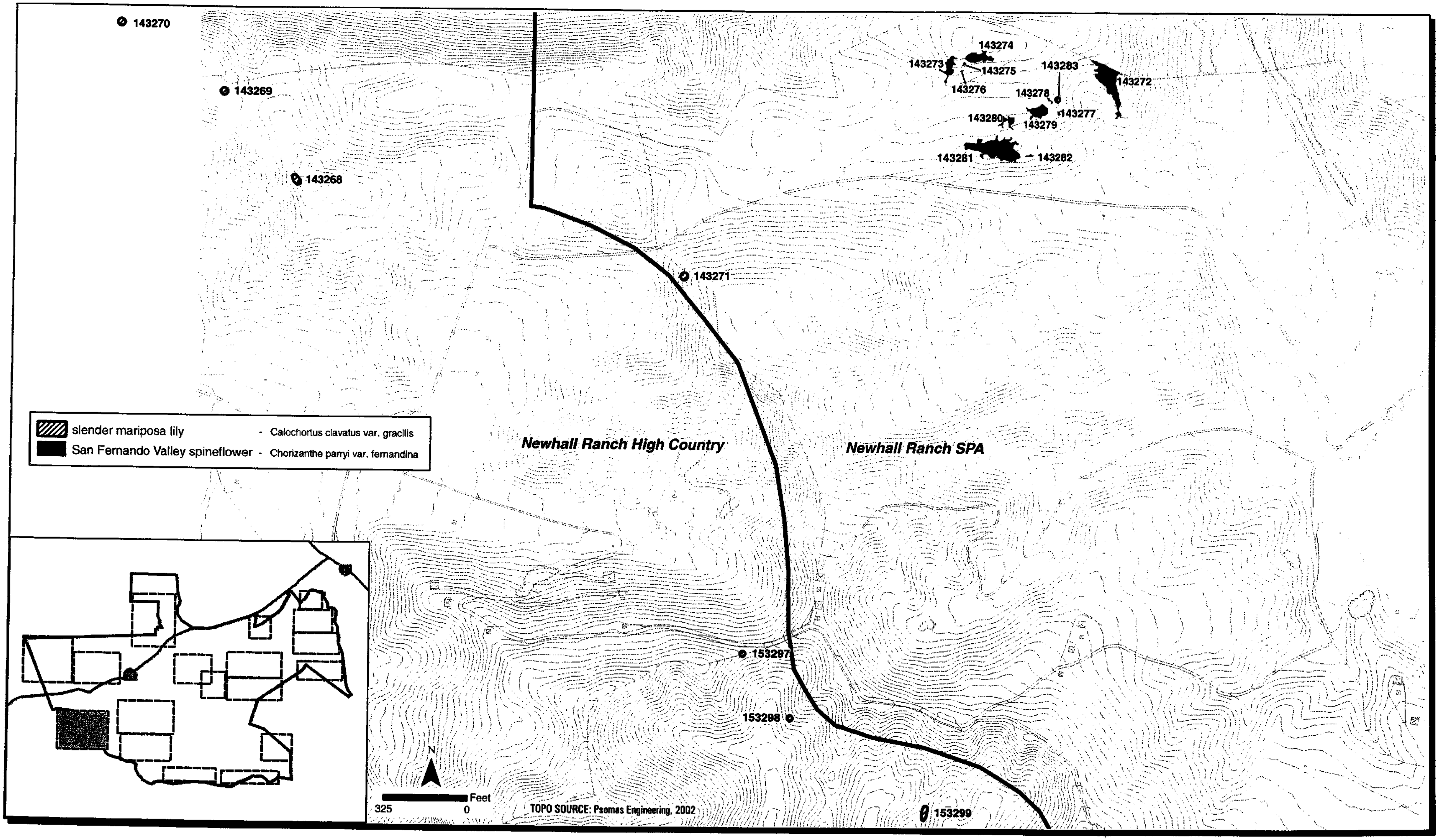
Newhall Ranch

2005 Sensitive Plant Survey Results

FIGURE 4

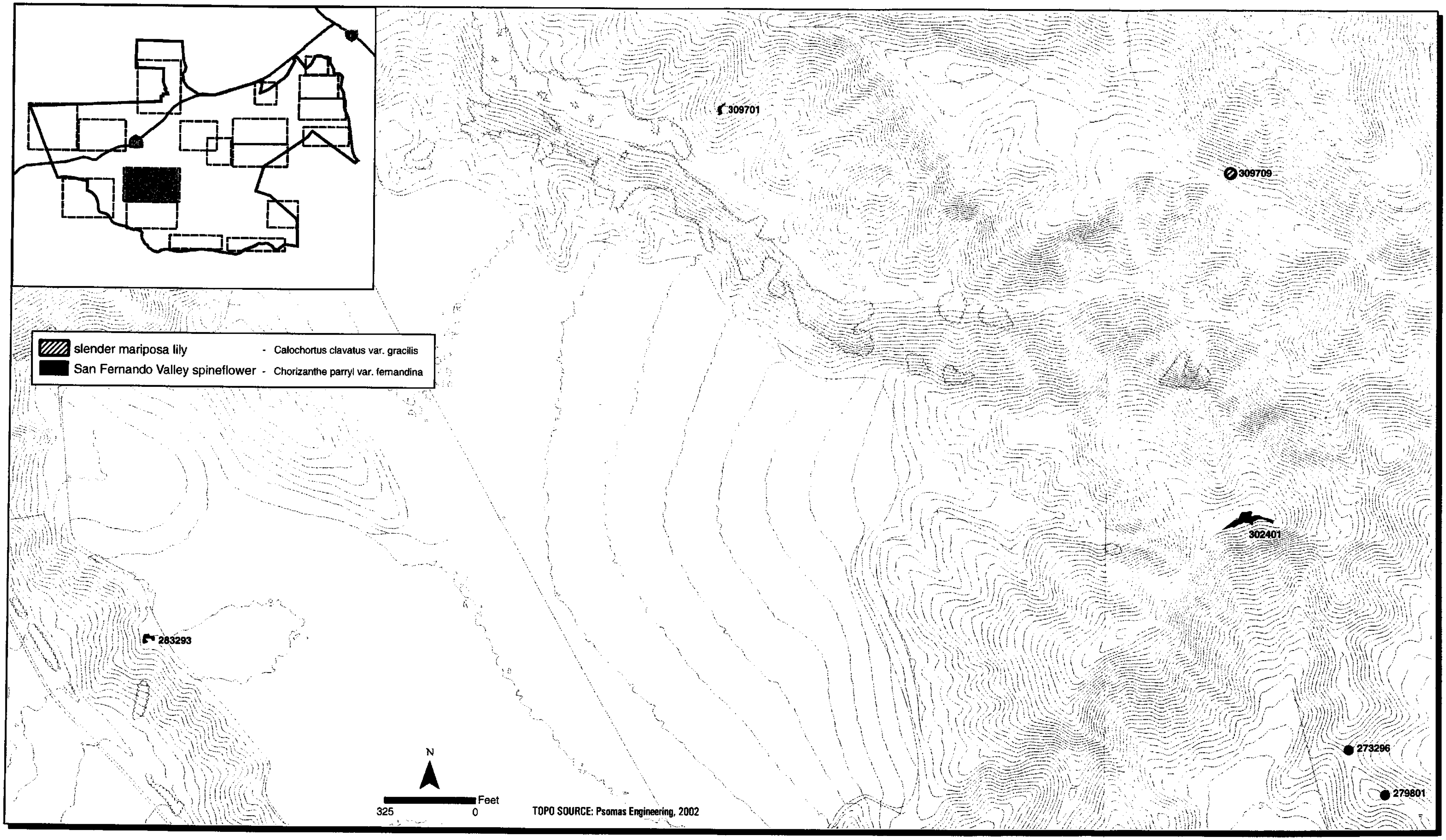


Newhall Ranch
2005 Sensitive Plant Survey Results
FIGURE 5



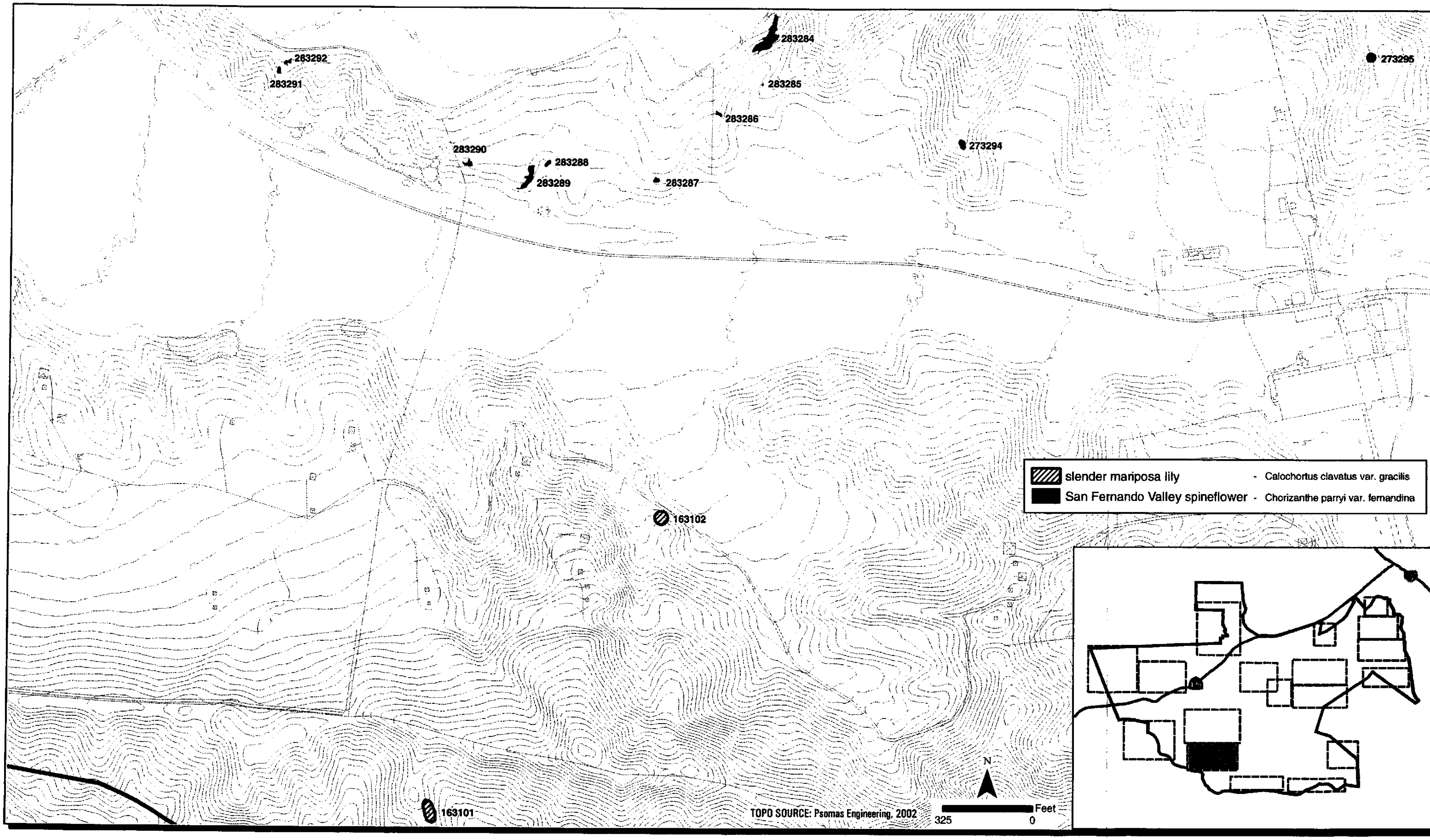
Newhall Ranch
2005 Sensitive Plant Survey Results

FIGURE
6



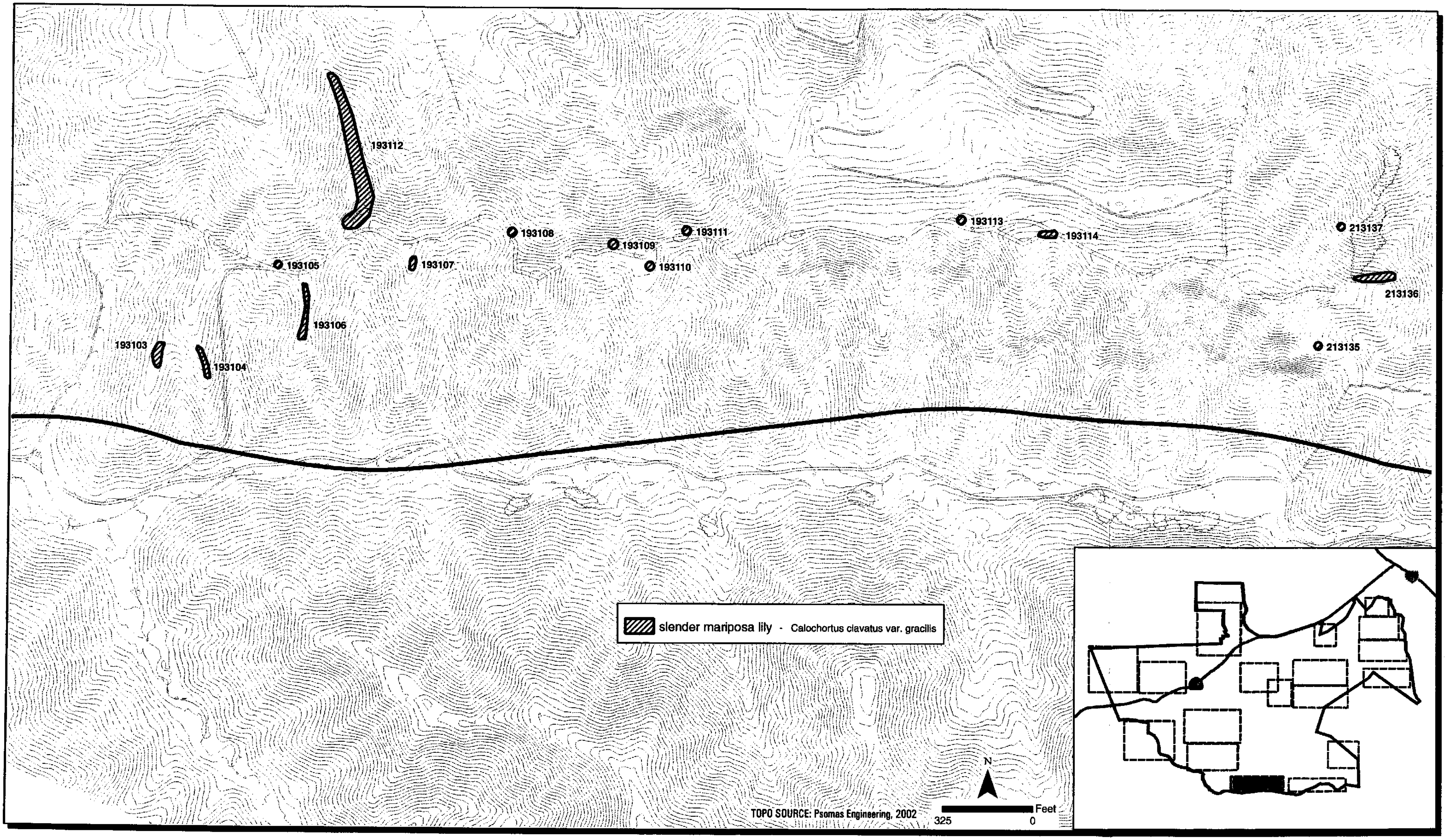
Newhall Ranch
2005 Sensitive Plant Survey Results

FIGURE
7



Newhall Ranch
2005 Sensitive Plant Survey Results

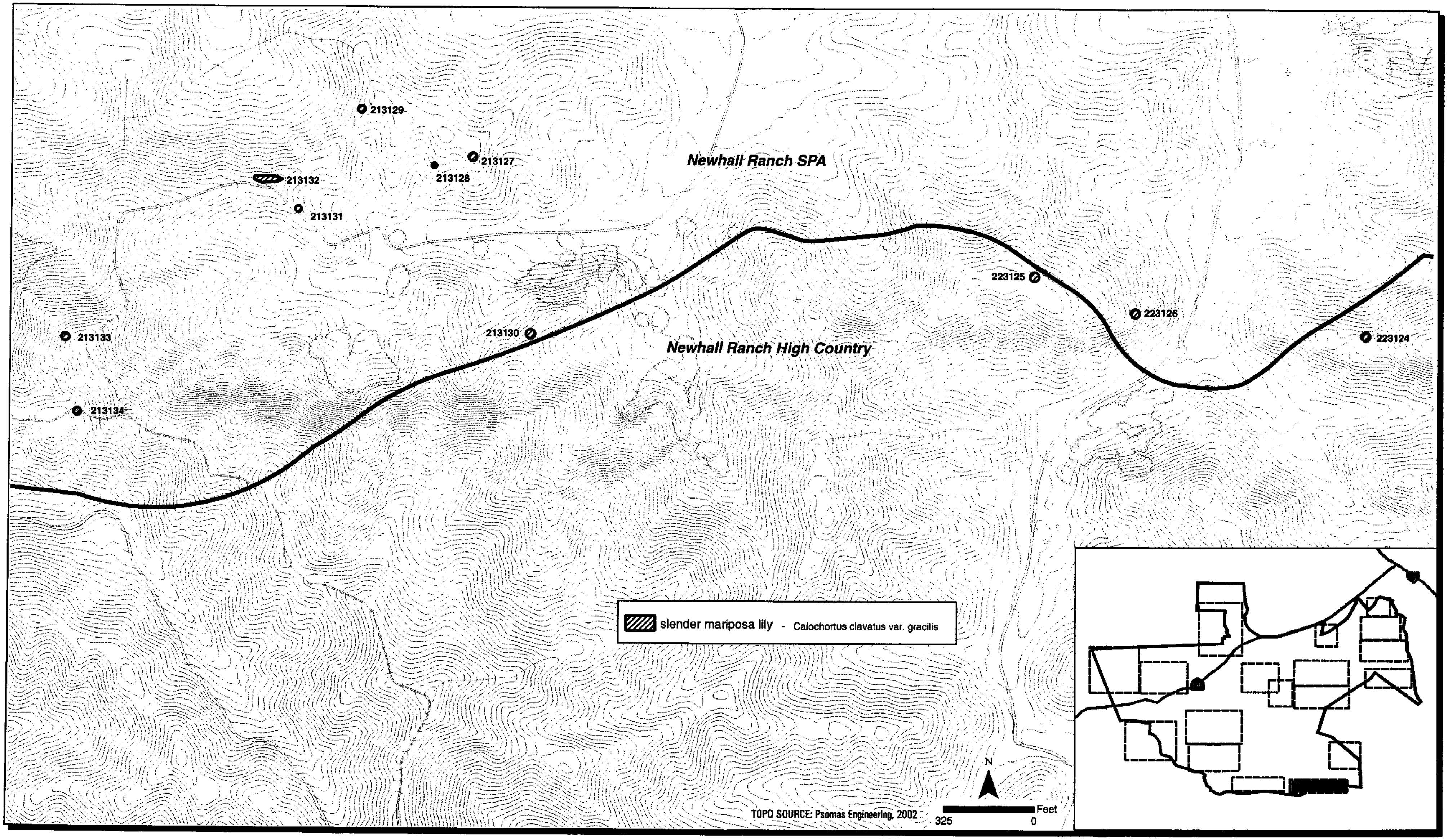
FIGURE
8



Newhall Ranch

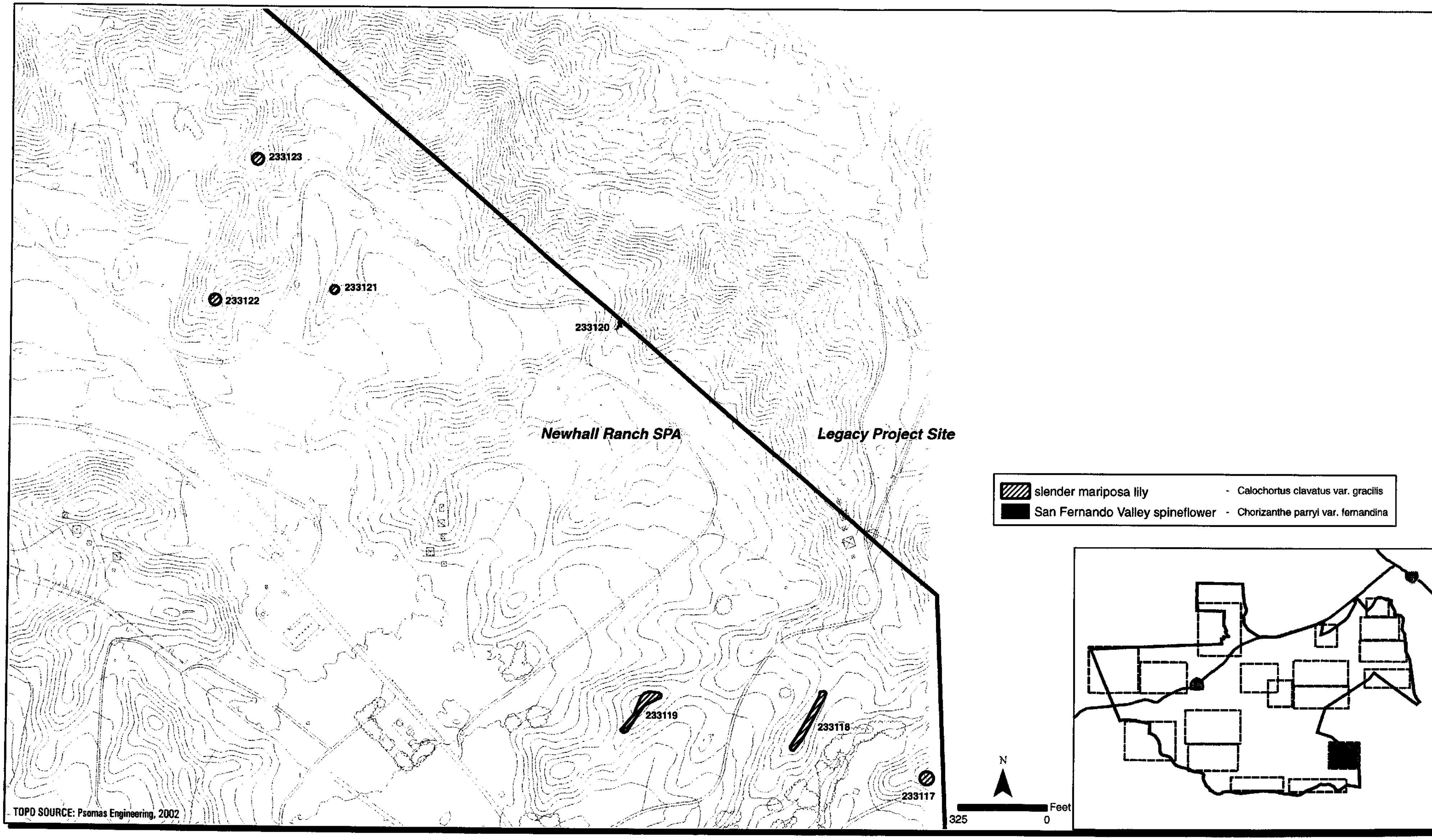
2005 Sensitive Plant Survey Results

FIGURE 9



Newhall Ranch
2005 Sensitive Plant Survey Results

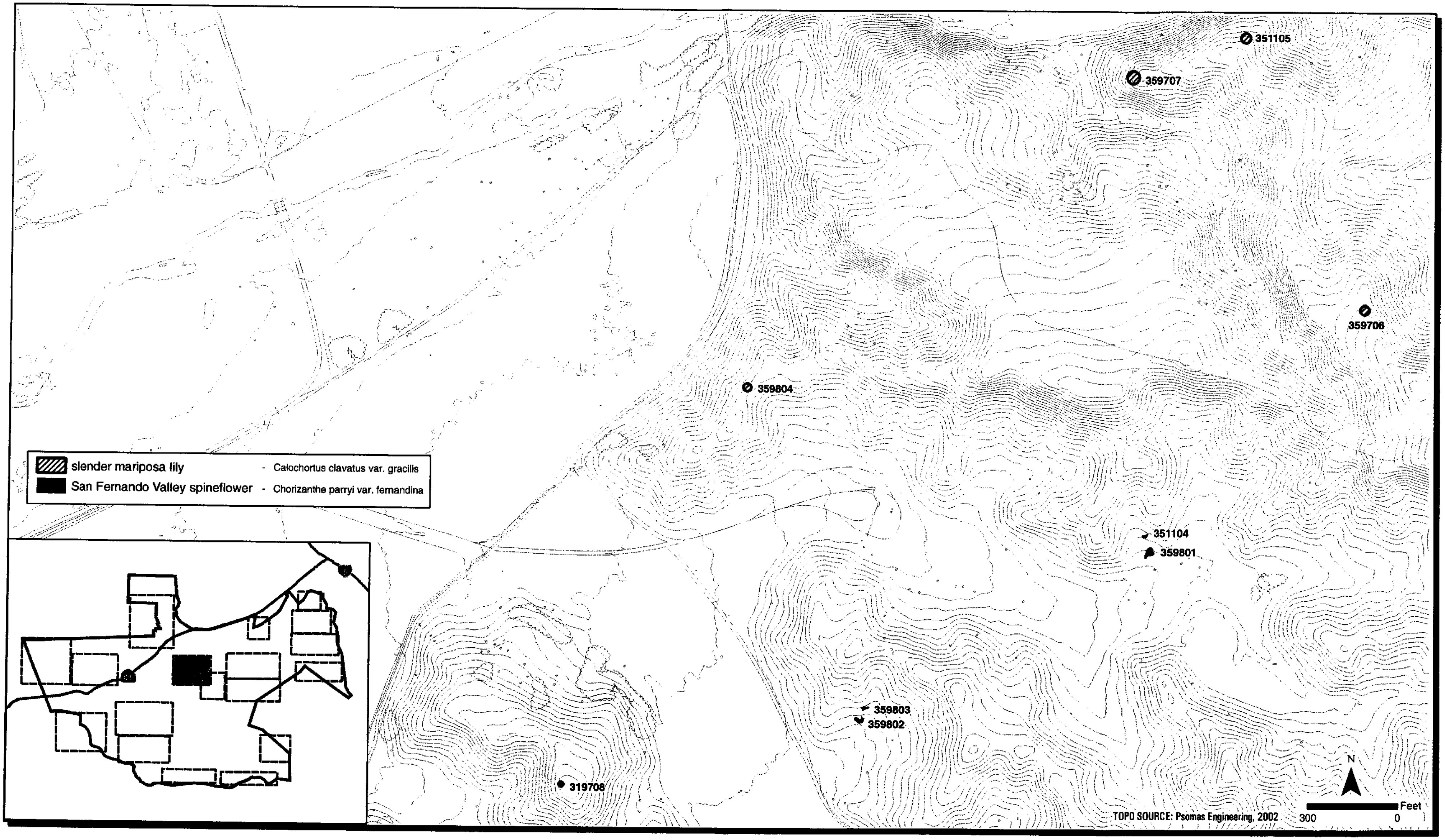
FIGURE
10



Newhall Ranch

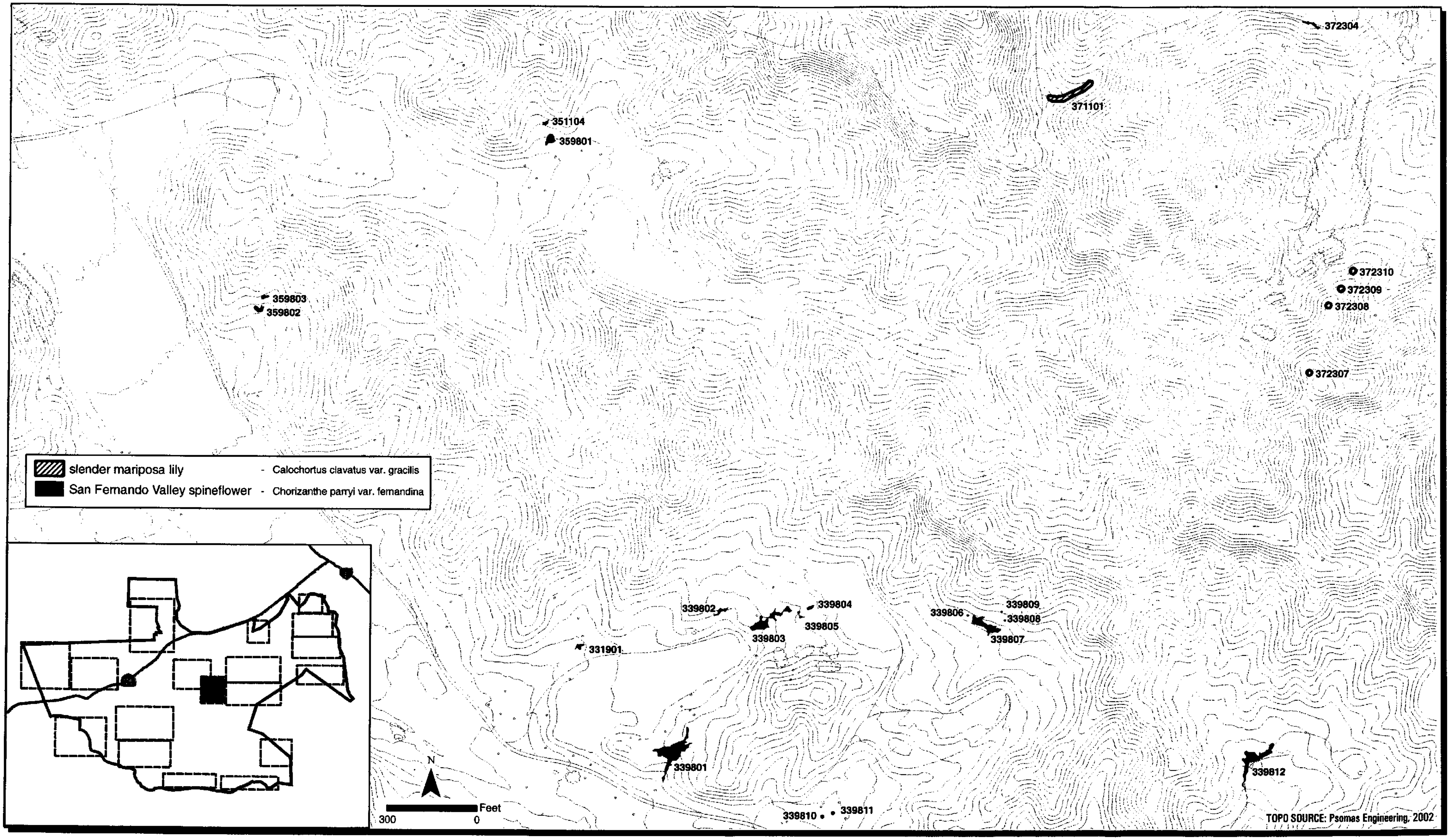
2005 Sensitive Plant Survey Results

FIGURE 11



Newhall Ranch
2005 Sensitive Plant Survey Results

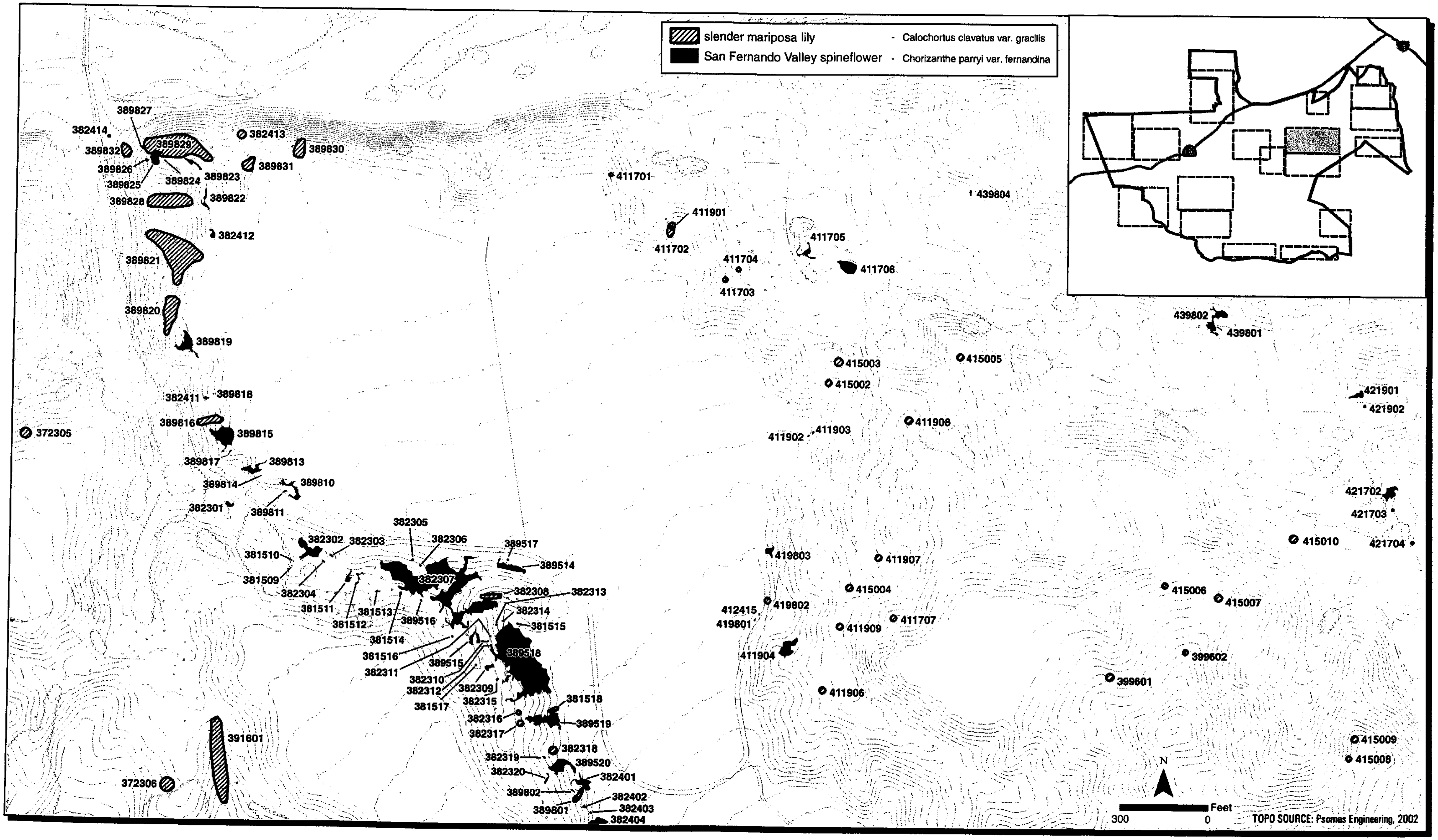
FIGURE 12



Newhall Ranch

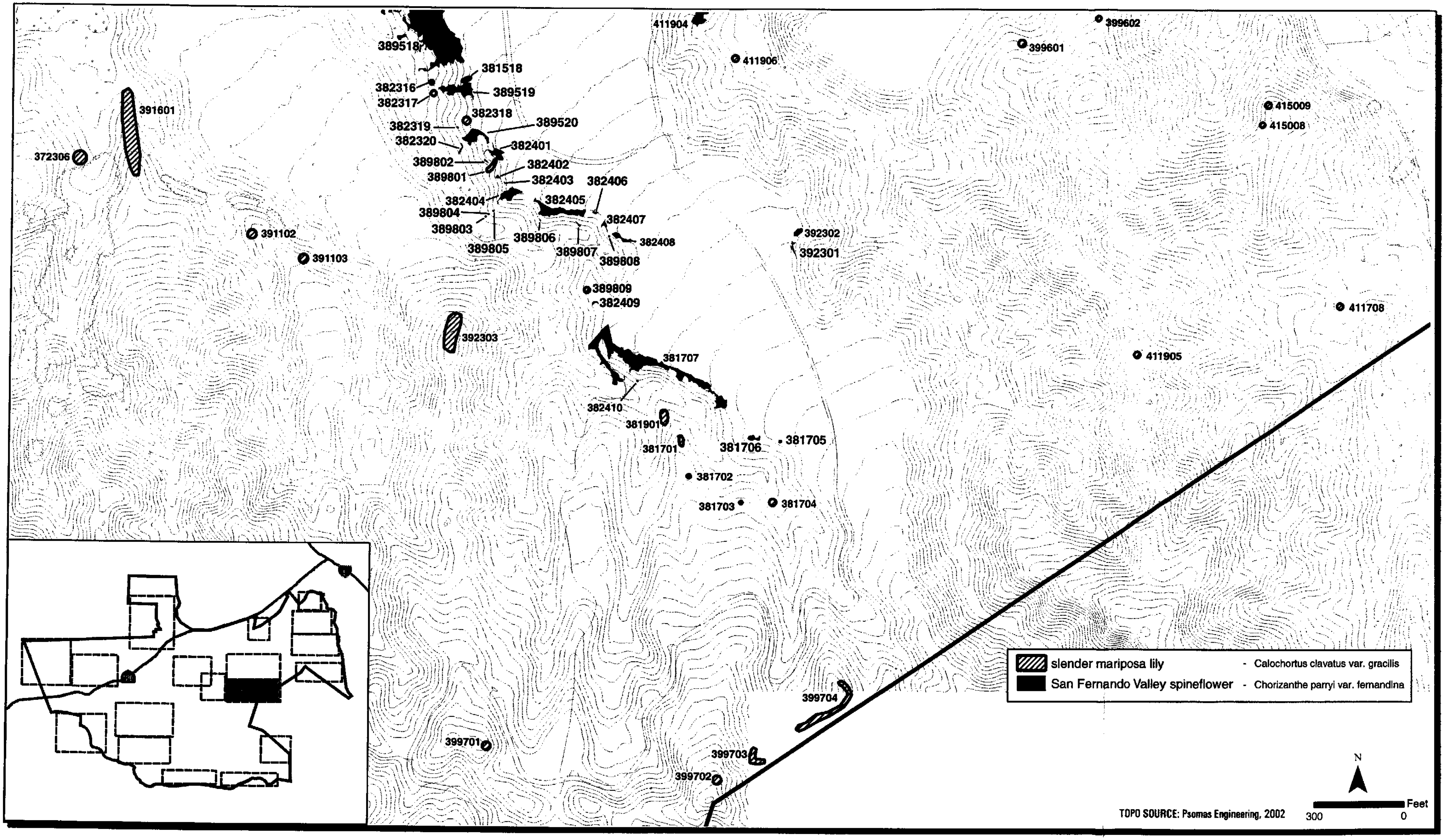
2005 Sensitive Plant Survey Results

FIGURE 13



Newhall Ranch
2005 Sensitive Plant Survey Results

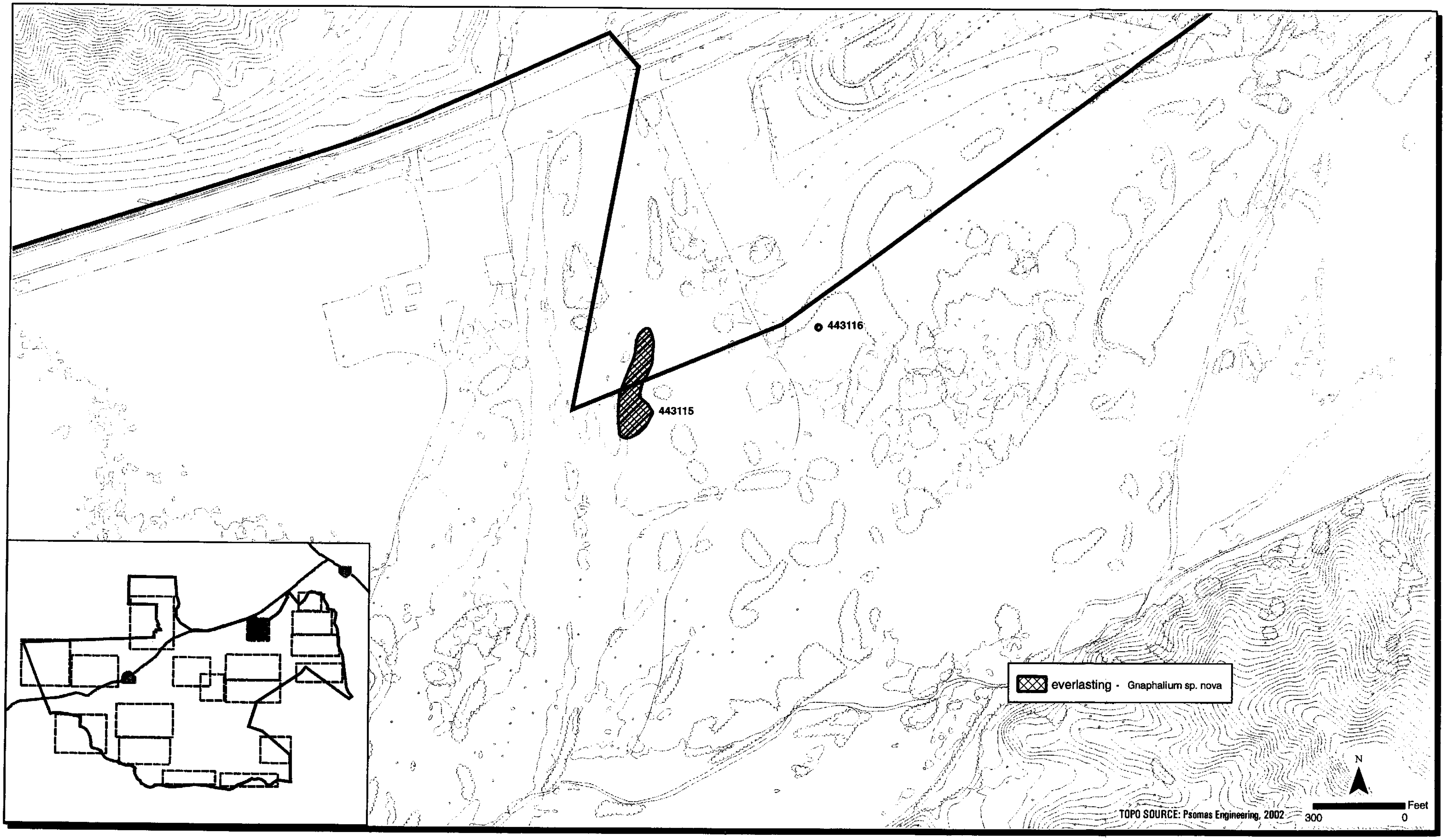
FIGURE 14



Newhall Ranch

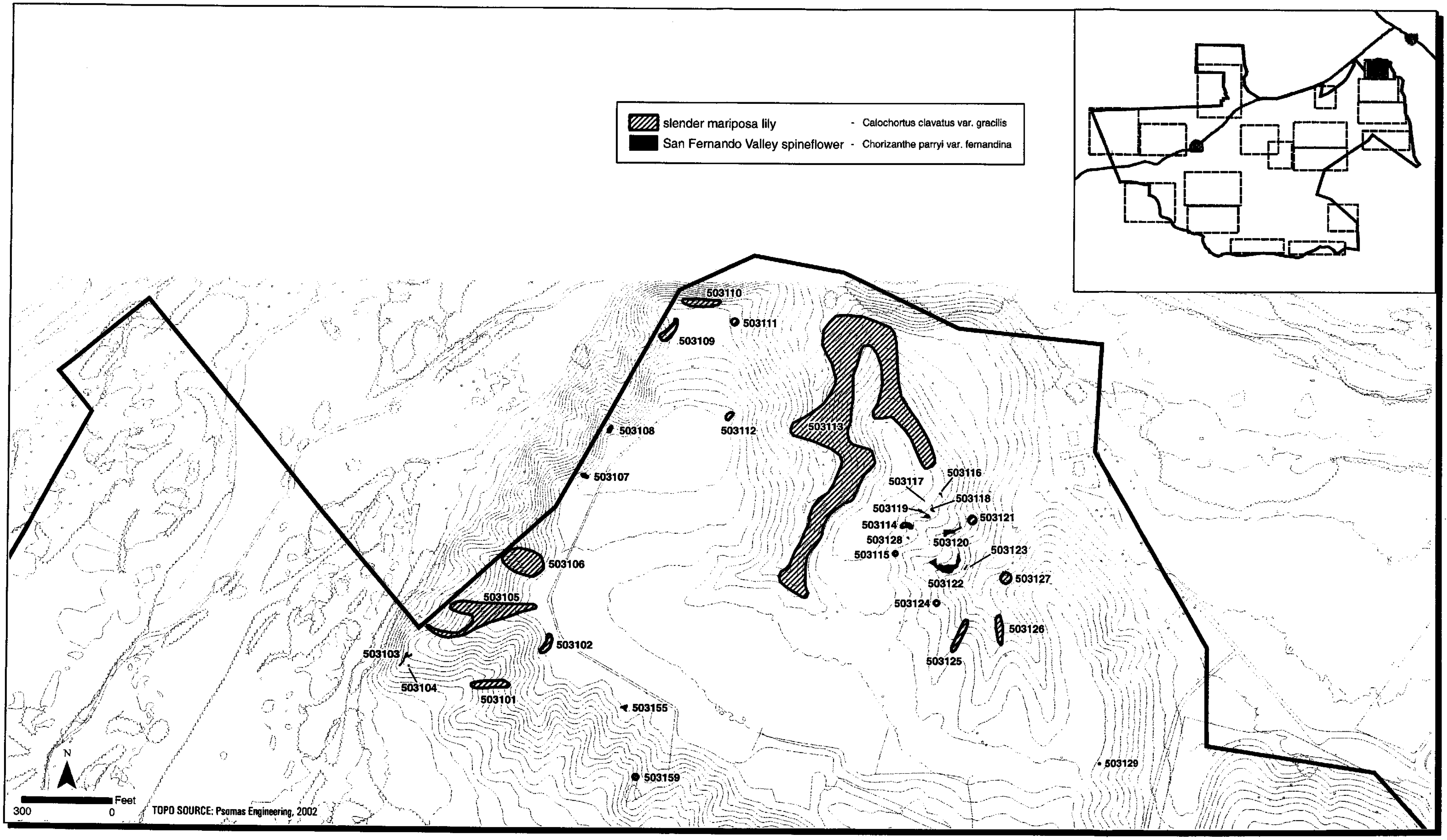
2005 Sensitive Plant Survey Results

FIGURE 15



Newhall Ranch
2005 Sensitive Plant Survey Results

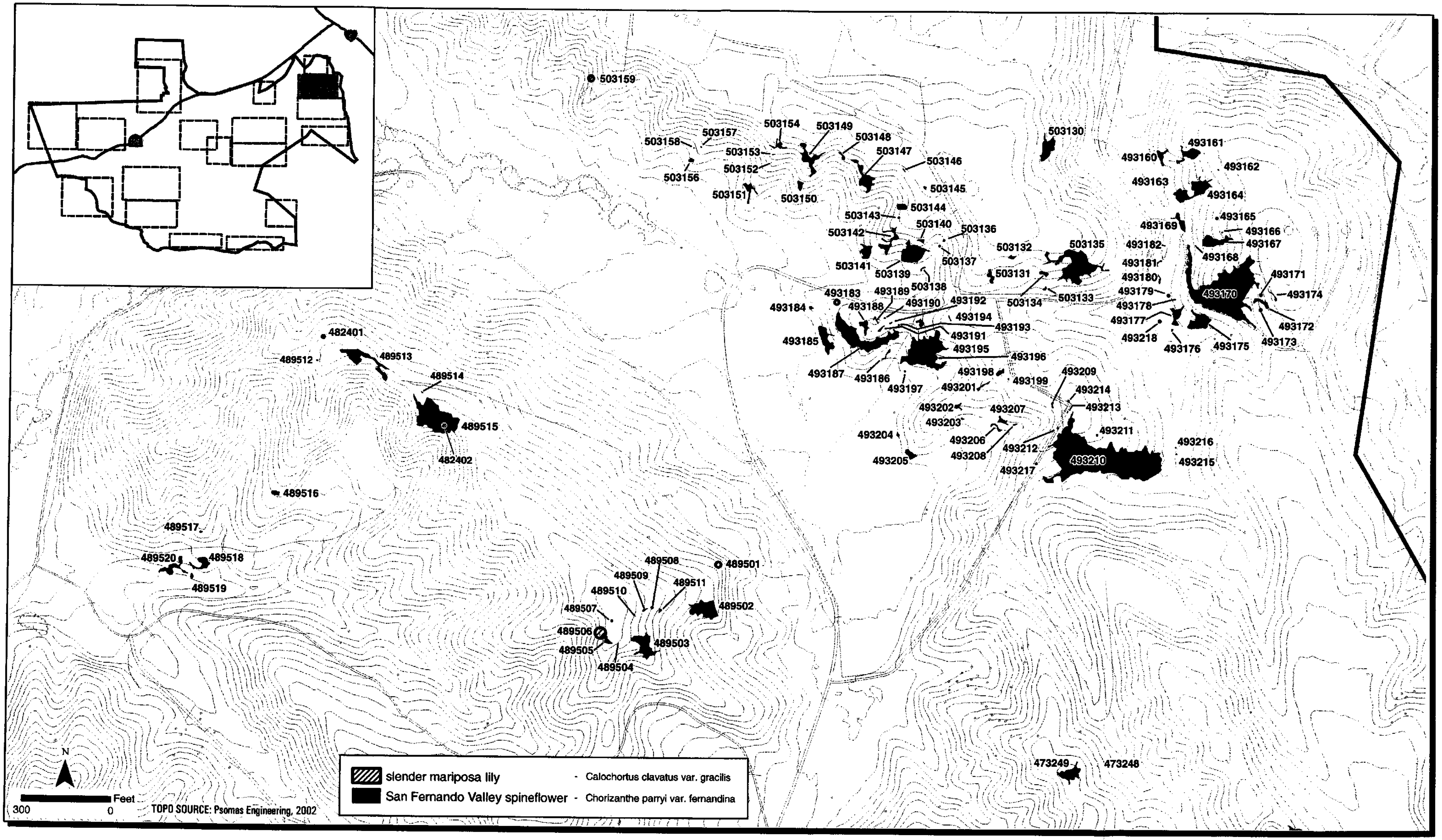
FIGURE
16



Newhall Ranch

2005 Sensitive Plant Survey Results

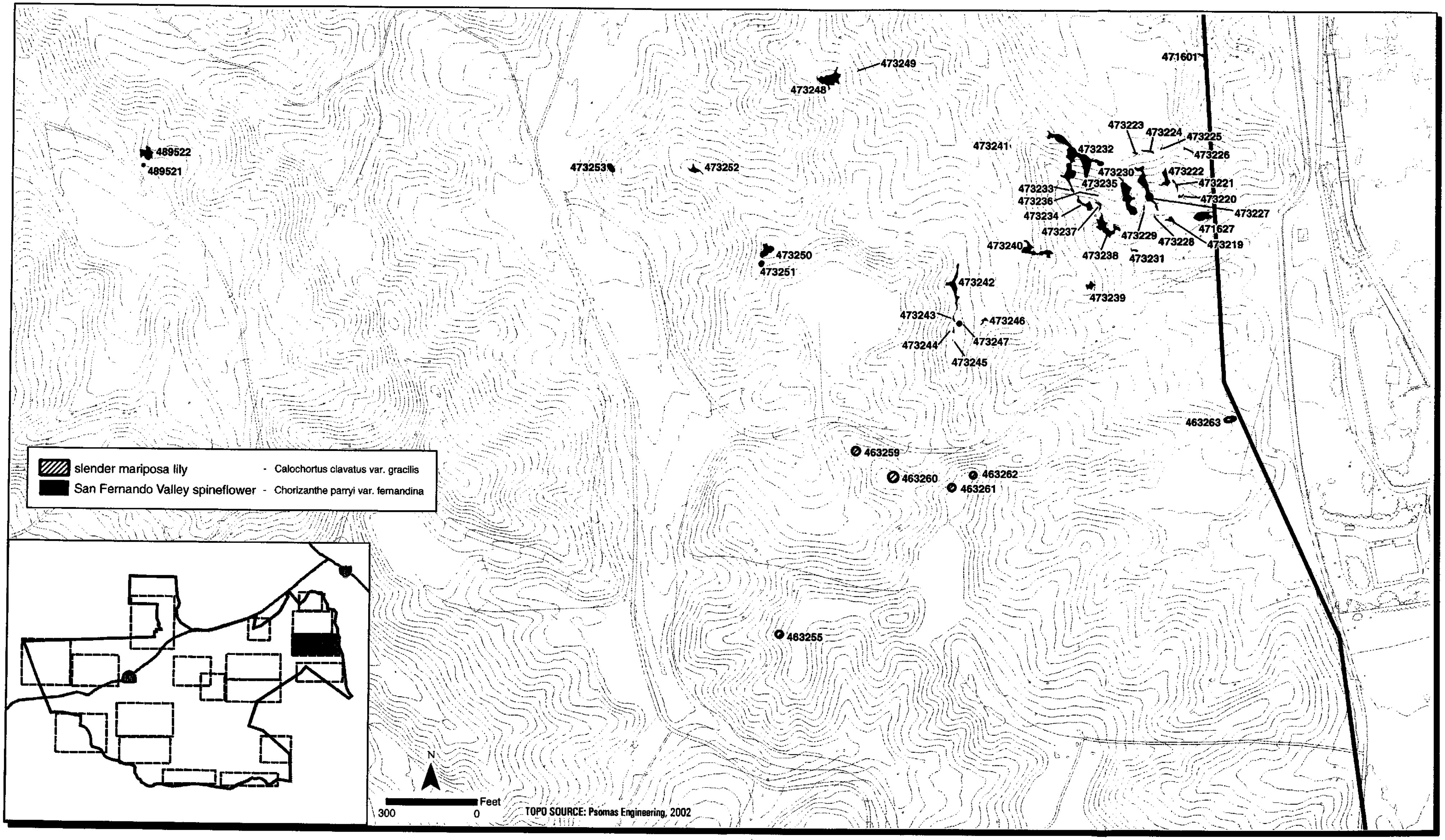
FIGURE 17



Newhall Ranch

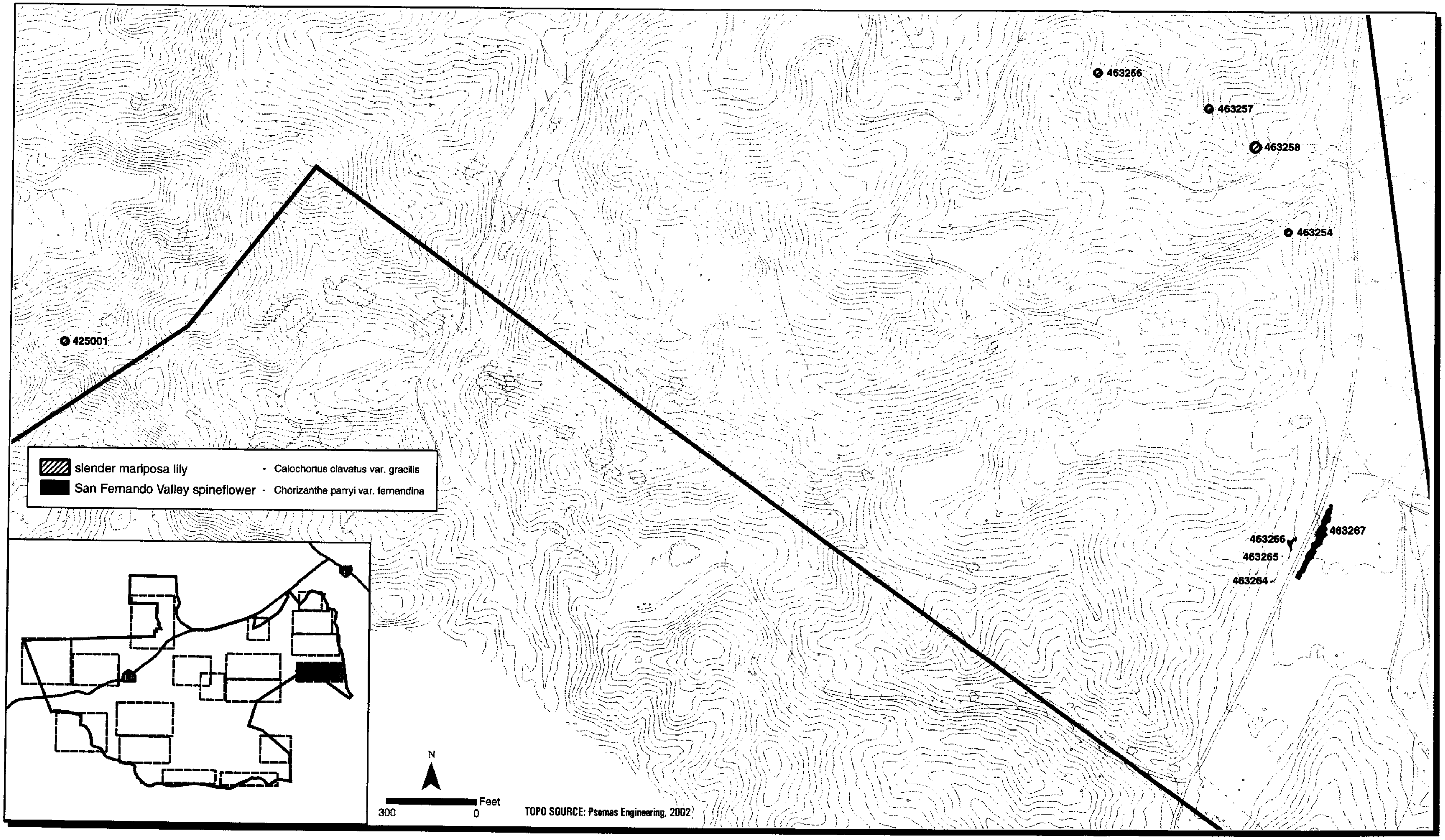
2005 Sensitive Plant Survey Results

FIGURE 18



Newhall Ranch
2005 Sensitive Plant Survey Results

FIGURE
19



Newhall Ranch

2005 Sensitive Plant Survey Results

FIGURE 20

of approximately 3,071 individuals observed within the project site during the 2005 field season (see *Table 3*). CNDDB forms for each occurrence on this site are included in *Appendix C*.

TABLE 3
Slender Mariposa Lily Summary of Occurrence Data for the Newhall Ranch SPA

Polygon Name	Polygon area (sq. ft.)	Estimated Number of Individuals
19706	19,572	26
19707	3,652	25
29705	1,489	1
39702	2,504	3
39703	1,489	4
49701	8,449	17
61902	702	1
79702	158,058	192
79703	29,363	12
79704	18,484	78
79705	14,079	73
79706	3,065	4
79801	6,591	5
79802	3,345	4
79803	26,000	40
99707	1,922	1
99708	1,922	1
99709	2,345	4
99801	503	2
99802	283	20
102302	548	700
109801	324	4
120001	367	6
122102	1,689	1
122103	83	1
122301	855	6
122303	2,940	32
122304	263	3
122305	1,079	1
122306	480	5
122307	609	22

TABLE 3
Slender Mariposa Lily Summary of Occurrence Data for the Newhall Ranch SPA

Polygon Name	Polygon area (sq. ft.)	Estimated Number of Individuals
122308	20,761	50
122309	715	2
122310	1,043	10
143268	842	123
143269	611	6
143270	651	4
143271	688	12
143283	263	4
153297	361	1
153298	361	1
153299	946	5
163101	2,510	28
163102	1,839	7
193103	2,538	30
193104	1,973	3
193105	541	4
193106	3,506	10
193107	961	5
193108	736	2
193109	865	2
193110	736	1
193111	736	2
193112	26,929	50
193113	692	1
193114	1,426	4
213127	692	1
213128	281	1
213129	541	1
213130	887	1
213131	389	2
213132	1,873	4
213133	563	1
213134	563	1
213135	541	2

TABLE 3
Slender Mariposa Lily Summary of Occurrence Data for the Newhall Ranch SPA

Polygon Name	Polygon area (sq. ft.)	Estimated Number of Individuals
213136	3,764	10
213137	541	1
223124	736	1
223125	887	2
223126	801	1
233117	1,839	1
233118	5,076	22
233119	4,714	25
233121	736	1
233122	1,320	0
233123	1,320	2
309709	1,137	2
319708	196	1
351105	836	2
359706	693	3
359707	1,499	7
359804	533	10
371101	2,607	4
372305	888	1
372306	1,672	4
372307	250	1
372308	260	1
372309	305	8
372310	305	1
382316	170	1
382317	274	1
382318	501	11
381518	292	7
381701	439	28
381702	141	2
381703	86	2
381704	430	5
381901	1,023	6
382308	924	6

TABLE 3
Slender Mariposa Lily Summary of Occurrence Data for the Newhall Ranch SPA

Polygon Name	Polygon area (sq. ft.)	Estimated Number of Individuals
382413	577	32
389801	530	3
389809	303	1
389816	1,753	10
389820	4,329	50
389821	14,628	200
389828	6,101	30
389829	13,065	125
389830	1,915	10
389831	1,301	10
389832	1,156	20
391102	699	1
391103	743	1
391601	11,233	13
392303	5,239	9
399601	456	1
399602	228	1
399701	583	5
399702	655	6
399703	1,403	4
399704	4,252	34
411701	102	5
411702	925	20
411703	182	3
411704	150	5
411707	297	2
411708	351	1
411905	346	1
411906	351	1
411907	351	1
411908	438	1
411909	316	1
415002	316	1
415003	561	3

TABLE 3
Slender Mariposa Lily Summary of Occurrence Data for the Newhall Ranch SPA

Polygon Name	Polygon area (sq. ft.)	Estimated Number of Individuals
415004	383	20
415005	351	10
415006	228	1
415007	438	3
415008	228	1
415009	351	1
415010	509	1
419802	303	4
425001	434	1
463254	357	2
463255	410	1
463256	419	1
463257	430	6
463258	839	3
463259	557	1
463260	868	3
463261	426	1
463262	362	8
463263	412	3
473247	104	1
473251	114	15
473253	201	3
482401	58	10
482402	261	1
489501	261	1
489506	1,046	3
493183	170	1
503101	2,701	40
503102	1,197	15
503105	15,692	100
503106	9,718	40
503107	147	3
503108	159	3
503109	1,835	15

TABLE 3
Slender Mariposa Lily Summary of Occurrence Data for the Newhall Ranch SPA

Polygon Name	Polygon area (sq. ft.)	Estimated Number of Individuals
503110	2,653	25
503111	366	7
503112	421	4
503113	125,514	200
503114	401	6
503115	169	1
503121	572	12
503124	239	1
503125	1,909	15
503126	1,782	15
503127	1,056	10
503144	260	5
503159	276	4
Total	683,231	3,093

4.2.2 Calystegia peirsonii (Peirson's morning-glory)

Peirson's morning-glory has no state or federal status, but is found on List 4 of the CNPS *Inventory*. This morning-glory is rhizomatous perennial that typically is found in more desert-like areas (*e.g.*, creosote bush, Joshua tree series) at elevations which exceed 3,000 feet AMSL, although there are records in the CNDDB for lower elevations in the local area. It was RECON's opinion (1996) that chaparral morning-glory (*Calystegia macrostegia* ssp. *cyclostegia*) was the more common species; however, after reviewing the floral bracts, leaf shape, and its glabrous nature, it is Dudek's opinion that the morning-glory observed in the study area is Peirson's morning-glory. This species was also recorded onsite during limited focused surveys for sensitive plant species conducted in 1992 (Dames and Moore 1993).

While never abundant, Peirson's morning-glory is widespread onsite and was observed on virtually all ridges and slopes, weakly climbing over mixed chaparral, California sagebrush, California buckwheat, and in California annual grassland series throughout the study area. CNDDB forms were not completed for this species because of its relatively low sensitivity.

4.2.3 Cercocarpus betuloides var. blancheae (island mountain-mahogany)

Island mountain-mahogany has no state or federal status, but is found on List 4 of the CNPS *Inventory*. It is an evergreen shrub that occurs as part of the chaparral in Los Angeles and Ventura counties, as well as on several of the Channel Islands (CNPS 2001). This species was not observed during limited focused surveys for sensitive plant species conducted in 1992 (Dames and Moore 1993) or general botany surveys conducted in 1995 (RECON and Impact Sciences 1996).

Onsite, island mountain-mahogany occurs as an occasional component of chaparral series at the base of north-facing slopes. CNDDB forms were not completed for this species because of the relatively low sensitivity of this species.

4.2.4 Chorizanthe parryi var. fernandina (San Fernando Valley spineflower)

San Fernando Valley spineflower is state-listed as endangered, a candidate for federal listing, and found on List 1B of the CNPS *Inventory*. Until its rediscovery in 1999 at Laskey Mesa on Ahmanson Ranch in Ventura County, it was thought to be extinct. A review of information of historic occurrence of SFVS in the CNDDB indicate that it was previously thought to occur in sandy to gravelly soils of washes, riverbeds, and upland areas primarily on the margins of the San Fernando Valley at the base of the Santa Susana Mountains, San Gabriel Mountains, and the Simi Hills. Munz (1974) provides distribution information to include Orange and San Diego counties. SFVS was not observed onsite during limited focused surveys for sensitive plant species conducted in 1992 (Dames and Moore 1993) or general botany surveys conducted in 1995 (RECON and Impact Sciences 1996).

SFVS polygons were identified in several general locations of the study area for the Newhall Ranch Specific Plan including areas around Airport Mesa (including Dead-End Canyon), Grapevine Mesa (including Lion Canyon and Long Canyon), Potrero Canyon, and San Martinez Canyon. The polygons for these occurrences are depicted in *Figures 4, 6* through *8, 12* through *15,* and *17* through *20.* Labels for each of the polygons in these figures correlate with those in *Tables 4* through *8*, which contain estimates for the numbers of individuals within each polygon.

TABLE 4

San Fernando Valley Spineflower Summary of Occurrence Data for the Airport Mesa Vicinity

[redacted]	Polygon Area (sq. ft.)	Estimated Number of Individuals
463264	26	50
463265	14	10
463266	550	1,500
463267	5,901	75,000
471601	522	18,310
471627	1,350	7,300
473219	253	200
473220	98	100
473221	131	35
473222	659	4,000
473223	86	30
473224	123	120
473225	18	30
473226	35	100
473227	2,216	5,000
473228	17	20
473229	47	50
473230	2,712	10,000
473231	99	50
473232	6,680	40,000
473233	99	35
473234	702	1,000
473235	10	3
473236	1	1
473237	176	100
473238	1,944	15,000
473239	432	5,000
473240	1,689	5,000
473241	22	30
473242	1,449	6,000
473243	61	100
473244	68	100
473245	5	1
473246	175	400

TABLE 4

San Fernando Valley Spineflower Summary of Occurrence Data for the Airport Mesa Vicinity

[illegible]	Polygon Area (sq. ft.)	Estimated Number of Individuals
473248	3	1
473249	2,123	5,000
473250	1,167	2,500
473252	463	1,000
489502	3,897	38,000
489503	3,128	31,000
489504	1	1
489505	333	300
489507	6	38
489508	16	47
489509	58	59
489510	2	1
489511	71	69
489512	3	12
489513	3,490	5,200
489514	14	20
489515	10,028	33,000
489516	325	300
489517	52	150
489518	1,156	3,600
489519	123	30
489520	1,443	600
489521	11	70
489522	1,209	21,000
493160	614	500
493161	1,629	3,000
493162	12	30
493163	4	5
493164	3,841	10,000
493165	82	1
493166	14	25
493167	2,125	30,000
493168	8	10
493169	841	500
493170	25,600	500,000

TABLE 4

San Fernando Valley Spineflower Summary of Occurrence Data for the Airport Mesa Vicinity

Polygon Name	Polygon Area (sq. ft.)	Estimated Number of Individuals
493171	107	1
493172	576	2,000
493173	125	1
493174	121	500
493175	2,714	5,000
493176	27	50
493177	1,187	3,000
493178	38	150
493179	93	1
493180	90	30
493181	81	50
493182	33	50
493184	93	15
493185	2,161	2,000
493186	161	500
493187	8,069	20,000
493188	713	750
493189	92	50
493190	9	40
493191	119	100
493192	31	50
493193	7	25
493194	41	100
493195	351	500
493196	10,562	15,000
493197	30	10
493198	329	300
493199	8	25
493201	188	300
493202	230	300
493203	47	50

TABLE 4
San Fernando Valley Spineflower Summary of Occurrence Data for the Airport Mesa Vicinity

Polygon Name	Polygon Area (sq. ft.)	Estimated Number of Individuals
493204	88	50
493205	625	1,500
493206	189	100
493207	350	500
493208	47	100
493209	94	200
493210	37,772	500,000
493211	19	50
493212	7	100
493213	17	50
493214	4	50
493215	15	1
493216	15	40
493217	43	3
493218	107	2
503103	370	750
503104	12	50
503116	80	200
503117	1	2
503118	116	1,000
503119	401	500
503120	734	1,000
503122	2,315	5,000
503123	71	30
503128	50	100
503129	16	50
503130	2,328	25,000

TABLE 4
San Fernando Valley Spineflower Summary of Occurrence Data for the Airport Mesa Vicinity

Polygon Name	Polygon Area (sq. ft.)	Estimated Number of Individuals
503131	515	5,000
503132	179	500
503133	93	300
503134	288	500
503135	8,830	80,000
503136	16	100
503137	11	50
503138	60	50
503139	3,876	75,000
503140	176	500
503141	1,244	10,000
503142	1,477	20,000
503143	11	4
503145	72	500
503146	29	50
503147	2,369	7,000
503148	190	500
503149	2,213	35,000
503150	367	1,000
503151	783	1,000
503152	1	1
503153	22	25
503154	458	500
503155	279	300
503156	166	300
503157	15	25
503158	10	10
Total	190,331	1,706,335

TABLE 5
San Fernando Valley Spineflower **Summary of Occurrence Data for the Grapevine Mesa Vicinity**

Polygon Name	Polygon Area (sq. ft.)	Estimated Number of Individuals
331901	291	93
339801	4,769	18,000
339802	341	6,500
339803	2,468	60,000
339804	192	1,800
339805	124	200
339806	21	30
339807	1,969	21,000
339808	15	50
339809	1	1
339810	23	40
339811	42	30
339812	3,005	10,500
351104	172	180
359801	720	1,700
359802	438	980
359803	204	20
372304	353	420
381509	7	1
381510	6	1
381511	394	1,860
381512	203	440
381513	56	42
381514	106	152
381515	11	26
381516	6	1
381517	9	5
381705	104	35
381706	474	400
381707	16,022	168,250
382301	289	2,475
382302	2,473	26,710
382303	63	100
382304	40	110

TABLE 5
San Fernando Valley Spineflower **Summary of Occurrence Data for the Grapevine Mesa Vicinity**

Polygon Name	Polygon Area (sq. ft.)	Estimated Number of Individuals
382305	44	40
382306	15	8
382307	26,639	1,765,570
382309	333	40,010
382310	104	27
382311	4	3
382312	7	1
382313	3	2
382314	37	6
382315	36	3
382319	14	17
382320	150	150
382401	1,147	2,500
382402	85	4
382403	13	100
382404	1,678	121,823
382405	3,451	3,000
382406	107	160
382407	196	4,200
382408	748	500
382409	118	70
382410	2	1
382411	110	50
382412	289	800
382414	131	1
389514	1,625	475
389515	675	690
389516	29	21
389517	7	1
389518	25,180	1,407,143
389519	3,160	88,609
389520	2,038	196,947
389802	48	17
389803	2	3
389804	10	1

TABLE 5
San Fernando Valley Spineflower **Summary of Occurrence Data for the Grapevine Mesa Vicinity**

Polygon Name	Polygon Area (sq. ft.)	Estimated Number of Individuals
389805	18	1
389806	13	1
389807	49	7
389808	9	1
389810	1,037	200
389811	73	2
389813	1,030	560
389814	14	75
389815	3,389	14,000
389817	70	30
389818	1	3
389819	2,032	17,000
389822	411	2,000
389823	480	7,830
389824	3	23
389825	1,218	5,000
389826	6	14
389827	137	486
392301	50	50
392302	504	10,040
411705	666	1,545
411706	1,891	880
411901	276	500
411902	5	4
411903	58	300
411904	1,946	4,580
412415	7	60
419801	16	50
419803	517	1,700
421702	1,300	2,500
421703	107	1
421704	1	70
421901	549	180
421902	93	1
439801	31	60

TABLE 5
San Fernando Valley Spineflower **Summary of Occurrence Data for the Grapevine Mesa Vicinity**

[redacted]	Polygon Area (sq. ft.)	Estimated Number of Individuals
439802	1,863	68,000
439803	5	1
439804	77	50
[redacted]	123,598	4,092,910

TABLE 6
San Fernando Valley Spineflower Summary of Occurrence Data for the Potrero Canyon Vicinity

[redacted]	Polygon Area (sq. ft.)	Estimated Number of Individuals
143272	8,520	75,000
143273	2,109	7,500
143274	2,943	25,000
143275	103	25
143276	27	7
143277	149	300
143278	125	50
143279	2,740	5,000
143280	1,175	5,000
143281	11,741	125,000
143282	130	750
233120	436	500
273294	692	2,000
273295	982	500
273296	982	3,000
279801	982	2
283284	4,211	7,000
283285	39	15
283286	228	500
283287	301	500
283288	284	200
283289	1,810	5,500
283290	439	1,500
283291	273	35

TABLE 6
San Fernando Valley Spineflower Summary of Occurrence Data for the Potrero Canyon Vicinity

Polygon Name	Polygon Area (sq. ft.)	Estimated Number of Individuals
283292	317	100
283293	721	500
302401	3,463	48,480
309701	471	13,190
Total	46,393	327,154

TABLE 7
San Fernando Valley Spineflower Summary of Occurrence Data for the San Martinez Grande Canyon Vicinity

Polygon Name	Polygon Area (sq. ft.)	Estimated Number of Individuals
61701	631	400
61702	427	50
61901	46,151	120,036
65011	5,738	600
69605	299	277
69606	180	200
69607	58	127
69608	990	919
69609	5,832	900
69610	15	3
69611	100	15
Total	60,421	123,527

TABLE 8
San Fernando Valley SpineflowerSummary of Occurrence Data for the Newhall Ranch SPA

[illegible]	Estimated Number of Individuals
Airport Mesa	1,706,335
Grapevine Mesa	4,092,910
Potrero Canyon	327,154
San Martinez Grande Canyon	123,527

Totals for the Newhall Ranch SPA	6,249,926

Most of the SFVS were found on slopes with a south-facing component in habitat that was open California sagebrush, California buckwheat, ecotonal California sagebrush/California buckwheat and California annual grassland series, or at the edge of agricultural fields on mesas. Most of the observed SFVS were found on soils mapped by the USDA (1969) as slightly eroded to eroded Castaic-Balcom silty clay loam (30-50 percent slopes) or Terrace Escarpments. Plants in the vicinities of Grapevine and Airport mesas were observed down slope of terrace surfaces capped by Zamora clay loam (2-9 percent slopes). Elevations at SFVS locations onsite range from approximately 1,000 to 1,300 feet AMSL.

Vegetative cover in the area of SFVS occurrences ranged from five to 100 percent, but was more commonly between 60 and 80 percent. The soil type for all mapped SFVS occurrences on the project site consisted of sandy loams.

A total of 300 SFVS polygons were mapped ranging in size from less than one to 46,151 square feet. The number of individuals within each polygon ranges from one (1) to approximately 1,765,570. At Airport Mesa there were an estimated 1,706,335 individuals in 154 polygons (*Table 5*). At Grapevine Mesa there were an estimated 4,092,910 individuals in 107 polygons (*Table 5*). At Potrero Canyon there were 327,154 individuals in 28 polygons (*Table 6*) and at San Martinez Grande Canyon there were 123,527 individuals in 11 different polygons (*Table 7*). The entire Newhall Ranch SPA contained an estimated 6,249,926 SFVS individuals for the 2005 field season (*Table 8*). CNDDB forms are included in *Appendix C* for each of the four occurrences onsite.

4.2.5 Gnaphalium sp. nova (everlasting)

The undescribed species of *Gnaphalium* documented within the study area during the 2004 field season was observed again during the 2005 field season. Plants of this unnamed everlasting were previously ascribed to the species *Gnaphalium leucocephalum*, which is not thought to occur west of the Peninsular and Transverse Ranges in California. These specimens, rather, are thought by UC Riverside (UCR) and Rancho Santa Ana Botanic Garden (RSA) botanists to be an undescribed taxon (*Gnaphalium* species *nova*). The *Gnaphalium* plants on the Newhall Ranch SPA differ from *Gnaphalium leucocephalum* in stature, pubescence, and phyllary characters.

A search of three herbaria (UCR, RSA, and the San Diego Natural History Museum) by Dudek biologist Marc Doalson revealed that 14 collections of this plant have been made in Ventura, Orange, Riverside, Los Angeles, and San Diego Counties. Eight collections date from 1901 to 1987 (1901, 1918, 1922, 1928, 1931, 1959, 1985 and 1987). There are six more recent collections dating from 1994 to 2003 (1994, two from 1995, 1997 and two from 2003). Many are from somewhat vague localities, such as "San Fernando Valley" and "Pasadena." Modern collections have come mostly from the Santa Ana Mountains region and especially Temescal Wash in western Riverside County, with several collections from adjacent San Diego County. In addition to the herbaria specimens, the *G.* sp. *nova* has been observed in 2003 and 2004 along Castaic Creek and the Santa Clara River in Los Angeles County (Dudek 2004). Plants are almost always associated with alluvial soils, often being found on the benches along major washes.

In 2005, the two occurrences on the Newhall Ranch SPA consist of approximately 800 individuals and five individuals (*Figure 16*). These occurrences are primarily on secondary alluvial benches. The vegetation around these plants consists of open alluvial sage scrub habitats that are sparsely vegetated. CNDDB forms were completed for these occurrences and are included in *Appendix C.*

4.2.6 Juncus acutus var. leopoldii (southwestern spiny rush)

Southwestern spiny rush has no state or federal status, but is found on List 4 of the CNPS *Inventory*. It is a perennial herb that grows in mesic areas such as meadows, marshes, and seeps. It is widespread occurring from San Louis Obispo to Baja California, Mexico (CNPS 2001). Southwestern spiny rush was occasional in mesic riparian areas such as along the Santa Clara River. CNDDB forms were not completed for this species because of its relatively low sensitivity.

4.2.7 Bryophytes and Lichens

Bryophytes (non-vascular plants including mosses, liverworts, and hornworts) are plants which lack true vascular tissues (specialized water and nutrient conducting vessicles) found in angiosperms (*i.e.* flowering plants) and gymnosperms (*i.e.* cone producing plants). Since these non-vascular plants lack water transporting tissues, their life histories require that they inhabit areas of high humidity or places where water is immediately available. These areas can be found adjacent to permanent or temporary water sources or in microhabitats which provide sufficient

moisture. Overall, the Newhall Ranch site is typical of the Mediterranean climate in Southern California and does not exhibit conditions favorable for a diverse flora of bryophytes. However, bryophytes were detected during surveys along north facing slopes, shady areas in canyons, and along cut banks in ephemeral drainages.
Lichens are not classified as true plants but are rather a symbiotic relationship between fungi and green algae and/or cyanobacteria. The relationship between the organisms of these phyla have allowed for their colonization of diverse niches throughout the world. Lichens were detected in the surveys of the Newhall Ranch site; however, appropriate habitat for lichens was limited to scattered non-granitic rocks and soils and fallen wood of trees and shrubs.

No sensitive bryophytes or lichens are recorded as occurring in the proximity of the Newhall Ranch project site (CDFG 2004).

5.0 ACKNOWLEDGMENTS

Michelle Balk, Makela Mangrich, and Patricia Schuyler prepared this report, with review by Sherri Miller and staff at Newhall. Mark McGinnis provided graphics and GIS mapping analyses. Tonette Foster provided word processing.

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APPENDIX A

Resumes Of Survey Personnel

MICHELLE L. BALK
Environmental Specialist

EDUCATION

M.S., Biology with emphasis Ecology and Evolution, University of Akron (1999)
B.S., Zoology, Iowa State University (1997)

PROFESSIONAL AFFILIATIONS

California Native Plant Society
Southern California Botanists
California Botanical Society

PROFESSIONAL CERTIFICATIONS

Quino Checkerspot Butterfly 10a Survey Permit
(USFWS Federal Permit)
CDFG Rare, Threatened, and Endangered Plant Voucher Collection Permit

EXPERIENCE

Ms. Balk has over four years of experience in environmental document preparation and resource conservation planning. Project experience includes biological resource surveys, data collection and analysis, environmental assessments, wetlands delineations, permitting, mitigation design and monitoring, and sensitive species surveys. Ms. Balk has engaged in interagency coordination and public outreach efforts due to the complexities of each project. Ms. Balk has also participated in the development of habitat conservation plans pursuant to Section 10 of the Federal Endangered Species Act.

PROFESSIONAL ASSIGNMENTS

Miramar Trunk Sewer Replacement and Permanent Access Project, City of San Diego Metropolitan Waste Water Department, City of San Diego, California. Performed delineation of "waters of the United States" and wetlands under the jurisdiction of the U.S. Army Corps of Engineers and California Department of Fish and Game. Completed vegetation mapping and sensitive plant surveys on this 13-acre project site. Conducted focused plant surveys for the state- and federally-listed willowy monardella and Encinitas baccharis. Coordinated with others on specific project design and prepared biological resources report.

North Agua Hedionda Sewer Rehabilitation Project, City of Carlsbad, California. Performed wetlands delineation, rare plant surveys, and exotic species mapping for half-mile sewer rehabilitation and shoreline protection project adjacent to coastal lagoon.

60th Street Canyon Sewer Replacement and Permanent Access Project, City of San Diego Metropolitan Waste Water Department, City of San Diego, California. Completed vegetation mapping, floristic surveys, and sensitive plant surveys on this 7-acre project site. Coordinated with others on specific project design and prepared biological resources report.

Lexington/Manzanita Canyon Sewer Replacement and Permanent Access Project, City of San Diego Metropolitan Waste Water Department, City of San Diego, California. Completed vegetation mapping, floristic surveys, sensitive plant surveys, and potential revegetation site surveys on this project site. Coordinated with others on specific project design and prepared biological resources report.

State Route125 South, California Department of Transportation, City of San Diego, California. Conducted rare plant surveys and Quino checkerspot butterfly surveys for mitigation site alternatives.

Sorrento-Miramar Curve Realignment and Second Main Track Project, North County Transit District, City of San Diego, California. Conducted a focused plant survey for the CNPS List 1B Palmer's grapplinghook along the approximately 180-acre linear rail corridor.

Newhall Ranch Development Project, Newhall Land and Farming Company, Valencia, California. Served as team leader for botanical surveys on Newhall Land and Farming Company parcels. Directed field team in performing general sensitive plant surveys and focused surveys for the state-listed endangered San Fernando Valley spineflower on project sites totalling 14,500 acres in Los Angeles and Ventura Counties in 2003.

Planning Area 1 Project, The Irvine Company, County of Orange, California. Conducted potential native grassland mitigation site surveys and rare plant surveys for CNPS List 1B sensitive plant species including intermediate mariposa lily as a member of a team of botanists within a portion of the 4,200-acre project site.

Village 3 Project, Otay Ranch Company, City of Chula Vista, California. Conducted rare plant surveys, including focused surveys for the federally-listed threatened and state-listed endangered Otay tarplant, on 263 acres in 2003.

Fanita Ranch, Santee, California. Conducted rare plant surveys on 2,000 acres in 2003.

Nickel Creek Project, Ramona, California. Performed rare plant mapping for the CNPS List 1B smooth tarplant for 14-acre multi-family residential development on the Santa Maria River.

Quantum Estates II Project, Quantum Estates II, LLC, County of San Diego, California. Conducted wetlands delineation and floristic survey for 39-acre residential development.

Camelot Project, Western Pacific Housing, City of San Diego, California. Conducted a delineation of "waters of the United States" and wetlands under the jurisdiction of the U.S. Army Corps of Engineers, California Department Fish Game, and California Regional Water Quality Control Board for the approximately 39-acre site. Performed floristic and rare plant surveys for site.

Levatino Property Project, Marker Development, Inc., Carlsbad, California. Provided wetlands delineation and floristic surveys for 20-acre property.

Barracuda Property Project, Private Individual Land Owner, Laguna Beach, California. Performed focused survey for the CNPS List 4 western dichondra within conservation easement on the property.
Oxnard Shores Project, City of Oxnard, California (2.8 acres); Concho Circle Project, Oceanside, California (2.4 acres); Harbor Project, City of Oxnard, California (1.2 acres). Performed vegetation mapping, general floristic surveys, and focused sensitive plant surveys for residential subdivision properties throughout southern California. Prepared biological reports summarizing results and implications of site surveys.

Single Family Residence Projects for Individual Land Owners, Cities of Laguna Beach (Third Avenue Project, Stan Oak Drive Project, Crestview Drive Project, Zell Project) and City of San Diego (Paul Girdner Residence). Conducted vegetation mapping, general floristic surveys, and focused sensitive plant surveys for single family residence projects throughout southern California. Prepared biological reports summarizing results and implications of site surveys.

Pole Maintenance Project/Bark Beetle Project, Southern California Edison, San Bernardino and San Jacinto Mountains, California. Conducted botanical surveys and habitat assessments for sensitive plants at pole replacement locations and along electric lines at numerous locations in the San Bernardino and San Jacinto Mountains.

“Spring Flora across Kern County” presented by the Jepson Herbarium. May 6-9, 2004.

“Basic Wetland Delineation”presented by the Wetland Training Institute, Inc. August 2-6, 2004.

“Morphology and Identification of Flowering Plants” workshop at Jepson Herbarium, Berkeley, California. March, 2003.

“Summer Annuals and Fall-Blooming Shrubs of the Eastern Mojave Desert” class through the Jepson Herbarium, Berkeley, California. September 2003.

Volunteer, Project Wildlife, San Diego, California. Cared for injured wildlife and reared baby birds at wildlife rescue organization.

PUBLICATIONS

"Phenotypic effects of leptin in an ectotherm: a new tool to study the evolution of life histories and endothermy?" with P.H. Niewiarowski and R.L. Londraville. The Journal of Experimental Biology 203:295-300, 2000.

SCOTT BOCZKIEWICZ
Biologist/ Habitat Restoration Specialist

EDUCATION

University of Wisconsin, Madison
B.S. Biological Conservation, 1994
B.A. Painting and Drawing, 1994

PROFESSIONAL AFFILIATIONS

Member of the Society for Wetland Scientists (SWS)
Member of the Society for Conservation Biology (SCB)
Member of the Society for Ecological Restoration, California Chapter (SERCal)

EXPERIENCE

Mr. Boczkiewicz has a diverse range of work experience in the biological sciences, with emphasis in conservation biology, wetland science, and restoration ecology. He has eleven years of progressive experience as a biologist, and has been evaluating impacts to sensitive, rare, threatened and endangered plant and wildlife species throughout Southern California for approximately three years. He has conducted sensitive species assessments, biological resource inventories, vegetation mapping, and wetland delineations for large public and private land holdings, and also has experience conducting focused surveys for botanical and wildlife species throughout San Diego, Riverside, Orange, Los Angeles, and San Bernardino Counties. Scott has performed biological monitoring of construction and infrastructure maintenance projects occurring in environmentally sensitive and/or protected areas, produced assessments of wetlands and uplands to support management plans and planning studies, designed mitigation plans and habitat restoration and monitoring plans for riparian, wetland, and upland habitats, identified regulatory issues for development and infrastructure projects to guide project designs, and completed permit applications supporting project compliance with federal, state, and local environmental regulations.

As-Needed Biological Consultant - City of San Diego. Providing pre-construction biological resource surveys, nesting bird surveys, vegetation mapping, biological monitoring, revegetation designs, and ESL compliance documents for multiple projects requiring service of existing sewer mains within urban-canyons throughout the city of San Diego. Mr. Boczkiewicz is responsible for all phases of approximately 25 MWWD canyon projects.

Biological Resource Surveys – Escondido, California. Conducted sensitive biological resources surveys for a 75-acre preserve property along Escondido Creek in unincorporated San

Diego County, to provide baseline biological site information supporting development of a long-term management plan for the Escondido Creek Conservancy.

Rare Plant and Biological Resource Surveys – Escondido, California. Assisted with a botanical inventory and rare plant surveys for a 65-acre property in Escondido.

Rare Plant and Sensitive Biological Resources Surveys – Temecula, California. Assisted with a botanical survey, rare plant surveys and habitat assessments for federally- and state-listed plant and wildlife species, for the Pipeline 6 project on the Pechanga Reservation in southern Riverside County.

Sensitive Biological Resources Surveys – San Bernardino, California. Conducting botanical surveys, wildlife surveys, and habitat assessments throughout the San Bernardino and San Gorgonio Mountains along Southern Con Edison power line routes. The surveys are supporting implementation of a Bark Beetle tree removal project along existing power lines within San Bernardino County.

Rare Plant Surveys and Biological Resource Surveys – Newhall, California. Assisted with botanical surveys, general sensitive plant surveys, and focused rare plant surveys for the state-listed endangered San Fernando Valley spineflower on Newhall Land and Farming Company parcels totaling 16,500 acres in Los Angeles and Ventura Counties.

Sensitive Biological Resource Surveys –San Diego, California. Conducted general botanical and wildlife surveys and rare plant surveys for the Murphy Canyon drainage in San Diego. Completed a biological resources impact analysis and a mitigation search for the City of San Diego Murphy Canyon Culvert Project.

Sensitive Amphibian Surveys –Rancho Santa Fe, California. Assisted with nocturnal relocation surveys for sensitive toad species on the 40-acre El Apajo development property located along the San Dieguito River in Rancho Santa Fe.

Wildlife Surveys and Herptile Trapping– Riverside, California. Completed raptor nest surveys, general wildlife surveys, and assisted with installation and implementation of 20 reptile trap arrays within the 2,600 acre LaBorde Canyon study area in Riverside County. The surveys and trapping supported a study to develop or site an off-highway vehicle park.

Sensitive Amphibian Surveys – San Bernardino, California. Assisted with nocturnal and diurnal surveys for sensitive amphibian species in selected drainages within the San Bernardino Mountains. The surveys supported placement and development of a hiking trail on lands owned and maintained by the U.S. Forest Service.

Riparian Wetland Delineation – Escondido, California. Conducted a jurisdictional wetland delineation to provide baseline biological site information supporting development of a long-term management plan for a 75-acre preserve property located along Escondido Creek in unincorporated San Diego County. The preserve is owned and operated by the Escondido Creek Conservancy.

Penasquitos Lagoon Wetland Delineation – San Diego, California. Conducted a jurisdictional wetland delineation of a riparian and salt marsh restoration site located in Penasquitos Lagoon for agency sign-off.

Collier Marsh Wetland Delineation – Lake Elsinore, California. Conducted a jurisdictional wetland delineation of an approximately 50-acre portion of Collier Marsh, located immediately north of Lake Elsinore in Riverside, California. The wetland delineation contributed to completion of a constraints report for the Eastern Municipal Water District.

SR-56 Wetlands Mitigation and Environmental Permitting - City of San Diego
Secured an ACOE 404 Individual Permit, USFWS Take Authorization for least Bell's Vireo, RWQCB 401 Water Quality Certification, and CDFG 1601 Streambed Alteration Agreement for Phase 2 of State Route 56 (SR-56) construction.

RELEVANT EXPERIENCE

- Received ArcView and ArcInfo training at the University of New Mexico, Albuquerque and GPS training from United States Army at the White Sands Missile Range, Las Cruces, New Mexico.
- Completed Wetland Hydrogeomorphic (HGM) classification training at the Division of State Lands, Salem, Oregon.
- Attended UC Jepson Exchange "*Carex*" class in July, 2003. The three-day course specialized in identification of over 120 *Carex* species from throughout California.
- Attended San Diego Natural History Museum class *"Sensitive Butterflies of San Diego County"* in December, 2003. The class specialized in identification of the nine most sensitive butterfly species in San Diego County.
- Attended Association of Environmental Professionals "CEQA" seminar in November, 2003.

PREVIOUS EXPERIENCE

With Adolfson Associates, Inc.
Sauvie Island/Newell Creek Canyon Biological Inventories. Metro Regional Open Spaces Division, Portland. Designed and conducted two biological resource inventories on County land acquisitions to provide baseline information for development of long-term management plans. Conducted comprehensive surveys for all plant, amphibian, reptile, avian, and mammal species on the Sauvie Island Complex, a 288-acre wetland site along the Multnomah Channel.

Developed a map classifying all vegetative formations on the site to the level of alliance and association utilizing by the National Vegetation Classification (NVC). Also conducted electrofishing surveys of three miles of Newell Creek to determine presence/absence and population dynamics of threatened and endangered salmonid species. Developed management and restoration plans for this tributary of the Willamette River.

Johnson Creek Predesign Wetland Study. City of Portland Environmental Services. Conducted extensive wetland delineations, wildlife habitat assessments, and functional value assessments of publicly owned properties within the 100-year floodplain of Johnson Creek. The study supported development of flood mitigation projects and programs for rehabilitating Johnson Creek watershed's natural functions. Also evaluated flood storage capacity, identified habitat values, and assessed potential for restoration and enhancement of habitat, hydrologic, and flood storage functions for each property.

Willamette Greenway Wildlife and Habitat Inventory. Portland Planning Bureau. Conducted a comprehensive natural, scenic, and recreational resource inventory of the Willamette River Greenway. The planning area, which covers the entire length of the river passing through Portland, is approximately 17 miles long and up to 2 miles wide. Conducted natural resource inventories, including assessment of fish and wildlife habitats, special status species, significant natural areas, vegetative cover, and other natural features.

Western Painted Turtle Study. Port of Portland. Designed and conducted study to assess painted turtle population structure, nesting behavior and nest sites, habitat use (active-season), and over-wintering sites. Performed trapping and marking surveys, telemetry surveys, and data gathering and analysis for the Western Painted Turtle. Performed extensive winter resident avifauna surveys within the Painted Turtle study areas to assess wildlife habitat potential for mitigation areas.

Westside Stream Diversion, City of Portland Environmental Services, Oregon. Conducted Natural Resources Assessments of four large watersheds in Southwest Portland to support a cost/benefit analysis for separating stormwater and sanitary sewer flows within those watersheds. Identified sensitive natural areas and evaluated all watersheds for multiple objective amenity areas that may support stream restoration, wetland or upland habitat creation, or other projects that provide benefit to the community while reducing flow to the CSO system. Identified all regulatory issues associated with natural resource impacts from construction activities within environmentally sensitive or protected areas.

Wetland Mitigation and Floodplain Restoration Monitoring. HMG, Washington County, Oregon. Developed revegetation plans for a 3.52 acre wetland mitigation site in the Tualatin River 100-year floodplain in Washington County, Oregon. Conducted compensatory wetland mitigation monitoring of floodplain restoration activities, and produced an assessment of planted vegetation survival and functions of mitigation site hydrology.

DARREN SMITH

EDUCATION

San Diego State University, M.A. geography with an emphasis in biogeography 1996
Humboldt State University, B.A. geography 1989

EXPERIENCE

Darren Smith has twelve years experience in biological resource management. He has participated in a large number of biological research and production projects at San Diego State University (SDSU), working with Dr. John O'Leary and Dr. Janet Franklin. Mr. Smith worked for Dudek and Associates from 1997 to 2001 as an associate biologist working on a variety of conservation and development projects. He has also worked for the City of San Diego and the California Coastal Commission. Mr. Smith is currently working at California State Parks as an associate resource ecologist. His work experience in research, private consulting and government has encompassed a wide variety of projects involving intensive vegetation sampling, biological inventories and monitoring, and applying GIS and remote sensing technology to biological resource conservation and development problems. Mr. Smith has produced or played a significant role in five southern California regional vegetation mapping efforts, and participated in numerous post-burn, post-impact and revegetation monitoring projects. Mr. Smith has conducted field-based research in Mediterranean-type and tropical ecosystems, focusing on patterns of plant species composition and diversity and their relationship to physical environment and disturbance. The outcome of these skills and work experience has led to the production of timely, well-received research, technical reports, and data products.

PROFESSIONAL ASSIGNMENTS

- Supervised field and GIS production of TJ River Watershed vegetation and landcover database in San Diego County, California and Baja California.
- Produced vegetation maps for Fallbrook Naval Weapons Station, and Marine Corps Air Station.
- Produced vegetation, and sensitive lands data layers for the City of San Diego Environmental Tier/Future Urbanizing Area project.
- Conducted rare plant surveys and mapped vegetation for a variety of projects in San Diego, Orange, Riverside, San Bernardino, Los Angeles, Kern, Santa Barbara, and San Luis Obispo Counties (1997-current). A selection of projects include: Moreno-Lakeside Pipeline, Wilson Creek Mitigation Bank, SCE Power Pole maintenance and replacement, White Water golf Course, Canyon Vista Estates, MSCP Black Mountain Sensitive Plant Inventory, Santa Fe Pipeline project, NCTB Miramar Curve, Oceanside/Melrose, Lone Tree Estates, Santa Fe Valley Properties, Chula Vista SPA1 and Wolf Canyon, Chino

Hills State Park Inventory, Monitoring, and Assessment Program, La Purisima Visitor Center, Chino Hills Visitor Center, Red Rock-Last Chance Canyon Riparian Bypass, Piute Butte Bouldering Constraints, and Lower Topanga Canyon Rare Plant Inventory.

- Monitored saltmarsh, and riparian revegetation efforts at Rancho Santa Fe Road Bridge, Sorrento Valley Utilities Improvements, Tijuana River Emergency Channel Mitigation Projects.
- Conducted pre-burn vegetation surveys of Burton-Mesa chaparral, Santa Barbara County.
- Monitored riparian vegetation for recovery following the removal of vehicular impacts in Coyote Canyon Anza-Borrego Desert State Park.
- Conducted long-term regional monitoring of post-burn coastal sage scrub in San Diego, Riverside and Orange Counties.
- Participated in a long-term California gnatcatcher habitat assessment including multi-year breeding and non-breeding season vegetation surveys in breeding pair home ranges and nesting sites, at MCAS Miramar, San Diego County.
- Participated in long-term study of vegetation recovery on San Clemente Island in Los Angeles County.

MEGAN S. ENRIGHT
Biologist

EDUCATION
B.S., Biology-Ecology, Behavior and Evolution, University of California, San Diego (1997)

PROFESSIONAL AFFILIATIONS
Member, California Native Plant Society
Member, Women's Environmental Council
Member, Southern California Botanists

PERMITS
Federal Permit to conduct Fairy Shrimp Survey (permit number-TE022524-0)
CDFG Rare, Threatened, and Endangered Plant Voucher Collection Permit (05006)

EXPERIENCE

Ms. Enright is a biologist with seven years experience in habitat restoration and biological assessments. She participated in coastal sage scrub restoration at the City of San Diego Miramar Landfill. The project included restoration design, native plant nursery management, and revegetation monitoring. Her current role at Dudek & Associates includes biological resources assessments and impact analyses, wetland delineations and permitting, vegetation mapping, rare plant surveys, and vernal pool studies.

Pipeline 6 Project, Metropolitan Water District of Southern California, County of Riverside, California. Conducted wetlands delineation and assisted in permit coordination for the Section 401 and Section 404 permits and 1601 Streambed Alteration Agreement. Conducted initial site reconnaissance, rare plant survey, and fairy shrimp survey for the proposed alignment. In addition, assisted in siting geotechnical activities.

Yucaipa Non-Potable Water Distribution System, Yucaipa Valley Water District, Counties of San Bernardino and Riverside, California. Conducted biological surveys including vegetation mapping, wetlands delineation and rare plant surveys within a project study area, which included the construction of five reservoirs, four pump stations and 39,120 linear feet of pipelines. Focused surveys were conducted for the state- and federally-listed Santa Ana River woolly-star and slender-horned spineflower.

Oceanside to Escondido Rail Project, North County Transportation District, Cities of Oceanside, Vista, San Marcos, Escondido and County of San Diego, California. Delineated wetlands and prepared vegetation map within the Loma Alta Creek, Buena Vista Creek, Buena Creek, Agua Hedionda Creek, San Marcos Creek, and Escondido Creek Watersheds. Prepared Section 401 and Section 404 permit applications and 1601 Streambed Alteration Agreement for impacts to non-tidal, adjacent wetlands; impacts were associated with the rail system. Prepared alternatives analysis, functional values assessment, and Conceptual Wetlands Mitigation Plan. Assisted in the preparation of an Exotics Removal Plan, Uplands Mitigation Plan, Brown-Headed Cowbird Trapping Plan, and a California gnatcatcher and least Bell's vireo Habitat Management and Monitoring Plan in accordance with the Biological Opinion issued by the United States Fish and Wildlife Service. Assisted in the preparation of the biological resources report and California Environmental Quality Act and National Environmental Policy Act documentation.

Camino Ruiz Road Alignment, Western Pacific Housing, City of San Diego - Future Urbanizing Area Subarea IV, California. Delineated wetlands, prepared vegetation map, and conducted rare plant surveys. Prepared Section 401 and Section 404 permit applications and 1603 Streambed Alteration Agreement for impacts to non-tidal, adjacent wetlands; impacts were associated with the roadway corridor. Prepared functional values assessment.

San Marcos Creek Roadway Improvements Project, City of San Marcos, City of San Marcos, California. Delineated wetlands, prepared vegetation map, and conducted rare plant surveys along San Marcos Creek from State Route 78 to Lake San Marcos.

Buena Vista Creek Channel Maintenance Project, City of Carlsbad-Engineering Division, Cities of Carlsbad and Oceanside. Project Manager for preparation of technical reports for California Environmental Quality Act documentation and wetlands permitting. Delineated wetlands, prepared vegetation map, and conducted rare plant surveys. Prepared biological resources report for California Environmental Quality Act documentation. Facilitated pre-application agency meetings with the U.S. Army Corps of Engineers, California Department of Fish and Game, and the California Regional Water Quality Control Board. Prepared a 1601 Memorandum of Understanding in accordance with Section1600 of the California Fish and Game Code and assisted in the preparation of an Exotics Removal Plan.

Salt Creek Channel Stage 6 Channel Widening Project, Riverside County Flood Control and Water Conservation District, County of Riverside, California. Delineated wetlands, prepared vegetation map, and conducted rare plant surveys, which included a focused survey for smooth tarplant (Centromadia [Hemizonia] pungens). Prepared biological resources report for California Environmental Quality Act documentation.

Canada Gobernadora, Santa Margarita Water District, Orange County, California. Project Manager for preparation of technical reports for California Environmental Quality Act documentation and wetlands permitting. Delineated wetlands, prepared vegetation map, and conducted rare plant surveys, which included a focused survey for San Diego tarplant (Deinandra [Hemizonia] paniculata), southern tarplant (Centromadia parryi spp. Australis), and many-stemmed dudleya (Dudleya multicaulis). Project also included focused surveys for least Bell's vireo, southwestern willow flycatcher and southwestern arroyo toad. Biological constraints on the site during the due diligence phase of the project.

Rancho Santalina Project, City of San Marcos, City of San Marcos, California. Conducted a delineation of "waters of the United States" under the jurisdiction of the U.S. Army Corps of Engineers, California Department Fish Game, and California Regional Water Quality Control Board, prepared vegetation map, and conducted focused rare plant survey, which included the federally-listed threatened and state-listed endangered thread-leaved brodiae (Brodiae filifolia). Prepared biological resources report for California Environmental Quality Act documentation.

Planning Areas 18 and 39, The Irvine Company, City of Irvine, California. Conducted a delineation of "waters of the United States" and wetlands under the jurisdiction of the U.S. Army Corps of Engineers, California Department Fish Game, and California Regional Water Quality Control Board and prepared vegetation map within the 1,200-acre project site. Developed wetlands permitting strategies with client. In addition, Dudek conducted focused surveys for least Bell's vireo, southwestern willow flycatcher, and California gnatcatcher.

Planning Area 1, The Irvine Company, County of Orange, California. Project Manager for preparation of biological technical reports for California Environmental Quality Act documentation for the Planning Area 1 Project, which encompasses over 4,200 acres, within which the northern half (approximate) would be permanent open space as part of a larger natural resources preserve, and the southern half (approximate) would be developed as a new community that includes residential, commercial, institutional (i.e., schools), agricultural, and open space uses. Prepared vegetation map and conducted rare plant surveys within the 4,200-acre project site. Prepared biological resources report for California Environmental Quality Act documentation and assisted in the preparation of wetlands permitting data.

Surfer's Point, Surfer's Point, LLC, City of Encinitas, California. Conducted vegetation mapping and floristic surveys and prepared biological resources report for California Environmental Quality Act documentation for the 34-unit timeshare resort project. Project dealt with coastal issues because it was located directly adjacent to Batiquitos Lagoon just east of Coast Highway 101.

Newhall Ranch Project, Newhall Land and Farming Company, Los Angeles and Ventura County, California. Served as field task manager for botanical surveys on Newhall Land and Farming Company parcels. Directed field team in performing general sensitive plant surveys and focused surveys for the state-listed endangered San Fernando Valley spineflower (Chorizanthe parryi var. fernandina) and other sensitive plants on approximately 6,000 acres in 2002 and 14,500 acres in 2003. In addition, collected San Fernando Valley spineflower seed from nine occurrences on Newhall Ranch in 2003. Prepared vegetation mapping for San

Fernando Valley spineflower occurrence areas and assisted in the preparation of the draft conservation and management plan for this species.

Quantum Estates II Projects, Quantum Estates II, LLC, County of San Diego, California. Conducted focused surveys for the state-listed endangered and federally-listed threatened Encinitas bacchairs (Baccharis vanessae) on approximately 40 acres in 2003.

Perris Valley Channel Lateral "B" State 2 Project, Riverside County Flood Control and Water Conservation District, County of Riverside, California. Conducted rare plant surveys along 9,600 linear feet of the Perris Valley Channel in 2003.

Village 3 Project, Otay Ranch Company, City of Chula Vista, California. Conducted rare plant surveys, including focused surveys for the federally-listed threatened and state-listed endangered Otay tarplant, on 263 acres in 2003.

Fanita Ranch, Santee, California. Conducted rare plant surveys on 2,000 acres in 2003.

DAVID FLIETNER
Biologist

EDUCATION

M.S., Botany, University of Florida (1987)
B.S., Plant Science, University of California, Davis (1983)
GIS Certificate, University of California, Riverside extension (1996)

REGISTRATION/CERTIFICATIONS

County of San Diego Certified Biologist
Quino checkerspot butterfly, USFWS Permit #TE-008031
Riverside fairy shrimp, conservancy fairy shrimp, longhorn fairy shrimp, vernal pool fairy shrimp, San Diego fairy shrimp, vernal pool tadpole shrimp, USFWS Permit #TE-797665
Licensed Agricultural Pest Control Advisor #4577 (weed control)
Qualified Applicator License #31356 (landscape, agriculture, and aquatic)
Certified for flat-tailed horned lizard surveys, BLM (2001)
Certificate of Educational Achievement in Revegetation/ Restoration Planning, California Society for Ecological Restoration (2001)
Certificate of Completion, Desert Tortoise Council Surveying, Monitoring and Handling Techniques Workshop (2002)

AFFILIATIONS

California Invasive Plant Council
California Native Plant Society
Southern California Botanists

EXPERIENCE

Mr. Flietner is a biologist with eight years experience conducting biological resource surveys, endangered species presence/absence surveys, wetland delineations, and construction and restoration monitoring. Biological resource survey experience includes vegetation mapping, floristic inventories, and focused surveys for sensitive plant species, arroyo toad, and flat-tailed horned lizard. He conducts surveys for Quino checkerspot butterfly and has conducted surveys San Diego fairy shrimp, and Riverside fairy shrimp. His experience includes wetlands delineations in accordance with U.S. Army Corps of Engineers guidelines and applications for Clean Water Act Section 401 and 404 permits and California Department of Fish and Game Streambed Alteration agreements. In addition, he performs qualitative and quantitative assessments of revegetation projects; writes biological technical reports, wetland delineation reports, habitat restoration plans and annual progress reports. He has conducted annual pesticide training for field applicators and nursery workers in Spanish and has written pest control recommendations for habitat restoration projects.

Los Angeles to San Diego Fiber-Optic Line, Southern Portion, San Diego County. San Diego Gas and Electric. Conducted floristic inventory, vegetation mapping, and focused surveys for quino checkerspot butterfly in vicinity of seven "pull sites" for line stringing operation. Prepared biological letter report summarizing results of surveys.

Potential Reservoir Sites, San Diego County, California. Otay Water District. Conducted focused presence/absence surveys for quino checkerspot butterfly at three potential reservoir sites for Otay Water District. Prepared report according to U.S. Fish and Wildlife Service requirements.

Oceanside Country Club Site, Oceanside California. City of Oceanside. Conducted vegetation mapping, floristic inventory, and post-impact assessment for sewer repair operations. Prepared biological technical report assessing impacts to wetland habitats, and conceptual wetlands mitigation and monitoring plan. Prepared Section 1601 Streambed Alteration Agreement, Section 404 Nationwide Permit application, and Section 401 Regional Water Quality Board permit application.

Rose and Tecolote Creek Clean Beaches Initiative Project, San Diego, California. City of San Diego Strom Water and Pollution Prevention Program. Conducted vegetation mapping, floristic inventory, and wetlands delineation for two pipeline projects to recirculate water in Mission Bay Regional Park. Prepared biological technical resources report, pre-construction notification under Nationwide Permit 12, Coastal Development Permit application to California Coastal Commission, and Section 401 application to Regional Water Quality Control Board.

Gavilan Hills/Smith Road Channel and Sediment Basin, Riverside County, California. Riverside County Flood Control and Water Conservation District. Mapped vegetation communities, conducted floristic inventory, and delineated wetlands in 71-acre project site. Prepared biological technical report including potential onsite mitigation for project impacts for Riverside County Flood Control and Water Conservation District.

County Line Channel Project, San Bernardino and Riverside Counties, California. Riverside County Flood Control and Water Conservation District. Mapped vegetation communities, conducted floristic inventory, identified potential Delhi sands flower-loving fly habitat, and identified occupied burrow owl habitat in approximately 2.5 linear mile project area. Prepared biological technical report including results of focused surveys for Delhi sands flower-loving fly surveys for Riverside.

Santa Ana River Maintenance Project, Riverside, California. Riverside County Flood Control and Water Conservation District. Mapped vegetation communities in approximately 500-acre flood control channel project area. Identified potential habitat of Santa Ana woolly-star and slender-horned spineflower. Prepared biological technical report describing resources and avoidance, minimization, and mitigation measures to be implemented in long-term flood control channel maintenance program.

Wildrose Business Park Regional Drainage Facility, Riverside County, California. Ridge Properties, LLC. Mapped vegetation communities, conducted floristic inventory, and performed wetlands delineation for approximately 1700 linear feet storm drain project. Prepared biological technical report and 1601 Streambed Alteration Agreement for project.

Cloverdale Leasehold, Escondido, California. County of San Diego Water Department. Performed wetland delineation on 90-acre parcel adjacent to Escondido Creek for renewal of leased property. Wrote biological letter report describing results of wetlands delineation, property use plan, and conceptual wetlands mitigation plan, including recommendation for control of Lepidium latifolium.

Wilson Creek Crossing, San Diego County, California. County of San Diego Department of Public Works. Mapped vegetation communities, conducted floristic inventory, performed wetlands delineation, and conducted presence/absence surveys for arroyo toad. Prepared biological technical report, conceptual wetlands mitigation and monitoring plan, Nationwide Permit 39 notification, and Section 1601 Agreement for San Diego County Water Department.

Gird Road Crossing, San Diego County, California. County of San Diego Department of Public Works. Mapped vegetation communities, conducted arroyo toad habitat assessment, floristic inventory, and wetlands delineation for San Diego Public Works Department. Prepared biological technical report including conceptual mitigation plan for impacts to CDFG-jurisdictional riparian vegetation.

San Diego Jewish Academy, San Diego, California. San Diego Jewish Academy. Monitored habitat coastal sage scrub and riparian, and restoration and wart-stemmed ceanothus revegetation projects for first two years of five-year implementation plan. Conducted quantitative and qualitative analysis and prepared two annual progress reports comparing site conditions with performance criteria. Recommended and monitoring additional maintenance measures, seeding, and plantings.

Riverside County Agricultural Preserve, Riverside County, California. Conducted habitat mapping, and biological resource inventory, including potential Delhi sands flower-loving fly habitat for proposed mixed-use development of 8,000 acre area. Prepared constraints analysis report including recommendations to avoid impacts to least Bell's vireo and southern willow flycatcher critical habitat.

DOUGLAS GETTINGER
Habitat Restoration Specialist

EDUCATION

B.S. Landscape Architecture, California State Polytechnic University at Pomona (1979)
B.S. Ornamental Horticulture, California State Polytechnic University at Pomona (1980)

REGISTRATION/CERTIFICATIONS

California Agricultural Pest Control Adviser License No. 01369 (expires 12/31/04)

PROFESSIONAL AFFILIATIONS

Member, Society for Ecological Restoration
Member, California Invasive Plant Council
Member, California Agricultural Production Consultants Association

EXPERIENCE

Mr. Gettinger has more than a decade of experience in habitat restoration work, including biological construction monitoring, and the design, implementation, and monitoring of habitat restoration projects. His training in landscape architecture and ornamental horticulture, coupled with his experience working on large construction projects help bring habitat restoration and endangered species habitat creation projects to a successful conclusion. He holds a California Pest Control Adviser License, which allows him to legally act as an expert and make recommendations for the control of invasive plant species. His project experience includes restoration of chaparral, coastal sage scrub, coastal salt marsh, freshwater marsh, limestone forest, riparian woodland, southern willow scrub, and oak woodland habitats implemented under agreements with various federal, state, and local agencies. He has experience working safely around the large earth-moving equipment found at various construction projects and has worked at hazardous materials sites requiring OSHA 40-hour hazardous worker training.

Metropolitan Wastewater Department As-needed Biological Services Contract 2000-2005, San Diego Metropolitan Wastewater Department, City of San Diego, California. Served as a biological construction monitor on numerous emergency sewer repair and maintenance projects in sensitive habitat areas located in canyons for the City of San Diego Metropolitan Wastewater Department on the as-needed biological services contract 2000-2005. Many tasks included emergency sewer repair projects where sewage was flowing into live stream conditions, which required immediate response from DUDEK staff. Other tasks included monitoring emergency sewer cleaning activities where temporary equipment access was needed in sensitive habitat canyon areas. Scheduled and coordinated the work of other biological monitors, as needed. Initial assessment reports, biological resources reports, and/or impact assessment reports were then prepared for each task, depending on project requirements.

San Diego County Water Authority Emergency Storage Reservoir Program, San Diego County Water Authority, County of San Diego, California. Assisted in focused biological surveys and helped prepare alternatives analysis for the environmental impact report for the San Diego County Water Authority Emergency Storage Reservoir Program. Performed extensive tree inventory surveys and mapping of coast live oak (*Quercus agrifolia*) and mesa oak (*Q. engelmannii*) in proposed project alternative areas.

Metropolitan Water District Pipeline Project, Metropolitan Water District of Southern California, Hemet, California. Collected seed from several sensitive species, including San Jacinto Valley crownscale (*Atriplex coronata var. nutatior*), little mousetail (*Myosurus minimus ssp. apus*), dwarf peppergrass (*Lapidium latipes*), and woolly marbles (*Psilocarpus brevissumus*) on a Metropolitan Water District pipeline right-of-way prior to construction in Riverside County, California. Seed was sent to Rancho Santa Ana Botanic Garden for counting, cleaning, and storage. Later sewed seed in appropriate locations along right-of-way after pipeline construction was completed. Also counted population and collected seed for Parish's brittlescale (*Atriplex parishii*), a species formerly presumed extinct.

Cannon Road Extension Project, City of Carlsbad Engineering Department, City of Carlsbad, California. Biological construction monitor for Phase 2 of the Cannon Road Extension Project in Carlsbad, California through sensitive habitat containing wetlands habitat for the federally endangered least Bell's vireo (*Vireo bellii pusillus*), southwestern willow flycatcher (*Empidonax traillii extimus*), and western clapper rail (*Rallus longirostris*), as well as coastal sage scrub habitat for the federally-listed threatened coastal California gnatcatcher (*Polioptila californica*). Prepared monthly project progress reports and reported permit violations to the agencies. Project included oversight of subcontractors performing paleontological monitoring and recovery, and construction noise monitoring. Also monitored the installation and 120-day maintenance period for the temporary impacts wetland mitigation area.

Scripps Poway Parkway Extension Project, City of Poway Engineering Department, City of Poway, California. Biological monitor during two years of road construction through four miles of sensitive habitat for the Scripps Poway Parkway Extension Project in Poway, California. Located appropriate preserve habitat in the City and transplanted Coast Barrel Cactus (*Ferrocactus viridescens*) growing in the project right-of-way prior to impacts. Worked with City inspectors, surveyors, and the contractor to insure that impacts stayed within permitted limits. Monitored erosion and sediment control implementation and maintenance, and revegetation planting and seeding.

Puente Hills Landfill Wetland Mitigation Project, Sanitation Districts of Los Angeles County, City of Whittier, California. Provided horticultural and botanical monitoring for the wetland habitat restoration project associated with the Puente Hills Landfill in Whittier, California. Work was performed for the Sanitation Districts of Los Angeles County. The wetland restoration area is adjacent to the Puente Hills Landfill and also provides visual screening of the landfill for adjacent residents. Also directed staff performing the required wildlife monitoring and provided consultation for coast live oak (*Quercus agrifolia*) mitigation being implemented on weedy mustard covered slopes adjacent to the landfill, coastal sage scrub restoration being attempted on the landfill's canyon fill slopes, and ornamental buffer landscape to provide visual screening.

Rocketdyne Ecological Risk Assessment Project, Boeing Integrated Defense Systems, County of Ventura, California. Assisted with focused biological surveys to map vegetation communities and search for sensitive plant and wildlife species at a contaminated site. Surveys were the first stage in conducting an ecological risk assessment for the Santa Susana Field Laboratory, Ventura County, California.

Rancho Pacfifica Cottages Habitat Enhancement Plan, Taylor-Woodrow Homes, Inc., City of Encinitas, California. Prepared a plan to control invasive exotic plant species such as giant reed (*Arundo donax*) that infests the creek channel within a biological open space being preserved on the property. The plan provides for the removal and control of invasive plant species and the planting of native wetland and upland species in their place.

Village 11 Project, Brookfield Homes, Chula Vista, California. Biological construction monitor for grading of the Village 11) project in Otay Ranch in Chula Vista, California. Grading of the approximately 500-acre site in the eastern portion of the Otay Valley was adjacent to the Salt Creek Open Space Preserve containing wetlands and habitat for the federally-listed threatened coastal California gnatcatcher. Dudek directed and monitored soil and biomass salvaging from suitable habitat areas within the project footprint and is currently monitoring installation of the wetland mitigation area.

Rolling Hills Ranch Wetland Mitigation Monitoring Project, McMillin Land Development, City of Chula Vista, California. Biological construction monitor for the installation and long-term monitoring of Phases I and II of the wetland mitigation for the Rolling Hills Ranch development in Chula Vista, California. Rolling Hills Ranch is an approximately 300-acre mixed use project. The wetland mitigation program, involves expanding wetland habitat along Salt Creek and controlling invasive, exotic salt cedar on the project site. The wetland mitigation was installed in two phases, approximately two years apart. Oversaw the collection of botanical data and preparation of the annual reports for the two phases.

Henry Ranch Biological Construction Monitoring and Wetland Mitigation Project, William Lyon Homes, City of San Ramon, California. Directed staff performing pre-construction surveys for federally-listed threatened California red-legged frog (*Rana aurora draytonii*) and nesting birds, and biological construction monitoring for permitted wetland impacts and initial land clearing at the Henry Ranch Project in San Ramon, California. Also oversaw and directed implementation of conceptual wetland mitigation pond plan, as well as other required enhancement measures.

Fieldstone Brush Management and Summer Holly Preservation Project, The Fieldstone Company, City of San Diego, California. Supervised a brush management and summer holly (*Comarostaphylos diversifolia*) preservation program at a housing project on the rim of Los Peñasquitos Canyon Preserve, San Diego, California.

Baldwin *Brodiaea* Preserve, The Baldwin Company, City of San Marcos, California. Supervised the planting of native purple needlegrass (*Nasella pluchra*) plants in a preserve for the federal and State-listed endangered thread-leaf brodiaea (*Brodiaea filifolia*) in San Marcos, California.

Newhall Ranch, Newhall Land and Farming Company, County of Los Angeles, California. Assisted with focused surveys for the state-listed endangered San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina)* on the approximately 6,000 acres in 2002 and 14,500 acres in 2003 on Newhall Ranch in Los Angeles County, California.

Talone Lake Wetland Mitigation Project, Gatlin Development Company, City of Oceanside, California. Designed a wetland mitigation plan, oversaw construction impacts and mitigation installation for the loss of wetland habitat associated with a mixed use project development for the Rancho del Oro project around Talone Lake, in Oceanside, California. Project site includes habitat for the federally-listed endangered least Bell's vireo (*Vireo bellii pusillus*). Assisted in preparation of a draft habitat management plan for the project and processed the 404 application with the U.S. Army Corps of Engineers and 1603 Streambed Alteration Agreement with the California Department of Fish and Game. Project included coastal sage scrub buffer zone around a wetland.

Ocean Trails Habitat Restoration Project, Ocean Trails L.P., City of Rancho Palos Verdes, California. Biological and horticultural monitor at the 92 acres Ocean Trails Restoration Project in Rancho Palos Verdes, California. The Ocean Trails project is restoring coastal sage scrub, southern cactus scrub, and coastal bluff scrub in ruderal and degraded native habitat. The restoration program is creating additional habitat for the federally-listed threatened coastal California gnatcatcher (*Polioptila californica*), which is already expanding into the still developing habitat.

Potrero Canyon Wetland Mitigation Plan, City of Los Angeles Department of Recreation and Parks, City of Los Angeles, California. Developed a riparian mitigation plan for impacts in a coastal canyon being filled to stabilize landslides and prevent further property losses at Potrero Canyon in the Pacific Palisades neighborhood in Los Angeles, California. Made an extensive search for offsite mitigation alternatives in the area. Attended community workshops to explain mitigation and learn neighborhood concerns about the project. Plan was prepared for presentation to the California Coastal Commission.

VIPUL JOSHI
Biologist

EDUCATION

B.S., Evolution, Behavior, Ecology, University of California, San Diego (1997)

EXPERIENCE

Mr. Joshi has five years professional experience as a biological consultant specializing in botanical surveying, permit acquisition, permit compliance, and project management. Mr. Joshi is well experienced with southern California flora and environmental regulations. Mr. Joshi also has had experience managing constraints analysis, entitlement processing, permit acquisition, and biological construction monitoring for a variety of public and private projects.

Mr. Joshi has specific experience with CEQA processing with a variety of local jurisdictions, state and federal Endangered Species Act permit processing, wetlands permitting including Nationwide and Individual Permits from the U.S. Army Corps of Engineers, and management of permit compliance. Specific biological survey skills include full rare plant surveys, focused presence/absence surveys for the state- and federally-listed quino checkerspot butterfly and vernal pool fairy shrimp, project-level vegetation mapping, wetlands delineation, vernal pool identification, vernal pool watershed mapping, and general biological assessment of functions and values.

Cielo del Norte - San Diego County, California. Provided baseline vegetation and rare plant surveys for project in Harmony Grove area. Drafted biological technical report and endangered species permitting strategy for 500-acre development in a critical preserve planning area. Participated in multiple screencheck EIR processing with the County. Provide project management for ongoing entitlement process.

Nickel Creek – Ramona, California. Provided baseline vegetation, wetlands delineation, and rare plant mapping for 14-acre multi-family residential development on the Santa Maria River. Coordinated with architect on least impactive development design and coordinated with County of San Diego to design a multi-use trail connection along the river while avoiding impacts to jurisdictional waters. Provided Biological Resources Technical Report evaluating project impacts pursuant to CEQA.

Manchester Avenue Residential Development – Encinitas, California. Provided project management for entitlement processing of medium-scale residential subdivision on coastal property supporting numbers rare vegetation communities and plant species. Project capabilities included vegetation mapping, rare plant surveys, wetlands delineation, impact assessment pursuant to CEQA, and permitting strategy for impacts to jurisdictional wetlands, state- and federal endangered species.

Levatino Property – Carlsbad, California. Provided biological resource mapping, rare plant surveys, and wetlands delineation for 20-acre property. Evaluated development constraints in consideration of regional planning efforts, state and federal regulations.

Maldanado Property – Carlsbad, California. Provided biological resource mapping, rare plant surveys, and wetlands delineation for 50-acre property. Evaluated development constraints in consideration of regional planning efforts, state and federal regulations.

Santa Fe Meadows – Santa Fe Valley, California. Provided vegetation mapping, rare plant survey, and wetlands delineation for 40-acre residential development area.

Shaw Property – San Diego, California. Provided vegetation mapping, rare plant, and wetlands delineation for 40-acre property.

Via de la Valle – San Diego, California. Provided biological resources mapping, wetlands delineation, rare plants survey, and development constraints analysis for 20-acre property on

Our Lady of Mt. Carmel Catholic Church – San Diego, California. Conducted baseline vegetation surveys, wetlands delineation, rare plants survey, vernal pool identification, and vernal pool watershed mapping. Drafted Biological Resources Technical Report for Mitigated Negative Declaration and participated in community meetings and response to comments. Drafted Resource Management Plan for onsite open space management and avoidance of long-term impacts to adjacent USFWS National Wildlife Refuge property.

Lux Art Institute – Encinitas, California. Provided biological resource mapping, including vegetation mapping, wetlands delineation, and rare plant survey for 20-acre property. Provided constraints analysis, evaluation of project impacts pursuant to a Habitat Loss Permit under Section 4(d) of the federal Endangered Species Act, and management of permit compliance.

Fry's Electronics - San Marcos, California. Provided initial vernal pool identification and mapping, utilizing portable GPS system, wetlands delineation, and rare plant mapping. Rare plant mapping included pool by pool floral inventory and mapping of state- and federally-listed endemic vernal pool plant species.

San Jacinto Valley – Riverside County, California. Provided biological resource mapping, wetland delineation, and rare plant survey for endemic alkali species within San Jacinto River floodplain.

San Marcos Creek Roadway Improvements Project, City of San Marcos, City of San Marcos, California. Delineated wetlands, prepared vegetation map, and conducted rare plant surveys along San Marcos Creek from State Route 78 to Lake San Marcos.

Otay Ranch - Chula Vista, California. Provided biological resource surveys and documentation for various developments covering over 4,000 acres of vacant land. Tasks have included vegetation mapping, rare plants surveys, wetlands delineations, fairy shrimp surveys, and quino checkerspot surveys. Provided Biological Resource Technical Report pursuant to CEQA documentation, assisted in preparation of Second Tier EIR, development wetlands and endangered species permitting strategies, preparing and processing Section 404 Nationwide Permits 14 and 39, Section 401 Water Quality Certification, Section 1601 Streambed Alternation Agreement, and Section 7 Biological Opinion, and managing compliance with various permit conditions.

Irvine Company - Irvine, California. Provided vegetation mapping, wetlands delineation, and rare plant mapping for over 5,000 acres of vacant land.

Fanita Ranch – Santee, California. Provided vegetation mapping, rare plant, and wetlands delineation for 2,000 acre property.

Salt Creek Gravity Sewer - City of Chula Vista, California. Developed project alternatives permitting strategy with City and project engineers for 11-mile gravity sewer along north edge of Otay River Valley. Provided baseline vegetation mapping, wetlands delineation, and rare plant surveys. Prepared biological technical report and EIR biological evaluation for CEQA compliance. Submitted and coordinated acquisition of Section 404 Nationwide Permit 12, Section 401 Water Quality Certification, Section 1603 Streambed Alternation Agreement, and Section 7 Biological Opinion, including identification of mitigation alternatives. Coordinated construction monitoring and permit compliance.

North Agua Hedionda Sewer Rehabilitation - City of Carlsbad, California. Provided project management for half-mile sewer rehabilitation and shoreline protection project adjacent to coastal lagoon. Assignments included vegetation mapping, tidal wetlands delineation, rare plant surveys, development of engineering alternatives, permitting strategies, public scoping meetings, analysis of alternative impacts, EIR biological resources documentation, tidal wetlands mitigation identification, permit preparation for Section 404 Nationwide Permit 14, Section 401 Water Quality Certification, Section 1603 Streambed Alternation Agreement, Coastal Development Permit, Section 7 Biological Opinion, and project planning in terms of scheduling and budget.

Yucapia Non-Potable Water Distribution System, Yucapia Valley Water District, Counties of San Bernardino and Riverside, California. Provided baseline vegetation mapping, wetlands delineation, and rare plant surveys for 500-acre riparian study area.

Pipe 6, Metropolitan Water District – Riverside County, California. Conducted rare plant surveys and quino checkerspot butterfly surveys over approximately 20 mile long alignment.

Perris Valley Storm Drain, Lateral B – Riverside County Flood Control District, California. Provided wetlands delineation and focused rare plant surveys for the two mile long open flood control channel for deepening and widening project. Analyzed CEQA and wetlands permitting strategies and provided Biological Resources Technical Report and wetlands permit applications for Section 404 Nationwide Permits 3, 12, and 14, Section 1603 Streambed Alteration Agreement, and Section 401 Water Quality Certification. Met with ACOE staff to confirm wetlands delineation.

Canada Gobernadora, Santa Margarita Water District, Orange County, California. Conducted rare plant surveys, which included a focused survey for San Diego tarplant (Deinandra [Hemizonia] paniculata), southern tarplant (Centromadia parryi spp. australis), and many-stemmed dudleya (Dudleya multicaulis).

SR-125 South - Caltrans/CTV. Provided support in preparation of Section 7 Biological Assessment and permit compliance negotiations. Conducted vegetation mapping, rare plant, and quino checkerspot surveys for various mitigation site alternatives. Drafted conceptual revegetation and management plans for various mitigation sites including sites on south edge of Otay River Valley, Otay Mesa, and Otay Mountain..

LaBorde Canyon off-Highway Vehicle Park Study, County of Riverside, California. Provided baseline vegetation mapping and plant species inventory.

KAMARUL MURI
Biologist/Environmental Specialist

EDUCATION

B.S., Ecology Behavior and Evolution, University of California, San Diego (2001)

REGISTRATION/CERTIFICATIONS

US Fish and Wildlife Service Quino checkerspot 10(a) Permit # TE051250-0; issued 3/04/2002, expires 03/03/2006
California Department of Fish and Game Rare, Threatened and Endangered Plant Voucher Collecting Permit # 05077; issued 3/10/2003, expires 3/10/2006.

EXPERIENCE

Mr. Muri has more than two years experience as a consultant and field biologist through involvement in a wide array of projects in San Diego, Riverside, Orange, Los Angeles and San Bernardino counties. Project experience includes biological resource surveys; data collection and analysis; California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) documentation; environmental assessments; wetlands permitting, mitigation design and monitoring; and endangered species surveys. Projects include issues relative to the California Coastal Act, the California Fish and Game Code, the federal Clean Water Act (Sections 401 and 404), the Rivers and Harbors Act, the Coastal Zone Management Act, the Migratory Bird Treaty Act, federal Endangered Species Act (fESA) and state Endangered Species Act (sESA). Mr. Muri currently holds a federal permit to conduct surveys for the federally-listed endangered adult Quino checkerspot butterfly and is working towards obtaining a permit to conduct surveys for the federally-listed threatened coastal California gnatcatcher.

Rancho Santa Fe Road Realignment and Bridge Construction Project, City of Carlsbad, California. Conducting biological monitoring of construction and ensuring compliance with resource permits during construction of the project. Resource permits issued for the project involve the federally-listed threatened coastal California gnatcatcher and wetlands regulated by the California Department of Fish and Game, the U.S. Army Corps of Engineers and the California Regional Water Quality Control Board. Also assisted with breeding season surveys to monitor nesting activity of gnatcatcher pairs located adjacent to the project.

Oceanside to Escondido Bikeway Project, North County Transit District. Cities of Vista and San Marcos, California. Monitored the removal of wetlands vegetation associated with construction activities for the project.

Salt Creek Channel Widening Project, Riverside County Flood Control and Water Conservation District, Riverside County, California. Conducted surveys of an existing smooth tarplant population to identify areas most suitable for translocation in support of a channel widening project. Helped to prepare specifications for the translocation effort and coordinated seed collection.

Perris Valley Lateral 'B' Stage 2 Project, Riverside County Flood Control and Water Conservation District, Riverside County, California. Conducted biological resource mapping, a delineation of jurisdictional wetlands and prepared a biological resources technical report in support of the channel widening project. Project impacts to jurisdictional areas were processed with a joint permit application for compliance with Section 1600 of the California Fish and Game Code, Sections 401and 404 of the federal Clean Water Act (CWA). Compliance with Section 404 of the federal CWA was achieved through the use of several Nationwide Permits for project-related improvements to roads and utilities.

Non-potable Water Distribution System Project, Yucaipa Valley Water District, Riverside and San Bernardino Counties, California. Conducted vegetation mapping and a jurisdictional wetlands delineation within a six-mile study area along San Timoteo Creek and evaluated impacts to undeveloped areas over approximately 200,000 linear feet of proposed non-potable water pipeline. Documents prepared in support of the project include a biological resources technical report and wetlands permit applications. Provided assistance in preparing the Draft Environmental Impact Report/ Environmental Impact Statement in accordance with the California Environmental Policy Act and the National Environmental Protection Act. Used aerial photographs to estimate historical vegetation density within San Timoteo Creek over a 42-year period to support the design of a Habitat Monitoring Program based on adaptive management principles.

San Diego Pipeline No. 6, Metropolitan Water District of Southern California, Riverside County, California. The project consists of a 30-mile nine-foot diameter water conveyance pipeline. Mr. Muri provided assistance in conducting habitat assessments for sensitive and federally-listed wildlife species.

Bark Beetle Tree Removal Project, Southern California Edison, San Bernardino, San Gabriel, and Santa Rosa Mountains, California. Conducting wildlife surveys, botanical surveys, habitat assessments and surveys for sensitive and U.S. Forest Service Threatened, Endangered, and Sensitive species throughout the San Bernardino, San Gabriel and Santa Rosa Mountains along Southern California Edison power line routes. The surveys are supporting implementation of a Bark Beetle tree removal project along existing power lines within Riverside and San Bernardino County.

Southern California Edison Utility Pole Maintenance Project. San Bernardino and San Gabriel Mountains, California. Monitored pole maintenance activities in biologically sensitive areas to ensure avoidance of impacts to potentially-occurring sensitive and U.S. Forest Service Threatened, Endangered and Sensitive species.

Cathedral High School Project, Catholic Diocese of San Diego, City of San Diego, California. Processed wetlands permitting package for the high school project to obtain authorization for impacts to jurisdictional waters under Section 401/404 of the federal Clean Water Act and Section 1603 of the California Fish and Game Code. Also responsible for monitoring construction and ensuring compliance with resource permits during construction of the project.

Beach Street Project, Taylor Woodrow Homes, City of Encinitas, California. Project manager for an 8.3-acre single- and multi-family residential development project on Requeza Street in the City of Encinitas. Conducted biological surveys and prepared a biological resources technical report to support environmental processing of the project pursuant to CEQA. Other tasks managed as part of the project included gaining approval from the City and the California Department of Fish and Game for encroachment into the 50-foot wetlands buffer required according to City guidelines, preparing an application for a Section 1603 Streambed Alteration Agreement to authorize habitat enhancement activities within wetlands onsite, and coordinating the completion of pre-construction nesting bird surveys.

El Apajo Estates Development Project Sensitive Amphibian Surveys. Rancho Santa Fe, California. Assisted with nocturnal relocation surveys for sensitive toad species on the 40-acre El Apajo development property located along the San Dieguito River in Rancho Santa Fe.

Mediterranean Village Residential Development, City of San Diego, California. Provided biological resource mapping, wetlands delineation, and impact analysis pursuant to CEQA.

Trabuco Canyon Private Residence Project, County of Orange, California. Conducted general biological reconnaissance surveys and focused surveys for California gnatcatcher within an undeveloped property near Trabuco Canyon in southern Orange County. Preparing a biological resources technical report to support development permit application.

Costa Del Sol Project, Barratt American, City of San Diego, California. Monitoring construction activities adjacent to sensitive native habitats to be preserved within the Multiple Habitat Planning Area of the City of San Diego's Multiple Species Conservation Program.

White Horse Estates Project, Barratt American, City of San Diego, California. Monitoring construction activities adjacent to sensitive native habitats to be preserved within the Multiple Habitat Planning Area of the City of San Diego's Multiple Species Conservation Program.

Newhall Ranch Rare Plant Surveys, Newhall Ranch and Farming Company, Los Angeles and Ventura Counties, California. Conducted focused surveys for the state-listed endangered San Fernando Valley spineflower and other sensitive plants on approximately 6,000 acres in 2002 and 14,500 acres in 2003. In addition, collected San Fernando Valley spineflower seed from nine occurrences on Newhall Ranch.

Western Riverside County Multiple Species and Habitat Conservation Plan, County of Riverside, Calfornia. Assisted in the document research and preparation of species accounts for endangered, threatened, sensitive and other key species in the County of Riverside.

RELEVANT EXPERIENCE

Attended San Diego Natural History Museum class "Sensitive Butterflies of San Diego County" in December, 2003. The class specialized in the biology and identification of the nine most sensitive butterfly species in San Diego County.

Attended Association of Environmental Professionals "CEQA Basics" seminar in November, 2003.

Attended Building Industry Association seminar on Storm Water Sampling and Analysis Strategy in March, 2003.

CHRISTOPHER E. OESCH
Habitat Restoration Specialist

EDUCATION

M.S., Environmental Systems; International Development Technology Humboldt State University Arcata, California (2003)
B.A., International Agriculture, Eastern Mennonite University (1998)

THESIS WORK

Mr. Oesch's thesis work focused on Hardscape Stream Channel Naturalization. The thesis examines modification of cement channelized stream sections, commonly found in urban settings, for mitigating their negative impacts to native plant and animal populations. This is achieved by incorporating aspects of natural stream hydrology and morphology into an existing hardscape channel. This approach is intended for improving habitat in existing hardscape channels when total removal of the hardscape structure is not an option. The thesis was modeled for the hardscape channel west of I-5 on Rose Creek, San Diego, California.

EXPERIENCE

Upon completing his Bachelors degree in International Agriculture, Mr. Oesch worked on sustainable agriculture restoration and development projects in Guatemala and Honduras. He has recently completed graduate research in hardscape urban wetland restoration modeled for Rose Creek in San Diego, California. He is currently working on a variety of habitat restoration projects at DUDEK involving freshwater marsh, salt marsh, riparian, urbanized/disturbed, chaparral, stream channel, and coastal sage scrub habitats.

Lake Val Sereno/ La Jolla Crossroads Off-Site Mitigation, Encinitas, California.
Mr. Oesch is the project monitor for the La Jolla Crossroads off-site mitigation located at Lake Val Sereno. This project involves the enhancement of 5.37 acres of freshwater wetland to fulfill the requirements of agency permits ACOE NWP-12, CDFG 1601 agreement and RWQCB 401 certification. His duties include advising on the removal of exotic and invasive plant species, documenting progress of planted native plants, collecting quantitative transect data, and recommending courses of action to improve site success in meeting performance standards.

Famosa Slough Saltmarsh/ Sorrento Creek Dredging Mitigation, San Diego, California.
Mr. Oesch is the conceptual plan author for a .5 acre enhancement area of saltmarsh. This enhancement is to fulfill mitigation requirements from the Sorrento Creek Maintenance Dredging performed by City of San Diego, Engineering and Capital Projects Department. This project is designed to fulfill the criteria of permits CDFG 1601 and ACOE 404. The enhancement area will include middle and lower saltmarsh plant species, bordered by a coastal sage scrub habitat buffer strip.

Poggi Creek Streambed Modification, Chula Vista, California. Mr. Oesch is the conceptual plan designer for a streambed erosion control project. This grade control structure design uses a low-profile, biodegradable approach to avoid being classified as "channel fill". The intended purpose is to prevent streambed scour, encourage sediment deposition, and promote native freshwater plant species establishment.

Torrey Hills Basin Wetland Mitigation, San Diego, California. Mr. Oesch is project monitor for site involving the creation of approximately 3 acres of wetland habitat to mitigate for impacts of the adjacent Torrey Hills housing development. His duties include advising on the removal of exotic and invasive plant species, documenting progress of planted native plants, collecting quantitative transect data, and recommending courses of action to troubleshoot hydrologic adversities in the performance of the basin's morphology.

Meadowbrook Villages Development Wetland Mitigation Project, Escondido, California. Mr. Oesch assisted in design of the stormwater detention/ wetland creation basin for a retirement development. The basin created opportunity for onsite wetland mitigation as well as provided increased stormflow storage capacity along Reidy Creek to prevent flooding. He also assisted in preliminary soil sampling and biotic surveying.

Las Virginas Creek Hardscape Naturalization Proposal, Los Angeles, California. Mr. Oesch assisted in a proposal for the naturalization of a section of concrete hardscape channel along Los Virginas Creek (see thesis work). Goals of the naturalization would be to create sediment deposition sufficient to grow wetland plant species, add topography to the channel bottom and sides which would encourage a more natural hydrologic regime, and to achieve these goals while passing floodwater efficiently as to not promote flooding.

Vista Sorrento Parkway Alkali Marsh Mitigation Project, San Diego, California. Mr. Oesch is the biological monitor for the project. This includes collecting transect data, recommendations on weed removal and native plant mortality. The project entails creation/enhancement of 1 acre of coastal sage scrub, mulefat scrub, and salt marsh habitats as mitigation for impacts from the Caltrans ROW project.

Los Penasquitos Lagoon Saltmarsh Mitigation Project, San Diego, California.
Mr. Oesch assisted in the monitoring of native saltmarsh and coastal sage scrub habitat including transect data collection, advisement on remedial plantings, and non-native plant removal.

Rolling Hills Ranch Wetland Mitigation Project, Chula Vista, California. Mr. Oesch assisted in annual monitoring efforts and transect data collection for 2 acres of created wetland habitat. This creation area was in mitigation for the surrounding Rolling Hills Ranch housing development.

Green Valley Mobile Home Park Slope Stabilization Project, Vista, California. Mr. Oesch is project monitor for stream-side mitigation project which includes freshwater marsh, riparian and disturbed habitats. This project is designed to fulfill requirements of CDFG 1603 and ACOE 404 permits. Mitigation was triggered when the mobile home park owners placed riprap along the stream banks covering freshwater marsh habitat and disturbing hydrology. His monitor duties include recommendations on weed removal, native plantings and general maintenance.

Summit Ridge Business Park Mitigation Project, San Diego, California. Mr. Oesch is the biological monitor for 10 acres of coastal sage scrub, with a 1 acre freshwater marsh component. This project is mitigation for the development of the Summit Ridge Business Park. His monitoring duties include biotic surveys, transect data collection, weed removal recommendations, and native planted species survival.

Newhall Ranch *Chorizanthe* seed collection, Santa Clarita, California. Mr. Oesch participated with a team of biologists collecting seed of the rare and endangered *Chorizanthe perryi fernadina* (spineflower). Polygons of spineflower locations were GPSed and mapped. Teams then returned to collect seed.

Rose Creek/ Nature School Habitat Enhancement Plan, San Diego, California. Mr. Oesch mapped 13 acres of the Rose Creek riparian corridor directly east I-5. Plants, and habitat locations were GPSed and a biotic survey was taken.

Agricultural Support/ Development Project, El Peten, Guatemala. Mr. Oesch coordinated an agricultural support and development project for several Mayan Indigenous communities in the Peten region of Guatemala. This involved working with government officials for importation of agricultural supplies from Belize, traveling between site locations and exploring possibilities for reestablishing crops. The project was necessitated by crops lost to fire and drought.

Carroll Canyon Emergency Maintenance Sewer Project, San Diego, California.
Mr. Oesch assisted in designating access routes around sensitive habitat for Metropolitan Wastewater vehicles to gain access to sewer clean-out locations.

Sorrento Valley Utilities Revegetation, San Diego County, California. Mr. Oesch monitored work crews in the removal of non-native plant species in biologically sensitive saltmarsh, freshwater marsh, and coastal sage scrub habitats.

Sorrento Creek Maintenance Dredging Project, San Diego, California. Mr. Oesch monitored City of San Diego work crews in removal of sediment from the channel bottoms of Carroll Canyon, Los Penasquitos, and Sorrento creeks. Monitoring was to insure the least possible impacts to surrounding vegetation, aquatic and terrestrial animal habitats. The project site contained potential Clapper rail (*Rallus longirostris*) habitat, which required flushing prior to beginning work in the channel areas. His duties also included, water samples taken daily and tested for total suspended solids (TSS) to ensure that discharge downstream of the project met TSS level requirements.

Tecolote Canyon Tree-of-Heaven Removal Project, San Diego, California. Mr. Oesch monitored work crews in removal of tree-of-heaven (*Ailanthus altissima*) and other exotics from a section of Tecolote Canyon. His monitoring duties included advisement of routes of least impact to surrounding native habitats, felling trees, and cut biomass dispersal.

TRICIA WOTIPKA
Environmental Specialist / Biologist

EDUCATION

B.S., Wildlife and Fisheries Science, Pennsylvania State University (2000) -Dean's Honor List, Fall 1998 - Spring 2000

PROFESSIONAL AFFILIATIONS

Audubon Society, 2000
Member, Women's Environmental Council
Secretary, 2001
Newsletter Chair, 2002
Member, Southern California Botanists

PROFESSIONAL CERTIFICATIONS

CDFG Rare, Threatened, and Endangered Plant Voucher Collection Permit (05078)

EXPERIENCE

Ms. Wotipka has over three years experience in environmental document preparation and resource conservation planning. Project experience includes vegetation mapping, rare plant surveys, general wildlife surveys, biological resource surveys, data collection and analysis, environmental assessments, wetlands delineations, permitting, mitigation design and monitoring, and endangered species surveys. Projects include issues relative to the California Fish and Game Code, the federal Clean Water Act (Sections 401 and 404), the National Environmental Policy Act (NEPA), the Migratory Bird Treaty Act, and the Endangered Species Act (ESA). Ms. Wotipka has also trained with the Wetlands Training Institute, Inc. and has successfully completed a course in basic wetlands delineation.

PROFESSIONAL ASSIGNMENTS

Pipeline Relocation along Gird Road, Rainbow Municipal Water District, San Diego County, California. Conducted vegetation mapping and wetlands delineation for this pipeline relocation project, necessitated due to a bridge expansion along Gird Road. Prepared and processed permits from ACOE, CDFG and RWQCB and prepared Addendum to County of San Diego MND. The project involved the addition of relocating a pipeline in this bridge expansion project. Issues discussed include impacts to state and federal jurisdictional wetlands, community character and traffic.

Aliso Creek Emergency Sewer and Park Improvements, Moulton Niguel Water District, County of Orange, California. Conducted vegetation mapping and wetlands delineation for sewer pipeline relocation and trail relocation. Prepared and processed permits from ACOE, RWQCB and CDFG for impacts to non-tidal wetlands along Aliso Creek within the Aliso and Wood Canyons Wilderness Park. Assisted in conducting focused rare plant surveys for the federally-listed threatened and state-listed endangered thread-leaved brodiaea (Brodiaea filifolia). Prepared biological resources technical report in support of a CEQA document and assisted in the preparation of a conceptual wetlands mitigation and monitoring plan for onsite mitigation.

Railway Expansion Project. Sorrento-Miramar Curve Realignment and Second Main Track Project. City of San Diego, California. Conducted vegetation mapping and field surveys for sensitive, state- and federally-listed plant species on approximately 190 acres.

San Marcos Creek Roadway Improvements Project, City of San Marcos, City of San Marcos, California. Prepared a Section 404 and 401 permit application in accordance with the federal Clean Water Act and a 1601 Streambed Alteration Agreement in accordance with California Fish and Game Code.

Sorrento-Miramar Curve Realignment and Second Main Track, North County Transit District, City of San Diego. Conducted a delineation of "waters of the United States" under the jurisdiction of the ACOE, CDFG, and California RWQCB and assisted in conducting rare plant surveys within the project study area, which occupies approximately 180 acres along the linear rail corridor.

Telegraph Canyon Road Widening Project, City of Chula Vista, City of Chula Vista, California. Prepared and processed a Water Quality Certification application pursuant to Section 401 of the federal Clean Water Act and a Streambed Alteration Agreement pursuant to Section 1601 of the California Fish and Game Code.

San Marcos Creek Roadway Improvements and Flood Protection Project, City of San Marcos, City of San Marcos, California. Prepared a Section 404 and 401 permit application in accordance with the federal Clean Water Act and a 1601 Streambed Alteration Agreement in accordance with California Fish and Game Code.

Poway Creek Channel Maintenance Project - City of Poway, California. Provided baseline biological surveys for channel maintenance project consisting of silt removal affecting over three acres of riparian habitat.

Homestead Dam, Commanding General MCAS Miramar, County of San Diego, California. Conducted biological surveys including vegetation mapping, wetlands delineation and focused surveys for willowy monardella. Prepared BA for section 7 consultation between MCAS Miramar and FWS for coastal California gnatcatcher. Project included maintenance activities to an existing dam in accordance with the Dam Safety Maintenance and Repair program, including replacement of outlet pipe, installation of erosion control devices for bank stabilization, removal of woody vegetation from the dam surface and revegetation with non-woody native plants.

Old Mission Dam, City of San Diego Parks and Recreation Division, San Diego, California. Assisted in wetlands delineation and vegetation map upstream of the historic Old Mission Dam.

Salt Creek Channel Stage 6 Channel Widening Project, Riverside County Flood Control and Water Conservation District, County of Riverside, California. Delineated wetlands and prepared vegetation map along the approximately five-mile alignment.

El Cuervo Norte Project, City of San Diego, City of San Diego, California. Conducted a delineation of "waters of the United States" and wetlands under the jurisdiction of the U.S. Army Corps of Engineers, California Department Fish Game, and California Regional Water Quality Control Board for the 24-acre Wetlands Mitigation Site for State Route 56 located within the Los Penasquitos Canyon Preserve along Los Penasquitos Canyon Creek.

Valpreda Footbridge Crossing Project, City of San Marcos, City of San Marcos, California Conducted a delineation of "waters of the United States" and wetlands under the jurisdiction of the U.S. Army Corps of Engineers, California Department Fish Game, and California Regional Water Quality Control Board for the approximately two acre site. The jurisdictional delineation was conducted to determine the biological constraints on the site during the due diligence phase of the project.

La Jolla Crossroads, La Jolla Crossroads, LLC, City of San Diego, California. Prepared and processed wetlands permits from ACOE, RWQCB and CDFG for impacts to non-tidal wetlands for mixed-use, in-fill project. Prepared alternatives analysis and functional values assessment. Evaluated wetlands mitigation sites and prepared conceptual wetlands mitigation and monitoring plan. Prepared CEQA Addendum for CDFG and conducted community outreach meetings for wetlands mitigation site.

Newhall Specific Plan, Newhall Land and Farming, Inc., counties of Los Angeles and Ventura, California. Conducted focused surveys for sensitive plant species, including the state-listed San Fernando Valley spineflower and participated in San Fernando Valley spineflower seed collection.

East Grove, Lyon Homes, Inc., City of Escondido, California. Prepared alternatives analysis, Public Notice and EA for ACOE.

University Commons Development Project, Brookfield Homes, City of San Marcos, California. Performed a delineation of “waters of the United States” and wetlands under the jurisdiction of the U.S. Army Corps of Engineers and California Department of Fish and Game on approximately 400-acres. Prepared and processed a Section 404 and 401 permit application in accordance with the federal Clean Water Act and a 1603 Streambed Alteration Agreement in accordance with California Fish and Game Code. In addition, Dudek conducted focused surveys for least Bell's vireo, quino checkerspot butterfly, arroyo toad, southwestern willow flycatcher, and California gnatcatcher.

Gateway Vista de Oro Residential Development, Gateway Vista de Oro, L.L.C., City of Vista, California. Conducted a delineation of "waters of the United States" and wetlands under the jurisdiction of the U. S. Army Corps of Engineers (ACOE) and California Department of Fish and Game (CDFG). Obtained a Section 401 permit application in accordance with the federal Clean Water Act and a 1603 Streambed Alteration Agreement in accordance with California Fish and Game Code. Conducted a pre-construction nesting bird survey within the wetlands habitat and coordinated with the client regarding tree removal and mitigation planting installation.

Lowe's Retail Store, Lowe's, Inc., City of Santee, California. Conducted biological surveys including vegetation mapping and wetlands delineation. Obtained permits from ACOE, RWQCB and CDFG for impacts to non-tidal wetlands. Conducted informal consultation with FWS for least Bell's vireo. Prepared alternatives analysis and functional values assessment.

Western Riverside Multiple Species Habitat Conservation Plan (MSHCP), County of Riverside, County of Riverside, California. Research for potentially covered plant species followed by syntheses of ecological information into species accounts.

Newhall Ranch Project, Newhall Land and Farming Company, Los Angeles and Ventura County, California. Conducted focused surveys for the state-listed endangered San Fernando Valley spineflower (Chorizanthe parryi var. Fernandina) and other sensitive plants on approximately 6,000 acres in 2002 and 14,500 acres in 2003. In addition, collected San Fernando Valley spineflower seed from nine occurrences on Newhall Ranch.

PUBLICATIONS

Researched and prepared the introduction of the "Spring Creek Watershed Water Sampling Protocol" for the Clearwater Conservancy, State College, Pennsylvania - Fall 1999.

APPENDIX B

Vascular Plant Species Observed

At Newhall Ranch

(2002, 2003, 2004, 2005)

APPENDIX B
VASCULAR PLANT SPECIES - NEWHALL RANCH

LYCOPODIAE

SELAGINELLACEAE - SPIKE-MOSS FAMILY
Selaginella bigelovii - Bigelow's spike-moss

EQUISETAE

EQUISETACEAE - HORSETAIL FAMILY
Equisetum hyemale – common scouring-rush
Equisetum laevigatum - smooth scouring-rush
Equisetum telmateia - giant horsetail

FILACEAE

AZOLLACEAE - MOSQUITO FERN FAMILY
Azolla c.f. filiculoides - duckweed fern

DENNSTAEDTIACEAE - BRAKEN FAMILY
Adiantum jordani - California maiden-hair
Pellaea andromedifolia - coffee fern
Pellaea mucronata var. *mucronata* - bird's-foot fern
Pentagramma triangularis - goldenback fern

POLYPODIACEAE - POLYPODY FAMILY
Polypodium californicum - California polypody

CONIFERAE

CUPRESSACEAE - CYPRESS FAMILY
* *Cedrus deodara* - Deodar cedar
Juniperus californica - California juniper

PINACEAE - PINE FAMILY
* *Pinus halepensis* - Aleppo pine
* *Pinus pinea* – stone pine

APPENDIX B
VASCULAR PLANT SPECIES - NEWHALL RANCH

ANGIOSPERMAE (DICOTYLEDONES)

AIZOACEAE - FIG-MARIGOLD FAMILY

* *Aptenia cordifolia* - baby sun-rose
* *Carpobrotus* sp. - sea-fig

AMARANTHACEAE - AMARANTH FAMILY

* *Amaranthus albus* - tumbleweed
Amaranthus blitoides - prostrate amaranth
* *Amaranthus hybridus* - amaranth
Amaranthus palmeri – Palmer's amaranth
Amaranthus powellii – Powell's amaranth
* *Amaranthus retroflexus* - rough pigweed

ANACARDIACEAE - SUMAC FAMILY

Malosma laurina - laurel sumac
Rhus ovata - sugar-bush
Rhus trilobata - squaw bush
* *Schinus molle* - Peruvian pepper-tree
Toxicodendron diversilobum - poison-oak

APIACEAE - CARROT FAMILY

* *Anethum graveolens* - dill
Apiastrum angustifolium - wild celery
* *Apium graveolens* - celery
Berula erecta - cutleaf water-parsnip
Bowlesia incana – American Bowlesia
* *Conium maculatum* – poison hemlock
* *Coriandrum sativum* - cilantro
* *Daucus carota* – Queen Anne's lace
Daucus pusillus – rattlesnake weed
Lomatium utriculatum - common lomatium
Sanicula bipinnata – poison sanicle

APPENDIX B
VASCULAR PLANT SPECIES - NEWHALL RANCH

APOCYNACEAE - DOGBANE FAMILY

Apocynum cannabinum - Indian hemp
* *Vinca major* – periwinkle

ASCLEPIADACEAE - MILKWEED FAMILY

Asclepias californica – California milkweed
Asclepias fascicularis - narrow-leaf milkweed

ASTERACEAE - SUNFLOWER FAMILY

Achillea millefolium – yarrow
Achyrachaena mollis – blow-wives
Acourtia microcephala – sacapellote
Agoseris grandiflora – large-flowered agoseris
Ambrosia acanthicarpa - annual burweed
Ambrosia confertifolia - weak-leaved burweed
Ambrosia psilostachya - western ragweed
Artemisia californica - coastal sagebrush
Artemisia douglasiana - California mugwort
Artemisia dracunculus - tarragon
Artemisia tridentata - Great Basin sagebrush
Baccharis douglasii - marsh baccharis
Baccharis emoryi – Emory's baccharis
Baccharis pilularis - coyote brush
Baccharis salicifolia - mule fat
Baccharis sarothroides - chaparral broom
Brickellia californica - California brickellbush
Brickellia nevinii - Nevin's brickellbush
* *Carduus pycnocephalus* - Italian thistle
* *Centaurea melitensis* - star thistle
Chaenactis glabriuscula - yellow pincushion
* *Chrysothamnus nauseosus* - rubber rabbitbrush
Cirsium occidentale var. *californicum*- California thistle
Cirsium occidentale var. *occidentale*- cobwebby thistle
* *Cirsium vulgare* - bull thistle
* *Cnicus benedictus* - blessed thistle
Conyza canadensis - horseweed
Conyza coulteri - Coulter's conyza

Coreopsis bigelovii – Bigelow's coreopsis
* *Coreopsis tinctoria* – calliopsis
Corethrogyne filaginifolia - virgate cudweed aster
* *Cotula coronopifolia* - African brass-buttons
Encelia actoni - Acton's encelia
Encelia californica - California bush sunflower
Encelia farinosa - brittlebush, incensio
Ericameria palmeri var. *pachylepis* - goldenbush
Ericameria pinifolia - pine-bush
Erigeron foliosus - leafy daisy
Eriophyllum confertiflorum - long-stem golden yarrow
Euthamia occidentalis - western goldenrod
Filago californica - California fluffweed
* *Filago gallica* - narrow-leaf filago
* *Gazania linearis* - gazania
Gnaphalium bicolor - bicolor cudweed
Gnaphalium californicum - California everlasting
Gnaphalium canescens ssp. *microcephalum* - white everlasting
Gnaphalium leucocephalum – Sonora everlasting
Gnaphalium luteo-album - white cudweed
Gnaphalium sp. *nova* - everlasting
Gnaphalium palustre - lowland cudweed
Hazardia squarrosa ssp. *grindelioides* - saw-toothed goldenbush
Helianthus annuus - common sunflower
Helianthus nuttallii c.f. ssp. *parishii* - Los Angeles sunflower
Hemizonia fasciculata - fascicled tarweed
Hemizonia kelloggii – Kellogg's tarweed
Heterotheca grandiflora - telegraph weed
Heterotheca sessiliflora - golden aster
Isocoma menziesii - goldenbush
Iva axillaris - poverty weed
* *Lactuca saligna* – willowleaf lettuce
* *Lactuca serriola* - prickly lettuce
Lagophylla ramosissima – common hareleaf
Lasthenia californica - coast goldfields
Lepidospartum squamatum - scale-broom
Lessingia filaginifolia – California aster

Lessingia glandulifera – lessingia
Malacothrix saxatilis - cliff malacothrix
* *Matricaria matricarioides* - pineapple weed
Micropus californicus - slender cottonweed
Pluchea odorata - marsh-fleabane
Pluchea sericea - arrow weed
* *Pulicaria paludosa* - Spanish sunflower
Rafinesquia californica - California chicory
Senecio californicus – California butterweed
Senecio flaccidus var. *douglasii* - butterweed
* *Senecio vulgaris* - common groundsel
Silybum marianum - milk thistle
* *Sonchus asper* - prickly sow-thistle
* *Sonchus oleraceus* - common sow-thistle
Stebbinoseris heterocarpa [*Microseris heterocarpa*] – brown puffs
Stephanomeria exigua - small wreathplant
Stephanomeria pauciflora - wire-lettuce
Stephanomeria virgata - twiggy wreathplant
Stylocline gnaphaloides - everlasting nest-straw
Uropappus lindleyi [*Microseris lindleyi*] – silver puffs
Wyethia ovata - mule ears
Xanthium spinosum - spiny cocklebur
Xanthium strumarium – cocklebur

BETULACEAE – BIRCH FAMILY

Alnus rhombifolia – white alder

BORAGINACEAE - BORAGE FAMILY

Amsinckia menziesii var. *intermedia* - yellow fiddleneck
Amsinckia menziesii var. *menziesii* - yellow fiddleneck
Amsinckia tessellata – devil's lettuce
Cryptantha sp. - forget-me-not
Cryptantha intermedia - common forget-me-not
Cryptantha micrantha – redroot cryptantha
Cryptantha microstachys – tejon cryptantha
Cryptantha muricata – prickly cryptantha
Heliotropium curassavicum - wild heliotrope

Pectocarya linearis - slender pectocarya
Pectocarya penincillata - pectocarya
Pectocarya setosa - pectocarya
Plagiobothrys arizonicus - popcorn flower
Plagiobothrys canescens - rusty popcorn flower
Plagiobothrys collinus - California popcorn flower
Plagiobothrys fulvus - common popcorn flower

BRASSICACEAE - MUSTARD FAMILY

Athysanus pusillus – dwarf athysanus
* *Brassica nigra* - black mustard
* *Capsella bursa-pastoris* - shepard's purse
Caulanthus lasiophyllus – California mustard
Descurainia pinnata ssp. *halictorum* – tansy mustard
* *Hirschfeldia incana* - short-podded mustard
Lepidium lasiocarpum - peppergrass
* *Lepidium latifolium* - peppergrass
Lepidium virginicum - wild peppergrass
* *Lobularia maritime* – sweet-alyssum
* *Raphanus sativus* - wild radish
* *Rorippa nasturtium-aquaticum* - water cress
* *Sisymbrium altissimum* - tumble mustard
* *Sisymbrium irio* - London rocket
* *Sisymbrium officinale* - hedge mustard
* *Sisymbrium orientale* - Oriental mustard
Stanleya pinnata var. *pinnata*– Prince's plume
Thysanocarpus curvipes – fringepod
Tropidocarpum gracile – slender dobie-pod

CACTACEAE - CACTUS FAMILY

* *Cereus peruvianus* - Peruvian apple cactus
Opuntia basilaris var. *ramosa* – beaver-tail cactus
Opuntia californica var. *parkeri* - cane cholla
Opuntia littoralis - coastal prickly-pear

Opuntia X vaseyi - prickly-pear cactus
* *Trichocereus spachianus* - golden torch cactus

CAPPARACEAE - CAPER FAMILY
Isomeris arborea - bladderpod

CAPRIFOLIACEAE - HONEYSUCKLE FAMILY
Lonicera subspicata - southern honeysuckle
Sambucus mexicana - Mexican elderberry
Symphoricarpos sp. - snowberry
Symphoricarpos c.f. mollis - spreading snowberry

CARYOPHYLLACEAE - PINK FAMILY
* *Cerastium glomeratum* - sticky mouse-ear
* *Herniaria cinerea* - gray herniaria
Loeflingia squarrosa - no common name
* *Silene gallica* - common catchfly
Spergularia sp. - stickwort, starwort
* *Spergularia rubra* - sand-spurrey
* *Spergularia c.f. villosa* - villous sand-spurrey
* *Stellaria media* - common chickweed

CASURINACEAE – SHEET OAK FAMILY
* *Casuarina cunninghamiana* - Austrailian Pine

CHENOPODIACEAE - GOOSEFOOT FAMILY
Atriplex canescens - four-winged saltbush
* *Atriplex heterosperma* - weedy orache
Atriplex lentiformis- big saltbush, quail brush
* *Atriplex rosea* - tumbling oracle
* *Atriplex semibaccata* - Australian saltbush
Atriplex serenana var. *serenana* - bractscale
Atriplex suberecta - Australian saltbush
Atriplex triangularis – spearscale
* *Bassia hyssopifolia* - five-hooked bassia
* *Beta vulgaris* – garden beet
* *Chenopodium album* - lamb's-quarters

* *Chenopodium ambrosioides* - Mexican tea
Chenopodium berlandieri - pitseed goosefoot
* *Chenopodium botrys* - goosefoot
Chenopodium californicum - California goosefoot
* *Chenopodium murale* - nettle-leaved goosefoot
Chenopodium rubrum - red goosefoot
* *Salsola tragus* - Russian-thistle
* *Spinacia oleracea* – spinach

CONVOLVULACEAE - MORNING-GLORY FAMILY
Calystegia macrostegia ssp. *cyclostegia* – morning-glory
Calystegia peirsonii - Peirson's morning-glory
* *Convolvulus arvensis* - bindweed

CRASSULACEAE - STONECROP FAMILY
Crassula connata - dwarf stonecrop
Dudleya cymosa - unidentified dudleya
Dudleya lanceolata - lanceleaf dudleya

CUCURBITACEAE - GOURD FAMILY
Cucurbita foetidissima - coyote-melon, calabazilla
Marah macrocarpus - wild cucumber

CUSCUTACEAE - DODDER FAMILY
Cuscuta californica - California dodder
Cuscuta pentagona – five-angled dodder
Cuscuta subinclusa – canyon dodder

DATISCACEAE - DASTICA FAMILY
Dastica glomerata - Durango root

ERICACEAE - HEATH FAMILY
Arctostaphylos glauca - bigberry manzanita

EUPHORBIACEAE - SPURGE FAMILY
Chamaesyce albomarginata - rattlesnake spurge
* *Chamaesyce maculata* – spotted spurge

Chamaesyce polycarpa - small-seed sand mat
Chamaesyce serpyllifolia – thyme-leafed spurge
Croton californicus - California croton
Eremocarpus setigerus - doveweed
Euphorbia spathulata - reticulate-seed spurge
* *Ricinus communis* - castor-bean
Stillingia linearifolia - linear-leaved stillingia

FABACEAE - PEA FAMILY
* *Acacia baileyana* - golden wattle
Astragalus didymocarpus – white dwarf locoweed
Astragalus gambelianus – Gambel's locoweed
Astragalus trichopodus - Santa Barbara locoweed
Glycyrrhiza lepidota - wild licorice
Lathyrus laetiflorus - wild sweet pea
Lathyrus vestitus - wild pea
Lotus corniculatus - bird's-foot lotus
Lotus hamatus – grab lotus
Lotus humistratus - lotus
Lotus purshianus - Spanish-clover
Lotus salsuginosus - coastal lotus
Lotus scoparius var. *scoparius* - deerweed
Lotus strigosus - strigose deerweed
Lupinus bicolor - Lindley's annual lupine
Lupinus excubitus – Mountain Springs bush lupine
Lupinus excubitus var. *hallii* - grape soda lupine
Lupinus hirsutissimus - stinging lupine
Lupinus microcarpus var. *densiflorus* - chick lupine
Lupinus microcarpus var. *microcarpus* - chick lupine
Lupinus sparsiflorus - Coulter's lupine
Lupinus succulentis - arroyo lupine
Lupinus truncatus - collar lupine
* *Medicago polymorpha* - California burclover
* *Medicago polymorpha* var. *brevispina* - short-spined California burclover
* *Medicago sativa* - alfalfa
* *Melilotus alba* - white sweet-clover
* *Melilotus indica* - yellow sweet-clover

* *Robinia pseudoacacia* - black locust
Trifolium sp. – clover
Trifolium albopurpureum – rancheria clover
Trifolium ciliolatum- tree clover
* *Trifolium fragiferum* - strawberry clover
Trifolium gracilentum – pin-point clover
* *Trifolium hirtum* - rose clover
Trifolium microcephalum – maiden clover
* *Trifolium repens* - white clover
Trifolium willdenovii – valley clover
Vicia hassei – Hesse's vetch
* *Vicia villosa* ssp. *villosa* – winter vetch

FAGACEAE - BEECH FAMILY
Quercus agrifolia - coast live oak
Quercus berberidifolia - scrub oak
Quercus douglasii - blue oak
Quercus lobata - valley oak

GERANIACEAE - GERANIUM FAMILY
* *Erodium brachycarpum* – shortfruit stork's bill
* *Erodium botrys* – long-beaked filaree
* *Erodium cicutarium* - red-stemmed filaree
* *Erodium moschatum* – white-stemmed filaree

GROSSULARIACEAE - CURRANT FAMILY
Ribes aureum - golden currant
Ribes malvaceum - chaparral currant

HYDROPHYLLACEAE - WATERLEAF FAMILY
Emmenanthe penduliflora - whispering bells
Eriodictyon crassifolium var. *nigrescens* - yerba santa
Eucrypta chrysanthemifolia - common eucrypta
Nemophila menziesii – baby blue-eyes
Nemophila parviflora var. *quercifolia* – oak-leaved nemophila
Phacelia cicutaria - caterpillar phacelia
Phacelia cicutaria var. *hispida* – caterpillar phacelia

Phacelia distans - blue fiddleneck
Phacelia imbricata ssp. *imbricata* - imbricate phacelia
Phacelia minor - wild canterbury-bell
Phacelia ramosissima - shrubby phacelia

JUGLANDACEAE - WALNUT FAMILY
Juglans californica - southern California black walnut

LAMIACEAE - MINT FAMILY
* *Marrubium vulgare* - horehound
Mentha citrata – orange mint
Salvia apiana - white sage
Salvia columbariae - chia
Salvia leucophylla - purple sage
Salvia mellifera - black sage
Stachys ajugoides – bugle hedge-nettle
Stachys ajugoides var. *rigida* - rigid hedge-nettle
Stachys albens - white hedge-nettle
Trichostema lanceolatum - vinegar weed

LAURACEAE - LAUREL FAMILY
Umbellularia californica - California laurel

LOASACEAE - STICK-LEAF FAMILY
Mentzelia sp. – blazing star
Mentzelia laevicaulis - blazing star
Mentzelia micrantha - small-flowered stick-leaf

LYTHRACEAE - LOOSESTRIFE FAMILY
Lythrum californicum - California loosestrife

MALVACEAE - MALLOW FAMILY
Malacothamnus fasciculatus ssp. *laxiflorus* – chaparral bush mallow
Malacothamnus fremontii – bush mallow
Malacothamnus marrubioides - bush mallow
* *Malva neglecta* - common mallow
* *Malva parviflora* - cheeseweed

APPENDIX B
VASCULAR PLANT SPECIES - NEWHALL RANCH

MELIACEAE - MAHOGANY FAMILY

* *Melia azedarach* - China berry

MORACEAE - FIG FAMILY

* *Ficus carica* – edible fig

MYRTACEAE - MYRTLE FAMILY

* *Eucalyptus* sp. - eucalyptus
* *Eucalyptus camaldulensis* – red gum
* *Eucalyptus globulus* - blue gum
* *Eucalyptus leucoxylon* - white ironbark
* *Eucalyptus polyanthemos* – silver dollar gum
* *Eucalyptus sideroxylon* - red ironbark

NYCTAGINACEAE - FOUR O'CLOCK FAMILY

Mirabilis laevis var. *crassifolia* [*M. californica*]- California wishbone-bush

OLEACEAE - OLIVE FAMILY

Fraxinus dipetala - California ash
* *Fraxinus uhdei* – tropical ash
Fraxinus velutina – velvet ash
* *Ligustrum lucidum* - glossy privet
* *Olea europaea* - mission olive

ONAGRACEAE - EVENING-PRIMROSE FAMILY

Camissonia bistorta – southern sun cup
Camissonia boothii - sun cup
Camissonia boothii ssp. *decorticans* – shredding evening primrose
Camissonia californica - mustard primrose
Camissonia hirtella - sun cup
Camissonia micrantha - miniature sun cup
Camissonia strigulosa - sun cup
Clarkia purpurea - winecup clarkia
Clarkia speciosa - clarkia
Clarkia unguiculata - elegant clarkia
Epilobium brachycarpum - willow herb

Epilobium canum ssp. *canum* - California fuchsia
Epilobium ciliatum - California cottonweed
Ludwigia peploides - yellow waterweed
Ludwigia repens - water primrose
Oenothera elata - evening primrose
* *Oenothera laciniata* - evening primrose

OROBANCHACEAE - BROOM-RAPE FAMILY
Orobanche parishii ssp. *parishii* - broom-rape

PAEONIACEAE - PEONY FAMILY
Paeonia californica - California peony

PAPAVERACEAE - POPPY FAMILY
Argemone corymbosa – prickly poppy
Eschscholzia californica - California poppy
Platystemon californicus – California creamcups

PLANTAGINACEAE - PLANTAIN FAMILY
Plantago erecta - dot-seed plantain
* *Plantago indica* - plantain
* *Plantago lanceolata* - English plantain
* *Plantago major* - common plantain

PLATANACEAE - SYCAMORE FAMILY
Platanus racemosa - western sycamore

POLEMONIACEAE - PHLOX FAMILY
Allophyllum divaricatum - purple false gillyflower
Allophyllum glutinosum – sticky false gillyflower
Eriastrum densifolium – woollystar
Eriastrum densifolium ssp. *elongatum* - elongate eriastrum
Eriastrum densifolium ssp. *mohavense* - Mohave eriastrum
Eriastrum sapphirinum - sapphire eriastrum
Gilia angelensis - angel gilia
Gilia capitata – globe gilia
Leptodactylon californicum - prickly phlox

Linanthus androsaceus – common linanthus*Linanthus pygmaeus* - linanthus
Navarretia atractyloides - holly-leaf skunkweed
Phlox gracilis – slender phlox

POLYGONACEAE - BUCKWHEAT FAMILY
Chorizanthe fimbriata – fringed spineflower
Chorizanthe parryi var. *fernandina* - San Fernando Valley spineflower
Chorizanthe staticoides - turkish rugging
Eriogonum angulosum - angle-stem buckwheat
Eriogonum baileyi – Bailey's buckwheat
Eriogonum brachyanthum – short-flowered buckwheat
Eriogonum elongatum - long-stemmed buckwheat
Eriogonum fasciculatum ssp. *foliolosum* - California buckwheat
Eriogonum fasciculatum ssp. *polifolium* - California buckwheat
Eriogonum gracile var. gracile - slender woolly buckwheat
Eriogonum gracillimum – rose and white buckwheat
Eriogonum maculatum – spotted buckwheat
Eriogonum c.f. viridescens - buckwheat
Lastarriaea coriacea - lastarriaea
* *Polygonum arenastrum* - common knotweed
* *Polygonum argyrocoleon* - smartweed
Polygonum lapathifolium - willow weed
Polygonum punctatum - perennial smartweed
Pterostegia drymarioides - pterostegia
* *Rumex conglomeratus* - whorled dock
* *Rumex crispus* - curly dock
Rumex hymenosepalus - wild rhubarb
Rumex maritimus – golden dock
Rumex obtusifolius - dock
Rumex salicifolius - willow dock

PORTULACACEAE - PURSLANE FAMILY
Calandrinia ciliata - redmaids
Calyptridium sp. - pussypaws
Claytonia parviflora - small-leaved montia
Claytonia perfoliata – miner's lettuce
* *Portulaca oleracea* - common purslane

APPENDIX B
VASCULAR PLANT SPECIES - NEWHALL RANCH

RANUNUCULACEAE - BUTTERCUP FAMILY

Clematis ligusticifolia - yerba de chiva
Delphinium parryi ssp. *parryi* – Parry's larkspur

RHAMNACEAE - BUCKTHORN FAMILY

Ceanothus crassifolius - hoary-leaved ceanothus
Ceanothus tomentosus - woolyleaf ceanothus
Rhamnus crocea - redberry
Rhamnus ilicifolia - holly-leaf redberry

ROSACEAE - ROSE FAMILY

Adenostoma fasciculatum – chamise
Cercocarpus betuloides – mountain-mahogany
Cercocarpus betuloides var. *betuloides* - birch-leaf mountain-mahogany
Cercocarpus betuloides var. *blancheae* - island mountain-mahogany
Heteromeles arbutifolia - toyon
Prunus ilicifolia - holly-leaf cherry
Rosa californica - California rose
Rubus ursinus - California blackberry
* *Sangwisorba minor* – garden burnet

RUBIACEAE - MADDER FAMILY

Galium angustifolium - narrow-leaved bedstraw
* *Galium aparine* - goose grass
Galium nuttallii ssp. *nuttallii* – San Diego bedstraw
Galium porrigens - climbing bedstraw

SALICACEAE - WILLOW FAMILY

Populus fremontii - Fremont's cottonwood
Populus tremuloides – Quaking aspen
Salix exigua - narrow-leaved willow
Salix gooddingii - black willow
Salix laevigata - red willow
Salix lasiolepis - arroyo willow
Salix lucida ssp. *lasiandra* - golden willow

SAURURACEAE - LIZARD'S-TAIL FAMILY

Anemopsis californica - yerba mansa

SCROPHULARIACEAE - FIGWORT FAMILY

Antirrhinum coulterianum - white snapdragon
Antirrhinum multiflorum – withered snapdragon
Castilleja affinis - coast paintbrush
Castilleja densiflora - dense-flowered owl's-clover
Castilleja exserta - common owl's-clover
Castilleja foliolosa - woolly Indian paintbrush
Collinsia heterophylla – purple Chinese houses
Cordylanthus rigidus – bird's beak
Keckiella cordifolia - heart-leaf penstemon
Linaria canadensis - toadflax
Mimulus aurantiacus - bush monkeyflower
Mimulus aurantiacus var. *pubescens* - bush monkeyflower
Mimulus guttatus - seep monkeyflower
Mimulus pilosus – downy monkeyflower
Penstemon centranthifolius - scarlet bugler
* *Verbascum thapsus* - woolly mullein
* *Verbascum virgatum* - wand mullein
* *Veronica anagallis-aquatica* - water speedwell

SIMAROUBACEAE - QUASSIA FAMILY

* *Ailanthus altissima* - tree of heaven

SOLANACEAE - NIGHTSHADE FAMILY

Datura wrightii - western jimsonweed
* *Nicotiana glauca* - tree tobacco
Nicotiana quadrivalvis – Indian tobacco
* *Solanum americanum* - small-flowered nightshade
Solanum douglasii - white nightshade
* *Solanum eleagnifolium* - silver leaf horse-nettle
* *Solanum sarrachoides* - hairy nightshade
Solanum xanti - chaparral nightshade

TAMARICACEAE - TAMARISK FAMILY

* *Tamarix* sp. – tamarisk
* *Tamarix ramoissima* - tamarisk

ULMACEAE - ELM FAMILY

* *Ulmus pumila* - Siberian elm

URTICACEAE - NETTLE FAMILY

Hesperocnide tenella – western nettle
Parietaria hespera – western pellitory
Urtica dioica - giant creek nettle
* *Urtica urens* - dwarf nettle

VERBENACEAE - VERVAIN FAMILY

Verbena lasiostachys - western verbena

VIOLACEAE – VIOLET FAMILY

Viola pedunculata – Johnny jump-ups

VISCACEAE - MISTLETOE FAMILY

Phoradendron macrophyllum - big leaf mistletoe
Phoradendron villosum - oak mistletoe

VITACEAE - GRAPE FAMILY

Parthenocissus vitacea - woodbine, Virginia creeper
Vitis girdiana - desert wild grape

ZYGOPHYLLACEAE - CALTROP FAMILY

* *Tribulus terrestris* - puncture vine

ANGIOSPERMAE (MONOCOTYLEDONES)

ARECACEAE - PALM FAMILY

* *Washingtonia robusta* - Mexican fan palm

CYPERACEAE - SEDGE FAMILY

Carex alma – sturdy sedge
Carex praegracilis – clustered field sedge
Carex sp. - sedge
Cyperus eragrostis - tall cyperus
Cyperus esculentus - yellow nut-grass
* *Cyperus involucratus* - nutsedge
Cyperus odoratus - coarse cyperus
Eleocharis montevidensis - slender creeping spike-rush
Eleocharis parishii – Parish's spikerush
Eleocharis rostellata – beaked spikerush
Scirpus acutus - hard-stemmed bulrush
Scirpus americanus - winged three-square
Scirpus maritimus – alkali bulrush
Scirpus microcarpus - bulrush
Scirpus robustus - Pacific coast bulrush

JUNCACEAE - RUSH FAMILY

Juncus sp. - rush
Juncus acutus ssp. *leopoldii* – southwestern spiny rush
Juncus balticus - wire rush
Juncus bufonius - toad rush
Juncus longistylis – rush
Juncus mexicanus – Mexican rush
Juncus rugulosus - wrinkled rush
Juncus textilis - Indian rush
Juncus torreyi – rush

Juncus triformis - Yosemite dwarf rush
Juncus xiphioides - iris-leaved rush

LEMNACEAE - DUCKWEED FAMILY
Lemna miniscula - duckweed
Lemna valdiviana - duckweed

LILIACEAE - LILY FAMILY
* *Allium cepa* - onion
Allium porrum - onion
* *Amaryllis bella-donna* - naked lady
* *Asparagus officinalis* – asparagus
Bloomeria crocea – common goldenstar
Brodiaea terrestris ssp. *kernensis* – dwarf brodiaea
Calochortus clavatus var. *gracilis*- slender mariposa lily
Calochortus venustus - mariposa lily
Dichelostemma capitatum - blue dicks
Muilla maritima - common muilla
Yucca whipplei – Our Lord's candle
Yucca schidigera - Mojave Yucca

POACEAE - GRASS FAMILY
Achnatherum coronatum - giant needlegrass
* *Agrostis* sp. - bentgrass
* *Agrostis viridis* - water bent
* *Arundo donax* - giant reed
* *Avena barbata* - slender oat
* *Avena fatua* - wild oat
Avena sativa – cultivated oat
Bromus catharticus - California brome
Bromus catharticus var. *catharticus* - California brome
* *Bromus diandrus* - ripgut grass
* *Bromus hordeaceus* - soft chess
* *Bromus madritensis* ssp. *rubens* - foxtail chess
* *Bromus sterilis* – sterile brome
* *Bromus tectorum* - cheat grass
* *Cortaderia jubata* - pampas grass

* *Crypsis schoenoides* - prickle grass
* *Cynodon dactylon* - Bermuda grass
* *Digitaria sanguinalis* - hairy crabgrass
Distichlis spicata - salt grass
* *Echinochloa colonum* - jungle-rice
Echinochloa crus-galli - barnyard grass
* *Eleusine indica* – goose grass
Elymus glaucus - western wild-rye
Elymus multisetus – big squirreltail
Eragrostis mexicana - lovegrass
* *Festuca arundinacea* - tall fescue
* *Hordeum marinum* - Mediterranean barley
* *Hordeum murinum* - glaucous foxtail barley
* *Lamarckia aurea* - goldentop
* *Leptochloa uninerva* - Mexican sprangletop
Leymus condensatus - giant ryegrass
Leymus triticoides - beardless wild rye
* *Lolium multiflorum* – Italian ryegrass
* *Lolium perenne* - perennial ryegrass
Melica imperfecta - California melic
Muhlenbergia asperifolia – scratch-grass
Muhlenbergia microsperma - littleseed muhly
Nassella cernua – nodding needlegrass
Nassella lepida – foothill needlegrass
Nassella pulchra – purple needlegrass
Panicum capillare – western witchgrass
* *Panicum miliaceum* – broom corn millet
* *Parapholis incurve* – sickle grass
Paspalum distichum – knotgrass
* *Phalaris aquatica* – Harding grass
* *Phalaris minor* - Mediterranean canary grass
* *Piptatherum miliaceum* - smilo grass
* *Poa annua* - annual bluegrass
Poa secunda - Malpais bluegrass
* *Polypogon interruptus* - ditch beard grass
* *Polypogon monspeliensis* - rabbit's-foot grass
Schismus barbatus – abumashi

Sorghum bicolor – sorghum
Sorghum halepense – Johnsongrass
Sporobolus airoides – alkali scation
* *Triticum aestivum* – cultivated wheat
Vulpia microstachys - fescue
* *Vulpia myuros* - rattail fescue
Vulpia octoflora - six-weeks fescue

POTAMOGETONACEAE - PONDWEED FAMILY
Potamogeton foliosus - leafy pondweed

TYPHACEAE - CATTAIL FAMILY
Typha domingensis - slender cattail
Typha latifolia - broad-leaved cattail

* signifies introduced (non-native) species

APPENDIX C

California Natural Diversity Database Forms

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ______________ Quad Code ______________
Index Code ______________ Occurrence # ______________
Copy Sent To ______________

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU.
USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Chorizanthe parryi* var. *fernandina*

Reporter: Andy Thomson, Sherri Miller, Vipul Joshi   Phone: (760) 942.5147

Address: Dudek & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: 28 May, 29 June, 6 July 2005   County: Los Angeles   Collection: no   If yes, # Mus./Herb:

Location: Santa Clarita Valley, Newhall Ranch: north of State Route 126, west of San Martinez Grande Canyon Road

Quad Name: Val Verde _X_ 7½' __ 15'   Elevation: 1000-1700' T 4N R 17W ____ ¼ Sec 15,16,22

Landowner/Manager: Newhall Land, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? _X_ Yes ____ No   If not, reason:

Is this a new location record? __ Yes _X_ No ____ Unknown

Total # of Individuals = ~ 123,530 Is this a subsequent visit _X_ Yes_ No Compared to your last visit: _X_ more __ same __ fewer

Phenology (plants): ____ % vegetative ____ % flowering ____% fruiting

Population Age Structure (animals): ____ # adults ____ # juveniles ____ # others

Site Function for Species (animals): ____ breeding ____ foraging ____ wintering ____ roosting ____ denning ____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

Locations are predominantly within disturbed or ruderal habitat. Ruderal habitat is dominated by *Bromus hordeaceous, Avena fatua, Centaurea melitensis, Vulpia myuros, and Hirschfeldia incana*. Clay soils predominate, with some loam. Most plants are on south or southwest slopes from 0-40%.

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, fire in recent past (5-10 years); Possible Threats: Currently proposed for estate residential development.

Overall Site Quality: ____ Excellent ____ Good _X_ Fair ____ Poor

Comments: This report summarizes 11 discrete locations, each with from 3 to an estimated 120,000 individuals observed.
Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

____ Keyed in a site reference:
____ Compared with specimen housed at:
____ Compared with photo/drawing in:
____ By another person (name):
_X_ Other: Personal knowledge

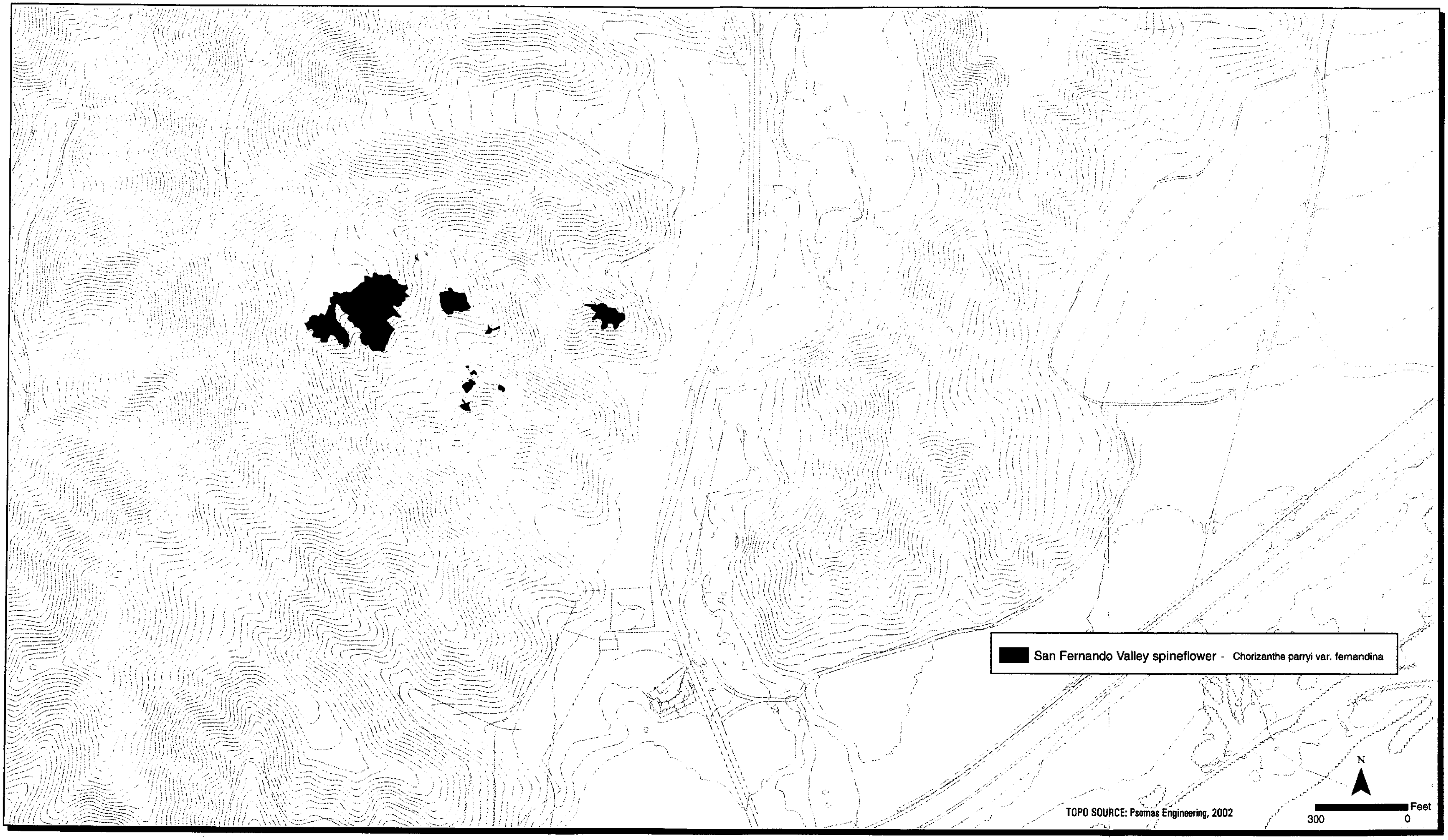
OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject: ____ Plant/Animal; ____ Habitat; ____ Diagnostic Feature; ____ Other

Type: ____ Slide; ____ Print

May we obtain duplicates **at our cost**? ____ Yes _X_ No



Newhall Ranch - San Martinez Grande

2005 Sensitive Plant Survey Results

FIGURE 1

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ______________ Quad Code ____________
Index Code _______________ Occurrence # _____________
Copy Sent To ______________________________________

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Chorizanthe parryi* var. *fernandina*

Reporter: Anuja Parikh, Nathan Gale, and others

Phone: (760) 942.5147

Address: Dudek & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: May 9-June 9, 2005 County: Los Angeles Collection: no If yes, # Mus./Herb:

Location: Northern Santa Susana Mountains/Santa Clarita Valley, Newhall Ranch, southeast of confluence of the Santa Clara River and Castaic Creek, east, south, and west edges of Airport Mesa and adjacent mesas.

Quad Name: Newhall
_X_ 7½' __ 15' Elevation: 1075-1250'

T _4N_ R _16W_ _W_ ¼ of _W_ ¼ Sec _3_
T _4N_ R _17W_ _E_ ¼ of _E_ ¼ Sec _3_

Landowner/Manager: Newhall Land, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? _X_ Yes ____ No If not, reason:

Is this a new location record? _____ Yes _X_ No _____ Unknown

Total # of Individuals = _~1,706,000_ Is this a subsequent visit? _X_ Yes___ No Compared to your last visit: _X_ more __ same __ fewer

Phenology (plants): ____ % vegetative _____ % flowering _____ % fruiting

Population Age Structure (animals): ____ # adults ____ # juveniles ____ # others

Site Function for Species (animals): ____ breeding ____ foraging ____ wintering ____ roosting ____ denning ____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

Most occurred in California grassland series, with some plants in California sagebrush communities (purple sage and California buckwheat series). Dominant plants include erod cic, *Bromus madritensis rubens, Erodicum cicutarium, Schismus barbatus, Bromus rubens,Artemisia californica,* and *Eriogonum fasiculatum.* Most plants were on up to 50% slopes with southwest, south, or southeast aspects.

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, farming, grading/clearing; Possible Threats: proposed residential/commercial development.

Overall Site Quality: ____ Excellent ____ Good _X_ Fair ____ Poor

Comments: This report summarizes 154 discrete locations, each with from 1 to an estimated 500,000 individuals observed.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

____ Keyed in a site reference:
____ Compared with specimen housed at:
____ Compared with photo/drawing in:
____ By another person (name):
_X_ Oher: Personal knowledge

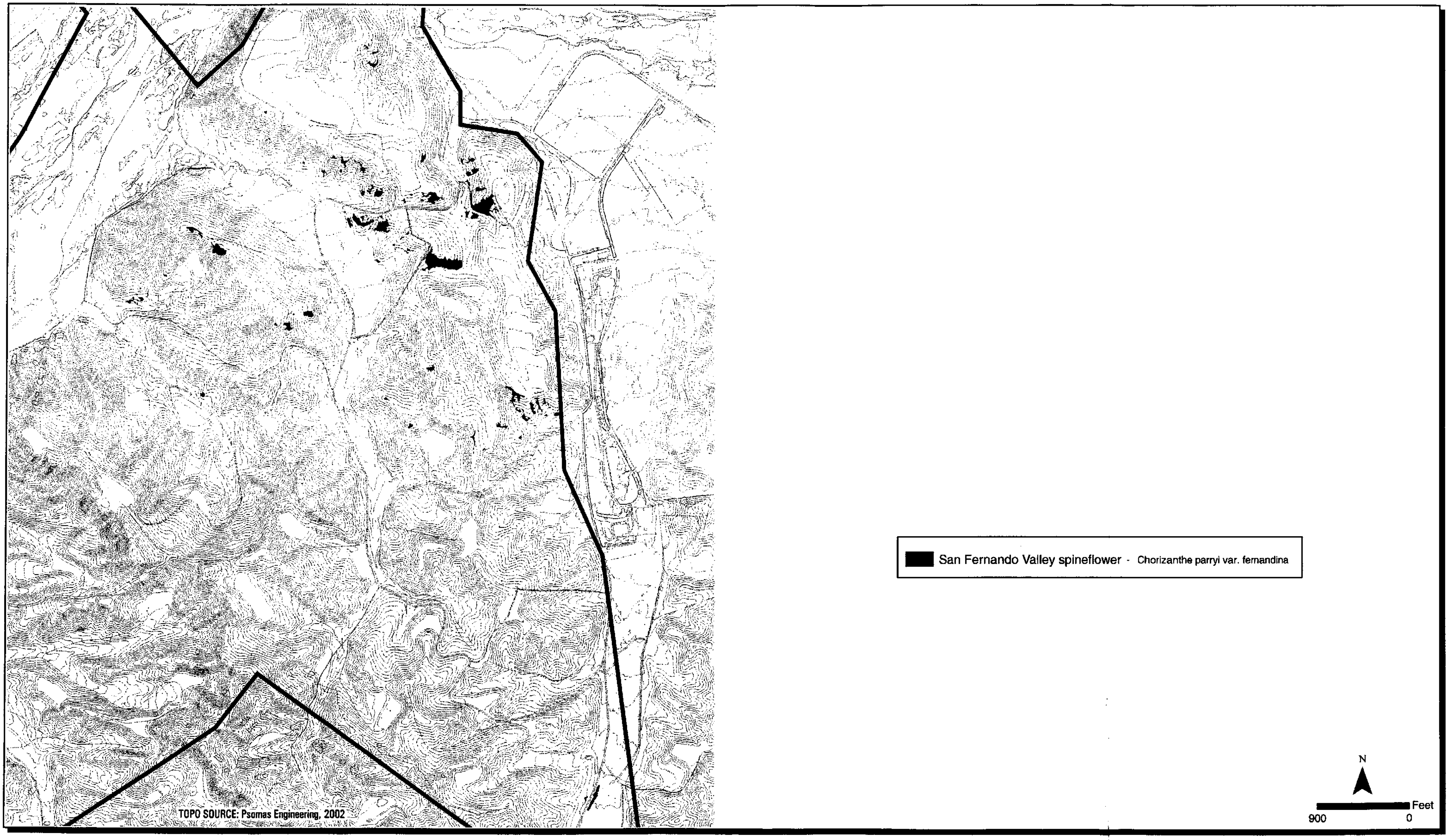
OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject: ____ Plant/Animal; ____ Habitat; ____ Diagnostic Feature; ____ Other

Type: ____ Slide; ____ Print

May we obtain duplicates **at our cost?**
____ Yes _X_ No



Newhall Ranch - Airport Mesa
2005 Sensitive Plant Survey Results

FIGURE
1

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ________	Quad Code ________
Index Code ________	Occurrence # ________
Copy Sent To ________	

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Chorizanthe parryi* var. *fernandina*

Reporter: Anuja Parikh, Nathan Gale Phone: (760) 942.5147

Address: Dudek & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: June 4 - 9, 2005 County: Los Angeles Collection: no If yes, # Mus./Herb:

Location: Northern Santa Susana Mountains/Santa Clarita Valley, Newhall Ranch: south of State Route 126 just east of the Ventura County line, on ridges and north facing slopes throughout Potrero Canyon.

Quad Name: Val Verde and Newhall _X_ 7½' __ 15' Elevation: 1100-1400' 4N R 17W NW ¼ Sec 3

Landowner/Manager: Newhall Land, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? _X_ Yes ____ No If not, reason:

Is this a new location record? ___ Yes _X_ No ____ Unknown

Total # of Individuals = ~326,000 plants Is this a subsequent visit? _X_ Yes _ No Compared to your last visit _X_ more__ same ____ fewer

Phenology (plants): ____ % vegetative __ % flowering ____% fruiting

Population Age Structure (animals): ____ # adults ____ # juveniles ____ # others

Site Function for Species (animals): ____ breeding ____ foraging ____ wintering ____ roosting ____ denning ____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

California sagebrush - black sage series, California grassland series, and California sagebrush - purple sage series, typically with 40% - 60%c non-native cover. Dominant plants asoociated withthe populations include *Artemisia californica, Salvia leucophylla, Centaurea melitensis, Erodium cicutarium, Bromus* spp. and *Eriogonum fasiculatum.* Soil texture is generally clay loam. Most plants are on southeast to south facing slopes, with some on southwestern aspects. Slopes were generally between 10% and 17%. Many areas have up to 50% bare ground.

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, fire in recent past (5-10 years); Possible Threats: Proposed for estate residential development.

Overall Site Quality: ____ Excellent ____ Good ____ Fair _X_ Poor (based on non-native plant cover)

Comments: This report summarizes 28 discrete locations, each with from 2 to an estimated 125,000 individuals observed.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

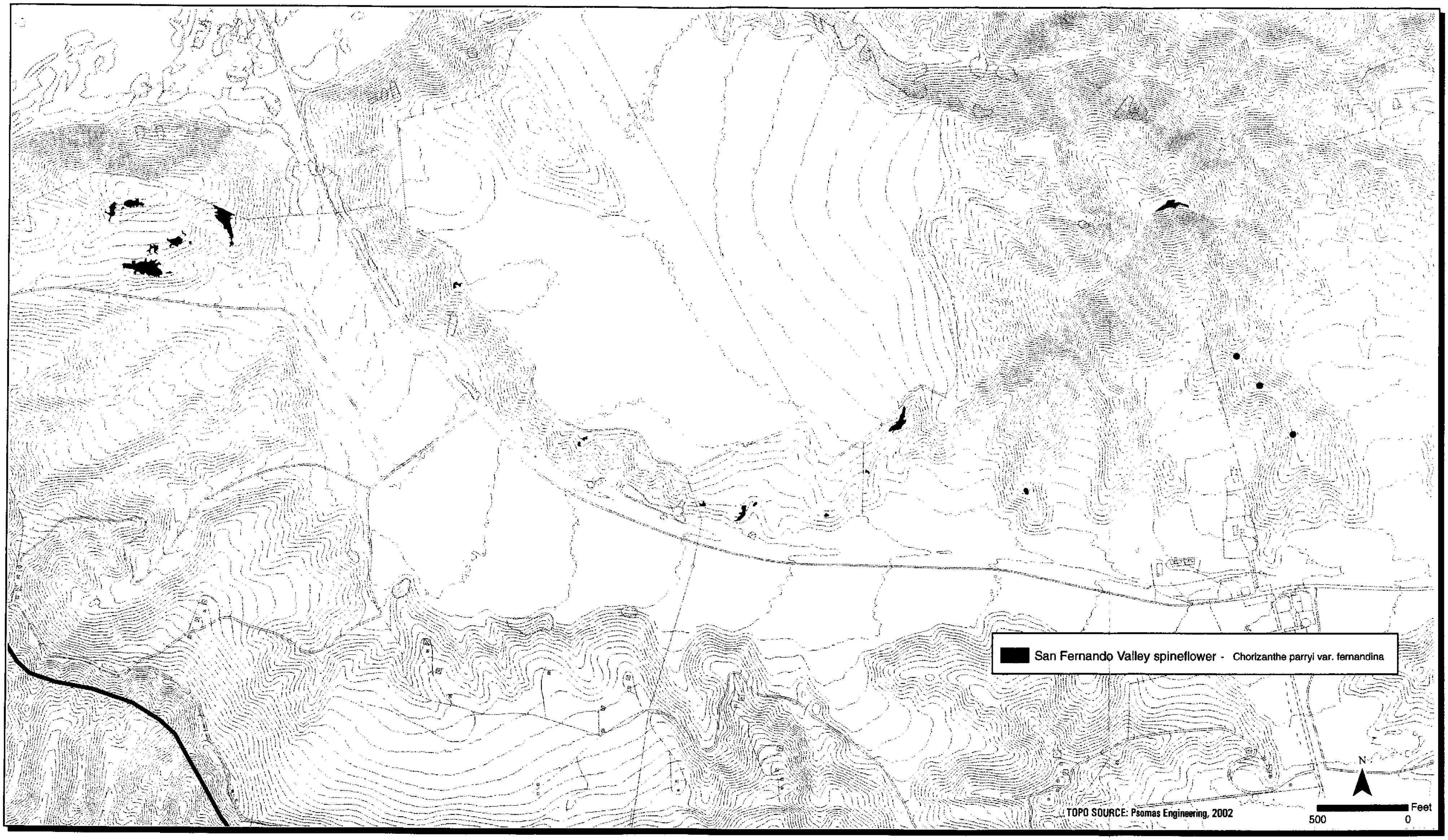
____ Keyed in a site reference:
____ Compared with specimen housed at:
____ Compared with photo/drawing in:
____ By another person (name):
_X_ Oher: personal knowledge

OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject	Type
___ Plant/Animal	___ Slide
___ Habitat	___ Print
___ Diagnostic Feature	
___ Other	

May we obtain duplicates **at our cost**?
____ Yes _X_ No



Newhall Ranch - Potrero Canyon
2005 Sensitive Plant Survey Results

FIGURE 1

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ______________ Quad Code ____________
Index Code ______________ Occurrence # ______________
Copy Sent To ______________________________________

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Chorizanthe parryi* var. *fernandina*

Reporter: Michelle Balk, Colin Khoury, Sherri Miller, Darren Smith, Megan Enright, others Phone: (760) 942-5147

Address: Dudek & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: May 1 - 5, 10-12; June 25, 26, 29; 14 July; 2005 County: Los Angeles Collection: no If yes, # Mus./Herb:

Location: Northern Santa Susana Mountains/Santa Clarita Valley, Newhall Ranch, south of confluence of the Santa Clara River and Castaic Creek, eastern, southern, and western edges of Grapevine Mesa and scattered ridges in the area.

Quad Name: Val Verde _X_ 7½' __ 15' Elevation: 1040-1290' T _17W_ R _4N_ _N_ ¼ Sec _3_

Landowner/Manager: Newhall Land, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? _X_ Yes ____ No If not, reason:

Is this a new location record? ____ Yes _X_ No ____ Unknown

Total # of Individuals = ~4,000,000 Is this a subsequent visit? _X_ Yes _ No Compared to your last visit: _X_ more __ same __ fewer

Phenology (plants): ____ % vegetative ____ % flowering ____ % fruiting

Population Age Structure (animals): ____ # adults ____ # juveniles ____ # others

Site Function for Species (animals): ____ breeding ____ foraging ____ wintering ____ roosting ____ denning ____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

Mixed chaparral, California sagebrush - California buckwheat, and chamise series communities provided habitat for most plants, with non-native cover generally 40 - 70%. Dominant plants include Bromus spp., Avena fatua, Erodium cicutarium, and Salsola tragus. Associated native species include *Adenostema fasiculata, Ericameria* sp.and *Artemisia californica*. Slopes were generally southwest-facing and less than 30%, although plants were found on all slopes with all aspects. Soil texture is predominantly silt loam.

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, farming; Possible Threats: proposed residential/commercial development.

Overall Site Quality: ____ Excellent _X_ Good ____ Fair ____ Poor

Comments: This report summarizes 103 discrete locations, each with from 1 to an estimated 1,765,000 individuals observed.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

____ Keyed in a site reference:
____ Compared with specimen housed at:
____ Compared with photo/drawing in:
____ By another person (name):
_X_ Oher: Personal knowledge

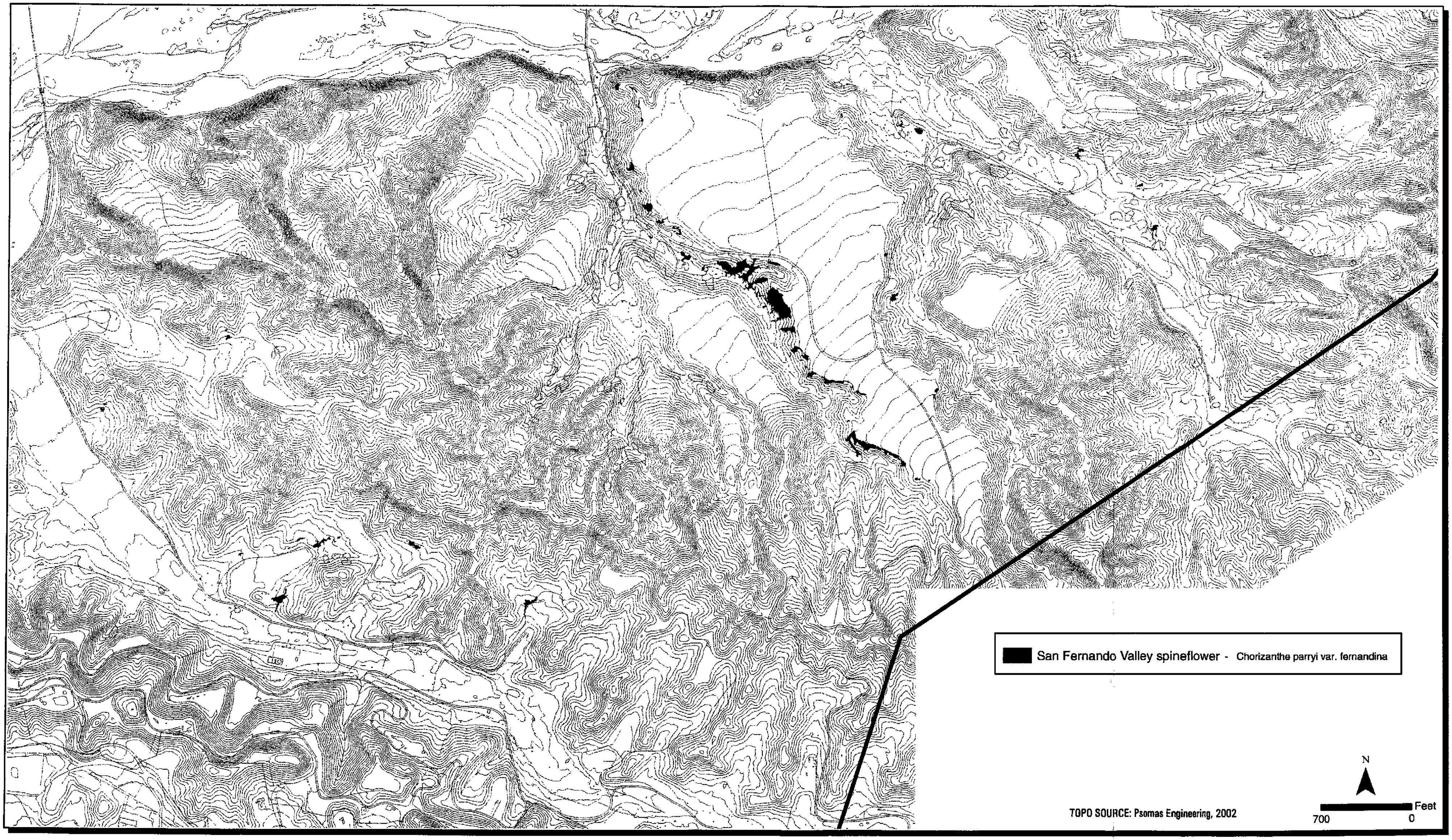
OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject: ____ Plant/Animal; ____ Habitat; ____ Diagnostic Feature; ____ Other

Type: ____ Slide; ____ Print

May we obtain duplicates **at our cost**?
____ Yes _X_ No



Newhall Ranch - Grapevine Mesa

2005 Sensitive Plant Survey Results

FIGURE 1

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ______	Quad Code ______
Index Code ______	Occurrence # ______
Copy Sent To ______	

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Calochortus clavatus* var. *gracilis*

Reporter: Galen Hagen, Michelle Balk, Dave Flietner Phone: (760) 942-5147

Address: Dudek & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: July 6-8, 2005 County: Los Angeles Collection: no If yes, # Mus./Herb:
Location: Northern Santa Susana Mountains, Newhall Ranch, northwest of confluence of the Santa Clara River and Castaic Creek, scattered on both sides of Chiquito Canyon.

Quad Name: Val Verde _X_ 7½' __ 15' Elevation: 1000-1300' T 4N R 17W ___¼ of___¼ Sec 15 and 16

Landowner/Manager: Newhall Land, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? _X_ Yes ____ No If not, reason:

Is this a new location record? ____ Yes _X_ No ____ Unknown

Total # of Individuals = ~60 Is this a subsequent visit? _X_ Yes _ No Compared to your last visit: _X_ more _ same ___ fewer

Phenology (plants): ___ % vegetative ___ % flowering ___ % fruiting

Population Age Structure (animals): ____ # adults ____ # juveniles ____ # others

Site Function for Species (animals): ____ breeding ____ foraging ____ wintering ____ roosting ____ denning ____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

California sagebrush is the predominant vegetation type with *Artemisia californica, Eriogonum fasciculatum, Centaurea melitensis* and *Bromus diandrus* the most common associated species. Soils texture most commonly loam, silt loam, or clay loam. Primarily on north, northwest, and northeast facing slopes with slope gradients typically ranging between 20 degrees and 45 degrees.

Current Land Use/Visible Disturbances/Possible Threats: Land used for cattle grazing and farming. Proposed for commercial/residential development.

Overall Site Quality: ____ Excellent ____ Good _X_ Fair ____ Poor

Comments: This description summarizes 5 discrete locations, each with from 1 to 26 individuals observed.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

____ Keyed in a site reference:
____ Compared with specimen housed at:
____ Compared with photo/drawing in:
____ By another person (name):
_X_ Other: personal knowledge

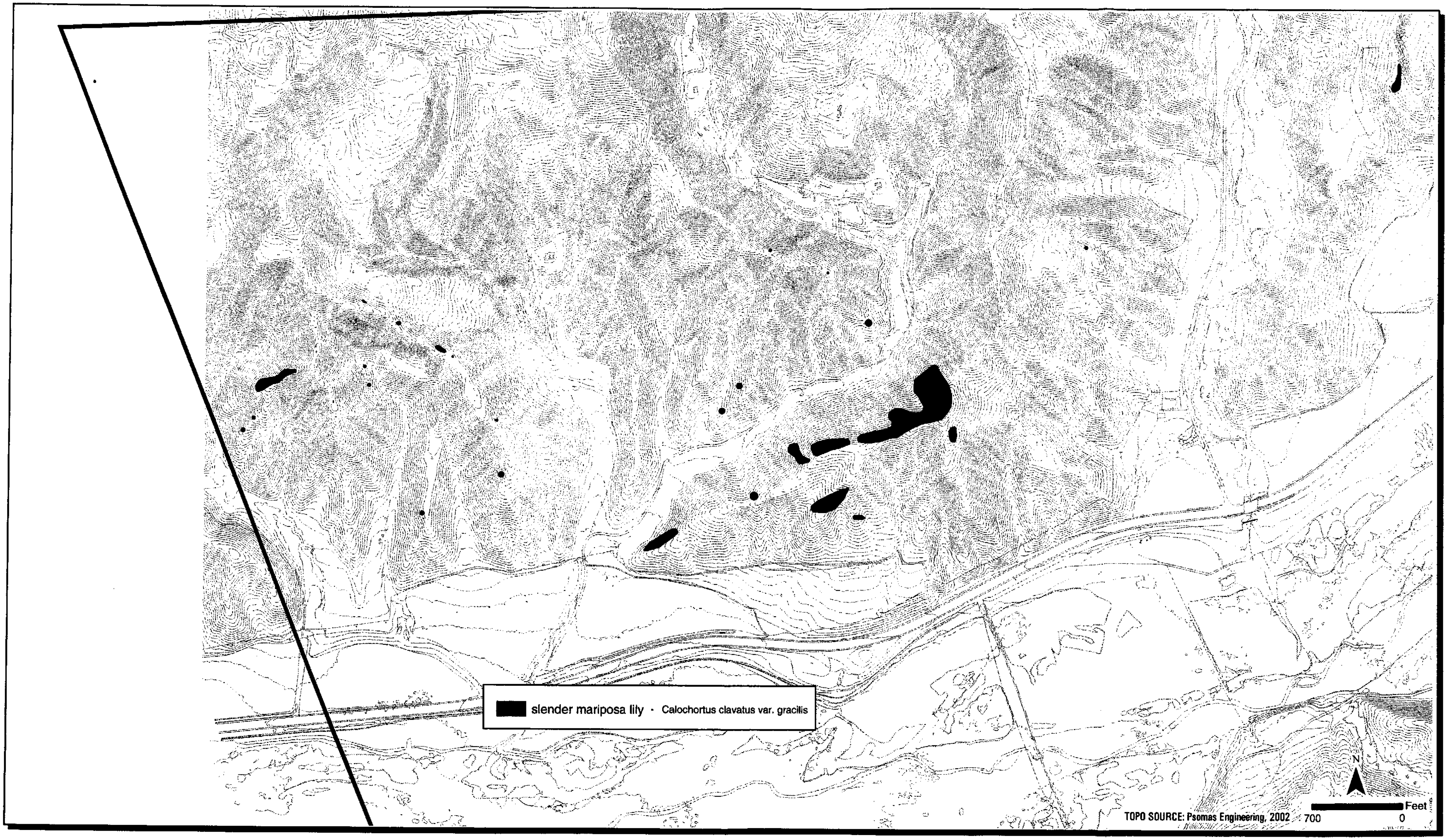
OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject: ____ Plant/Animal ____ Habitat ____ Diagnostic Feature ____ Other

Type: ____ Slide ____ Print

May we obtain duplicates **at our cost**?
____ Yes _X_ No



Newhall Ranch - Homestead Canyon

2005 Sensitive Plant Survey Results

FIGURE 1

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ______________ Quad Code ____________
Index Code ______________ Occurrence # ____________
Copy Sent To ________________________________

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Calochortus clavatus* var. *gracilis*

Reporter: Megan Enright and others Phone: (760) 942-5147

Address: Dudek & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: May 1, 3, 5, 11, 12, 27, 28; June 21-2 and 28-30; 2005 County: Los Angeles Collection: no
If yes, # Mus./Herb:

Location: Northern Santa Susana Mountains/Santa Clarita Valley, Newhall Ranch, south of confluence of the Santa Clara River and Castaic Creek, eastern, southern, and western edges of Grapevine Mesa and scattered ridges in the area.

Quad Name: Val Verde
_X_ 7½' __ 15' Elevation: 1040-1290' T 17W R 4N N ¼ Sec 3

Landowner/Manager: Newhall Land, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? _X_ Yes ____ No If not, reason:

Is this a new location record? ____ Yes _X_ No ____ Unknown

Total # of Individuals = ~740 Is this a subsequent visit? _X_ Yes _ No Compared to your last visit: _X_ more __ same __ fewer

Phenology (plants): ____ % vegetative ____ % flowering ____ % fruiting

Population Age Structure (animals): ____ # adults ____ # juveniles ____ # others

Site Function for Species (animals): ____ breeding ____ foraging ____ wintering ____ roosting ____ denning ____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

California sagebrush communities predominate, including black sage, purple sage, and California buckwheat series. Aspect ranges from east to northwest, with most on north-east facing slopes of up to 45%. Soil texture is silt loam or loam.

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, farming; Possible Threats: proposed residential/commercial development.

Overall Site Quality: ____ Excellent ____ Good _X_ Fair ____ Poor

Comments: This report summarizes approximately 60 discrete locations, each with from 1 to an estimated 200 individuals observed.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

____ Keyed in a site reference:
____ Compared with specimen housed at:
____ Compared with photo/drawing in:
____ By another person (name):
_X_ Oher: personal knowledge

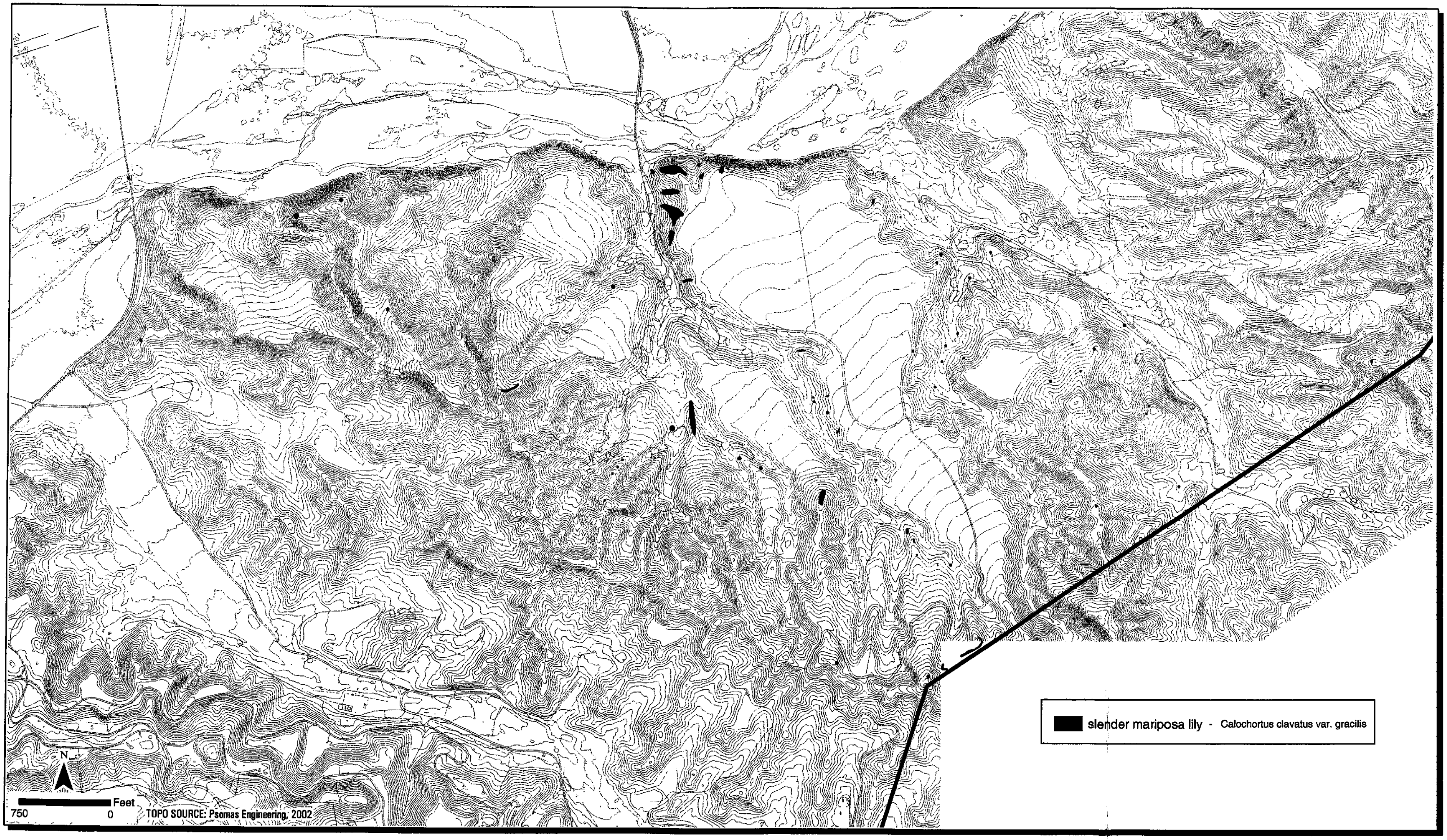
OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject
____ Plant/Animal
____ Habitat
____ Diagnostic Feature
____ Other

Type
____ Slide
____ Print

May we obtain duplicates **at our cost**?
____ Yes _X_ No



Newhall Ranch - Grapevine Mesa

2005 Sensitive Plant Survey Results

FIGURE 1

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ____________ Quad Code ____________
Index Code ____________ Occurrence # ____________
Copy Sent To ____________

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Calochortus clavatus* var. *gracilis*

Reporter: Anuja Parikh, Nathan Gale   Phone: (760) 942.5147

Address: Dudek & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: May 9, 10, 14, 16, 24; June 1-3, 7,9; 2005   County: Los Angeles   Collection: no   If yes, # Mus. /Herb :

Location: Northern Santa Susana Mountains/Santa Clarita Valley, Newhall Ranch, southeast of confluence of the Santa Clara River and Castaic Creek, east, south, and west edges of Airport Mesa and adjacent mesas.

Quad Name: Newhall   T 4N   R 16W   W ¼ of W ¼ Sec 3
X 7½' __ 15'   Elevation: 1075-1250'   T 4N   R 17W   E ¼ of E ¼ Sec3

Landowner/Manager: Newhall Land, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? X Yes ____ No   If not, reason:

Is this a new location record? ____ Yes X No ____ Unknown

Total # of Individuals = 630   Is this a subsequent visit? X Yes __ No   Compared to your last visit: __ more __ same __ fewer

Phenology (plants): ____ % vegetative ____ % flowering ____ % fruiting

Population Age Structure (animals): ____ # adults ____ # juveniles ____ # others

Site Function for Species (animals): ____ breeding ____ foraging ____ wintering ____ roosting ____ denning ____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

Most occurred in California sagebrush (purple sage series). Dominant plants include *Artemisia californica, Eriogonum fasiculatum, Salvia leucophylla,* and *Bromus* spp. Most plants were on up to 50% slopes with north, northwest, or northeast aspects.

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, farming, grading/clearing; Possible Threats: proposed residential/commercial development.

Overall Site Quality: ____ Excellent ____ Good X Fair ____ Poor

Comments: This report summarizes 36 discrete locations, each with from 1 to an estimated 200 individuals observed.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

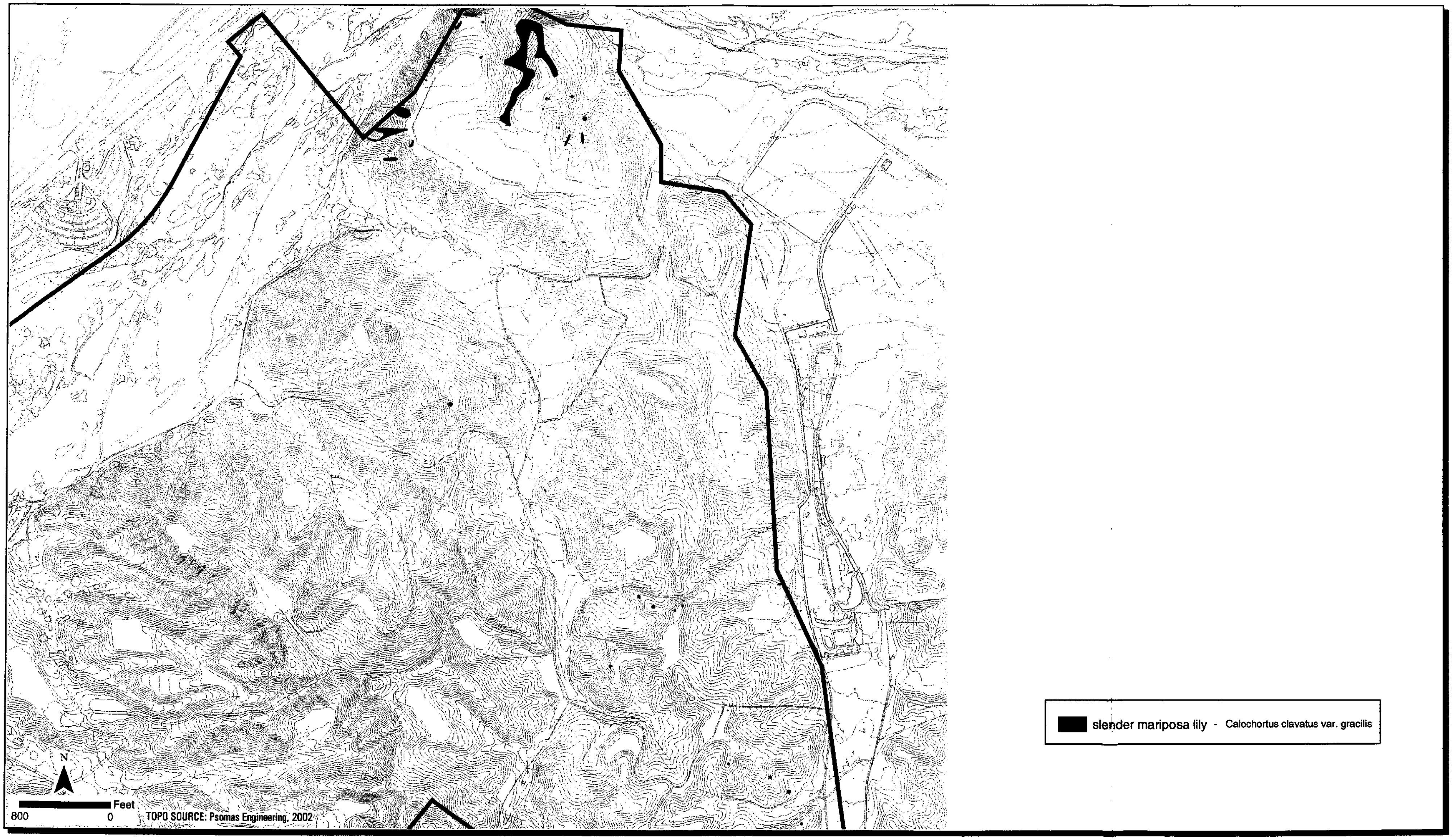
____ Keyed in a site reference:
____ Compared with specimen housed at:
____ Compared with photo/drawing in:
____ By another person (name):
X Other: Personal knowledge

OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject	Type
____ Plant/Animal	____ Slide
____ Habitat	____ Print
____ Diagnostic Feature	
____ Other	

May we obtain duplicates **at our cost**?
____ Yes X No



Newhall Ranch - Airport Mesa

2005 Sensitive Plant Survey Results

FIGURE 1

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ____________	Quad Code ____________
Index Code ____________	Occurrence # ____________
Copy Sent To ____________	

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Calochortus clavatus* var. *gracilis*

Reporter: Doug Gettinger, Andy Thomson, Galen Hagen, Colin Khoury, Marc Doalson, Tricia Wotipka, Tom Liddicoat Phone: (760) 942.5147

Address: Dudek & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: May 29; July 11-13, 19, 20, 23; 2005 County: Los Angeles Collection: no If yes, # Mus./Herb:

Location: Santa Clarita Valley, Newhall Ranch: north of State Route 126, west of San Martinez Grande Canyon Road

Quad Name: Val Verde _X_ 7½' __ 15' Elevation: 1090-1235' T 4N R 17W NW ¼ Sec 3

Landowner/Manager: Newhall Land, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? _X_ Yes ____ No If not, reason:

Is this a new location record? __ Yes _X_ No ____ Unknown

Total # of Individuals = _~ 1,300_ Is this a subsequent visit? _X_ Yes_ No Compared to your last visit:_ more __ same _X_ fewer

Phenology (plants): ____ % vegetative ___ % flowering ___% fruiting ??

Population Age Structure (animals): ____ # adults ____ # juveniles ____ # others

Site Function for Species (animals): ____ breeding ____ foraging ____ wintering ____ roosting ____ denning ____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

California grassland series with less than 15% native cover, dominated by *Bromus madritensis rubens, Centaurea melitensis, Hordeum vulgare, Erodium cicutraium,* etc. Associated native species include *Artemisia california, Salvia leucophylla,* and *Eriogonum fasciculatum.* Most plants were on slopes of up to 30%, but some plants were on slopes up to 60%. Most plants were on south-east facing slopes, but also occurred with south and southwest aspects.
Clay loams soils predominate, with some loam.

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, fire in recent past (5-10 years); Possible Threats: Currently proposed for estate residential development.

Overall Site Quality: ____ Excellent ____ Good ___ Fair _X_ Poor (based on % non-native cover)

Comments: This report summarizes 11 discrete locations, each with from 1 to an estimated 550 individuals observed. The reduction in population from the previous year is likely due to below average rainfall, germination, and survival.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

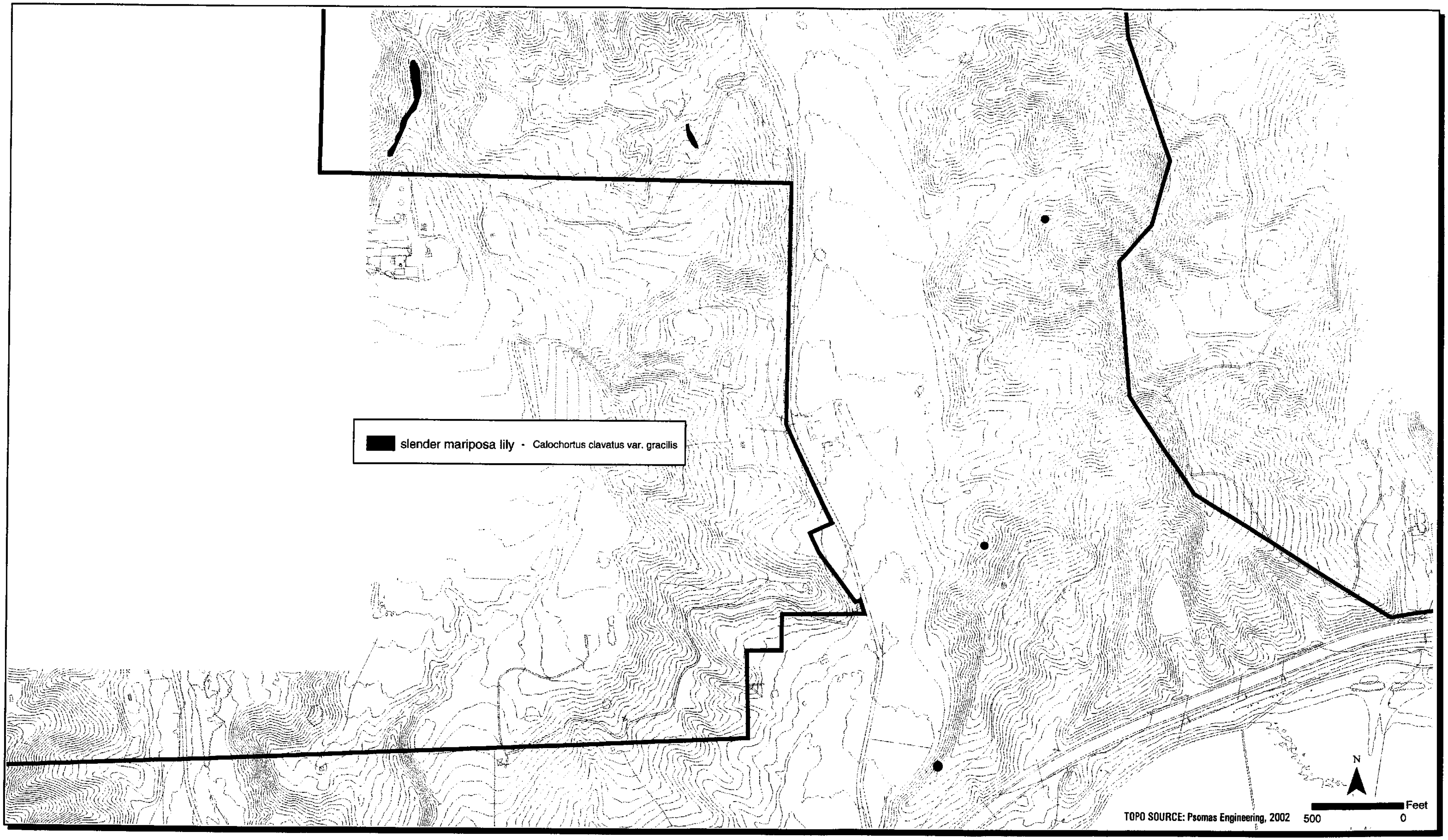
____ Keyed in a site reference:
____ Compared with specimen housed at:
____ Compared with photo/drawing in:
____ By another person (name):
_X_ Other: Personal knowledge

OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject	Type
___ Plant/Animal	____ Slide
___ Habitat	____ Print
____ Diagnostic Feature	
____ Other	

May we obtain duplicates **at our cost**?
____ Yes _X_ No



Newhall Ranch - San Martinez Grande

2005 Sensitive Plant Survey Results

FIGURE 1

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ______________ Quad Code ______________
Index Code ______________ Occurrence # ______________
Copy Sent To ______________________________

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Calochortus clavatus* var. *gracilis*

Reporter: Anuja Parikh, Nathan Gale Phone: (760) 942-5147

Address: Dudek & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: July 3, 5, 13, 14, 18, 20, 21; 2005 County: Los Angeles Collection: no If yes, # Mus./Herb:

Location: Northern Santa Susana Mountains, Newhall Ranch, southwest of confluence of the Santa Clara River and Castaic Creek, west to northeastern side of Long Canyon.

Quad Name: Val Verde _X_ 7½' __ 15' Elevation: 1000-1300' T 4N R 17W W ¼ of Sec 3

Landowner/Manager: Newhall Land, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? _X_ Yes ____ No If not, reason:

Is this a new location record? ____ Yes _X_ No ____ Unknown

Total # of Individuals = 194 Is this a subsequent visit? _X_ Yes __ No Compared to your last visit: _X_ more __ same ___ fewer

Phenology (plants): ____ % vegetative ____ % flowering ____ % fruiting

Population Age Structure (animals): ____ # adults ____ # juveniles ____ # others

Site Function for Species (animals): ____ breeding ____ foraging ____ wintering ____ roosting ____ denning ____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

Growing in California sagebrush – purple sage series, on a variety of slopes with a variety of aspects. Soils are clay loam.

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use-Cattle grazing, farming, Visible Disturbances-removal of oil derricks, Possible Threats-proposed residential/commercial development.

Overall Site Quality: ____ Excellent _X_ Good ____ Fair ____ Poor

Comments: This report summarizes approximately 32 discrete locations, each with from 1 to an estimated 50 individuals observed.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

____ Keyed in a site reference:
____ Compared with specimen housed at:
____ Compared with photo/drawing in:
____ By another person (name):
_X_ Other: personal knowledge

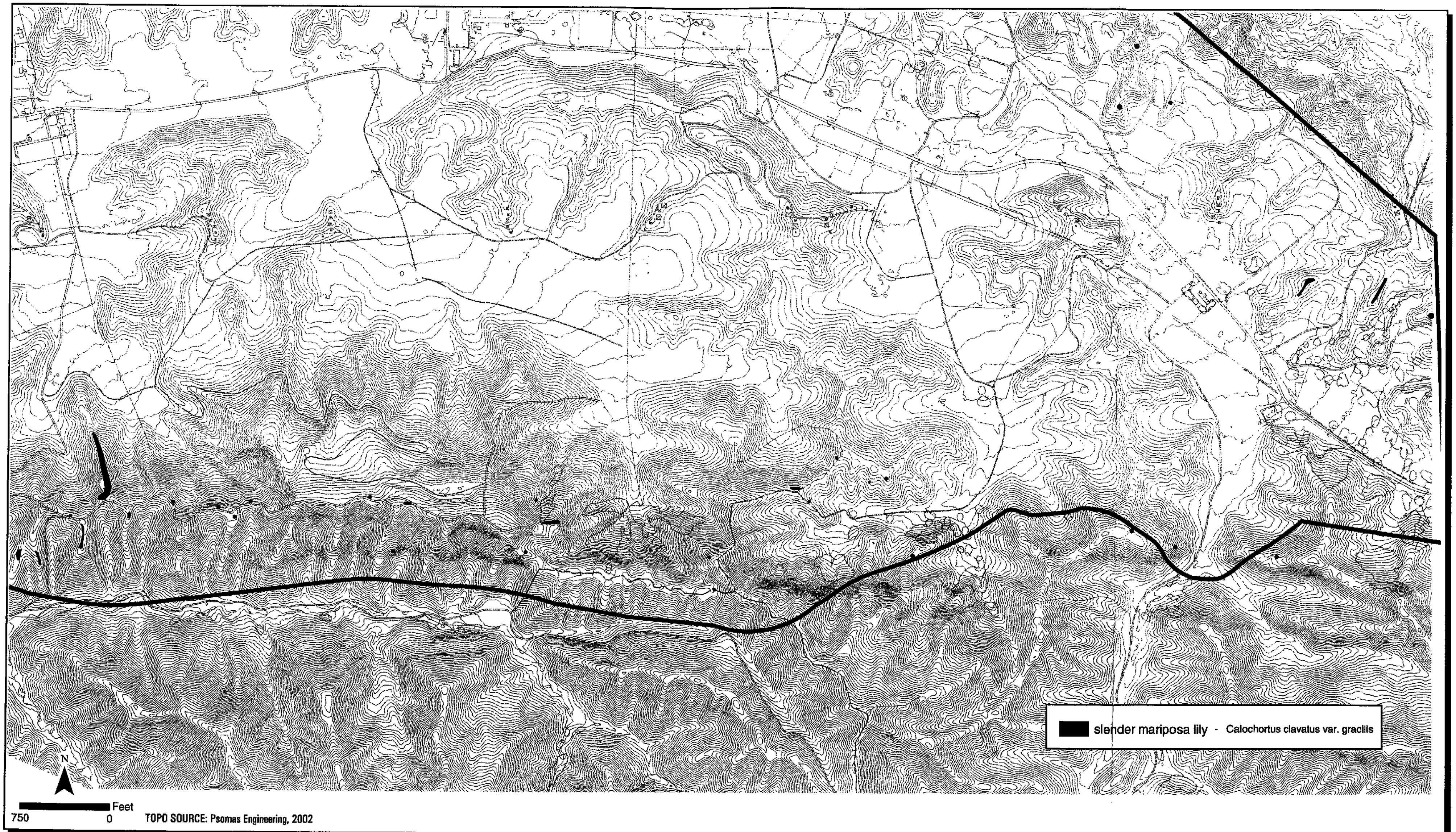
OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject — Type

____ Plant/Animal ____ Slide
____ Habitat ____ Print
____ Diagnostic Feature
____ Other

May we obtain duplicates **at our cost**?
____ Yes _X_ No



Newhall Ranch - East Potrero Canyon

2005 Sensitive Plant Survey Results

FIGURE 1

CALIFORNIA NATIVE SPECIES FIELD SURVEY FORM

OFFICE USE ONLY

Document Code ______________ Quad Code ______________
Index Code ______________ Occurrence # ______________
Copy Sent To ______________________________

PLEASE ENTER ALL INFORMATION AVAILABLE TO YOU. USE THE BACK FOR COMMENTS IF NECESSARY. ***PLEASE ATTACH OR DRAW A MAP ON BACK.***

Scientific name (no codes): *Calochortus clavatus* var. *gracilis*

Reporter: Anuja Parikh, Nathan Gale Phone: (760) 942.5147

Address: Dudek & Associates, 605 Third Street, Encinitas, CA 92024

Date of Field Work: June 6, 8, 29; July 3; 2005 County: Los Angeles Collection: no If yes, # Mus./Herb:

Location: Northern Santa Susana Mountains/Santa Clarita Valley, Newhall Ranch: south of State Route 126 just east of the Ventura County line, on ridges and north facing slopes throughout Potrero Canyon.

Quad Name: Val Verde and Newhall _X_ 7½' __ 15' Elevation: 1100-1400' 4N R 17W NW ¼ Sec 3

Landowner/Manager: Newhall Land, 23823 Valencia Boulevard, Valencia, CA 91355

Species Found? _X_ Yes ____ No If not, reason:

Is this a new location record? ___ Yes _X_ No ____ Unknown

Total # of Individuals = 186 plants Is this a subsequent visit? _X_ Yes__ No Compared to your last visit:__ more __same _X_ fewer

Phenology (plants): ____ % vegetative __ % flowering ____% fruiting

Population Age Structure (animals): ____ # adults ____ # juveniles ____ # others

Site Function for Species (animals): ____ breeding ____ foraging ____ wintering ____ roosting ____ denning ____ other

Habitat Description (plant communities, dominants, associates, other rare spp., substrate/soils, aspect/slope):

California sagebrush plant communities predominate, with about 50% of the individuals on California sagebrush-purple sage series. Dominant plants include *Salvia leucophylla, Artemisia californica,* and *Eriogonum fasciculatum.* Soil texture is clay loam. Most plants are on northwest-facing slopes, although they occurred on all aspects.

Current Land Use/Visible Disturbances/Possible Threats: Current Land Use: Cattle grazing, farming; Visible Disturbances: cattle grazing, fire in recent past (5-10 years); Possible Threats: Proposed for estate residential development.

Overall Site Quality: ____ Excellent ____ Good _X_ Fair ____ Poor

Comments: This report summarizes 10 discrete locations, each with from 4 to an estimated 123 individuals observed.

Should/Could this site be protected? How?

Other comments:

DETERMINATION (Check one or more, fill in blanks)

___ Keyed in a site reference:
___ Compared with specimen housed at:
___ Compared with photo/drawing in:
___ By another person (name):
_X_ Oher: personal knowledge

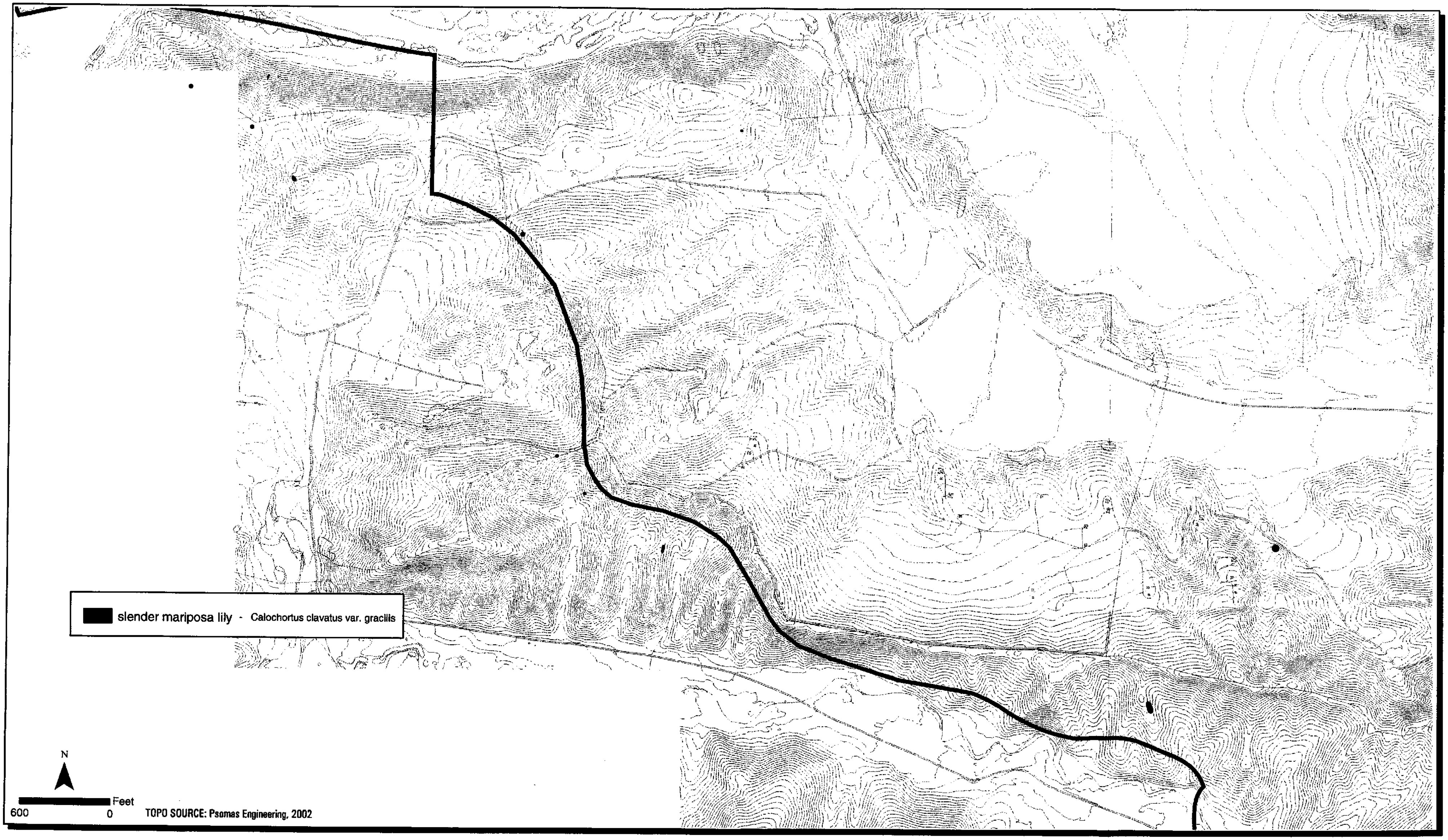
OTHER KNOWLEDGEABLE INDIVIDUALS (Name/Address/Phone)

PHOTOGRAPHS (Check one or more)

Subject: ___ Plant/Animal; ___ Habitat; ___ Diagnostic Feature; ___ Other

Type: ___ Slide; ___ Print

May we obtain duplicates **at our cost**? ____ Yes _X_ No



Newhall Ranch - West Potrero Canyon

2005 Sensitive Plant Survey Results

FIGURE 1

RARE PLANT SURVEYS

NEWHALL RANCH SPECIFIC PLAN PROJECT SITES
LOS ANGELES COUNTY, CA

Submitted to:

IMPACT SCIENCES, INC.
30343 Canwood Street, Suite 210
Agoura Hills, CA 91301
ATTN: Tom Worthington

Submitted by:

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September 2002

1. INTRODUCTION

This report documents the results of rare plant surveys conducted within the Newhall Ranch Specific Plan area in Los Angeles County, California. The four project locations surveyed were River Village, Homestead, Salt Canyon, and a portion of Airport Mesa. The River Village site is located along the Santa Clara River from the Los Angeles County line in the west to Castaic Creek in the east. It also extends northward into part of Chiquito Canyon and southward into part of Long Canyon; it was surveyed during the period of May 5 through May 21, 2001. The Homestead site comprises the plan area north of Highway 126 and north of River Village, and includes the sites designated as Homestead, Homestead Estates, and Chiquito Canyon Residential; it was surveyed from May 22 through May 30, 2001. Salt Canyon lies south of the Santa Clara River along the extreme western boundary of the plan area, east of the county line; it was surveyed from June 15 through June 17, 2001. The portion of Airport Mesa that was surveyed lies in the northeastern part of the plan area; it was surveyed from May 1 through May 5, 2002. See Figures 1 and 2 for the specific survey locations and for a key to the other figures presented in this report.

A team of two consultants from FL*x* (Dr. Anuja Parikh and Dr. Nathan Gale) conducted the rare plant surveys with specific focus on target species potentially occurring at the site, including the San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*). In addition, vegetation types and plant species associations were noted and their dominant species recorded. A list of observed plant species, including rare and commonly occurring plants, was compiled. Plant community descriptions in this report follow Holland (1986) where applicable; species nomenclature follows Hickman (1993).

2. VEGETATION TYPES AND PLANT SPECIES ASSOCIATIONS

The Newhall Ranch Specific Plan area is composed of variable terrain, ranging from relatively flat riverwash, secondary washes, and terraces, to previously disturbed flat areas or fields, to gentle and steep hillslopes and ridges.

Developed and/or Disturbed Areas. Portions of each of the four sites surveyed in the Specific Plan area, particularly the valley flatlands and the tops of mesas, comprise areas that have been disturbed previously by agricultural disking or grading, or currently are agricultural fields. There are small areas of buildings associated with agricultural operations, and additionally, there are roads and pads associated with previous and ongoing oil field development. The disturbed areas not under active use have ruderal vegetation dominated by non-native plants. Species observed included bromegrasses (*Bromus* spp.), oats (*Avena* spp.), hare barley (*Hordeum murinum*), shortpod mustard (*Hirschfeldia incana*), and red-stemmed filaree (*Erodium cicutarium*).

NEWHALL RANCH
Newhall Ranch Company

L E G E N D

FLX Survey Extent

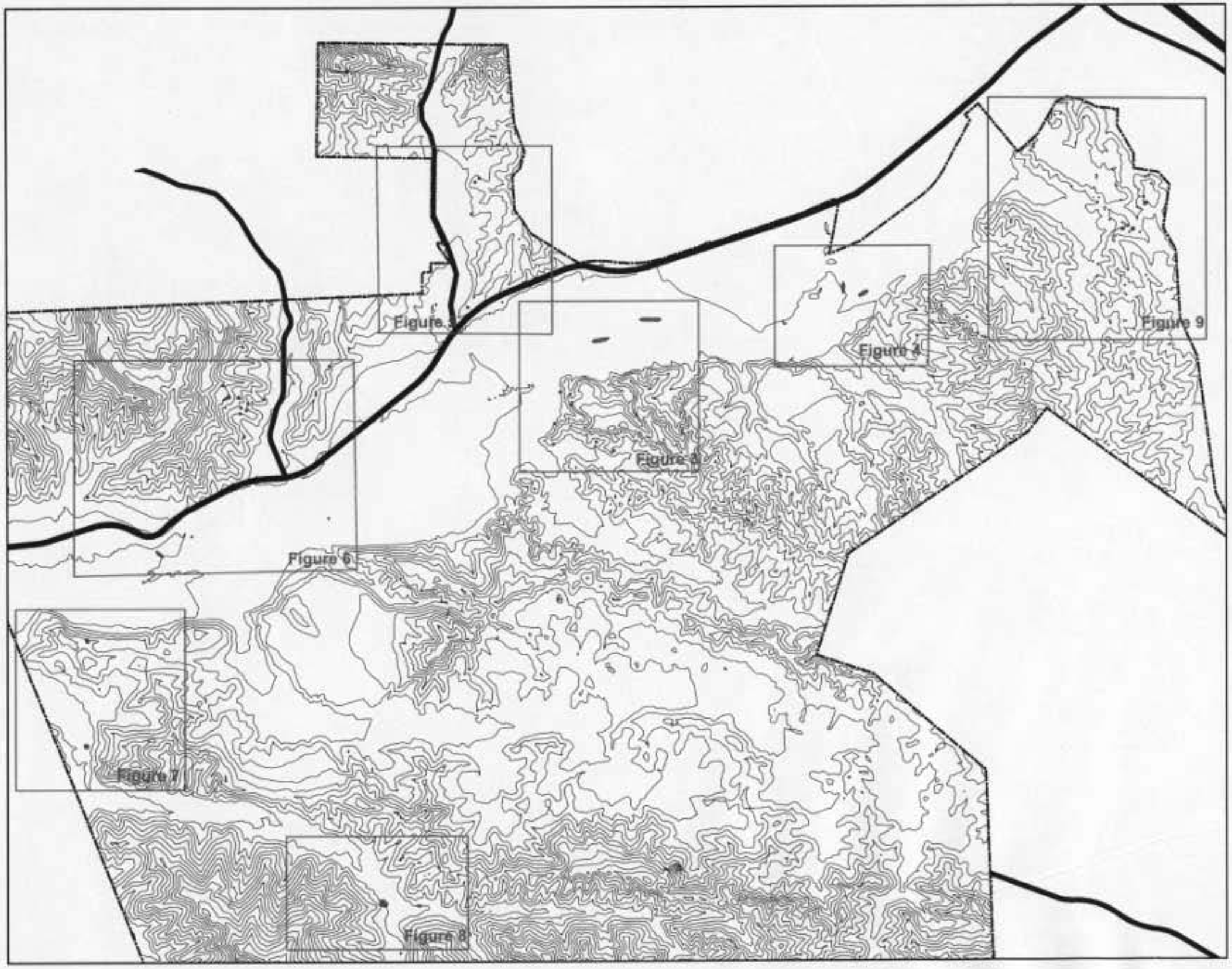
Newhall Ranch Specific Plan Boundary

0 1,250 2,500 Feet
0 400 800 Meters

FORMA

Figure 1

FLX SURVEY EXTENTS



NEWHALL RANCH

L E G E N D

Rare Plant Locations

FORMA

NORTH

Figure 2

RARE PLANT GRAPHIC INDEX

Non-Native Grassland. This community occurs on relatively flat terrain and sometimes on gentle hillslopes throughout the Specific Plan area. Annual introduced grasses up to about 0.5 m tall are dominant in non-native grasslands; annual herb species also are found. Flowering occurs in spring, and the plants mostly are dead in summer and fall. Non-native grasslands occur on fine-textured, usually clay soils, that are moist to wet in the winter but dry in the summer and fall (Holland, 1986). Grass species found at the sites include mainly bromegrasses (*Bromus diandrus*, *B. madritensis* ssp. *rubens*, *B. hordeaceus*), wild oats (*Avena barbata*, *A. fatua*), and rat-tail fescue (*Vulpia myuros* ssp. *myuros*). Introduced herbaceous ruderal species also are found, and include red-stemmed filaree (*Erodium cicutarium*), shortpod mustard (*Hirschfeldia incana*), and star-thistles (*Centaurea* spp.). Scattered native plants found in this community include small-seed sandmat (*Chamaesyce polycarpa*), wishbone bush (*Mirabilis californica*), and clarkias (*Clarkia* spp.). With respect to sensitivity status, non-native grassland has been state-ranked as S4 (apparently secure) by the California Natural Diversity Database (CNDDB).

Venturan Coastal Sage Scrub. Coastal sage scrub is the most extensive vegetation type within the Specific Plan area, and occurs on gentle to steep hillslopes in all surveyed sites. It varies in cover from dense to sparse. This community contains low, soft-woody shrubs up to 1.5 m tall, and is not as dense as chaparral or some other coastal scrubs. Plant growth occurs in late winter and spring after the rains, with most species flowering in spring and summer (Holland, 1986). Dominant native species in the scrub found on the four sites are California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*) and California sagebrush (*Artemisia californica*); other common plants include sages (*Salvia leucophylla, S. mellifera, S. apiana*), California broom (*Lotus scoparius*), California-aster (*Lessingia filaginifolia* var. *filaginifolia*), California encelia (*Encelia californica*), giant wild-rye (*Leymus condensatus*), and chaparral mallow (*Malacothamnus fasciculatus*). Elements of the more xeric Riversidian sage scrub also are scattered in the scrub, and include thickleaf yerba santa (*Eriodictyon crassifolium* var. *nigrescens*), goldenbush (*Ericameria palmeri* var. *pachylepis*), Our Lord's candle (*Yucca whipplei*), and cactus (*Opuntia basilaris* var. *basilaris*, *O. littoralis*). The understory generally is sparse, with grasses, including the native foothill needlegrass (*Nassella lepida*), and native herbs such as wishbone bush (*Mirabilis californica*) and morning-glory (*Calystegia macrostegia*). Scrub with generally sparser shrub cover provides habitat for the sensitive species, Peirson's morning-glory (*Calystegia peirsonii*) and San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*). With respect to sensitivity status, Venturan coastal sage scrub has been state-ranked as S3.1 (10,000 to 50,000 acres, very threatened) by the CNDDB.

Coastal Sage - Chaparral Scrub. The steepest north-facing slopes in Long Canyon and the northern part of Chiquito Canyon support a mixed association of coastal sage scrub and chaparral species. Chaparral is made up of sclerophyllous evergreen shrubs adapted to fire, and is dense in cover, often impenetrable, with a sparse understory (Holland, 1986). It is dominated by shrubs about 1 to 3 m tall. Growth is highest in the spring and reduced in the summer, and flowering occurs late winter to early summer. Species found in the coastal sage-chaparral scrub include chamise (*Adenostoma fasciculatum*), hoaryleaf ceanothus (*Ceanothus crassifolius*), black sage (*Salvia mellifera*), toyon (*Heteromeles arbutifolia*), California buckwheat(*Eriogonum fasciculatum* var. *foliolosum*), California encelia (*Encelia californica*), bush monkeyflower (*Mimulus aurantiacus*), mountain mahogany (*Cercocarpus betuloides* var. *betuloides*), blue elderberry (*Sambucus mexicana*), and heart-leaved penstemon (*Keckiella *cordifolia*). With respect to sensitivity status, coastal sage-chaparral scrub has been state-ranked as S3.2 (10,000 to 50,000 acres, threatened) by the CNDDB.

Coast Live Oak Woodland. This community occurs at the base of protected north-facing slopes in Long Canyon and the northern part of Chiquito Canyon, and is dominated by the evergreen coast live oak (*Quercus agrifolia* var. *agrifolia*). Trees can reach 10 to 25 m in height and are known to be long-lived and well adapted to surviving fire. Oak woodlands occur away from the direct influence of the ocean in shaded canyons and on north-facing slopes (Holland, 1986). They often grade into chaparral or coastal scrub upslope or under drier conditions; on moister sites or areas subject to fog, they grade into various forest types. The shrub layer is poorly developed in oak woodlands, and the herb layer often has annual grasses, which have replaced the native perennial grasses once commonly associated with this community. Species associates are spiny redberry (*Rhamnus crocea*), skunkbrush (*Rhus trilobata*), blue elderberry (*Sambucus mexicana*), holly-leaf cherry (*Prunus ilicifolia* ssp. *ilicifolia*), wild cucumber (*Marah macrocarpus* var. *macrocarpus*), eucrypta (*Eucrypta chrysanthemifolia*), clarkias (*Clarkia* spp.), bedstraws (*Galium* spp.), and ripgut grass (*Bromus diandrus*). With respect to sensitivity status, coast live oak woodland has been state-ranked as S4 (apparently secure) by the CNDDB.

Valley Oak Woodland. Small patches of woodland dominated by the winter-deciduous valley oak (*Quercus lobata*) occur in the northeastern part of the surveyed portion of Airport Mesa. Valley oaks (*Quercus lobata*) are California's largest broad-leaved tree, and grow in an open canopy form, reaching 15 to 35 m in height. They typically occur on deep, well-drained alluvial soils in valleys, but also on non-alluvial soils on slopes. Understory plants observed at the site include California-aster (*Lessingia filaginifolia* var. *filaginifolia*), California sagebrush (*Artemisia californica*), foxtail chess (*Bromus madritensis* ssp. *rubens*), goldenbush (*Ericameria palmeri* var. *pachylepis*), and ripgut grass (*Bromus diandrus*). With respect to sensitivity status, valley oak woodland has been state-ranked as S2.1 (2,000 to 10,000 acres, very threatened) by the CNDDB.

Riverwash. In the Newhall Ranch Specific Plan area, the main channel of the Santa Clara River and tributary washes are sparsely vegetated and subject to scouring. The soils are sandy riverwash and gravel, and in places form sand bars and low terraces within the channels. No well-defined plant community is found here, although scattered elements of riparian scrub were observed. Shrub species found in and adjacent to the dry channels include mule fat (*Baccharis salicifolia*), sandbar willow (*Salix exigua*), tamarisk (*Tamarix* sp.), scale-broom (*Lepidospartum squamatum*), big saltbush (*Atriplex lentiformis* ssp. *lentiformis*), California broom (*Lotus scoparius*), and Great Basin sagebrush (*Artemisia tridentata*). Smaller plants growing in these areas include woolly star (*Eriastrum densifolium* ssp. *elongatum*), hairy goldenaster (*Heterotheca sessiliflora* ssp. *fastigiata*), buckwheat (*Eriogonum baileyi*), Mediterranean schismus (*Schismus barbatus*), cryptantha (*Cryptantha micrantha*), slender pectocarya (*Pectocarya linearis* ssp. *ferocula*), lastarriaea (*Lastarriaea coriacea*), California evening primrose (*Oenothera californica* ssp. *californica*), annual bur-sage (*Ambrosia acanthicarpa*), and foxtail chess (*Bromus madritensis* ssp. *rubens*).

Freshwater Marsh. Small patches of wet areas in the main channel of the Santa Clara River and tributary washes in the Newhall Ranch Specific Plan area have freshwater marsh vegetation. This community typically is dominated by emergent perennial monocots, often up to 5 m tall and forming closed canopies. Marshes are found on relatively deep organic soils on sites permanently flooded with fresh water (Holland, 1986). Species found in the wettest parts of the channels are cattails (*Typha angustifolia, T. latifolia*), bulrushes (*Scirpus californicus, S. americanus*), nutsedge (*Cyperus esculentus*), water cress (*Rorippa nasturtium-aquaticum*), water speedwell (*Veronica anagallis-aquatica*), and hoary nettle (*Urtica dioica* ssp. *holosericea*). With respect to sensitivity status, freshwater marsh has been state-ranked as S2.1 (2,000 to 10,000 acres, very threatened) by the CNDDB.

Mule Fat Scrub. Mule fat scrub is found in linear patches along the main channel of the Santa Clara River and some tributary drainages in the Newhall Ranch Specific Plan area. Mule fat scrub typically is a tall, semi-woody and herbaceous riparian scrub, and is relatively species-poor. An early seral community, it often grades to riparian woodlandor forest (Holland, 1986). The dominant species in this community is mule fat (*Baccharis salicifolia*); arrow weed (*Pluchea sericea*), tree tobacco (*Nicotiana glauca*), and tamarisk (*Tamarix* sp.) also are common. The understory is sparse or absent, but sometimes includes species such as Mexican rush (*Juncus mexicanus*) and grasses. With respect to sensitivity status, mule fat scrub has been state-ranked as S4 (apparently secure) by the CNDDB.

Southern Willow Scrub. Several small patches of this community occur along the main channel of the Santa Clara River and in the northern part of Chiquito Canyon. Willow scrub is a broadleaved, winter-deciduous riparian community, typically too dense to allow understory development. It is a relatively early seral community, succeeding to cottonwood-sycamore forests (Holland, 1996). In the Specific Plan area, this community includes willows (*Salix exigua, S. lasiolepis, S. laevigata*), mule fat (*Baccharis salicifolia*), and Mexican elderberry (*Sambucus mexicana*). The understory is sparse, with species such as mugwort (*Artemisia douglasiana*), shrubby phacelia (*Phacelia ramosissima* var. *ramosissima*), and grasses. With respect to sensitivity status, southern willow scrub has been state-ranked as S2.1 (2,000 to 10,000 acres, very threatened) by the CNDDB.

Southern Cottonwood-Willow Riparian Forest. This community occurs on terraces above the main channel of the Santa Clara River. It consists of tall, open, broadleaved, winter-deciduous trees, and is dominated by Fremont cottonwood (*Populus fremontii* ssp. *fremontii*) and willows (*Salix lasiolepis, S. laevigata, S. exigua*). These species require moist, bare mineral soil for germination and establishment, provided after floodwaters recede; this forest type therefore is found mostly along perennially wet streams (Holland, 1996). Scattered coast live oak (*Quercus agrifolia* var. *agrifolia*) trees sometimes occur in this forest type on the upper parts of the river terraces in the Specific Plan area. Understory plants include mule fat (*Baccharis salicifolia*), arrow weed (*Pluchea sericea*), Mexican elderberry (*Sambucus mexicana*), southern California black walnut (*Juglans californica* var. *californica*), mugwort (*Artemisia douglasiana*), hoary nettle (*Urtica dioica* ssp. *holosericea*), ripgut grass (*Bromus diandrus*), and alkali rye (*Leymus triticoides*). With respect to sensitivity status, southern cottonwood-willow riparian forest has been state-ranked as S3.2 (10,000 to 50,000 acres, threatened) by the CNDDB.

3. RARE PLANT SPECIES

The rare plant surveys of River Village, Homestead, and Salt Canyon were carried out in the months of May and June 2001 to accommodate the blooming periods of various species potentially occurring in the region, or previously reported by the CNDDB. In 2002, the surveys of portions of Airport Mesa were conducted in early May due to the very low rainfall year in southern California that resulted in annual plants having a particularly short-lived season. A list of target species potentially occurring at the four sites is presented in Table 1; these species were searched for during the focused rare plant surveys.

TABLE 1: SENSITIVE PLANT SPECIES POTENTIALLY OCCURRING ON THE NEWHALL RANCH SPECIFIC PLAN PROJECT SITES

Scientific Name	Common Name	Family	Status* Federal/State/CNPS
Astragalus brauntonii	Braunton's milk-vetch	Fabaceae	FE/-/1B
Berberis nevinii	Nevin's barberry	Berberidaceae	FE/SE/1B
Calochortus clavatus var. *gracilis*	Slender mariposa lily	Liliaceae	FSC/-/1B
Calochortus plummerae	Plummer's mariposa lily	Liliaceae	FSC/-/1B
Calystegia peirsonii	Peirson's morning-glory	Convolvulaceae	FSC/-/4
Cercocarpus betuloides var. *blancheae*	Island mountain-mahogany	Rosaceae	-/-/4
Chorizanthe parryi var. *Fernandina*	San Fernando Valley spineflower	Polygonaceae	FC/SE/1B
Deinandra minthornii	Santa Susana tarplant	Asteraceae	FSC/SR/1B
Delphinium parryi ssp. *Blochmaniae*	Dune larkspur	Ranunculaceae	FSC/-/1B
Dodecahema leptoceras	Slender-horned spineflower	Polygonaceae	FE/SE/1B
Dudleya blochmaniae ssp. *blochmaniae*	Blochman's dudleya	Crassulaceae	FSC/-/1B
Dudleya multicaulis	Many-stemmed dudleya	Crassulaceae	FSC/-/1B
Harpagonella palmeri var. *palmeri*	Palmer's grappling hook	Boraginaceae	FSC/-/4
Juglans californica var. *californica*	Southern California black walnut	Juglandaceae	-/-/4
Juncus acutus ssp. *Leopoldii*	Southwestern spiny rush	Juncaceae	-/-/4
Opuntia basilaris var. *brachyclada*	Short-joint beavertail	Cactaceae	FSC/-/1B
Perideridia pringlei	Pringle's yampah	Apiaceae	-/-/4
Senecio aphanactis	Rayless ragwort	Asteraceae	-/-/2

* FE = Federal endangered
FC = Federal candidate
FSC = Federal species of concern (unofficial designation)
SE = State/California endangered
SR = State/California rare
1B = CNPS List 1B, rare or endangered in California and elsewhere
2 = CNPS List 2, rare or endangered in California, more common elsewhere
4 = CNPS List 4, plants of limited distribution

A known population (not on Newhall Ranch) of the slender-horned spineflower (*Dodecahema leptoceras*) and a known population (on Newhall Ranch) of San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*) were field-checked as reference populations in 2001 and 2002. Both species were observed flowering in 2001. Despite the low rainfall in 2002, San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*) had germinated and was observed flowering, but no plants of slender-horned spineflower (*Dodecahema leptoceras*) were seen.

At all the project sites, when sensitive plants were observed, their locations were mapped and population sizes were estimated. Single plants of a species or small populations were marked on the map with a point; larger populations were indicated with a polygon representing the spatial extent of the plants. The determination of which individual plants were included in a given polygon was based on their distribution or spatial clustering. Each population composed of more than one plant represents a cluster of plants. Clusters were mapped either separately or combined into larger clusters based on applied field judgment regarding the degree of continuity of species cover as well as the scale of the maps used in the field. For example, at the scale of a USGS 7.5 minute quadrangle, the smallest area that can be mapped with a polygon is about 1 acre; on maps at scales of 1 inch=200 feet, or 1 inch=400 feet, such as those used in the field for the project sites, much smaller areas can be mapped.

The population size, when small, was based on counting individual plants. For larger populations, plants were counted in a small representative area, and then an estimate for the entire population was made based on visual extrapolation over the larger area.

3.1 River Village

Three sensitive species were found in the River Village project site during the 2001 surveys: Peirson's morning-glory (*Calystegia peirsonii*), southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*), and southern California black walnut (*Juglans californica* var. *californica*), all CNPS List 4 species. A summary of the populations of these species located at the site is provided below. These population locations, as numbered below, have been marked on the accompanying maps (See Figures 3, ~~and 4~~, 5 and 6).

Peirson's morning-glory (*Calystegia peirsonii*) populations were found in 10 locations on slopes with different exposures. Elevations ranged from 1000 to 1200 feet, and the soils were variable in texture (see Figures 3, 5, and 6). Most plants were flowering, and were associated with grassland and coastal sage scrub species.

1. ~75 plants, with *Eriogonum fasciculatum*, *Avena fatua*, and *Bromus diandrus*.
2. ~1000 plants, with *Eriogonum fasciculatum* and *Bromus diandrus*.
3. ~30 plants, with *Bromus* spp. and *Lupinus* spp.
4. ~10 plants, with *Eriogonum fasciculatum* and *Bromus* spp.
5. ~25 plants, with *Artemisia californica*, *Bromus diandrus*, and *Bromus madritensis* ssp. *rubens*.
6. ~75 plants, with *Artemisia californica*, *Eriogonum fasciculatum*, and *Melica imperfecta*.
7. ~20 plants, with *Bromus madritensis* ssp. *rubens*.
8. ~10 plants, with *Bromus hordeaceus*, *Centaurea melitensis*, and *Chaenactis glabriuscula*.
9. ~150 plants, with *Eriogonum fasciculatum*, *Lessingia filaginifolia*, and *Bromus madritensis* ssp. *rubens*.
10. ~75 plants, with *Bromus madritensis* ssp. *rubens* and *Centaurea melitensis*.

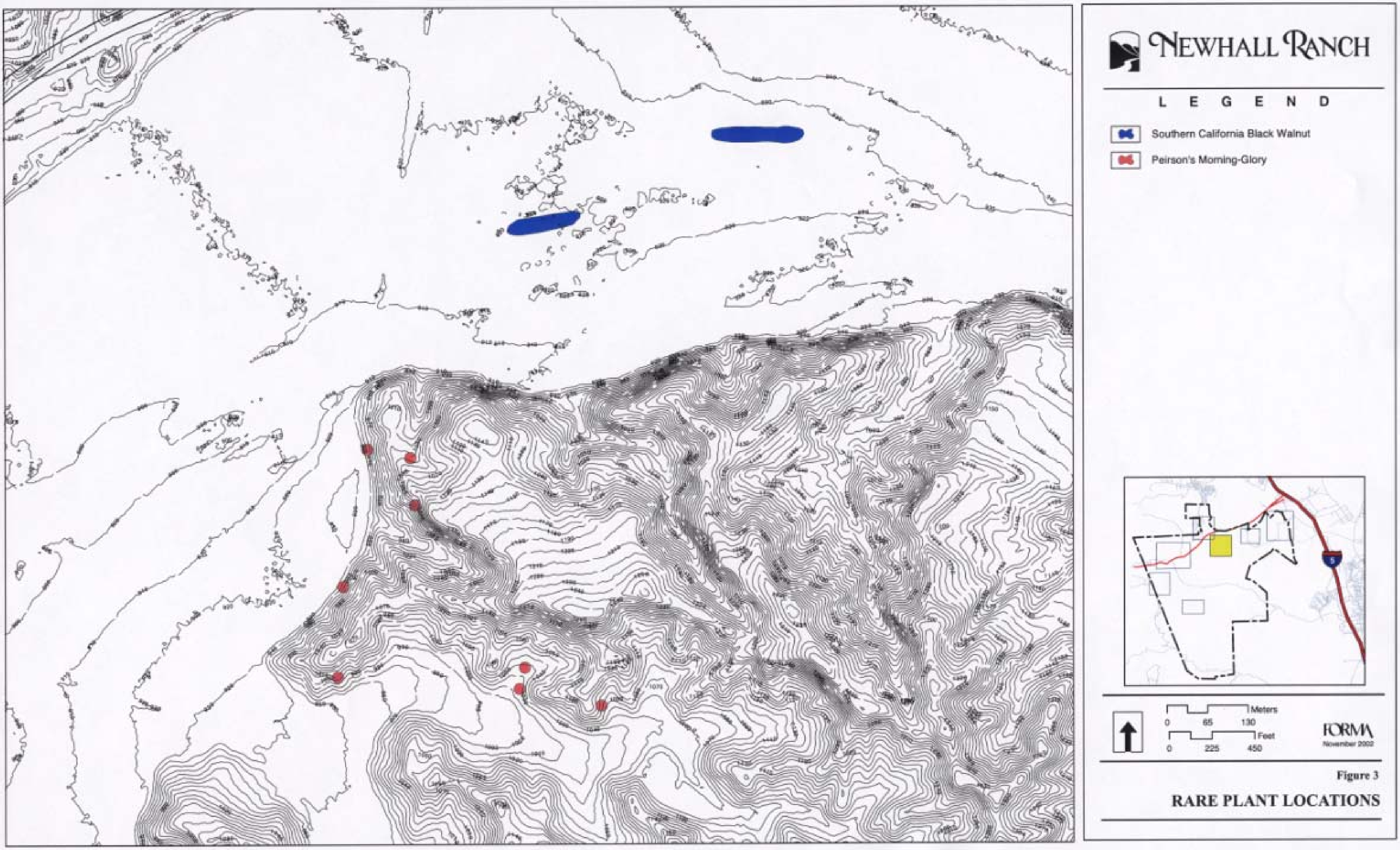
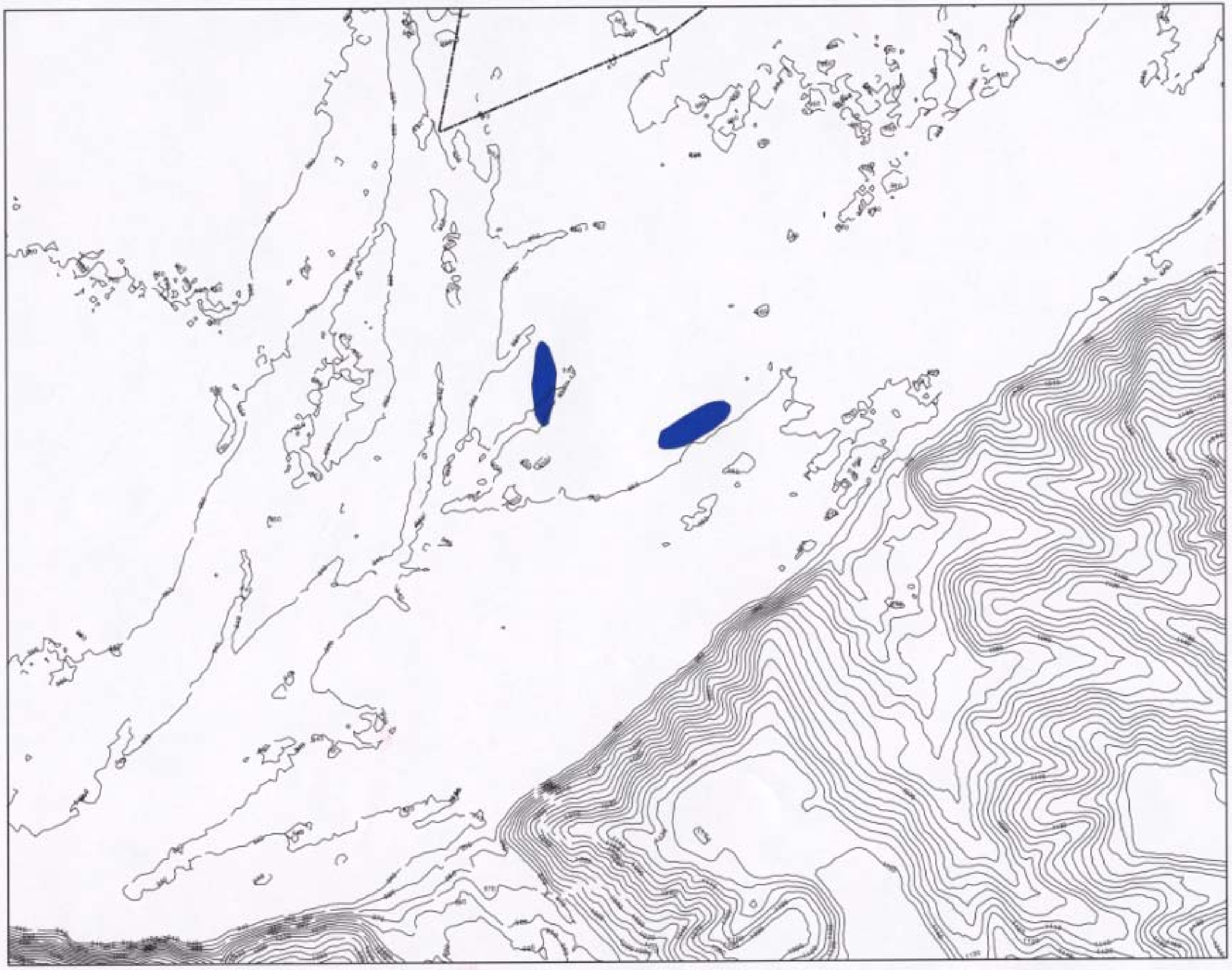


Figure 3

RARE PLANT LOCATIONS



NEWHALL RANCH

L E G E N D

Southern California Black Walnut

Meters 0 50 100

Feet 0 150 300

FORMA
November 2002

Figure 4

RARE PLANT LOCATIONS

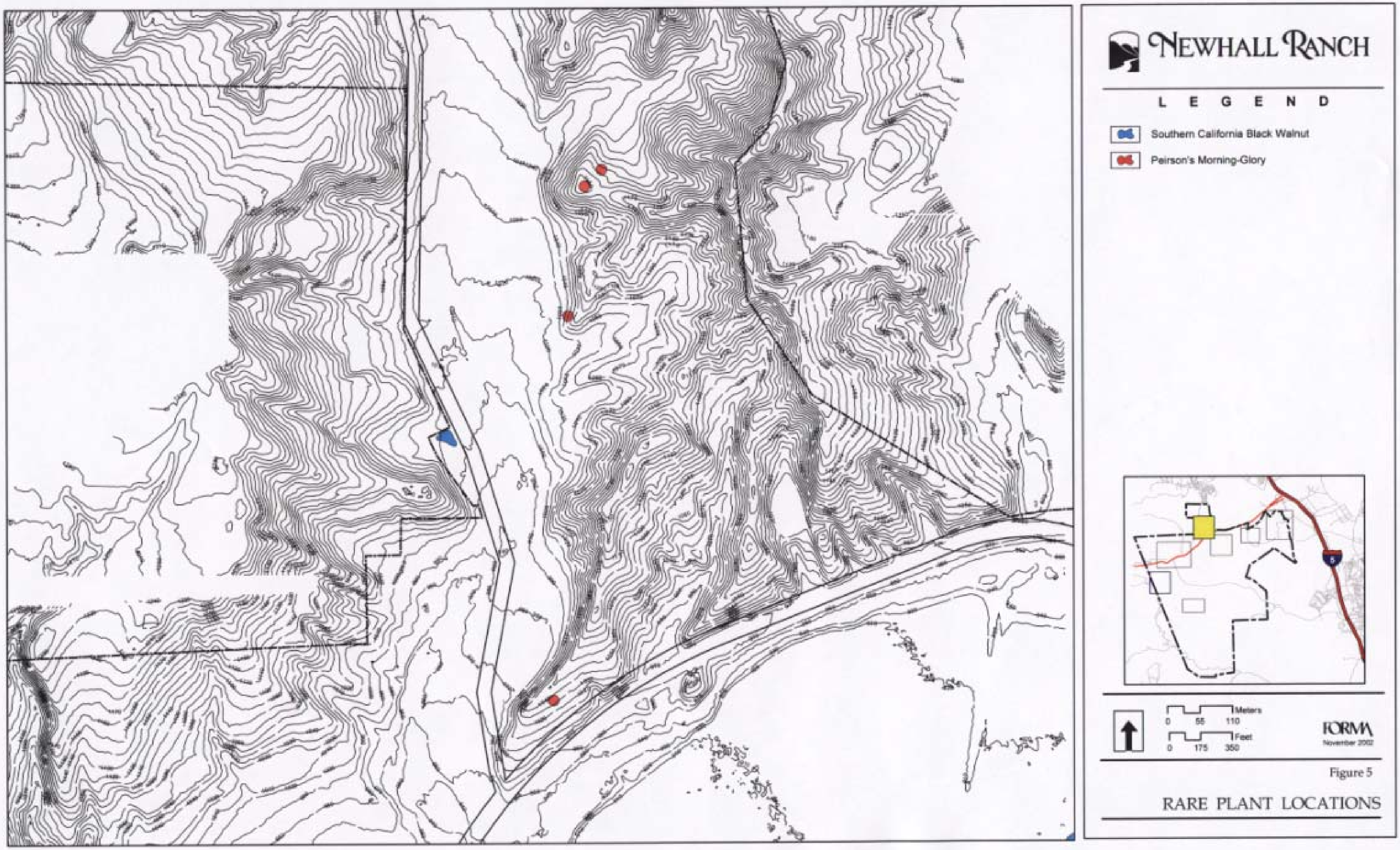
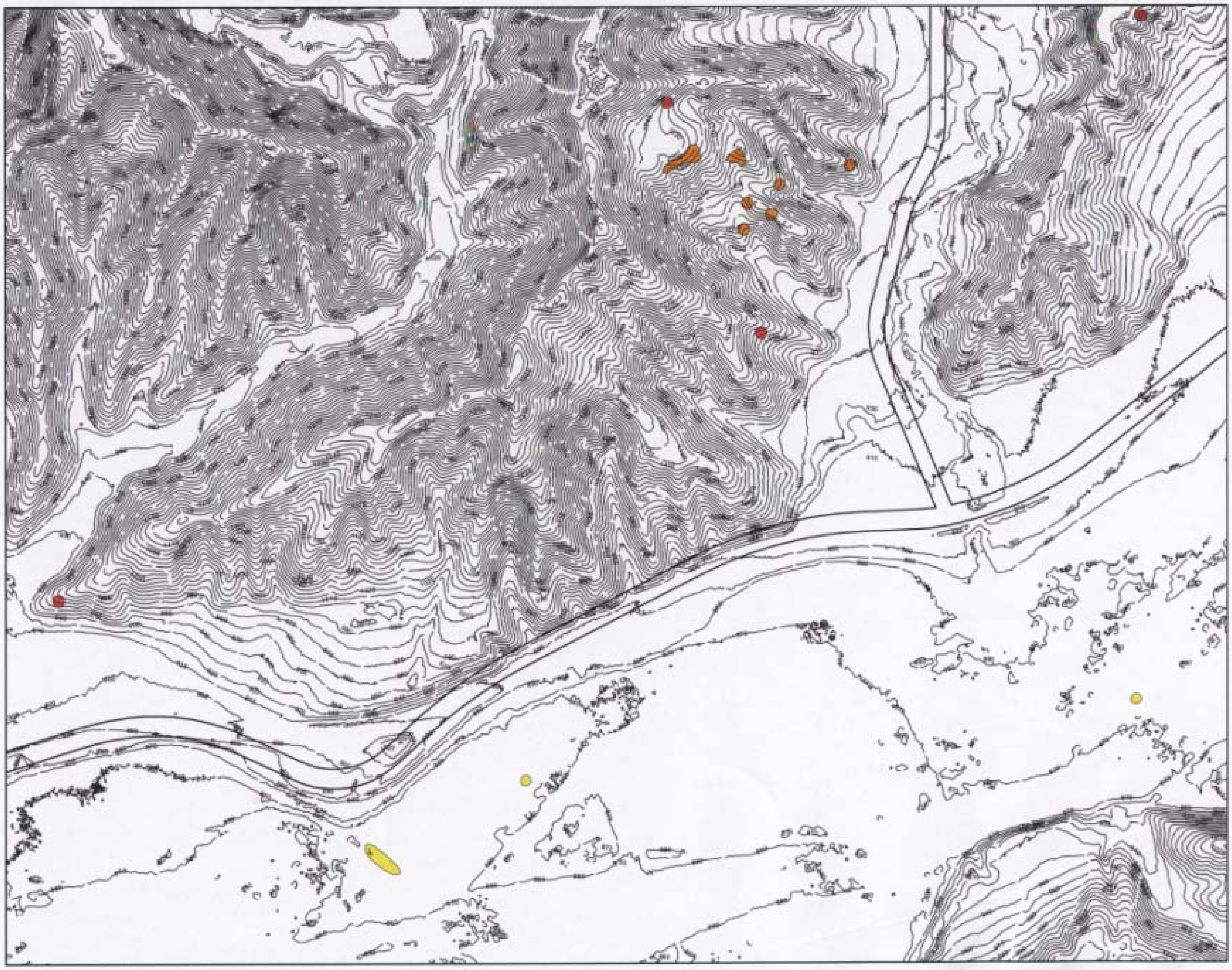


Figure 5

RARE PLANT LOCATIONS



NEWHALL RANCH

LEGEND

Peirson's Morning-Glory

San Fernando Valley Spineflower

Southwestern Spiny Rush

FORMA

November 2002

Figure 6

RARE PLANT LOCATIONS

Southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*) populations were found in three locations in secondary channels of the floodplain of the Santa Clara River, on flat terrain (see Figure 6). Elevations ranged from 800 to 900 feet. The plants occurred on alluvial soils, and were associated mostly with wetland species.

1. One clump, with *Salix exigua*, *Baccharis salicifolia*, and *Ambrosia psilostachya*.
2. ~25 clumps, with *Juncus mexicanus*, *Baccharis salicifolia*, and *Leymus triticoides*.
3. ~15 clumps, with *Baccharis emoryi*, *Leymus triticoides*, *Polypogon monspeliensis*, and *Melica imperfecta*.

Southern California black walnut (*Juglans californica* var. *californica*) trees were scattered in six locations, five in the willow-cottonwood riparian forest of the Santa Clara River, and one along Chiquito Canyon Road (possibly planted) (see Figures 3, 4 and 5). The walnut trees were found on relatively flat terrain at elevations of 800 to 1000 feet. The six populations each have 5 to 10 trees.

3.2 Homestead/Homestead Estates/Chiquito Canyon Residential

Two sensitive species were found in this combined project site during the 2001 surveys. San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*; FC/SE/CNPS List 1B) and Peirson's morning-glory (*Calystegia peirsonii*; CNPS List 4) were located in the Homestead Estates site. Peirson's morning-glory (*Calystegia peirsonii*) also was found in the Homestead site; no rare plants were observed in the Chiquito Canyon Residential project site. A summary of the populations of these species located at the sites is provided below. These population locations, as numbered below, have been marked on the accompanying map (see Figure 6).

San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*) populations were found in seven locations west of San Martinez Grande Canyon Road, on slopes with southern exposures. Elevations ranged from 1000 to 1200 feet, and the soils were sandy loams. Most of the plants were flowering, and were associated with grassland and coastal sage scrub species.

1. ~1000+ plants, with *Eriogonum fasciculatum*, *Artemisia californica*, *Erodium cicutarium*, *Bromus madritensis* ssp. *rubens*, and *Bromus hordeaceus*.
2. ~1000+ plants, with *Eriogonum fasciculatum*, *Artemisia californica*, *Erodium cicutarium*, *Bromus madritensis* ssp. *rubens*, and *Bromus hordeaceus*.
3. ~750 plants, with *Chorizanthe staticoides*, *Eriogonum fasciculatum*, *Artemisia californica*, *Bromus madritensis* ssp. *rubens*, and *Bromus hordeaceus*.
4. ~750 plants, with *Eriogonum fasciculatum*, *Artemisia californica*, *Bromus madritensis* ssp. *rubens*, and *Bromus hordeaceus*.
5. ~750 plants, with *Eriogonum fasciculatum*, *Artemisia californica*, *Erodium cicutarium*, and *Bromus madritensis* ssp. *rubens*.
6. ~10000+ plants, with *Eriogonum fasciculatum*, *Artemisia californica*, *Salvia leucophylla*, *Hirschfeldia incana*, and *Bromus madritensis* ssp. *rubens*.
7. ~500 plants, with *Eriogonum fasciculatum*, *Artemisia californica*, *Bromus madritensis* ssp.

rubens, and *Bromus hordeaceus*.

Peirson's morning-glory (***Calystegia peirsonii***) populations were found in six locations on slopes with different exposures. Elevations ranged from 950 to 1200 feet, and the soils were variable in texture. The first population was found in the Homestead Estates project site, and the other five populations in the Homestead site. Most plants were flowering, and were associated with grassland and coastal sage scrub species.

1. 5 plants, with *Bromus madritensis* ssp. *rubens* and *Bromus diandrus*.
2. 1 plant, with *Erodium cicutarium* and *Bromus* spp.
3. ~35 plants, with *Erodium cicutarium* and *Bromus madritensis* ssp. *rubens*, near *Eriogonum fasciculatum* and *Calystegia macrostegia*.
4. ~500 plants, with *Centaurea melitensis*, *Bromus* spp., and *Hirschfeldia incana*.
5. ~10 plants, with *Centaurea melitensis*, *Bromus* spp., and *Hirschfeldia incana*.
6. ~75 plants, with *Avena barbata*, *Centaurea melitensis*, *Lessingia filaginifolia*, *Eriogonum fasciculatum*, and *Salvia leucophylla*.

3.3 Salt Canyon

Two sensitive species were found in the Salt Canyon project site during the 2001 surveys: Peirson's morning-glory (*Calystegia peirsonii*) and southern California black walnut (*Juglans californica* var. *californica*), both CNPS List 4 species. A summary of the populations of these species located at the site is provided below. These population locations have been marked on the accompanying maps (see Figures 7 and 8).

Peirson's morning-glory (***Calystegia peirsonii***) was found in one location on a gentle east-facing slope, on clayey soil. The elevation was about 1050 feet (see Figure 7). The plants were flowering, and were associated with *Bromus madritensis* ssp. *rubens*, *Bromus hordeaceus*, *Salvia leucophylla*, and *Artemisia californica*; *Calystegia macrostegia* was found in the vicinity.

Southern California black walnut (***Juglans californica* var. *californica***) trees were scattered in two locations along the watercourse in Salt Canyon (see Figures 7 and 8). The first population had three trees, and was found at an elevation of about 950 feet, with *Artemisia californica*, *Salvia mellifera*, and *Salix lasiolepis*. The second population, found at about 1150 feet, had eight trees, and species associates were *Artemisia californica*, *Salvia leucophylla*, *Leymus condensatus*, and *Sambucus mexicana*.

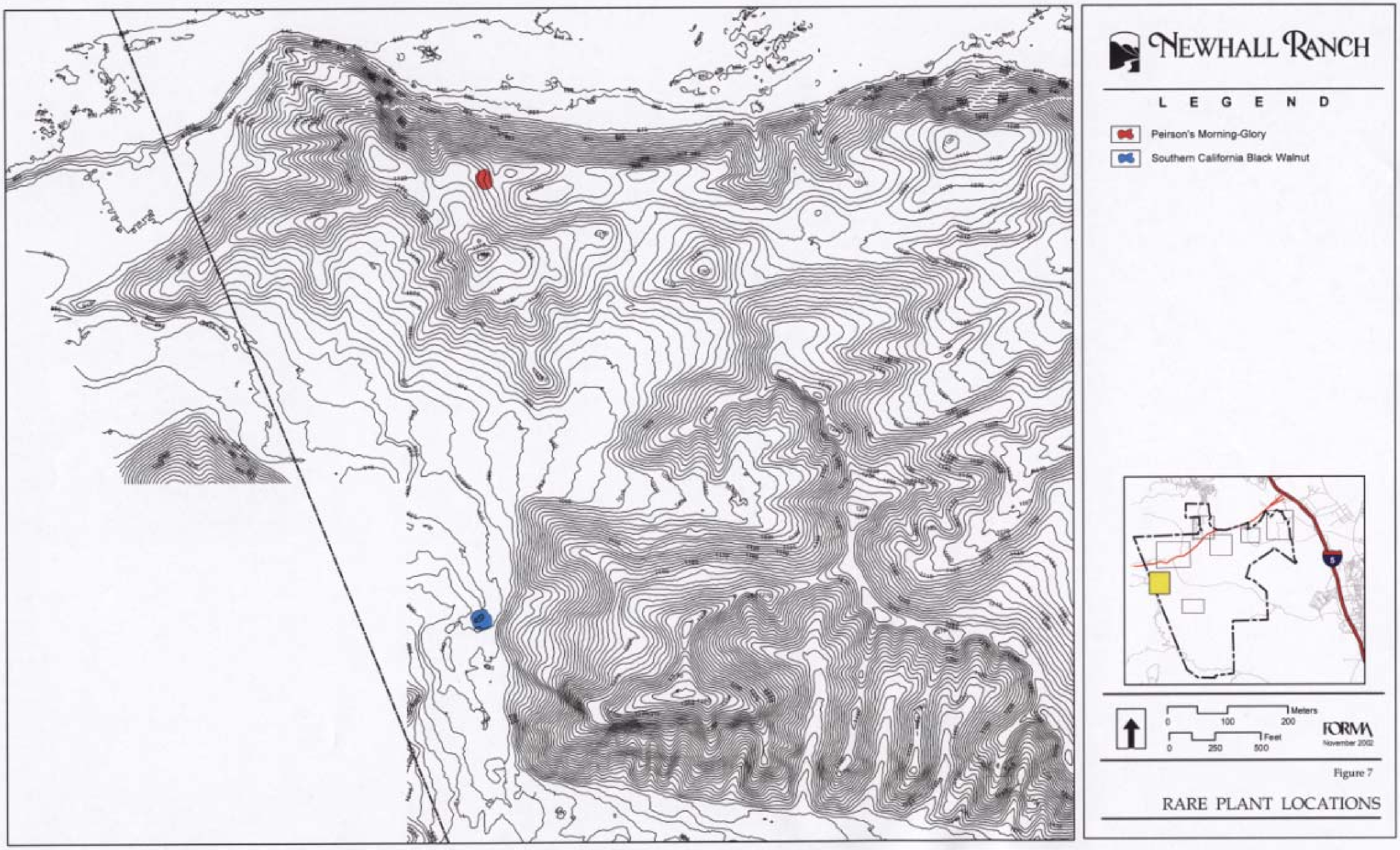


Figure 7

RARE PLANT LOCATIONS

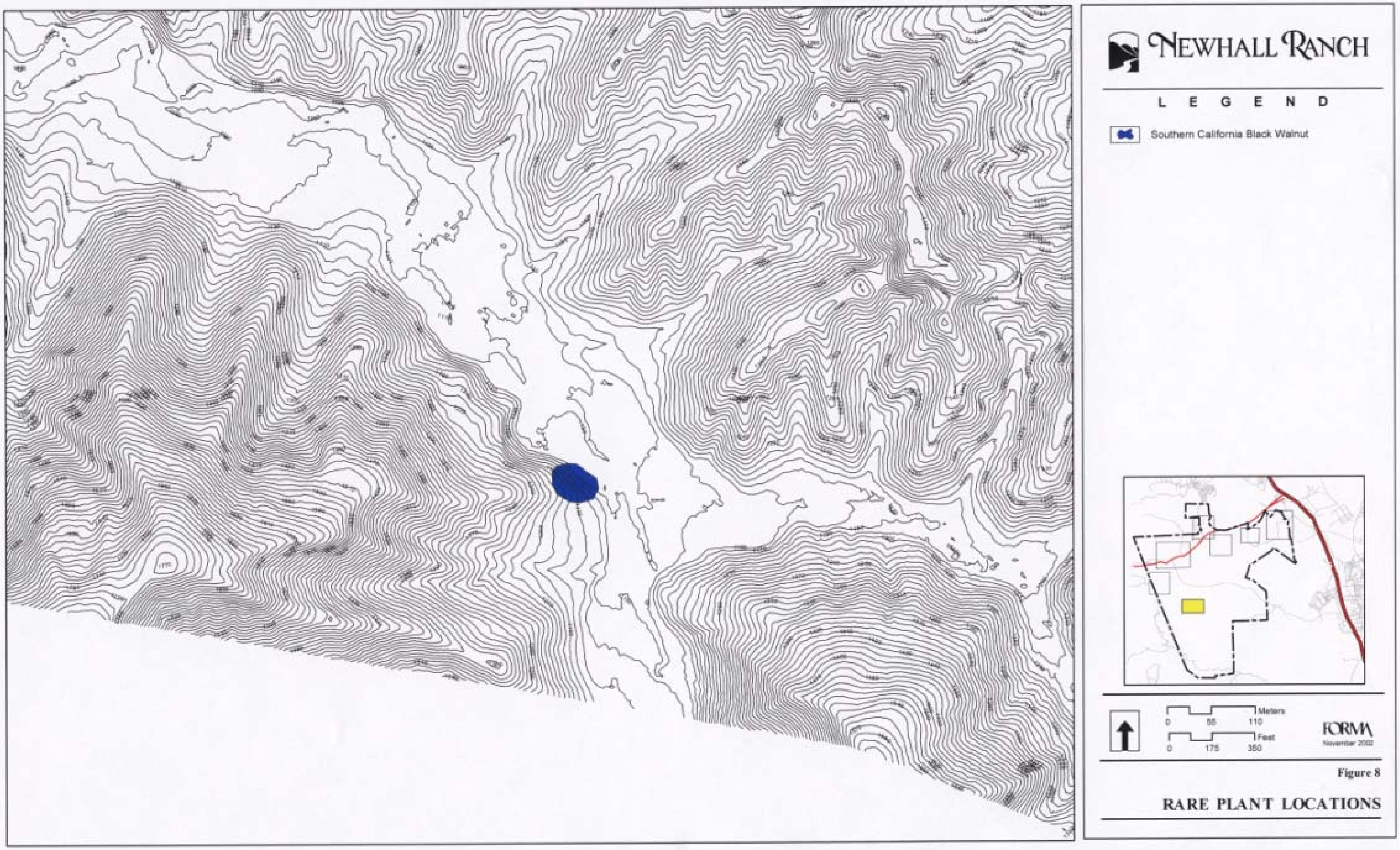


Figure 8

RARE PLANT LOCATIONS

3.4 Portions of Airport Mesa

Two sensitive species were found in the Airport Mesa site during the 2002 surveys: San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*; FC/SE/CNPS List 1B) and Peirson's morning-glory (*Calystegia peirsonii*; CNPS List 4). A summary of the populations of these species located at the site is provided below. These population locations, as numbered below, have been marked on the accompanying map (see Figure 9).

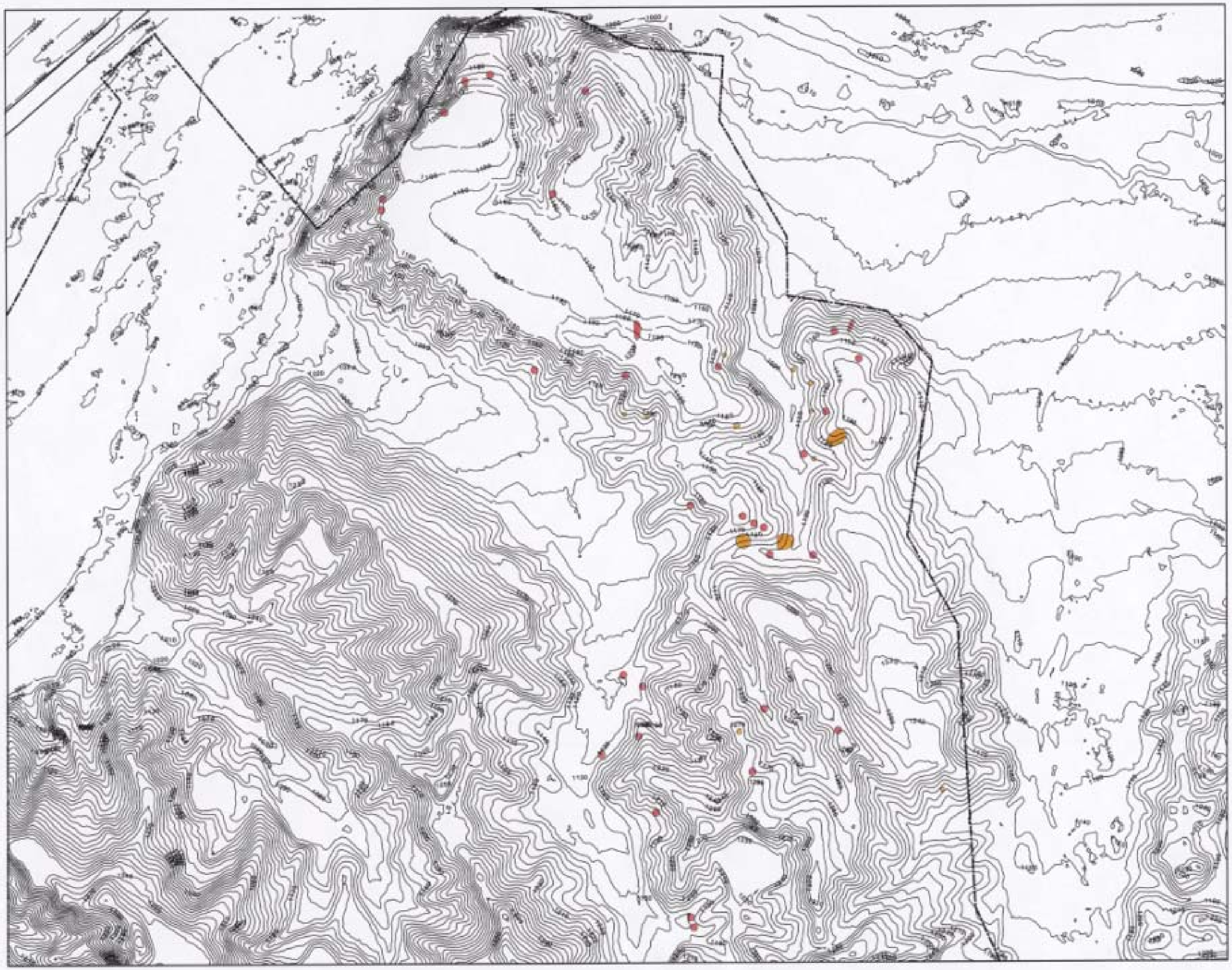
San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*) populations were found in 14 locations in the central, eastern, and southern parts of the site, mostly on slopes with southern exposures. Elevations ranged from 1100 to 1275 feet, and the soils were sandy loams. The plants were either in late flower, or had not flowered and were desiccated due to the lack of normal amounts of rainfall in 2002. They were associated with grassland and coastal sage scrub species.

1. ~50 plants, with *Eriogonum fasciculatum*, *Bromus madritensis* ssp. *rubens*, and *Erodium cicutarium*.
2. ~75 plants, with *Bromus madritensis* ssp. *rubens*, *Avena barbata*, near *Eriogonum fasciculatum*, *Artemisia californica*, and *Lessingia filaginifolia*.
3. 5 plants, with *Eriogonum fasciculatum*, *Bromus madritensis* ssp. *rubens*, near *Yucca whipplei*.
4. 11 plants, with *Opuntia littoralis*, *Bromus madritensis* ssp. *rubens*, *Erodium cicutarium*, and *Chamaesyce polycarpa*.
5. ~25 plants, with *Bromus madritensis* ssp. *rubens*, *Avena barbata*, and *Lastarriaea coriacea*, near *Artemisia californica* and *Eriogonum fasciculatum*.
6. ~100 plants, with *Bromus madritensis* ssp. *rubens* and *Eriogonum elongatum*.
7. ~75 plants, with *Bromus madritensis* ssp. *rubens*, *Artemisia californica*, near *Eriogonum fasciculatum* and *Prunus ilicifolia*.
8. 2 plants, at the base of a graded slope, with *Bromus madritensis* ssp. *rubens*, *Vulpia myuros*, and *Erodium cicutarium*.
9. 1 plant, at the base of a graded slope, with *Bromus diandrus*, *Bromus madritensis* ssp. *rubens*, and *Hirschfeldia incana*.
10. ~150 plants, on a graded slope/knoll, with *Bromus madritensis* ssp. *rubens* and *Avena barbata*.
11. 1 plant, at the base of a graded slope, with *Bromus madritensis* ssp. *rubens*, *Vulpia myuros*, and *Hirschfeldia incana*.
12. ~250 plants, on the lower parts of a graded slope, with *Bromus madritensis* ssp. *rubens*, *Deinandra fasciculata*, and *Ericameria palmeri* var. *pachylepis*.
13. ~20 plants, on the lower parts of a graded slope, with *Bromus madritensis* ssp. *rubens* and *Vulpia myuros*.
14. 4 plants, along a road below a graded slope, with *Ericameria palmeri* var. *pachylepis* and *Bromus madritensis* ssp. *rubens*.

Peirson's morning-glory (*Calystegia peirsonii*) populations were found in 32 locations on slopes with different exposures. Elevations ranged from 1100 to 1300 feet, and the soils were variable in texture. Most plants were flowering, and were associated with grassland and coastal sage scrub species.

1. ~50 plants, with *Salvia leucophylla* and *Bromus diandrus*, near *Eriogonum fasciculatum*.
2. ~120 plants, with *Eriogonum fasciculatum*, *Avena fatua*, and *Bromus madritensis* ssp. *rubens*.

NEWHALL RANCH



L E G E N D

Peirson's Morning-Glory

San Fernando Valley Spineflower

Meters
0 85 170

Feet
0 275 550

FORMA
November 2002

Figure 9

RARE PLANT LOCATIONS

3. 5 plants, with *Artemisia californica* and *Bromus diandrus*.
4. ~20 plants, with *Salvia leucophylla*, *Artemisia californica*, *Eriogonum fasciculatum*, *Bromus madritensis* ssp. *rubens*, and *Nassella lepida*.
5. ~20 plants, with *Artemisia californica*, *Eriogonum fasciculatum*, *Nassella lepida*, and *Salvia leucophylla*.
6. ~20 plants, with *Artemisia californica*, *Eriogonum fasciculatum*, and *Bromus madritensis* ssp. *rubens*.
7. ~25 plants, with *Bromus hordeaceus*, *Bromus madritensis* ssp. *rubens*, and *Lotus scoparius*.
8. ~2500+ plants, with *Bromus madritensis* ssp. *rubens*, *Eriogonum elongatum*, *Ericameria palmeri* var. *pachylepis*, *Artemisia californica*, and *Artemisia tridentata*.
9. ~40 plants, with *Eriogonum fasciculatum*, *Artemisia californica*, and *Bromus diandrus*.
10. ~2500+ plants, with *Lessingia filaginifolia*, *Bromus madritensis* ssp. *rubens*, *Ericameria palmeri* var. *pachylepis*, and *Bromus diandrus*.
11. ~300 plants, under *Quercus lobata*, with *Artemisia californica*, *Ericameria palmeri* var. *pachylepis*, *Lessingia filaginifolia*, and *Bromus madritensis* ssp. *rubens*.
12. ~200 plants, with *Eriogonum fasciculatum*, *Ericameria palmeri* var. *pachylepis*, and *Bromus madritensis* ssp. *rubens*.
13. 5 plants, with *Eriogonum fasciculatum* and *Bromus madritensis* ssp. *rubens*, near *Artemisia californica*.
14. 5 plants, with *Bromus madritensis* ssp. *rubens*.
15. ~350 plants, with *Artemisia tridentata*, *Ericameria palmeri* var. *pachylepis*, and *Bromus madritensis* ssp. *rubens*.
16. ~250 plants, with *Bromus madritensis* ssp. *rubens*, *Ericameria palmeri* var. *pachylepis*, and *Salvia apiana*.
17. ~250 plants, with *Mirabilis californica*, *Artemisia californica*, and *Bromus madritensis* ssp. *rubens*.
18. ~400 plants, with *Ericameria palmeri* var. *pachylepis*, *Salvia leucophylla*, *Eriogonum fasciculatum*, and *Bromus madritensis* ssp. *rubens*.
19. ~400 plants, with *Salvia leucophylla*, *Artemisia californica*, *Eriogonum fasciculatum*, and *Bromus madritensis* ssp. *rubens*.
20. ~25 plants, with *Eriogonum fasciculatum* and *Bromus madritensis* ssp. *rubens*.
21. ~300 plants, with *Artemisia dracunculus*, *Ericameria palmeri* var. *pachylepis*, *Salvia leucophylla*, *Eriogonum fasciculatum* and *Bromus madritensis* ssp. *rubens*.
22. ~350 plants, with *Eriogonum fasciculatum*, *Artemisia californica*, and *Bromus madritensis* ssp. *rubens*.
23. ~100 plants, with *Bromus madritensis* ssp. *rubens* and *Avena barbata*, near *Ericameria palmeri* var. *pachylepis* and *Eriogonum fasciculatum*.
24. ~50 plants, with *Avena barbata*, *Bromus madritensis* ssp. *rubens*, and *Erodium cicutarium*, near *Yucca whipplei* and *Artemisia californica*.
25. ~10 plants, at the base of a graded slope, with *Bromus madritensis* ssp. *rubens*.
26. 5 plants, at the base of a graded slope, with *Bromus madritensis* ssp. *rubens*.
27. ~10 plants, at the base of a graded slope, with *Avena barbata*, *Erodium cicutarium*, and *Bromus madritensis* ssp. *rubens*.
28. ~25 plants, on a graded slope, with *Avena barbata*, *Erodium cicutarium*, and *Vulpia myuros*.

29. ~20 plants, on a graded slope, with *Avena barbata*, *Bromus madritensis* ssp. *rubens*, and *Vulpia myuros*.
30. ~50 plants, on a graded slope, with *Bromus madritensis* ssp. *rubens*, near *Ericameria palmeri* var. *pachylepis*.
31. ~15 plants, at the base of a graded slope, with *Ericameria palmeri* var. *pachylepis* and *Bromus madritensis* ssp. *rubens*.
32. ~50 plants, on a graded slope, with *Bromus madritensis* ssp. *rubens* and *Vulpia myuros*.

4. PLANT SPECIES LIST

Plant species observed in the Newhall Ranch Specific Plan project sites are listed below.

FERNS AND FERN-ALLIES
Equisetaceae
Equisetum laevigatum
Pteridaceae
Pentagramma triangularis ssp. *triangularis*

Selaginellaceae
Selaginella bigelovii
ANGIOSPERMS
DICOTYLEDONS
Anacardiaceae
Rhus trilobata
*Schinus molle**
Toxicodendron diversilobum
Apiaceae
Apiastrum angustifolium
Bowlesia incana
Yabea microcarpa
Asclepiadaceae
Asclepias fascicularis
Asteraceae
Acourtia microcephala
Ambrosia acanthicarpa
Ambrosia psilostachya
Artemisia californica
Artemisia douglasiana
Artemisia dracunculus
Artemisia tridentata
Baccharis emoryi
Baccharis pilularis
Baccharis salicifolia
Brickellia californica
Brickellia nevinii

*Carduus pycnocephalus**
*Centaurea melitensis**
*Centaurea solstitialis**
Chaenactis glabriuscula var. *glabriuscula*
Deinandra fasciculata
Encelia californica
Encelia farinosa
Ericameria palmeri var. *pachylepis*
Eriophyllum confertiflorum
Filago californica
*Filago gallica**
Gnaphalium californicum
Hazardia squarrosa
Heterotheca grandiflora
Heterotheca sessiliflora ssp. *echioides*
Heterotheca sessiliflora ssp. *fastigiata*
Isocoma menziesii var. *menziesii*
Iva axillaris ssp. *robustior*
Lepidospartum squamatum
Lessingia filaginifolia
Lessingia glandulifera var. *glandulifera*
Malacothrix saxatilis var. *commutata*
Pluchea sericea
Psilocarphus tenellus
*Silybum marianum**
Stylocline gnaphaloides
Boraginaceae
Amsinckia menziesii var. *intermedia*
Cryptantha micrantha
Heliotropium curassavicum
Pectocarya linearis ssp. *ferocula*
Plagiobothrys nothofulvus
Brassicaceae
*Brassica nigra**
*Hirschfeldia incana**
Rorippa nasturtium-aquaticum
*Sisymbrium irio**
Cactaceae
Opuntia basilaris var. *basilaris*
Opuntia littoralis
Capparaceae
Isomeris arborea
Caprifoliaceae
Sambucus mexicana
Chenopodiaceae

Atriplex canescens ssp. *linearis*
Atriplex lentiformis
*Atriplex semibaccata**
*Chenopodium album**
*Salsola tragus**
Convolvulaceae
Calystegia macrostegia ssp. *cyclostegia*
Calystegia peirsonii[†]
Crassulaceae
Crassula connata
Dudleya lanceolata

Cucurbitaceae
Cucurbita foetidissima
Marah macrocarpus var. *macrocarpus*
Euphorbiaceae
Chamaesyce polycarpa
Croton californicus
Eremocarpus setigerus
*Ricinus communis**
Fabaceae
Astragalus trichopodus var. *phoxus*
Lotus salsuginosus var. *salsuginosus*
Lotus scoparius
Lupinus bicolor
Lupinus latifolius
Lupinus succulentus
*Melilotus indicus**
Fagaceae
Quercus agrifolia var. *agrifolia*
Quercus berberidifolia
Quercus lobata
Geraniaceae
*Erodium cicutarium**
Grossulariaceae
Ribes aureum
Hydrophyllaceae
Eriodictyon crassifolium var. *nigrescens*
Eucrypta chrysanthemifolia
Phacelia ramosissima var. *ramosissima*
Juglandaceae
Juglans californica var. *californica*[†]
Lamiaceae
*Marrubium vulgare**
Salvia apiana

Salvia leucophylla
Salvia mellifera
Trichostema lanceolatum
Malvaceae
Malacothamnus fasciculatus
Myrtaceae
*Eucalyptus globulus**
Nyctaginaceae
Mirabilis californica
Onagraceae
Camissonia bistorta
Camissonia boothii ssp. *decorticans*
Camissonia campestris ssp. *campestris*
Camissonia californica
Camissonia hirtella
Camissonia micrantha
Clarkia cylindrica ssp. *cylindrica*
Clarkia epilobioides
Clarkia purpurea ssp. *quadrivulnera*
Clarkia unguiculata
Epilobium canum
Oenothera californica ssp. *californica*
Paeoniaceae
Paeonia californica
Papaveraceae
Eschscholzia californica
Polemoniaceae
Eriastrum densifolium ssp. *elongatum*
Eriastrum sapphirinum
Gilia angelensis
Leptodactylon californicum
Navarretia atractyloides
Polygonaceae
Chorizanthe parryi var. *fernandina*†
Chorizanthe staticoides
Eriogonum baileyi
Eriogonum elongatum var. *elongatum*
Eriogonum fasciculatum var. *foliolosum*
Eriogonum gracile
Eriogonum gracillimum
Lastarriaea coriacea
Portulacaceae
Calyptridium monandrum
Claytonia perfoliata
Ranunculaceae

Delphinium parryi ssp. *parryi*
Rhamnaceae
Ceanothus crassifolius
Rhamnus crocea
Rhamnus ilicifolia

Rosaceae
Adenostoma fasciculatum
Cercocarpus betuloides var. *betuloides*
Heteromeles arbutifolia
Prunus ilicifolia ssp. *ilicifolia*
Rosa californica
Rubus ursinus
Rubiaceae
Galium angustifolium ssp. *angustifolium*
*Galium aparine**?
Galium californicum ssp. *flaccidum*
Galium nuttallii ssp. *nuttallii*
Salicaceae
Populus fremontii ssp. *fremontii*
Salix exigua
Salix laevigata
Salix lasiolepis
Saururaceae
Anemopsis californica
Scrophulariaceae
Antirrhinum coulterianum
Castilleja affinis ssp. *affinis*
Castilleja exserta
Castilleja foliolosa
Collinsia parryi
Keckiella cordifolia
Mimulus aurantiacus
Penstemon centranthifolius
*Veronica anagallis-aquatica**
Solanaceae
Datura wrightii
*Nicotiana glauca**
Solanum xanti
Tamaricaceae
Tamarix sp.*
Urticaceae
Urtica dioica ssp. *holosericea*
Violaceae
Viola pedunculata

ANGIOSPERMS
MONOCOTYLEDONS
Cyperaceae
Cyperus esculentus
Scirpus acutus var. *occidentalis*
Scirpus americanus
Scirpus californicus
Scirpus maritimus
Juncaceae
Juncus acutus ssp. *leopoldii*†
Juncus effusus
Juncus mexicanus
Liliaceae
Calochortus clavatus ssp. *pallidus*
Dichelostemma capitatum
Yucca whipplei
Poaceae
*Arundo donax**
*Avena barbata**
*Avena fatua**
*Bromus diandrus**
*Bromus hordeaceus**
Bromus madritensis ssp. *rubens**
*Bromus tectorum**
*Cynodon dactylon**
Distichlis spicata
*Hordeum murinum**
Koeleria macrantha
Leymus condensatus
Leymus triticoides
Melica imperfecta
Nassella lepida
Nassella pulchra
Poa secunda ssp. *secunda*
*Polypogon monspeliensis**
*Schismus barbatus**
*Vulpia myuros**
Typhaceae
Typha angustifolia
Typha latifolia

* Non-native plant species
*? Possible non-native plant species
† Sensitive plant species

5. REFERENCES

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Holland, R.F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. Unpublished Report. State of California, The Resources Agency, Department of Fish and Game, Natural Heritage Division, Sacramento, California.

SENSITIVE PLANT SPECIES SURVEYS

SANTA CLARA RIVER
NEWHALL RANCH/VALENCIA COMPANY PROJECT SITES
LOS ANGELES COUNTY, CALIFORNIA

Submitted to:

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October 2004

1. INTRODUCTION

The Santa Clara River in the Newhall Ranch/Valencia Company project area, Los Angeles County, California, was surveyed for sensitive plant species and vegetation types in 2004. The area surveyed in the main channel of the river extended from the Water Reclamation Plant, located at Rye Canyon Road south of the junction of Interstate 5 and State Highway 126, westwards to the Los Angeles/Ventura County line. In addition, the tributary Castaic Creek was surveyed from Interstate 5 southwest to its confluence with the main river channel (Figure 1). The length of the Santa Clara River surveyed was approximately 6.8 miles, and that of Castaic Creek was about 2.6 miles. In both these riparian corridors, the extent of surveys included the scoured channel bottom, sandbars and islands in the channel, and low terraces at the immediate edge of the channels. Agricultural activities currently constitute the primary land use in most of the surrounding area.

A team of two consultants from FL*x* (Dr. Anuja Parikh and Dr. Nathan Gale) conducted the vegetation and sensitive plant species surveys in two phases. The first survey was carried out from May 31 through June 3, and from June 15 through June 17, 2004. The second survey was conducted from September 8 through September 10, and from September 13 through September 16. The focus of the first survey phase was for spring-flowering plants, in particular for spineflowers, including the slender-horned spineflower (*Dodecahema leptoceras*) and San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*). The focus of the second survey phase was primarily for the late-flowering Los Angeles sunflower (*Helianthus nuttallii* ssp. *parishii*). A list of plant species observed in both drainages, including sensitive and commonly occurring plants, was compiled (see Appendix). Plant community descriptions in this report follow Holland (1986) where applicable; species nomenclature follows Hickman (1993).

2. VEGETATION TYPES AND PLANT SPECIES ASSOCIATIONS

The main channel of the Santa Clara River had flowing water throughout its length during both survey periods. Numerous braided secondary channels also were present; some of these had flowing water, some had ponded water, and some had saturated soils. Castaic Creek had very little flowing water during the survey periods, and had a few areas with ponded water or saturated soils. These wetter areas occurred primarily just upstream of the confluence of Castaic Creek and the river. Similar vegetation types exist in both survey corridors, but corresponding with hydrology, the main river channel had more and larger areas with marsh vegetation. Plant communities common to the two survey corridors include riverwash, freshwater marsh, mule fat scrub, and southern cottonwood-willow riparian forest. In addition, two other scrub communities, southern willow scrub and southern riparian scrub, were observed in the Santa Clara River.

Riverwash. In areas where scouring has occurred, the main channel of the Santa Clara River is relatively sparsely vegetated. Similarly, the northern part of Castaic Creek lacks continuous vegetation cover. The soils in these scoured areas are sandy riverwash and gravel, and in places form sand bars and low terraces within the channels. No well-defined plant community is found here, although scattered elements of riparian scrub were observed. Shrub species found in and adjacent to the channel include mule fat (*Baccharis salicifolia*), narrow-leaved willow (*Salix exigua*), Mediterranean tamarisk (*Tamarix ramosissima*), scale-broom (*Lepidospartum squamatum*), sandwash groundsel (*Senecio flaccidus* var. *douglasii*), tree tobacco (*Nicotiana glauca*), giant reed (*Arundo donax*), big saltbush (*Atriplex lentiformis* ssp. *lentiformis*), and Great Basin sagebrush (*Artemisia tridentata* ssp. *parishii*). Other plants growing in these areas include white sweetclover (*Melilotus alba*), annual bur-sage (*Ambrosia acanthicarpa*), cocklebur (*Xanthium strumarium*), hairy goldenaster (*Heterotheca sessiliflora* ssp. *fastigiata*), California croton (*Croton californicus*), buckwheat (*Eriogonum baileyi* var. *baileyi*), California evening primrose (*Oenothera californica* ssp. *californica*), Mediterranean schismus (*Schismus barbatus*), and foxtail chess (*Bromus madritensis* ssp. *rubens*).

Freshwater Marsh. Relatively extensive wet areas of the main and secondary channels of the Santa Clara River, and the southernmost part of Castaic Creek have freshwater marsh vegetation. This community typically is dominated by emergent perennial monocots, often up to 5 meters tall and forming closed canopies. Marshes are found on relatively deep organic soils on sites permanently flooded with fresh water (Holland, 1986). Species found in the wettest parts of the survey area are cattails (*Typha latifolia*, *T. domingensis*), bulrushes (*Scirpus americanus*, *S. acutus* var. *occidentalis*, *S. maritimus*), smartweeds (*Polygonum lapathifolium*, *P. punctatum*, *P. persicaria*), nutsedges (*Cyperus odoratus*, *C. eragrostis*, *C. involucratus*), water speedwell (*Veronica anagallis-aquatica*), water cress (*Rorippa nasturtium-aquaticum*), yellow waterweed (*Ludwigia peploides* ssp. *peploides*), Mexican sprangletop (*Leptochloa uninervia*), cocklebur (*Xanthium strumarium*), and barnyard grass (*Echinochloa crus-galli*).

Mule Fat Scrub. This community mostly is found in linear patches along the main and secondary channels of the Santa Clara River and in the northern part of Castaic Creek. Mule fat scrub typically is a tall, semi-woody and herbaceous riparian scrub, and is relatively species-poor. An early seral community, it often grades to riparian woodland or forest (Holland, 1986). The dominant species in this community is mule fat (*Baccharis salicifolia*); narrow-leaved willow (*Salix exigua*), Mediterranean tamarisk (*Tamarix ramosissima*), giant reed (*Arundo donax*), tree tobacco (*Nicotiana glauca*), and arrow weed (*Pluchea sericea*) also are common. In this community, the understory generally is sparse or absent, and includes species such as western ragweed (*Ambrosia psilostachya*), salt heliotrope (*Heliotropium curassavicum*), and annual grasses.

Southern Willow Scrub. This community occurs in a limited zone of the Santa Clara River survey area, mostly in the eastern part near Castaic Junction, where the river turns from a northeasterly to a southwesterly direction. The floodplain here is dominated by relatively dense, even-aged stands of southern willow scrub. Willow scrub is a broadleaved, winter-deciduous riparian community, typically too dense to allow understory development. It is a relatively early seral community, succeeding to cottonwood-sycamore forests (Holland, 1996). In this portion of the survey area, saplings and small trees of arroyo willow (*Salix lasiolepis*), red willow (*Salix laevigata*), and shining willow (*Salix lucida* ssp. *lasiandra*) are found, with some tree tobacco (*Nicotiana glauca*) at the edges. The understory generally is sparse or absent.

Southern Riparian Scrub. This community is found on low, flat terraces of the Santa Clara River, adjacent to the channel. A combination of mule fat scrub and southern willow scrub species is found on the terraces, including mule fat (*Baccharis salicifolia*), willows (*Salix exigua*, *S. laevigata*), scale-broom (*Lepidospartum squamatum*), tree tobacco (*Nicotiana glauca*), and giant reed (*Arundo donax*). In addition, other native species include California-aster (*Lessingia filaginifolia* var. *filaginifolia*), California broom (*Lotus scoparius* var. *scoparius*), telegraph weed (*Heterotheca grandiflora*), Great Basin sagebrush (*Artemisia tridentata* ssp. *parishii*), sandwash groundsel (*Senecio flaccidus* var. *douglasii*), thickleaf yerba santa (*Eriodictyon crassifolium* var. *nigrescens*), California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*), and chollas (*Opuntia littoralis*, *O. parryi*). Introduced annual grasses also are present in the understory of southern riparian scrub.

Southern Cottonwood-Willow Riparian Forest. This community occurs on terraces above the main channel of the Santa Clara River, and dominates the Castaic Creek channel and terraces. It consists of tall, open, broadleaved, winter-deciduous trees, and is dominated by Fremont cottonwood (*Populus fremontii* ssp. *fremontii*) and willows (*Salix lasiolepis*, *S. laevigata*, *S. exigua*). These species require moist, bare mineral soil for germination and establishment, provided after floodwaters recede; this forest type therefore is found mostly along perennially wet streams (Holland, 1996). Understory plants in this community in the survey area include mule fat (*Baccharis salicifolia*), Mexican elderberry (*Sambucus mexicana*), mugwort (*Artemisia douglasiana*), salt heliotrope (*Heliotropium curassavicum*), western ragweed (*Ambrosia psilostachya*), cocklebur (*Xanthium strumarium*), and annual grasses. In many portions of the survey corridors, the cottonwood-willow forest is degraded by the invasion of non-native plants such as giant reed (*Arundo donax*), Mediterranean tamarisk (*Tamarix ramosissima*), and tree tobacco (*Nicotiana glauca*).

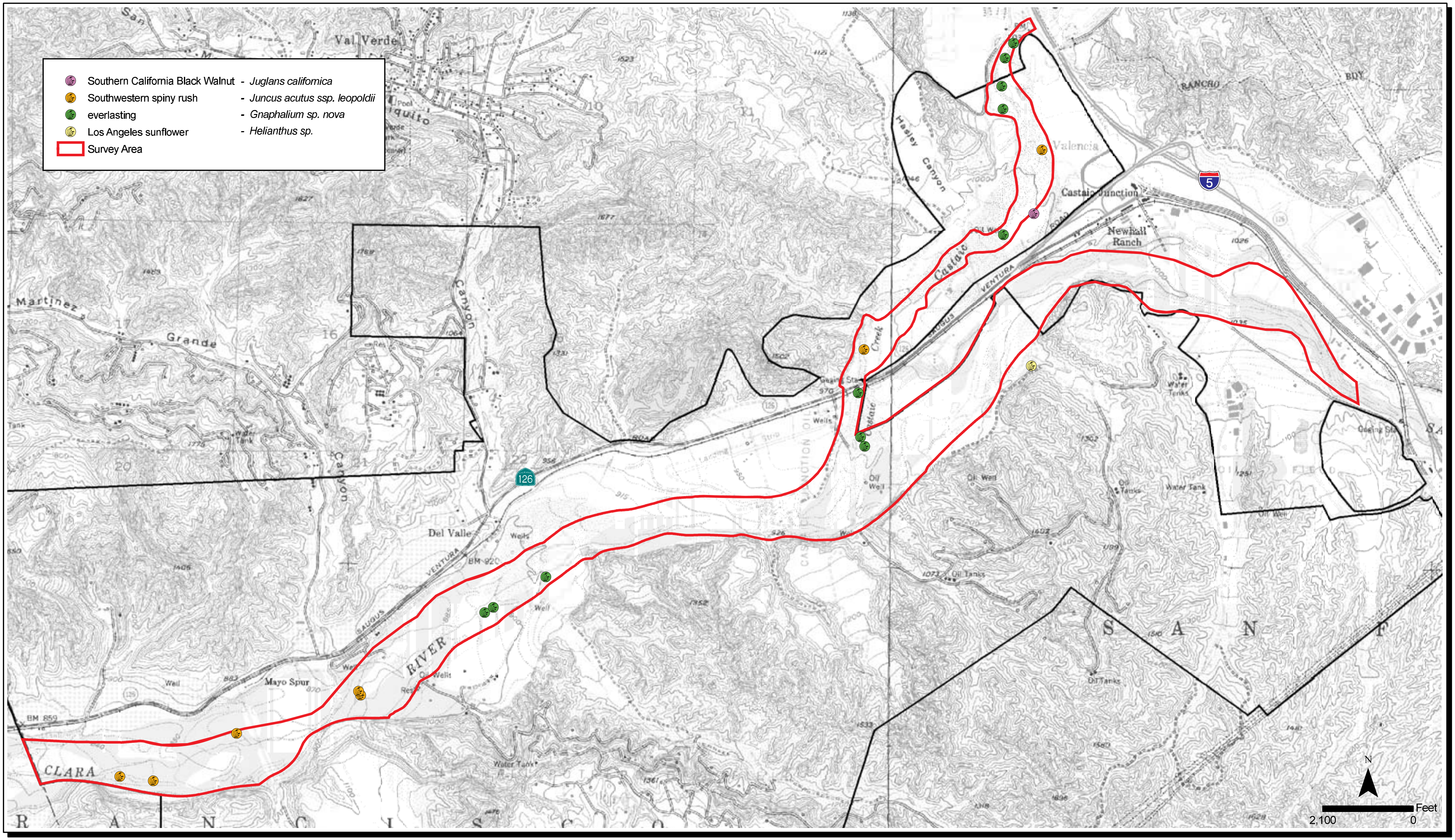
3. SENSITIVE PLANT SPECIES

The sensitive plant species surveys were carried out in two phases, May/June and September, to accommodate the blooming periods of various species found in the region, or previously reported by the California Natural Diversity Database (CNDDB). The focus of the earlier survey was for spring-flowering plants, in particular for spineflowers, including the slender-horned spineflower (*Dodecahema leptoceras*) and San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*). The focus of the second survey was for late-blooming species, primarily the Los Angeles sunflower (*Helianthus nuttallii* ssp. *parishii*). Populations of these species known to occur in the vicinity of the survey area or in the region were checked in the field before commencing surveys to ensure that the plants were flowering, and therefore readily visible.

A list of target species potentially occurring in the Santa Clara River survey area, including Castaic Creek, is presented in Table 1; these species were searched for during the focused sensitive plant species surveys. The species included in the table are those that occur in wetland habitats, and also sensitive upland plant species potentially occurring in the vicinity of the river survey area. Upland species are included because it is not uncommon for such plants to be washed down from higher elevations and habitats and to become established in the drier portions of the riparian corridor and the riverbed.

Two sensitive species were found in the 2004 Santa Clara River and Castaic Creek survey area: southern California black walnut (*Juglans californica*) and southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*). Both are CNPS List 4 species with no federal or state listing. CNDDB California Native Species Field Survey Forms were not completed for these plants due to their relatively low sensitivity. The observed sensitive plant species occurrences are mapped in Figure 1.

Southern California black walnut (*Juglans californica*). One southern California black walnut (*Juglans californica*) tree was found along the southern bank of Castaic Creek, west of the junction of Interstate 5 and State Highway 126. The tree occurred at the edge of cottonwood-willow forest on relatively flat terrain at an elevation of about 1,000 feet. Many trees of this species occur on the higher terraces of the Santa Clara River in the riparian forest habitat immediately adjacent to the currently-defined survey zone.



Sensitive Plant Surveys - Santa Clara River - Newhall Ranch/Valencia Company Project Sites

2004 Sensitive Plant Occurrence Data

FIGURE
1

TABLE 1: SENSITIVE PLANT SPECIES POTENTIALLY OCCURRING IN THE SANTA CLARA RIVER SURVEY AREA AND VICINITY

Scientific Name	Common Name	Family	Status* Federal/State/CNPS
Arenaria paludicola	Marsh sandwort	Caryophyllaceae	FE/SE/1B
Berberis nevinii	Nevin's barberry	Berberidaceae	FE/SE/1B
Calochortus clavatus var. *gracilis*	Slender mariposa lily	Liliaceae	-/-/1B
Calochortus plummerae	Plummer's mariposa lily	Liliaceae	-/-/1B
Calochortus weedii var. *vestus*	Late-flowered mariposa lily	Liliaceae	-/-/1B
Calystegia peirsonii	Peirson's morning-glory	Convolvulaceae	-/-/4
Centromadia parryi ssp. *australis*	Southern tarplant	Asteraceae	-/-/1B
Cercocarpus betuloides var. *blancheae*	Island mountain-mahogany	Rosaceae	-/-/4
Chorizanthe parryi var. *fernandina*	San Fernando Valley spineflower	Polygonaceae	FC/SE/1B
Deinandra minthornii	Santa Susana tarplant	Asteraceae	-/SR/1B
Delphinium parryi ssp. *blochmaniae*	Dune larkspur	Ranunculaceae	FSC/-/1B
Dodecahema leptoceras	Slender-horned spineflower	Polygonaceae	FE/SE/1B
Erodium macrophyllum	Round-leaved filaree	Geraniaceae	-/-/2
Harpagonella palmeri	Palmer's grappling hook	Boraginaceae	-/-/4
Helianthus nuttallii ssp. *parishii*	Los Angeles sunflower	Asteraceae	-/-/1A
Juglans californica	Southern California black walnut	Juglandaceae	-/-/4
Juncus acutus ssp. *leopoldii*	Southwestern spiny rush	Juncaceae	-/-/4
Malacothamnus davidsonii	Davidson’s bush mallow	Malvaceae	FSC/-/1B
Muhlenbergia californica	California muhly	Poaceae	-/-/4
Nama stenocarpum	Mud nama	Hydrophyllaceae	-/-/2
Navarretia setiloba	Piute Mountains navarretia	Polemoniaceae	FSC/-/1B
Nemacladus gracilis	Slender nemacladus	Campanulaceae	-/-/4
Nemophila parviflora var. *quercifolia*	Oak-leaved nemophila	Hydrophyllaceae	-/-/4
Opuntia basilaris var. *brachyclada*	Short-joint beavertail	Cactaceae	-/-/1B
Rorippa gambelii	Gambel's watercress	Brassicaceae	FE/ST/1B
Senecio aphanactis	Rayless ragwort	Asteraceae	-/-/2
Sidalcea neomexicana	Salt spring checkerbloom	Malvaceae	-/-/2
Thelypteris puberula var. *sonorensis*	Sonoran maiden fern	Thelypteridaceae	-/-/2

* - = No listing
FE = Federal endangered
FT = Federal threatened
FC = Federal candidate
FSC = Federal species of concern
SE = State/California endangered
ST = State/California threatened
SR = State/California rare
1A = CNPS List 1A, plants presumed extinct in California
1B = CNPS List 1B, plants rare, threatened, or endangered in California and elsewhere
2 = CNPS List 2, plants rare, threatened, or endangered in California, but more common elsewhere
3 = CNPS List 2, plants about which more information is needed, a review list
4 = CNPS List 4, plants of limited distribution, a watch list

Southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*). Five locations with a total of about 15 plants of southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*) were observed along the edges of the western portion of the Santa Clara River survey area. In the Castaic Creek survey zone, two locations of this species were seen. One population had about 50 plants; the other location had a single plant. This species generally occurred at elevations ranging from 900 feet to 1,000 feet, and was associated with mule fat (*Baccharis salicifolia*), narrow-leaved willow (*Salix exigua*), and Mediterranean tamarisk (*Tamarix ramosissima*).

Everlasting (*Gnaphalium* sp. *nova*). A previously undescribed species of everlasting (*Gnaphalium* sp. *nova*) was found in several locations in the survey area. In the past, plants of this species have been described as Sonora everlasting (*Gnaphalium leucocephalum*), which, however, does not occur in California. Two main populations of this undescribed species, totaling about 600 individuals, were documented in 2003 in the Santa Clara River and in Castaic Creek south of State Highway 126 (Dudek and Associates, 2004). In the current 2004 surveys, these two occurrences were noted again with about 700 plants. In addition, a population of about 250 individuals was observed in the portion of Castaic Creek west of the Interstate 5 bridge and east of Commerce Center Drive. Currently, this undescribed species of everlasting (*Gnaphalium* sp. *nova*) has no recognized sensitivity status.

Slender-horned spineflower (*Dodecahema leptoceras*). This species is known to occur in alluvial scrub vegetation on low terraces of drainages. Species associates include lastarriaea (*Lastarriaea coriacea*), red-stemmed filaree (*Erodium cicutarium*), valley lessingia (*Lessingia glandulifera* var. *glandulifera*), and Mediterranean schismus (*Schismus barbatus*). A known location (not on Newhall property) of this sensitive species was checked in May 2004 as a reference. A few plants of the species had germinated and were flowering. If slender-horned spineflower (*Dodecahema leptoceras*) exists in the Santa Clara River and Castaic Creek survey areas, where some limited potential habitat is present, it should have been observable in 2004, but it was not found.

San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*). Many populations of this species occur on Newhall property in upland coastal sage scrub and grassland vegetation near the Santa Clara River and Castaic Creek survey areas. Since the year 2000, when it was found on Newhall Ranch, extensive surveys have been conducted each year for the San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*). In Spring 2004, the plants were smaller and fewer than in 2003, but were flowering and identifiable. Potential habitat exists on the upper terraces of the Santa Clara River and Castaic Creek survey areas, and it is possible that plants could wash down from adjacent upland populations. If San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*) exists in the survey area, it should have been observable, but it was not found. A few scattered plants of the common species Turkish rugging (*Chorizanthe staticoides*) were the only spineflowers observed in the survey area.

Los Angeles sunflower (*Helianthus nuttallii* ssp. *parishii*). In June 2002, a sunflower species was found in a spring-fed marsh on Newhall Ranch property on the south bank of the Santa Clara River, and was thought possibly to be the presumed-extinct Los Angeles sunflower (*Helianthus nuttallii* ssp. *parishii*). Following later field visits in August and September when the plants were flowering, samples were sent for identification to experts at University of California, Berkeley, Indiana University, and Rancho Santa Ana Botanic Garden (RSABG). The plants were identified variously as Los Angeles sunflower (*Helianthus nuttallii* ssp. *parishii*), Nuttall's sunflower (*Helianthus nuttallii* ssp. *nuttallii*), and California sunflower (*Helianthus californicus*). Since 2002, staff members at RSABG have conducted investigations on the chromosome number and pollen of the Newhall sunflower plants and compared them to related taxa. The most recent report from these studies (Porter and Fraga, 2004), made available during the September 2004 surveys, concludes that the Newhall plants are not likely to be Los Angeles sunflower (*Helianthus nuttallii* ssp. *parishii*). They likely represent a unique entity, but it is not known if they are a hybrid between Los Angeles sunflower (*Helianthus nuttallii* ssp. *parishii*) and California sunflower (*Helianthus californicus*), or an intermediate step in the evolution of California sunflower (*Helianthus californicus*). The Newhall sunflower was not found in any new locations in the Santa Clara River or in Castaic Creek during the 2004 surveys. Habitats similar to the spring-fed marsh where the plants currently are known to occur were not observed during the field surveys. Scattered plants of the annual native common sunflower (*Helianthus annuus*) were seen in several locations in the survey area.

4. REFERENCES

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APPENDIX

PLANT SPECIES LIST,
SANTA CLARA RIVER, LOS ANGELES COUNTY, CALIFORNIA

PLANT SPECIES LIST
SANTA CLARA RIVER, LOS ANGELES COUNTY, CALIFORNIA

SCIENTIFIC NAME	COMMON NAME	GROWTH FORM	RIVER CHANNEL	CASTAIC CREEK
FERNS AND FERN-ALLIES				
Azollaceae	**Mosquito Fern Family**			
Azolla filiculoides	Pacific mosquito fern	AH, PH	✓	
Equisetaceae	**Horsetail Family**			
Equisetum hyemale ssp. *affine*	Common scouring rush	PH	✓	
Equisetum laevigatum	Smooth scouring rush	PH	✓	
ANGIOSPERMS - MONOCOTS				
Arecaceae	**Palm Family**			
*Washingtonia robusta**	Mexican fan palm	T	✓	✓
Cyperaceae	**Sedge Family**			
*Cyperus difformis**	Rice flatsedge	AH	✓	
Cyperus eragrostis	Tall umbrella-sedge	PH	✓	✓
*Cyperus involucratus**	Umbrella plant	PH	✓	✓
Cyperus odoratus	Fragrant umbrella-sedge	AH	✓	✓
Eleocharis macrostachya	Pale spikerush	PH		✓
Eleocharis montevidensis	Slender creeping spikerush	PH	✓	
Eleocharis parishii	Parish's spikerush	PH	✓	✓
Scirpus acutus var. *occidentalis*	Tule	PH	✓	✓
Scirpus americanus	Common three-square	PH	✓	✓
Scirpus californicus	California bulrush	AH	✓	
Scirpus maritimus	Saltmarsh bulrush	PH	✓	
Scirpus robustus	Coastal bulrush	PH	✓	
Scirpus saximontanus	Club-rush	AH		
Hydrocharitaceae	**Waterweed Family**			
Najas guadalupensis	Common water-nymph	AH	✓	
Juncaceae	**Rush Family**			
Juncus acutus ssp. *leopoldii* ▪	Southwestern spiny rush	PH	✓	✓
Juncus bufonius var. *bufonius*	Toad rush	AH	✓	
Juncus mexicanus	Mexican rush	PH	✓	
Juncus torreyi	Torrey's rush	PH	✓	
Juncus xiphioides	Iris-leaved rush	PH	✓	✓
Lemnaceae	**Duckweed Family**			
Lemna minuscula	Least duckweed	PH	✓	
Lemna valdiviana	Valdivia duckweed	PH	✓	✓
Liliaceae	**Lily Family**			
Yucca whipplei	Our Lord's candle	Ss		✓
Poaceae	**Grass Family**			
*Agrostis viridis**	Water bent	PG	✓	✓
*Arundo donax**	Giant reed	PG	✓	✓
*Avena barbata**	Slender wild oat	AG	✓	✓
*Avena fatua**	Wild oat	AG	✓	✓

PLANT SPECIES LIST
SANTA CLARA RIVER, LOS ANGELES COUNTY, CALIFORNIA

SCIENTIFIC NAME	COMMON NAME	GROWTH FORM	RIVER CHANNEL	CASTAIC CREEK
*Avena sativa**	Cultivated oat	AG	✓	
*Bromus diandrus**	Ripgut grass	AG	✓	✓
*Bromus hordeaceus**	Soft chess	AG	✓	✓
Bromus madritensis ssp. *rubens**	Foxtail chess	AG	✓	✓
*Bromus tectorum**	Cheat grass, Downy brome	AG	✓	✓
*Cortaderia jubata**	Pampas grass	PG	✓	✓
*Cynodon dactylon**	Bermuda grass	PG	✓	✓
*Digitaria sanguinalis**	Crab grass	AG	✓	
Distichlis spicata	Saltgrass	PG	✓	
*Echinochloa crus-galli**	Barnyard grass	AG	✓	
*Eragrostis barrelieri**	Lovegrass	AG	✓	
Eragrostis mexicana ssp. *mexicana*	Lovegrass	AG	✓	
Eragrostis mexicana ssp. *virescens*	Lovegrass	AG	✓	
Eragrostis pectinacea var. *pectinacea*	Lovegrass	AG	✓	
*Festuca arundinacea**	Tall fescue	PG		✓
Hordeum murinum ssp. *leporinum**	Hare barley	AG	✓	✓
Leptochloa uninervia	Mexican sprangletop	AG	✓	
Leymus condensatus	Giant wild-rye	PG	✓	✓
Leymus triticoides	Beardless wild-rye	PG	✓	✓
*Lolium multiflorum**	Italian ryegrass	AG, BG	✓	✓
*Lolium perenne**	Perennial ryegrass	PG	✓	
*Panicum hillmanii**	Panicgrass	AG	✓	
Paspalum distichum	Knotgrass	PG	✓	
*Piptatherum miliaceum**	Smilo grass	PG	✓	✓
Poa secunda ssp. *secunda*	One-sided bluegrass	PG	✓	
*Polypogon interruptus**	Ditch beard grass	PG	✓	
*Polypogon monspeliensis**	Annual beard grass	AG	✓	✓
*Schismus barbatus**	Mediterranean schismus	AG	✓	✓
Setaria gracilis	Knotroot bristle grass	PG	✓	
*Triticum aestivum**	Wheat	AG		✓
Vulpia myuros var. *hirsuta**	Rat-tail fescue	AG	✓	✓
Potamogetonaceae	**Pondweed Family**			
Potamogeton foliosus var. *foliosus*	Leafy pondweed	PH	✓	
Potamogeton pectinatus	Fennel-leaf pondweed	PH	✓	
Typhaceae	**Cattail Family**			
Typha domingensis	Southern cattail	PH	✓	✓
Typha latifolia	Broad-leaved cattail	PH	✓	✓
Zannichelliaceae	**Horned-Pondweed Family**			
Zannichellia palustris	Horned-pondweed	PH	✓	

PLANT SPECIES LIST
SANTA CLARA RIVER, LOS ANGELES COUNTY, CALIFORNIA

SCIENTIFIC NAME	COMMON NAME	GROWTH FORM	RIVER CHANNEL	CASTAIC CREEK
ANGIOSPERMS - DICOTS				
Aizoaceae	**Fig-Marigold Family**			
Sesuvium verrucosum	Western sea-purslane	PH	✓	
Amaranthaceae	**Amaranth Family**			
*Amaranthus albus**	Tumbleweed	AH	✓	✓
Amaranthus blitoides	Prostrate pigweed	AH	✓	
Anacardiaceae	**Sumac or Cashew Family**			
Rhus ovata	Sugar bush	S	✓	✓
Toxicodendron diversilobum	Western poison oak	S	✓	
Apiaceae	**Carrot Family**			
*Apium graveolens**	Celery	PH	✓	
Berula erecta	Cutleaf water-parsnip	PH	✓	✓
Asteraceae	**Sunflower Family**			
Ambrosia acanthicarpa	Annual bur-sage	AH	✓	✓
Ambrosia psilostachya	Western ragweed	AH	✓	✓
Artemisia californica	California sagebrush	S	✓	✓
Artemisia douglasiana	Mugwort	PH	✓	✓
Artemisia dracunculus	Tarragon	PH	✓	✓
Artemisia tridentata ssp. *parishii*	Great Basin sagebrush, Big sagebrush	S	✓	✓
Baccharis emoryi	Emory's baccharis	S	✓	
Baccharis pilularis	Coyote brush, Chaparral broom	S	✓	✓
Baccharis salicifolia	Mule fat, Seep-willow, Water-wally	S	✓	✓
Brickellia californica	California brickellbush	S	✓	
*Carduus pycnocephalus**	Italian thistle	AH, BH	✓	
*Centaurea melitensis**	Tocalote	AH	✓	✓
*Chamomilla suaveolens**	Pineapple weed, Rayless chamomile	AH	✓	✓
Chrysothamnus nauseosus ssp. *hololeucus*	Rubber rabbitbrush	S	✓	✓
Cirsium occidentale var. *californicum*	California thistle	BH	✓	
Cirsium occidentale var. *occidentale*	Cobwebby thistle	BH		✓
*Cnicus benedictus**	Blessed thistle	AH	✓	✓
Conyza canadensis	Horseweed	AH	✓	✓
*Coreopsis tinctoria**	Calliopsis	AH	✓	
*Cotula coronopifolia**	Brass-buttons	PH	✓	
Eclipta prostrata	False daisy	AH	✓	
Ericameria palmeri var. *pachylepis*	Palmer's goldenbush	S	✓	✓
Erigeron foliosus var. *foliosus*	Fleabane aster	Ss	✓	
Euthamia occidentalis	Western goldenrod	PH	✓	
Filago californica	California filago	AH	✓	✓
*Gaillardia pulchella**	Indian-blanket	AH	✓	
Gnaphalium sp. *nova* (undescribed)	Everlasting	PH	✓	✓
Gnaphalium californicum	California everlasting	AH, BH	✓	✓

PLANT SPECIES LIST
SANTA CLARA RIVER, LOS ANGELES COUNTY, CALIFORNIA

SCIENTIFIC NAME	COMMON NAME	GROWTH FORM	RIVER CHANNEL	CASTAIC CREEK
Gnaphalium canescens ssp. *microcephalum*	Felty everlasting	BH, PH		✓
*Gnaphalium luteo-album**	Weedy cudweed	AH	✓	✓
Gnaphalium palustre	Lowland cudweed	AH	✓	
Helianthus annuus	Common sunflower	AH	✓	✓
Heterotheca grandiflora	Telegraph weed	AH, PH	✓	✓
Heterotheca sessiliflora ssp. *fastigiata*	Hairy goldenaster	PH	✓	✓
*Lactuca serriola**	Prickly lettuce	AH	✓	✓
Lepidospartum squamatum	Scale-broom	S	✓	✓
Lessingia filaginifolia var. *filaginifolia*	California-aster	PH, Ss	✓	✓
Malacothrix saxatilis var. *commutata*	Cliff malacothrix	PH	✓	✓
Malacothrix saxatilis var. *tenuifolia*	Cliff malacothrix	PH	✓	✓
Pluchea odorata	Salt marsh fleabane	AH, PH	✓	
Pluchea sericea	Arrow weed	S	✓	✓
*Pulicaria paludosa**	Spanish sunflower	AH, PH	✓	
Senecio flaccidus var. *douglasii*	Sandwash groundsel, Bush senecio	Ss	✓	✓
*Silybum marianum**	Milk thistle	AH, BH	✓	✓
Sonchus asper ssp. *asper**	Prickly sow thistle	AH	✓	✓
*Sonchus oleraceus**	Common sow thistle	AH	✓	✓
Stephanomeria exigua	Small wreath-plant	AH		✓
Stephanomeria virgata	Wand chicory	AH	✓	✓
Xanthium strumarium	Cocklebur	AH	✓	✓
Betulaceae	**Birch Family**			
Alnus rhombifolia	White alder	T	✓	
Boraginaceae	**Borage Family**			
Amsinckia menziesii var. *intermedia*	Rancher's fireweed	AH	✓	✓
Cryptantha intermedia	Large-flowered popcorn flower	AH	✓	
Cryptantha micrantha	Hairy purpleroot cryptantha	AH	✓	✓
Cryptantha muricata	Prickly popcorn flower	AH	✓	
Heliotropium curassavicum	Salt heliotrope	PH	✓	✓
Pectocarya penicillata	Winged pectocarya	AH	✓	
Brassicaceae	**Mustard Family**			
*Brassica nigra**	Black mustard	AH	✓	✓
*Capsella bursa-pastoris**	Shepherd's purse	AH	✓	
*Coronopus didymus**	Wart cress	AH	✓	
*Hirschfeldia incana**	Shortpod mustard	BH, PH	✓	✓
*Lepidium latifolium**	Broad-leaved peppergrass	PH	✓	✓
*Lobularia maritima**	Sweet alyssum	PH	✓	✓
Rorippa nasturtium-aquaticum	Water cress	PH	✓	✓
*Sisymbrium altissimum**	Tumble or Jim Hill mustard	AH	✓	✓
*Sisymbrium irio**	London rocket	AH	✓	
*Sisymbrium orientale**	Oriental mustard	AH	✓	

PLANT SPECIES LIST
SANTA CLARA RIVER, LOS ANGELES COUNTY, CALIFORNIA

SCIENTIFIC NAME	COMMON NAME	GROWTH FORM	RIVER CHANNEL	CASTAIC CREEK
Cactaceae	**Cactus Family**			
Opuntia littoralis	Coast prickly-pear	S	✓	✓
Opuntia parryi	Cane cholla, Snake cholla	S	✓	✓
Caprifoliaceae	**Honeysuckle Family**			
Sambucus mexicana	Mexican elderberry, Blue elderberry	S	✓	✓
Caryophyllaceae	**Pink Family**			
*Polycarpon tetraphyllum**	Four-leaved allseed	AH	✓	✓
Spergularia marina	Saltmarsh sand-spurrey	AH	✓	
Chenopodiaceae	**Goosefoot Family**			
Atriplex lentiformis ssp. *lentiformis*	Big saltbush	S	✓	✓
*Atriplex semibaccata**	Australian saltbush	PH, S	✓	
Atriplex triangularis	Spearscale	AH	✓	
*Bassia hyssopifolia**	Five-hooked bassia	AH	✓	
*Chenopodium album**	Lamb's quarters, Pigweed	AH	✓	
*Chenopodium ambrosioides**	Mexican tea	AH, PH	✓	
Chenopodium berlandieri	Pitseed goosefoot	AH	✓	✓
*Chenopodium botrys**	Jerusalem oak	AH	✓	
*Chenopodium murale**	Nettle-leaved goosefoot	AH	✓	
*Salsola tragus**	Russian thistle, Tumbleweed	AH	✓	✓
Convolvulaceae	**Morning-Glory Family**			
Calystegia longipes	Piute morning-glory	Ss	✓	
Crassulaceae	**Stonecrop Family**			
Dudleya lanceolata	Lance-leaf live-forever	PH	✓	✓
Cucurbitaceae	**Gourd Family**			
Cucurbita foetidissima	Calabazilla	PH	✓	✓
Cuscutaceae	**Dodder Family**			
Cuscuta californica var. *californica*	California dodder	AV	✓	✓
Datiscaceae	**Datisca Family**			
Datisca glomerata	Durango root	PH	✓	
Euphorbiaceae	**Spurge Family**			
*Chamaesyce maculata**	Spotted spurge	AH	✓	
Chamaesyce polycarpa	Small-seed sandmat	PH	✓	
Croton californicus	California croton	PH	✓	✓
Eremocarpus setigerus	Dove weed, Turkey mullein	AH	✓	✓
*Ricinus communis**	Castor bean	S	✓	✓
Fabaceae	**Legume Family**			
Astragalus trichopodus var. *phoxus*	Santa Barbara locoweed	PH	✓	✓
Glycyrrhiza lepidota	Wild licorice	PH	✓	
Lotus purshianus var. *purshianus*	Spanish clover	AH	✓	
Lotus salsuginosus var. *salsuginosus*	Coastal lotus	AH	✓	
Lotus scoparius var. *scoparius*	California broom	PH, S	✓	✓

PLANT SPECIES LIST
SANTA CLARA RIVER, LOS ANGELES COUNTY, CALIFORNIA

SCIENTIFIC NAME	COMMON NAME	GROWTH FORM	RIVER CHANNEL	CASTAIC CREEK
Lotus strigosus	Strigose lotus	AH	✓	
Lupinus bicolor	Miniature lupine	AH	✓	✓
Lupinus excubitus var. *excubitus*	Grape soda lupine	S	✓	
Lupinus hirsutissimus	Stinging lupine	AH	✓	✓
Lupinus microcarpus var. *microcarpus*	Chick lupine	AH		✓
Lupinus succulentus	Arroyo lupine	AH	✓	
*Medicago polymorpha**	California burclover	AH	✓	
*Melilotus alba**	White sweetclover	AH, BH	✓	✓
*Melilotus indica**	Sourclover	AH	✓	✓
*Robinia pseudoacacia**	Black locust	T	✓	
*Spartium junceum**	Spanish broom	S	✓	✓
Vicia villosa ssp. *villosa**	Hairy or winter vetch	AH	✓	✓
Fagaceae	**Oak Family**			
Quercus agrifolia var. *agrifolia*	Coast live oak	T	✓	✓
Quercus lobata	Valley oak, Roble	T	✓	✓
Geraniaceae	**Geranium Family**			
*Erodium cicutarium**	Red-stemmed filaree	AH	✓	✓
Grossulariaceae	**Gooseberry Family**			
Ribes aureum var. *gracillimum*	Golden currant	S		✓
Hydrophyllaceae	**Waterleaf Family**			
Emmenanthe penduliflora	Whispering bells	AH	✓	✓
Eriodictyon crassifolium var. *nigrescens*	Thickleaf yerba santa	S	✓	✓
Phacelia brachyloba	Short-lobed phacelia	AH	✓	
Phacelia cicutaria var. *hispida*	Caterpillar phacelia	AH	✓	
Phacelia minor	Wild canterbury-bell	AH	✓	
Phacelia parryi	Parry's phacelia	AH	✓	
Phacelia ramosissima var. *latifolia*	Branching phacelia	PH	✓	✓
Phacelia tanacetifolia	Tansy phacelia	AH	✓	✓
Phacelia viscida	Sticky phacelia	AH	✓	
Juglandaceae	**Walnut Family**			
Juglans californica ▪	Southern California black walnut	S, T		✓
Lamiaceae	**Mint Family**			
*Marrubium vulgare**	Horehound	PH	✓	✓
Salvia apiana	White sage	Ss	✓	
Salvia leucophylla	Purple sage	S	✓	
Salvia mellifera	Black sage	S	✓	✓
Stachys albens	White hedge nettle	PH	✓	
Trichostema lanceolatum	Vinegar weed	AH		✓
Linaceae	**Flax Family**			
*Linum usitatissimum**	Common flax	AH	✓	

PLANT SPECIES LIST
SANTA CLARA RIVER, LOS ANGELES COUNTY, CALIFORNIA

SCIENTIFIC NAME	COMMON NAME	GROWTH FORM	RIVER CHANNEL	CASTAIC CREEK
Loasaceae	**Loasa Family**			
Mentzelia laevicaulis	Blazing star	PH	✓	
Mentzelia micrantha	Small-flowered stick-leaf	AH	✓	
Petalonyx thurberi ssp. *thurberi*	Sandpaper plant	Ss	✓	
Malvaceae	**Mallow Family**			
Malacothamnus fasciculatus	Chaparral mallow	S	✓	✓
Myrtaceae	**Myrtle Family**			
*Eucalyptus camaldulensis**	Red gum, River red gum	T		✓
Nyctaginaceae	**Four O'clock Family**			
Mirabilis californica	Wishbone bush	PH, Ss		✓
Oleaceae	**Olive Family**			
Fraxinus dipetala	California ash	S, T		✓
Onagraceae	**Evening Primrose Family**			
Camissonia bistorta	California sun cup	AH, PH		✓
Camissonia californica	Mustard evening primrose	AH	✓	✓
Camissonia hirtella	Sun cup	AH	✓	
Clarkia unguiculata	Elegant clarkia	AH	✓	
Epilobium canum ssp. *canum*	California fuchsia, Zauschneria	PH, Ss	✓	
Epilobium ciliatum ssp. *ciliatum*	Willow-herb	PH	✓	✓
Ludwigia peploides ssp. *peploides*	Yellow waterweed	PH	✓	
Oenothera californica ssp. *californica*	California evening primrose	PH	✓	✓
Oenothera elata ssp. *hirsutissima*	Great marsh evening primrose	BH, PH	✓	
*Oenothera laciniata**	Evening primrose	AH, PH	✓	
Papaveraceae	**Poppy Family**			
Eschscholzia californica	California poppy	AH, PH	✓	
Plantaginaceae	**Plantain Family**			
*Plantago major**	Common plantain	PH	✓	✓
Platanaceae	**Sycamore Family**			
Platanus racemosa	Western sycamore	T	✓	✓
Polemoniaceae	**Phlox Family**			
Allophyllum glutinosum	Stinky gilia	AH	✓	
Eriastrum densifolium ssp. *elongatum*	Mesa phlox	PH	✓	✓
Gilia capitata ssp. *abrotanifolia*	Globe gilia	AH	✓	
Gilia scopulorum	Rock gilia	AH	✓	
Leptodactylon californicum	Prickly phlox	PH	✓	
Polygonaceae	**Buckwheat Family**			
Chorizanthe staticoides	Turkish rugging	AH	✓	
Eriogonum baileyi var. *baileyi*	Buckwheat	AH		✓
Eriogonum brachyanthum	Buckwheat	AH	✓	✓
Eriogonum covilleanum	Coville's eriogonum	AH	✓	
Eriogonum elongatum var. *elongatum*	Long-stemmed buckwheat	Ss, S	✓	✓

PLANT SPECIES LIST
SANTA CLARA RIVER, LOS ANGELES COUNTY, CALIFORNIA

SCIENTIFIC NAME	COMMON NAME	GROWTH FORM	RIVER CHANNEL	CASTAIC CREEK
Eriogonum fasciculatum var. *foliolosum*	California buckwheat	S	✓	✓
Eriogonum gracile var. *gracile*	Slender buckwheat	AH	✓	✓
Eriogonum maculatum	Buckwheat	AH		✓
*Polygonum arenastrum**	Common knotweed, Doorweed	AH, PH	✓	
Polygonum lapathifolium	Willow weed	AH	✓	✓
*Polygonum persicaria**	Lady’s thumb	AH	✓	
Polygonum punctatum	Perennial smartweed	AH, PH	✓	
*Rumex crispus**	Curly dock	PH	✓	✓
Rumex maritimus	Golden dock	AH, BH	✓	
*Rumex obtusifolius**	Bitter dock	PH	✓	✓
*Rumex pulcher**	Fiddle dock	PH	✓	
Rumex salicifolius var. *salicifolius*	Willow dock	PH	✓	✓
Portulacaceae	**Purslane Family**			
*Portulaca oleracea**	Common purslane	AH	✓	
Primulaceae	**Primrose Family**			
*Anagallis arvensis**	Scarlet pimpernel, Poor-man's	AH	✓	✓
Rhamnaceae	**Buckthorn Family**			
Ceanothus crassifolius	Hoaryleaf ceanothus	S	✓	
Ceanothus oliganthus var. *oliganthus*	Hairyleaf ceanothus	S	✓	
Rosaceae	**Rose Family**			
Rosa californica	California rose	S	✓	✓
Rubus ursinus	California blackberry	PH	✓	
Rubiaceae	**Madder Family**			
Galium angustifolium ssp. *angustifolium*	Narrow-leaved bedstraw	PH	✓	✓
Salicaceae	**Willow Family**			
Populus fremontii ssp. *fremontii*	Fremont or Alamo cottonwood	T	✓	✓
Salix exigua	Narrow-leaved willow	S	✓	✓
Salix gooddingii	Goodding's black willow	T	✓	
Salix laevigata	Red willow	T	✓	✓
Salix lasiolepis	Arroyo willow	S, T	✓	✓
Salix lucida ssp. *lasiandra*	Shining willow, Pacific willow	S, T	✓	✓
Saururaceae	**Lizard's-Tail Family**			
Anemopsis californica	Yerba mansa	PH	✓	✓
Scrophulariaceae	**Figwort Family**			
Antirrhinum multiflorum	Sticky snapdragon	AH, PH	✓	
Castilleja affinis ssp. *affinis*	Coastal paintbrush	PH	✓	
Castilleja exserta	Purple owl's-clover	AH	✓	
Cordylanthus rigidus ssp. *setigerus*	Bird's-beak	AH		✓
*Linaria pinifolia**	Toadflax	AH	✓	
Mimulus aurantiacus	Bush monkeyflower	Ss, S	✓	✓
Mimulus brevipes	Yellow monkeyflower	AH	✓	

PLANT SPECIES LIST
SANTA CLARA RIVER, LOS ANGELES COUNTY, CALIFORNIA

SCIENTIFIC NAME	COMMON NAME	GROWTH FORM	RIVER CHANNEL	CASTAIC CREEK
Mimulus cardinalis	Scarlet monkeyflower	PH	✓	
Mimulus floribundus	Floriferous monkeyflower	AH	✓	
Mimulus guttatus	Creek monkeyflower	AH, PH	✓	
Mimulus pilosus	Downy mimetanthe	AH	✓	
Mimulus rubellus	Ciliolate-toothed monkeyflower	AH	✓	
Scrophularia californica ssp. *floribunda*	California figwort	PH	✓	
*Verbascum virgatum**	Wand mullein	BH	✓	
*Veronica anagallis-aquatica**	Water speedwell	PH	✓	✓
Solanaceae	**Nightshade Family**			
Datura wrightii	Jimson weed	AH, PH	✓	✓
*Nicotiana glauca**	Tree tobacco	T	✓	✓
Nicotiana quadrivalvis	Wallace's tobacco	AH	✓	
Solanum americanum	Little white nightshade	AH, Ss	✓	✓
Solanum douglasii	White nightshade	PH, Ss	✓	✓
Solanum xanti	Purple nightshade	PH, Ss		✓
Tamaricaceae	**Tamarisk Family**			
*Tamarix ramosissima**	Mediterranean tamarisk	S, T	✓	✓
Urticaceae	**Nettle Family**			
Urtica dioica ssp. *holosericea*	Hoary nettle	PH	✓	✓
Verbenaceae	**Vervain Family**			
Verbena lasiostachys var. *lasiostachys*	Western verbena	PH	✓	✓
*Verbena tenuisecta**	Verbena	AH, PH		✓
Viscaceae	**Mistletoe Family**			
Phoradendron macrophyllum	Big leaf mistletoe	S		✓
Vitaceae	**Grape Family**			
Parthenocissus vitacea	Virginia creeper, woodbine	PV	✓	
Vitis girdiana	Desert wild grape	PV	✓	
Zygophyllaceae	**Caltrop Family**			
*Tribulus terrestris**	Puncture vine	AH	✓	✓

NOTES:

1. Species observed during field surveys conducted by FL*x*, May 31, June 1, June 2, June 3, June 15, June 16, June 17, September 8, September 9, September 10, September 13, September 14, September 15, and September 16, 2004.

2. Scientific and common names are from Hickman (1993), Smith (1998), Abrams and Ferris (1960), and Sawyer and Keeler-Wolf (1995).

3. Growth Form indicates species growth habit:
AG = Annual Grass; AH = Annual Herb; AV = Annual Vine; BG = Biennial Grass; BH = Biennial Herb; PG = Perennial Grass; PH = Perennial Herb; PV = Perennial Vine; Ss = Subshrub; S = Shrub; T = Tree.

* Non-native plant species
■ Sensitive plant species

Rare Plant Surveys

RARE PLANT SURVEYS FOR *HELIANTHUS* SP.

RIVER VILLAGE AND WATER RECLAMATION PLANT

LOS ANGELES COUNTY, CA

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1. INTRODUCTION

This report documents the results of rare plant surveys conducted at the River Village and Water Reclamation Plant sites within the Newhall Ranch project area in Los Angeles County, California. The River Village site is located on the north side of the Santa Clara River, between Chiquito Canyon in the west and Castaic Creek in the east. The Water Reclamation Plant site also is located on the north side of the Santa Clara River, just east of the Los Angeles County line.

A team of two consultants from FLx (Dr. Anuja Parikh and Dr. Nathan Gale) conducted the rare plant surveys on October 16 and 17, 2002. The focus of the surveys was the Los Angeles sunflower (*Helianthus nuttallii* ssp. *parishii*), which is found in wetland habitats; the surveys, therefore, concentrated on the wetter areas of the two sites. Upland areas of the River Village and Water Reclamation sites were not examined in detail, since they already had been surveyed for rare plants in Spring 2001. During the current surveys, wetland vegetation types and plant species associations were noted and their dominant species were recorded. A list of observed plant species, including rare and commonly occurring plants, was compiled. Plant community descriptions in this report follow Holland (1986) where applicable; species nomenclature follows Hickman (1993).

2. VEGETATION TYPES AND PLANT SPECIES ASSOCIATIONS

The River Village and Water Reclamation Plant sites lie on flat terraces above the Santa Clara River. The terraces are used primarily for agriculture. The wetter areas of the project sites, where the surveys were conducted, occur in and along the edges of the river floodplain, and are composed of relatively flat terrain in the main and secondary channels of the river, as well as the slopes of the riverbanks.

Riverwash. In areas where scouring has occurred, the main channel of the Santa Clara River is relatively sparsely vegetated. The soils in these scoured areas are sandy riverwash and gravel, and in places form sand bars and low terraces within the channel. No well-defined plant community is found here, although scattered elements of riparian scrub were observed. Shrub species found in and adjacent to the channel include mule fat (*Baccharis salicifolia*), sandbar willow (*Salix exigua*), tamarisk (*Tamarix* sp.), scale-broom (*Lepidospartum squamatum*), sandwash groundsel (*Senecio flaccidus* var. *douglasii*), big saltbush (*Atriplex lentiformis* ssp. *lentiformis*), and Great Basin sagebrush (*Artemisia tridentata*). Other plants growing in these areas include white sweetclover (*Melilotus albus*), annual bur-sage (*Ambrosia acanthicarpa*), cocklebur (*Xanthium strumarium*), California croton (*Croton californicus*), buckwheat (*Eriogonum baileyi*), California evening primrose (*Oenothera californica* ssp. *californica*), Mediterranean schismus (*Schismus barbatus*), and foxtail chess (*Bromus madritensis* ssp. *rubens*).

Freshwater Marsh. Small patches of wet areas in the main and secondary channels of the Santa Clara River in the River Village and Water Reclamation Plant sites have freshwater marsh vegetation. This community typically is dominated by emergent perennial monocots, often up to 5 m tall and forming closed canopies. Marshes are found on relatively deep organic soils on sites permanently flooded with fresh water (Holland, 1986). Species found in the wettest parts of the channels are cattails (*Typha latifolia, T. domingensis*), smartweeds (*Polygonum hydropiperoides, P. punctatum*), bulrushes (*Scirpus acutus* var. *occidentalis, S. pungens*), nutsedge (*Cyperus odoratus*), water primrose (*Ludwigia peploides* ssp. *peploides*), water cress (*Rorippa nasturtium-aquaticum*), sticky willowweed (*Epilobium ciliatum* ssp.

ciliatum), and water speedwell (*Veronica anagallis-aquatica*). With respect to sensitivity status, freshwater marsh has been state-ranked as S2.1 (2,000 to 10,000 acres, very threatened) by the California Natural Diversity Database (CNDDB).

Mule Fat Scrub. Mule fat scrub is found in linear patches along the main and secondary channels of the Santa Clara River. Mule fat scrub typically is a tall, semi-woody and herbaceous riparian scrub, and is relatively species-poor. An early seral community, it often grades to riparian woodland or forest (Holland, 1986). The dominant species in this community is mule fat (*Baccharis salicifolia*); arrow weed (*Pluchea sericea*), tree tobacco (*Nicotiana glauca*), tamarisk (*Tamarix* sp.), and giant reed (*Arundo donax*) also are common. The understory is sparse or absent, but sometimes includes species such as Mexican rush (*Juncus mexicanus*), salt heliotrope (*Heliotropium curassavicum*), and grasses. With respect to sensitivity status, mule fat scrub has been state-ranked as S4 (apparently secure) by the CNDDB.

Southern Cottonwood-Willow Riparian Forest. This community occurs on low terraces above the main channel of the Santa Clara River. It consists of tall, open, broadleaved, winter-deciduoustrees, and is dominated by Fremont cottonwood (*Populus fremontii* ssp. *fremontii*) and willows (*Salix laevigata, S. exigua, S. lasiolepis*). These species require moist, bare mineral soil for germination and establishment, provided after floodwaters recede; this forest type therefore is found mostly along perennially wet streams (Holland, 1996). Understory plants include mule fat (*Baccharis salicifolia*), arrow weed (*Pluchea sericea*), Mexican elderberry (*Sambucus mexicana*), southern California black walnut (*Juglans californica* var. *californica*), mugwort (*Artemisia douglasiana*), hoary nettle (*Urtica dioica* ssp. *holosericea*), ripgut grass (*Bromus diandrus*), and alkali rye (*Leymus triticoides*). With respect to sensitivity status, southern cottonwood-willow riparian forest has been state-ranked as S3.2 (10,000 to 50,000 acres, threatened) by the CNDDB.

3. RARE PLANT SPECIES

In June 2002, a sunflower species was found in a marsh on Newhall Ranch property on the south bank of the Santa Clara River, and was thought possibly to be the Los Angeles sunflower (*Helianthus nuttallii* ssp. *parishii*), presumed extinct. Following later field visits in August and September when the plants were flowering, samples were sent for identification to Rancho Santa Ana Botanic Garden, University of California, Berkeley, and to Indiana University. The plants have not been identified conclusively to date as the rare taxon, and may be Nuttall's sunflower (*Helianthus nuttallii* ssp. *nuttallii*) or California sunflower (*Helianthus californicus*). Since the rare plant blooms from August to October, the current surveys were conducted in October 2002 to search specifically for the Los Angeles sunflower (*Helianthus nuttallii* ssp. *parishii*) before the end of its blooming period. The surveys concentrated on wetland habitats, and other target species potentially occurring in wetlands also were included in the search.

A list of target species for the current surveys at the River Village and Water Reclamation Plant sites is presented in Table 1. In addition to the Los Angeles sunflower (*Helianthus nuttallii* ssp. *parishii*), the species included in the table are those that occur in wetland habitats and are late-blooming species or potentially are identifiable late in the year.

TABLE 1: SENSITIVE PLANT SPECIES POTENTIALLY OCCURRING IN WET AREAS ON THE NEWHALL RANCH PROPERTY

Scientific Name	Common Name	Family	Status* Federal/State/CNPS
Arenaria paludicola	Marsh sandwort	Caryophyllaceae	FE/SE/1B
Berberis nevinii	Nevin's barberry	Berberidaceae	FE/SE/1B
Helianthus nuttallii ssp. *parishii*	Los Angeles sunflower	Asteraceae	-/-/1A
Juglans californica var. *californica*	Southern California black walnut	Juglandaceae	-/-/4
Juncus acutus ssp. *leopoldii*	Southwestern spiny rush	Juncaceae	-/-/4
Malacothamnus davidsonii	Davidson's bush mallow	Malvaceae	-/-/1B
Muhlenbergia californica	California muhly	Poaceae	-/-/4
Rorippa gambelii	Gambel's watercress	Brassicaceae	FE/ST/1B
Sidalcea neomexicana	Salt spring checkerbloom	Malvaceae	-/-/2
Thelypteris puberula var. *sonorensis*	Sonoran maiden fern	Thelypteridacea	-/-/2

* FE = Federal endangered
SE = State/California endangered
ST = State/California threatened
1A = CNPS List 1A, presumed extinct in California
1B = CNPS List 1B, rare or endangered in California and elsewhere
2 = CNPS List 2, rare or endangered in California, more common elsewhere
4 = CNPS List 4, plants of limited distribution

The Los Angeles sunflower (*Helianthus nuttallii* ssp. *parishii*) was not found at the River Village and Water Reclamation Plant sites during the October 2002 surveys. A few scattered plants of common sunflower (*Helianthus annuus*) and slender sunflower (*Helianthus gracilentus*) were observed.

At the River Village site, one new (i.e., in addition to those found in Spring 2001) location each was found of the CNPS List 4 sensitive species **southern California black walnut (*Juglans californica* var. *californica*)** and **southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*)**. Two southern California black walnut (*Juglans californica* var. *californica*) trees were found in the willow-cottonwood riparian forest of the Santa Clara River on relatively flat terrain at an elevation of about 940 feet. About ten clumps of southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*) were found with *Baccharis salicifolia* and *Scirpus microcarpus* on a low terrace in the riverbed at 925 feet.

At the Water Reclamation Plant site, four additional populations of **southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*)** were found in secondary channels and on a low terrace on flat terrain, at about 850 feet. The plants occurred on alluvial soils, and were associated mostly with wetland species. A summary of these populations is provided below, and their locations have been marked on the accompanying map.

1. ~25 clumps, with *Pluchea sericea*, *Baccharis salicifolia*, and *Tamarix* sp.
2. 5 clumps, with *Arundo donax*, *Tamarix* sp., and *Baccharis salicifolia.*
3. 6 clumps, with *Tamarix* sp., *Scirpus americanus*, and *Heliotropium curassavicum.*
4. ~50 clumps, scattered over a relatively large area, with *Populus fremontii* ssp. *fremontii*, *Baccharis salicifolia*, and *Tamarix* sp.

4. PLANT SPECIES LIST

Plant species observed at the River Village and Water Reclamation Plant sites are listed below.

FERNS AND FERN-ALLIES
Azollaceae
Azolla filiculoides
Equisetaceae
Equisetum laevigatum
ANGIOSPERMS
DICOTYLEDONS
Asteraceae
Ambrosia acanthicarpa
Ambrosia psilostachya
Artemisia californica
Artemisia douglasiana
Artemisia tridentata
Baccharis emoryi
Baccharis pilularis
Baccharis salicifolia
Conyza canadensis
Euthamia occidentalis
*Gnaphalium luteo-album**
Gnaphalium stramineum
Helianthus annuus
Helianthus gracilentus
Heterotheca grandiflora
Heterotheca sessiliflora ssp. *fastigiata*
Lepidospartum squamatum
Pluchea odorata
Pluchea sericea
*Pulicaria paludosa**
Senecio flaccidus var. *douglasii*
Xanthium strumarium
Boraginaceae
Heliotropium curassavicum
Brassicaceae
*Brassica nigra**
*Hirschfeldia incana**
*Lepidium latifolium**
Rorippa nasturtium-aquaticum
Cactaceae
Opuntia littoralis
Opuntia prolifera
Capparaceae
Isomeris arborea
Caprifoliaceae
Sambucus mexicana
Chenopodiaceae
Atriplex lentiformis
*Salsola tragus**
Euphorbiaceae
Croton californicus
Fabaceae
Lotus scoparius
*Melilotus albus**
Fagaceae
Quercus agrifolia var. *agrifolia*
Hydrophyllaceae
Eriodictyon crassifolium var. *nigrescens*
Juglandaceae
Juglans californica var. *californica*†
Lamiaceae
*Marrubium vulgare**
Onagraceae
Epilobium canum
Epilobium ciliatum ssp. *ciliatum*
Ludwigia peploides ssp. *peploides*
Oenothera californica ssp. *californica*
Oenothera elata ssp. *hirsutissima*
Plantaginaceae
*Plantago major**
Platanaceae
Platanus racemosa
Polygonaceae
Eriogonum baileyi
Eriogonum brachyanthum
Eriogonum fasciculatum var. *foliolosum*
Eriogonum gracile
Polygonum hydropiperoides
Polygonum punctatum
*Rumex crispus**
Rosaceae
Rosa californica
Rubus ursinus

Salicaceae
Populus fremontii ssp. *fremontii*
Salix exigua
Salix laevigata
Salix lasiolepis
Saururaceae
Anemopsis californica
Scrophulariaceae
*Veronica anagallis-aquatica**
Solanaceae
Datura wrightii
*Nicotiana glauca**
Solanum douglasii
Tamaricaceae
Tamarix sp.*
Urticaceae
Urtica dioica ssp. *holosericea*
ANGIOSPERMS
MONOCOTYLEDONS
Cyperaceae
Cyperus odoratus
Eleocharis parishii
Scirpus acutus var. *occidentalis*
Scirpus americanus
Scirpus californicus
Scirpus microcarpus
Scirpus pungens
Juncaceae
Juncus acutus ssp. *leopoldii*†
Juncus mexicanus
Juncus textilis
Lemnaceae
Lemna minuscula
Poaceae
*Arundo donax**
*Avena barbata**
*Avena fatua**
*Bromus diandrus**
*Bromus hordeaceus**
Bromus madritensis ssp. *rubens**
Distichlis spicata
Leymus triticoides
*Polypogon monspeliensis**
*Schismus barbatus**
*Vulpia myuros**
Typhaceae
Typha domingensis
Typha latifolia

* Non-native plant species
*? Possible non-native plant species
† Sensitive plant species

5. REFERENCES

Hickman, J.C. (Editor). 1993. The Jepson Manual, Higher Plants of California. University of California Press, Berkeley, California.

Holland, R.F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. Unpublished Report. State of California, The Resources Agency, Department of Fish and Game, Natural Heritage Division, Sacramento, California.

Plant Species Occurring or Potentially Occurring on the Project Site

PLANT SPECIES OCCURRING OR POTENTIALLY OCCURRING ON OR ADJACENT TO NEWHALL RANCH

LYCOPODIAE

SELAGINELLACEAE - SPIKE-MOSS FAMILY

Selaginella bigelovii - Bigelow's spike-moss

EQUISETAE

EQUISETACEAE - HORSETAIL FAMILY

Equisetum hyemale – common scouring-rush
Equisetum laevigatum - smooth scouring-rush
Equisetum telmateia - giant horsetail

FILACEAE

AZOLLACEAE - MOSQUITO FERN FAMILY

Azolla c.f. filiculoides - duckweed fern

DENNSTAEDTIACEAE - BRAKEN FAMILY

Adiantum jordani - California maiden-hair
Pellaea andromedifolia - coffee fern
Pellaea mucronata var. *mucronata* - bird's-foot fern
Pentagramma triangularis - goldenback fern

POLYPODIACEAE - POLYPODY FAMILY

Polypodium californicum - California polypody

CONIFERAE

CUPRESSACEAE - CYPRESS FAMILY

* *Cedrus deodar*a - Deodar cedar
Juniperus californica - California juniper

PINACEAE - PINE FAMILY

* *Pinus halepensis* - Aleppo pine
* *Pinus pinea* – stone pine

ANGIOSPERMAE (DICOTYLEDONES)

AIZOACEAE - FIG-MARIGOLD FAMILY

*	*Aptenia cordifolia* - baby sun-rose
*	*Carpobrotus* sp. - sea-fig

AMARANTHACEAE - AMARANTH FAMILY

*	*Amaranthus albus* - tumbleweed
	Amaranthus blitoides - prostrate amaranth
*	*Amaranthus hybridus* - amaranth
	Amaranthus palmeri – Palmer's amaranth
	Amaranthus powellii – Powell's amaranth
*	*Amaranthus retroflexus* - rough pigweed

ANACARDIACEAE - SUMAC FAMILY

	Malosma laurina - laurel sumac
	Rhus ovata - sugar-bush
	Rhus trilobata - squaw bush
*	*Schinus molle* - Peruvian pepper-tree
	Toxicodendron diversilobum - poison-oak

APIACEAE - CARROT FAMILY

*	*Anethum graveolens* - dill
	Apiastrum angustifolium - wild celery
*	*Apium graveolens* - celery
	Berula erecta - cutleaf water-parsnip
	Bowlesia incana – American Bowlesia
*	*Conium maculatum* – poison hemlock
*	*Coriandrum sativum* - cilantro
*	*Daucus carota* – Queen Anne's lace
	Daucus pusillus – rattlesnake weed
	Lomatium utriculatum - common lomatium
	Sanicula bipinnata – poison sanicle

APOCYNACEAE - DOGBANE FAMILY

	Apocynum cannabinum - Indian hemp
*	*Vinca major* - periwinkle

ASCLEPIADACEAE - MILKWEED FAMILY

	Asclepias californica – California milkweed
	Asclepias fascicularis - narrow-leaf milkweed

ASTERACEAE - SUNFLOWER FAMILY

Achillea millefolium – yarrow
Achyrachaena mollis – blow-wives
Acourtia microcephala – sacapellote
Agoseris grandiflora – large-flowered agoseris
Ambrosia acanthicarpa - annual burweed
Ambrosia confertifolia - weak-leaved burweed
Ambrosia psilostachya - western ragweed
Artemisia californica - coastal sagebrush
Artemisia douglasiana - California mugwort
Artemisia dracunculus - tarragon
Artemisia tridentata - Great Basin sagebrush
Baccharis douglasii - marsh baccharis
Baccharis emoryi – Emory's baccharis
Baccharis pilularis - coyote brush
Baccharis salicifolia - mule fat
Baccharis sarothroides - chaparral broom
Brickellia californica - California brickellbush
Brickellia nevinii - Nevin's brickellbush
* *Carduus pycnocephalus* - Italian thistle
* *Centaurea melitensis* - star thistle
Chaenactis glabriuscula - yellow pincushion
* *Chrysothamnus nauseosus* - rubber rabbitbrush
Cirsium occidentale var. *californicum*- California thistle
Cirsium occidentale var. *occidentale*- cobwebby thistle
* *Cirsium vulgare* - bull thistle
* *Cnicus benedictus* - blessed thistle
Conyza canadensis - horseweed
Conyza coulteri - Coulter's conyza
Coreopsis bigelovii – Bigelow's coreopsis
* *Coreopsis tinctoria* – calliopsis
Corethrogyne filaginifolia - virgate cudweed aster
* *Cotula coronopifolia* - African brass-buttons
Encelia actoni - Acton's encelia
Encelia californica - California bush sunflower
Encelia farinosa - brittlebush, incensio
Ericameria palmeri var. *pachylepis* - goldenbush
Ericameria pinifolia - pine-bush

Erigeron foliosus - leafy daisy
Eriophyllum confertiflorum - long-stem golden yarrow
Euthamia occidentalis - western goldenrod
Filago californica - California fluffweed
* *Filago gallica* - narrow-leaf filago
* *Gazania linearis* - gazania
Gnaphalium bicolor - bicolor cudweed
Gnaphalium californicum - California everlasting
Gnaphalium canescens ssp. *microcephalum* - white everlasting
Gnaphalium leucocephalum – Sonora everlasting
Gnaphalium luteo-album - white cudweed
Gnaphalium sp. *nova* - everlasting
Gnaphalium palustre - lowland cudweed
Hazardia squarrosa ssp. *grindelioides* - saw-toothed goldenbush
Helianthus annuus - common sunflower
Helianthus nuttallii c.f. ssp. *parishii* - Los Angeles sunflower
Hemizonia fasciculata - fascicled tarweed
Hemizonia kelloggii – Kellogg's tarweed
Heterotheca grandiflora - telegraph weed
Heterotheca sessiliflora - golden aster
Isocoma menziesii - goldenbush
Iva axillaris - poverty weed
* *Lactuca saligna* – willowleaf lettuce
* *Lactuca serriola* - prickly lettuce
Lagophylla ramosissima – common hareleaf
Lasthenia californica - coast goldfields
Lepidospartum squamatum - scale-broom
Lessingia filaginifolia – California aster
Lessingia glandulifera – lessingia
Malacothrix saxatilis - cliff malacothrix
* *Matricaria matricarioides* - pineapple weed
Micropus californicus - slender cottonweed
Pluchea odorata - marsh-fleabane
Pluchea sericea - arrow weed
* *Pulicaria paludosa* - Spanish sunflower
Rafinesquia californica - California chicory
Senecio californicus – California butterweed
Senecio flaccidus var. *douglasii* - butterweed
* *Senecio vulgaris* - common groundsel
Silybum marianum - milk thistle

* *Sonchus asper* - prickly sow-thistle
* *Sonchus oleraceus* - common sow-thistle
Stebbinoseris heterocarpa [*Microseris heterocarpa*] – brown puffs
Stephanomeria exigua - small wreathplant
Stephanomeria pauciflora - wire-lettuce
Stephanomeria virgata - twiggy wreathplant
Stylocline gnaphaloides - everlasting nest-straw
Uropappus lindleyi [*Microseris lindleyi*] – silver puffs
Wyethia ovata - mule ears
Xanthium spinosum - spiny cocklebur
Xanthium strumarium – cocklebur

BETULACEAE – BIRCH FAMILY

Alnus rhombifolia – white alder

BORAGINACEAE - BORAGE FAMILY

Amsinckia menziesii var. *intermedia* - yellow fiddleneck
Amsinckia menziesii var. *menziesii* - yellow fiddleneck
Amsinckia tessellata – devil's lettuce
Cryptantha sp. - forget-me-not
Cryptantha intermedia - common forget-me-not
Cryptantha micrantha – redroot cryptantha
Cryptantha microstachys – tejon cryptantha
Cryptantha muricata – prickly cryptantha
Heliotropium curassavicum - wild heliotrope
Pectocarya linearis - slender pectocarya
Pectocarya penincillata - pectocarya
Pectocarya setosa - pectocarya
Plagiobothrys arizonicus - popcorn flower
Plagiobothrys canescens - rusty popcorn flower
Plagiobothrys collinus - California popcorn flower
Plagiobothrys fulvus - *common popcorn flower*

BRASSICACEAE - MUSTARD FAMILY

Athysanus pusillus – dwarf athysanus
* *Brassica nigra* - black mustard
* *Capsella bursa-pastoris* - shepard's purse
Caulanthus lasiophyllus – California mustard
Descurainia pinnata ssp. *halictorum* – tansy mustard
* *Hirschfeldia incana* - short-podded mustard

Lepidium lasiocarpum - peppergrass
* *Lepidium latifolium* - peppergrass
Lepidium virginicum - wild peppergrass
* *Lobularia maritime* – sweet-alyssum
* *Raphanus sativus* - wild radish
* *Rorippa nasturtium-aquaticum* - water cress
* *Sisymbrium altissimum* - tumble mustard
* *Sisymbrium irio* - London rocket
* *Sisymbrium officinale* - hedge mustard
* *Sisymbrium orientale* - Oriental mustard
Stanleya pinnata var. *pinnata*– Prince's plume
Thysanocarpus curvipes – fringepod
Tropidocarpum gracile – slender dobie-pod

CACTACEAE - CACTUS FAMILY

* *Cereus peruvianus* - Peruvian apple cactus
Opuntia basilaris var. *ramosa* – beaver-tail cactus
Opuntia californica var. *parkeri* - cane cholla
Opuntia littoralis - coastal prickly-pear
Opuntia X vaseyi - prickly-pear cactus
* *Trichocereus spachianus* - golden torch cactus

CAPPARACEAE - CAPER FAMILY

Isomeris arborea - bladderpod

CAPRIFOLIACEAE - HONEYSUCKLE FAMILY

Lonicera subspicata - southern honeysuckle
Sambucus mexicana - Mexican elderberry
Symphoricarpos sp. - snowberry
Symphoricarpos c.f. mollis - spreading snowberry

CARYOPHYLLACEAE - PINK FAMILY

* *Cerastium glomeratum* - sticky mouse-ear
* *Herniaria cinerea* - gray herniaria
Loeflingia squarrosa - no common name
* *Silene gallica* - common catchfly
Spergularia sp. - stickwort, starwort
* *Spergularia rubra* - sand-spurrey
* *Spergularia c.f. villosa* - villous sand-spurrey
* *Stellaria media* - common chickweed

CASURINACEAE – SHEET OAK FAMILY

* *Casuarina cunninghamiana* - Austrailian Pine

CHENOPODIACEAE - GOOSEFOOT FAMILY

Atriplex canescens - four-winged saltbush
* *Atriplex heterosperma* - weedy orache
Atriplex lentiformis- big saltbush, quail brush
* *Atriplex rosea* - tumbling oracle
* *Atriplex semibaccata* - Australian saltbush
Atriplex serenana var. *serenana* - bractscale
Atriplex suberecta - Australian saltbush
Atriplex triangularis – spearscale
* *Bassia hyssopifolia* - five-hooked bassia
* *Beta vulgaris* – garden beet
* *Chenopodium album* - lamb's-quarters
* *Chenopodium ambrosioides* - Mexican tea
Chenopodium berlandieri - pitseed goosefoot
* *Chenopodium botrys* - goosefoot
Chenopodium californicum - California goosefoot
* *Chenopodium murale* - nettle-leaved goosefoot
Chenopodium rubrum - red goosefoot
* *Salsola tragus* - Russian-thistle
* *Spinacia oleracea* – spinach

CONVOLVULACEAE - MORNING-GLORY FAMILY

Calystegia macrostegia ssp. *cyclostegia* – morning-glory
Calystegia peirsonii - Peirson's morning-glory
* Convolvulus arvensis - bindweed

CRASSULACEAE - STONECROP FAMILY

Crassula connata - dwarf stonecrop
Dudleya cymosa - unidentified dudleya
Dudleya lanceolata - lanceleaf dudleya

CUCURBITACEAE - GOURD FAMILY

Cucurbita foetidissima - coyote-melon, calabazilla
Marah macrocarpus - wild cucumber

CUSCUTACEAE - DODDER FAMILY

Cuscuta californica - California dodder
Cuscuta pentagona – five-angled dodder
Cuscuta subinclusa – canyon dodder

DATISCACEAE - DASTICA FAMILY

Dastica glomerata - Durango root

ERICACEAE - HEATH FAMILY

Arctostaphylos glauca - bigberry manzanita

EUPHORBIACEAE - SPURGE FAMILY

Chamaesyce albomarginata - rattlesnake spurge
* *Chamaesyce maculata* – spotted spurge
Chamaesyce polycarpa - small-seed sand mat
Chamaesyce serpyllifolia – thyme-leafed spurge
Croton californicus - California croton
Eremocarpus setigerus - doveweed

Euphorbia spathulata - reticulate-seed spurge
* *Ricinus communis* - castor-bean
Stillingia linearifolia - linear-leaved stillingia

FABACEAE - PEA FAMILY

* *Acacia baileyana* - golden wattle
Astragalus didymocarpus – white dwarf locoweed
Astragalus gambelianus – Gambel's locoweed
Astragalus trichopodus - Santa Barbara locoweed
Glycyrrhiza lepidota - wild licorice
Lathyrus laetiflorus - wild sweet pea
Lathyrus vestitus - wild pea
Lotus corniculatus - bird's-foot lotus
Lotus hamatus – grab lotus
Lotus humistratus - lotus
Lotus purshianus - Spanish-clover
Lotus salsuginosus - coastal lotus
Lotus scoparius var. *scoparius* - deerweed
Lotus strigosus - strigose deerweed
Lupinus bicolor - Lindley's annual lupine
Lupinus excubitus – Mountain Springs bush lupine
Lupinus excubitus var. *hallii* - grape soda lupine
Lupinus hirsutissimus - stinging lupine
Lupinus microcarpus var. *densiflorus* - chick lupine
Lupinus microcarpus var. *microcarpus* - chick lupine
Lupinus sparsiflorus - Coulter's lupine
Lupinus succulentis - arroyo lupine
Lupinus truncatus - collar lupine
* *Medicago polymorpha* - California burclover
* *Medicago polymorpha* var. *brevispina* - short-spined California burclover
* *Medicago sativa* - alfalfa
* *Melilotus alba* - white sweet-clover
* *Melilotus indica* - yellow sweet-clover
* *Robinia pseudoacacia* - black locust
Trifolium sp. – clover
Trifolium albopurpureum – rancheria clover
Trifolium ciliolatum- tree clover
* *Trifolium fragiferum* - strawberry clover

Trifolium gracilentum – pin-point clover
* *Trifolium hirtum* - rose clover
Trifolium microcephalum – maiden clover
* *Trifolium repens* - white clover
Trifolium willdenovii – valley clover
Vicia hassei – Hesse's vetch
* *Vicia villosa* ssp. *villosa* – winter vetch

FAGACEAE - BEECH FAMILY
Quercus agrifolia - coast live oak
Quercus berberidifolia - scrub oak
Quercus douglasii - blue oak
Quercus lobata - valley oak

GERANIACEAE - GERANIUM FAMILY
* *Erodium brachycarpum* – shortfruit stork's bill
* *Erodium botrys* – long-beaked filaree
* *Erodium cicutarium* - red-stemmed filaree
* *Erodium moschatum* – white-stemmed filaree

GROSSULARIACEAE - CURRANT FAMILY
Ribes aureum - golden currant
Ribes malvaceum - chaparral currant

HYDROPHYLLACEAE - WATERLEAF FAMILY
Emmenanthe penduliflora - whispering bells
Eriodictyon crassifolium var. *nigrescens* - yerba santa
Eucrypta chrysanthemifolia - common eucrypta
Nemophila menziesii – baby blue-eyes
Nemophila parviflora var. *quercifolia* – oak-leaved nemophila
Phacelia cicutaria - caterpillar phacelia
Phacelia cicutaria var. *hispida* – caterpillar phacelia
Phacelia distans - blue fiddleneck
Phacelia imbricata ssp. *imbricata* - imbricate phacelia
Phacelia minor - wild canterbury-bell
Phacelia ramosissima - shrubby phacelia

JUGLANDACEAE - WALNUT FAMILY
Juglans californica - southern California black walnut

LAMIACEAE - MINT FAMILY

* *Marrubium vulgare* - horehound
Mentha citrata – orange mint
Salvia apiana - white sage
Salvia columbariae - chia
Salvia leucophylla - purple sage
Salvia mellifera - black sage
Stachys ajugoides – bugle hedge-nettle
Stachys ajugoides var. *rigida* - rigid hedge-nettle
Stachys albens - white hedge-nettle
Trichostema lanceolatum - vinegar weed

LAURACEAE - LAUREL FAMILY
Umbellularia californica - California laurel

LOASACEAE - STICK-LEAF FAMILY
Mentzelia sp. – blazing star
Mentzelia laevicaulis - blazing star
Mentzelia micrantha - small-flowered stick-leaf

LYTHRACEAE - LOOSESTRIFE FAMILY
Lythrum californicum - California loosestrife

MALVACEAE - MALLOW FAMILY
Malacothamnus fasciculatus ssp. *laxiflorus* – chaparral bush mallow
Malacothamnus fremontii – bush mallow
Malacothamnus marrubioides - bush mallow
* *Malva neglecta* - common mallow
* *Malva parviflora* - cheeseweed

MELIACEAE - MAHOGANY FAMILY
* *Melia azedarach* - China berry

MORACEAE - FIG FAMILY

* *Ficus carica* – edible fig

MYRTACEAE - MYRTLE FAMILY

* *Eucalyptus* sp. - eucalyptus
* *Eucalyptus camaldulensis* – red gum
* *Eucalyptus globulus* - blue gum
* *Eucalyptus leucoxylon* - white ironbark
* *Eucalyptus polyanthemos* – silver dollar gum
* *Eucalyptus sideroxylon* - red ironbark

NYCTAGINACEAE - FOUR O'CLOCK FAMILY

Mirabilis laevis var. *crassifolia* [*M. californica*]- California wishbone-bush

OLEACEAE - OLIVE FAMILY

Fraxinus dipetala - California ash
* *Fraxinus uhdei* – tropical ash
Fraxinus velutina – velvet ash
* *Ligustrum lucidum* - glossy privet
* *Olea europaea* - mission olive

ONAGRACEAE - EVENING-PRIMROSE FAMILY

Camissonia bistorta – southern sun cup
Camissonia boothii - sun cup
Camissonia boothii ssp. *decorticans* – shredding evening primrose
Camissonia californica - mustard primrose
Camissonia hirtella - sun cup
Camissonia strigulosa - sun cup
Clarkia purpurea - winecup clarkia
Clarkia speciosa - clarkia
Clarkia unguiculata - elegant clarkia
Epilobium brachycarpum - willow herb
Epilobium canum ssp. *canum* - California fuchsia
Epilobium ciliatum - California cottonweed
Ludwigia peploides - yellow waterweed

Ludwigia repens - water primrose
Oenothera elata - evening primrose
* *Oenothera laciniata* - evening primrose

OROBANCHACEAE - BROOM-RAPE FAMILY
Orobanche parishii ssp. *parishii* - broom-rape

PAEONIACEAE - PEONY FAMILY
Paeonia californica - California peony

PAPAVERACEAE - POPPY FAMILY
Argemone corymbosa – prickly poppy
Eschscholzia californica - California poppy
Platystemon californicus – California creamcups

PLANTAGINACEAE - PLANTAIN FAMILY
Plantago erecta - dot-seed plantain
* *Plantago indica* - plantain
* *Plantago lanceolata* - English plantain
* *Plantago major* - common plantain

PLATANACEAE - SYCAMORE FAMILY
Platanus racemosa - western sycamore

POLEMONIACEAE - PHLOX FAMILY
Allophyllum divaricatum - purple false gillyflower
Allophyllum glutinosum – sticky false gillyflower
Eriastrum densifolium – woollystar
Eriastrum densifolium ssp. *elongatum* - elongate eriastrum
Eriastrum densifolium ssp. *mohavense* - Mohave eriastrum
Eriastrum sapphirinum - sapphire eriastrum
Gilia angelensis - angel gilia
Gilia capitata – globe gilia
Leptodactylon californicum - prickly phlox
Linanthus androsaceus – common linanthus

Linanthus pygmaeus - linanthus
Navarretia atractyloides - holly-leaf skunkweed
Phlox gracilis – slender phlox

POLYGONACEAE - BUCKWHEAT FAMILY

Chorizanthe parryi var. *fernandina* - San Fernando Valley spineflower
Chorizanthe staticoides - turkish rugging
Eriogonum angulosum - angle-stem buckwheat
Eriogonum baileyi – Bailey's buckwheat
Eriogonum brachyanthum – short-flowered buckwheat
Eriogonum elongatum - long-stemmed buckwheat
Eriogonum fasciculatum ssp. *foliolosum* - California buckwheat
Eriogonum fasciculatum ssp. *polifolium* - California buckwheat
Eriogonum gracile var. gracile - slender woolly buckwheat
Eriogonum gracillimum – rose and white buckwheat
Eriogonum maculatum – spotted buckwheat
Eriogonum c.f. viridescens - buckwheat
Lastarriaea coriacea - lastarriaea
* *Polygonum arenastrum* - common knotweed
* *Polygonum argyrocoleon* - smartweed
Polygonum lapathifolium - willow weed
Polygonum punctatum - perennial smartweed
Pterostegia drymarioides - pterostegia
* *Rumex conglomeratus* - whorled dock
* *Rumex crispus* - curly dock
Rumex hymenosepalus - wild rhubarb
Rumex maritimus – golden dock
Rumex obtusifolius - dock
Rumex salicifolius - willow dock

PORTULACACEAE - PURSLANE FAMILY

Calandrinia ciliata - redmaids
Claytonia parviflora - small-leaved montia
Claytonia perfoliata – miner's lettuce
* *Portulaca oleracea* - common purslane

RANUNUCULACEAE - BUTTERCUP FAMILY

Clematis ligusticifolia - yerba de chiva
Delphinium parryi ssp. *parryi* – Parry’s larkspur

RHAMNACEAE - BUCKTHORN FAMILY

Ceanothus crassifolius - hoary-leaved ceanothus
Ceanothus tomentosus - woolyleaf ceanothus
Rhamnus crocea - redberry
Rhamnus ilicifolia - holly-leaf redberry

ROSACEAE - ROSE FAMILY

Adenostoma fasciculatum – chamise
Cercocarpus betuloides – mountain-mahogany
Cercocarpus betuloides var. *betuloides* - birch-leaf mountain-mahogany
Cercocarpus betuloides var. *blancheae* - island mountain-mahogany
Heteromeles arbutifolia - toyon
Prunus ilicifolia - holly-leaf cherry
Rosa californica - California rose
Rubus ursinus - California blackberry
* *Sangwisorba minor* – garden burnet

RUBIACEAE - MADDER FAMILY

Galium angustifolium - narrow-leaved bedstraw
* *Galium aparine* - goose grass
Galium nuttallii ssp. *nuttallii* – San Diego bedstraw
Galium porrigens - climbing bedstraw

SALICACEAE - WILLOW FAMILY

Populus fremontii - Fremont's cottonwood
Salix exigua - narrow-leaved willow
Salix gooddingii - black willow
Salix laevigata - red willow
Salix lasiolepis - arroyo willow
Salix lucida ssp. *lasiandra* - golden willow

SAURURACEAE - LIZARD'S-TAIL FAMILY

Anemopsis californica - yerba mansa

SCROPHULARIACEAE - FIGWORT FAMILY

Antirrhinum coulterianum - white snapdragon
Antirrhinum multiflorum – withered snapdragon
Castilleja affinis - coast paintbrush
Castilleja densiflora - dense-flowered owl's-clover
Castilleja exserta - common owl's-clover
Castilleja foliolosa - woolly Indian paintbrush
Collinsia heterophylla – purple Chinese houses
Cordylanthus rigidus – bird’s beak
Keckiella cordifolia - heart-leaf penstemon
Linaria canadensis - toadflax
Mimulus aurantiacus - bush monkeyflower
Mimulus aurantiacus var. *pubescens* - bush monkeyflower
Mimulus guttatus - seep monkeyflower
Mimulus pilosus – downy monkeyflower
Penstemon centranthifolius - scarlet bugler
* *Verbascum thapsus* - woolly mullein
* *Verbascum virgatum* - wand mullein
* *Veronica anagallis-aquatica* - water speedwell

SIMAROUBACEAE - QUASSIA FAMILY

* *Ailanthus altissima* - tree of heaven

SOLANACEAE - NIGHTSHADE FAMILY

Datura wrightii - western jimsonweed
* *Nicotiana glauca* - tree tobacco
Nicotiana quadrivalvis – Indian tobacco
* *Solanum americanum* - small-flowered nightshade
Solanum douglasii - white nightshade
* *Solanum eleagnifolium* - silver leaf horse-nettle
* *Solanum sarrachoides* - hairy nightshade
Solanum xanti - chaparral nightshade

TAMARICACEAE - TAMARISK FAMILY

* *Tamarix* sp. – tamarisk

* *Tamarix ramoissima* - tamarisk

ULMACEAE - ELM FAMILY

* *Ulmus pumila* - Siberian elm

URTICACEAE - NETTLE FAMILY

Hesperocnide tenella – western nettle

Parietaria hespera – western pellitory

Urtica dioica - giant creek nettle

* *Urtica urens* - dwarf nettle

VERBENACEAE - VERVAIN FAMILY

Verbena lasiostachys - western verbena

VIOLACEAE – VIOLET FAMILY

Viola pedunculata – Johnny jump-ups

VISCACEAE - MISTLETOE FAMILY

Phoradendron macrophyllum - big leaf mistletoe

Phoradendron villosum - oak mistletoe

VITACEAE - GRAPE FAMILY

Parthenocissus vitacea - woodbine, Virginia creeper

Vitis girdiana - desert wild grape

ZYGOPHYLLACEAE - CALTROP FAMILY

* *Tribulus terrestris* - puncture vine

ANGIOSPERMAE (MONOCOTYLEDONES)

ARECACEAE - PALM FAMILY

* *Washingtonia robusta* - Mexican fan palm

CYPERACEAE - SEDGE FAMILY

Carex alma – sturdy sedge

Carex praegracilis – clustered field sedge

Carex sp. - sedge

Cyperus eragrostis - tall cyperus

Cyperus esculentus - yellow nut-grass
* *Cyperus involucratus* - nutsedge
Cyperus odoratus - coarse cyperus
Eleocharis montevidensis - slender creeping spike-rush
Eleocharis parishii – Parish's spikerush
Eleocharis rostellata – beaked spikerush
Scirpus acutus - hard-stemmed bulrush
Scirpus americanus - winged three-square
Scirpus maritimus – alkali bulrush
Scirpus microcarpus - bulrush
Scirpus robustus - Pacific coast bulrush

JUNCACEAE - RUSH FAMILY

Juncus sp. - rush
Juncus acutus ssp. *leopoldii* – southwestern spiny rush
Juncus balticus - wire rush
Juncus bufonius - toad rush
Juncus longistylis – rush
Juncus mexicanus – Mexican rush
Juncus rugulosus - wrinkled rush
Juncus textilis - Indian rush
Juncus torreyi – rush
Juncus triformis - Yosemite dwarf rush
Juncus xiphioides - iris-leaved rush

LEMNACEAE - DUCKWEED FAMILY

Lemna miniscula - duckweed
Lemna valdiviana - duckweed

LILIACEAE - LILY FAMILY

* *Allium cepa* - onion
Allium porrum - onion
* *Amaryllis bella-donna* - naked lady
* *Asparagus officinalis* – asparagus
Bloomeria crocea – common goldenstar
Brodiaea terrestris ssp. *kernensis* – dwarf brodiaea
Calochortus clavatus var. *gracilis*- slender mariposa lily
Calochortus venustus - mariposa lily

Dichelostemma capitatum - blue dicks
Muilla maritima - common muilla
Yucca whipplei – Our Lord's candle

POACEAE - GRASS FAMILY

Achnatherum coronatum - giant needlegrass
* *Agrostis* sp. - bentgrass
* *Agrostis viridis* - water bent
* *Arundo donax* - giant reed
* *Avena barbata* - slender oat
* *Avena fatua* - wild oat
Avena sativa – cultivated oat
Bromus catharticus - California brome
Bromus catharticus var. *catharticus* - California brome
* *Bromus diandrus* - ripgut grass
* *Bromus hordeaceus* - soft chess
* *Bromus madritensis* ssp. *rubens* - foxtail chess
* *Bromus sterilis* – sterile brome
* *Bromus tectorum* - cheat grass
* *Cortaderia jubata* - pampas grass
* *Crypsis schoenoides* - prickle grass
* *Cynodon dactylon* - Bermuda grass
* *Digitaria sanguinalis* - hairy crabgrass
Distichlis spicata - salt grass
* *Echinochloa colonum* - jungle-rice
Echinochloa crus-galli - barnyard grass
* *Eleusine indica* – goose grass
Elymus glaucus - western wild-rye
Elymus multisetus – big squirreltail
Eragrostis mexicana - lovegrass
* *Festuca arundinacea* - tall fescue
* *Hordeum marinum* - Mediterranean barley
* *Hordeum murinum* - glaucous foxtail barley
* *Lamarckia aurea* - goldentop
* *Leptochloa uninerva* - Mexican sprangletop
Leymus condensatus - giant ryegrass
Leymus triticoides - beardless wild rye
Leptichloa uninervia - Mexican sprangletop
* *Lolium multiflorum* – Italian ryegrass
* *Lolium perenne* - perennial ryegrass

Melica imperfecta - California melic
Muhlenbergia asperifolia – scratch-grass
Muhlenbergia microsperma - littleseed muhly
Nassella cernua – nodding needlegrass
Nassella lepida – foothill needlegrass
Nassella pulchra – purple needlegrass
Panicum capillare – western witchgrass
* *Panicum miliaceum* – broom corn millet
* *Parapholis incurve* – sickle grass
Paspalum distichum – knotgrass
* *Phalaris aquatica* – Harding grass
* *Phalaris minor* - Mediterranean canary grass
* *Piptatherum miliaceum* - smilo grass
* *Poa annua* - annual bluegrass
Poa secunda - Malpais bluegrass
* *Polypogon interruptus* - ditch beard grass
* *Polypogon monspeliensis* - rabbit's-foot grass
Schismus barbatus – abumashi
Sorghum bicolor – sorghum
Sorghum halepense – Johnsongrass
Sporobolus airoides – alkali scation
* *Triticum aestivum* – cultivated wheat
Vulpia microstachys - fescue
* *Vulpia myuros* - rattail fescue
Vulpia octoflora - six-weeks fescue

POTAMOGETONACEAE - PONDWEED FAMILY

Potamogeton foliosus - leafy pondweed

TYPHACEAE - CATTAIL FAMILY

Typha domingensis - slender cattail
Typha latifolia - broad-leaved cattail

* signifies introduced (non-native) species

Please refer to map No. 4.4-E in the accompanying map box.

DRAFT

Biological Resources Technical Report

Newhall Ranch High Country Specific Management and Salt Creek Area

OCTOBER 2006

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BIOLOGICAL RESOURCES TECHNICAL REPORT

for the

Newhall Ranch High Country Specific Management Area

and the

Salt Creek Area

October 2006

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SUMMARY OF FINDINGS

Dudek conducted general biological surveys, including vegetation mapping, general wildlife surveys, and sensitive plant surveys within the approximately 4,205-acre Newhall Ranch High Country Specific Management Area (NRHC SMA) and the 1,518-acre Salt Creek area. Collectively, these areas are referred to as the study area in this report. The study area is located in an unincorporated portion of the Santa Clara River Valley on the north slopes of the Santa Susana Mountains between Potrero and Tapo canyons and straddles the Los Angeles/Ventura County Line. Site elevations range from 800 feet above mean sea level (AMSL) in the Santa Clara River bottom in Ventura County to approximately 3,500 feet AMSL on the ridgeline of the Santa Susana Mountains along the southern boundary.

Dudek conducted sensitive plant surveys between April and July, 2003 within approximately 5,133 acres of the total 5,723 acres within the study area. Dudek conducted sensitive plant surveys within the remaining 590 acres of the study area between May and July, 2006. Dudek conducted vegetation mapping and general wildlife surveys between early November and late December of 2005 and between May and August, 2006.

Sensitive plant species observed within the study area include slender mariposa lily (*Calochortus clavatus* var. *gracilis),* Plummer's mariposa lily (*Calochortus plummerae*), late-flowered mariposa lily (*Calochortus weedii* var. *vestus*), Peirson's morning glory (*Calystegia peirsonii)*, island mountain-mahogany (*Cercocarpus betuloides* var. *blancheae), s*outhern California black walnut (*Juglans californica*), navarretia (*Navarretia* sp. *nova*) and Parish's big sagebrush (*Artimisia tridentata* ssp. *parishii*).

A number of vegetation communities were identified within the study area during the vegetation surveys. Upland vegetation communnities dominate the landscape within the study area. The dominant upland plant communities include chaparral (undifferentiated), California sagebrush scrub, California grassland, live oak woodland, valley oak savannah, and agriculture. Riparian and wetland vegetation communities in Salt Creek and its tributaries include river wash, southern willow scrub, cismontane alkali marsh, elderberry scrub, bulrush-cattail wetland, southern cottonwood-willow riparian forest, arrowweed scrub and alluvial scrub.

The diversity of vegetation communities within the study area provide habitat for a number of sensitive wildlife species. Dudek conducted habitat assessments for the following sensitive species: arroyo toad (*Bufo californicus*), western pond turtle (*Clemmys marmorata pallida*), two-striped garter snake (*Thamnophis hammondii*), ringneck snake (*Diadophis punctatus*), California legless lizard (*Anniella pulchra*), coast horned lizard (*Phrynosoma coronatum*), coastal western whiptail (*Cnemidophorus tigris multiscutatus*), coastal rosy boa (*Charina* [*Lichanura*] *trivirgata rosefusca),* coast patch-nosed snake (*Salvadora hexalepis virgultea*), San Diego desert woodrat (*Neotoma lepida intermedia*), coastal California gnatcatcher (*Polioptila californica californica*), least Bell's vireo (*Vireo bellii pusillus*), and American badger (*Taxidea taxus*). Based on the given habitat information, elevational range, biological patterns of these species, and predatory base, Dudek anticipates that the study area is likely to support the species listed above. Coastal western whiptail and coast horned lizard were observed onsite.

1.0 INTRODUCTION

The purpose of this report is to document the results of general biological surveys, including vegetation mapping, general wildlife surveys, and sensitive plant species surveys within the approximately 4,205-acre Newhall Ranch High Country Specific Management Area (NRHC SMA) and the 1,518-acre Salt Creek area (*Figures 1* and *2*).

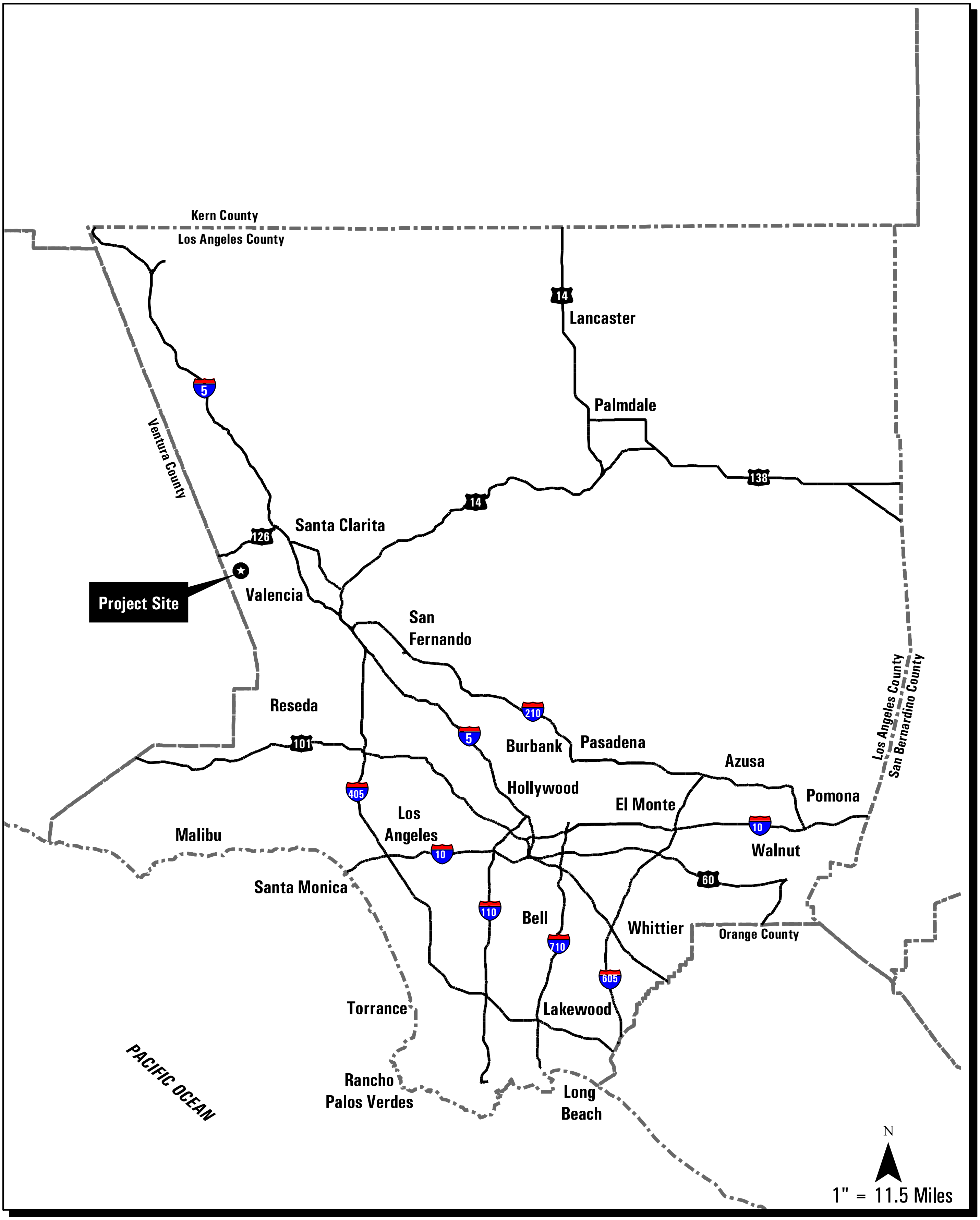
2.0 SITE DESCRIPTION

The NRHC SMA is located in the southern portion of the Newhall Ranch Specific Plan Area on the north slopes of the Santa Susana Mountains between Potrero and Tapo canyons in Los Angeles County. The Salt Creek area is adjacent to the NRHC SMA to the west in Ventura County (*Figures 1* and *2*). These two areas combined are considered the study area for this report. The study area lies roughly six miles west of Interstate 5 and west-southwest of the junction of I-5 and State Route 126 (SR-126). The City of Santa Clarita is located to the east of the study area. Site elevations range from 800 feet above mean sea level (AMSL) in the Santa Clara River bottom in Ventura County to approximately 3,500 feet AMSL on the ridgeline of the Santa Susana Mountains along the southern boundary (*Figure 2*).

This study area is dominated by rugged terrain with the main feature being a southeast-to-northwest drainage area for Salt Creek and its associated tributaries. Slope gradients range from moderate to very steep in most of the site to gentle within the Santa Clara River floodplain and along the lower portions of Salt Creek.

2.1 Plant Communities and Land Covers

Native and naturalized vegetation communities within the study area are representative of those found in this region and provide high-quality examples of those plant communities found in the Santa Susana Mountains and the Santa Clara River ecosystems in this area. Upland vegetation communities dominate the landscape within the study area. The major upland plant communities include chaparral (undifferentiated), California sagebrush scrub, California grassland, live oak woodland, valley oak savannah, and agriculture. Salt Creek and its tributaries support riverwash, southern willow scrub, cismontane alkali marsh, elderberry scrub, bulrush-cattail wetland, southern cottonwood-willow riparian forest, arrowweed scrub and alluvial scrub riparian plant communities.



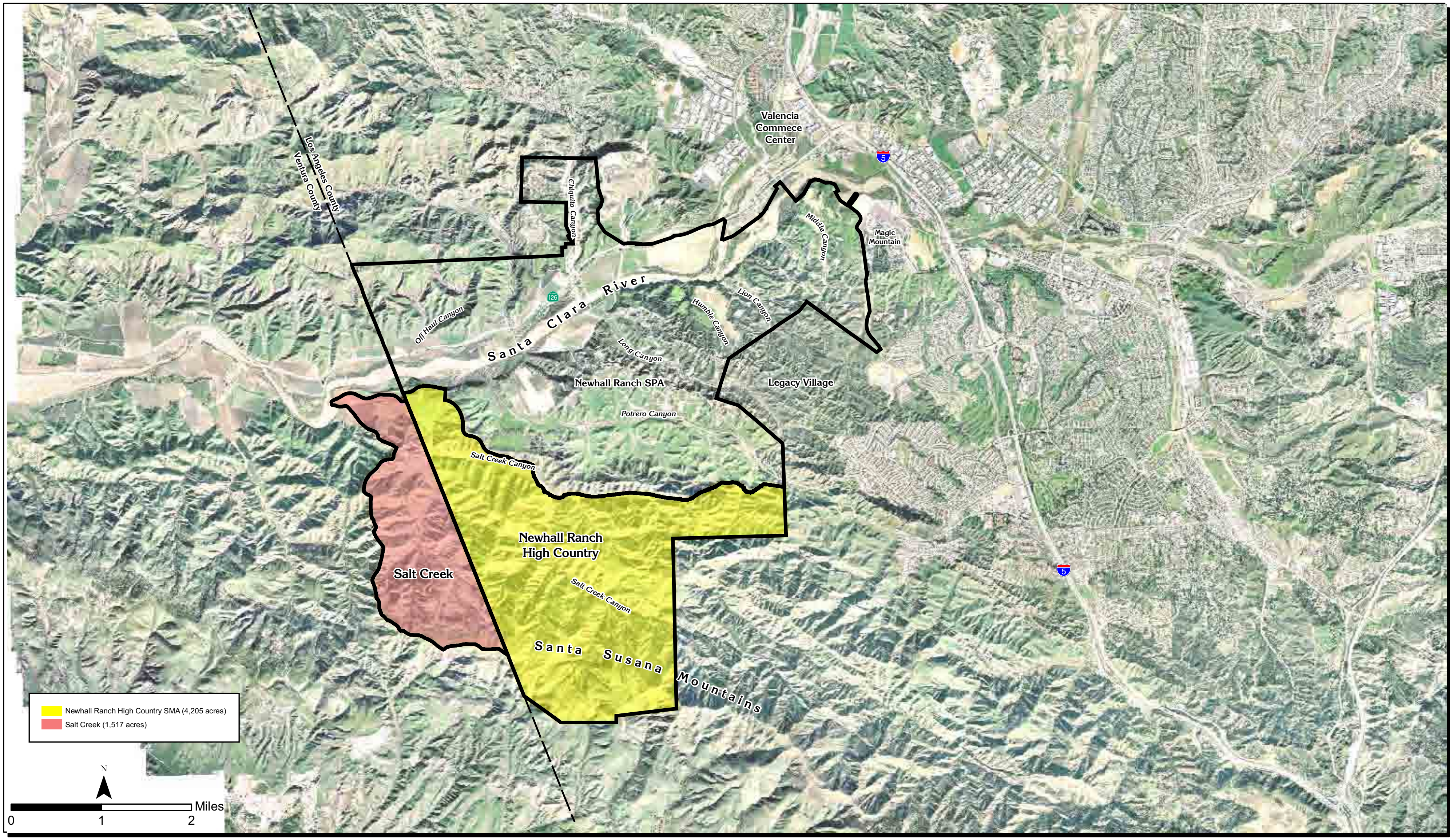
Newhall Ranch High Country Specific Management Area and Salt Creek Area

Biological Resources Technical Report

Regional Map

FIGURE

1



Newhall Ranch High Country Specific Management Area and Salt Creek Area Biological Resources Technical Report

Vicinity Map

FIGURE 2

Newhall Land (Newhall) leases out portions of the study area for cattle grazing and agricultural operations (e.g., food crop production, dryland farming, honey farming). All such operations are currently ongoing. Grazing activities and agricultural operations have had a noticeable effect on much of the natural habitat onsite. Some scrub vegetation communities have been displaced by non-native California grasslands as a result of grazing and many lowland areas have been utilized for agriculture. Southern California Edison and Southern California Gas Company have distribution lines within easements onsite as well.

2.2 Geology and Soils

Geologically, the study area is located within the Transverse Ranges geomorphic province of southern California in the eastern portion of the Ventura depositional basin. This basin was produced by tectonic downwarping in the geologic past to produce a large-scale synclinal structure in which a thick sequence of Cenozoic sediments has accumulated. These sediments have been lithified into a sequence of sedimentary rock that has subsequently been uplifted, tilted, and tectonically deformed. They are cut by segments of the Del Valle and Salt Creek faults (Allan E. Seward 2002).

Soils in the study area are mapped as Balcom-Castaic-Saugus association, 30 to 50 percent slopes, eroded (NRCS 1969). Because the mapping was done at a generalized level, there are areas within the study area with lesser slopes and other soil types that were not mapped. Balcom-Castaic-Saugus association, 15 to 30 percent slopes and small areas of San Andreas and San Benito soils may also be found within the study area.

Soils found onsite are characterized generally by steep to very steep, often eroded slopes. The soils are well drained, with moderate to moderately slow subsoil permeability, and medium to very rapid runoff. The erosion hazard is moderate to very high, largely dependent on slope steepness.

3.0 METHODS AND SURVEY LIMITATIONS

Data regarding biological resources present on the project site were obtained through a review of the pertinent literature; field reconnaissance; and focused surveys for sensitive species, with varying levels of specificity; all of which are described below.

3.1 Literature Review

General floristic and sensitive botanical resources present or potentially present within the study area were identified through a literature search using the following sources: the California Natural Diversity Database (CNDDB) for the Newhall, Simi Valley West, Oat Mountain, Mint Canyon, San Fernando, Green Valley, Warm Springs Mountain, Whitaker Peak, Cobblestone Mountain, Piru, Simi Valley East, Van Nuys, Canoga Park, Calabasas, Thousand Oaks, and Val Verde quadrangle maps (CNDDB website consulted in November 2005 and January 2006); Critical Habitat Designation for Western Los Angeles and Ventura counties (USFWS 2004); 2002, 2003, 2004 and 2005 Sensitive Plant Survey Results for Newhall Ranch Specific Plan Area (Dudek 2002, 2004a, 2005); 2003 Sensitive Plant Survey Results for Valencia Commerce Center, Castaic Mesa, Isola and Ventura Homestead Sites, Magic Mountain Entertainment Center (Entrada) Site, Castaic Junction Site, and Salt Creek (Dudek 2004b-g); 2004 Sensitive Plant Survey Results for Valencia Commerce Center, Entrada Site, Legacy, and Newhall Ranch Specific Plan Area (Dudek 2004h-k); Biological Resource Assessment of the Proposed Santa Susana Mountains/Simi Hills Significant Ecological Area (PCR, November 2000); CalFlora (University of California, Berkeley, May 2002); U.S. Fish and Wildlife Service (USFWS 1999); California Department of Fish and Game (CDFG 2002); can we update? Inventory of Rare and Endangered Plants of California (CNPS 2001); Vascular Flora of the Liebre Mountains, Western Transverse Ranges, California (Boyd 1999); Checklist of Rare Ventura County Plant Species (Magney 2002); A Flora of the Santa Barbara Region, California (Smith 1976); A Flora of the Santa Monica Mountains (Raven et al. 1986); Biology of the San Fernando Valley Spineflower, Ahmanson Ranch, Ventura County, California (Glenn Lukos Associates, Inc. and Sapphos Environmental, Inc. 2000); Report to the Fish and Game Commission on the Status of San Fernando Valley Spineflower (CDFG 2001); Biota Report, Newhall Ranch Specific Plan (RECON and Impact Sciences, Inc. 1996); and herbarium specimens from Rancho Santa Ana Botanic Garden (RSA) and the University of California, Riverside (UCR) Herbarium. General information regarding vegetation communities was obtained from Holland (1986) and Sawyer and Keeler-Wolf (1995), with vegetation mapping generally correspond with the *Vegetation Classification and Mapping Program, List of California Terrestrial Natural Communities Recognized by the California Natural Diversity Database* (CDFG 2003). Plant species nomenclature follows Hickman (1993).

3.2 Field Reconnaissance

Botanical and wildlife surveys were conducted on foot by Dudek biologists and biologists subcontracted by Dudek. Sensitive plant surveys were conducted between April and July, 2003 within the Salt Creek area and approximately on *Figure 2* and as shown in *Table 1*. Vegetation mapping and general wildlife surveys were conducted between early November and late December of 2005 and in May through August 2006 in the study area according to the schedule in *Table 2*. Focused sensitive plant surveys were conducted in May and July 2006 in the 590 acres that were not surveyed during 2003 surveys, in accordance with the schedule in *Table 2*.

TABLE 1
2003 Survey Schedule and Personnel
Salt Creek Site

Date	Biologists	Purpos	General Geographic Area
4-30-03	Anuja Parikh and Nathan Gale	Focused survey for SFVS and noting other sensitive plant species when observed	Lower Salt Canyon
5-6-03	Anuja Parikh and Nathan Gale	Focused survey for SFVS and noting other sensitive plant species when observed	Lower Eastern Salt Creek
5-7-03	Megan Enright, Cathleen Weigand, Anuja Parikh, and Nathan Gale	Focused survey for SFVS and noting other sensitive plant species when observed	Lower Western Fork Salt Creek and Lower Salt Creek
5-8-03	Mark Elvin, Anuja Parikh, and Nathan Gale	Focused survey for SFVS and noting other sensitive plant species when observed	Lower Salt Creek
5-9-03	Kim Marsden, Mark Elvin, Megan Enright, Cathleen Weigand, Kathy Rindlaub, Anuja Parikh, and Nathan Gale	Focused survey for SFVS and noting other sensitive plant species when observed	Lower Western Fork Salt Creek, Lower Salt Creek, Upper Western Fork Salt Creek, and Middle Western Fork Salt Creek
5-10-03	Kim Marsden and Kathy Rindlaub	Focused survey for SFVS and noting other sensitive plant species when observed	Lower Western Fork Salt Creek
5-11-03	Kim Marsden	Focused survey for SFVS and noting other sensitive plant species when observed	Lower Western Fork Salt Creek
5-12-03	Anuja Parikh, Nathan Gale, Mark Elvin, Megan Enright, Scott Boczkiewicz, Tricia Wotipka, and Andrew Sanders	Focused survey for SFVS and noting other sensitive plant species when observed	Upper Western Fork Salt Creek, Middle Western Fork Salt Creek, and Lower Western Fork Salt Creek
5-13-03	Anuja Parikh, Nathan Gale, Mark Elvin, Megan Enright, Scott Boczkiewicz, Tricia Wotipka, and Andrew Sanders	Focused survey for SFVS and noting other sensitive plant species when observed	Upper Western Fork Salt Creek and Middle Western Fork Salt Creek
5-14-03	Anuja Parikh, Nathan Gale, Megan Enright, Scott Boczkiewicz, Tricia Wotipka, Andrew Sanders, and Mark Elvin	Focused survey for SFVS and noting other sensitive plant species when observed	Upper Western Fork Salt Creek, Middle Western Fork Salt Creek and Lower Western Fork Salt Creek
5-15-03	Anuja Parikh, Nathan Gale, Mark Elvin, Megan Enright, Scott Boczkiewicz, Tricia Wotipka, and Andrew Sanders	Focused survey for SFVS and noting other sensitive plant species when observed	Upper Western Fork Salt Creek and Middle Western Fork Salt Creek
5-19-03	Anuja Parikh and Nathan Gale	Focused survey for SFVS and noting other sensitive plant species when observed	Middle Western Fork Salt Creek
5-20-03	Anuja Parikh, Nathan Gale, Mark Elvin, and Kathy Rindlaub	Focused survey for SFVS and noting other sensitive plant species when observed	Middle Western Fork Salt Creek
5-21-03	Anuja Parikh, Nathan Gale, Mark Elvin, Kim Marsden, and Kathy Rindlaub	Focused survey for SFVS and noting other sensitive plant species when observed	Middle Western Fork Salt Creek
5-22-03	Anuja Parikh, Nathan Gale, Mark Elvin, and Kathy Rindlaub	Focused survey for SFVS and noting other sensitive plant species when observed	Lower Eastern Fork Salt Creek, Lower Salt Creek, Upper Central Salt Canyon and Upper Western Fork Salt Creek
5-23-03	Kim Marsden, Kathy Rindlaub, Mark Elvin, Cathleen Weigand, and Darren Smith.	Focused survey for SFVS and noting other sensitive plant species when observed	Upper Central Salt Canyon, Upper Western Fork Salt Creek and Middle Eastern Fork Salt Creek

TABLE 1
2003 Survey Schedule and Personnel
Salt Creek Site

Date	Biologists	Purpos	General Geographic Area
5-24-03	Kim Marsden and Darren Smith	Focused survey for SFVS and noting other sensitive plant species when observed	Middle Mesa Salt Canyon
5-26-03	Mark Elvin, Anuja Parikh, and Nathan Gale	Focused survey for SFVS and noting other sensitive plant species when observed	Lower Salt Creek and Lower Eastern Fork Salt Creek
5-27-03	Mark Elvin, Megan Enright, and Tricia Wotipka	Focused survey for SFVS and noting other sensitive plant species when observed	Upper Eastern Salt Canyon
5-28-03	Mark Elvin, Megan Enright, and Tricia Wotipka	Focused survey for SFVS and noting other sensitive plant species when observed	Middle Mesa Salt Canyon
5-29-03	Michelle Balk, Mark Elvin, Megan Enright, and Tricia Wotipka	Focused survey for SFVS and noting other sensitive plant species when observed	Middle Eastern Fork Salt Creek
5-30-03	Michelle Balk, Megan Enright, and Tricia Wotipka	Focused survey for SFVS and noting other sensitive plant species when observed	Middle Eastern Fork Salt Creek
6-12-03	Mark Elvin, Megan Enright, Andrew Sanders, and Cathleen Weigand	Focused survey for SFVS and noting other sensitive plant species when observed	Lower Western Fork Salt Creek
7-1-03	Mark Elvin	Focused survey for SFVS and noting other sensitive plant species when observed	Upper Central Salt Canyon and Upper Eastern Salt Canyon

TABLE 2
2005-2006 Survey Schedule & Personnel
Salt Creek and High Country Sites

Date	Biologists	Purpose	Conditions
11-7-05	Andy Thomson, Scott Boczkiewicz, Kamarul Muri, Marc Doalson	Vegetation mapping, sensitive plant survey, wetlands mitigation assessment	N/A
11-8-05	Scott Boczkiewicz, Doug Gettinger, Kamarul Muri, Marc Doalson	Vegetation mapping, sensitive plant survey, wetlands mitigation assessment	N/A
11-9-05	Doug Gettinger, Marc Doalson, Colin Khoury	Vegetation mapping, sensitive plant survey	N/A
11-10-05	Mark Doalson, Colin Khoury	Vegetation mapping, sensitive plant survey	N/A
11-14-05, 11-15-05	Andy Thomson, Colin Khoury, Michelle Balk, Chris Oesch	Vegetation mapping, sensitive plant survey	N/A
11-16-05, 11-17-05	Marc Doalson, Colin Khoury, Michelle Balk, Tricia Wotipka	Vegetation mapping, sensitive plant survey	N/A
11-18-05	Marc Doalson, Tricia Wotipka	Vegetation mapping, sensitive plant survey	N/A
11-28-05	Brock Ortega, Kamarul Muri, Tricia Wotipka, Paul Lemons, Rebekah Krebs	General wildlife surveys/ Habitat assessment	Time: 0900-1600 Cloud cover: 0-15% Temp: 50-65 Wind: 0-3mph
11-29-05	Brock Ortega, Kamarul Muri, Tricia Wotipka, Paul Lemons, Rebekah Krebs	General wildlife surveys/ Habitat assessment	Time: 0800-1600 Cloud cover: 0-15% Temp: 40-65 Wind: 0-5mph
11-30-05	Brock Ortega, Kamarul Muri, Tricia Wotipka, Paul Lemons, Rebekah Krebs	General wildlife surveys/ Habitat assessment	Time: 0800-1530 Cloud cover: 0-5% Temp: 45-65 Wind: 0-15mph
12-1-05	Brock Ortega, Kamarul Muri, Tricia Wotipka, Paul Lemons, Rebekah Krebs	General wildlife surveys/ Habitat assessment	Time: 0800-1300 Cloud cover: 05-80% Temp: 45-65 Wind: 0-10mph

TABLE 2
2005-2006 Survey Schedule & Personnel
Salt Creek and High Country Sites

Date	Biologists	Purpose	Conditions
12-19-05	Andy Thomson, Doug Gettinger, Stuart Fraser	Vegetation mapping, sensitive plant survey, coastal sage scrub mitigation assessment	N/A
12-20-05	Andy Thomson, Doug Gettinger, Stuart Fraser	Vegetation mapping, sensitive plant survey, wetlands mitigation assessment, slender mariposa lily mitigation assessment	N/A
12-21-05	Andy Thomson, Doug Gettinger	Vegetation mapping, sensitive plant survey, wetlands mitigation assessment, slender mariposa lily mitigation assessment, oak tree mitigation assessment	N/A
5-31-06	Andy Thomosn, Saudamini Sindhar, Jeremy Sison, Marc Doalson	Sensitive plant survey	N/A
6-1-06	Andy Thomson, Jeremy Sison, Marc Doalson	Sensitive plant survey	N/A
6-6-06	Andy Thomson, Patricia Schuyler, Marc Doalson, Chris Oesch	Sensitive plant survey	N/A
6-7-06	Andy Thomson, Patricia Schuyler, Marc Doalson, Chris Oesch	Sensitive plant survey	N/A
6-8-06	Andy Thomson, Patricia Schuyler, Marc Doalson, Makelah Mangrich	Sensitive plant survey	N/A
7-11-06	Andy Thomson, Clint Emerson, Rebekah Krebs, Chris Oesch	Sensitive plant survey	N/A
7-12-06	Andy Thomson, Clint Emerson, Rebekah Krebs, Chris Oesch	Sensitive plant survey	N/A
7-27-06	Sherri Miller	Vegetation community mapping	N/A
8-1-06	Phil Behrends, Sherri Miller	Vegetation community mapping	N/A
8-8-06	Sherri Miller	Vegetation community mapping	N/A

3.2.1 Resource Mapping

Vegetation communities were mapped in the field directly onto a 400-scale (1" = 400') color aerial photograph provided by AirPhoto USA (2005). Dudek Geographic Information Systems (GIS) technician Mark McGinnis digitized the vegetation boundaries into an ArcView file, and a GIS coverage for vegetation communities was created. Vegetation community classifications used in this report follow the *Vegetation Classification and Mapping Program, List of California Terrestrial Natural Communities Recognized by the California Natural Diversity Database* (CDFG 2003; Terrestrial Natural Communities) nomenclature, with modifications or additions to coordinate with the vegetation communities previously mapped by others within the study area and within the overall Newhall Ranch Specific Plan Area.

3.2.2 Flora

All plant species encountered during the 2003, 2005 and 2006 field surveys were identified and recorded for inclusion in *Appendix A*. Latin and common names of plants follow The Jepson Manual (Hickman 1993) or other recent published taxonomic treatments. Where not listed in Hickman (1993), common names were taken from Abrams (1923). Where not found in this reference, a variety of sources were used (e.g., Abrams 1923, Dale 1986, or Roberts 1998).

Botanical surveys of the Salt Creek site (*Figure 2*) were conducted between April and July 2003 in accordance with the schedule provided in *Table 1*. Surveys focused on the identification and location of populations of state-listed San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*; SFVS); incidental observations of other state- and federally-listed and California Native Plant Society (CNPS) Lists 1A, 1B, and 2 species were also noted if observed (see the list of target species in *Table 3*). Biologists were able to observe reference populations of SFVS and other sensitive species in order to develop a search-image prior to conducting surveys of the project site in 2003. During the 2005 vegetation surveys, limited sensitive plant surveys were also conducted for conspicuous species that were observable in the late fall. Additional focused sensitive plant surveys were conducted in the 590 acres of the NRHC SMA that were not surveyed in 2003 between May and July of 2006. Locations of sensitive plant species observed during the surveys isn included in *Figure 3*.

TABLE 3
Sensitive Plant Species Subject to Field Surveys

Scientific Name	Common Name
Arenaria paludicola	marsh sandwort
Astragalus brauntonii	Braunton's milk-vetch
Atriplex coulteri	Coulter's saltbush
Atriplex serenana var. *davidsonii*	Davidson's saltscale
Baccharis malibuensis	Malibu baccharis
Berberis nevinii	Nevin's barberry
Brodiaea filifolia	thread-leaved brodiaea
Calochortus clavatus var. *clavatus*	club-haired mariposa lily
Calochortus clavatus var. *gracilis*	slender mariposa lily
Calochortus plummerae	Plummer's mariposa lily
Calystegia peirsonii	Peirson's morning-glory
Calystegia sepium ssp. *Binghamiae*	Santa Barbara morning-glory
Centromadia [=*Hemizonia*] *parryi* ssp. *Australis*	southern tarplant
Cercocarpus betuloides var. *blancheae*	island mountain-mahogany
Chorizanthe parryi var. *Fernandina*	San Fernando Valley spineflower
Deinandra [=*Hemizonia*] *minthornii*	Santa Susana tarplant
Delphinium parryi ssp. *Blochmaniae*	dune larkspur
Dodecahema leptoceras	slender-horned spineflower

TABLE 3
Sensitive Plant Species Subject to Field Surveys

Scientific Name	Common Name
Dudleya blochmaniae ssp. *Blochmaniae*	Blochman's dudleya
Dudleya cymosa ssp. *Marcescens*	marcescent dudleya
Dudleya cymosa ssp. *Ovatifolia*	Santa Monica Mountains dudleya
Dudleya multicaulis	many-stemmed dudleya
Dudleya parva	Conejo dudleya
Eriogonum crocatum	Conejo buckwheat
Erodium macrophyllum	round-leaved filaree
Galium grande	San Gabriel bedstraw
Helianthus nuttallii ssp. *Parishii*	Los Angeles sunflower
Horkelia cuneata var. *puberula*	mesa horkelia
Juglans californica	southern California black walnut
Juncus acutus var. *leopoldii*	Southwestern spiny rush
Malacothamnus davidsonii	Davidson's bush mallow
Nama stenocarpum	mud nama
Navarreti fossalis	spreading navarretia
Nolina cismontane	chaparral nolina
Opuntia basilaris var. *brachyclada*	short-joint beavertail
Orcuttia californica	California Orcutt grass
Pentachaeta lyonii	Lyon's pentachaeta
Rorippa gambellii	Gambel's water cress
Senecio aphanactis	rayless ragwort
Sidalcea neomexicana	salt spring checkerbloom
Thelypteris puberula var. *sonorensis*	Sonoran maiden fern

3.2.3 Fauna

Latin and common names of animals follow Stebbins (2003) for reptiles and amphibians, American Ornithologists' Union (2003) for birds, Jones et al. (1997) for mammals, and Emmel and Emmel (1973) for butterflies.

Surveys were conducted by qualified biologists walking meandering transects throughout the project site, surveying all suitable habitat types, to ensure that sufficient visual coverage was obtained (*Figure 4*). Wildlife species detected during the field survey by sight, calls, tracks, scat, or other signs were recorded. Binoculars (7 x 50 power) were used to aid in the identification of observed wildlife. At regular intervals the biologists stopped, remained quiet, and listened for wildlife vocalizations. Most canyons and ridgelines on the project site were surveyed in an effort to get 100 percent visual coverage of the site. In addition, biologists conducted a brief crepuscular/nocturnal visit to the site along Salt Creek and the southern ridgeline in order to check on "ground owl" claims by Ranch staff and look for large mammals. A predator call was used at varying intervals to entice mammal response.

All wildlife species detected on site were recorded. All vegetation communities on site were surveyed for potential to support sensitive wildlife species. In addition, specific habitat assessments for the following wildlife species were conducted: arroyo toad (*Bufo californicus*), western pond turtle (*Clemmys marmorata*), two-striped garter snake (*Thamnophis hammondii*), western ringneck snake (*Diadophis punctatus*), California legless lizard (*Anniella pulchra*), coast horned lizard (*Phrynosoma coronatum*), coastal rosy boa (*Charina [=Lichanura] trivirgata* ssp. *roseofusca*), coastal western whiptail (*Aspidoscelis tigris multiscutatus*), coast patch-nosed snake (*Salvadora hexalepis virgultea*), desert woodrat (*Neotoma lepida*), and American badger (*Taxidea taxus*).

A comprehensive list of wildlife species observed or detected onsite is presented in *Appendix B*.

3.2.4 Sensitive/Regulated Biological Resources

Sensitive plant and wildlife species are those species that have been given special recognition by federal, state, or local conservation agencies and organizations due to limited, declining, or threatened population sizes. This includes those species listed by the state and federal government as threatened or endangered, those species proposed for state and/or federal listing or candidates, those plant species found on Lists 1A, 1B or 2 of the CNPS Inventory of Rare and Endangered Plants of California (CNPS 2001; Inventory) or CNPS online inventory (http://cnps.web.aplus. net/cgi-bin/inv/inventory.cgi), and those plant species which are found on the list of "Threatened and Endangered Species and Species of Concern, Los Angeles County" (http://www. losangelesalmanac.com/topics/Environment/ ev14b.htm). CNPS List 3 or List 4 species were included in discussions only when encountered during the field surveys.

Additional sources used for determination of sensitive biological resources are as follows: wildlife, USFWS 2004, CDFG (2004 and 2005b), vegetation communities, Holland (1986), CDFG (2005).

3.2.5 Oak Tree Estimate

Dudek conducted an oak tree estimate within the study area in 2006. The number of oak trees onsite was initially estimated by utilizing high resolution aerial photography to count the number of trees within all oak vegetation communities onsite. The initial oak tree estimate was field checked to determine if the estimate was accurate. A random sample of oak tree vegetation community polygons was sampled by counting the number of oaks by species within defined areas within the various oak vegetation communities. Oak trees with a diameter at breast height (DBH) greater than three inches were counted in this estimate. After field checking, it was determined that the estimates made by aerial photo interpretation in oak woodland vegetation communities were not accurate. This was due to factors such as canyon shading in the aerial image, burned trees in some portions of the site, and a merged canopy in dense areas, among other factors. In contrast, oak tree estimates by aerial photo interpretation in valley oak savannah were accurate, likely because valley oak savannah typically occurs on less steep terrain (resulting in less shading in the aerial photo) and has a much lesser density than the oak woodland vegetation communities.

After determining that the aerial photo estimate was not accurate for oak woodland vegetation communities, an alternative method of estimating the number of trees onsite was utilized, wherein the density of oaks in the various oak vegetation communities onsite was estimated from a series of random samples within each oak woodland vegetation community. The number of oak trees was counted in the field within several polygons and then a density calculation (trees per acre) was done for each area. The estimated polygons were treated as independent samples in order to conduct a statistical re-sampling analysis, wherein 10 polygons were randomly sampled multiple times to test the accuracy of the overall density estimate to the individual samples. After determining that the re-sampled estimate was within the confidence limits of the overall estimate in over 95 percent of the cases, the estimated densities for each oak vegetation community onsite were applied to all oak woodland acreage within the study area to get a total number of oak trees by species within the study area.

3.3 Survey Limitations

The 2003 plant surveys were conducted in the spring and summer during a year with a "normal" amount of rainfall providing ideal conditions to determine the diversity of species (including sensitive plants) onsite and to map their presence, abundance, and distributions more accurately (when necessary). The timing of the surveys was coincident with the blooming period for SFVS and other spring blooming annual species. Surveys continued past the peak bloom period for the SFVS into the summer when SFVS became a highly visible brick red color while many of the other plants dried and faded to pale straw colors. Surveying during these two time periods maximized the potential for detection of SFVS during the survey effort.

Riparian areas along Salt Creek, thick chaparral, and steep north facing slopes were not surveyed during the spring and summer 2003. Surveys for SFVS were concentrated in areas of suitable habitat, which was generally on south-facing slopes. Other sensitive species (particularly those identified in *Table 3*) were recorded when incidentally observed.

The focused surveys for SFVS were conducted during daylight hours under weather conditions that did not preclude observation of sensitive plant species (e.g., surveys were not conducted during heavy fog or rain).

The 2005 plant surveys were conducted in November and December for conspicuous species that were observable in the late Fall, such as southern California black walnut (*Juglans californica*). Many annual species were not observable at this time.

The 2006 plant surveys were conducted in May, June and July when annual species were observable. Total rainfall amounts were near average for the season; however, precipitation was sporadic, with most of the rain coming late in the season, resulting in conditions that were not optimal for flowering of geophytic species (such as *Calochortus* spp.) and some annual species.

For wildlife surveys conducted in the late fall of 2005, limitations of the survey include a diurnal bias and the absence of trapping for small mammals, reptiles, and amphibians. The survey was primarily conducted during the daytime to maximize the detection of most animals. Birds represent the largest component of the vertebrate fauna, and because most birds are active in the daytime, diurnal surveys maximize the number of observations of this portion of the fauna. In contrast, daytime surveys usually result in few observations of mammals, many of which may only be active at night. In addition, many species of reptiles and amphibians are secretive in their habits and are difficult to observe using standard meandering transects.

4.0 RESULTS OF SURVEY

4.1 Botany - Plant Communities and Floral Diversity

Native and naturalized vegetation communities within the study area are representative of those found in this region and provide examples of those plant communities found in the Santa Susana Mountains and the Santa Clara River ecosystems. Riparian and wetland vegetation communities within the study area include: alluvial scrub, arrowweed scrub, cismontane alkali marsh, bulrush-cattail wetland, southern cottonwood-willow riparian forest, mule fat scrub, riverwash, southern willow scrub and tamarisk scrub. Upland vegetation communities cover the majority of land within the study area, and consist of the following vegetation communities: agriculture, burned undifferentiated chaparral, burned California sagebrush scrub, burned California sagebrush scrub-undifferentiated chaparral, big sagebrush scrub, California grassland, undifferentiated chaparral, California sagebrush scrub-artemisia, California sagebrush scrub-purple sage, coyote brush scrub, elderberry scrub, coast live oak woodland, disturbed habitat, mixed oak savannah, mixed oak woodland, Valley needlegrass grassland, scrub oak chaparral, valley oak savannah, valley oak woodland and California walnut woodland (*Table 4*).

TABLE 4
Vegetation Communities and Land Cover Types for Newhall Ranch High Country Specific Management Area and the Salt Creek Area

VEGETATION COMMUNITY/LAND COVER TYPE	SUBCOMMUNITY	NRHC SMA ACREAGE	SALT CREEK ACREAGE
Upland Grassland			
California grassland		464.9	187.9
Valley needlegrass grassland		0.6	0
Upland Scrub			
California sagebrush scrub		437.0	11.8
	Burned California sagebrush scrub	784.8	615.6
	California sagebrush scrub – Artemisia	0.3	0
	California sagebrush scrub – purple sage scrub	84.1	2.1
	Burned California sagebrush scrub-chaparral	5.2	0
Coyote brush scrub		2.2	0
Undifferentiated chaparral scrub		537.0	9.1
	Burned Undifferentiated chaparral scrub	831.2	115.6
	Scrub oak chaparral	0.2	0
Upland Woodland and Savannah			
Coast live oak woodland		446.7	148.0
Mixed oak woodland		74.2	94.6
	Mixed oak savannah	0	3.4
Valley oak woodland		47.8	23.9
	Valley oak savannah	300.3	110.0
California Walnut woodland		6.8	20.4
Riparian Waters and Herbs			
River wash		33.3	7.4
Bulrush cattail wetland		1.4	0
Cismontane alkali marsh		3.3	0
Riparian Scrub			
Alluvial scrub		0.6	0.4
Arrowweed scrub		0	0.7
Big sagebrush scrub		8.5	0
Elderberry scrub		3.2	1.4
Mulefat scrub		14.1	20.1
Southern willow scrub		4.3	2.5
Tamarisk scrub			0.2
Riparian Woodland			
Southern cottonwood willow riparian forest		0.9	0
Land Covers			
Agriculture		59.8	99.1
Disturbed lands		52.7	43.9
Total		**4,205.4**	**1,518.1**

California Grassland (42.040.00)

California grassland is characterized by a mixture of weedy, introduced annuals, primarily dominated by grasses. It may occur where disturbance by maintenance (mowing, scraping, discing, spraying, etc.), grazing, repetitive fire, agriculture, or other mechanical disruption have altered soils and removed native seed sources from areas formerly supporting native vegetation. Onsite annual grassland consists of various annual non-native grasses including wild oat (*Avena fatua*), slender oat (*Avena barbata*), and bromes (*Bromus diandrus, B. madritensis ssp. rubens, B. hordeaceus*).

Other herbaceous species found in California grassland include black mustard, tocalote, Russian thistle (*Salsola tragus*), and dove weed (*Eremocarpus setigerus*). Some of these grasslands include occasional California sagebrush scrub species as described below. Non-native grasslands may support special-status plant and animal species and provide foraging habitat for raptors (birds of prey).

Valley Needlegrass Grassland (41.170.00)

Valley needlegrass grassland contains at least ten percent or more of vegetative cover composed of perennial, native grasses. Species associated with this vegetation community include needlegrass (*Nasella pulchra*, *Nasella lepida*), leafy bentgrass (*Agrostis pallens*), junegrass (*Koeleria macrantha*), rattail fescue (*Vulpia myuros*), bromes (*Bromus* spp.), blue-eyed grass (*Sisyrinchium bellum*), blue dicks (*Dichelostemma capitatum*), mariposa lily (*Calochortus* spp.), common goldenstar (*Bloomeria crocea*), smooth cat's-ear (*Hypochoeris glabra*), and shooting star (*Dodecatheon clevelandii*). This plant community typically intermixes with coastal sage scrub on some clay soils, often on more mesic exposures and at the bases of slopes, but also may occur in large patches.

Native grassland is rare in southern California. It typically includes non-native annual species intermixed with native perennial grasses and forbs. It has a substantial component of native species and generally occurs on intact clay substrates. Native grasslands, especially those on clay soils, provide potential habitat for a number of sensitive plant species (Roberts, pers. comm. 2000). Native grasslands provide nesting and foraging habitat for a diversity of passerine bird species and raptors (primarily foraging), many of which are considered to be sensitive.

California Sagebrush Scrub (32.010.00)

California sagebrush scrub is classified as a coastal scrub vegetation community in the Terrestrial Natural Communities (CNDDB 2003). It is a native plant community characterized by a variety of soft, low, aromatic, drought-deciduous shrubs, such as California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), California bush sunflower (*Encelia californica*), and sages (*Salvia* spp.), with scattered evergreen shrubs, including lemonadeberry (*Rhus integrifolia*), laurel sumac (*Malosma laurina*), and toyon (*Heteromeles arbutifolia*). It typically develops on south-facing slopes and other xeric situations. Coastal sage scrub is considered a sensitive vegetation community because of its depleted nature and the large number of special-status plant and wildlife species that it supports (Holland 1986).

Onsite California sagebrush scrub is dominated by a mixture of California sagebrush, black sage (*Salvia mellifera*), purple sage (*Salvia leucophylla*), and California buckwheat. Other species present within this community include our lord's candle (*Yucca whipplei*), slender tarweed (*Hemizonia fasiculata*), deerweed (*Lotus scoparius*), black mustard (*Brassica nigra*), and tocalote (*Centaurea melitensis*), with scattered chaparral species including chamise (*Adenostoma fasciculatum*), sugar bush (*Rhus ovata*), toyon, and chaparral bushmallow (*Malacothamnus fasciculatus*). California sagebrush scrub occurs onsite on dryer slopes, generally south or west facing.

A large majority of the California sagebrush scrub has recently burned (2003 fire) and was not classified into subcommunites. An additional large portion was also not classified into subcommunities because of the lack of single species dominance. California sagebrush scrub subcommunities mapped onsite include California sagebrush scrub-Artemesia, California sagebrush scrub-purple sage and California sagebrush scrub-undifferentiated chaparral. Each one of these subcommunities is dominated by a particular species that characterizes the community.

These subcommunities are listed below.

- California Sagebrush-Artemisia (dominated only by California sagebrush) (32.010.01).
- California Sagebrush Scrub-Purple Sage Scrub (32.010.04), including disturbed.
- Burned California Sagebrush Scrub-Undifferentiated Chaparral (equal dominance of California sagebrush scrub and chaparral species) (modified from 32.300.00).

Coyote Brush Scrub (32.060.00)

Coyote brush scrub is classified as a coastal scrub vegetation community in the Terrestrial Natural Communities (CNDDB 2003) and is dominated by coyote brush (*Baccharis pilularis*). It contains many of the same species as California sagebrush scrub (i.e. California sagebrush, California buckwheat, and sages, with scattered evergreen shrubs). Coyote brush scrub occurs mostly in uplands, but can occur along xeric drainages as well. It generally is regarded as a post-disturbance vegetation community in a successional state, with the climax community most often being California sagebrush scrub.

Because coyote brush scrub is an effective colonizer of disturbed sites it can be found in xeric to seasonally mesic areas, in heavily disturbed upland areas and flat areas or canyons and drainages that receive low seasonal flow or urban runoff.

Undifferentiated Chaparral Scrub (37.000.00)

Undifferentiated chaparral scrub is a drought- and fire-adapted community of broad-leafed shrubs, 1.5-3.0 m tall, typically forming dense impenetrable stands. It develops primarily on mesic north-facing slopes and in canyons. This association is typically a mixture of chamise, hoary leaf ceanothus (*Ceanothus crassifolius*), scrub oak (*Quercus berberidifolia*), laurel sumac, and black sage.

Dominant chaparral species onsite include a mixture of chamise, hoaryleaf ceanothus (*Ceanothus crassifolius*), spiny redberry (*Rhamnus crocea*), sugar bush, and toyon. Other species that occur in this community onsite include chaparral bushmallow, holly-leaf redberry (*Rhamnus ilicifolia*), holly-leaf cherry (*Prunus ilicifolia*), and California sagebrush scrub species as described above.
A large portion of undifferentiated chaparral scrub within the study area burned recently (2003 fire) affecting the vegetation community presently re-establishing. Burned undifferentiated chaparral was mapped separately. Additionally, a chaparral subcommunity (Scrub Oak Chaparral (37.407.00)) was found within the study area. The community is dominated by scrub oak (*Quercus berberidifolia*) that characterizes the community.

Coast Live Oak Woodland (71.060.19)

Coast live oak woodland is dominated by coast live oak (*Quercus agrifolia*). Canopy height ranges from 10 to 25 m. The shrub layer is poorly developed, but may include toyon, gooseberry (*Ribes* spp.), laurel sumac or Mexican elderberry (*Sambucus mexicana*). The herb component is continuous, dominated by a variety of introduced species.

Within the study area, coast live oak woodland is dominated by coast live oak, with southern California black walnut as a co-dominant in most areas. Additionally, a few canyon live oak (*Quercus chrysolepis*) were also observed in the vegetation community onsite. Common understory components include toyon, gooseberry, deerweed, Italian thistle (*Carduus pycnocephalus*), horehound (*Marubium vulgare*), poison-oak (*Toxicodendron diversilobum*), elegant clarkia (*Clarkia unguiculata*) and non-native annual grasses (*Bromus* spp., *Avena* spp., *Lolium multiflorum*).

Mixed Oak Woodland (71.100.00)

Mixed oak woodland includes a predominance of coast live oak with valley oak (*Quercus lobata*) in sufficient numbers to constitute between 20 and 50 percent cover. The understory has a similar composition to that described for coast live oak woodland above. A subcommunity of mixed oak woodland also exists onsite, mixed oak savannah (71.100.08), which includes valley oaks or coast live oaks sparsely populated with an understory of non-native annual grasses.

Valley Oak Woodland (71.040.00)

Valley oak woodland includes a predominance of valley oak in sufficient numbers to constitute greater than 40 percent canopy cover. The understory of valley oak woodland has a similar composition to that described for coast live oak woodland above, with a greater proportion of non-native annual grasses, Italian thistle and short-podded mustard (*Hirschfeldia incana*).

A subcommunity of valley oak woodland also exists onsite, valley oak savannah (71.040.05), which includes valley oak sparsely populated (up to 40 percent canopy cover) with an understory of primarily non-native grasslands, with occasional patches of native grasslands.

California Walnut Woodland (72.100.01)

California walnut woodland is comprised of an overstory of southern California black walnut and a very limited understory dominated by a variety of introduced species. California walnut woodland is often associated with oak woodland vegetation communities onsite.

River Wash

River wash occurs within stream channels that are frequently scoured by flooding, resulting in unvegetated or sparsely vegetated gravelly or rocky channel bottoms. Occasional seedlings and young plants occur within this vegetation community, including mule fat, tamarisk and Fremont cottonwood, among others. This community does not fit into a defined plant community classification in the Terrestrial Natural Communities (CNDDB 2003). Onsite, river wash occurs in the lower reaches of the Salt Creek drainage and some of the tributaries to Salt Creek.

Bulrush-Cattail Wetland (52.102.00)

Bulrush-cattail wetland consists of approximately equal dominance of bulrush (*Scirpus* spp.) and cattail (*Typha* spp.) species. It occurs along Salt Creek within the study area.

Cismontane Alkali Marsh (52.203.00)

Cismontane alkali marsh typically occurs in areas that are currently wet or inundated throughout most to all of the year. Dominant species include rushes (*Juncus* spp.), salt grass (*Distichilis spicata*), sedges (*Carex* spp.), yerba mansa (*Anemopsis californica*), and alkali heath (*Frankenia grandifoila*). This community occurs at lake beds and flood plains, characterized by higher levels of salts than are found in the freshwater marsh habitat. It differs from coastal saltmarsh primarily in that it is not subject to tidal inundation.

Alluvial Scrub

Alluvial scrub is a community that occurs in creeks and washes on alluvial material. Species that can usually be found in this community include wetland species that can tolerate more xeric conditions and transitional sage scrub species. This community does not fit into a defined plant community classification in the Terrestrial Natural Communities (CNDDB 2003) and was defined onsite by the dominant plant species. Onsite this community occurs in small patches within Salt Creek. Species found onsite within this community include big sagebrush, mule fat, tree tobacco, scalebroom (*Lepidosparum squamatum*), big saltbush (*Atriplex lentiformis*), and California sagebrush.

Arrowweed Scrub (63.710.00)

Arrowweed scrub occurs in moderate to dense streamside thickets strongly dominated by arrowweed (*Pluchea sericea)*. It occurs in streambanks, ditches, and washes with gravelly or sandy channels in most major drainages in the drier southern parts of California. Onsite, arrowweed scrub occurs along the banks of the Santa Clara River or its tributaries and is dense, with a few tamarisk individuals interspersed throughout.

Big Sagebrush Scrub (35.110.00)

Big sagebrush scrub is comprised mostly of soft-woody shrubs, 0.5-2 m tall, usually with bare ground underneath and between shrubs (Holland 1986). This community is typically dominated by big sagebrush (*Artemisia tridentata*) and non-native grasses. California sagebrush scrub and chaparral scrub species also occur within this vegetation type. This community generally occurs in alluvial areas along washes and canyon bottoms.

Elderberry Scrub (63.410.00)

Elderberry scrub is an open scrub vegetation community dominated by Mexican elderberry (*Sambucus mexicana*) but with scattered laurel sumac, toyon, and lemonadeberry, as well as an understory of grasses. Elderberry scrub is found in foothill areas on the upper benches of streams, and is often associated with sycamore riparian woodland.

Mulefat Scrub (63.510.00)

Mulefat scrub is a relatively low (two to three meter), dense, shrubby plant community that occurs in riparian areas, edges of catchment basins, and in canyons. It is dominated by mule fat (*Baccharis salicifolia*), and may contain a small number of arroyo willow (*Salix lasiolepis)*, upland shrubs, and facultative herbs. Mulefat scrub is a seral community that occurs mainly along major drainages and floodplains where the riparian vegetation is open or disturbed. Frequent flooding and/or scouring maintains this community in an early successional state (Holland 1986). Characteristic plant species in this community include mule fat, coyote brush

(*Baccharis pilularis*), western ragweed (*Ambrosia psilostachya*), and a few other obligate or facultative wetland species (Reed 1988).

Southern Willow Scrub (63.130.00)

According to Holland (1986), southern willow scrub has been described as a dense, broad-leafed, winter-deciduous riparian thicket dominated by several species of willow (*Salix* spp.), with scattered emergent Fremont cottonwood (*Populus fremontii*) and western sycamore (*Platanus racemosa*). Most stands are too dense to allow much understory development. This vegetation community is considered seral due to repeated disturbance/flooding and is therefore unable to develop into the taller southern cottonwood-willow riparian forest.

Tamarisk Scrub (63.810.02)

Areas dominated by tamarisk (*Tamarix* sp.) were mapped as tamarisk scrub. This invasive, non-native vegetation community is considered riparian. Tamarisk typically occurs on moist soils and in streambeds and its occurrence may be related directly to soil disturbance or introduction of propagules by grading or flooding.

Southern Cottonwood-Willow Riparian Forest (61.130.02)

Southern cottonwood-willow riparian forest is a tall, open, broad-leafed winter deciduous riparian forest dominated by Fremont cottonwood (*Populus fremontii*) and several different species of willow. It occurs in frequently overflowed lands along rivers and streams.

Agriculture

Agriculture refers to areas where irrigated row and field crops are being grown [i.e., intensive agriculture]. This area may support grass species such as barley (*Hordeum* spp.) and wild oat (*Avena* spp.). This land has little biological resource value because it provides very limited habitat value for most native species. However, this area may supply grain and water for native and migratory birds.

Disturbed Land

Disturbed land typically occurs in areas where soils have been recently or repeatedly disturbed by grading or compaction resulting in the growth of very few native perennials, and is usually dominated by bare ground or non-native dicotyledonous species including filaree (*Erodium* spp.), black mustard, thistles (e.g., *Cynara cardunculus*, *Carduus pynocephalus*, and *Centaurea melitensis*), dove weed, and others. Within the study area, disturbed land occurs on permeable surfaces without vegetation, as well as with weedy annual non-native vegetation including Russian thistle, tocalote, dove weed, black mustard, and bull thistle (*Cirsium vulgare*).

4.1.1 Floral Diversity

A total of 462 plant species were identified within the study area during the 2003, 2005 and 2006 plant surveys. Of these, 362 plant species (78 percent) are native to the region and 100 plant species (22 percent) are non-native. The cumulative list of plant species identified on the site is provided as *Appendix A*.

4.2 Zoology – Wildlife Diversity

4.2.1 General Wildlife

The project site supports habitat for a diverse number of upland and wetland species. The wide range of vegetation communities and elevation changes found within the study area help to provide a greater number of suitable habitats for wildlife species. Vegetation communities providing habitat for wildlife found within the study area include the following: alluvial scrub, arrowweed scrub, cismontane alkali marsh, bulrush-cattail wetland, southern cottonwood-willow riparian forest, mule fat scrub, riverwash, southern willow scrub, undifferentiated chaparral, California sagebrush scrub, big sagebrush scrub, California grassland, coyote brush scrub, elderberry scrub, coast live oak woodland, mixed oak savannah, mixed oak woodland, valley needlegrass grassland, scrub oak chaparral, valley oak savannah, valley oak woodland and California walnut woodland. Additionally, tamarisk scrub, agriculture and disturbed habitat may provide limited habitat value to wildlife. Eighty-four species of wildlife were observed during the surveys (*Appendix B*). *Figure 4* in the map pocket depicts the locations of sensitive wildlife species observed onsite, survey travel routes, and raptor nest.

4.2.2 Birds

Fifty-six species of birds were observed during the survey. Some of the species observed within the study area include turkey vulture (*Cathartes aura*), Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), white-tailed kite (*Elanus leucurus*), prairie falcon (*Falco mexicana*), American kestrel (*Falco sparverius*), California quail (*Callipepla californica*), killdeer (*Charadrius vociferus*), mourning dove (*Zenaida macroura*), barn owl (*Tyto alba*), long-eared owl (*Asio otus*), white-throated swift (*Aeronautes saxatalis*), Anna's hummingbird (*Calypte anna*), northern flicker (*Colaptes auratus*), acorn woodpecker (*Melanerpes formicivorus*), Nuttall's woodpecker (*Picoides nuttallii*), red-breasted sapsucker (*Sphyrapicus ruber*), Williamson's sapsucker (*Sphyrapicus thyroideus*), western wood-pewee (*Contopus sordidulus*), black phoebe (*Sayornis nigricans*), Say's phoebe (*Sayornis saya*), western kingbird (*Tyrannus verticalis*), and cliff swallow (*Petrochelidon pyrrhonota*). For a complete list of birds observed on the site please see *Appendix B*. In addition, stick nests were observed on the site. These nests were recorded on aerial maps.

4.2.3 Reptiles and Amphibians

Seven reptile or amphibian species were observed within the study area, including western pond turtle (*Clemmys marmorata*; observed 5/29/03), western fence lizard (*Sceloporus occidentalis*), side-blotched lizard (*Uta stansburiana*), California whipsnake (*Masticophis lateralis*), coast horned lizard (*Phrynosoma coronatum*), coastal western whiptail (*Cnemidophorus tigris multiscutatus*) and western diamondback rattlesnake (*Crotalus atrox*).

4.2.4 Mammals

Sixteen species of mammals were recorded within the study area, including brush rabbit (*Sylvilagus bachmani*), western grey squirrel (*Sciurus griseus*), California ground squirrel (*Spermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), California pocket mouse (*Chaetodipus californicus dispar*), woodrat (*Neotoma* sp.), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), common raccoon (*Procyon lotor*), long-tailed weasel (*Mustela frenata*), American badger (*Taxidea taxus*) (burrow), mountain lion (*Felis concolor*), bobcat (*Lynx rufus*), black bear (*Ursus americanus*), mule deer (*Odocoileus hemionus*), and domestic cattle (*Bos bovis*).

4.2.5 Butterflies and Moths

Seven species of butterflies or moths were recorded on the site, including common white (*Pontia protodice*), California dogface (*Colias Eurydice*), California white (*Pontia sisymbrii*), monarch (*Danaus plexippus*), buckeye (*Junonia coenia*), west coast lady (*Vanessa annabella*), and painted lady (*Vanessa cardui*).

4.3 Sensitive Biological Resources

The following resources are discussed in this section: **(1)** plant and animal species present in the project vicinity that are given special recognition by federal, state, or local conservation agencies and organizations owing to declining, limited, or threatened populations, that are the result, in most cases, of habitat reduction; and **(2)** habitat areas that are unique, are of relatively limited distribution, or are of particular value to wildlife. Sources used for determination of sensitive biological resources are as follows: wildlife, USFWS 2002, CDFG (2004 and 2005a); plants, CDFG (2005 b,c) and CNPS (2001); and vegetation communities, Holland (1986) and CDFG 2003.

4.3.1 Sensitive Plant Species

A total of eight sensitive plant species were identified during 2003, 2005 and 2006 surveys within the study area. These and other sensitive plant species that have the potential to occur within the study area, based on the presence of suitable habitat and soils, are listed in *Table 5*. This list is confined primarily to those species listed by the state and federal government as threatened or endangered, those species proposed for state and/or federal listing or candidates, those plant species found on Lists 1A, 1B, or 2 of the CNPS *Inventory of Rare and Endangered Plants of California* (CNPS 2001) and the County of Los Angeles. Those sensitive species that were observed during the field surveys are discussed in greater detail below. A number of species found on CNPS Lists 3 or 4 also have the potential to occur onsite (e.g., *Calochortus catalinae, Acanthomintha obovata ssp. cordata, Mucronea californica*); however, due to their relatively low sensitivity level, they are only discussed in the following sections if observed onsite.

TABLE 5
Sensitive Plant Species Observed or Potentially Occurring within the Study Area

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/ Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Arenaria paludicola	marsh sandwort	FE/SE	1B	dense freshwater marsh/perennial herb/May-August	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrence is in the Santa Ana River. Limited suitable habitat onsite; very low likelihood of occurrence within the study area.
Artemisia tridentata ssp. *Parishii*	Parish's big sagebrush scrub	--None/None	--None	Big sagebrush scrub on the margins of drainage channels/perennial shrub/November-August	Observed during 2003, 2005 and 2006 field seasons on the margins of the Salt Creek drainage and tributary drainages. Co-occurs with *Artemisia tridentata* ssp. *tridentata*. Observed within big sagebrush scrub within NRSP. Parish's big sagebrush is considered sensitive by the County of Los Angeles.
Astragalus brauntonii	Braunton's milk-vetch	FE/None	1B	chaparral, coastal sage scrub, grasslands; often on carbonate substrates/perennial herb/March-July	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrence is in the Simi Hills. Suitable habitat exists onsite. Moderate likelihood of occurrence within study area.

TABLE 5
Sensitive Plant Species Observed or Potentially Occurring within the Study Area

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/ Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Atriplex coulteri	Coulter's saltbush	None/None	1B	coastal sage scrub and grasslands on alkaline or clay substrate/perennial herb/March-October	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for the Newhall or Val Verde quads; however, suitable habitat present onsite. Moderate likelihood of occurrence within study area.
Atriplex serenana var. *davidsonii*	Davidson's saltscale	None/None	1B	coastal bluff scrub and coastal sage scrub on alkaline substrate/annual herb/May-October	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for the Newhall or Val Verde quads. *Atriplex serenana var. serenana* observed onsite. Low likelihood of occurrence within the study area.
Baccharis malibuensis	Malibu baccharis	None/None	1B	chaparral, coastal sage scrub, cismontane woodland/ deciduous shrub/August	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for the Newhall or Val Verde quads; closest known populations in the western Santa Monica Mountains near Malibu. Not expected to occur within the study area.
Berberis nevinii	Nevin's barberry	FE/SE	1B	chaparral, coastal sage scrub, riparian scrub, cismontane woodland on sandy or gravelly substrate/evergreen shrub/March-April	Not observed during 2003, 2005 or 2006 field season. CNDDB records exist for San Francisquito Canyon at confluence with Santa Clara River; suitable habitat present onsite. Moderate likelihood of occurrence within study area.
Brodiaea filifolia	thread-leaved brodiaea	FT/SE	1B	clay substrate openings in chaparral, sage scrub, and grasslands/perennial herb (geophyte)/March-June	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrence is in San Dimas. Suitable habitat present onsite; however, suitable soils not present. Low likelihood of occurrence within study area.
Calochortus clavatus var. *clavatus*	club-haired mariposa lily	None/None	4	chaparral and coastal sage scrub/ perennial herb (geophyte)/March-May	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for Newhall and Val Verde quads. Very low likelihood of occurrence in study area.
Calochortus clavatus var. *gracilis*	slender mariposa lily	None/None	1B	chaparral and coastal sage scrub/perennial herb (geophyte)/March-May	Observed during the 2003, 2005 and 2006 field seasons on slopes and ridgelines throughout the study area. A total of 85 polygons was mapped with an estimation of approximately 31,370 individuals (flowering and/or fruiting) during the 2003 growing season. Observed during the 2005 field season as dried inflorescences in previously mapped areas on north tending slopes throughout the study area. One additional polygon and and 34 points were mapped with an estimation of approximately 371 individuals in the additional 590 acres during the 2006

TABLE 5
Sensitive Plant Species Observed or Potentially Occurring within the Study Area

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/ Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
					field season. This species is locally abundant. CNDDB records also exist for mouth of Pico Canyon.
Calochortus plummerae	Plummer's mariposa lily	None/None	1B	chaparral, coastal sage scrub, cismontane woodland, grasslands on rocky granitic substrate/perennial herb (geophyte)/May-July	Observed during the 2006 field season on steep southwest-facing slopes. A total of three polygons and two point locations was mapped with an estimation of approximately 78 individuals (flowering and/or fruiting) during the 2006 growing season.
Calochortus weedii var. *vestus*	late-flowered mariposa lily	None/None	1B	chaparral, cismontane & riparian woodland/perennial herb (geophyte)/ June-August	Observed during the 2003 field season in chaparral and walnut woodlands. This species was also observed at the head of the Salt Creek drainage on the crest of the Santa Susana Mountains in the study area. Approximately 250 individuals were recorded in the three polygons. Not observed during 2005 or 2006 field seasons. No CNDDB records exist for the Newhall or Val Verde quads; however, habitat similar to where species occurs in eastern Ventura County is present onsite.
Calystegia peirsonii	Peirson's morning-glory	None/None	4	chaparral, coastal sage scrub, cismontane woodland, grassland/ perennial herb/May-June	Observed during the 2003 and 2006 field season in chaparral and California sagebrush throughout the survey area. Not observed during 2005 field season.
Calystegia sepium ssp. *Binghamiae*	Santa Barbara morning-glory	None/None	1A	marshes and swamps/perennial herb/ April-May	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for the Newhall or Val Verde quads; however, limited suitable habitat present onsite. Low likelihood of occurrence within study area.
Centromadia [=Hemizonia] parryi ssp. *Australis*	southern tarplant	None/None	1B	mesic edges of marshes in grasslands/ annual herb/May-November	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for the Newhall or Val Verde quads; however, suitable habitat present onsite. Low likelihood of occurrence within study area.
Cercocarpus betuloides var. *blancheae*	island mountain-mahogany	None/None	4	chaparral, closed-cone coniferous forest/evergreen shrub/February-May	Observed during the 2003, 2005 and 2006 field seasons in mixed chaparral at lower elevations in the study area.
Chorizanthe parryi var. *Fernandina*	San Fernando Valley spineflower	FC/SE	1B	Coastal sage scrub, sandy soils/annual herb/April-June	Not observed during 2003, 2005 or 2006 field season. Documented just offsite to the east in Potrero Canyon. Limited suitable habitat onsite. Low likelihood of occurrence.
Deinandra [=Hemizonia] minthornii	Santa Susana tarplant	None/SR	1B	chaparral and coastal sage scrub on rocky substrate/deciduous shrub/July-November	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for the Newhall or Val Verde quads; however, records exist for the Simi Hills and Oat Mountain. Suitable habitat

TABLE 5
Sensitive Plant Species Observed or Potentially Occurring within the Study Area

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/ Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
					exists onsite. Moderate likelihood of occurrence within study area.
Delphinium parryi ssp*. blochmaniae*	dune larkspur	None/None	1B	maritime chaparral, coastal dunes/ perennial herb/ April-may	Not observed during 2003, 2005 or 2006 field season. No likelihood of occurrence due to lack of appropriate habitat.
Dodecahema leptoceras	slender-horned spineflower	FE/SE	1B	Alluvial scrub on sandy substrate/annual herb/April-June	Not observed during 2003, 2005 or 2006 field season; however, Santa Clara River bottom excluded from survey area. Historic CNDDB records exist for the Newhall or Val Verde quads in alluvial habitat similar to those present onsite. Moderate likelihood of occurrence within study area.
Dudleya blochmaniae var*. blochmaniae*	Blochman's dudleya	None/None	1B	clay openings in chaparral and coastal sage scrub, grasslands/perennial herb/April-June	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for the Newhall or Val Verde quads. Suitable habitat present onsite; however, suitable soils not present. Low likelihood of occurrence within study area.
Dudleya cymosa ssp. *Marcescens*	marcescent dudleya	FT/CR	1B	chaparral, often on volcanic substrate/perennial herb (geophyte)/ April-June	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for Newhall and Val Verde quads. Low likelihood of occurrence within study area.
Dudleya cymosa ssp. *Ovatifolia*	Santa Monica Mountains dudleya	FT/None	1B	chaparral and coastal sage scrub, often on volcanic substrate/perennial herb (geophyte)/April-June	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for Newhall and Val Verde quads. Low likelihood of occurrence within study area.
Dudleya multicaulis	many-stemmed dudleya	None/None	1B	coastal bluff scrub, coastal sage scrub, valley and foothill grassland, rocky, often clay substrate/perennial herb/ April-June	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for the Newhall or Val Verde quads; closest known occurrences are in Calabasas and San Dimas. Suitable habitat exists onsite. Moderate likelihood of occurrence within study area.
Dudleya parva	Conejo dudleya	FT/None	1B	coastal sage scrub and grassland on rocky, gravelly clays/perennial herb/May-June	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for the Newhall or Val Verde quads. Suitable habitat exists onsite. Low likelihood of occurrence within study area.
Erodium macrophyllum	round-leaved filaree	None/None	2	cismontane woodland and grasslands on clay substrate/annual herb/March-May	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for the Newhall or Val Verde quads; however records exist for Simi Valley, and this plant was observed in the hills east of Castaic Lake in 2003. Suitable habitat present onsite; moderate likelihood of occurrence in study area.

TABLE 5
Sensitive Plant Species Observed or Potentially Occurring within the Study Area

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/ Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Helianthus nuttallii ssp. *Parishii*	Los Angeles sunflower	None/None	1A	marshes and swamps/perennial herb/ August-October	Not observed within study area during 2003, 2005 or 2006 field season. A *Helianthus* population, discovered in 2002 at Castaic Spring, on the south side of the Santa Clara River between Middle Canyon and San Jose Flats, was determined by some experts to be this species, but determined by other experts not to be this species. Based on pollen electron microscopy and chromosome counts, it is likely that the Newhall *Helianthus* species is a hybrid between *H. nuttallii* and *H. californicus* or an intermediate evolutionary step between the two species (Porter and Fraga 2004). No suitable habitat observed in study area.
Horkelia cuneata var. *puberula*	mesa horkelia	None/None	1B	chaparral, cismontane woodland, coastal sage scrub on sandy or gravelly substrate/ perennial herb/February-December	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for the Newhall or Val Verde quads. Suitable habitat present onsite. Low likelihood of occurrence within study area.
Juglans californica	southern California black walnut	None/None	4	chaparral, cismontane woodland, coastal sage scrub, alluvial scrub/ deciduous tree/March-May	Observed during 2003, 2005 and 2006 field season in walnut woodlands, oak woodlands, California sagebrush scrub, and chaparral onsite. Focused surveys for this species were not conducted; however 2,288 individuals were mapped onsite.
Juncus acutus ssp. *Leopoldii*	southwestern spiny rush	None/None	4	coastal dunes, meadows, seeps, marshes, and swamps/ perennial herb/May-June	Not observed during 2003, 2005 or 2006 field season. Moderate likelihood of occurrence within the study area.
Malacothamnus davidsonii	Davidson's bush mallow	None/None	1B	chaparral, coastal sage scrub, riparian woodland/ deciduous scrub/June-January	Not observed during 2003, 2005 or 2006 field season. Nearest occurrences are in San Fernando and Sunland. Suitable habitat present onsite. Moderate likelihood of occurrence within study area.
Nama stenocarpum	mud nama	None/None	2	edges of lakes, rivers, ponds, vernal pools/annual/January-July	Not observed during 2003, 2005 or 2006 field season. Moderate likelihood of occurrence on banks of Santa Clara River and other mesic areas onsite. No CNDDB records exist for the Newhall or Val Verde quads. Limited suitable habitat present onsite. Low likelihood of occurrence within study area.
Navarretia sp. *nova*	Navarretia	None/None	None	Grasslands on clay soils	Observed during the 2003 field season on gentle to moderate north-facing slopes. An estimated 60,000 individuals were observed within the study area.

TABLE 5
Sensitive Plant Species Observed or Potentially Occurring within the Study Area

Scientific Name	Common Name	Status Federal/State	CNPS List	Primary Habitat Associations/ Life Form/Blooming Period	Presence or Likelihood of Occurrence Onsite
Nemophila parviflora var. *quercifolia*	oak-leaved nemophila	None/None	4	cismontane woodland, lower montane coniferous forest/annual herb/may-June	Not observed onsite during 2003, 2005 or 2006 field season. Has been observed in oak woodland east of Grapevine Mesa. High likelihood of occurrence in study area.
Nolina cismontana	chaparral nolina	None/None	1B	chaparral, coastal sage scrub on sandstone or gabbro substrate/ perennial shrub May-July	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for the Newhall or Val Verde quads. Suitable habitat present onsite. Low likelihood of occurrence within study area.
Opuntia basilaris var. *brachyclada*	short-joint beavertail	None/None	1B	chaparral, Joshua tree woodland, Mojavean desert scrub/succulent shrub/ April-June	Not observed during 2003, 2005 or 2006 field season. Outside range of species. Low likelihood of occurrence within study area.
Pentachaeta lyonii	Lyon's pentachaeta	FE/SE	1B	openings in chaparral and coastal sage scrub, grasslands/annual herb/March-August	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrences are in the Simi Valley. Suitable habitat present onsite. Moderate likelihood of occurrence within study area.
Rorippa gambelii	Gambel's watercress	FE/ST	1B	Marsh and swamps (freshwater and brackish)/ perennial herb/April-June	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for the Newhall or Val Verde quads. Limited suitable habitat present onsite. Low likelihood of occurrence within study area.
Senecio aphanactis	Rayless ragwort	None/None	2	chaparral, coastal sage scrub, cismontane woodland on alkaline substrate/annual herb/January-April	Not observed during 2003, 2005 or 2006 field season. Historic CNDDB record for Saugus, south of Santa Clara River. Suitable habitat onsite. Moderate likelihood of occurrence within study area.
Sidalcea neomexicana	salt spring checkerbloom	None/None	2	chaparral, coastal sage scrub, and playas on alkaline substrate/perennial herb/March-June	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for the Newhall or Val Verde quads; suitable habitat present onsite. Moderate likelihood of occurrence within study area.
Thelypteris puberula var. *sonorensis*	Sonoran maiden fern	None/None	2	meadows and seeps/perennial herb/ fertile January-September	Not observed during 2003, 2005 or 2006 field season. No CNDDB records exist for the Newhall or Val Verde quads; nearest occurrence at Point Dume. Limited suitable habitat present onsite. Low likelihood of occurrence within study area.

Legend

FE:	Federally-listed as endangered	CNPS List 1A:	Plants presumed extinct in California
FT:	Federally-listed as threatened	CNPS List 1B:	Plants rare, threatened, or endangered in California and elsewhere
FC:	Federal candidate for listing	CNPS List 2:	Plants rare, threatened, or endangered in California but more common elsewhere
SC:	State candidate for listing	CNPS List 3:	Plants about which we need more information – a review list
SE:	State-listed as endangered	CNPS List 4:	Plants of limited distribution – a watch list
ST:	State-listed as threatened	SR:	State-listed as rare

Figure 3 depicts the locations of sensitive plant species within the study area. Additional information regarding the mapping for each sensitive species is included in the sections below (*Sections 4.4.1.1* through *4.4.1.8*).

4.3.1.1 Slender mariposa lily (*Calochortus clavatus* var. *gracilis*)

Slender mariposa lily has no state or federal status but is a CNPS List 1B plant. It is typically found in chaparral, California sagebrush scrub, and grasslands. It has been documented to occur at the mouth of Pico Canyon and on Entrada, Legacy and Newhall Ranch project sites (Newhall Quad; CNDDB 2005). Other varieties of this species documented from southern California include club-haired mariposa lily (*C. clavatus* var. *clavatus*) and pale mariposa lily (*C. clavatus* var. *pallidus*). The club-haired mariposa lily differs in that it is virtually a serpentine endemic (restricted to serpentine soils) and a very robust species, generally attaining a height of one meter. Pale mariposa lily differs in that the petals are a paler yellow, the anthers are paler (yellow to pale purple), and the hairs on the petals are not as knobby or club shaped. Neither the club-haired mariposa lily nor pale mariposa have a prominent red line above the nectary on the petal, as is the case with the slender mariposa lily.

Multiple polygons of mariposa lily were mapped by Dudek within the study area (*Figure 3*) by drawing boundaries on aerial photograph field maps around the areas that contained the mariposa lily. Surveys within the study area were conducted during and after the blooming season for the slender mariposa lily. The majority of the surveys were conducted during the blooming period for this species, but the plants were beginning to senesce during the surveys making observations less likely. The fruiting individuals were much more cryptic than the flowering plants, therefore it is expected that only a portion of the plants that were in flower earlier were observed. Moreover, geophytes like *Calochortus* generally only have a percentage of the plants flower in any given year and the non-flowering individuals are generally not as visible.

Within the study area, the slender mariposa lily was found primarily on east-, northeast-, and southwest-facing ridges and slopes in California sagebrush scrub and grasslands. The plants were generally mapped in areas of high vegetative cover and a variety of soil types (e.g., gravelly loam, sandy loam, rocky clay). A total of 85 polygons was mapped within the study area during the 2003 surveys, with an estimated number of individuals of approximately 31,500. Additionally, one polygon and 34 point locations supporting 371 individuals were mapped onsite during the 2006 surveys for the additional 590 acres.

4.3.1.2 Plummer's mariposa lily (*Calochortus plummerae*

Plummer's mariposa lily has no state or federal status but is a CNPS List 1B plant. It is typically found in chaparral, California sagebrush scrub, and grasslands. Surveys within the study area were conducted during and after the blooming season for Plummer's mariposa lily. Similar to slender mariposa lily, the fruiting individuals were much more cryptic than the flowering plants; therefore it is expected that only a portion of the plants that were in flower earlier were observed. Moreover, geophytes like *Calochortus* generally only have a percentage of the plants flower in any given year and the non-flowering individuals are generally not as visible.

Within the study area, Plummer's mariposa lily was found primarily on steep southwest-facing ridges and slopes in California sagebrush scrub and grasslands. The plants were generally mapped in areas of high vegetative cover and a variety of soil types (e.g., gravelly loam, sandy loam, rocky clay). A total of three polygons and two point locations of Plummer's mariposa lily was mapped by Dudek within the study area during the 2006 surveys (*Figure 3*), with an estimated number of approximately 78 individuals.

4.3.1.3 Late-flowered mariposa lily (*Calochortus weedii* var. *vestus*)

Late-flowered mariposa lily has no state or federal status, but is found on List 1B of the CNPS Inventory. This geophytic perennial has been documented from the Santa Susana Mountains in Ventura County to the west and also occurs in Ventura, Santa Barbara, San Luis Obispo, and Monterey counties. It typically grows in chaparral and cismontane woodland vegetation communities between 900 and 3,000 feet AMSL. Three polygons were mapped in 2003 by Dudek with a polygon size ranging from 12,801 to 72,903 square feet. The estimated number of individuals within each polygon ranges from 50 to 100, with a total of approximately 250 individuals observed within the project site during the 2003 field season. This species was not observed during the 2005 or 2006 field seasons.

4.3.1.4 Peirson's morning glory (*Calystegia peirsonii)*

Peirson's morning-glory has no state or federal status, but is found on List 4 of the CNPS Inventory. This morning-glory is a rhizomatous perennial that is typically found in more desert-like areas (e.g., creosote bush scrub, Joshua tree woodland) at elevations which exceed 3,000 feet AMSL, although there are records in the CNDDB for lower elevations in the local area.

While never abundant, Peirson's morning-glory is widespread onsite and was observed on virtually all ridges and slopes by Dudek in 2003, weakly climbing over mixed chaparral, California sagebrush, and in grasslands throughout the study area. It was not the subject of focused surveys. It was also observed during the 2006 field season, with a similar abundance and distribution.

4.3.1.5 Island mountain-mahogany (*Cercocarpus betuloides* var. *blancheae)*

Island mountain-mahogany has no state or federal status, but is found on List 4 of the CNPS Inventory. It is an evergreen shrub that occurs as part of the chaparral in Los Angeles and Ventura counties, as well as on several of the Channel Islands (CNPS 2001).

Onsite, island mountain-mahogany occurs as an occasional component of chaparral at the base of north-facing slopes in survey area. This species was observed during the 2003, 2005 and 2006 field seasons.

4.3.1.6 Southern California black walnut (*Juglans californica*)

Southern California black walnut has no state or federal status, but is found on List 4 of the CNPS Inventory. Within its distributional range in southern California, this species is found as scattered occurrences throughout chaparral, cismontane woodlands, and coastal and alluvial scrub vegetation communities (CNPS 2001).

This large shrub to tree was incidentally observed throughout the study area by Dudek in 2003, 2005 amd 2006 (*Figure 3*). It is a dominant component at the upper elevations, forming stands of California walnut woodland, and is common in oak woodlands. It is an occasional component of mixed chaparral, California sagebrush, and alluvial scrub at the lower elevations. Approximately 2,288 individuals were observed during the 2005 and 2006 plant surveys.

4.3.1.7 Navarretia (*Navarretia* sp. *nova*)

An undescribed species of Navarretia was documented within the study area during the 2003 field season by Dudek. This plant is undoubtedly closely related to *Navarretia jaredii*, *N. pubescens*, and *N. setiloba*; but is also distinct from each of these taxa. Several previous collections of this unnamed navarretia have been made in the Santa Clara River Valley between the Los Angeles County line and Ojai. Plants of the unnamed Navarretia differ from *N. jaredii* in that it has a purple spot on the edge of the corolla tube, there are papillae in the tube, and the stems are not white hairy. It differs from *N. pubescens* in the presence of the purple spot and papillae in the tube, the bracts are slightly wider, and the flowers are smaller and whitish as opposed to larger and purple. It differs from *N. setiloba* by the presence of the purple spot, having narrower bracts, and a smaller flower.

Two polygons consisting of an estimated 60,000 individuals were observed during the 2003 (*Figure 3*). The navarretia was observed growing on clay lenses with a gentle to moderate north-facing slope. The vegetation around these plants consisted of valley needlegrass grasslands that were sparsely vegetated.

4.3.1.8 Parish's big sagebrush (*Artimisia tridentata* ssp. *parishii*)

Parish's big sagebrush has no state or federal status, and is not considered sensitive by CNPS, however this species is considered sensitive by the County of Los Angeles. According to Hickman (1993) the distribution for this subspecies includes San Benito, Montery, Fresno, Kings, Los Angeles, Ventura, Orange, San Diego, Santa Barbara, Mono, Inyo, San Bernardino, and Riverside Counties. Onsite this subspecies is found in big sagebrush scrub on the margins of Salt Creek and is found growing alongside *A.t.* ssp. *tridentata*.

There are big sagebrush plants with drooping inflorescence branches (*A.t.* ssp. *parishii*) and erect inflorescence branches (*A.t.* ssp. *tridentata*) that co-occur onsite. After analyzing the characteristics of numerous samples, including examining the fruits under a microscope, it was determined that both subspecies probably occur onsite. However, it appears as though these two subspecies may hybridize, as the full range of characteristics (drooping and erect inflorescence branches and hairy and glandular fruit) were found among the collected specimens onsite.

The shape of the inflorescence branches (drooping or erect) was not consistently tied to the fruit surface having hairs or being glandular (i.e., plants with drooping inflorescence branches were found to have flowers with glandular fruit, and plants with drooping inflorescence branches were found to have flowers with hairy fruit). Therefore it is not possible to determine the subspecies from looking at whether or not the inflorescence branches are drooping or not. An analysis with a microscope of the fruit surface of flowers on each individual plant would be needed to determine which subspecies it is.

The conclusion made by Dudek was that the plants could be grouped into three categories, those that appeared to be consistent with *A. t.* ssp. *tridentata* (erect inflorescence branches and glandular fruit), those that appeared to be consistent with *A. t.* ssp. *parishii* (drooping inflorescence branches and hairy fruit), and those that had mixed characters (presumed hybrids).

4.3.2 Sensitive Wildlife Species

A total of 18 sensitive wildlife species was identified during the late fall of 2005. These and other sensitive species that have the potential to occur within the study area, based on the presence of suitable habitat and distribution, are listed in *Table 6*. This list is confined primarily to those species listed by the state and federal government as threatened or endangered, those species proposed for state and/or federal listing or candidates, those wildlife species generally considered to be rare or declining, and the County of Los Angeles. Wildlife species subject to existing mitigation measures are discussed in greater detail below.

4.3.2.1 Arroyo toad (*Bufo californicus*)

The arroyo toad is federally-listed as endangered (FE) and is considered a species of special concern by the State of California. Arroyo toads are found in foothill canyons and inter-mountain valleys where the river is bordered by low hills and the stream gradient is low (Miller and Miller 1936, Sweet 1992). The arroyo toad is an extreme habitat specialist, restricted to riparian environments in the middle reaches of third order streams (Sweet 1989). Arroyo toads are known to either breed, forage, and/or aestivate in aquatic habitats, riparian, coastal sage scrub, oak, and chaparral habitats. Holland (2001) found that on Camp Pendleton, California, large numbers of arroyo toads even utilized non-native exotic patches within otherwise suitable habitat. The species is currently thought to be restricted to the headwaters of large streams with persistent water from March to mid-June that have shallow, gravely pools less than 18 inches deep, and adjacent sandy terraces. Upland burrows have been noted for this species. Patterns of habitat use by sub-adults and non-breeding adults is not well understood (Sweet 1992).

Breeding pools must be open and shallow with minimal current, and with a sand or pea gravel substrate overlain with sand or flocculent silt (Sweet 1989). Adjacent banks must provide open, sandy or gravely terraces with very little herbaceous cover for adult and juvenile foraging areas, within a moderate riparian canopy of cottonwood, willow, or oak. Heavily shaded pools are unsuitable for larvae and juvenile toads due to lower water and soil temperatures and poor algal mat development (Sweet 1992). Episodic flooding is critical to keep the low terraces relatively vegetation free. Juveniles favor areas which remain damp and contain less than 10 percent cover, as these sites possess the thermal and refuge characteristics required for juvenile survival and rapid growth (Sweet 1992). Larval growth appears to be more rapid in pools with low silt loads (Jennings and Hayes 1994). Adults use terraces in the 100-year flood zone, which may extend up to 100 m from the stream (Campbell et.al. 1996), however, more recent data suggest that they may move between 1 and 2 km into adjacent upland habitats to estivate. Most terraces

TABLE 6
Sensitive Wildlife Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/State[1]	Primary Habitat Associations	Status Onsite Or Potential To Occur
		INVERTEBRATES		
Branchinecta lynchi	Vernal pool fairy shrimp	FT/ None	Vernal pools; cool-water pools with low to moderate dissolved solids	Low potential to occur based on habitats present, suitable pools not located
Danaus plexippus (wintering sites)	Monarch butterfly	None/ None	Overwinters in eucalyptus groves	Species observed on site during fall 2005 survey period
Plebulina emigdionis	San Emigdio blue butterfly	None/None	Often near streambeds, washes, or alkaline areas. Associated with four-wing saltbrush (*Atriplex canescens)* and quail bush (*Atriplex lentiformis*).	A colony was observed in Potrero Canyon in NRSP in association with *Atriplex lentiformis* plants (Compliance Biology 2004). Suitable habitat occurs within Salt Creek area, VCC and Entrada.
		FISH		
Catostomus santaanae	Santa Ana sucker	FT/ CSC	Small, shallow, cool, clear streams less than 7 meters in width and a few centimeters to more than a meter in depth; substrates are generally coarse gravel, rubble and boulder	Low potential to occur based on habitats present, habitat may occur in Salt Creek
Gasterosteus aculeatus williamsoni	Unarmored threespine stickleback	FE/CE, CFP	Slow-moving and backwater areas.	This species is known to occur in the Santa Clara River and has been observed in the portion of the river within NRSP (ENTRIX 2005).
Gila orcuttii	Arroyo chub	None/ CSC	Warm, fluctuating streams with slow-moving or backwater sections of warm to cool streams at depths > 40 centimeters; substrates of sand or mud	Low potential to occur based on habitats present
		Amphibians		
Bufo californicus	Arroyo toad	FE/CSC	Stream channels for breeding(typically 3rd order); adjacent stream terraces and uplands for foraging and wintering	Moderate potential to occur along Salt Creek and some supporting forks
Ensatina klauberi	Large-blotched salamander	None/CSC	Oak woodland, chaparral, coastal sage scrub, coastal dunes, conifer forest	High potential to occur based on habitat present
Rana aurora draytoni	California red-legged frog	FT/CSC	Lowland streams, wetlands, riparian woodlands, livestock ponds; dense, shrubby or emergent vegetation associated with deep, still or slow-moving water; uses adjacent uplands	Low potential to occur based on habitats present

TABLE 6
Sensitive Wildlife Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/State[1]	Primary Habitat Associations	Status Onsite Or Potential To Occur
Rana mucosa	Mountain yellow-legged frog	FE, FC/CSC	Meadow streams, isolated pools, lake borders, rocky stream courses within ponderosa pine, montane hardwood-conifer and montane riparian habitat types	Low potential to occur based on habitats present
Spea [=*Scaphiopus*] *hammondi*	Western spadefoot	None/CSC	Most common in grasslands, coastal sage scrub near rain pools or vernal pools; riparian habitats	High potential to occur based on habitat present
REPTILES				
Anniella pulchra pulchra	Silvery legless lizard	None/CSC	Loose soils (sand, loam, humus) in coastal dune, coastal sage scrub, woodlands, and riparian habitats	High potential to occur based on habitat present
Arizona elegans occidentalis	Coastal (California) glossy snake	None/ None	Grassland, chaparral, coastal sage scrub, woodlands in sandy and rocky substrates	High potential to occur based on habitat present
Aspidoscelis tigris stejnegeri	Coastal western whiptail	None/None	Coastal sage scrub, chaparral	Present on site
Charina [=*Lichanura*] *trivirgata* ssp. *roseofusca*	Coastal rosy boa	None/ None	Rocky chaparral, coastal sage scrub, oak woodlands, desert and semi-desert scrub	High potential to occur based on habitat present
Coleonyx variegatus abbotti	San Diego banded gecko	None/ None	Cismontane chaparral, coastal sage scrub, desert scrub; granite outcrops	High potential to occur based on habitat present
Diadophis punctatus modestus	San Bernardino ringneck snake	None/None	Open, rocky and somewhat moist areas near intermittent streams: grasslands, sage scrub	High potential to occur based on habitat present
Emys [=*Clemmys*] *marmorata pallida*	Southwestern pond turtle	None/ CSC	Slow-moving permanent or intermittent streams, ponds, small lakes, reservoirs with emergent basking sites; adjacent uplands used during winter	Species observed on site on 5/29/03. Some potential to still occur on site
Eumeces skiltonianus interparietalis	Coronado skink	None/ CSC	Grassland, riparian and oak woodland; found in litter, rotting logs, under flat stones	Low potential to occur based on habitats present
Lampropeltis zonata (San Bernardino population)	San Bernardino mountain kingsnake	None/ CSC	Valley-foothill hardwood, hardwood-conifer, chaparral, coniferous forest, wet meadow	Low potential to occur based on habitats present
Phrynosoma coronatum (blainvillei population)	Coast (San Diego) horned lizard	None/ CSC	Coastal sage scrub, annual grassland, chaparral, oak and riparian woodland, coniferous forest	Present on site
Salvadora hexalepis virgultea	Coast patch-nosed snake	None/CSC	Chaparral, washes, sandy flats, rocky areas	High potential to occur based on habitat present
Thamnophis hammondii	Two-striped garter snake	None/ CSC	Streams, creeks, pools, streams with rocky beds, ponds, lakes, vernal pools	High potential to occur based on habitat present
Thamnophis sirtalis ssp.	South Coast garter snake	None/ CSC	Marshes, meadows, sloughs, ponds, slow-moving water courses	Low potential to occur based on habitats present
BIRDS				

TABLE 6
Sensitive Wildlife Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/State[1]	Primary Habitat Associations	Status Onsite Or Potential To Occur
Accipiter cooperii (nesting)	Cooper's hawk	None/ CSC	Riparian and oak woodlands, montane canyons	Species observed on site during fall 2005 survey period
Accipiter striatus (nesting)	Sharp-shinned hawk	None/ CSC	Nests in coniferous forests, ponderosa pine, black oak, riparian deciduous, mixed conifer, Jeffrey pine; winters in lowland woodlands and other habitats	High potential to occur during winter months
Agelaius tricolor (nesting colony)	Tricolored blackbird	BCC, USBC/ CSC/ Aud	Nests near fresh water, emergent wetland with cattails or tules; forages in grasslands, woodland, agriculture	Low potential to occur based on habitats present
Aimophila ruficeps canescens	Southern California rufous-crowned sparrow	None/ CSC	Grass-covered hillsides, coastal sage scrub, chaparral with boulders and outcrops	High potential to occur based on habitat present
Ammodramus savannarum	Grasshopper sparrow	SMC/ None	Open grassland and prairie, especially native grassland with a mix of grasses and forbs	High potential to occur based on habitat present
Amphispiza belli belli	Bell's sage sparrow	BCC, SMC/ CSC	Coastal sage scrub and dry chaparral along coastal lowlands and inland valleys	High potential to occur based on habitat present
Aquila chrysaetos (nesting and wintering)	Golden eagle	BCC/ CSC, P	Open country, especially hilly and mountainous regions; grassland, coastal sage scrub, chaparral, oak savannas, open coniferous forest	High potential to occur based on habitat present, breeding resources available
Ardea alba (rookery)	Great egret	None/None	Nests colonially in large trees. Rookery sites are typically located near marshes, tide-flats, irrigated pastures, and margins of rivers and lakes.	Individuals commonly observed foraging within the Santa Clara River in NRSP and within VCC; moderate potential for foraging within Salt Creek area and Entrada. No rookery sites have been observed on the Project site during annual bird surveys.
Ardea herodias	Great blue heron	None/None	Variety of habitats, but primarily wetlands; lakes, rivers, marshes, mudflats, estuaries, saltmarsh, riparian habitats	High potential to occur based on habitat present, breeding resources available
Asio flammeus (nesting)	Short-eared owl	USBC/ CSC/ Aud	Grassland, prairies, dunes, meadows, irrigated lands, saline and freshwater emergent wetlands	Species observed on site during fall 2005 survey period
Asio otus (nesting)	Long-eared owl	None/ CSC	Riparian, live oak thickets, other dense stands of trees, edges of coniferous forest	Species observed on site during fall 2005 survey period
Athene cunicularia (burrow sites)	Burrowing owl	BCC/ CSC	Grassland, lowland scrub, agriculture, coastal dunes and other artificial open areas	Moderate potential. "Groundowls" as referred by Ranch staff may be short-eared owl

TABLE 6
Sensitive Wildlife Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/State[1]	Primary Habitat Associations	Status Onsite Or Potential To Occur
Botaurus lentiginosus	American bittern	USBC, SMC/ None	Emergent habitat of freshwater marsh and vegetation borders of ponds and lakes	Low potential to occur based on habitats present
Buteo lineatus	Red-shouldered hawk	None/ None	Riparian and woodland habitats, eucalyptus	Species observed on site during fall 2005 survey period
Buteo regalis (wintering)	Ferruginous hawk	BCC, SMC/ CSC Aud	Open, dry country, grasslands, open fields, agriculture	High potential to occur based on habitat present
Buteo swainsoni (nesting)	Swainson's hawk	BCC, USBC/ ST/ Aud	Open grassland, shrublands, croplands	Low potential to occur based on habitats present
Campylorhynchus brunneicapillus sandiegensis	Coastal (San Diego) cactus wren	BCC/ CSC	Southern cactus scrub, maritime succulent scrub, cactus thickets in coastal sage scrub	Low potential to occur based on habitats present
Carduelis lawrencei	Lawrence's goldfinch	BCC/None	Valley foothill hardwood, valley foothill hardwood-conifer; and, in S. CA., desert riparian, palm oasis, pinyon-juniper and lower montane habitats.	Observed within the riparian habitats within NRSP during annual bird surveys; suitable nesting and foraging habitat is present within NRSP, Salt Creek area, VCC and Entrada.
Cathartes aura	Turkey vulture	None/ None	Rangeland, agriculture, grassland; uses cliffs and large trees for roosting, nesting and resting	Species observed on site during fall 2005 survey period, nesting opportunities are also present
Catharus ustulatus	Swainson's thrush	None/ None	Riparian habitat with dense understory and dense shrubs	Low potential to occur based on habitats present
Circus cyaneus (nesting)	Northern harrier	None/ CSC	Open wetlands (nesting), pasture, old fields, dry uplands, grasslands, rangelands, coastal sage scrub	High potential to occur based on habitat present
Coccyzus americanus occidentalis (nesting)	Western yellow-billed cuckoo	FC, BCC, SMC/ SE	Dense, wide riparian woodlands and forest with well-developed understories	Low potential to occur based on habitats present
Dendroica petechia brewsteri (nesting)	Yellow warbler	None/ CSC	Nests in lowland and foothill riparian woodlands dominated by cottonwoods, alders and willows; winters in a variety of habitats	High potential to occur based on habitat present
Elanus leucurus (nesting)	White-tailed kite	MNBMC/ P	Open grasslands, savanna-like habitats, agriculture, wetlands, oak woodlands, riparian	Species observed on site during fall 2005 survey period
Empidonax traillii extimus (nesting)	Southwestern willow flycatcher	FE, USBC/ SE/ Aud	Riparian woodlands along streams and rivers with mature, dense stands of willows or alders; may nest in thickets dominated by tamarisk	Low potential to occur based on habitats present

TABLE 6
Sensitive Wildlife Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/State[1]	Primary Habitat Associations	Status Onsite Or Potential To Occur
Eremophila alpestris actia	California horned lark	None/ CSC	Open habitats, grassland, rangeland, shortgrass prairie, montane meadows, coastal plains, fallow grain fields	High potential to occur based on habitat present
Falco columbarius (wintering)	Merlin	None/ CSC	Nests in open country, open coniferous forest, prairie; winters in open woodlands, grasslands, cultivated fields, marshes, estuaries and sea coasts	High potential to occur based on habitat present
Falco mexicanus (nesting)	Prairie falcon	BCC/ CSC	Grassland, savannas, rangeland, agriculture, desert scrub, alpine meadows; nest on cliffs or bluffs	Species observed on site during fall 2005 survey period
Falco peregrinus anatum	American peregrine falcon	BCC, (FD) / SE, P	Nests on cliffs, buildings, bridges; forages in wetlands, riparian, meadows, croplands, especially where waterfowl are present	High potential to occur based on habitat present
Haliaeetus leucocephalus (nesting & wintering)	Bald eagle	FT/ SE, P	Seacoasts, rivers, swamps, large lakes; winters at large bodies of water in lowlands and mountains	Low potential to occur based on habitats present
Icteria virens (nesting)	Yellow-breasted chat	None/ CSC	Dense, relatively wide riparian woodlands and thickets of willows, vine tangles and dense brush.	Low potential to occur based on habitats present
Lanius ludovicianus (nesting)	Loggerhead shrike	BCC/ CSC	Open ground including grassland, coastal sage scrub, broken chaparral, agriculture, riparian, open woodland	Species observed on site during fall 2005 survey period
Melospiza lincolnii	Lincoln's sparrow	None/None	Nests in wet montane meadows of corn lily, sedges, and low willows; winters in thickets of shrubs, tall forbs interspersed with grassy areas; usually on damp ground or near water	Low potential to occur based on habitats present
Numenius americanus (nesting)	Long-billed curlew	BCC, USBC/ CSC/ Aud	Nests in upland shortgrass prairies and wet meadows in northeast California; winters in coastal estuaries, open grasslands and croplands	Low potential to occur based on habitats present
Nycticorax nycticorax (rookery)	Black-crowned night heron	None/ None	Marshes, ponds, reservoirs, estuaries; nests in dense-foliaged trees and dense fresh or brackish emergent wetlands	Low potential to occur based on habitats present
Pandion haliaetus (nesting)	Osprey	None/CSC	Large waters (lakes, reservoirs, rivers) supporting fish; usually near forest habitats, but widely observed along the coast	Low potential to occur based on habitats present
Picoides pubescens	Downy woodpecker	None/None	Nests in deciduous (often willow) woodlands, oak woodlands, orchards, suburban plantings and occasionally conifers	High potential to occur based on habitat present
Piranga rubra (nesting)	Summer tanager	None/CSC	Nests in riparian woodland; winter habitats include parks and residential areas	High potential to occur based on habitat present

TABLE 6
Sensitive Wildlife Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/State[1]	Primary Habitat Associations	Status Onsite Or Potential To Occur
Plegadis chihi (rookery site)	White-faced ibis	SMC/CSC	Nests in marsh; winter foraging in shallow lacustrine waters, muddy ground of wet meadows, marshes, ponds, lakes, rivers, flooded fields and estuaries	Low potential to occur based on habitats present
Polioptila caeurulea	Blue-gray gnatcatcher	None/None	Chaparral, brushland	Species observed on site during fall 2005 survey period
Polioptila californica californica	Coastal California gnatcatcher	FT, USBC/ CSC/ Aud	Coastal sage scrub, coastal sage scrub-chaparral mix, coastal sage scrub-grassland ecotone, riparian in late summer	Low potential due to elevation and habitat disturbance
Progne subis (nesting)	Purple martin	None/ CSC	Nests in tall sycamores, pines, oak woodlands, coniferous forest; forages over riparian, forest and woodland	Low potential to occur based on habitats present
Pyrocephalus rubinus flammeus (nesting)	Vermillion flycatcher	None/CSC	Breeding habitat includes riparian woodlands, riparian scrub, and freshwater marshes	A single individual was observed along the Santa Clara River in 1993; suitable breeding and foraging habitat present.
Riparia riparia (nesting)	Bank swallow	None/ ST	Nests in lowland country with soft banks or bluffs; open country and water during migration	Low potential to occur based on habitats present
Siala mexicana	Western bluebird	None/None	Open forests of deciduous, coniferous or mixed trees, savanna, edges of riparian woodland	Species observed on site during fall 2005 survey period
Sphyrapicus thyroideus	Williamson's sapsucker	None/None	Nests in montane spruce-fir, Douglas-fir, lodgepole pine, ponderosa pine, mixed deciduous-coniferous forest; inhabits broader variety of conifers during non-breeding season	Species observed on site during fall 2005 survey period
Tachycineta bicolor	Tree swallow	None/ None	Nests in cavity-containing trees or snags near or in water; riparian forest and woodland, lodgepole pine belt; forages over water	Low potential to occur based on habitats present
Vireo bellii pusillus (nesting)	Least Bell's vireo	FE, BCC, USBC/ SE/ Aud	Nests in southern willow scrub with dense cover within 1-2 meters of the ground; habitat includes willows, cottonwoods, baccharis, wild blackberry or mesquite on desert areas	Low potential to occur based on habitats present
Wilsonia pusilla	Wilson's warbler	None/None	Nests in montane meadows and low, dense willow thickets; in migration occurs in chaparral, woodlands and forests with shrubs	Species observed on site during fall 2005 survey period

TABLE 6
Sensitive Wildlife Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/State[1]	Primary Habitat Associations	Status Onsite Or Potential To Occur
		MAMMALS		
Antrozous pallidus	Pallid bat	CSC/ WBWG	Rocky outcrops, cliffs, and crevices with access to open habitats for foraging	This species was detected on the project site during ANABAT surveys (Impact Sciences 2004)
Choeronycteris mexicana	Mexican long-tongued bat	None/ CSC/WBWG	Desert and montane riparian, desert succulent scrub, desert scrub, and pinyon-juniper woodland. Roosts in caves, mines, and buildings.	Low potential to occur based on habitats present
Coryorhinus townsendii townsendii	Townsend's western big-eared bat	CSC/ WBWG	Mesic habitats, gleans from brush or trees or feeds along habitat edges	High potential to occur based on habitat present
Eumops perotis californicus	Western mastiff bat	CSC/ WBWG	Roosts in small colonies in cracks and small holes, seeming to prefer man-made structures	Low potential to occur based on habitats present
Euderma maculata	*Spotted bat*	None/ CSC	Occupies a wide variety of habitats from arid deserts and grasslands, to mixed conifer forests. Feeds over water and along washes. Needs rock crevices in cliffs or caves for roosting. VERIFY INFO	High potential to occur based on habitat present
Lassiurus xanthinus	Western yellow bat	None//None	Desert and montane riparian, desert succulent scrub, desert scrub, and pinyon-juniper woodland.	Low potential to occur based on habitats present
Lepus californicus bennettii	San Diego black-tailed jackrabbit	None/ CSC	Arid habitats with open ground; grasslands, coastal sage scrub, agriculture, disturbed areas, rangelands	High potential to occur based on habitat present
Myotis leibii(=ciliolabrum)	Small-footed myotis	None/None	Caves, old mines, abandoned buildings	Low potential to occur based on habitats present
Myotis thysanodes	Fringed myotis	None/ None/ WBWG	Open habitats, early successional stages, streams, lakes, and ponds are foraging areas	High potential to occur based on habitat present
Myotis volans	Long-legged myotis	None/ None/ WBWG	Feeds over open water and over open habitats, using denser woodlands and forests for cover and reproduction	High potential to occur based on habitat present
Myotis yumanensis	Yuma myotis	None/ None	Closely tied to open water which is used for foraging; open forests and woodlands are optimal habitat	Low potential to occur based on habitats present
Neotoma lepida intermedia	San Diego desert woodrat	None/ CSC	Coastal sage scrub, chaparral, pinyon-juniper woodland with rock outcrops, cactus thickets, dense undergrowth	A single woodrat midden was located – probably occurs at low densities
Nyctinomops femorosaccus	Pocketed free-tailed bat	None/ CSC	Rocky desert areas with high cliffs or rock outcrops	High potential to occur based on habitat present
Nyctinomops macrotis	Big free-tailed bat	None/ CSC	Rugged, rocky canyons	High potential to occur based on habitat present.

TABLE 6
Sensitive Wildlife Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/State[1]	Primary Habitat Associations	Status Onsite Or Potential To Occur
Odocoileus hemionus	Mule deer	None/ Regulated	Coastal sage scrub, chaparral, riparian, woodlands, forest; often browses in open areas adjacent to cover	Species observed on site during fall 2005 survey period
Onychomys torridus ramona	Southern grasshopper mouse	None/ CSC	Grassland, sparse coastal sage scrub	Low potential to occur based on habitats present
Perognathus longimembris brevinasus	Los Angeles pocket mouse	None/ CSC	Grassland, coastal sage scrub, disturbed habitats; fine, sandy soils	High potential to occur based on habitat present
Puma concolor	Mountain lion	None/Regulated	Coastal sage scrub, chaparral, riparian, woodlands, forest; rests in rocky areas, and on cliffs and ledges that provide cover	Species tracks observed on site during fall 2005 survey period
Taxidea taxus	American badger	None/ CSC	Dry, open treeless areas, grasslands, coastal sage scrub	Species burrow observed on site during fall 2005 survey period
Urocyon cinereoargenteus	Gray fox	None/ None	Coastal sage scrub, chaparral, riparian, woodlands, forest	Species observed on site during fall 2005 survey period

[1]The federal and state status of species primarily is based on the Special Animals List (July 2005), California Department of Fish and Game.

Federal Designations:

BCC	Fish and Wildlife Service: Birds of Conservation Concern
FC	Candidate for federal listing as threatened or endangered
(FD)	Federally-delisted; monitored for five years
FE	Federally-listed Endangered
FT	Federally-listed as Threatened
MNBMC	Fish and Wildlife Service Migratory Nongame Birds of Management Concern
PFT	Proposed for listing as Federally Threatened
USBC	United States Bird Conservation Watch List
SMC	Fish and Wildlife Service Region 1 Species of Management Concern

State Designations:

CSC	California Special Concern Species
P	California Department of Fish and Game Protected and Fully Protected Species
SE	State-listed as Endangered
ST	State-listed as Threatened

Other:

AFS E	American Fisheries Society Endangered classification
Aud	Audubon Society Watch list
WBWG	Western Bat Working Group High Priority species

are not immediately adjacent to the stream, but are separated by a dynamic, channel margin zone of mixed sediments which is reworked as storm waters flood the primary channel (Campbell et.al. 1996). Drainages with straighter courses will have broader marginal zones and fewer terraces but may have associated oak flats that provide suitable adult habitat (Campbell et.al. 1996). Adults excavate shallow burrows on the terraces where they shelter during the day when the surface is damp or during longer intervals in the dry season.

Based on the given habitat information, elevational range, biological patterns of this species, and predatory base, it is concluded that study area does have potential to support arroyo toad. This species was not observed during the late Fall 2005 wildlife surveys; however, based on the surveys conducted by Dudek biologists, it is anticipated that this species potentially occurs on site. Suitable habitat is generally confined to Salt Creek and its immediate side-channels and East Fork. One potential factor which may prohibit the arroyo toad is the apparently high salt content of the areas near water.

4.3.2.2 Western pond turtle (*Clemmys marmorata pallida*)

The western pond turtle is a California species of special concern. This species inhabits slow moving permanent or intermittent streams, small ponds, small lakes, reservoirs, abandoned gravel pits, permanent and ephemeral shallow wetlands, stock ponds, and sewage treatment lagoons (Rathbun et al., 1992; Holland, 1994). Pools are the preferred habitat within streams (Bury, 1972). Abundant logs, rocks, submerged vegetation, mud, undercut banks, and ledges are necessary habitat components for cover as well as a water depth greater than 2 meters (Brattstrom and Messer, 1988; Holland, 1994). Additionally, emergent basking sites, emergent vegetation and the availability of suitable terrestrial shelter and nesting sites seem to characterize optimal habitat. Adjacent upland areas typically provide overwintering and estivation sites.

The elevational range for the species is from brackish estuarine waters at sea level to over 2,000 meters, but it is uncommon over 1,529 meters (Stebbins, 1954; Bury, 1963; Holland, 1994).

The western pond turtle's daily activity revolves around thermoregulation and foraging patterns. It often suns itself at the edge of water, or on branches or stones above water. It is secretive and will seek refuge at the bottom of a pond or stream at the slightest disturbance. In the early morning and evening, pond turtles may move up or downstream, moving from one pool to the next in search of basking sites, mates or foraging. Northern populations tend to forage early in the morning, then usually begin basking between 0900¬ and 1000, and continue basking intermittently throughout the day. They usually terminate basking at around 90-95 degrees Fahrenheit (F.), maintaining a body temperature of 75-90 degrees F. for most activities (Bury

1972). Foraging may occur during the late afternoon or early evening during the warmth of summer. Often they will remain quietly on the bottom of pools to avoid a critical thermal maximum of 104 degrees F.

Geographical variation occurs in the seasonal activity of the pond turtle, although in warmer portions of its range, it may be active in every month (Holland, 1994). The primary activity period is February-November for the northern portion of its range (Evenden, 1948; Bury, 1972).

This species was observed within the study area on May 29, 2003 in an area that supported a deep pond along Salt Creek. Survey conditions for that day at 9am were: temp 67 degrees, marine layer, winds 0-1 mph. Over the last two years this area has been subjected to an intense fire event, and subsequent succession. With rain events, this area has silted in, and is no longer ponded. This area now supports a large meadow with Salt Creek running through it. This area no longer has the capacity to support the western pond turtle. It is possible that in the future this area may wash out and once again have the suitable habitat conditions needed to support the western pond turtle. Smaller, but apparently stagnant pools occur at intervals along the East Fork of Salt Creek and a source population occurs within the Santa Clara River. Therefore, it is concluded that this species has a low potential to currently use the site, but having utilized the site in the past, has a moderate potential to utilize the site in the future.

4.3.2.3 Two-striped garter snake (*Thamnophis hammondii*)

The two-striped garter snake is a California species of special concern. This species is considered one of the most aquatic of garter snakes and is typically associated with wetland habitats such as streams, creeks and pools (Fitch, 1940; Rossman et al., 1996). It is closely associated with streams with rocky beds and bordered by willows (Stebbins, 1985); also ponds, lakes, wetlands and vernal pools. It also occurs in mixed oak, oak woodlands and chaparral on coastal slopes of mountains and foothills to sea level.

The Upper Sonoran Zone is its primary range, but it also extends into the Lower Sonoran and Transition zones. It is common west of the deserts in southern California. It occurs from Monterey County southward (including Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside and San Diego counties) along the coast and drainages within the coast and peninsular ranges to Mission San Fernando Velicata in northwestern Baja California, Mexico (Stebbins, 1985; McGuire, 1989). This snake may follow streams that run down into the desert from the western mountains, as to Victorville on the Mohave River, and Palm Canyon at the eastern base of the San Jacinto Mountains (Van Denburgh and Slevin, 1918). It also occurs in isolated populations in northern Baja California Sur as well as Catalina Island, off the California coast

(Rossman, Ford and Seigel, 1996). The most northern locality reported by Van Denburgh and Slevin (1918) of a typical specimen is Oceano, San Luis Obisbo County. Elevational range for the species is at least from sea level to 8,000 feet (Van Denburgh and Slevin, 1918; Stebbins, 1985).

Based on the given habitat information, elevational range, biological patterns of this species, and predatory base, it is concluded that the study area does have the potential to support the two-striped garter snake. This species was not observed during the late Fall 2005 wildlife surveys; however, based on the surveys conducted by Dudek biologists, it is anticipated that this species potentially occurs on site. Most of Salt Creek and many of its feeding side-canyons support the appropriate combination of water and cover to support this species.

4.3.2.4 Ringneck snake (*Diadophis punctatus*)

The ringneck snake is a California species of special concern. According to Stebbins (1985), Diadophis punctatus is a snake of moist habitats including woodlands, forest, grassland, chaparral, farms, and gardens. At Camp Pendleton, San Diego County, California, D. punctatus is found in most habitats, including coastal sage scrub, chaparral, oak woodland, riparian areas, and grassland (Holland and Goodman 1998). During a 26 year study in Kansas, Fitch (1975) found that while D. punctatus used a wide variety of habitats, terrain and vegetation, some chief requirements became apparent. These include soil that is slightly damp but not wet or soggy, abundant shelter in the form of a surface mat of dead vegetation and/or loose objects such as flat rocks, boards, or trash and screening shrubs or trees with open canopies sparse enough to permit abundant sunshine to reach the ground. Regardless, ringneck snakes appear to be most common in open, relatively rocky areas within valley-foothill, mixed chaparral, and annual grass habitats (Zeiner et al 1988). Holland and Goodman (1998) thought that it may be more common in grasslands and scarce in riparian areas where sandy soils are extensive or not bordered by areas with heavier soils.

Though D. *punctatus* utilize a wide variety of habitats, they are usually found on the ground under bark, beneath and inside rotting logs, and under stones and boards (Stebbins 1985) within those habitats. Ringneck snake utilize surface litter and cover extensively, and rely on rotting logs, woodpiles, stable talus, and small holes in the ground (Ziener et al 1988), and usually encountered during the day under boards or flat rocks.

The species is usually tied to riparian habitats and canyon bottoms, however they are not aquatic (Rosen et al 1996; Hammerson 1982). Henderson (1970) appears to support this position by maintaining that captive snakes maintained on moist substrates develop blisters, thus supporting the notion that while ringneck snakes occur near wet habitats, they do not depend on the wet areas of that habitat.

Thirteen subspecies (Pinou et al 1995) of D. punctatus range from southern Washington and Idaho to northern Baja California, Mexico from Atlantic coast to Pacific coast (Stebbins 1985; Stoltz 1993; USDA Forest Service 1995; Hinojosa 1996). Diadophis punctatus is widespread in California, absent only from large portions of the Central Valley, high mountains, desert and areas east of the Sierra-Cascade crest (Zeiner et al 1988). The six Californian subspecies occur at elevations ranging from sea level to 2150 m (Ziener et al 1988; Stebbins 1985).

Based on Stebbins (1985), it appears that D. p. similis is nearly restricted to San Diego County and northern Baja California, Mexico, while D. p. modestus occurs in northern San Diego County north through Ventura County. Undoubtedly a zone of overlap occurs. D. punctatus are most typically found diurnally under surface objects (Zeiner et al 1988) during the spring and fall (Holland and Goodman 1998), with crepuscular and some nocturnal activity noted during the summer (Zeiner et al 1988, Holland and Goodman 1998).

Based on the given habitat information, elevational range, biological patterns of this species, and predatory base, it is concluded that the study area is highly likely to support ringneck snake. This species was not observed during the late Fall 2005 wildlife surveys; however, based on abundant suitable habitat and microhabitat resources on the site, it is anticipated that this species potentially occurs on site.

4.3.2.5 California legless lizard (*Anniella pulchra*)

The California legless lizard is a California species of special concern. Anniella pulchra has been described as a sand-swimmer (Gans et al 1992) that is common in several habitats but especially in coastal dune, valley-foothill, chaparral, and coastal sage scrub (Zeiner et al 1988). Holland and Goodman (1998) state that it may be found in a variety of habitats including coastal sage scrub, chaparral, oak woodland, and pine forests. Stebbins (1985) and Miller (1944) go on to say that it frequents the sparse vegetation of beaches, pine-oak woodland, streamside growth of sycamores, cottonwoods, and oaks alluvial fans, oak-grass covered sandy hills, and grape vineyards. It may occasionally enter desert scrub habitats (Stebbins 1985).

A fossorial animal (Holland and Goodman 1998), it is found primarily in areas with sandy or loose organic soil or where there is plenty of leaf litter (Zeiner et al 1988). Gans et al. (1992) claims that it is a burrower in shallow sand, and its habitats are characterized by loose soils (sand, loam, humus) suitable for burrowing (Holland and Goodman 1998) can be found

(Stebbins 1985). *Anniella pulchra* may sometimes seek cover under flat boards or rocks where they lie barely covered in loose soil Zeiner et al 1988), but more typically they occur in the leaf litter under the overhang of trees and bushes on sunny slopes (Stebbins 1985). They usually burrow in washes, dune sand of beaches, and loose soil near the bases of slopes and near permanent or temporary streams (Stebbins 1985), but Klauber (1932) found them occasionally in dense soil or amongst rocks.

Burt (1931) states that a key habitat feature is moist sandy soils. Miller goes on to say that soil moisture is an essential habitat requirement, and Stebbins (1985) agrees that it needs moisture, warmth, and plant cover. However, Klauber (1932) disagreed with the notion that they require moist soil based on their presence in very dry desert situations. Regardless, it is evident that they are usually associated with friable soils with some moisture content and some vegetative cover. It has also been noted that they may sometimes occur in the twig base of woodrat nests (Stebbins 1985). Germano and Mrafka (1996) found them at the surface in hillside alkali scrub habitat with no sandy soils present. While Cunningham (1953) collected specimens from the foothill region of Los Angeles with scattered live oaks, elderberries, and buckwheat in loose and sandy soil under a log and boulder; in Santa Barbara with juniper, willow, and mule fat habitat under a boulder in damp sandy soil near a stream; beneath a boulder on an alluvial fan with fine and hard packed soil; and under logs or tin in sandy soil.

Key population areas probably occur in sandy and loose soil areas within a variety of habitats upto rocky and brush-covered areas within the study area, below 1830 m. This would include alluvial areas, sandy washes, a variety of woodland habitats, and potentially some agricultural areas.

Zeiner et al (1988) states that all habitat requirements are probably met within their normal activity area, therefore seasonal movements probably do not occur. Due to their fossorial nature, little is nothing is known of their movement ecology. They are likely to move is certain resources are not available to them or to reach suitable hibernacula if used. Miller (1944) thought that there were four limiting factors affecting movement or dispersal in the slowly emigrating *Annilella*, these include: **1)** limited by too much or too little soil moisture; **2)** limited by extreme soil temperatures, **3)** limited to friable loamy or sandy material; and **4)** limited by vegetation communities that form dense root mats like perennial grasslands.

Based on the given habitat information, elevational range, biological patterns of this species, and predatory base, it is concluded that the study area is highly likely to support this species. The project site supports abundant loose soils on both hillsides and within canyon bottoms. Further, the site has abundant wet or moist resources available. This species was not observed during the late Fall 2005 wildlife surveys; however, it is highly likely to occur onsite.

4.3.2.6 Coast horned lizard (*Phrynosoma coronatum*)

The coast horned lizard is federal species of concern (FSC). The state of California considers the coast horned lizard to be a state-protected species and a species of special concern. P. c. *blainvillei* is found in a wide variety of vegetation types including coastal sage scrub, annual grassland, chaparral, oak woodland, riparian woodland and coniferous forest (Klauber, 1939; Stebbins, 1954). In inland areas, this species is restricted to areas with pockets of open microhabitat, created by disturbance (e.g., floods, fire, roads, grazed areas, fire breaks) (Jennings and Hayes, 1994). The horned lizard occurs primarily in scrub, chaparral, and grassland habitats.

Historically, *Phrynosoma c. blainvillei* was distributed from the Transverse Ranges in Kern, Los Angeles, Santa Barbara, and Ventura counties southward through the Peninsular Ranges of southern California to Baja California (Jennings, 1988). P. c. *blainvillei* seems to have disappeared from about 45 percent of its former range in southern California, in particular on the coastal plain where it was once common (Hayes and Guyer, 1981) and in riparian and coastal sage scrub habitats on the old alluvial fans of the southern California coastal plain (Bryant, 1911, Van Denburgh, 1922). In California, *Phrynosoma c. blainvillei* ranges from the Transverse Ranges south to the Mexican border west of the deserts, although the taxon occurs on scattered sites along the extreme western desert slope of the Peninsular Ranges (Jennings, 1988). The known elevation range of this species is from 10 meters at the El Segundo dunes (Los Angeles County) to approximately 2,130 meters at Tahquitz Meadow, on San Jacinto Mountain, in Riverside County. *Phrynosoma c. blainvillei* is thought to intergrade with P. c. frontale in extreme southern Kern county and northern Santa Barbara, Ventura, and Los Angeles counties (Reeve, 1952; Montanucci, 1968; Jennings, 1988).

Coast horned lizard was observed within the study area during surveys conducted in summer 2006.

4.3.2.7 Coastal western whiptail (*Cnemidophorus tigris multiscutatus*)

The coastal western whiptail is a California species of special concern. This species occurs in a wide variety of habitats including coastal sage scrub, desert scrub, alluvial fan scrub, woodlands, grasslands, playas, and respective ecotones between these habitats.

The western whiptail can be found in open, often rocky areas with little vegetation or sunny microhabitats within shrub or grassland associations (Benes, 1969). *Cnemidophorus* is commonly found on the eastern and western slopes of the San Gabriel Mountains in all habitats except yellow pine forest (Schoenherr, 1976). Schoenherr (1976) also indicates that the western whiptail probably occurs in oak woodland (although none have been taken in this habitat type) because they have been detected in riparian areas.

The western whiptail ranges through the semi-arid and arid desert lowlands of southern California, southern Arizona, adjacent areas of Mexico and western Baja California, Mexico (Lowe, et al., 1970). It is the third most common lizard in the San Gabriel Mountains after *Sceloporus occidentalis* and *Uta stansburiana* (Schoenherr, 1976). .

The daily activity period of C. *tigris* individuals consists of nearly continuous movement associated with the search for prey with activity peaks in the morning and afternoon. They can be characterized as terrestrial, fusiform, diurnal, and actively foraging lizards (Anderson, 1993).

Coastal western whiptail was observed within the study area during surveys conducted in summer 2006.

4.3.2.8 Coastal rosy boa (Charina [Lichanura] trivirgata rosefusca)

The coastal rosy boa is a California species of special concern. According to Zeiner et al (1988), in coastal areas, the rosy boa occurs in rocky chaparral-covered hillsides and canyons, while in the desert it occurs on scrub flats with good cover. Holland and Goodman (1998) add that it is known from a variety of desert and semi-desert habitats, however it is absent from grasslands but may occur in oak woodlands if it interdigitates with scrub or chaparral habitats. A majority of the specimens found on Camp Pendleton (San Diego County, California), were in coastal sage scrub, chaparral, or mixed habitats, however it was also found in riparian areas (Holland and Goodman 1998). Yingling (1982) states that the coastal rosy boa occurs in chaparral and desert-edge foothills. Within these habitats, it appears to prefer moderate to dense vegetative cover with rocks (Stebbins 1985; Zeiner et al 1988; Holland and Goodman 1998). Holland and Goodman (1998) state that rock outcrops are commonly found in habitats used by the rosy boa and according to Zeiner et al (1988), they have been found under rocks, in boulder piles, and along rock outcrops and vertical canyon walls (Zeiner et al 1988). Additionally, woodrat nests are often used as refugia (Holland and Goodman 1998).

The species' range extends from southern California and southwestern Arizona, south throughout Baja California, Mexico and northwestern mainland Mexico, avoiding the lowest deserts which are mainly in agricultural production or open dunes (Yingling 1982; Stebbins 1985, Zeiner et al 1988). *Charina (Lichanura) trivirgata roseofusca* only occurs west of the desert below approximately 1200 m in elevation. Its range extends from Los Angeles and southwestern San Bernardino Counties, south through western Riverside County (easternmost range is around the San Jacinto Mountains), through San Diego County (up to the western 1370 m elevation on the Peninsular Ranges) and south approximately 150 miles into northern Baja California, Mexico (Cope 1889; Stejneger 1889; Yingling 1982; Stebbins 1985, Spiteri 1986; Zeiner et al 1988).

Charina trivirgata roseofusca is a slow moving, robust, and placid (Klauber 1931) snake which lives in relatively dense rocky scrub and chaparral habitats up to 1350 m in elevation. The coastal rosy boa is not particularly well adapted to high temperatures and aridity and therefore, the presence of rocky areas and outcrops are essential for thermal insulation and predator avoidance (Miller and Stebbins 1964).

Based on the given habitat information, elevational range, biological patterns of this species, and predatory base, it is concluded that the study area is highly likely to support this species. The rugged heterogenous terrain, combined with large patches of dense vegetation, makes this site particularly suitable.

4.3.2.9 Coast patch-nosed snake (*Salvadora hexalepis virgultea*)

The coast patch-nosed snake is a California species of special concern. S. hexalepis is a broad generalist in its habitat requirements. It seems to make use of whatever cover is available and thrives in most environments (Stebbins 1954). It occupies desert scrub, coastal chaparral, washes, sandy flats, and rocky areas. Additionally, Bogert (1939) noted a predilection in *S. hexalepis virgultea* (coastal patch-nosed snake) for brush or chaparral. He deduced that each form in the genus *Salvadora* occupies different habitats that are segregated based on natural physiographic and climatic factors, or combinations of the two.

The patch-nosed snake ranges from west-central Nevada south to the tip of Baja California and northwestern Sonora, and from coastal southern California to southwestern Utah and central Arizona, occurring from below sea level to around 2,130 meters (Goldberg 1995).

This species is diurnal (Stebbins 1985) and can be found throughout the day during the milder months of spring. Activity is restricted to the mornings and late afternoons during the summer months. May and June are the typical months of peak activity; however, in the southern part of its range, activity may extend all year during mild to warm weather.

Climatic environmental factors are unquestionably involved in the distribution of the genus *Salvadora* (Bogert 1939). Humidity is apparently a factor in the dispersal of the genus to the east; *Salvadora ranges* little, if at all, east of longitude 96 degrees in Texas (Brown 1903). Expansion to the north seems to be limited by temperature. *Salvadora* extends slightly farther north than regions in which the mean average daily temperature is permanently above 32 degrees Fahrenheit (Bogert 1939). Burt (1932) concludes that mean annual temperature, rather than moisture content of the soil, appears to be the prime factor in controlling the northward expansion of the genus.

Based on the given habitat information, elevational range, biological patterns of this species, and predatory base, it is concluded that the study area is likely to support this species. Abundant suitable habitat, canyons and washes occur throughout the property.

4.3.2.10 San Diego desert woodrat (*Neotoma lepida intermedia*)

The San Diego desert woodrat is a California species of special concern. Desert woodrats are found in a variety of shrub and desert habitats, primarily associated with rock outcroppings, boulders, cacti, or areas of dense undergrowth (Bleich 1973; Bleich and Schwartz 1975; Brown et al. 1972; Cameron and Rainy 1972; Thompson 1982). Bleich and Schwartz (1975) recorded 81 percent of captures of woodrats in rocky areas on the Naval Weapons Station, Fallbrook Annex in northern San Diego County, substantiating other work on habitat selection by this species (Cameron and Rainey 1972; Thompson 1982). Desert woodrats are noted for their flexibility or plasticity in utilizing various materials, such as twigs and other debris (sticks, rocks, dung), to build elaborate dens or "middens," which typically include several chambers for nesting and food, as well as several entrances. Middens may be used by several generations of woodrats (Cameron and Rainey 1972). Woodrats often are associated with cholla cactus which they use for water and dens or boulders and boulder piles (Thompson 1982). Thus, their distribution is a consequence of habitat structure and heterogeneity (i.e., patchiness). Thompson (1982) found that woodrats at Joshua Tree in the Mojave Desert actively avoid open areas. They also inhabit pinyon-juniper hillsides at lower elevations and juniper woodland (MWD and RCHCA 1995). The desert woodrat often is associated with large cactus patches (Montgomery 1998), and within coastal sage scrub communities, it almost is invariably associated with prickly pear (*Opuntia occidentalis*). It also is found in rocky outcroppings and boulder-covered hillsides in chaparral or oak woodlands (MWD and RCHCA 1995). In chaparral, rock dens usually are located near primary food sources to minimize travel time and exposure to predators. In the Mojave Desert, dens comprised of cholla were preferentially inhabited compared to yucca, and were occupied for longer periods (4.1 months versus 2.5 months, respectively) (Smith 1995). Smith (1995) suggests that cholla provides better protection from predators than yucca.

The most common natural habitats for records are chaparral, coastal sage scrub and grassland. Where substantial patches of these habitats are still intact, desert woodrats should still occur

The only information on dispersal by desert woodrats reviewed was the study discussed above by Smith (1995) where males apparently dispersed more than females. A study of "dispersal capacity" by the dusky-footed woodrat (*N. fuscipes*) in the Mission Valley of San Diego County demonstrated that this species can travel at least 1,600 meters, or about one mile in a five-day period (Smith 1965). However, this study was highly artificial because woodrats were trapped and released a location distant from the original capture site; i.e., the study did not address natural dispersal behavior but rather movements after being artificially displaced. Nonetheless the study shows that a closely related woodrat in a similar habitat has the capacity to move relatively long distances over a short period of time.

Although desert woodrats are adapted to extremely arid environments, they cannot rely on metabolic water alone, as do many sympatric heteromyids (kangaroo rats, kangaroo mice, and pocket mice), and require fresh vegetation to meet their daily water requirements (Cameron and Rainey 1972). Cactus may be important source of free water (Cameron and Rainey 1972). Lee (1963) showed experimentally that desert woodrats cannot stand direct exposure to the high diurnal temperatures of the Mojave Desert and have developed behavioral adaptations such as microhabitat selection and insulation of dens with vegetation to survive in extreme environments (cited in Cameron and Rainey 1972). Woodrats also create conditions within dens where water vapor pressure is greater inside the den than outside, resulting in less evaporative water loss in hot conditions. There is field evidence that woodrats indeed suffer from extreme drought in hot environments. Smith (1995) found that den occupancy rates dropped from approximately 50 percent to 5-10 percent during a severe drought in the eastern Mojave Desert. However, mortality was not due to starvation, but lack of reproduction. There was complete reproductive failure in 1989 and from August 1988 to April 1990 no woodrats in reproductive condition or juveniles were trapped. Smith concluded that woodrats did not survive long enough to reproduce.

Woodrats have been shown to have a minimum requirement of dense shrub cover, cacti, or rock outcrops to persist in a habitat (MWD and RCHCA 1995). Cactus patches are a favorite den site for woodrats because they provide protection from predators and may reduce evaporative water loss. Woodrat middens are a resource that may be used by generations of woodrats, but the use of middens depends on the habitat conditions and availability of materials (i.e., sticks and rocks, and other debris).

A few middens were observed within the study area, but not in high densities. While individuals were not observed, it is presumed that they are present onsite, based on the presence of middens.

4.3.2.11 Coastal California gnatcatcher (*Polioptila californica californica*)

The coastal California gnatcatcher is federally-listed threatened (FT) and is a California species of special concern. The coastal California gnatcatcher (gnatcatcher), a subspecies of the California gnatcatcher, is a small member of the thrush family (*Muscicapidae*). The gnatcatcher typically occurs in or near sage scrub habitat, which is a broad category of vegetation that includes the following plant communities as classified by Holland (1986): Venturan coastal sage scrub, Diegan coastal sage scrub, maritime succulent scrub, Riversidean sage scrub, Riversidean alluvial fan sage scrub, southern coastal bluff scrub, and coastal sage-chaparral scrub. Coastal sage scrub is composed of relatively low-growing, dry-season deciduous, and succulent plants. Characteristic plants of this community include California sagebrush, various species of sage, California buckwheat, lemonadeberry, California encelia, and Opuntia spp. Ninety-nine percent of all gnatcatcher locality records occur at or below an elevation of 984 feet (Atwood 1990).

Coastal sage scrub is patchily distributed throughout the range of the gnatcatcher, and the gnatcatcher is not uniformly distributed within the structurally and floristically variable coastal sage scrub community. Rather, the subspecies tends to occur most frequently within the California sagebrush-dominated stands on mesas, gently sloping areas, and along the lower slopes of the coast ranges (Atwood 1990). An analysis of the percent gap in shrub canopy supports the general impression that gnatcatchers prefer relatively open stands of coastal sage scrub (Bontrager 1991). The gnatcatcher occurs in high frequencies and densities in scrub with an open or broken canopy while it is absent from scrub dominated by tall shrubs and occurs in low frequencies and densities in low scrub with a closed canopy (Weaver 1998). The territory size increases as vegetation density decreases and with distance from the coast, probably due to food resource availability. Thus, gnatcatchers will use even sparsely vegetated coastal sage scrub for shelter and to forage for insects as long as perennial shrubs are available (ERCE 1990).

Gnatcatchers also use chaparral, grassland, and riparian or alluvial habitats where they occur adjacent to sage scrub (Bontrager 1991). The use of these habitats appears to be most frequent during late summer, autumn, and winter, with smaller numbers of birds using such areas during the breeding season. These non-sage scrub habitats are used for dispersal, but data on dispersal use are largely anecdotal (Bowler 1995; Campbell et al. 1995). Although existing quantitative data may reveal relatively little about gnatcatcher use of these other habitats, these areas may be critical during certain times of the year for dispersal or as foraging areas during drought conditions (Campbell et al. 1998). Breeding territories have also been documented in non-sage scrub habitat. Campbell et al. (1998) discuss likely hypotheses explaining why non-CSS habitat is used by gnatcatchers including food source availability, dispersal areas for juveniles, temperature extremes, fire avoidance, and lowered predation rate for fledglings.

A large portion of the project site falls in proposed critical habitat for the USFWS Critical Habitat Designation for 'Western Los Angeles and Ventura counties' (USFWS 2004). This species was not detected during the late Fall 2005 wildlife surveys. Based on the elevations present onsite, steep slopes and present level of disturbance of the California sagebrush scrub vegetation community within the study area, there is a low potential for this species to occur onsite.

4.3.2.12 Least Bell's vireo (*Vireo bellii pusillus*)

The least Bell's vireo is federally-listed endangered (FE) and is state-listed as endangered (SE). The least Bell's vireo occupies a more restricted nesting habitat than the other subspecies of Bell's vireo as summarized in USFWS (1986). Least Bell's vireos primarily occupy riverine riparian habitats that typically feature dense cover within 1-2 meters of the ground and a dense, stratified canopy. It inhabits low, dense riparian growth along water or along dry parts of intermittent streams. Typically it is associated with southern willow scrub, cottonwood forest, mule fat scrub, sycamore alluvial woodland, coast live oak riparian forest, arroyo willow riparian forest, wild blackberry, or mesquite in desert localities. It uses habitat which is limited to the immediate vicinity of water courses below 1,500 feet elevation in the interior (USFWS 1986; Small 1994). In the coastal portions of southern California, the least Bell's vireo occurs in willows and other low, dense valley foothill riparian habitat and lower portions of canyons and along the western edge of the deserts in desert riparian habitat.

The least Bell's vireo primarily nests in small, remnant segments of vegetation typically dominated by willows and mule fat but may also use a variety of shrubs, trees, and vines. The birds forage in riparian and adjoining chaparral or scrub habitat (Salata 1983). Nests are typically built within one meter of the ground in the fork of willows, wild rosa (*Rosa californica*), mule fat, or other understory vegetation (Franzreb 1989). Cover surrounding nests is moderately open midstory with an overstory of willow, cottonwood, sycamore, or oak. Crown cover is usually more than 50 percent and contains occasional small openings. The most critical structural component to least Bell's vireo breeding habitat is a dense shrub layer at 2 to 10 feet above the ground (Goldwasser 1981; Franzreb 1989). Quantitative measures for least Bell's vireo habitat have been used to developed standards for occupied habitat in coastal San Diego County. These standards are currently used in evaluating habitat restoration projects (e.g., RECON 1989; Dudek 1999).

During the spring and fall migration, the Bell's vireo occupies a wider range of habitats including coastal sage scrub, riparian and woodland habitats. The winter range of habitats of the Bell's vireo include thornscrub vegetation adjacent to watercourses or in riparian gallery forests along the west coast of north and central Mexico. In southern Mexico and Honduras, tropical deciduous forest and arid tropical scrub along the coast is used (Brown 1993).

Least Bell's vireos are nearly obligate riparian breeders. They appear to be especially dependent on the presence of willows within occupied habitat, although the structure is extremely important, and they are characterized as preferring early successional habitat (USFWS 1998). The vireo tends to establish territories in sites with a particular habitat configuration, including small amounts of aquatic and herbaceous cover, large amounts of shrub and tree cover, and a large proportion of tree cover with shrub understory. In addition, the width of the vegetation belt appears to be important for establishing vireo territories. Two features appear to be essential for a vireo territory: the presence of dense cover within 1 to 2 meters of the ground and a dense, stratified canopy for foraging. Native upland buffers are particularly important in narrow drainages. Those pairs that select areas bordered by coastal sage scrub and grasslands tended to be more successful than those bordered by agricultural and urban areas. Those territories adjoining golf courses, campgrounds, and sand mines had significantly fewer successful pairs than those next to chaparral, coastal scrub oak or grasslands (Franzreb 1989). Least Bell's vireo is known to forage in upland vegetation up to 300 yards from the nest (USFWS 1986).

The north portion of the project site falls in modeled, final critical habitat for the USFWS Critical Habitat Designation for 'Western Los Angeles and Ventura counties' (USFWS 2004). This species was not detected during the late Fall 2005 wildlife surveys. Based on their habitat needs, there is a moderate potential for this species to occur onsite, particularly within Salt Creek and its tributaries.

4.3.2.13 American Badger (*Taxidea taxus*)

The American badger is a California species of special concern. The current range of the badger extends from the Northern part of Alberta, Canada, to central Mexico and eastward from the Pacific coast to a line running roughly from east Texas to the central lake states. Badgers are generally associated with treeless regions, prairies, parklands, and cold desert areas. Altitudinally, their range extends from below sea level to over 3,600m. The rocky mountains and Grand Canyon are geographic features associated with the distribution of western subspecies (Long 1973 as cited in Chapman and Feldhamer 1982). Badgers are an uncommon, permanent resident found throughout most of the state (California), except in the northern North Coast area

(Grinnel et al. 1937 as cited in Zeiner et al. 1990). Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils (Zeiner et al. 1990).

Badgers are carnivorous. They eat fossorial rodents: rats, mice, chipmunks, and especially ground squirrels and pocket gophers. Also eat some reptiles, insects, earthworms, eggs, birds, and carrion. Diet shifts seasonally and yearly in response to yearly availability to prey (Zeiner et al. 1990).

Badgers dig burrows in friable soil for cover. They frequently reuse old burrows, although some may dig a new den in each night especially in the summer.

Home range estimates vary geographically and seasonally. In Utah, Lindzey (1978 as cited in Zeiner et al. 1990) found fall and winter home ranges of 5 females varied from 137-304 ha (338-751 ac). Those of two males varied from 537-627 ha (1327-1549 ac). In Idaho, Messic and Hornocker (1981 as cited in Zeiner et al. 1990) found that home ranges of 7 adult females and 3 males averaged 160 ha (400 ac) and 240 ha (600 ha), respectively. (Zeiner et al. 1990).

Based on the given habitat information, elevational range, biological patterns of this species, and predatory base, it is concluded that the study area does have the capacity to support the American badger. This species was not observed during the late Fall 2005 wildlife surveys. However, one badger burrow was observed during the surveys indicating that this species has in the past or is continuing to utilize the study area as habitat.

4.3.3 Wildlife Corridors and Habitat Linkages

Wildlife corridors are linear features that connect large patches of natural open space and provide avenues for the migration of animals. Wildlife corridors contribute to population viability by assuring continual exchange of genes between populations, providing access to adjacent habitat areas for foraging and mating, and providing routes for recolonization of habitat after local extirpation or ecological catastrophes (e.g., fires).

Habitat linkages are small patches that join larger blocks of habitat and help reduce the adverse effects of habitat fragmentation. Habitat linkages provide a potential route for gene flow and long-term dispersal of plants and animals and may also serve as primary habitat for smaller animals, such as reptiles and amphibians. Habitat linkages may be continuous habitat or discrete habitat islands that function as stepping stones for dispersal.

The study area will be connected to various wildlife corridors and habitat linkages. The Santa Clarita woodlands park to the east connects directly up to the study area. To the south and west the study area is directly adjacent to the Santa Susana Mountains. These mountains are managed by the Bureau of Land Management and possibly others. Salt Creek runs in a southeast to northwest direction in the northern portion of the study area. This creek is a tributiary to the Santa Clara River, located offsite to the north. The Santa Clara River is connected to the Los Padres National Forest to the north. Through the use of these river beds as wildlife corridors, this preserve could serve as a wildlife corridor to the Angeles National Forest to the east and to the Los Padres National Forest to the northwest.

Habitat linkages are present within a 2.5 to 25 mile radius of the study area. These areas include Rocky Peak Park, Santa Susana Park, Chatsworth Reservoir, Sage Ranch, Whiteface Open Space, and Happy Camp Canyon Regional Park. In addition, the study area is adjacent to lands managed by the Bureau of Land Management and several smaller ranch preserves and parks. The site itself currently functions as live-in habitat for many species including southern California's largest land mammals, black bear, mountain lion, mule deer, bobcat, and coyote. Numerous ridges and washes funnel wildlife generally to the north via Salt Creek and to the east via Salt Creek's East Fork.

4.4 Oak Tree Estimate

Based on the results of the analysis described in *Section 3.2.4* above, live oak woodland has an average density of 17.63 coast live oak trees per acre and 0.59 valley oak trees per acre, for a combined total average density of 18.22 oak trees per acre within the study area. Similarly, mixed oak woodland has an average density of 12.38 coast live oak trees per acre and 5.73 valley oak trees per acre, for a combined total average density of 18.12 oak trees per acre. Valley oak woodland has a lesser density average than live oak woodland and mixed oak woodland, with an average density of 1.71 coast live oak trees per acre and 13.48 valley oak trees per acre, for a combined total average density of 15.19 oak trees per acre. The total number of oak trees within oak woodland vegetation communities was estimated by extrapolating these calculated densities across all oak woodland vegetation communities within the study area.

Using the density estimates for oak woodlands described above in combination with the aerial photo estimate of oaks in valley oak savannah and individual oak trees mapped in non-oak vegetation communities, the estimated number of coast live oak in NRHC SMA is 8,886 and in the Salt Creek area is 3,827 for total of 12,713. The estimated number of valley oak in the NRHC SMA is 2,535 and in the Salt Creek area is 1,235 for total of 3,770. Coast live oak and valley oak combined totals 11,422 for the NRHC SMA and 5,062 in the salt creek area for a grand total of approximately 16,484 oak trees within the study area.

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APPENDIX A

Vascular Plant Species Observed

2003-2005 Combined Plant List

LYCOPODIAE

SELAGINELLACEAE - SPIKE-MOSS FAMILY

Selaginella bigelovii - Bigelow's spike-moss

EQUISETAE

EQUISETACEAE - HORSETAIL FAMILY

Equisetum hyemale – common scouring-rush
Equisetum laevigatum - smooth scouring-rush

FILACEAE

DENNSTAEDTIACEAE - BRAKEN FAMILY

Adiantum jordani - California maiden-hair
Pellaea andromedifolia - coffee fern
Pellaea mucronata var. *mucronata* - bird's-foot fern
Pentagramma triangularis - goldenback fern

DRYOPTERIDACEAE – WOOD FERN FAMILY

Dryopteris arguta – coastal wood fern

POLYPODIACEAE - POLYPODY FAMILY

Polypodium californicum - California polypody

ANGIOSPERMAE (DICOTYLEDONES)

AMARANTHACEAE - AMARANTH FAMILY

* *Amaranthus albus* - tumbleweed
Amaranthus blitoides - prostrate amaranth
* *Amaranthus retroflexus* - rough pigweed

ANACARDIACEAE - SUMAC FAMILY

Malosma laurina - laurel sumac
Rhus ovata - sugar-bush
Rhus trilobata - squaw bush
* *Schinus molle*- Peruvian pepper tree
Toxicodendron diversilobum - poison-oak

APIACEAE - CARROT FAMILY

Apiastrum angustifolium - wild celery
* *Apium graveolens* - celery
Berula erecta - cutleaf water-parsnip
Bowlesia incana – American bowlesia
* *Conium maculatum* – poison hemlock
* *Coriandrum sativum* - cilantro
* *Daucus carota* – Queen Anne's lace
Daucus pusillus – rattlesnake weed
Lomatium caruifolium - Alkali Parsnip
Lomatium utriculatum - common lomatium
Osmorhiza brachypoda – California sweet-cicely
* *Petroselinum crispum* - parsley
Sanicula bipinnata - poison sanicle
Sanicula crassicaulis – Pacific sanicle
* *Torilis arvensis* – Japanese hedge-parseley
* *Torilis nodosa* – knot hedge-parseley
Yabea microcarpa - California hedge parsley

ASCLEPIADACEAE - MILKWEED FAMILY

Asclepias fascicularis - narrow-leaf milkweed

ASTERACEAE - SUNFLOWER FAMILY

Achillea millefolium – yarrow
Achyrachaena mollis – blow-wives
Acourtia microcephala – sacapellote
Agoseris grandiflora – large-flowered agoseris
Agoseris retrorsa – spear-leaf agoseris
Ambrosia acanthicarpa - annual burweed
Ambrosia confertifolia - weak-leaved burweed
Ambrosia psilostachya - western ragweed
Artemisia californica - coastal sagebrush
Artemisia douglasiana - California mugwort
Artemisia dracunculus - tarragon
Artemisia tridentata - Great Basin sagebrush
Baccharis douglasii - marsh baccharis
Baccharis pilularis - coyote brush
Baccharis salicifolia - mule fat
Brickellia californica - California brickellbush

    Brickellia nevinii - Nevin's brickellbush
* *Carduus pycnocephalus* - Italian thistle
* *Centaurea melitensis* - star thistle
    Chaenactis artemisiifolia – artemisia pincushion
    Chaenactis glabriuscula - yellow pincushion
    Cirsium occidentale var. *californicum*- California thistle
    Cirsium occidentale var. *occidentale*- cobwebby thistle
* *Cirsium vulgare* - bull thistle
* *Cnicus benedictus* - blessed thistle
    Conyza canadensis - horseweed
    Conyza coulteri - Coulter's conyza
    Coreopsis bigelovii – Bigelow's coreopsis
    Corethrogyne filaginifolia - virgate cudweed aster
* *Cotula australis* - Australian brass-buttons
    Deinandra increscens ssp. *increscens* – no common name
    Encelia californica - California bush sunflower
    Ericameria palmeri var. *pachylepis* – goldenbush
    Ericameria pinifolia- pine-bush
    Erigeron foliosus - leafy daisy
    Eriophyllum confertiflorum - long-stem golden yarrow
    Filago californica - California fluffweed
    Filago gallica - narrow-leaf filago
    Gnaphalium bicolor - bicolor cudweed
    Gnaphalium californicum - California everlasting
    Gnaphalium canescens ssp. *microcephalum* - white everlasting
* *Gnaphalium luteo-album* - white cudweed
* *Gnaphalium palustre* - lowland cudweed
    Gnaphalium stramineum – cotton-batting plant
    Grindelia sp. – gumplant
    Hazardia squarrosa ssp. *grindelioides* - saw-toothed goldenbush
    Helianthus annuus - common sunflower
    Hemizonia fasciculata - fascicled tarweed
    Heterotheca grandiflora - telegraph weed
    Heterotheca sessiliflora - golden aster
* *Hypochaeris glabrata* – smooth cat's ear
* *Hypochaeris radicata* – hairy cat's ear
    Isocoma menziesii - goldenbush
    Isocoma menziesii var. *menziesii* [*Haplopappus venetus*] - Menzies' goldenbush

* *Lactuca serriola* - prickly lettuce
Lagophylla ramosissima – common hareleaf
Lasthenia californica - coast goldfields
Layia glandulosa – white layia
Layia platyglossa – tidy tips
Lepidospartum squamatum - scale-broom
Lessingia filaginifolia- California aster
Madia exigua – small tarweed
Madia gracilis – slender madia
Malacothrix clevelandii – Cleveland's malacothrix
Malacothrix saxatilis - cliff malacothrix
* *Matricaria matricarioides* - pineapple weed
Micropus californicus - slender cottonweed
* *Picris echioides* – bristly ox-tongue
Pluchea odorata - marsh-fleabane
Pluchea sericea - arrow weed
Psilocarphus tenellus – slender woolly-heads
Rafinesquia californica - California chicory
Senecio flaccidus var. *douglasii* - butterweed
* *Senecio vulgaris* - common groundsel
* *Silybum marianum* – milk thistle
Solidago californica – California goldenrod
* *Sonchus asper* - prickly sow-thistle
* *Sonchus oleraceus* - common sow-thistle
* *Spartium junceum* – Spanish broom
Stebbinoseris heterocarpa [*Microseris heterocarpa*] – brown puffs
Stephanomeria cichoriacea - chicory-leaved stephanomeria
Stephanomeria exigua - small wreathplant
Stephanomeria pauciflora - wire-lettuce
Stephanomeria virgata - twiggy wreathplant
Stylocline gnaphaloides - everlasting nest-straw
Uropappus lindleyi [*Microseris lindleyi*] – silver puffs
Xanthium spinosum - spiny cocklebur
Xanthium strumarium – cocklebur

BORAGINACEAE - BORAGE FAMILY

Amsinckia menziesii var. *intermedia* - yellow fiddleneck
Amsinckia menziesii var. *menziesii* - yellow fiddleneck

Amsinckia tessellata – devil's lettuce
Cryptantha decipiens – gravel cryptantha
Cryptantha intermedia - common forget-me-not
Cryptantha micrantha – redroot cryptantha
Cryptantha Microstachys – tejon cryptantha
Cryptantha Muricata – prickly cryptantha
Heliotropium curassavicum - wild heliotrope
Pectocarya linearis - slender pectocarya
Pectocarya penincillata - pectocarya
Plagiobothrys arizonicus - popcorn flower
Plagiobothrys canescens - rusty popcorn flower
Plagiobothrys Nothofulvus - popcorn flower

BRASSICACEAE - MUSTARD FAMILY

Arabis sparsiflora – no common name
Athysanus pusillus – dwarf athysanus
* *Brassica nigra* - black mustard
* *Capsella bursa-pastoris* - shepard's purse
Caulanthus lasiophyllus – California mustard
Erysimum capitatum – wall flower
* *Hirschfeldia incana* - short-podded mustard
Lepidium oblongum - peppergrass
Lepidium virginicum - wild peppergrass
* *Raphanus sativus*- radish
* *Rorippa nasturtium-aquaticum* - water cress
* *Sisymbrium altissimum* - tumble mustard
* *Sisymbrium irio* - London rocket
* *Sisymbrium officinale* - hedge mustard
* *Sisymbrium orientale* - Oriental mustard
Stanleya pinnata var. *pinnata*– Prince's plume
Thysanocarpus curvipes – fringepod
Thysanocarpus laciniatus – lacepod
Tropidocarpum gracile – slender dobie-pod

CACTACEAE - CACTUS FAMILY

Opuntia californica var. *parkeri* - cane cholla
Opuntia littoralis - coastal prickly-pear
Opuntia x vaseyi - prickly-pear cactus

CAMPANULACEAE - BELLFLOWER FAMILY

Nemacladus ramosissimus – Nuttall's threadplant

CAPPARACEAE - CAPER FAMILY

Isomeris arborea - bladderpod

CAPRIFOLIACEAE - HONEYSUCKLE FAMILY

Lonicera interrupta – chaparral honeysuckle
Lonicera subspicata - southern honeysuckle
Sambucus mexicana - Mexican elderberry

CARYOPHYLLACEAE - PINK FAMILY

* *Cerastium glomeratum* - sticky mouse-ear
* *Herniaria hirsute* ssp. *cinerea* - gray herniaria
Loeflingia squarrosa - no common name
* *Silene gallica* - common catchfly
* *Stellaria media* - common chickweed
Stellaria nitens – shining chickweed

CHENOPODIACEAE - GOOSEFOOT FAMILY

Atriplex canescens - four-winged saltbush
* *Atriplex heterosperma* - weedy orache
Atriplex lentiformis- big saltbush, quail brush
* *Atriplex semibaccata* - Australian saltbush
Atriplex serenana var. *serenana* - bractscale
* *Atriplex suberecta* - Australian saltbush
* *Bassia hyssopifolia* - five-hooked bassia
* *Chenopodium album* - lamb's-quarters
Chenopodium berlandieri - pitseed goosefoot
Chenopodium californicum - California goosefoot
* *Chenopodium murale* - nettle-leaved goosefoot
* *Salsola tragus* - Russian-thistle

CONVOLVULACEAE - MORNING-GLORY FAMILY

Calystegia macrostegia- morning-glory
Calystegia peirsonii - Peirson's morning-glory
* *Convolvulus arvensis* - bindweed

CRASSULACEAE - STONECROP FAMILY

Crassula connata - dwarf stonecrop
Dudleya lanceolata - lanceleaf dudleya

CUCURBITACEAE - GOURD FAMILY

Cucurbita foetidissima - coyote-melon, calabazilla
Marah fabaceus - California Manroot
Marah macrocarpus - wild cucumber

CUSCUTACEAE - DODDER FAMILY

Cuscuta californica - California dodder

ERICACEAE - HEATH FAMILY

Arctostaphylos glandulosa ssp. *mollis* - manzanita
Arctostaphylos glauca - bigberry manzanita

EUPHORBIACEAE - SPURGE FAMILY

Chamaesyce albomarginata - rattlesnake spurge
Chamaesyce polycarpa - small-seed sand mat
Eremocarpus setigerus - doveweed
Euphorbia spathulata - reticulate-seed spurge

FABACEAE - PEA FAMILY

Amorpha californica var. *californica* – false indigo
Astragalus didymocarpus – white dwarf locoweed
Astragalus gambelianus – Gambel's locoweed
Astragalus trichopodus - Santa Barbara locoweed
Lathyrus vestitus - wild pea
Lotus hamatus – grab lotus
Lotus humistratus - lotus
Lotus purshianus - Spanish-clover
Lotus salsuginosus - coastal lotus
Lotus scoparius var. *scoparius* - deerweed
Lotus strigosus - strigose deerweed
Lupinus bicolor - Lindley's annual lupine
Lupinus excubitus var. *excubitus* - grape soda lupine
Lupinus excubitus var. *hallii* - grape soda lupine
Lupinus hirsutissimus - stinging lupine

Lupinus microcarpus var. *densiflorus* - chick lupine
Lupinus microcarpus var. *microcarpus* - chick lupine
Lupinus sparsiflorus - Coulter's lupine
Lupinus succulentis - arroyo lupine
Lupinus truncatus - collar lupine
* *Medicago polymorpha* - California burclover
* *Melilotus alba* - white sweet-clover
* *Melilotus indica* - yellow sweet-clover
Trifolium albopurpureum – rancheria clover
Trifolium ciliolatum- tree clover
Trifolium fucatum – bull clover
Trifolium gracilentum – pin-point clover
* *Trifolium hirtum* - rose clover
Trifolium microcephalum – maiden clover
Trifolium willdenovii – valley clover
Vicia americana – American vetch
Vicia exigua – slender vetch
Vicia hassei – Hesse's vetch
* *Vicia vilosa* – hairy vetch

FAGACEAE - BEECH FAMILY
Quercus agrifolia - coast live oak
Quercus berberidifolia - scrub oak
Quercus chrysolepis – canyon live oak
Quercus douglasii x *lobata* - oak
Quercus lobata - valley oak

GERANIACEAE - GERANIUM FAMILY
* *Erodium cicutarium* - red-stemmed filaree
* *Erodium botrys* – long-beaked filaree
* *Erodium moschatum* – white-stemmed filaree

GROSSULARIACEAE - CURRANT FAMILY
Ribes aureum - golden currant
Ribes californicum - California gooseberry
Ribes malvaceum - chaparral currant

HYDROPHYLLACEAE - WATERLEAF FAMILY
Emmenanthe penduliflora - whispering bells

Eriodictyon crassifolium var. *nigrescens* - yerba santa
Eucrypta chrysanthemifolia - common eucrypta
Nemophila menziesii var. *integrifolia* - baby blue eyes
Nemophila pedunculata – littlefoot nemophila
Phacelia cicutaria var. *hispida* – caterpillar phacelia
Phacelia cicutaria var. *hubbyi* - caterpillar scorpionweed
Phacelia distans - blue fiddleneck
Phacelia imbricata ssp. *imbricata* - imbricate phacelia
Phacelia minor - wild canterbury-bell
Phacelia ramosissima - shrubby phacelia
Phacelia viscida - sticky phacelia
Pholistoma auritum – fiesta flower

JUGLANDACEAE - WALNUT FAMILY
Juglans californica - southern California black walnut

LAMIACEAE - MINT FAMILY
* *Lamium amplexicaule* - henbit
* *Marrubium vulgare* - horehound
Monardella lanceolata - mustang mint
Salvia apiana - white sage
Salvia columbariae - chia
Salvia leucophylla - purple sage
Salvia mellifera - black sage
Salvia x bernardina – no common name
Scutellaria tuberosa – Danny's skullcap
Stachys ajugoides var. *rigida* - rigid hedge-nettle
Stachys albens - white hedge-nettle
Trichostema lanatum – woolly bluecurls
Trichostema lanceolatum - vinegar weed

LAURACEAE - LAUREL FAMILY
Umbellularia californica - California laurel

LOASACEAE - STICK-LEAF FAMILY
Mentzelia sp. – no common name
Mentzelia laevicaulis - blazing star

MALVACEAE - MALLOW FAMILY

Malacothamnus fasciculatus ssp. *laxiflorus* – chaparral bush mallow
* *Malva parviflora* - cheeseweed

NYCTAGINACEAE - FOUR O'CLOCK FAMILY

Mirabilis laevis var. *crassifolia* [*M. californica*]- California wishbone-bush

OLEACEAE - OLIVE FAMILY

Fraxinus dipetala - California ash
* *Fraxinus uhdei* – tropical ash
* *Olea europaea* - mission olive

ONAGRACEAE - EVENING-PRIMROSE FAMILY

Camissonia bistorta – southern sun cup
Camissonia bistorta x hirtella – sun cup
Camissonia boothii ssp. *decorticans* – shredding evening primrose
Camissonia californica - mustard primrose
Camissonia hirtella - sun cup
Clarkia cylindrica - speckled clarkia
Clarkia purpurea - winecup clarkia
Clarkia unguiculata - elegant clarkia
Epilobium brachycarpum - willow herb
Epilobium canum ssp. *canum* - California fuchsia
Epilobium ciliatum - California cottonweed

OROBANCHACEAE - BROOM-RAPE FAMILY

Orobanche fasciculata – clustered broom-rape

PAEONIACEAE - PEONY FAMILY

Paeonia californica - California peony

PAPAVERACEAE - POPPY FAMILY

Dendromecon rigida - tree poppy
Dicentra chrysantha- golden ear-drops
Dicentra ochroleuca - yellow bleeding heart
Eschscholzia californica - California poppy
Meconella denticulata – small-flower meconella
Papaver californicum – fire poppy

PLANTAGINACEAE - PLANTAIN FAMILY

Plantago erecta - dot-seed plantain
Plantago major- common plantain
Plantago c.f. ovata – woolly plantain

PLATANACEAE - SYCAMORE FAMILY

Platanus racemosa - western sycamore

POLEMONIACEAE - PHLOX FAMILY

Allophyllum divaricatum - purple false gilyflower
Eriastrum densifolium ssp. *densifolium* - woollystar
Eriastrum sapphirinum - sapphire eriastrum
Gilia angelensis - angel gilia
Gilia capitata – globe gilia
Gilia splendens – splendid gilia
Leptodactylon californicum - prickly phlox
Linanthus androsaceus – common linanthus
Navarretia atractyloides - holly-leaf skunkweed
Phlox gracilis – slender phlox

POLYGONACEAE - BUCKWHEAT FAMILY

Chorizanthe staticoides - turkish rugging
Eriogonum sp. - buckwheat
Eriogonum sp. - buckwheat
Eriogonum elongatum - long-stemmed buckwheat
Eriogonum fasciculatum ssp. *foliolosum* - California buckwheat
Eriogonum c.f. gracile - slender woolly buckwheat
Eriogonum c.f. viridescens - buckwheat
Eriogonum nudum - naked buckwheat
Lastarriaea coriacea - lastarriaea
* *Polygonum arenastrum* - common knotweed
Pterostegia drymarioides – granny's hairnet
* *Rumex conglomeratus* - whorled dock
* *Rumex crispus* - curly dock
Rumex hymenosepalus - wild rhubarb
Rumex salicifolius - willow dock

PORTULACACEAE - PURSLANE FAMILY

Calandrinia ciliata - redmaids
Claytonia parviflora - small-leaved montia
Claytonia perfoliata – miner's lettuce

PRIMULACEAE - PRIMROSE FAMILY

* *Anagallis arvensis* – scarlet pimpernel

RANUNUCULACEAE - BUTTERCUP FAMILY

Clematis ligusticifolia - yerba de chiva
Clematis pauciflora- ropevine
Delphinium cardinale – scarlet larkspur
Delphinium parryi spp. *parryi* – Parry's larkspur

RHAMNACEAE - BUCKTHORN FAMILY

Ceanothus crassifolius - hoary-leaved ceanothus
Ceanothus foliosus – southern blue lilac
Ceanothus leucodermis – white-bark ceanothus
Ceanothus tomentosus- Ramona-lilac
Rhamnus crocea - redberry
Rhamnus ilicifolia - holly-leaf redberry

ROSACEAE - ROSE FAMILY

Adenostoma fasciculatum – chamise
Cercocarpus betuloides var. *betuloides* - birch-leaf mountain-mahogany
Cercocarpus betuloides var. *blancheae* - island mountain-mahogany
Heteromeles arbutifolia - toyon
Prunus ilicifolia - holly-leaf cherry
Prunus virginiana var. *demissa* – western choke-cherry
Rosa californica - California rose
Rubus ursinus - California blackberry

RUBIACEAE - MADDER FAMILY

Galium angustifolium - narrow-leaved bedstraw
* *Galium aparine* - goose grass
Galium nuttallii – Nuttall's bedstraw
Galium porrigens - climbing bedstraw

SALICACEAE - WILLOW FAMILY

Populus fremontii - Fremont's cottonwood
Salix exigua - narrow-leaved willow
Salix gooddingii - black willow
Salix laevigata - red willow
Salix lasiolepis - arroyo willow
Salix lucida- shining willow

SAURURACEAE - LIZARD'S-TAIL FAMILY

Anemopsis californica - yerba mansa

SAXIFRAGACEAE - SAXIFRAGE FAMILY

Lithophragma bolanderi - Bolander's woodland star
Saxifraga californica - California saxifrage

SCROPHULARIACEAE - FIGWORT FAMILY

Antirrhinum coulterianum - white snapdragon
Antirrhinum multiflorum - withered snapdragon
Castilleja affinis - coast paintbrush
Castilleja exserta - common owl's-clover
Castilleja foliolosa - woolly Indian paintbrush
Collinsia heterophylla – purple Chinese houses
Collinsia parviflora - maiden blue eyed Mary
Cordylanthus rigidus – bird's beak
Keckiella cordifolia - heart-leaf penstemon
Mimulus aurantiacus - bush monkeyflower
Mimulus aurantiacus var. *pubescens* - bush monkeyflower
Mimulus brevipes - yellow monkeyflower
Mimulus guttatus - seep monkeyflower
Penstemon centranthifolius - scarlet bugler
Scrophularia californica - California figwort
* *Veronica anagallis-aquatica* - water speedwell
* *Veronica persica* – Persian speedwell

SOLANACEAE - NIGHTSHADE FAMILY

Datura wrightii - western jimsonweed
* *Nicotiana glauca* - tree tobacco
* *Solanum americanum* - small-flowered nightshade

Solanum douglasii - white nightshade
Solanum xanti - chaparral nightshade

TAMARICACEAE - TAMARISK FAMILY
* *Tamarix* sp. - tamarisk

URTICACEAE - NETTLE FAMILY
Hesperocnide tenella – western nettle
Parietaria hespera – western pellitory
Urtica dioica - giant creek nettle
* *Urtica urens* - dwarf nettle

VERBENACEAE - VERVAIN FAMILY
Verbena lasiostachys - western verbena

VIOLACEAE – VIOLET FAMILY
Viola pedunculata – Johnny jump-ups

VISCACEAE - MISTLETOE FAMILY
Phoradendron macrophyllum - big leaf mistletoe
Phoradendron villosum - oak mistletoe

ZYGOPHYLLACEAE - CALTROP FAMILY
* *Tribulus terrestris* - puncture vine

ANGIOSPERMAE (MONOCOTYLEDONES)

CYPERACEAE - SEDGE FAMILY
Carex sp. - sedge
Cyperus eragrostis - tall cyperus
Eleocharis montevidensis - slender creeping spike-rush
Scirpus americanus - winged three-square
Scirpus maritimus – alkali bulrush
Scirpus robustus - Pacific coast bulrush

IRIDACEAE - IRIS FAMILY

Sisyrinchium bellum – blue-eyed grass

JUNCACEAE - RUSH FAMILY

Juncus sp. - rush
Juncus balticus - wire rush
Juncus bufonius - toad rush
Juncus mexicanus- Mexican rush
Juncus xiphioides - iris-leaved rush

LILIACEAE - LILY FAMILY

Bloomeria crocea – common goldenstar
Calochortus clavatus var. *gracilis* - slender mariposa lily
Calochortus venustus - mariposa lily
Calochortus weedii var. *vestus* – late-flowered mariposa lily
Chlorogalum pomeridianum - soap plant
Dichelostemma capitatum - blue dicks
Yucca whipplei – Our Lord's candle

POACEAE - GRASS FAMILY

Achnatherum coronatum - giant needlegrass
* *Agrostis viridis* - water bent
Aristida adscensionis - six-weeks three-awn
* *Arundo donax* - giant reed
* *Avena barbata* - slender oat
* *Avena fatua* - wild oat
* *Avena sativa* - cultivated oat
* *Bromus arenarius* - Australian brome
Bromus carinatus - California brome
* *Bromus diandrus* - ripgut grass
Bromus grandis - tall brome
* *Bromus hordeaceus* - soft chess
* *Bromus madritensis* ssp. *rubens* - foxtail chess
* *Bromus sterilis* – sterile brome
* *Bromus tectorum* - cheat grass
* *Cynodon dactylon* - Bermuda grass
Distichlis spicata - salt grass
* *Echinochloa crus-galli* - barnyard grass

Elymus elymoides – bottlebrush squirreltail
Elymus glaucus - western wild-rye
Eragrostis mexicana - lovegrass
* *Hordeum marinum* - Mediterranean barley
* *Hordeum murinum* - glaucous foxtail barley
Koeleria macrantha - Junegrass
* *Lamarckia aurea* - goldentop
* *Leptochloa uninerva* - Mexican sprangletop
Leymus condensatus - giant ryegrass
Leymus triticoides - beardless wild rye
* *Lolium multiflorum* - Italian ryegrass
* *Lolium perenne* - perennial ryegrass
* *Lolium temulentum* - darnel
Melica imperfecta - California melic
Muhlenbergia microsperma - littleseed muhly
Nassella cernua - nodding needlegrass
Nassella lepida - foothill needlegrass
Nassella pulchra – purple needlegrass
Paspalum distichum – knotgrass
* *Phalaris minor* - Mediterranean canary grass
* *Piptatherum miliaceum* - smilo grass
* *Poa annua* – annual bluegrass
Poa secunda - Malpais bluegrass
* *Polypogon monspeliensis* - rabbit's-foot grass
* *Schismus barbatus* – abumashi
* *Triticum aestivum* – cereal wheat
Vulpia microstachys - fescue
* *Vulpia myuros* - rattail fescue
Vulpia octoflora - six-weeks fescue

TYPHACEAE - CATTAIL FAMILY

Typha angustifolia- narrow leaved cattail
Typha dominigensis – southern cattail
Typha latifolia - broad-leaved cattail

* signifies introduced (non-native) species

APPENDIX B

Master Faunal Compendium

WILDLIFE SPECIES -VERTEBRATES

REPTILES

EMYDIDAE - BOX AND WATER TURTLE
Clemmys marmorata - western pond turtle (Observed 5/29/03)

IGUANIDAE - IGUANID LIZARDS
Cnemidophorus tigris multiscutatus - coastal western whiptail
Sceloporus occidentalis - western fence lizard
Uta stansburiana - side-blotched lizard

COLUBRIDAE - COLUBRID SNAKES
Masticophis lateralis - California whipsnake

VIPERIDAE - VIPERS
Crotalus atrox - western diamondback rattlesnake

BIRDS

CATHARTIDAE - NEW WORLD VULTURES
Cathartes aura - turkey vulture

ACCIPITRIDAE - HAWKS
Accipiter cooperii - Cooper's hawk
Buteo jamaicensis - red-tailed hawk
Buteo lineatus - red-shouldered hawk
Elanus leucurus - white-tailed kite

FALCONIDAE - FALCONS
Falco mexicana - prairie falcon
Falco sparverius - American kestrel

PHASIANIDAE - PHEASANTS & QUAILS
Callipepla californica - California quail

CHARADRIIDAE - PLOVERS
Charadrius vociferus – killdeer

COLUMBIDAE - PIGEONS & DOVES
Zenaida macroura - mourning dove

TYTONIDAE - BARN OWLS
Tyto alba - barn owl

STRIGIDAE - TRUE OWLS
Asio otus - long-eared owl

APODIDAE - SWIFTS
Aeronautes saxatalis - white-throated swift

TROCHILIDAE - HUMMINGBIRDS
Calypte anna - Anna's hummingbird

PICIDAE - WOODPECKERS
Colaptes auratus - northern flicker
Melanerpes formicivorus - acorn woodpecker
Picoides nuttallii - Nuttall's woodpecker
Sphyrapicus ruber - red-breasted sapsucker
Sphyrapicus sp. - sapsucker
Sphyrapicus thyroideus - Williamson's sapsucker

TYRANNIDAE - TYRANT FLYCATCHERS
Contopus sordidulus - western wood-pewee
Sayornis nigricans - black phoebe
Sayornis saya - Say's phoebe
Tyrannus verticalis - western kingbird

HIRUNDINIDAE - SWALLOWS
Petrochelidon pyrrhonota - cliff swallow

CORVIDAE - JAYS & CROWS
Aphelocoma californica - western scrub-jay
Corvus brachyrhynchos - American crow
Corvus corax - common raven

PARIDAE - TITMICE
Baeolophus inornatus - oak titmouse

AEGITHALIDAE - BUSHTITS
Psaltriparus minimus - bushtit

SITTIDAE - NUTHATCHES
Sitta carolinensis - white-breasted nuthatch

TROGLODYTIDAE - WRENS
Salpinctes obsoletus - rock wren
Thryomanes bewickii - Bewick's wren
Troglodytes aedon - house wren

REGULIDAE - KINGLETS
Regulus calendula - ruby-crowned kinglet

SYLVIIDAE - GNATCATCHERS
Polioptila caerulea - blue-gray gnatcatcher

TURDIDAE - THRUSHES & BABBLERS
Sialia currucoides - mountain bluebird
Sialia mexicana - western bluebird

TIMALIIDAE - LAUGHINGTHRUSH AND WRENTIT
Chamaea fasciata - wrentit

MIMIDAE - THRASHERS
Mimus polyglottos - northern mockingbird

LANIIDAE - SHRIKES
Lanius ludovicianus - loggerhead shrike

STURNIDAE - STARLINGS
* *Sturnus vulgaris* - European starling

PARULIDAE - WOOD WARBLERS
Dendroica coronata - yellow-rumped warbler

Dendroica towndsendi - Townsend's warbler
Geothlypis trichas - common yellowthroat
Wilsonia pusilla - Wilson's warbler

EMBERIZIDAE - BUNTINGS & SPARROWS
Aimophila ruficeps - rufous-crowned sparrow
Junco hyemalis - dark-eyed junco
Melospiza melodia - song sparrow
Pipilo crissalis - California towhee
Pipilo maculatus - spotted towhee
Zonotrichia leucophrys - white-crowned sparrow

ICTERIDAE - BLACKBIRDS & ORIOLES
Sturnella neglecta - western meadowlark

FRINGILLIDAE - FINCHES
Carpodacus mexicanus - house finch
Carduelis psaltria - lesser goldfinch
Carduelis tristis - American goldfinch

MAMMALS

LEPORIDAE - HARES & RABBITS
Sylvilagus bachmani - brush rabbit

SCIURIDAE - SQUIRRELS
Sciurus griseus - western gray squirrel
Spermophilus beecheyi - California ground squirrel

GEOMYIDAE - POCKET GOPHERS
Thomomys bottae - Botta's pocket gopher

HETEROMYIDAE - POCKET MICE & KANGAROO RATS
Chaetodipus californicus dispar - California pocket mouse

MURIDAE - RATS & MICE
Neotoma sp. - woodrat

CANIDAE - WOLVES & FOXES

Canis latrans - coyote
Urocyon cinereoargenteus - gray fox

PROCYONIDAE - RACCOONS & RELATIVES

Procyon lotor - common raccoon

MUSTELIDAE - WEASELS, SKUNKS, & OTTERS

Mustela frenata - long-tailed weasel
Taxidea taxus - American badger (burrow)

FELIDAE - CATS

Felis concolor - mountain lion
Lynx rufus - bobcat

URSIDAE - BEARS

Ursus americanus- Black Bear

CERVIDAE - DEERS

Odocoileus hemionus - mule deer

BOVIDAE - BISON, GOATS & SHEEP

* *Bos bovis* - domestic cattle

WILDLIFE SPECIES - INVERTEBRATES

BUTTERFLIES AND MOTHS

PIERIDAE - WHITES AND SULFURS

Pontia protodice - common white
Colias Eurydice - California dogface
Pontia sisymbrii - California white

NYMPHALIDAE - BRUSH-FOOTED BUTTERFLIES

Danaus plexippus – monarch
Junonia coenia - buckeye
Vanessa annabella – west coast lady
Vanessa cardui - painted lady

* signifies introduced (non-native) species

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Please refer to map No. 4.4-F in the accompanying map box.

Please refer to map No. 4.4-G in the accompanying map box.

APPENDIX 4.5

Floodplain Data

E N T R I X

FOCUSED SPECIAL-STATUS AQUATIC SPECIES ASSESSMENT - SANTA CLARA RIVER

LANDMARK VILLAGE PROJECT NEWHALL RANCH, CALIFORNIA

Prepared for:

Newhall Land

Valencia, CA

Prepared by:

ENTRIX, Inc.

Ventura, CA

Project No. 3109002

October 6, 2006

E N T R I X

Focused Special Status Aquatic Species Assessment
Santa Clara River

Landmark Village Project
Newhall Ranch, California

Prepared for:

Newhall Land
23823 Valencia Boulevard
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Project No. 3109002

October 6, 2006

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1. INTRODUCTION

This report summarizes the focused assessment of potential effects of the Landmark Village (Project) on threatened or endangered aquatic species inhabiting the Newhall Ranch reach of the Santa Clara River, from the Castaic Creek confluence through the boundary of the proposed Landmark Project. Specifically, this report focused on potential impacts to unarmored threespine stickleback, arroyo toad, and California red-legged frog as these species are listed as threatened or endangered by the State and Federal Endangered Species Act. In addition, this assessment includes discussion of potential impacts to southwestern pond turtle and two-stripe garter snake designated by the State as "Species of Concern." The primary focus of this assessment is to examine potential impacts to the habitat of the above species resulting from alterations to local hydrology and corresponding habitat areas through implementation of the Project.

1.1 LANDMARK VILLAGE PROJECT (LANDMARK)

Newhall Land (Newhall) plans to develop approximately 291 acres of property west of Castaic Creek adjacent to the north bank of the Santa Clara River. The Project site is currently used for agricultural production, and is within the approved Newhall Ranch Specific Plan boundaries. Newhall retained ENTRIX to assess the potential effects of the Project on selected special-status aquatic species, including unarmored threespine stickleback, arroyo toad, California red-legged frog, southwestern pond turtle, and two-stripe garter snake. The primary features related to the Project examined in this assessment focus on buried soil cement bank stabilization along both the north and south banks of the Santa Clara River, erosion protection for portions of the utility corridor both east and west of the Landmark Village site, construction of Long Canyon Road bridge over the river, which would include bridge abutments and piers, and exposed rock rip rap flanking the SR-126 bridge at Castaic Creek. The footprint of the buried bank stabilization is set back from the Santa Clara and the existing riparian corridor, and the exposed protection along Castaic Creek is along the margin of the active channel. This assessment addresses both the construction footprint of the bank protection as well as the anticipated hydrologic and water quality influences of the Project on in-stream habitat utilization.

1.2 BACKGROUND

Unarmored Threespine Stickleback

The unarmored threespine stickleback, *Gasterosteus aculeatus williamsoni*, was designated a federally endangered species in 1970 (U. S. Fish and Wildlife Service 1985) and a state endangered species in 1971. Populations are restricted to three sections of the upper Santa Clara River including the Newhall Ranch reach, which represents the downstream demarcation of the unarmored subspecies. Currently, Critical Habitat for unarmored threespine stickleback has not been designated under the Endangered Species Act. The fish is a small, largely annual fish that requires shallow, slow, marginal stream flows with abundant aquatic vegetation for cover. The male guards territories and builds a small nest of decaying vegetation where he guards the eggs until they hatch. Large numbers of stickleback can exist in the summer and fall with the long breeding season in southern California, and breeding can be almost all year in dry years when a stream is minimally disrupted by storm flows. Up to a few hundred stickleback per 10 meters of stream can exist under optimum conditions. Strong storm flows usually severely decimate the population until the streams stabilize in spring and the numbers can build up again.

Other populations within the Santa Clara River watershed occur upstream of the Project site both in Soledad Canyon above Lang Station (about 12 miles upstream) and in San Francisquito Canyon from just below Drinkwater Reservoir upstream to the vicinity of the old St. Francis Dam location (about 11..5 miles upstream of the river). San Francisquito Creek actually enters the Santa Clara River about three miles upstream of the Project site near the upper end of the downstream unarmored population. Recently, a population was discovered in upper Bouquet Canyon (Jonathan Baskin, pers. comm.) about 11 miles above its mouth at the Santa Clara River. Perennial flows occur in the Santa Clara River downstream of the Saugus Water Reclamation Plant, which discharges tertiary treated effluent immediately downstream of the Bouquet Canyon Road Bridge over the Santa Clara River. These populations are located upstream of the Project site and the hydrology and habitat where these populations are situated are clearly not affected by the Project.

Arroyo Toad

Arroyo toads (*Bufo californicus*) occupy the margins of permanent and seasonal streams in coastal foothill canyons and valleys and to a limited extent in the desert, but they require extremely specialized and limited microhabitat within that general habitat type. Most spawning occurs in shallow overflow pools adjacent to inflow channels of third and higher-order streams. During the remainder of the year, adults occupy adjacent sand bars and sandy terraces, nearly always within 100 meters of suitable spawning pools. Suitable spawning pools lack suspended silt, aquatic predators, and dense woody bordering vegetation (Sweet 1993). Suitable bordering sandbars are usually dampened by capillarity and often include sparse emergent vegetation. The moist substratum keeps metamorphosing juveniles from desiccating during warm summer weather (Sweet 1993; Jennings and Hayes 1994). Suitable terrace habitat includes at least some dense overgrowth, such as California sycamore (*Platanus racemosa*), Fremont cottonwood (*Populus fremontii*), and willows (*Salix* sp.), but the understory is usually barren except for layers of dead leaves (Sweet 1993). Adult and metamorphosed juvenile arroyo toads are known to forage for various invertebrates around the drip line of large oaks (*Quercus*). They also forage extensively on ants (Sweet 1992, 1993). Little is known of arroyo toad winter hibernaculum requirements, but these toads are believed to hibernate exclusively in the riverine terrace, above the level of frequent winter floods (USFWS 1999).

On April 13, 2005, the U.S. Fish and Wildlife Service issued its Final Designation of Critical Habitat for the Arroyo Toad. Unit 6, covering a portion of the Newhall Ranch reach of the Santa Clara River and once considered for inclusion in the Critical Habitat Area, has been removed from the Final Designation of Critical Habitat.

California Red-legged Frog

California red-legged frog (*Rana aurora draytonii*) habitat components include spawning pools and their terrestrial borders, spring/summer refuges, and subterranean hibernation sites. These may be combined at single sites or they may be separated by aquatic or terrestrial “dispersal corridors” (Hayes & Jennings 1989; Jennings & Hayes 1994). Spawning pools are the ecologically central components of California red-legged frog habitat, because they support all elements of the species’ reproductive biology and also provide forage for all red-legged frog life stages. Spawning pools are typically permanent or extended seasonal ponds (through August), or stream/spring pools of 0.7-1.2 meters in depth, with dense bordering, emergent, and surface vegetation. Such pools may be as small as 1m^2 in surface area, with no known upper area limit. Always present at spawning habitat is a large complex invertebrate fauna for juvenile forage, extensive submerged herbaceous and algal vegetation for tadpole forage, and small terrestrial mammals such as voles (*Microtus*) that are an important component of adult frog forage (Jennings & Hayes 1994). Most suitable ponds are also partially to fully sunlit with mud or silt substrata, environmental factors essential to promote dense floating and emergent vegetation. Large populations of exotic predators such as bullfrogs and exotic centrarchid fish are usually absent from California red-legged frog spawning pools.

Newly constructed or impounded ponds rarely support California red-legged frog populations—most spawning sites have existed in stable, relatively undisturbed form for decades (Barry unpbl; Hayes & Jennings 1989). Likewise, red-legged frog spawning habitat is usually absent from river bottomland, presumably because high springtime flows would disrupt spawning success by scouring spawning pools and discouraging long-term aquatic vegetative growth. California red-legged frogs are vulnerable to early season floods because they spawn in early to mid-winter.

Adult California red-legged frogs may move in late spring and summer to shaded pools along streams where undercut banks and exposed root masses offer secure refuges. However, an isolated summer refuge component appears not to be critical to population survival because many adult frogs may be found throughout the summer at spawning pools. Hibernaculum preferences probably include lentic substrata (pond bottoms) or any secure subterranean site near spawning or summer refuge habitat, such as rodent burrows, vegetation mats, and root channels.

California red-legged frog "dispersal habitat" refers usually to stream courses that do not offer spawning or summer habitat but could be dispersal corridors between populations (USFWS 2002). Such corridors probably pertain more to populations in xeric localities; preliminary data from Marin County, California populations indicate that in mesic regions California red-legged frogs can disperse across any non-saline vegetated habitat (Gary Fellers, USGS, pers. comm.). "Dispersal habitat" as discussed in this report refers to any habitat that could be occupied temporarily by California red-legged frogs; it does not necessarily imply that California red-legged frogs might use such habitat to disperse or move among spawning pool habitats.

The 2001 Critical Habitat designation for the California red-legged frog was vacated by court order, but the U.S. Fish and Wildlife Service (2004a) reproposed Critical Habitat with substantially the same boundaries on 13 April 2004. A Final Rule is expected in spring 2005. Neither Critical Habitat designation included any part of the Santa Clara River or tributaries in the Landmark Project Area.

Southwestern Pond Turtle

Southwestern pond turtles (*Clemmys (Emys) marmorata pallida*), a California Species of Concern, require exposed permanent or extended seasonal (through August) slow or still water, bordered by or in the vicinity of suitable upland oviposition (egg deposition) habitat. Suitable oviposition areas are usually gently sloping treeless hillsides well above floodplains, with southern or southwestern exposure and clay or possibly sandy soil (Holland 1991). Eggs are deposited in flask-shaped vertical excavations from late spring through summer, and hatchlings apparently remain in the nest until the following spring (Holland 1991). All life history stages of post-emergent pond turtles are highly aquatic. Suitable aquatic habitat for adult pond turtles usually includes relatively deep water (at least 0.5 meter) with secure basking sites (logs, exposed banks, etc) within reach of secure subsurface concealment. The aquatic substratum may be silty, muddy, or rocky. Juveniles are generally more secretive than adults and may favor more secure basking habitat such as densely vegetated sections of ponds and stream pools (Barry unpbl. obs.). A complex invertebrate fauna and relatively high primary productivity typically also characterize southwestern pond turtle aquatic habitat (Jennings and Hayes 1994). The most important forage for hatchlings is nektonic plankton, but adults utilize a variety of plant and animal forage sources (Bury 1986).

Two-striped Garter Snake

The two-striped garter snake (*Thamnophis hammondii*) occurs from southern Baja California north to central Monterey and western Fresno Counties (Rossman and Stewart 1987). These snakes are found most frequently along the margins of rocky and sandy streams with fairly fast water, and they were formerly ubiquitous and abundant in association with such habitat throughout coastal southern California (Jennings and Hayes 1994). The two-striped garter snake is a California Species of Concern because most of its characteristic habitat in the lowlands of Southern California has been severely degraded and consequently this species has disappeared from substantial portions of its range (Stewart 1968; Jennings and Hayes 1994). Two striped garter snakes are believed to feed almost exclusively on fish and tadpoles, which they catch in shallow water by stalking, ambushing, or by cornering against submerged rocks or root masses (Jennings and Hayes 1994; Barry unpbl. obs). Thus, even though they are fundamentally terrestrial, they depend entirely on aquatic habitat for forage.

Although the preferred microhabitat for this species is poorly understood, the greatest numbers seemingly occur in areas along stream courses where the combination of in-stream rocky or other cover, terrestrial vegetative or other cover, and easy access to aquatic forage species of the appropriate size range exists (Barry unpbl obs.). For example, along relatively undisturbed reaches of the San Gabriel River in the San Gabriel Mountains these snakes are frequently found along relatively shallow rocky pools that laterally border somewhat deeper reaches, and they also frequent exposed root masses associated with pools created by the fallen trees. Smaller fish and tadpoles are typically abundant and easy for the snakes to capture in the shallow sections and the root mass pools, and larger fish occur in the adjacent deeper sections (Barry unpbl. obs.). Shoreline rocks, burrows, and dense vegetation (including root masses) offer excellent terrestrial cover, and submerged rocky aggregations offer aquatic refugia. Thus, although these wary snakes are often abundant and easily observed in such habitat, they are difficult to capture because they rarely stray far from secure cover and they flee rapidly into the water when approached (Barry unpbl. obs.).

Two-striped garter snakes are active nearly year-round in the Southern California lowlands, but in higher elevations they hibernate for a variable time span during the winter, and emerge as early as February. They usually mate soon after emergence, but females of this species can become gravid with sperm stored from matings that occurred as long as two years previously (Stewart 1972). Two-striped garter snakes bear live young in litters that average 8-10, usually in late July (Rossman and Stewart 1987). Mortality in newborns is probably fairly high, in particular because newborns may have difficulty securing small amphibian or fish prey in disturbed waterways (Jennings and Hayes 1994; Barry unpbl. obs.).

1.3 STUDY SCOPE

The scope of this assessment is on the potential effects of the Project on the target aquatic species described above. The assessment is based on a review of technical and regulatory documents provided by Newhall Land (Section 2.1) and a field reconnaissance survey of the Project site. Additionally, the preparers of this assessment have relied upon their extensive knowledge and experience on this subject. See Section 5, below, for a list of the preparers of this assessment. In addition, please refer to Appendix B for copies of the resumes of the preparers. No new quantitative surveys or analyses were conducted as part of this study.

1.4 ORGANIZATION OF DOCUMENT

The remainder of this report is organized as follows:

- **Section 2** describes the methods used in the development of the assessment.
- **Section 3** discusses the results of this assessment.
- **Section 4** cites literature and technical references used in the preparation of this assessment. These reference documents are incorporated herein by this reference.
- **Section 5** is the list of preparers of this assessment.

2. METHODS

The methods used to conduct this assessment are based on review of technical and regulatory documentation provided by Newhall, and field reconnaissance surveys of the Project area. The methods are described in greater detail below.

2.1 REVIEW OF EXISTING PROJECT REPORTS AND DOCUMENTATION

The following technical reports and supporting documentation were reviewed in assessing the potential effects of the Landmark Village Project on sensitive aquatic species inhabiting the Santa Clara River and their habitat:

- *Biological Resources Assessment of the Proposed Santa Clara River Significant Ecological Area. Los Angeles County Department of Regional Planning. PCR Services Corporation, Frank Hovore and Associates, FORMA Systems, November 2000.*

- *Final EIS/EIR: 404 Permit and 1603 Streambed Alteration Agreement for Portions of the Santa Clara River and its Tributaries, Los Angeles County*. Valencia Company, August 1998.

- *Results of Focused Surveys for Arroyo Toad and Special-Status Aquatic Reptiles and Amphibians, River Village Project; Newhall Ranch, Valencia, California. Newhall Ranch Company, Compliance Biology, Inc, Camarillo, CA, October, 2004.*

- *Biological Resources of the Upland Areas of the West Ranch. Newhall Land and Farming Company, Valencia, California, Dames and Moore, Santa Barbara, California, July 1993.*

- *Natural River Management Plan: Permitted Projects and Activities*. Santa Clara River and tributaries. Valencia Company, November 1998.

- *Results of Focused Surveys for Arroyo Toad and Special-Status Aquatic Reptiles and Amphibians within the Natural River Management Plan Area, Valencia, California.* Impact Sciences, September 2001.

- *Aquatic Surveys Along the Santa Clara River Part I: Castaic Junction Project Area, Los Angeles County, California.* Aquatic Consulting Services, Inc., April 2002.

- *Aquatic Surveys Along the Santa Clara River Part III: West of Commerce Center Bridge to the Ventura County Line, California.* Aquatic Consulting Services, Inc., June 2002.

- *Biological Opinion for the Natural River Management Plan, Santa Clarita, Los Angeles County, California (1-8-02-F-4R) (File No. 940050400-BAH)*. U.S. Fish and Wildlife Service, November 2002.

- *Results of Focused Surveys for Unarmored Threespine Stickleback and Other Special-Status Fish Species, Newhall Ranch, Valencia California.* Impact Sciences, Inc., January 2003.

- *Results of Focused Surveys for Arroyo Toad and Special-Status Aquatic Reptiles and Amphibians within the Newhall Ranch Area, Los Angeles County, California. Newhall Land and Farming,* Impact Sciences, Inc., *September 19, 2001.*

- *Letter from Scott Cameron (Ecological Sciences, Oxnard, CA) to Rick Farris, U.S. Fish and Wildlife Service, Ventura, CA, Subject: Permit submittal requirements, TE 808242, arroyo toad surveys, Los Angeles County, California, August 2, 2001.*

- *Letter from Scott Cameron (Ecological Sciences, Oxnard, CA) to Mark Subbotin, Newhall Ranch Co, Valencia, CA, Subject: Results of focused arroyo toad surveys, Auto Center Expansion Project and Hart Baseball and Softball Complex (Hart Complex Area), Santa Clarita, California.*

- *Letter from David Crawford (Impact Science, Inc, Agoura Hills, CA) to Mark Subbotin, Newhall Land and Farming, Subject: Brief summary of arroyo toad survey results in NRMP area, June 18, 2001.*

- *Biota Report, Newhall Ranch Specific Plan, Los Angeles County Department of Regional Planning, Los Angeles, California, September 7, 1995, July 1996 revision.*

- *SEATAC Biota Report, Combined San Francisquito Canyon Projects (West Creek (VTTM 52455) and East Creek (VTTM 44831, 52667), Newhall Land and Farming Company, Significant Ecological Area 19, San Francisquito Canyon, Los Angeles County, California, Los Angeles County Department of Regional Planning, Frank Hovore & Associates, San Marino Environmental Associates, Planning Consultants Research, August 19, 1998.*

- *Amended 404 Permit (No. 940050400-BAH) for Natural River Management Plan.* U.S. Army Corps of Engineers, June 2003.

- *Proposed Designation of Critical Habitat for the California red-legged frog (Rana aurora draytonii), U.S. Fish and Wildlife Service, April 13, 2004, 69 FR 19620-19642.*

- *Proposed Designation of Critical Habitat for the Arroyo Toad, U.S. Fish and Wildlife Service, April 28, 2004, 69 FR 23254-23328.*

- *Final Designation of Critical Habitat for the Arroyo Toad, Final Rule. U.S. Fish and Wildlife Service, April 13, 2005, 50CFR Part 17 (RIN 1018-AT42).*

- *Revised Additional Analysis to the Newhall Ranch Specific Plan and Water Reclamation Plant Final Program EIR, Volume VIII (May 2003), Section 2.3, Floodplain Modifications.*

- *Flood Technical Report for the Landmark Village Project (2006). Pacific Advanced Civil Engineering, Inc. (PACE)*

- *Landmark Village Water Quality Technical Report. (GeoSyntec Consultants 2006).*

2.2 REVIEW OF RECORDS AND LITERATURE

Information on the special-status wildlife of the proposed Landmark Project Area was obtained through a search of the *California Natural Diversity Database* (CNDDB; CDFG, 2004); from searches of the specimen catalogues of the major California vertebrate museum collections (detailed below); from the U.S. Fish and Wildlife Service (USFWS), Ventura Office, Endangered Species Division's species list (USFWS 2003); and from reports on biological studies completed in the Project vicinity. Preliminary identification of potential habitat for sensitive aquatic species within the Project site was determined by reviewing aerial photography provided by Newhall Land. Site visits on 31 March and 10 November 2004 identified other potential habitat.

The first step to evaluate Project effects on potential populations of the target special-status aquatic species is to determine the historical presence of these species within the Project area. ENTRIX biologists queried the California Natural Diversity Database (CDFG 2004), the collection catalogue of the Los Angeles County Museum of Natural History (LACM), and the online collection databases of the Museum of Vertebrate Zoology, University of California, Berkeley (UC Berkeley 2004); and the California Academy of Sciences (CAS 2004), to obtain this information. Various literature sources were also used. (Disclaimer: CNDDB and museum records always carry some degree of uncertainty because of potential misidentifications or incorrect locality data. Further, the absence of species records from any given site does not imply that the species is absent from the site).

The ENTRIX biologists then examined maps and aerial photographs to locate aquatic habitat within and near the banks of the Santa Clara River within the Project site. Aquatic habitat suitability for any of the reptile and amphibian species was determined by comparison with previously published assessments (e.g., Holland 1991; Jennings and Hayes 1994; Sweet 1992, 1993; USFWS 1999, 2002), as well as by the ENTRIX biologists' extensive experience with the species in various parts of California. To assess the potential effects of the proposed Project on unarmored threespine stickleback, arroyo toad, California red-legged frogs, southwestern pond turtles, and two-striped garter snakes, ENTRIX biologists consulted the USFWS Biological Opinion for the Natural River Management Plan (NRMP), Santa Clarita, Los Angeles County, California (1-8-02-F-4R), dated 15 November 2002; various natural history accounts for these species (e.g., Jennings and Hayes 1994; Holland 1991; Sweet 1992; Swift et al. 1993; Stebbins 1951); Newhall Ranch Specific Plan Final Program EIR (March 1999); Revised Additional Analysis to the Newhall Ranch Specific Plan and Water Reclamation Plant Final Program EIR, Volume VIII (May 2003), Section 2.3, Floodplain Modifications; *Landmark Village Water Quality Technical Report. (GeoSyntec Consultants April 2006);* and the PACE Flood Technical Report for the Landmark Village Project (2006).

2.3 FIELD RECONNAISSANCE SURVEYS

Several herpetological and ichthyological reconnaissance surveys were conducted in the spring and late fall of 2004 to document habitat conditions within the Project area (Figure 1). An additional reconnaissance was performed in February 2005 following a severe January flood event (Figure 2). The survey activities are more fully described in the following sections.

Herpetological Reconnaissance Surveys

ENTRIX biologists, Sean Barry and Matt Carpenter, conducted reconnaissance-level field surveys, focused on the following sensitive aquatic vertebrate species and their associated habitat within the Santa Clara River floodplain: 1) southwestern arroyo toad; 2) California red-legged frog; 3) southwestern pond turtle; and 4) two-striped garter snake. The purpose of field surveys was to analyze the potential effects of the Landmark Village Project on these species and their habitat.

The surveys were conducted on March 31 and November 10, 2004 in and along the Santa Clara River, within the boundaries of the Landmark Project site (Castaic Creek west to Chiquito Creek). The Project site was examined for aquatic habitat, such as flowing or standing water, emergent vegetation, and associated aquatic species. During the November survey, the ENTRIX biologist photographed the Santa Clara River channel within the Project area every 100-200 feet, and also photographed other areas of potential aquatic species habitat, to document the stream cross-sections and to document any potential bordering and other associated cover, pool, and channel habitat. See Appendix A for photographs.

Potential habitat for arroyo toads, California red-legged frogs, western pond turtles, and two-striped garter snakes was noted, along with other features relevant to life history, such as the presence of prey or predators. Habitat factors noted for arroyo toads included the presence of clear, standing water (required for egg deposition), sandy banks, and the presence of willows, cottonwood, and sycamore trees. Habitat factors noted for California red-legged frogs included relatively deep and vegetated sunlit pools. Habitat factors noted for southwestern pond turtles included permanent or nearly permanent water, depth of water, basking sites such as partially submerged logs, rocks, mats of floating vegetation or open mud banks, and suitable terrestrial sites for egg-laying. Habitat factors noted for two-striped garter snakes included isolated stream channels with adjacent shallow and deep moving water with bordering vegetative (including root masses) or rocky cover, in-stream cover, and evidence of fish.

Ichthyological Reconnaissance Surveys

ENTRIX biologists, Dr. Camm Swift and Steve Howard, conducted reconnaissance-level field surveys, focused on unarmored threespine stickleback. The purpose of these field surveys was to analyze the potential effects of the Landmark Project on this species and its associated habitat. The entire reach of the Santa Clara River from the mouth of Salt Creek to the Castaic Junction was surveyed on March 31 and April 1, 2004. An additional survey was conducted on November 8, 2004 in the Santa Clara River and Castaic Creek from the mouth to the State Route 126 (SR-126) Bridge within the Landmark Village Project area. The surveys focused mainly on evaluating habitat conditions within these reaches and in establishing the relative proximity from the stream side Project boundary to in-stream habitats. Most of these efforts were visual habitat assessments documented by field photographs with special reference to unarmored threespine stickleback and other fishes. Some collecting was conducted with a small seine (1.8 X 1.2 m, 3 mm mesh/6 X 3 feet, one eighth inch mesh) and aquarium dip nets in habitats that could potentially contain sticklebacks. Further upstream, the Santa Clara River at the Commerce Center Drive Bridge area and Castaic Creek near the Interstate 5 Bridge was examined on December 16, 2004.

Winter 2005 Post-Flooding Reconnaissance Surveys

Camm Swift and Sean Barry conducted an additional survey within the Landmark Village Project reach of the Santa Clara River on February 1, 2005 to document and evaluate habitat changes due to the recent large storm flows that disturbed much of the habitat that was previously examined.

3. RESULTS

This section discusses the results of the assessment and addresses potential impacts of the Project on the target special-status aquatic species. Based on the review of hydraulic modeling documents provided, it appears that very little or no physical in-stream changes will result from the Project. This assessment focuses on the effect of bank stabilization (Figure 3) on those species and does not address other terrestrial features of the Project. Much of the existing terrestrial habitat is currently in a disturbed (agricultural) state and is poorly suited for the target species. The hydraulic models reviewed suggest that the in-stream conditions will not be affected by the bank protection features except in extreme flood event years.

The results of the assessment for each species are described further below:

3.1 UNARMORED THREESPINE STICKLEBACK

Historical and Recent Vicinity Records

Unarmored threespine stickleback collections have been few and widely scattered in the Del Valle Zone of the Santa Clara River with a few notable exceptions. One exception is the refuge area identified during the surveys for the Mobil and Arco 1994 oil spill investigations. This is an area of marshy habitat just north northeast of Magic Mountain that apparently is always wetted and contains numerous stickleback. During the oil spill, this refuge area was apparently not affected since the main river flow directed the contamination away from this sensitive area.

Thus, it was also considered a site for relocating rescued stickleback that could not be returned to the main river immediately because of the oil contamination.

Results of ENTRIX Field Reconnaissance

The March 31 and April 1, 2004 surveys were during relatively high spring flows and the river had recently been scoured and fresh sediments were present. Also virtually all marginal herbaceous vegetation and other cover were washed out along much of the river. Due to an unusual set of strong October rain storms, the river was also scoured out during the visits in November and December 2004. Typically, the November and December collections would precede any high flows, marginal herbaceous vegetation would be well developed, and fishes would be abundant. Due to the early storms, the habitat conditions noted during our surveys were comparable to those normally associated with early spring conditions. In some drought years, the river goes without being substantially scoured out and fishes can remain abundant all year. For our spring 2004 surveys, the habitat was more or less in early spring scoured conditions.

During the spring 2004 survey, the river was running a visually estimated 30 to 40 cubic feet per second (cfs) and was turbid with visibility to about 50 cm. Some small spring tributaries and isolated pools were clear. The water temperature ranged from 22-26 degrees and at least four areas of upwelling with water at 18 to 20 degrees C. The substrate was variously sand, gravel, and cobble and 10-40% of the margins of the river had some vegetative cover such as herbaceous vegetation, debris, or overhanging trees or bushes. This marginal vegetation was just beginning to develop, as was green algae in the water. About 30-40% of the habitat was low to high gradient riffles with the remaining being runs. Eight to ten deeper, standing or backwater pools, more than 1 m deep, were seen near large obstructions. In the area of the mouth or delta of Castaic Creek in the Santa Clara River, a small flow entered the main river with a few associated pools and backwaters. However, it was emerging from the stream bed a few hundred meters upstream since the main Castaic Creek was dry farther upstream. In about 30 seine hauls and 140 dips with aquarium dip nets, throughout the stretch examined over the two days, no stickleback were taken or seen. Arroyo chubs were abundant, and one Santa Ana sucker was taken. Larval arroyo chubs were commonly seen and up to about 15 sucker larvae were observed. Some backwater areas had clawed frogs and about 25 were taken. In addition, several clawed frog larvae were seen in isolated floodplain pools.

The survey on November 8, 2004 was restricted specifically to the Landmark Village Project area and the well scoured channel with an estimated 25-30 cfs of flow and sand was about 75% of the substrate and gravel, cobble, and rock, the other 25% in the main river. Visibility was about 50 cm in the main river and some isolated ponds were clearer. Several isolated or spring fed pools existed in the riparian areas on the north side of the floodplain and were choked with cattails, willows, and Arundo. The shores of the main river channel where almost entirely scoured off by the October storms. Ten seine hauls took six half grown to adult unarmored threespine stickleback in backwater areas of the main river that serve as small refuges during scouring flows. Arroyo chubs were common in the river with over 150 taken, and in the oxbow ponds crayfish (about 20 taken) were common. One large arroyo chub was taken in the oxbow ponds, along with one small clawed frog. A few mosquitofish were collected and other seen in the protected oxbows. Even though some fish were common or very locally abundant, these were in occasional oxbow and marginal areas with most areas of faster flow devoid of fishes.

On the December 16, 2004 visit, Castaic Creek was dry all the way to the SR-126 Bridge and the only wetted areas were near storm drains that were surveyed earlier this year and found to be fishless. The Commerce Center Drive Bridge area was similar to the river downstream examined by Swift and Howard, but no fish collections were made and no fish were seen. The Commerce Center Drive Bridge is upstream of the Landmark Village Project.

Following a severe flood event in January 2005, ENTRIX biologists conducted a one-day reconnaissance survey of the Project reach to evaluate the response of habitat conditions.

Generally, plant and animal life had been flushed from the active stream channel. Riparian and aquatic vegetation along the stream margins had been scoured. Few or no aquatic insects were observed during numerous spot inspections. The streambed also aggraded in many areas, particularly in backwater pools where significant shallowing or complete filling had occurred. Significant deposition of sand and gravel was also observed in the forms of lateral and mid-channel bars. Most exotic aquatic species appeared to have been flushed out by the flooding events. Based on this survey, the observed flood event would have flushed out most aquatic species due to its size and severity, with or without the proposed Project improvements. Figure 2 illustrates the state of channel conditions in the Santa Clara River along the Project area following the January 2005 flood.

Project Impacts

The potential impacts to unarmored threespine stickleback due to the construction and persistence of the Project's bank stabilization features and the bridge construction are expected to be less than significant. Stickleback are known to inhabit the Newhall Ranch reach of the Santa Clara River adjacent to the Landmark Village Project area. The location of the proposed stabilization features is set back beyond the existing riparian corridor in a majority of the Project and construction would not interface with the active stream channel. The hydrologic influence of the bank stabilization on fish is likely to be essentially transparent when viewed in conjunction with flood flow conditions. Based on reconnaissance surveys conducted following recent flood events (January and February 2005), high flow conditions appear to have dislocated and dispersed aquatic organisms downstream.

The Flood Technical Report for the River Village Project (PACE 2006) found that there would be no significant impacts in water flows, velocities, depth, sedimentation, or floodplain and channel conditions adjacent to and downstream of the Project site as a result of the proposed Project improvements. These hydraulic effects were also found to be insufficient to alter the amount, location and nature of aquatic and riparian habitats in the Project area and downstream into Ventura County. The technical analysis further determined that the river would still retain sufficient width to allow natural fluvial processes to continue; and, as a result, the mosaic of habitats in the river that support various sensitive species would be maintained, and the population of the species within and immediately adjacent to the river corridor would not be significantly affected. Based on that technical assessment, no impacts to adjacent or downstream populations of the unarmored threespine stickleback are expected.

The Landmark Village Water Quality Technical Report (GeoSyntec 2006) indicates that modeled concentrations in runoff from developed areas with Project Design Features (PDFs) are below all benchmark water quality objectives and criteria and TMDL waste load allocations for the Santa Clara River and are addressed by a comprehensive site design, source control, and treatment control strategy. These water quality objectives are established to protect various beneficial uses including general wildlife, sensitive, rare and endangered species. Therefore, potential impacts from the Project on receiving water quality and beneficial uses in the Santa Clara River are not significant. Based upon that Report, no impacts to adjacent or downstream populations of unarmored threespine stickleback are expected.

3.2 ARROYO TOAD

Historical and Recent Vicinity Records

Neither of the museum database queries (CAS 2004; UC Berkeley 2004) yielded records of the arroyo toad from the main channel of the Santa Clara River. However, mainstem Santa Clara River CNDDB records for the arroyo toad exist from the "Santa Clara River, just east of Interstate 5" (1994), which is about two miles east of the River Village Project site, and from "Bear Canyon at the Santa Clara River, six miles upstream of Solemint" (2001), which is about eleven miles east of the Project site. Arroyo toads were also found recently at the confluence of San Francisquito Creek and the Santa Clara River, about 2.3 miles east of the River Village Project (Impact Sciences 2001). Further, the Aquatic Consulting surveys (2002a) reported arroyo toad tadpoles from pools adjacent to the Valencia Water Treatment Plant and from a pool just upstream of the River Village Project area (site 26). Among north tributaries to the Santa Clara River, arroyo toads are well-known from the Blue Point area along Piru Creek (CNDDB, LACM, and CAS records); from several sites along Sespe Creek (Ventura County) (CNDDB and LACM records and Sweet (1992)); and from at least one location along Castaic Creek north of Castaic Lake (CNDDB 2004; Compliance Biology 2004; U.S. Fish and Wildlife Service 2004). The existence of tributary records upstream and downstream of the Project area, as well as the in-channel Santa Clara River records west of Interstate 5 place the Project site within the probable distribution of the arroyo toad in the Santa Clara River channel. The recent origin of many of the records indicates that the arroyo toad still inhabits suitable habitat within the Santa Clara River basin, including the main channel. However, although standardized USFWS "protocol" surveys conducted recently within the Landmark Village Project site (Impact Sciences 2001; Compliance Biology 2004) showed that all of the components of arroyo toad habitat exist within the Landmark Village Project boundaries, these studies failed to document the occurrence of arroyo toads within such boundaries. Non-protocol surveys by Aquatic Consulting Services (2002b) also identified arroyo toad habitat in the Santa Clara River from the Landmark Village Project downstream to the Ventura County line.

Results of ENTRIX Field Reconnaissance

The March 31, 2004 survey was conducted during daylight hours from just northwest of the Travel Village trailer park along Castaic Creek downstream to the Wolcott Road crossing, with particular attention to the braided Castaic Creek channel complex just upstream of the confluence with the Santa Clara River. A spot survey was also conducted at the Long Canyon crossing downstream of Wolcott Road. Potential arroyo toad spawning habitat in the form of overflow pools with stable gravel or sandbars and nearby terrace vegetation was noted throughout the braided channel, and in the main stem of the Santa Clara River just downstream of the Wolcott Road crossing on the north and in places on the south sides of the river. Although the water level was fairly high because of winter storm runoff, overflow pools were visible but submerged upstream of the Long Canyon crossing, on the north bank of the river mainstem. No arroyo toads were observed during this reconnaissance surveys, but none would be expected because of the early season and the time of day of the survey.

The November 10, 2004 survey was conducted during daylight hours from the junction of Chiquito Creek and SR-126 downstream to the Santa Clara River, then upstream along the mainstem Santa Clara River to the confluence with Castaic Creek, then upstream along Castaic Creek nearly to SR-126. Flows in the mainstem river were lower than they had been the previous March, although they were undoubtedly recently augmented by heavy autumn rains. However, Chiquito Creek was dry between SR-126 and the Santa Clara River, and the Chiquito Creek channel was not incised or otherwise well defined close to the confluence. This suggests that Chiquito Creek flows downstream of SR-126 tend to be very episodic, short term, and sediment-loaded. A long overflow channel was visible along the north side of the Santa Clara River between the Long Canyon crossing and Wolcott Road, but this channel was choked with several generations of emergent vegetation (especially cattails (*Typha*)) and may not be suited to arroyo toad spawning. This is probably the same channel that was submerged but visible during the March 31, 2004 survey. The braided complex at the Castaic Creek confluence was mostly dry, but the main channel of Castaic Creek where it parallels and eventually flows into the Santa Clara River just upstream of the Wolcott Road crossing still held substantial water (to about 18 inches depth). How much of this had resulted from the recent rains was not clear. Castaic Creek itself from the braided complex upstream to SR-126 was essentially dry, and overflow channels of the type preferred by arroyo toads as spawning habitat were not evident upstream of the braided complex. However, bordering terrace habitat on the south side of the Santa Clara River and along much of Castaic Creek was clearly well suited to arroyo toads. No arroyo toads were observed during this survey, but none would be expected because of the lateness of the season, the time of day of the survey, and the prevailing cool weather.

Following a severe flood event in January 2005, ENTRIX biologists conducted a brief one-day reconnaissance survey of the Project reach to evaluate the response of habitat conditions.

Generally, plant and animal life had been flushed from the active stream channel. Riparian and aquatic vegetation along the stream margins had been scoured. Few or no aquatic insects were observed during numerous spot inspections. The streambed also aggraded in many areas, particularly in backwater pools where significant shallowing or complete filling had occurred. Significant deposition of sand and gravel was also observed in the forms of lateral and mid-channel bars. Most exotic aquatic species appeared to have been flushed out by the flooding events. Based on this survey, the observed flood event would have flushed out most aquatic species due to its size and severity, with or without the proposed Project improvements. Figure 2 illustrates the state of channel conditions in the Santa Clara River along the Project area following the January 2005 flood.

The early 2005 flood events severely altered riparian habitat conditions which may take up to several years to finally reach pre-flood condition equilibrium. Overall, the surveys confirmed that limited potential arroyo toad spawning and foraging habitat typically exists along the Santa Clara River and possibly Castaic Creek within the Landmark Village Project Area boundaries. However, the results of the focused USFWS protocol surveys cited above indicate that arroyo toads are very scarce or absent along these reaches and along the Santa Clara River downstream to the Los Angeles-Ventura County line (Aquatic Consulting Services 2002). The following discussion of Project impacts pertains only to available arroyo toad foraging and spawning habitat within the Landmark Village Project Area.

Project Impacts

Although the arroyo toad has not been recorded from within the Project area, seemingly suitable, but limited, habitat exists within the Project boundaries in the reach from Castaic Creek downstream at least to Wolcott Road and possibly to the Long Canyon crossing. It is not anticipated that the proposed Project's bank stabilization features will substantially alter the local sediment transport regime or otherwise affect in-stream habitat (spawning, foraging) for arroyo toad. The Project area falls within an extremely dynamic reach of the Santa Clara River where high disturbance flood events occur every 5 to 10 years and change the existing stream structure. The EIR/EIS for the NRMP area, located directly east of the Landmark site, stated that the widening of the river channels within the areas of bank protection (i.e., stabilization) would not cause system-wide channel or bed erosion, or aggradation. In its 1998 and 2002 Biological Opinions on the NRMP (p. 30), the U.S. Fish and Wildlife Service accepted the NRMP's findings, and stated further that the NRMP would not affect arroyo toad habitat negatively within the Santa Clara River mainstem. Utilization of these same methods of bank protection in Landmark are anticipated to lead to the same result – no affect of arroyo toad habitat.

The Flood Technical Report for the Landmark Village Project (PACE 2006) found that there would be no significant impacts in water flows, velocities, depth, sedimentation, or floodplain and channel conditions downstream of the Project site as a result of the proposed Project improvements. These hydraulic effects were also found to be insufficient to alter the amount, location and nature of aquatic and riparian habitats in the Project area and downstream into Ventura County. The technical analysis further determined that the river would still retain sufficient width to allow natural fluvial processes to continue; and, as a result, the mosaic of habitats in the river that support various sensitive species would be maintained, and the population of the species within and immediately adjacent to the river corridor would not be significantly affected. Based on that technical assessment, no impacts to downstream populations of the arroyo toad are expected.

The Landmark Village Water Quality Technical Report (GeoSyntec 2006) indicates that modeled concentrations in runoff from developed areas with Project Design Features (PDFs) are below all benchmark water quality objectives and criteria and TMDL waste load allocations for the Santa Clara River and are addressed by a comprehensive site design, source control, and treatment control strategy. These water quality objectives are established to protect various beneficial uses including general wildlife, sensitive, rare and endangered species.

Therefore, potential impacts from the Project on receiving water quality <u>and beneficial uses</u> in the Santa Clara River are not significant. Based upon that Report, no impacts to downstream populations of arroyo toad are expected.

3.3 CALIFORNIA RED-LEGGED FROG

Historical and Recent Vicinity Records

There are no California Natural Diversity Database records for the California red-legged frog from the Santa Clara River watershed, Los Angeles and Ventura Counties. However, the Museum of Vertebrate Zoology (UC Berkeley 2003) lists 17 specimens from Soledad Canyon (Santa Clara River channel) in its collection, from as recently as 1953. More precise locality data are unavailable. The California Academy of Sciences (CAS 2003) also lists a Soledad Canyon specimen, from 1950. The nearest specific locality to the Project site is some 15 miles upstream near the confluence with Agua Dulce Creek. Jennings and Hayes (1994) and the CNDDB indicate that this species still occurs in the Santa Clara River watershed, in sites along San Francisquito Creek 5-10 miles northeast of the Project site, and in tributaries to the Santa Clara River in Ventura County. The closest documented Ventura County occurrence is in Piru Creek 4.5 miles north of Piru, about 10 airline miles west to north-west of the Project site (USFWS 2002). Potential spawning habitat for California red-legged frogs also exists in some of the small tributaries that flow north into the Santa Clara River, within and near the Project boundaries. Further, the verified records upstream and downstream of the Project site place the Project site within the distribution of the California red-legged frog along the Santa Clara River.

Results of ENTRIX Field Reconnaissance

The field evaluations indicate that potential spawning or summer habitat for the California red-legged frog is absent from the main channel of the Santa Clara River within the Project site. Further, the various USFWS protocol surveys for arroyo toads conducted along the Santa Clara River from Santa Clarita to the Ventura County line during the past few years would probably have found California red-legged frogs if they occurred in the mainstem of the Santa Clara River, but none were reported during these surveys. California red-legged frogs generally avoid large river channels with widely fluctuating flows, because such habitat usually does not permit reproductive activity (Hayes and Jennings 1989). For example, episodic winter flooding (typical of the Santa Clara River stream channel) may dislodge egg masses, and subsequent desiccation before the summer (also typical of the Santa Clara River) would kill tadpoles before they could metamorphose. Conversely, during the late winter and autumn, when California red-legged frogs may be most likely to move randomly (USFWS 2002), the mainstem Santa Clara River channel can be considered potential “dispersal habitat,” primarily because adult frogs can survive in the main channel during that season.

Following a severe flood event in January 2005, ENTRIX biologists conducted a one-day reconnaissance survey of the Project reach to evaluate the response of habitat conditions. Generally, plant and animal life had been flushed from the active stream channel. Riparian and aquatic vegetation along the stream margins had been scoured. Few or no aquatic insects were observed during numerous spot inspections. The streambed also aggraded in many areas, particularly in backwater pools where significant shallowing or complete filling had occurred. Significant deposition of sand and gravel was also observed in the forms of lateral and mid-channel bars. Most exotic aquatic species appeared to have been flushed out by the flooding events. Based on this survey, the observed flood event would have flushed out most aquatic species due to its size and severity, with or without the proposed Project improvements. Figure 2 illustrates the state of channel conditions in the Santa Clara River along the Project area following the January 2005 flood.

Project Impacts

As indicated above, field evaluations indicate that potential spawning or summer habitat for the California red-legged frog is absent from the main channel of the Santa Clara River within the Project site. Within the Project site boundaries, impacts to California red-legged frogs would probably result only from construction activity effects on the unlikely presence of dispersing red-legged frogs during the construction process. On that basis, implementation of Project improvements would not significantly affect California red-legged frog populations.

The Flood Technical Report for the Landmark Village Project (PACE 2006) found that there would be no significant impacts in water flows, velocities, depth, sedimentation, or floodplain and channel conditions downstream of the Project site as a result of the proposed Project improvements. These hydraulic effects were also found to be insufficient to alter the amount, location and nature of aquatic and riparian habitats in the Project area and downstream into Ventura County. The technical analysis further determined that the river would still retain sufficient width to allow natural fluvial processes to continue; and, as a result, the mosaic of habitats in the river that support various sensitive species would be maintained, and the population of the species within and immediately adjacent to the river corridor would not be significantly affected. Based on that technical assessment, no impacts to downstream populations of the California red-legged frog are expected.

The Landmark Village Water Quality Technical Report (GeoSyntec 2006) indicates that modeled concentrations in runoff from developed areas with Project Design Features (PDFs) are below all benchmark water quality objectives and criteria and TMDL waste load allocations for the Santa Clara River and are addressed by a comprehensive site design, source control, and treatment control strategy. These water quality objectives are established to protect various beneficial uses including general wildlife, sensitive, rare and endangered species.

Therefore, potential impacts from the Project on receiving water quality and beneficial uses in the Santa Clara River are not significant. Based upon that Report, no impacts to existing populations of Red-legged Frog are expected.

3.4 SOUTHWESTERN POND TURTLE

Historical and Recent Vicinity Records

Southwestern pond turtles are probably distributed throughout the Santa Clara River watershed, wherever there are sufficient permanent or near-permanent water and oviposition sites to support populations. However, the CNDDB includes only two Santa Clara River records of southwestern pond turtles, from near Castaic Junction (2000) and from downstream near the Ventura County line (1998). Neither of the museum databases includes any Santa Clara River watershed southwestern pond turtle records. Conversely, the Impact Sciences (2001) report states that during those surveys pond turtles were observed numerous times at unspecified sites within the NRMP reaches, presumably where sufficient water existed to satisfy the aquatic habitat requirements discussed previously.

Results of ENTRIX Field Reconnaissance

During the March 31, 2004 field reconnaissance survey, ENTRIX biologists observed pond turtles at the confluence of Castaic Creek and the Santa Clara River and at the Long Canyon crossing. The November survey revealed that suitable aquatic habitat remains in the mainstem late in the year (presumably augmented by autumn rains). Neither survey identified specific terrestrial oviposition habitat, but moderate west- and south-facing meadowland slopes in the canyon openings appear to supply oviposition habitat requirements. Some potentially suitable oviposition habitat may also occur along the Castaic Creek embankment between the confluence with the Santa Clara River and Interstate 5. However, firm claylike soils, a possible oviposition site requirement (Holland 1991), seem to be absent from the mainstem channel, including the terrace on the north river bank.

Following a severe flood event in January 2005, ENTRIX biologists conducted a one-day reconnaissance survey of the Project reach to evaluate the response of habitat conditions. Generally, plant and animal life had been flushed from the active stream channel. Riparian and aquatic vegetation along the stream margins had been scoured. Few or no aquatic insects were observed during numerous spot inspections. The streambed also aggraded in many areas, particularly in backwater pools where significant shallowing or complete filling had occurred. Significant deposition of sand and gravel was also observed in the forms of lateral and mid-channel bars. Most exotic aquatic species appeared to have been flushed out by the flooding events. Based on this survey, the observed flood event would have flushed out most aquatic species due to its size and severity, with or without the proposed Project improvements. Figure

2 illustrates the state of channel conditions in the Santa Clara River along the Project area following the January 2005 flood.

Project Impacts

Project impacts on southwestern pond turtles will probably include temporary or permanent alteration of aquatic channel foraging habitat consequent to construction activities, possible loss of basking areas, but probably no long-term effects from bank stabilization as long as adjacent braids and overflow channels continue to exist. Oviposition habitat on the south bank and downstream will probably not be affected by bank stabilization, but may be temporarily disturbed during future road and bridge development.

The Flood Technical Report for the Landmark Village Project (PACE 2006) found that there would be no significant impacts in water flows, velocities, depth, sedimentation, or floodplain and channel conditions downstream of the Project site as a result of the proposed Project improvements. These hydraulic effects were also found to be insufficient to alter the amount, location and nature of aquatic and riparian habitats in the Project area and downstream into Ventura County. The technical analysis further determined that the river would still retain sufficient width to allow natural fluvial processes to continue; and, as a result, the mosaic of habitats in the river that support various sensitive species would be maintained, and the population of the species within and immediately adjacent to the river corridor would not be significantly affected. Based on that technical assessment, no impacts to adjacent or downstream populations of the southwestern pond turtle are expected.

The Landmark Village Water Quality Technical Report (GeoSyntec 2006) indicates that modeled concentrations in runoff from developed areas with Project Design Features (PDFs) are below all benchmark water quality objectives and criteria and TMDL waste load allocations for the Santa Clara River and are addressed by a comprehensive site design, source control, and treatment control strategy. These water quality objectives are established to protect various beneficial uses including general wildlife, sensitive, rare and endangered species.

Therefore, potential impacts from the Project on receiving water quality and beneficial uses in the Santa Clara River are not significant. Based upon that Report, no impacts to adjacent or downstream populations of southwestern pond turtle are expected.

3.5 TWO-STRIPED GARTER SNAKE

Historical and Recent Vicinity Records

Santa Clara River records for the two-striped garter snake in the Newhall Ranch region are absent from the CNDDB and the museum collections, yet the various reports reviewed for this document and personal communications with local biologists indicate that this species occurs somewhat commonly along this reach of the river.

Results of ENTRIX Field Reconnaissance

During the March 31, 2004 survey, the ENTRIX biologists observed one two-striped garter snake near an exposed root mass along the braided confluence of Castaic Creek and the Santa Clara River. Exposed root masses are particularly favored by these snakes because they offer secure shelter and they tend to form small shallow backwater pools where small fish congregate and are easy for the snakes to capture (Barry unpbl. obs.). The November 10, 2004 survey revealed that such isolated complex refugia are very limited along the reach from Castaic Creek to Chiquito Creek, but the survey also revealed that low dense bankside vegetation, another type of favored retreat, occurs almost continuously along the north side of the river from Chiquito Creek upstream nearly to the Wolcott Road crossing. Much of this vegetation is associated with overflow pools that entrap fish during the late spring and early summer, which undoubtedly attracts two-striped garter snakes in greater than typical numbers to exploit this resource. However, subsequent pool drying eliminates this resource and garter snakes consequently disperse, to return during the following spring when the forage resource is renewed (Barry unpbl. obs.).

Following a severe flood event in January 2005, ENTRIX biologists conducted a one-day reconnaissance survey of the Project reach to evaluate the response of habitat conditions. Generally, plant and animal life had been flushed from the active stream channel. Riparian and aquatic vegetation along the stream margins had been scoured. Few or no aquatic insects were observed during numerous spot inspections. The streambed also aggraded in many areas, particularly in backwater pools where significant shallowing or complete filling had occurred. Significant deposition of sand and gravel was also observed in the forms of lateral and mid-channel bars. Most exotic aquatic species appeared to have been flushed out by the flooding events. Based on this survey, the observed flood event would have flushed out most aquatic species due to its size and severity, with or without the proposed Project improvements. Figure 2 illustrates the state of channel conditions in the Santa Clara River along the Project area following the January 2005 flood.

Project Impacts

Project impacts on two-stripe garter snake will be less than significant since the proposed Project's bank stabilization features are set back from the active channel and existing snake habitat. No adverse change to foraging habitat is expected from implementation of the Project.

The Flood Technical Report for the Landmark Village Project (PACE 2006) found that there would be no significant impacts in water flows, velocities, depth, sedimentation, or floodplain and channel conditions downstream of the Project site as a result of the proposed Project improvements. These hydraulic effects were also found to be insufficient to alter the amount, location and nature of aquatic and riparian habitats in the Project area and downstream into Ventura County. The technical analysis further determined that the river would still retain sufficient width to allow natural fluvial processes to continue; and, as a result, the mosaic of habitats in the river that support various sensitive species would be maintained, and the population of the species within and immediately adjacent to the river corridor would not be significantly affected. Based on that technical assessment, no impacts to adjacent or downstream populations of the two-striped garter snake are expected.

The Landmark Village Water Quality Technical Report (GeoSyntec 2006) indicates that modeled concentrations in runoff from developed areas with Project Design Features (PDFs) are below all benchmark water quality objectives and criteria and TMDL waste load allocations for the Santa Clara River and are addressed by a comprehensive site design, source control, and treatment control strategy. These water quality objectives are established to protect various beneficial uses including general wildlife, sensitive, rare and endangered species.

Therefore, potential impacts from the Project on receiving water quality and beneficial uses in the Santa Clara River are not significant. Based upon that Report, no impacts to adjacent or downstream populations of two-striped garter snake are expected.

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5. List of Preparers

ENTRIX, Inc.

- **Steve Howard**, Project Manager/Fisheries Biologist: coordination and management of ENTRIX technical staff through the background document review, field reconnaissance and document preparation phases and supported technical discussion of issues related to stickleback and fish.

- **Camm Swift, Ph.D.**, Senior Fisheries Biologist: conducted field reconnaissance survey and background document review; prepared technical discussion of issues related to stickleback and fish.

- **Sean Barry, M.S.**, Senior Herpetologist: conducted field reconnaissance surveys and reviewed background documents, site photos and field reconnaissance documentation; prepared technical discussion of issues related to amphibians and reptiles.

- **Matt Carpenter**, Senior Project Scientist: assisted in 2005 field reconnaissance survey and background document review.

- Resumes for these preparers are included in Appendix B.

APPENDIX A

FIGURES AND FIELD PHOTOGRAPHS

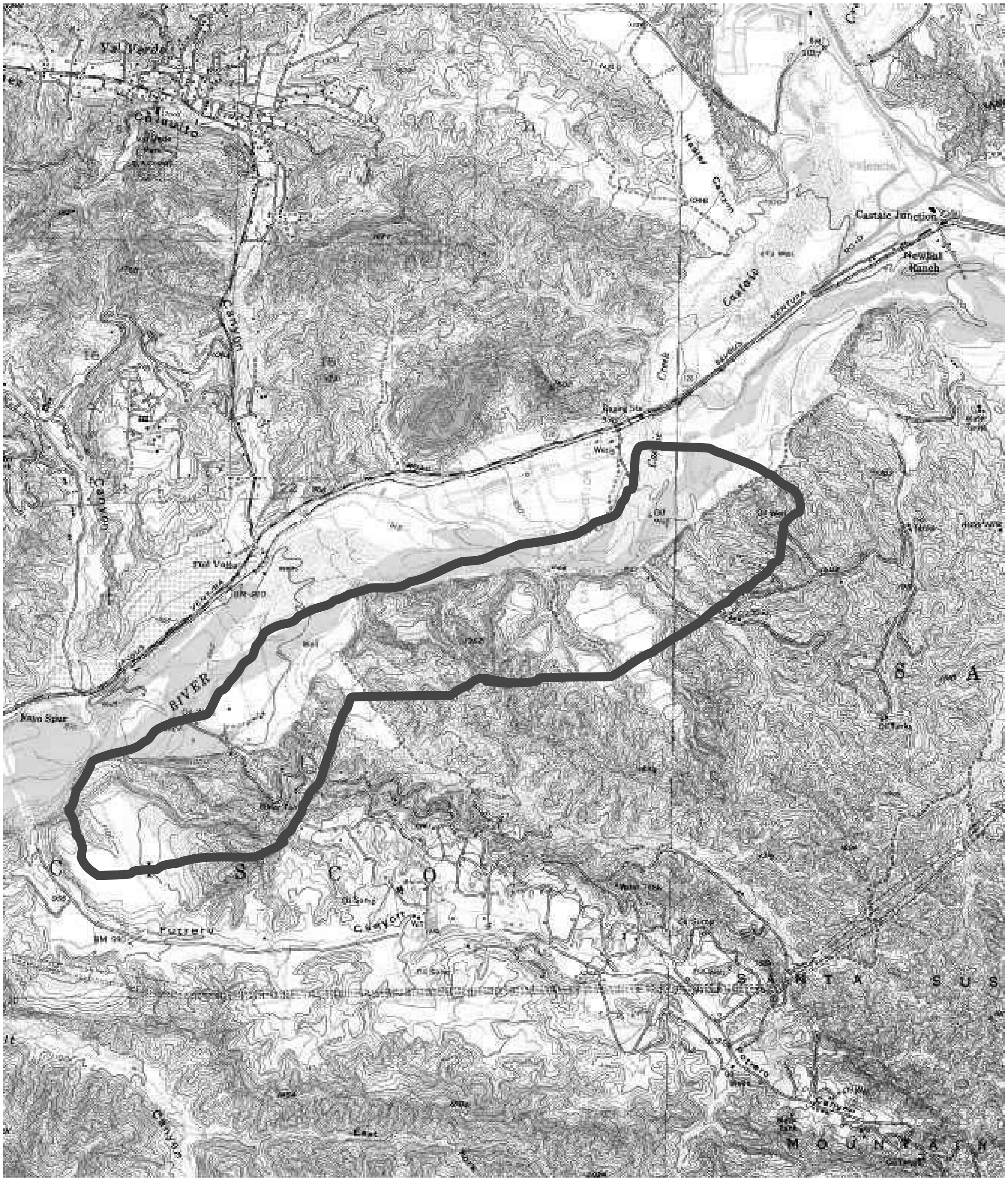

Figure 1. Landmark Village Study Area (Santa Clara River) – Newhall Ranch, California

Figure 2. **Landmark Village Study Area Aerial Photograph (following January 2005 Flooding)**

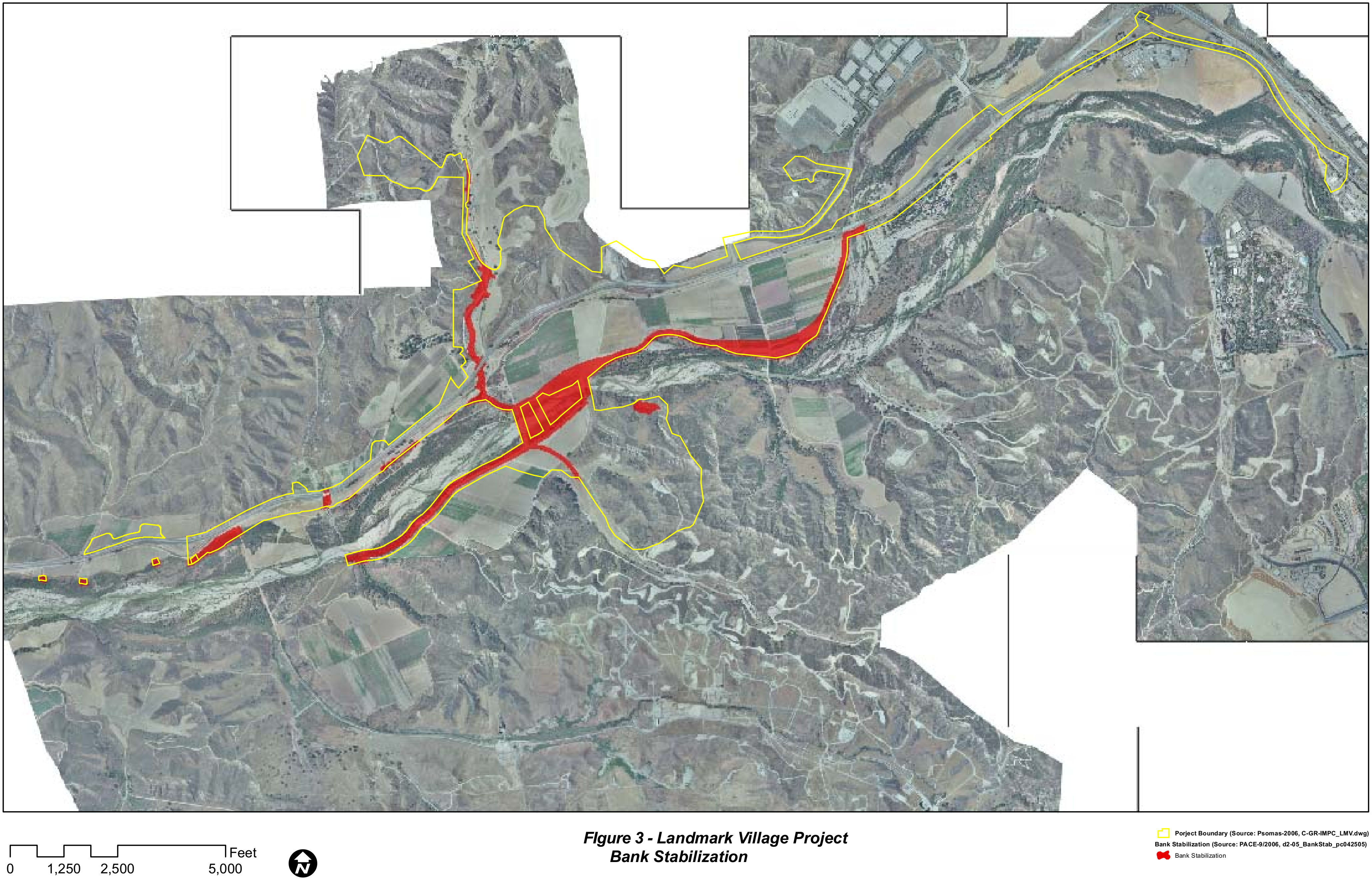

FIgure 3 - Landmark Village Project
Bank Stabilization

Castaic Creek / Santa Clara River Confluence photographed in November 2004 prior to winter 2005 floods.

Castaic Creek upstream of confluence following January 2005 flood (note vegetation scoured throughout).

Spring 2004 channel conditions at the Landmark Village Project site (facing upstream)

Isolated pool seined for fish and other aquatic vertebrates during the Spring 2004 reconnaissance.

APPENDIX B

RESUMES OF PREPARERS

STEVEN R. HOWARD

aquatic invertebrate ecology
fisheries biology
habitat assessments and mapping
instream flow analysis/IFIM
limnology
salmonid biology
stream and estuarine ecology
water quality assessment
environmental monitoring

EDUCATION

- Humboldt State University, Arcata, CA: B.S., Fisheries, 1999
- Ventura College, General Education, Biology & Mathematics 1993-1994
- Cuesta College, General Education, Biology & Mathematics 1992-1993

PERMITS, CERTIFICATION AND ADDITIONAL TRAINING

- California Department of Fish and Game. Resident Scientific Collecting Permit No. 801226-04
- USFWS Project Permitted Tidewater Goby Specialist in Ventura and Santa Cruz Counties
- Theory and Application of the Physical Habitat Simulation System, Utah State University, May 2002
- Sampling Theory and Design Workshop, Humboldt State University, March 2002
- Aquatic Ecological Assessment Workshop, CDFG, March 2002

PROFESSIONAL EXPERIENCE

Mr. Howard is an interdisciplinary scientist with an emphasis on aquatic studies including fishery habitat assessment and population surveys, fish species identification, fisheries techniques, fish passage assessment, fish and aquatic invertebrate population analysis, water quality assessment, and wildlife population and escapement surveys. Mr. Howard has preformed numerous projects in aquatic habitats ranging from high elevation lakes and streams to coastal estuaries. Mr. Howard has also conducted projects including subsurface soil and groundwater investigations, environmental impact studies, environmental monitoring, and site closure and remediation. Mr. Howard has been involved in permitting large power projects and smaller instream projects throughout California.

Fish Population Studies

Mr. Howard has conducted numerous fish population studies throughout many of the western states. Representative projects include chinook, steelhead and bull trout studies in northern California and Oregon, steelhead studies in central and southern California, various trout species studies in California, Oregon and Idaho, and native fish studies in Oregon and southern California. Mr. Howard has also conducted fish population surveys in southern and central California estuaries for the endangered tidewater goby.

RELAVENT EXPERIENCE

Fish and Wildlife Studies

- **McKenzie River Watershed Spring Chinook Population Study** – Lane County, OR
  Mr. Howard conducted chinook salmon spawning surveys, obtained biological samples from spawned-out salmon, collected downstream migrants, monitored fish passage though leaburg dam, and monitored bull trout migration under the Western Oregon Research and Monitoring Program. Mr. Howard conducted these projects for the Oregon Department of Fish and Wildlife.
- **Oregon State Elk Population Study** – Lane County, OR
  Mr. Howard managed an initial statewide effort to obtain elk teeth and tissue samples throughout the state of Oregon. This effort was successful and set precedent for future Oregon Department of Fish and Wildlife elk tissue collection efforts.
- **United Water Conservation District FERC Relicensing Project** – Ventura County, CA
  ENTRIX, Inc. designed multiple studies under agency consultation during the FERC application process. Mr. Howard conducted fish population studies and identified fish species present in Piru Creek below Santa Felecia Dam, within Piru Lake and above the lake in Piru Creek.
- **United Water Conservation District Steelhead Migration Project** – Ventura County, CA
  ENTRIX, Inc. directed fish passage monitoring and fish rescue consultation involving steelhead on the lower Santa Clara River. Mr. Howard was the lead fisheries biologist for the project. The Vern Freeman Diversion fish passage facility includes a fish ladder, fish screens, and a downstream migrant fish trap. During steelhead migration, facilities at the diversion were inspected for stranded steelhead and resident rainbow trout for relocation to the appropriate habitat. These operations were interim mitigation measures for section 10 incidental steelhead take.
- **PacifiCorp FERC Relicensing Project** – Jackson County, OR
  ENTRIX, Inc. conducted numerous aquatic studies under agency consultation during the FERC reliscencing application process. Mr. Howard analyzed fish population data in the upper Rogue River watershed to estimate salmonid population densities above and below dams.
- **Moyie River Fish Population Study** – Bonner County, ID
  ENTRIX, Inc. conducted a salmonid relative abundance survey in the Moyie River in Idaho. The survey was performed utilizing four divers at several gas pipeline river crossings. This was conducted in conjunction with past monitoring and a proposed expansion of the pipeline at the crossings in the Moyie River. Mitigation for each crossing consisted of installing Riprap wings to prevent bank Scour and rock-drop structures to form rearing and holding pools.
- **Ventura County Flood Control Tidewater Goby Project** – Ventura County, CA
  ENTRIX, Inc. served as fisheries professional to the Ventura County Flood Control District during pipe maintenance in the Hueneme drain. A temporary impoundment was placed around the work area which trapped numerous fish including tidewater gobies. Mr. Howard identified fish species within the impoundment and relocated all fish away from the work area.
- **Ventura County Flood Control Bank Stabilization Project** – Ventura County, CA
  ENTRIX, Inc. served as fisheries professional for Ventura County Flood Control District during a bank stabilization and habitat restoration project on the Sespe River.

Mr. Howard was in charge of identifying fish species for relocation outside of the project boundary.

- **San Clemente Dam Retrofit Drawdown Project –** Monterey County, CA
  ENTRIX, Inc. is conducting annual fish rescues upstream of San Clemente Dam and fish trapping and relocation activities to appropriate habitats downstream of San Clemente Dam for California-American Water Company. Water quality monitoring was also an important part of this project during the drawdown activities. Dissolved oxygen can drop dramatically during these types of projects. Aerators were installed throughout the reservoir to maintain adequate DO levels during the project. A low percentage of steelhead mortalities occurred during this project. Mr. Howard conducted fish rescues and relocations and water quality monitoring during this project. Mr. Howard was one of a few biologists permitted by NOAA Fisheries to conduct electrofishing and fish relocation activities during this project.
- **Haines Creek Native Fish Population Monitoring and Exotic Species Removal Project –** Los Angeles County, CA
  ENTRIX, Inc. is involved in a multi-year fish population monitoring project on Haines Creek. Haines Creek is one of a few creeks that has sustaining populations of Santa Ana suckers and Santa Ana speckled dace. Numerous exotic species are also found in Haines Creek such as largemouth bass, green sunfish, mosquito fish and crawfish. Sampling is conducted by a 2-pass seining method in 200-meter sample sites.
- **San Lorenzo River Steelhead and Tidewater Goby Relocation Project –** Santa Cruz County, CA
  ENTRIX, Inc. conducted steelhead and tidewater goby rescue and relocation activities during a bank stabilization project in the tidally influenced reach of the San Lorenzo River. A portadam was constructed around the work area and water was pumped out the impoundment. During fish rescue operations, Mr. Howard discovered the first known tidewater goby in the San Lorernzo River, which prompted further consultation to complete the project. Entrix, Inc. assisted in expediting this consultation process with the USFWS and NOAA Fisheries by monitoring water quality within the impoundment and describing tidewater goby habitat and in the San Lorenzo River.

Habitat Assessment Studies

- **Habitat Typing Projects** – California and Oregon
  ENTRIX, Inc. performs numerous habitat typing investigations for multiple clients throughout the United States. Mr. Howard has performed habitat typing field projects in northern California coastal rivers and in mountain streams in southern California and Oregon.
- **Steelhead Habitat and Passage Assessment** – Ventura County, CA
  ENTRIX, Inc. conducted a steelhead habitat and passage assessment for the City of Ventura to be included in the Ventura River Habitat Conservation Plan. Mr. Howard was the lead fisheries biologist in charge of assessing steelhead habitat on North Fork Matilija Creek. A diversion facility on the Ventura River currently blocks access to headwater steelhead habitat in North Fork Matilija Creek and its tributaries. A fish passage facility is planned for construction in the near future allowing upstream migration to important steelhead habitat in the North Fork Matilija. This habitat assessment quantified spawning and rearing habitat for southern California steelhead trout.
- **Matilija Creek Steelhead Habitat Evaluation** – Ventura County, CA
  ENTRIX, Inc. conducted a steelhead habitat evaluation for the Matilija Dam Ecosystem Restoration Project. Mr. Howard assisted a project team during this evaluation. The report supplemented the F3 Feasibility Study prepared by the US Army Corps of Engineers and Ventura County Flood Control District. The Matilija Dam

project is the largest dam removal and restoration activity ever proposed in California. Restoration will connect endangered southern California ESU steelhead with nearly 50 percent of its historic Ventura River basin spawning and rearing habitat.

- **Salsipuedes Creek Fish Passage Project** – Santa Barbara County, CA
  ENTRIX, Inc. modified an existing concrete apron to provide for fish passage along Salsipuedes Creek near Lompoc, California. Responsibilities included surveying, conducting site reconnaissance studies, preparing design drawings, permit information, and a grant application, and construction oversight. Mr. Howard assisted the project engineer on anadromous fish passage criteria for the project.

Bioassessment and Invertebrate Studies

- **Olympic View Sanitary Landfill Wetland Evaluation** – Kitsap County,WA
  ENTRIX, Inc. conducted statistical analysis of previously collected data to evaluate relationships between chemical and physical water parameters and the abundance and diversity of macroinvertebrates in a wetland adjacent to the landfill. Stepwise regression analysis attempted to correlate species abundance and richness with water quality and chemistry to assess localized impacts. Mr. Howard conducted this statistical analysis and assisted the project team with the final report.
- **Santa Clara River Estuary Bioassessment** – Ventura County, CA
  ENTRIX, Inc. designed and conducted this bioassessment study which involved stratified sampling of several estuarine habitats for benthic macroinvertebrates in the Santa Clara River Estuary. Mr. Howard was the lead field biologist on this project. The macroinvertebrate data characterized the assemblage diversity and develops relationships between species abundance, density, richness and microhabitat preferences (grain size, salinity tolerances, etc.). The objective of this study was to support the City and LAWRQCB in the development of defensible site-specific NPDES limits for metals discharged to the estuary.
- **Big Creek FERC Relicensing Bioassessment Project** - Sierra National Forest, CA
  ENTRIX, Inc. performed this study under agency consultation for the SCE Big Creek FERC relicensing application process. Mr. Howard was a lead biologist on this bioassessment project. The project was conducted in a large portion of the South Fork San Joaquin River watershed. Macroinvertebrate sampling occurred above and below large dams and small diversions to assess Southern California Edison project impacts.

Instream Flow Studies/PHABSIM Modeling

- **United Water Conservation District FERC Relicensing IFIM Project** – Ventura County, CA
  ENTRIX, Inc. conducted an instream flow study to determine the impacts of Santa Felicia Dam on the steelhead habitat in Piru Creek. Mr. Howard lead a crew comprised of client staff and sub-contractors.
- **United Water Conservation District FERC Relicensing Steelhead Migration Project**– Ventura County, CA
  ENTRIX, Inc. conducted a migration study on the Santa Clara River downstream of Piru Creek to determine adequate flow releases that would facilitate steelhead upstream migration to Piru Creek.
- **Ventura River IFIM Project** – Ventura County, CA
  ENTRIX, Inc. conducted this instream flow study to determine the impacts of dams and diversions on the steelhead habitat in the Ventura River. The results of this study will assist in the identification of factors potentially limiting fish populations in the effected reaches of the Ventura River and to determine appropriate minimum instream flows. Mr. Howard conducted the field investigation, PHABSIM Modeling

and produced the final report. Instream Flow Incremental Methodology (IFIM) studies in Oregon and California including the Ventura River. These projects use multiple flow regimes in determining fish habitat suitability downstream from dams and diversions.

- **Matilija Creek IFIM Project** – Ventura County, CA
  ENTRIX, Inc. conducted this instream flow study to determine the impacts of releases from Matilija Dam on Steelhead rearing and spawning habitat from the dam to the Robles Diversion on the Ventura River. The results of this study will assist in the identification of factors potentially limiting fish populations in the effected reach and to determine appropriate release flows and ramping rates. Mr. Howard conducted the field investigation, data collection, and modeling setup.
- **PacifiCorp FERC IFIM Project** – Jackson County, OR
  ENTRIX, Inc. conducted this instream flow study to determine the impacts of dams and diversions on fisheries habitat in the upper Rogue River watershed. Mr. Howard assisted in the field investigation and data collection.

Water Quality Studies

- **Santa Clara River Estuary Metals Translator Study** – Ventura County, CA
  ENTRIX, Inc. conducted a yearlong investigation focused on determining the metals translators for copper, nickel, zinc, and lead in the Santa Clara River Estuary. There are chemical differences between the Ventura Water Reclamation Facilities (VWRF) discharged effluent and the receiving Santa Clara River water. The Metals Translator Study determined what fraction of metals in the VWRF effluent were dissolved in the receiving water, and therefore bioavailable. Mr. Howard was the lead investigator on the Santa Clara River Estuary Metals Translator Study for the City of San Buenaventura.
- **Big Creek FERC Relicensing Water Quality Project** – Sierra national Forest, CA
  ENTRIX, Inc. conducted a water quality study related to the hydroelectric relicensing of Southern California Edison's Big Creek system in the San Joaquin River watershed. Study sites were selected by ENTRIX and a combined agency working group targeting large reservoirs, small impoundments, and streams below project facilities. Mr. Howard was in charge of multiple sampling teams working throughout the San Joaquin watershed.

Environmental Monitoring

- **360 Networks Fiber Optics Project** – Modoc, Lassen, Tehama, Glenn, Butte, Yuba, and Sutter Counties, CA
  ENTRIX, Inc. monitored fiber optic installation that occurred within a variety of sensitive habitats including rivers, wetlands, vernal pools, caves, and cultural resource areas. Many species listed under the California and Federal endangered species acts were of special concern on this project. Mr. Howard was the lead environmental monitor on this fiber optics project for the California Public Utilities Commission. No significant environmental impacts, under the adopted environmental mitigation measures, occurred on this project.
- **Southern Trails Gas Pipeline Project** – Riverside County, CA
  ENTRIX, Inc. monitored fiber optic installation that occurred within a variety of sensitive dessert habitats including rivers, washes, reptile and bird habitats, and cultural resource areas in the Mojave Dessert near Palm Springs, California. Mr. Howard was the Lead Field Coordinator for the California State Lands Commission on this project. The pipeline right-of-way was 8 miles long which crossed numerous washes including the San Gorgonio River. No significant environmental impacts, under the adopted environmental mitigation measures, occurred on this project.
- **Ventura County Flood Control Sediment Removal–** Ventura County, CA

ENTRIX, Inc. monitored a sediment removal and channel maintenance project on Pole Creek in Fillmore, California. Mr. Howard served as fisheries professional and Environmental Monitor to the Ventura County Flood Control District on this project. This creek is a tributary to the Santa Clara River which supports a small population of endangered southern California steelhead trout. Mr. Howard assessed steelhead habitat quality and steelhead migration barriers. Additionally, Mr. Howard monitored construction to eliminate the possibility of project related steelhead impacts.

PROFESSIONAL HISTORY

- ENTRIX, Inc. Senior Staff Scientist, 2003 to date
- ENTRIX, Inc. Staff Scientist, 2000 to 2003
- Oregon Dept. of Fish and Wildlife, 1998

AFFILIATIONS

- American Fisheries Society, Oregon and Cal-Neva Chapters since 1998
- Trout Unlimited

CAMM SWIFT

fish and fisheries biology
aquatic ecology / habitat restoration
ESA compliance and consultation
environmental monitoring
estuarine and stream ecology
archaeological and paleontological analysis

EDUCATION

- Florida State University, Tallahassee, Florida: Ph.D., Biology (Ichthyology), 1970
- University of Michigan, Ann Arbor, Michigan: M. A., Zoology, 1965
- University of California, Berkeley, California: A.B., Zoology, 1963

PROFESSIONAL HISTORY

- Entrix, Inc., Senior Project Scientist, present
- Independent Consultant, 5 years
- Loyola Marymount University, Visiting, Department of Biology, 3 years
- Natural History Museum of Los Angeles County, Associate Curator of Fishes, 22 years

PROFESSIONAL TRAINING

- Electrofishing Workshop, Smith-Root Company, American Fisheries Society Annual Meeting, Phoenix, Arizona, August 2002
- Workshop on interactive teaching (National Science Foundation supported), Los Angeles Cooperative for Teaching Excellence, California State University, Dominguez Hills, California, Spring 1997

PROFESSIONAL EXPERIENCE

Camm Swift has more than 20 years of experience working on the biology and conservation of freshwater and estuarine fishes of coastal southern California. He has served on the Recovery Teams for the unarmored threespine stickleback and tidewater goby, both federally endangered species, and was an author of the recovery plans for both fish. He has extensive knowledge on the freshwater fishes of coastal southern California, including their biology, requirements for recovery, and habitat restoration needs for improving conservation status. He has major expeditionary experience in the fresh and estuarine waters of the southeastern United States, Pacific coastal Mexico and Costa Rica, the Indus River Delta, Pakistan, and Amazonian Peru. He has extensive field and supervisory experience. He has conducted literature searches, written comprehensive reports and peer-reviewed publications, and served as an expert witness on fishery conservation issues. He has considerable experience in the identification and analysis of archaeological and fossil fish bones from the southeastern United States, southern California, and coastal Pakistan.

RELEVANT EXPERIENCE

Environmental/Civil Engineering

Biology and Distribution of Federally Endangered Tidewater Goby on Vandenberg Air Force Base – California.
Dr. Swift developed a sampling program to assess relative population size and distribution with bimonthly sampling of five coastal lagoons and streams on Vandenberg Air Force Base to define the biological parameters of this fish species on the base. He and several students conducted sampling and preliminary aging with otoliths, and prepared a major report on the biology of the species and recommendations for management of the species on the Base.

Status of Freshwater Fishes - Southern California
Dr. Swift supervised crews of three to six graduate students surveying the esturarine and freshwaters of coastal southern California, and prepared a report of findings for the Department of Fish and Game. The report led to major publication on these fishes, and provided much of the information justifying eventual federal and state listing of the more threatened species.

Distribution, Migration, and Predation on the Federally Threatened Santa Ana Sucker - Santa Ana River, California
Dr. Swift conducted a study of Santa Ana suckers in the middle Santa Ana River in San Bernardino, Riverside, and Orange counties to determine population levels, areas of spawning, distribution of larvae and young-of-the-year fish, possible diversion (and loss) of suckers into settling ponds, and impacts of exotic predatory aquatic organisms on the suckers. Dr. Swift prepared a report that provided basis for several management strategies to improve conditions for the sucker and lead to its eventual recovery. The study included snorkel surveys, three-pass transect population estimates with electroshocking, pit tagging of larger suckers, and developing characters to identify larval suckers.

Dynamics of Estuarine Fish Populations in Small Coastal Lagoons - Camp Pendleton
Dr. Swift conducted periodic fish collections in seven coastal lagoons over 5 years to monitor status and fluctuations in populations of the federally endangered tidewater goby and associated estuarine fish species. He documented the effects of the 1998 El Nino on these populations and their rebound back to "normal." He also documented true metapopulational phenomena among the tidewater goby populations subsequently confirmed by genetic studies.

Fish Communities of Ballona Marsh - western Los Angeles County
Dr. Swift conducted two studies (Natural History Museum of Los Angeles County in 1980-81 and San Marino Environmental Associates in 1997-98), each consisting of a series of collections over a 1-year period, to describe the existing fish communities, document changes over time, and recommend measures for long-term management of the marsh for native fishes.

Management Plan for Exotic Aquatic Organisms - Camp Pendleton
Dr. Swift prepared a comprehensive report on the distribution and status of exotic aquatic species on the base, and proposed many measures for their management and control.

Management and Control of Exotic Aquatic Organisms - Haines Creek-Lower Big Tujunga Wash, Los Angeles County
Dr. Swift is conducting a 5-year effort to remove or control exotic fishes, amphibians, turtles, and crayfish in this 1.7-kilometer stream and two associated ponds. A wide variety of methods are being utilized, including gill nets, various traps, removal of frog egg masses, seining, and snorkeling to spear fish and disrupt nesting basses and sunfishes. Dr. Swift is monitoring native fish populations to assess the effects of exotic control efforts by performing stratified random sampling of 16 transects in the stream.

Steelhead Surveys and Monitoring - Vandenberg Air Force Base, CA
Using methods based on the California Department of Fish and Game Salmonid Stream Restoration Manual, Dr. Swift provided comprehensive steelhead habitat description and assessment on five smaller drainages. The project included complete habitat typing of all five streams, snorkel and visual surveys for steelhead and other native fishes, upstream and downstream trapping during the winter migratory period, and historical research.

Advise Six-Agency Committee on Quality and Rationale for Critical Habitat Designations for Endangered Big River Fishes in the Colorado River - Southwestern United States
Dr. Swift conducted comprehensive historical research on the biology of four fishes and analysis of their needs for determining the validity and justification for the U.S. Fish and Wildlife Service Critical Habitat designations and how they might affect operations of the MWD.

Expert Witness on Coastal Minnow/Sucker Community – Southern California
Dr. Swift provided extensive and detailed information on the biology of these fishes to support the California Department of Fish and Game's position of the extreme importance of the wash habitat for their continued existence. The surviving remnant fish community consisted of the Santa Ana sucker (federally threatened) and Santa Ana speckled dace and arroyo chub, both California species of special concern.

AFFILIATIONS

- American Fisheries Society, President-Elect, President, and Past President, Cal-Nevada Chapter, 1996-1998
- American Society of Ichthyologists and Herpetologists
- Estuarine Research Federation (including recently formed California Estuarine Research Society [CAERS])
- Southern California Academy of Sciences, Secretary, President and Fellow, 1985-1991
- Society of Vertebrate Paleontology
- Western Field Ornithologists
- California Native Plant Society
- American Association for the Advancement of Science
- Sigma Xi

PUBLICATIONS AND PRESENTATIONS

Swift, C. C., J. S. Nelson, C. Maslow, and T. Stein. 1989. Biology and distribution of the tidewater goby, Eucyclogobius newberryi, (Pisces:Gobiidae) of California. Nat. Hist. Mus. Los Angeles Co., Contrib. Sci., 404, 19 pp.

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Imber, M. J., J. B. Cruz, J. S. Grove, R. J. Lavenberg, and C. C. Swift. 1992. Feeding Ecology of the dark-rumped petrel in the Galapagos Islands. The Condor, 94(2):437-447.

Swift, C. C., T. R. Haglund, R. Fisher, and M. Ruiz. 1993. Status and distribution of the freshwater fishes of southern California. Bull. S. Calif. Acad. Sci. 92(3):101-167.

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Lafferty, K., R. Swenson, and C. C. Swift. 1996. Tidewater goby; endangered species profile. Environmental Biology of Fishes, 46:254.

Lafferty, K., Swift, C. C., and R. Ambrose. 1999a. Post flood persistence and recolonization of the endangered tidewater goby populations. North American Journal of Fisheries Management, 19(2):618-622.

__________________________. 1999b. Extirpation and recolonization in a metapopulation of an endangered fish, the tidewater goby. Conservation Biology, 13(6):1447-1453.

Swift, C. C., K. Hieb, and R. Swenson. 2002. Family Gobiidae, pp. 7-9. IN: William S. Leet, Christopher M. Dewees, Richard Klingbeil, and Eric J. Larson (editors), California's Living Marine Resources: A status report. The Errata. California Department of Fish and Game, Sacramento, CA (December, 2001). The larger work appeared in early 2002 lacking the Gobiidae Chapter due to editorial error; it was included in the Errata subsequently printed and added to the Web edition [www.dfg.ca.gov/mrd]

Dawson, M. N., K. D. Louie, M. Barlow, D. K. Jacobs, and C. C. Swift. 2002. Comparative phylogeography of sympatric sister species, Clevelandia ios and Eucyclogobius newberryi (Teleostei, Gobiidae), across the California transition zone. Molecular Ecology, 11:1065-1075.

Swift, C. C. and D. Holland. 2002. Exotic fish species and their impacts on small coastal lagoons in southern California. (Abst.). Bull. S. Calif. Acad. Sci., 101(2), Supplement, p. 32.

Swift, C. C. 2002. Interaction between native fish, habitat, and exotic species in the middle Santa Ana River, southern California. (Abst.), Bull. S. Calif. Acad. Sci., 101(2), Supplement, p. 32.

SEAN J. BARRY

zoology/herpetology
ecology/mammalogy
molecular biology
regulatory compliance

EDUCATION

- University of California, Davis, B.S., Zoology
- University of California, Davis, M.S., Zoology
- Thesis: The Distribution, Habitat, and Evolution of the San Francisco Garter Snake, *Thamnophis sirtalis tetrataenia*

REGISTRATION

- California Department of Fish and Game scientific collecting permit #000131, mammals, fish, reptiles, amphibians, invertebrates, California species of special concern, expires May 2005
- Section 10A US Fish and Wildlife Service Endangered Species Recovery Permit, #TE 827500, for distribution-wide studies of the California red-legged frog (*Rana aurora draytonii*), the giant garter snake (*Thamnophis gigas*), and the San Francisco garter snake (*Thamnophis sirtalis tetrataenia*). Expires 12/31/2006.

PROFESSIONAL HISTORY

- ENTRIX Inc, Project Scientist/Herpetologist, 2003 to date
- Independent Consultant/Herpetologist, 1974 to 2003
- Staff Research Associate, University of California, Davis, 1983 to 2003
- Curator of the Vertebrate Museum, Department of Zoology, University of California, Davis, 1972 to 1975
- Biologist, California Department of Fish and Game, Endangered Species Program Reptiles and Amphibians office, 1972 to 1975

PROFESSIONAL EXPERIENCE

Mr. Barry has more than 28 years of experience working with agencies and consulting firms on investigations of State and federally listed (threatened/endangered) California reptiles and amphibians, for refuge development, urban impact assessments, and evaluation of conservation status of individual populations. He is a nationally recognized authority on the endangered San Francisco garter snake (*Thamnophis sirtalis tetrataenia*) and has also recently completed studies of special-status (e.g., Sierra Nevada) California red-legged frog populations (*Rana aurora draytonii*). His scientific background also includes projects related to molecular systematics (microsatellite and single nucleotide polymorphism analysis) and molecular biology of regulated genes (targeted gene studies, gene expression analysis, etc). Responsibilities have included project and safety management, budget planning, all aspects of field and laboratory technical work, grant and proposal preparation, and teaching/mentorship.

AFFILIATIONS

- Ecological Society of America
- American Society of Mammalogists

- American Society of Ichthyologists and Herpetologists
- Society for the Study of Amphibians and Reptiles
- Herpetologists' League
- Society for Systematic Biology
- Society for the Preservation of Natural History Collections

REVIEWS

- San Francisco Garter Snake Recovery Plan, US Fish and Wildlife Service, 1983-85.
- California Red-Legged Frog Recovery Plan, US Fish and Wildlife Service, 2000-2002.
- Check-list of Amphibians, Reptiles, Birds, and Mammals of California, California Department of Fish and Game
- "Measuring and Monitoring Biological Diversity" book series (mammals, amphibians, reptiles), Smithsonian Institution Press. February 2000-present
- Journal of Herpetology, 1998-present

SELECTED PUBLICATIONS

Barry, S.J. 1976. Investigations on the occurrence of the San Francisco garter snake at the Stanford Linear Accelerator Center. SLAC Tech. Note 76-2, 6 p.

Barry, S. J. 1978. The status of the San Francisco garter snake. California Department of Fish and Game Endangered Species Special Publ. 78-2. 20 p.

Barry, S. 1993. The San Francisco garter snake: protection is the key to recovery. Tideline 13:1-3,15.

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Barry, S. J. and M. Mangel, 1994. Review of Harrison, L. Kinetic Theory of Living Pattern. Mathematical Biosciences. 124:237-241.

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Barry, S. J., M. R. Jennings, and Hobart M. Smith. 1996. Current subspecific names for western *Thamnophis sirtalis*. Herpetological Review, 27:172-173.

Barry, S. J. 1997. Museum and Anatomical Preparation of Reptile Specimens. in Ackerman, L., ed. The Biology, Husbandry, and Medicine of Captive Reptiles. TFH, Neptune, NJ, 3 vols.

Barry, S. J. and M. R. Jennings. 1998. *Eutaenia sirtalis tetrataenia* Cope in Yarrow, 1875 and *Coluber infernalis* Blainville, 1835 (Currently *Thamnophis s. tetrataenia* and *T. s. infernalis*): proposed conservation of usage of the subspecific names by the designation of a neotype for *T. s. infernalis*. Bulletin of Zoological Nomenclature 55:224-228.

Barry, S. J. 1999. A study of the California red-legged frog (*Rana aurora draytonii*) of Butte County, California. Par Environmental Services, Sacramento, CA, Tech. Rept. No.3, 16p.

In Press

Barry, S. J., in prep. Preparing Reptiles as Scientific Specimens. *in* Foster, M., and McDiarmid, R., eds Measuring and Monitoring Biological Diversity: Standard Methods for Reptiles. Autumn 2003, Smithsonian Institution Press.

Submitted

Barry, S. J. and M. R. Jennings. Nomenclature of western *Thamnophis sirtalis* resolved by designation of a neotype for *T. s. infernalis*. Herpetological Review

APPENDIX 4.7

Traffic and Access

RIVER VILLAGE

Traffic Impact Analysis

September 2004

AUSTIN-FOUST ASSOCIATES, INC.

DRAFT

RIVER VILLAGE

TRAFFIC IMPACT ANALYSIS

Prepared by:

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Santa Ana, California 92705-7827
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September 28, 2004

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1.0 INTRODUCTION

This report presents the results of a traffic study carried out to evaluate the River Village project. The project encompasses a portion of the Newhall Ranch Specific Plan area and is located within the County of Los Angeles. This report provides the traffic and circulation material for the environmental document prepared for this project.

1.1 PROJECT DESCRIPTION

A detailed description of this project and the resulting California Environmental Quality Act (CEQA) requirements addressed here can be found in the environmental document. The proposed project represents the first development area for the Newhall Ranch. It consists of 1,444 residential dwelling units (a mix of single family detached, condominiums and apartments), commercial retail, office, an elementary school and a public park. The proposed uses are consistent with the approved Newhall Ranch Specific Plan.

The site is bounded by State Route (SR) 126 to the north, the Santa Clara River to the south, and the Castaic Creek to the east. Initially, site access will be obtained from SR-126 via the existing intersections of Wolcott Way and Chiquito Canyon Road. Future phases of Newhall Ranch will provide access to and from the south via the future Long Canyon Road. Figure 1-1 illustrates the location of the site in relation to the surrounding roadway system.

1.2 STUDY AREA

The study area includes the roadways and intersections within the project site as well as locations near to the project site where project generated traffic could cause a significant impact. Generally, the study area incorporates those locations where project traffic represents one-percent or more of total traffic. Figure 1-2 illustrates the general area to be evaluated.

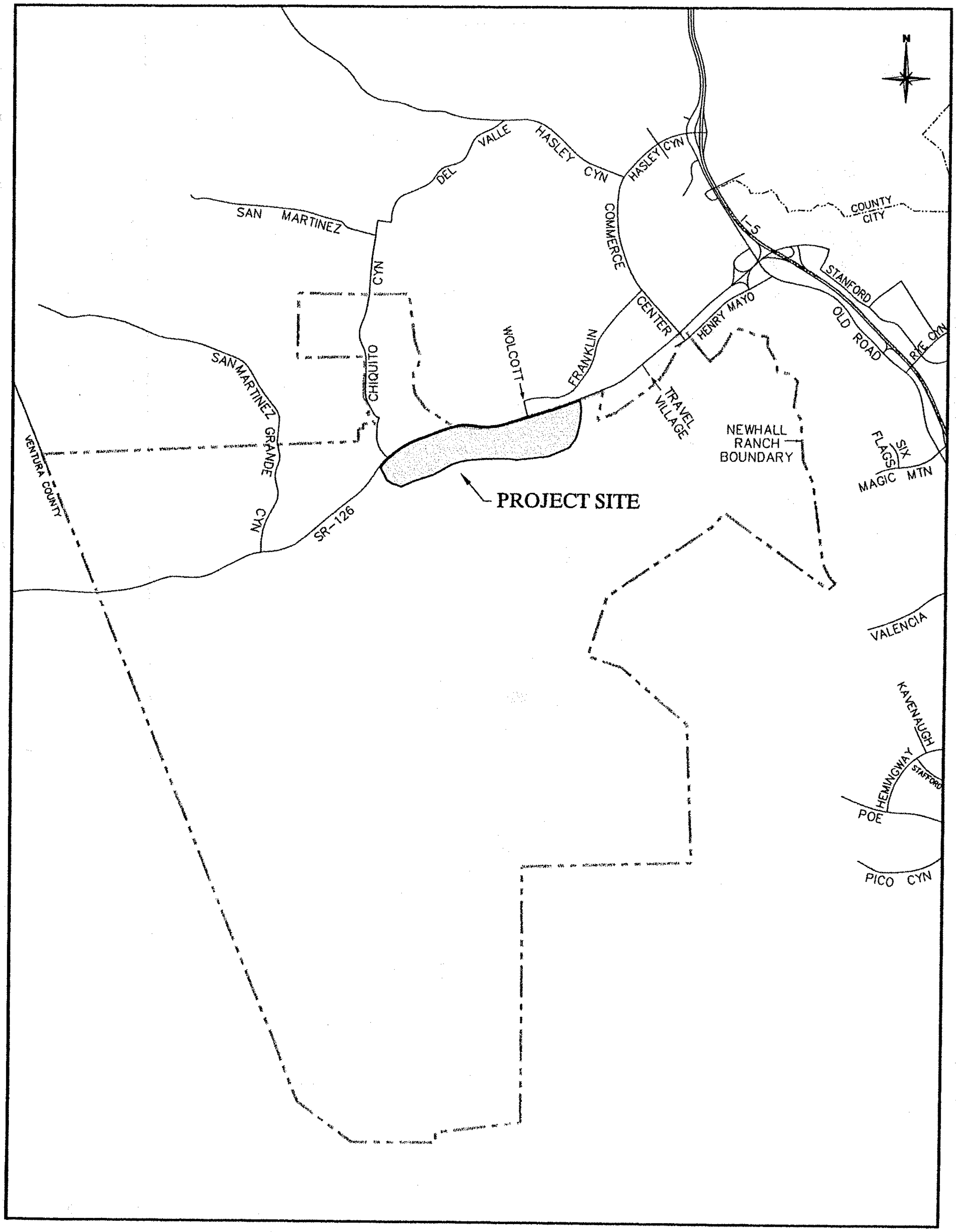
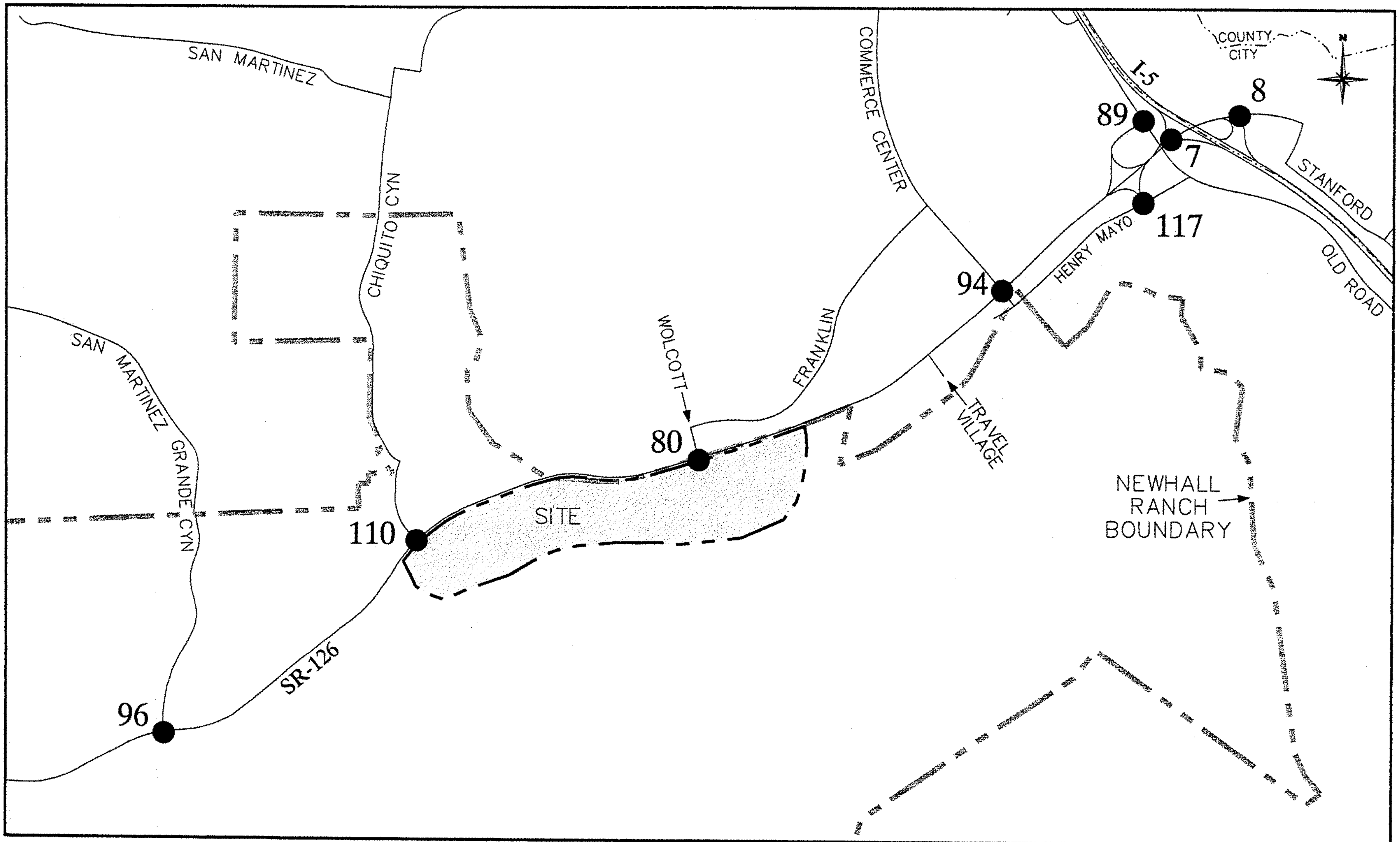


Figure 1-1

PROJECT SITE LOCATION



Legend

● Study Intersection

Figure 1-2

INTERSECTION STUDY LOCATIONS

1.3 METHODOLOGY

The traffic analysis evaluates the proposed project utilizing the established guidelines of the County Department of Public Works (see Reference 4 in Section 1.7). The project is evaluated for the year in which occupancy will occur and is analyzed both singularly and together with the cumulative traffic from other known developments. For evaluation purposes, the project is separated into three phases and the planned year of occupancy for Phase 1 is 2007. The planned year of occupancy for Phase 2 is 2008 and 2010 is the estimated occupancy date for project buildout (Phase 3).

Horizon year baseline conditions are derived using actual traffic volumes (measured in 2003) plus a growth factor of two percent per year to account for background growth in ambient traffic. Additional future traffic volumes from other development planned to occur in the area (related projects) is also added for an analysis of cumulative conditions.

Future conditions inclusive of related projects are derived using the Santa Clarita Valley Consolidated Traffic Model (SCVCTM). The SCVCTM was developed jointly by the County of Los Angeles Department of Public Works and the City of Santa Clarita and is the primary tool used for forecasting traffic volumes for the Santa Clarita Valley. The SCVCTM has the ability to provide traffic volume forecasts for two future scenarios; Interim Year, which generally corresponds to a horizon of approximately ten years in the future, and Long-Range Cumulative, which represents buildout conditions. As part of the development of this traffic impact analysis, an update to the traffic model was prepared which involved a review of current related project information from both the City and County. The SCVCTM land use database was then updated where necessary in order to include the most current information (see Section 4.1.3 for related project information).

The impact analysis is based on specific performance criteria which are outlined in the following section. Where appropriate, mitigation measures are identified for those scenarios in which one or more locations do not meet the performance criteria.

1.4 PERFORMANCE CRITERIA

For CEQA purposes, defined performance criteria are utilized to determine if a proposed project causes a significant impact. In most traffic studies, performance criteria are based on two primary measures. The first is "capacity", which establishes the vehicle carrying ability of a roadway and the second is "volume." The volume measure is either a traffic count (in the case of existing volumes) or a forecast for a future point in time. The ratio between the volume and the capacity gives a volume/capacity (V/C) ratio and based on that V/C ratio, a corresponding level of service (LOS) is defined. Traffic LOS is designated A through F with LOS A representing free flow conditions and LOS F representing severe traffic congestion. Traffic flow quality for each LOS is described in Table 1-1.

Table 1-2 summarizes the V/C ranges that correspond to LOS "A" through "F" for arterial roads, intersections and freeway segments. The V/C ranges listed for arterial roads and intersections within the study area are those used by the County of Los Angeles. The V/C ranges listed for freeway segments are based on the V/C and LOS relationships specified in the *2000 Highway Capacity Manual* (see Reference 1 in Section 1.6 and referred to as "*HCM 2000*" in this report) for basic freeway sections with free-flow speeds of 105 kilometers per hour (65 miles per hour).

Both the V/C ratio and the LOS are used in determining impact significance. Certain LOS values are deemed unacceptable by the County and increases in the V/C ratio which cause or contribute to the LOS being unacceptable are defined as a significant impact (see following sections for details).

In establishing V/C based performance criteria, there are certain items that need to be addressed to obtain suitable V/C estimates and relate them to LOS. For instance, while average daily traffic (ADT) is a useful measure to show general levels of traffic on a facility and to provide data for other related aspects such as noise and air quality, highway congestion is largely a peak hour or peak period occurrence and ADT does not reflect peak period conditions very effectively. Because of this, ADT is not used here as the basis for capacity evaluation but instead this evaluation focuses on those parts of the day when such congestion can occur, specifically the AM and PM peak hours.

The following section outlines the impact criteria for the facilities within the project study area.

1.4.1 Arterial Roads

For the arterial system, the peak hour is the accepted time period used for impact evaluation and a number of techniques are available to establish suitable V/C ratios and define the corresponding LOS. These definitions and procedures are established by individual local jurisdictions or by regional programs such as the Congestion Management Program (CMP).

Table 1-1

LEVEL OF SERVICE DESCRIPTIONS

LOS	Arterial Roads	Freeway Segments
A	Describes primarily free-flow operations at average travel speeds, usually about 90 percent of the free-flow speed for the given street class. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Control delay at signalized intersections is minimal.	Describes free-flow operations. Free-flow speeds prevail. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream. The effects of incidents or point breakdowns are easily absorbed at this level.
B	Describes reasonably unimpeded operations at average travel speeds, usually about 70 percent of the free-flow speed for the street class. The ability to maneuver within the traffic stream is only slightly restricted, and control delays at signalized intersections are not significant.	Represents reasonably free flow, and free-flow speeds are maintained. The ability to maneuver within the traffic stream is only slightly restricted, and the general level of physical and psychological comfort provided to drivers is still high. The effects of minor incidents and point breakdowns are still easily absorbed.
C	Describes stable operations; however, ability to maneuver and change lanes in midblock locations may be more restricted than at LOS B, and longer queues, adverse signal coordination, or both may contribute to lower average travel speeds of about 50 percent of the free-flow speed for the street class.	Provides for flow with speeds at or near the free-flow speed of the freeway. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver. Minor incidents may still be absorbed, but the local deterioration in service will be substantial. Queues may be expected to form behind any significant blockage.
D	Borders on a range in which small increases in flow may cause substantial increases in delay and decreases in travel speed. LOS D may be due to adverse signal progression, inappropriate signal timing, high volumes, or a combination of these factors. Average travel speeds are about 40 percent of free-flow speed.	The level at which speeds begin to decline slightly with increasing flows and density begins to increase somewhat more quickly. Freedom to maneuver within the traffic stream is more noticeably limited, and the driver experiences reduced physical and psychological comfort levels. Even minor incidents can be expected to create queuing, because the traffic stream has little space to absorb disruptions.

Table 1-1 (cont)
LEVEL OF SERVICE DESCRIPTIONS

LOS	Arterial Roads	Freeway Segments
E	Characterized by significant delays and average travel speeds of 33 percent or less of the free-flow speed. Such operations are caused by a combination of adverse signal progression, high signal density, high volumes, extensive delays at critical intersections, and inappropriate signal timing.	At its highest density value, LOS E describes operation at capacity. Operations at this level are volatile, because there are virtually no usable gaps in the traffic stream. Vehicles are closely spaced, leaving little room to maneuver within the traffic stream at speeds that still exceed 49 miles per hour. Any disruption of the traffic stream, such as vehicles entering from a ramp or a vehicle changing lanes, can establish a disruption wave that propagates throughout the upstream traffic flow. At capacity, the traffic stream has no ability to dissipate even the most minor disruption, and any incident can be expected to produce a serious breakdown with extensive queuing. Maneuverability within the traffic stream is extremely limited, and the level of physical and psychological comfort afforded the driver is poor.
F	Characterized by urban street flow at extremely low speeds, typically one-third to one-fourth of the free-flow speed. Intersection congestion is likely at critical signalized locations, with high delays, high volumes, and extensive queuing.	Describes breakdowns in vehicular flow. Such conditions generally exist within queues forming behind breakdown points. LOS F operations within a queue are the result of a breakdown or bottleneck at a downstream point. LOS F is also used to describe conditions at the point of the breakdown or bottleneck and the queue discharge flow that occurs at speeds lower than the lowest speed for LOS E, as well as the operations within the queue that forms upstream. Whenever LOS F conditions exist, they have the potential to extend upstream for significant distances.

Source: *Highway Capacity Manual 2000 (HCM 2000)*, Transportation Research Board, National Research Council.

Table 1-2

VOLUME/CAPACITY RATIO LEVEL OF SERVICE RANGES

VOLUME/CAPACITY (V/C) RATIO RANGE	LEVEL OF SERVICE (LOS)
ARTERIAL ROADS	
0.00 – 0.60	A
0.61 – 0.70	B
0.71 – 0.80	C
0.81 – 0.90	D
0.91 – 1.00	E
Above 1.00	F
FREEWAY SEGMENTS (FFS = 65 MPH)	
0.00 – 0.30	A
0.31 – 0.50	B
0.51 – 0.71	C
0.72 – 0.89	D
0.90 – 1.00	E
Above 1.00	F

The analysis of the arterial road system is based on intersection capacity since this is the defining capacity limitation on an arterial highway system. There may be exceptions where certain facilities have long distances between signalized intersections, but within the traffic analysis study area, peak hour intersection performance is the most representative measure for evaluating the arterial road system. Levels of service for arterial roadway intersections are determined based on operating conditions during the AM and PM peak hours. For intersections, the intersection capacity utilization (ICU) methodology is applied, providing a planning level basis for determining V/C and LOS. This methodology sums the V/C ratios for the critical movements of an intersection and is the preferred procedure for intersection analysis by the County of Los Angeles. The ICU methodology is generally compatible with the intersection capacity analysis methodology outlined in the *HCM 2000*. The ICU ranges that correspond to LOS A through F are the same as the V/C ranges shown previously in Table 1-2 for arterial roads and intersections.

The ICU calculation methodology and associated impact criteria proposed for the study area arterial system are summarized in Table 1-3. The County strives to maintain LOS C (ICU not to exceed 0.80) at existing intersections and utilizes LOS D (ICU not to exceed 0.90) as the accepted standard and target level of service for future intersections.

Table 1-3

ARTERIAL INTERSECTION PERFORMANCE CRITERIA

V/C Calculation Methodology

Level of service to be based on peak hour intersection capacity utilization (ICU) values calculated using the following assumptions:

Saturation Flow Rate: 1,600 vehicles/hour/lane (exception follows)
2,880 vehicles/hour for dual left-turn lanes

Clearance Interval: .10

Performance Standards

LOS D (peak hour ICU less than or equal to 0.90) for new (future) intersections and intersection in the Commerce Center area
LOS C or existing LOS, whichever is greater, for existing intersections

Impact Thresholds

An intersection is considered to be adversely impacted if:

The intersection is forecast to operate deficiently (i.e., worse than the performance standard).

Compared to the ICU in the no-project alternative[1], the ICU in the with-project alternative increases the ICU by the following:

PRE-PROJECT ICU	PROJECT INCREMENT
.71 - .80 (LOS C)	greater than or equal to .04
.81 - .90 (LOS D)	greater than or equal to .02
> .90 (LOS E/F)	greater than or equal to .01

[1]A comparison of with-project conditions to existing conditions is also provided as a special analysis (see Section 4.8).

Abbreviations: V/C – Volume/Capacity Ratio

Since the project is located along a state highway, the methodology for determining level of service that is preferred by the State of California Department of Transportation (Caltrans) is also used as part of this study. The preferred Caltrans approach (see Reference 9 in Section 1.6) utilizes the Highway Capacity Manual (HCM) signalized intersection methodology. This procedure determines level of service from the average control delay per vehicle during the peak hours and in this way is different from the County's ICU methodology which determines level of service from percent of used capacity.

1.5 DEFINITIONS

Certain terms used throughout this report are defined below to clarify their intended meaning:

ADT	Average Daily Traffic. Generally used to measure the total two-directional traffic volumes passing a given point on a roadway.
CMP	Congestion Management Program. A state mandated program administered by the Los Angeles County Metropolitan Transportation Authority (MTA) that provides a mechanism for coordinating land use and development decisions.
ICU	Intersection Capacity Utilization. A measure of the volume to capacity ratio for an intersection. Typically used to determine the peak hour level of service for a given set of intersection volumes.
LOS	Level of Service. A scale used to evaluate circulation system performance based on intersection ICU values or volume/capacity ratios of arterial and freeway segments.
Peak Hour	This refers to the hour during the AM peak period (typically 7 AM - 9 AM) or the PM peak period (typically 3 PM - 6 PM) in which the greatest number of vehicle trips are generated by a given land use or are traveling on a given roadway.
Tripend	A trip generation measure which represents the total trips entering and leaving a location.
V/C	Volume to Capacity Ratio. This is typically used to describe the percentage of capacity utilized by existing or projected traffic on a segment of an arterial or intersection.
VPH	Vehicles Per Hour. Used for roadway volumes (counts or forecasts) and trip generation estimates. Measures the number of vehicles in a one hour period, typically the AM or PM peak hour.
VPHPL	Vehicles Per Hour Per Lane. Similar to VPH but with the roadway volume averaged to the total number of roadway lanes.

1.6 REFERENCES

1. "Highway Capacity Manual 2000," Transportation Research Board, National Research Council.

2. "Trip Generation 6th Edition," Institute of Transportation Engineers, 1997.

3. "Traffic Manual," State of California Department of Transportation, July 1996.

4. "Traffic Impact Analysis Report Guidelines," County of Los Angeles Department of Public Works, January 1, 1997.

5. "Route Concept Report, Route 5" Caltrans District 7 Transportation Planning, 2000.

6. "2002 Congestion Management Program for Los Angeles County," Los Angeles County Metropolitan Transportation Authority, June 2002.

7. "Santa Clarita Valley Consolidated Traffic Model 1995 Update and Validation," City of Santa Clarita and County of Los Angeles Department of Public Works, June 1995.

8. "Santa Clarita Valley Consolidated Traffic Model Version 3.3," County of Los Angeles, City of Santa Clarita and Austin-Foust Associates, Inc., April 2003.

9. "Guide for the Preparation of Traffic Impact Studies," State of California Department of Transportation, December 2002.

10. "Draft – SR-126 Feasibility Study Traffic Analysis," Austin-Foust Associates, Inc., July 2004.

2.0 TRANSPORTATION SETTING

This chapter describes the transportation setting for the traffic analysis. Existing conditions are first discussed, followed by a description of the future circulation system as outlined in the County's Master Plan of Highways (MPH).

2.1 EXISTING CONDITIONS

The following section describes existing traffic conditions in the study area. It includes a description of the study area roadway system, existing traffic volumes and corresponding levels of service as defined by the performance criteria outlined in the previous chapter.

2.1.1 Existing Roadway System

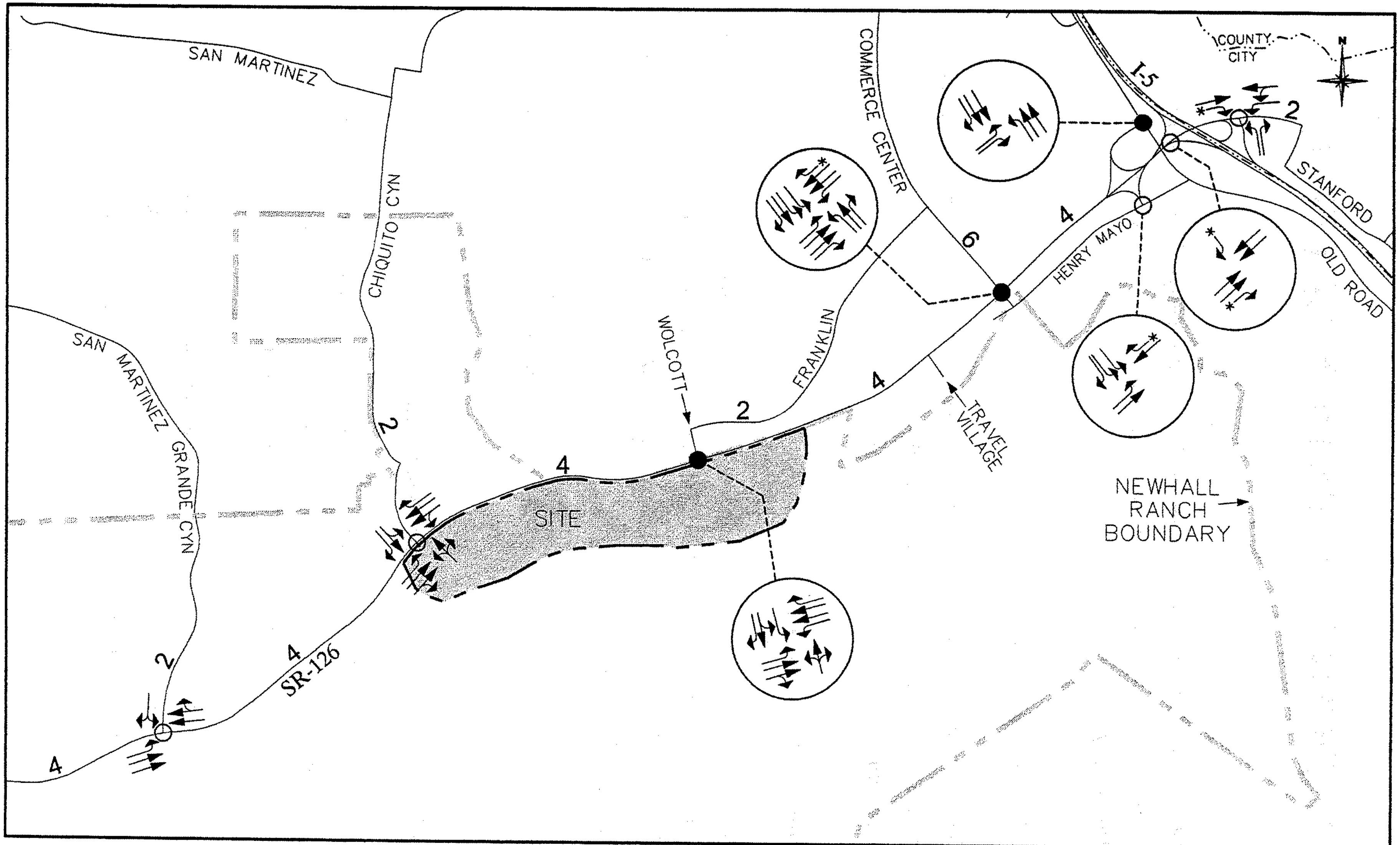
The existing roadway network in the study area is illustrated in Figure 2-1 in the form of mid-block lanes as well as intersection lane configurations and control types for the intersections being studied. SR-126 parallels the northerly border of the project site and features at-grade intersections with Chiquito Canyon Road and Wolcott Way.

The I-5 Freeway provides regional access for future residents of the site and is located approximately two miles east of the project site.

2.1.2 Existing Traffic Volumes and Levels of Service

Illustrations of peak hour turning movement volumes for each study area intersection can be found in Figures 2-2 and 2-3 for the AM and PM peak hours, respectively. The peak hour counts were collected during June 2003. ADT volumes for select roadway segments are illustrated in Figure 2-4.

Twenty-four hour roadway counts were also collected on Chiquito Canyon Road and Wolcott Way, just north of their intersections with SR-126. Since SR-126 is a state highway, Caltrans was contacted to obtain current traffic volume data for this facility. Traffic volumes on I-5 were obtained from



Legend

- ○ Unsignalized/Stop Sign
- ● Traffic Signal
- X Midblock Lane
- * Free Right-Turn Lane

Figure 2-1

EXISTING ROADWAY NETWORK

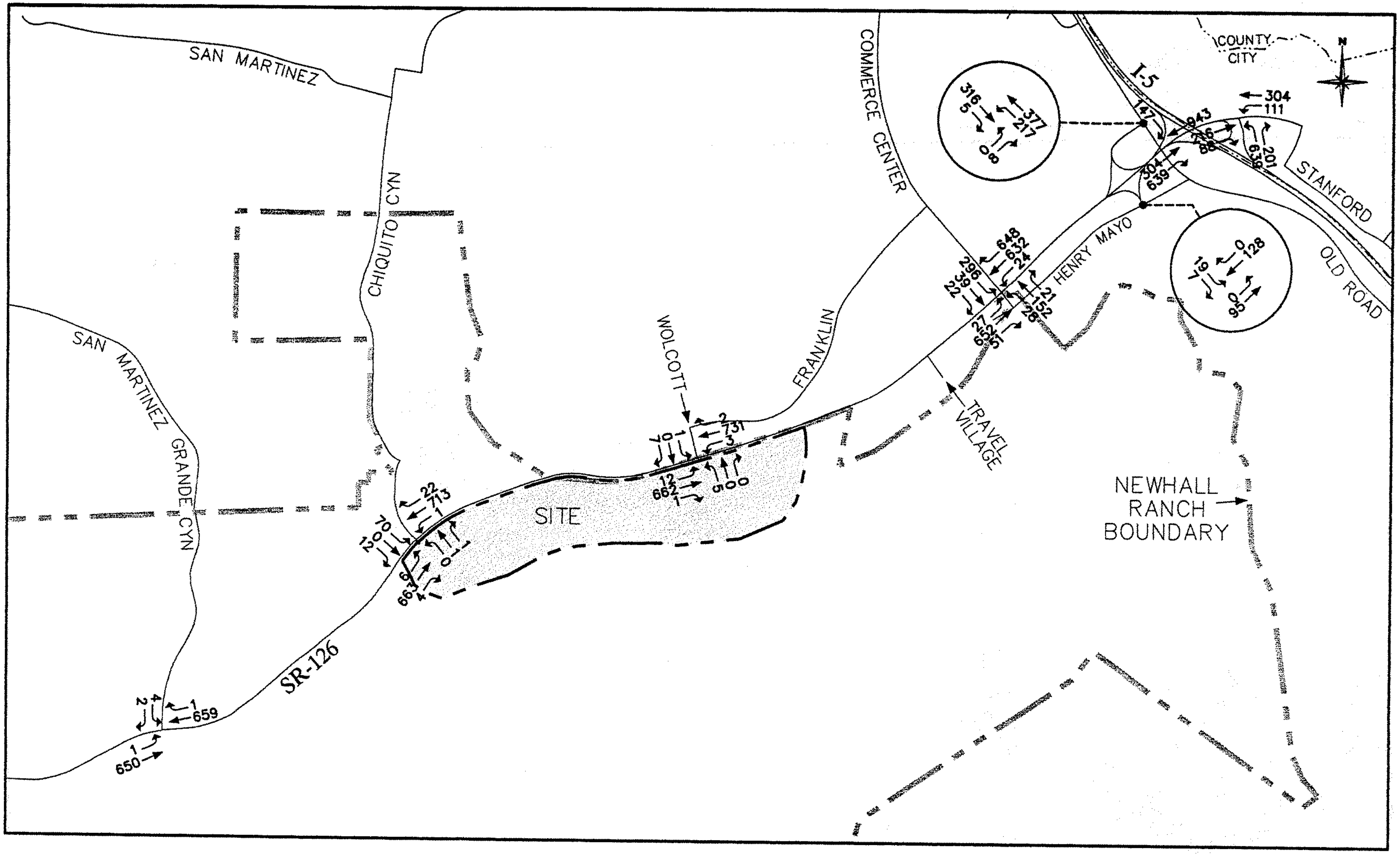


Figure 2-2

AM PEAK HOUR TURNING MOVEMENT VOLUMES
-EXISTING CONDITIONS

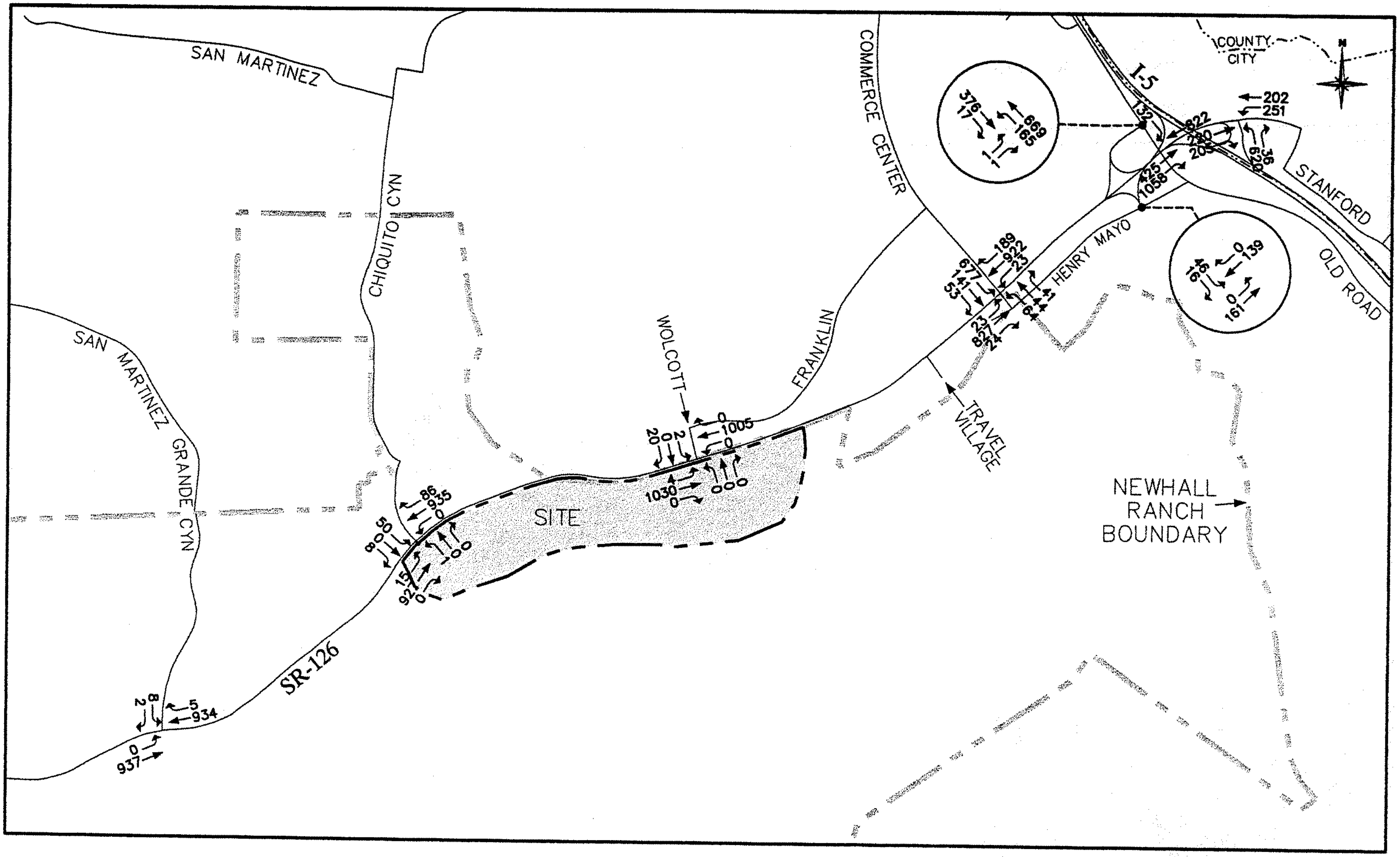


Figure 2-3

PM PEAK HOUR TURNING MOVEMENT VOLUMES -EXISTING CONDITIONS

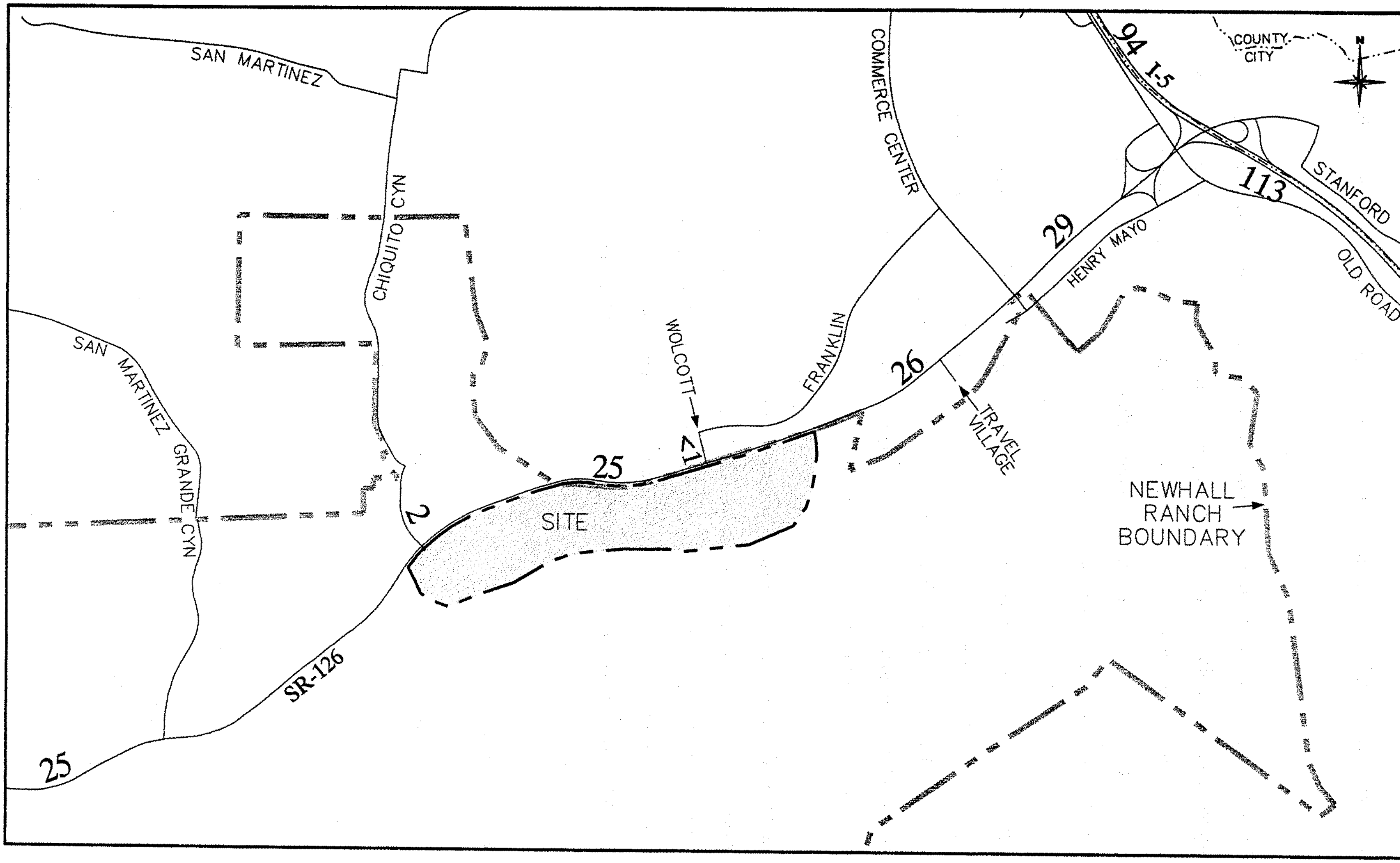


Figure 2-4

AVERAGE DAILY TRAFFIC VOLUMES (000s)
-EXISTING CONDITIONS

the Caltrans database which is published annually. Table 2-1 summarizes the traffic count data for these roadways.

For adjacent intersections in which the raw count data does not balance from one location to the next, manual adjustments are applied. Typically the higher of the two volumes are used as the basis for balancing in order to provide a worse-case estimate of existing conditions. There are a number of reasons why raw count data does not balance, including counts taken on different days or intersections that experience different peak hours due to varying side street volumes.

As discussed in the section on performance criteria in Chapter 1.0, LOS is a concept developed to quantify the degree of comfort afforded to drivers as they travel on a given roadway. The degree of comfort includes such elements as travel time, number of stops, total amount of stopped delay, etc. As defined in the HCM 2000, six grades are used to denote the various LOS. The six are denoted A through F and a discussion on these was also given in Chapter 1.0.

The results of the ICU LOS analyses for project area intersections are shown in Table 2-2 (detailed ICU worksheets are provided in Appendix A). The table shows how each intersection in the study area currently meets the County's performance standard. As noted in the table, some intersections in the study area are not currently controlled by a traffic signal. For those locations, the ICU provides an indication of the level of service based on traffic signal control and provides a benchmark for comparison of future conditions with the proposed project.

2.1.3 Public Transportation

Santa Clarita Transit currently operates one fixed-route transit line (Route 2) which provides service near to the project site. The route passes the project site via SR-126 and provides service to the greater Val Verde and Commerce Center areas. Additional routes, accessible from Route 2, provide service to the greater Santa Clarita Valley area.

2.2 LONG-RANGE TRANSPORTATION SYSTEM

The Los Angeles County Highway Plan includes future roadway improvement projects near the project site. Specifically, the plan designates SR-126 as a six lane Major Arterial highway from the

Table 2-1

ROADWAY VOLUME SUMMARY – EXISTING (2003) CONDITIONS

Location	Dir.	Lanes	AM Peak Hr.	PM Peak Hr.	ADT
SR-126 at Ventura/LA County Line	EB	1	920	1,030	13,060
	WB	1	810	960	11,870
Chiquito Canyon Road	NB	1	30	100	880
	SB	1	110	70	1,060
Wolcott Way	NB	1	20	10	130
	SB	1	10	20	150
I-5 north of SR-126	NB	4	2,100	2,500	49,000*
	SB	4	1,900	2,100	45,000*
I-5 south of SR-126	NB	4	2,800	3,100	60,000*
	SB	4	2,400	2,500	53,000*

*AADT by direction

Table 2-2

ICU SUMMARY – EXISTING (2003) CONDITIONS

	AM PEAK HOUR		PM PEAK HOUR		COUNT
INTERSECTION	ICU	LOS	ICU	LOS	DATE
7. I-5 SB Ramps & SR-126*	.39	A	.36	A	June 2003
8. I-5 NB Ramps & SR-126**	.71	C	.77	C	June 2003
80. Wolcott & SR-126	.34	A	.42	A	June 2003
89. Old Road & SR-126 WB Ramps	.34	A	.32	A	June 2003
94. Commerce Center & SR-126	.52	A	.68	B	June 2003
96. San Martinez Canyon & SR-126**	.31	A	.40	A	June 2003
110. Chiquito Canyon & SR-126**	.36	A	.43	A	June 2003
117. SR-126 EB Ramp & Henry Mayo**	.19	A	.22	A	June 2003

*Uncontrolled (no conflicting movements)
**Stop Sign Control

Level of service ranges:	
.00 - .60	A
.61 - .70	B
.71 - .80	C
.81 - .90	D
.91 – 1.00	E
Above 1.00	F

Ventura County line to San Martinez Grande Canyon Road and as a six lane expressway from San Martinez Grande Canyon Road to I-5.

The project site is also within the adopted Newhall Ranch Specific Plan area. The Specific Plan designates Long Canyon Road as a six lane Major Arterial Highway for the segment that passes through the project site. Chiquito Canyon Road is designated as a Limited Secondary Arterial Highway from SR-126 through the Specific Plan area.

The spine road that passes through the project site in an east/west direction is designated in the Specific Plan as a four lane Secondary Arterial Highway. Amending the Specific Plan to reclassify this roadway as a two lane Local Collector is discussed in Chapter 5.0.

In addition to the future arterial roadway improvements, Caltrans designates I-5 (eight lanes existing) in its Route Concept Report (see Reference 6 in Section 1.7) as being ultimately a 10 lane facility.

2.3 INTERIM YEAR TRANSPORTATION SYSTEM

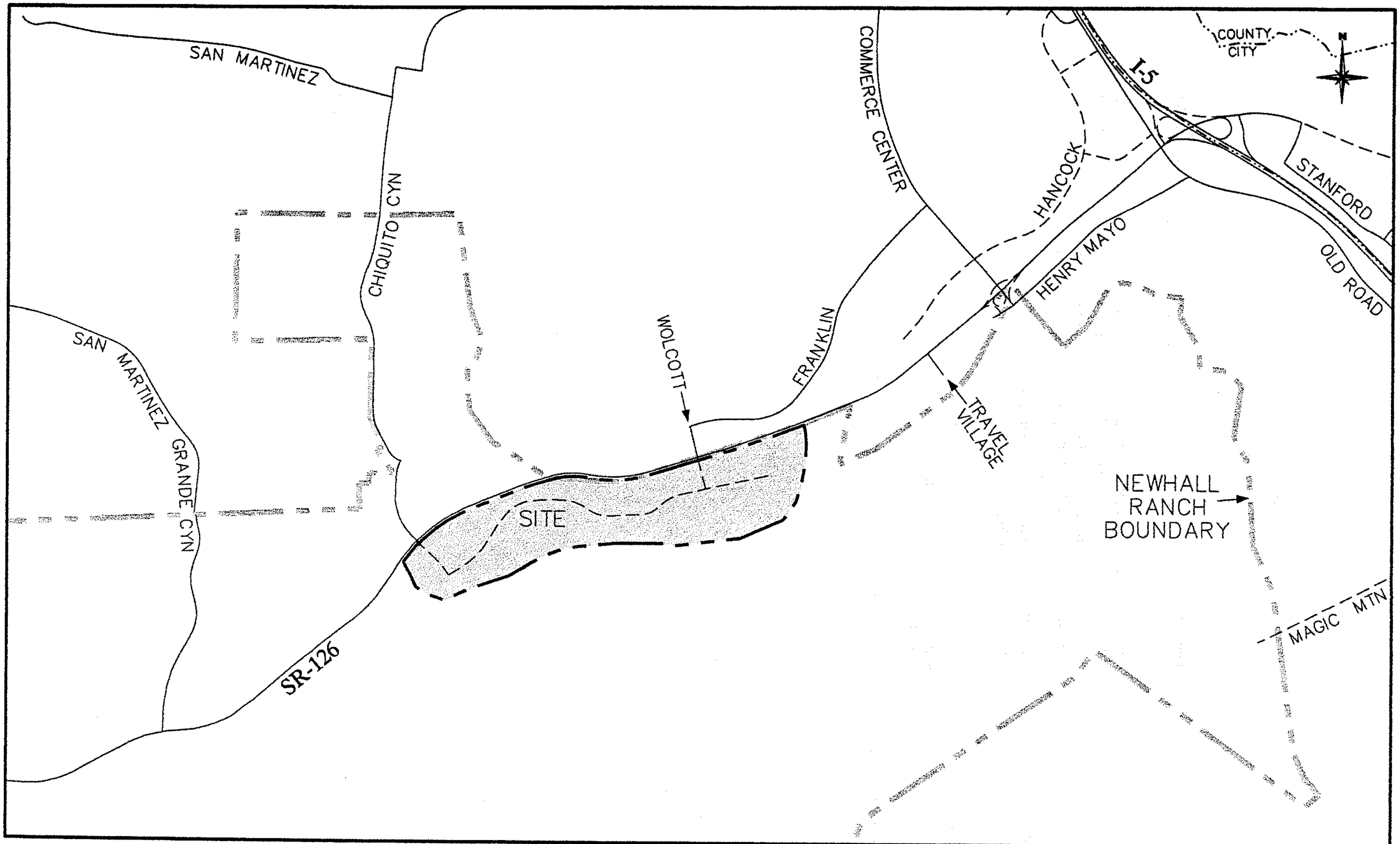
The project site is located in an area that will be experiencing growth in the upcoming years. To accommodate this growth, a number of new roadway facilities are planned to be constructed within the next five to ten years. Table 2-3 lists the known projects within the project study area. The committed roadway improvements are assumed as part of background conditions for future forecasts of traffic conditions, both with and without project generated traffic. The non-committed improvements have not been assumed to be completed before project occupancy but are used as part of the evaluation of cumulative conditions for Phase 2 and Phase 3 of the project and the project will be responsible for a payment of its share of these non-committed improvements.

Figure 2-5 illustrates the Interim Year roadway network. Notable changes from existing conditions include the reconfigured I-5/SR-126 interchange, the removal of the direct ramps to the SR-126 from both The Old Road and Henry Mayo Drive, the grade separated interchange for Commerce Center Drive at SR-126, and the extension of Newhall Ranch Road east to Copper Hill Drive.

Table 2-3

PLANNED ROADWAY IMPROVEMENT PROJECTS

Location	Improvement	Estimated Completion
COMMITTED		
I-5/SR-126 Interchange	Interchange improvements that include adding access to eastbound SR-126 from southbound I-5, access to southbound I-5 from westbound SR-126, direct access to northbound I-5 from westbound SR-126 and widening bridge to 8 lanes.	2005 (began March 2003)
Newhall Ranch Road	Construct segment between Vanderbilt Way and Copper Hill Drive/Rye Canyon Road	2006
NON-COMMITTED		
SR-126/Commerce Center Drive Interchange	Grade separated interchange between SR-126 and Commerce Center Drive	2008
SR-126 between Commerce Center Drive and I-5	Widen to 8 lanes	2008



Legend

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Figure 2-5

INTERIM YEAR TRANSPORTATION SYSTEM

3.0 PROJECT DESCRIPTION

This chapter describes the project in terms of its transportation characteristics. Trip generation is summarized and the distribution of project trips on the study area roadway network is presented.

3.1 PROJECT OVERVIEW

The site plan for the proposed River Village project can be seen in Figure 3-1. The project site is located in an unincorporated portion of the Santa Clarita Valley and lies entirely within the approved Newhall Ranch Specific Plan area.

The proposed project represents the first development area for the Newhall Ranch. It consists of both residential and commercial uses. The residential component of the project consists of 591single family detached dwelling units, 398 condominium units and 455 apartment units, for a total of 1,444 residential dwelling units. The non-residential component consists of just over one million square feet of commercial retail and office, one elementary school and a public park. The proposed uses are consistent with the approved Newhall Ranch Specific Plan.

This analysis addresses the project in three phases. The first phase consists of 500 residential units. The second phase consists of the entire residential component, the elementary school, 100,000 square feet of commercial uses and a park. The third phase consists of the balance of the commercial uses (940,000 square feet). A phased approach is necessary since the project will first develop with residential units and, after a sufficient amount of occupancies, enough commercial square footage to support the 1,444 housing units. The balance of commercial square footage will be developed later, such as with future phases of Newhall Ranch to support those residential uses.

The site is bounded by SR-126 to the north, the Santa Clara River to the south, and the Castaic Creek to the east. Initially, site access will be obtained from SR-126 via the existing intersections of Wolcott Way and Chiquito Canyon Road. Future phases of Newhall Ranch will provide access to and from the south via the future Long Canyon Road.

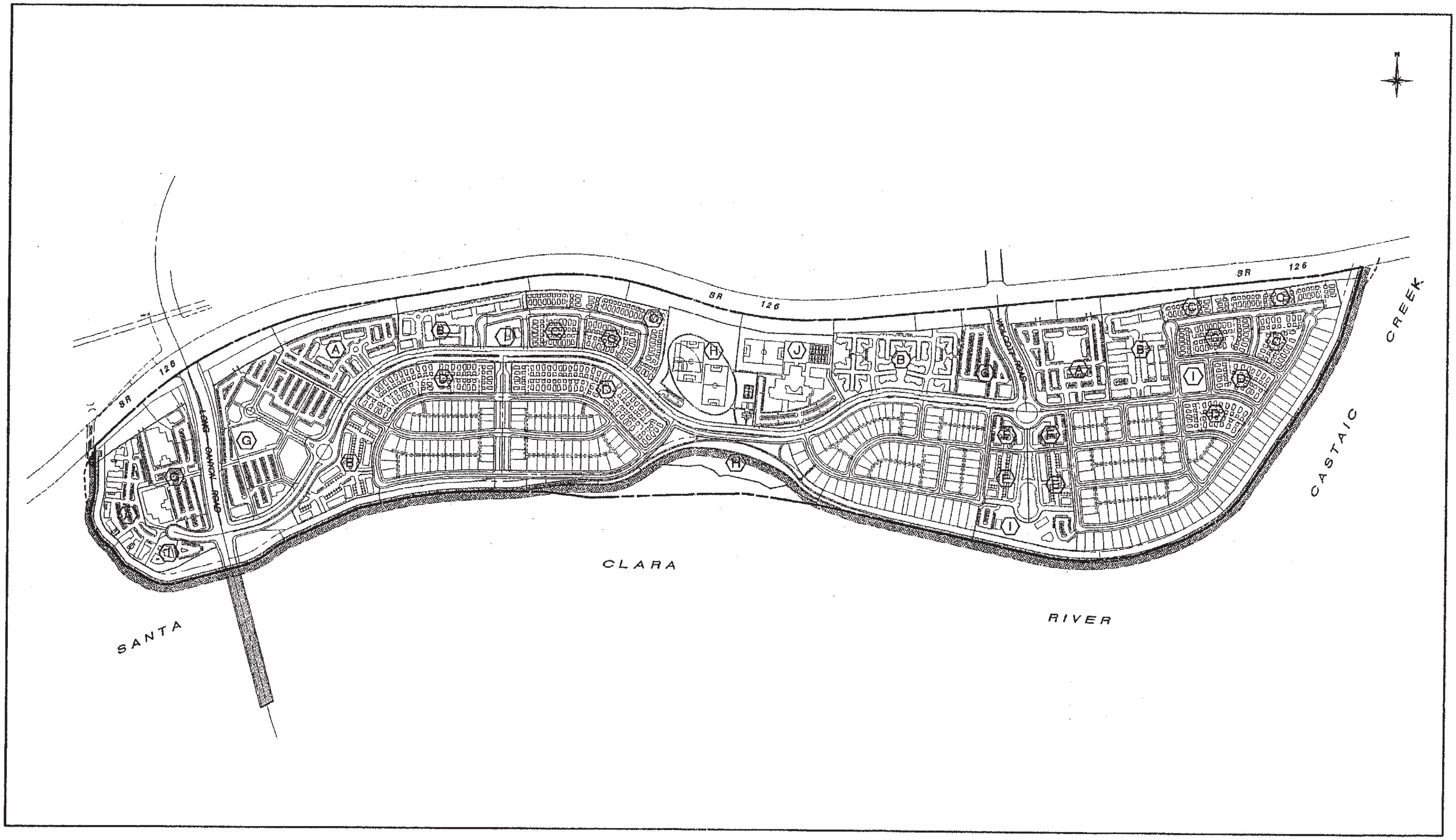

Figure 3-1

PROJECT SITE PLAN

3.2 PROJECT TRIP GENERATION

Trip generation estimates for the proposed project are shown in Table 3-1. Phase 1 is estimated to generate approximately 4,950 ADT with approximately 375 tripends occurring in the AM peak hour and approximately 505 tripends occurring in the PM peak hour. Phase 2 (including the 500 units of Phase 1) is estimated to generate approximately 20,700 total ADT with approximately 1,400 tripends occurring in the AM peak hour and approximately 1,900 tripends occurring in the PM peak hour.

The third phase of the project (project buildout) is estimated to generate an additional 21,200 ADT for a total of 41,900 ADT. The total project will generate approximately 2,900 tripends in the AM peak hour and 4,100 tripends in the PM peak hour.

3.3 PROJECT TRIP DISTRIBUTION

The geographic distribution of project generated trips was derived by utilizing the SCVCTM. The SCVCTM first calculates production and attraction tripends for the proposed land uses and by using the built in distribution functions of the model, an estimation of travel patterns for the project site is developed. The quantity of trips internal to the project site are also determined through this process. A special select zone trip assignment calculates the volume of project traffic on roadway segments throughout the study area. Since the volume of traffic generated by Phase 1 is significantly less than the subsequent phases, the distribution for Phase 1 was derived manually using the select zone model runs as a reference. Phase 1 is also unique in that it is the only phase that is made up entirely of residential uses and, therefore, will have a negligible amount of on-site trip capture.

Figure 3-2 illustrates the distribution pattern assumed for Phase 1 and Figures 3-3 and 3-4 illustrate the project generated trips (Phase 1 only) for the critical AM and PM peak hours, respectively.

Figure 3-5 illustrates the general distribution pattern for the Phase 2 project traffic on a daily basis and Figures 3-6 and 3-7 illustrate the project generated trips for the AM and PM peak hours, respectively. Figure 3-8 illustrates the general distribution pattern for buildout of the project site and Figures 3-9 and 3-10 illustrate the AM and PM peak hour volumes for that scenario. As noted above, the SCVCTM was utilized to calculate the distribution patterns and since the SCVCTM models the AM and PM peak hours uniquely, there are variations in distribution percentages between the two time periods, as depicted in the

Table 3-1

TRIP GENERATION AND TRIP RATE SUMMARY

LAND USE	UNITS		AM PEAK HOUR IN	AM PEAK HOUR OUT	AM PEAK HOUR TOTAL	PM PEAK HOUR IN	PM PEAK HOUR OUT	PM PEAK HOUR TOTAL	ADT
TRIP GENERATION									
Residential – Phase 1									
Single Family Detached	500	DU	95	280	375	325	180	505	4,950
Residential – Phase 2 (Remainder)									
Single Family Detached	91	DU	17	51	68	59	33	92	900
Condominiums	398	DU	24	191	215	187	103	291	3,184
Apartment	455	DU	36	196	232	187	96	282	3,140
Residential – Phases 1+2 Total	**1,444**	**DU**	**173**	**718**	**890**	**758**	**412**	**1,170**	**12,174**
Non-Commercial – Phase 2									
Elementary School	750	STU	195	150	345	60	68	128	1,088
Developed Park	20.9	AC	0	0	0	1	1	1	54
Non-Commercial Total			**195**	**150**	**345**	**61**	**68**	**129**	**1,142**
Commercial - Phase 2									
Commercial Center (<10 ac)	49.0	TSF	53	34	87	163	176	339	4,168
Commercial Shops	9.5	TSF	7	5	11	17	17	34	352
Commercial Office	9.5	TSF	15	2	17	2	12	14	110
Commercial Center (<10 ac)	32.0	TSF	35	22	57	106	115	221	2,722
Commercial - Total	**100.0**	TSF	**110**	**62**	**172**	**288**	**321**	**609**	**7,352**
PHASE 1 + PHASE 2 TOTAL			**478**	**930**	**1,407**	**1,107**	**801**	**1,908**	**20,668**
Commercial – Buildout (Phase 2 + Phase 3)									
Commercial Center (<10 ac)	49.0	TSF	53	34	87	163	176	339	4,168
Commercial Center (<10 ac)	27.1	TSF	30	19	49	90	98	188	2,305
Commercial Shops	9.5	TSF	7	5	11	17	17	34	352
Commercial Office	9.5	TSF	15	2	17	2	12	14	110
Commercial Center (10-30 ac)	252.0	TSF	184	118	302	600	650	1,250	13,623
Commercial Office	692.9	TSF	1,074	131	1,205	146	894	1,040	8,010
Commercial - Buildout Total	**1,040**	TSF	**1,363**	**309**	**979**	**1,018**	**1,847**	**2,865**	**28,568**
BUILDOUT (PHASES 1 + 2 + 3) TOTAL			**1,731**	**1,177**	**2,908**	**1,837**	**2,327**	**4,164**	**41,884**
TRIP RATES									
Single Family (6-10 DU/Ac) - SCVCTM #3		DU	.19	.56	.75	.65	.36	1.01	9.90
Condominium/Townhouse - SCVCTM #4		DU	.06	.48	.54	.47	.26	.73	8.00
Apartment - SCVCTM #5		DU	.08	.43	.51	.41	.21	.62	6.90
Commercial Center (10-30 ac) -SCVCTM #11		TSF	.73	.47	1.20	2.38	2.58	4.96	54.06
Commercial Center (<10 ac) - SCVCTM #12		TSF	1.09	.69	1.78	3.32	3.60	6.92	85.06
Commercial Shops - SCVCTM #13		TSF	.72	.48	1.20	1.80	1.80	3.60	37.06
Commercial Office - SCVCTM #40		TSF	1.55	.19	1.74	.21	1.29	1.50	11.56
Elementary/Middle School - SCVCTM #20		STU	.26	.20	.46	.08	.09	.17	1.45
Developed Park - SCVCTM #51		AC	.00	.00	.00	.03	.04	.07	2.60

Notes: Peak hour rates are from the County's traffic model (SCVCTM) and are consistent with the TIA preparation guidelines and ITE trip generation manual.

DU = Dwelling Unit
STU = Student
TSF = Thousand Square Feet
AC = Acre

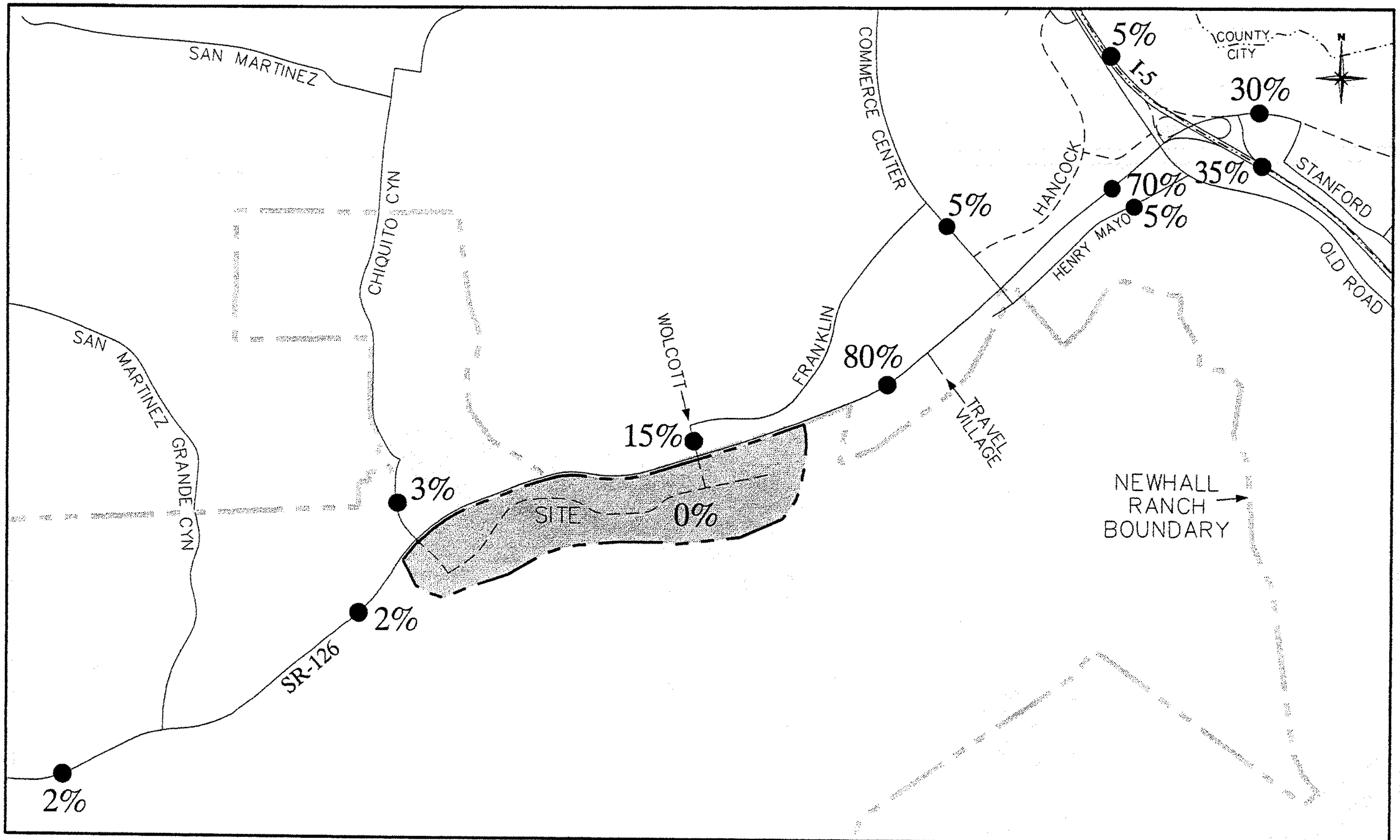

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Figure 3-2

PROJECT DISTRIBUTION - PHASE 1

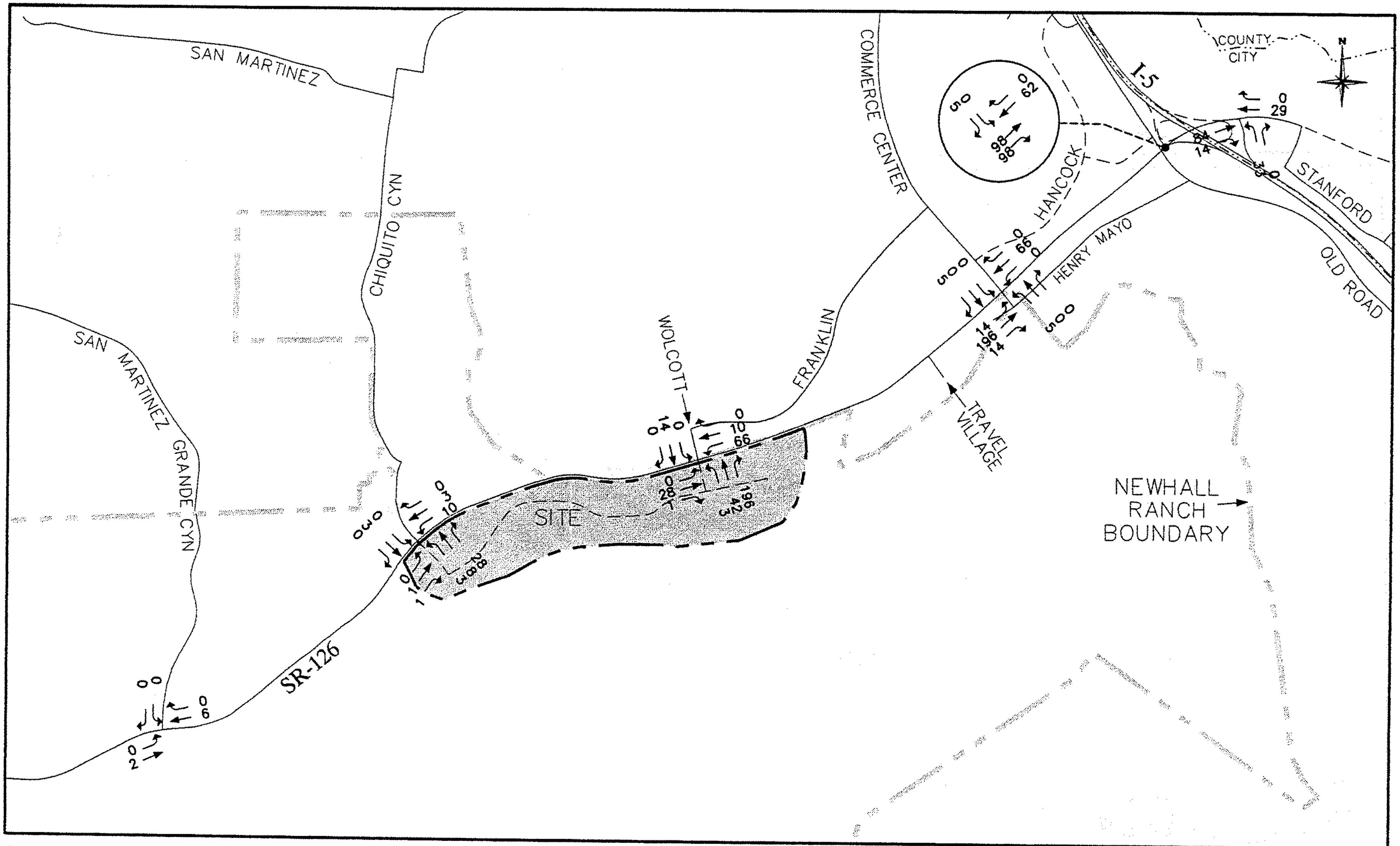

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Figure 3-3

AM PEAK HOUR TURNING MOVEMENT VOLUMES -PROJECT PHASE 1 TRIPS ONLY

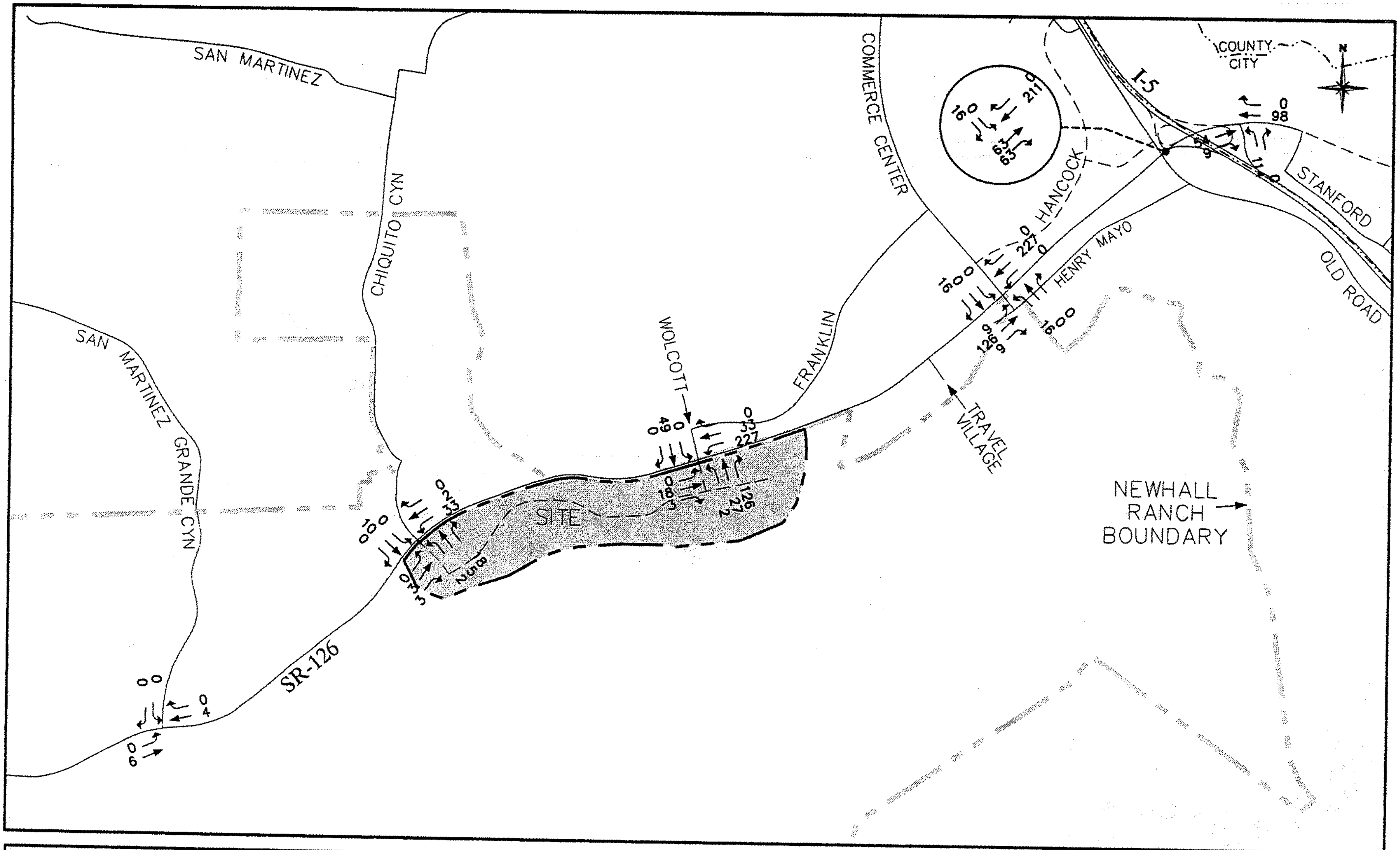

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Figure 3-4

PM PEAK HOUR TURNING MOVEMENT VOLUMES -PROJECT PHASE 1 TRIPS ONLY

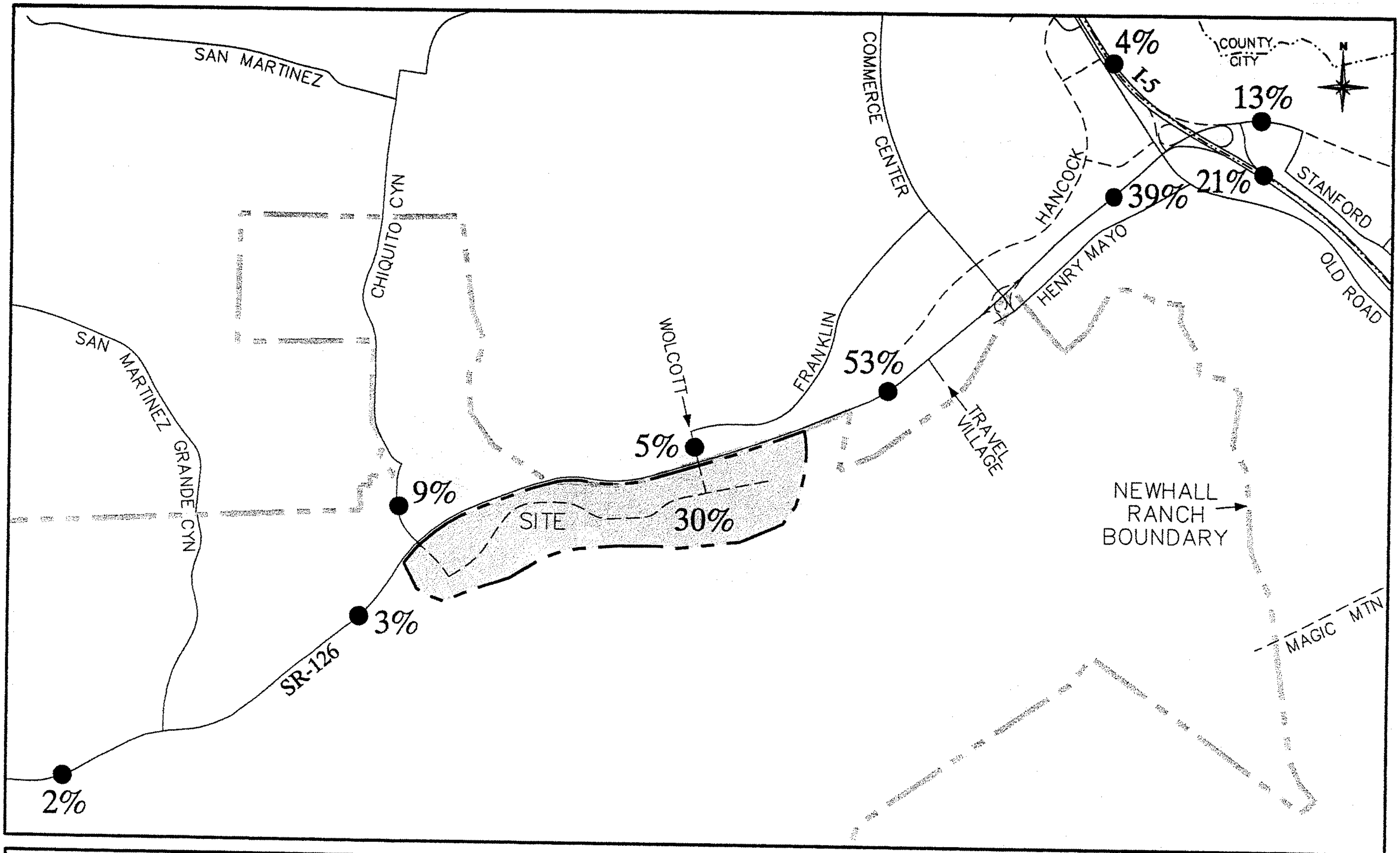

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Figure 3-5

PROJECT DISTRIBUTION - PHASES 1 + 2

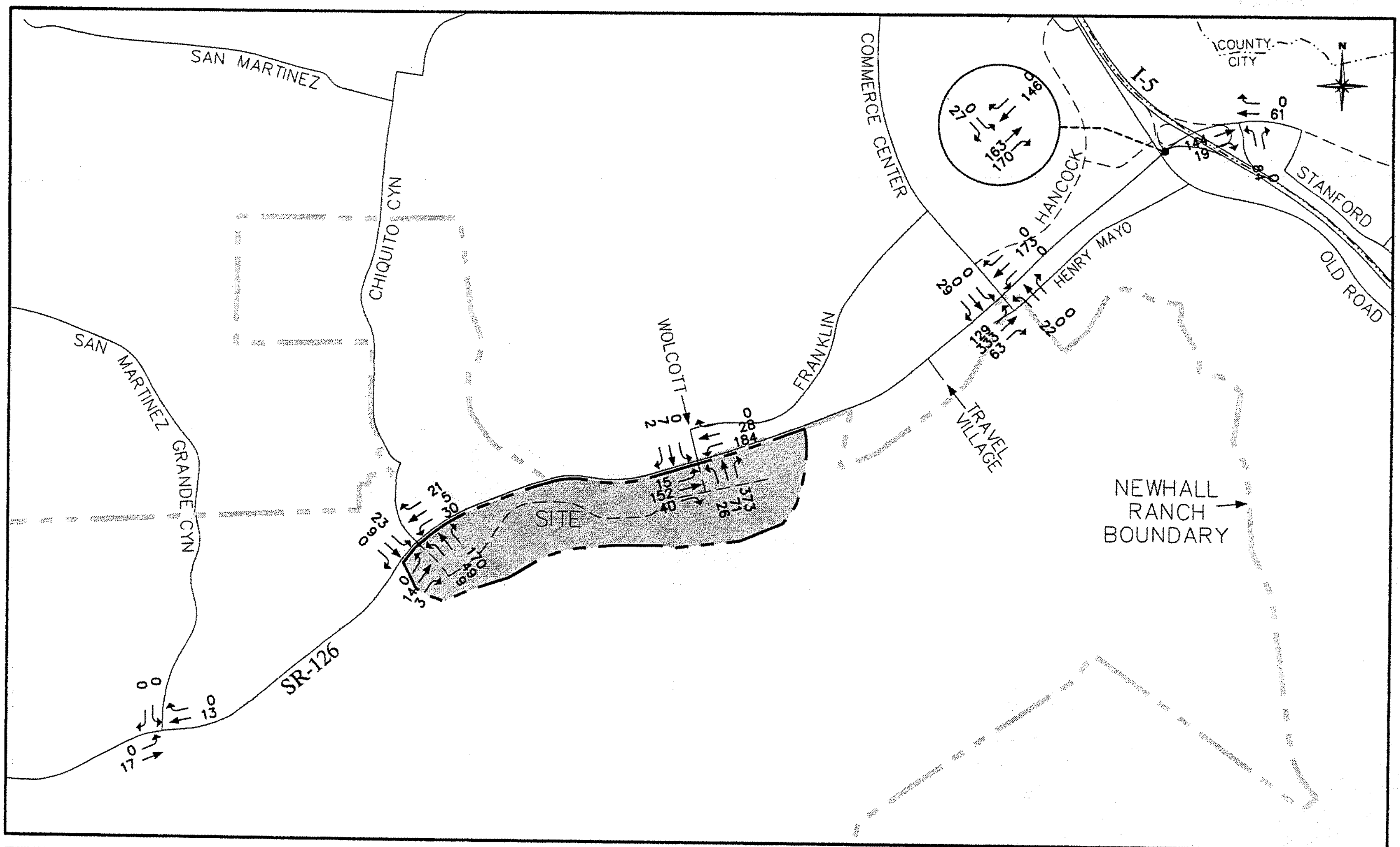

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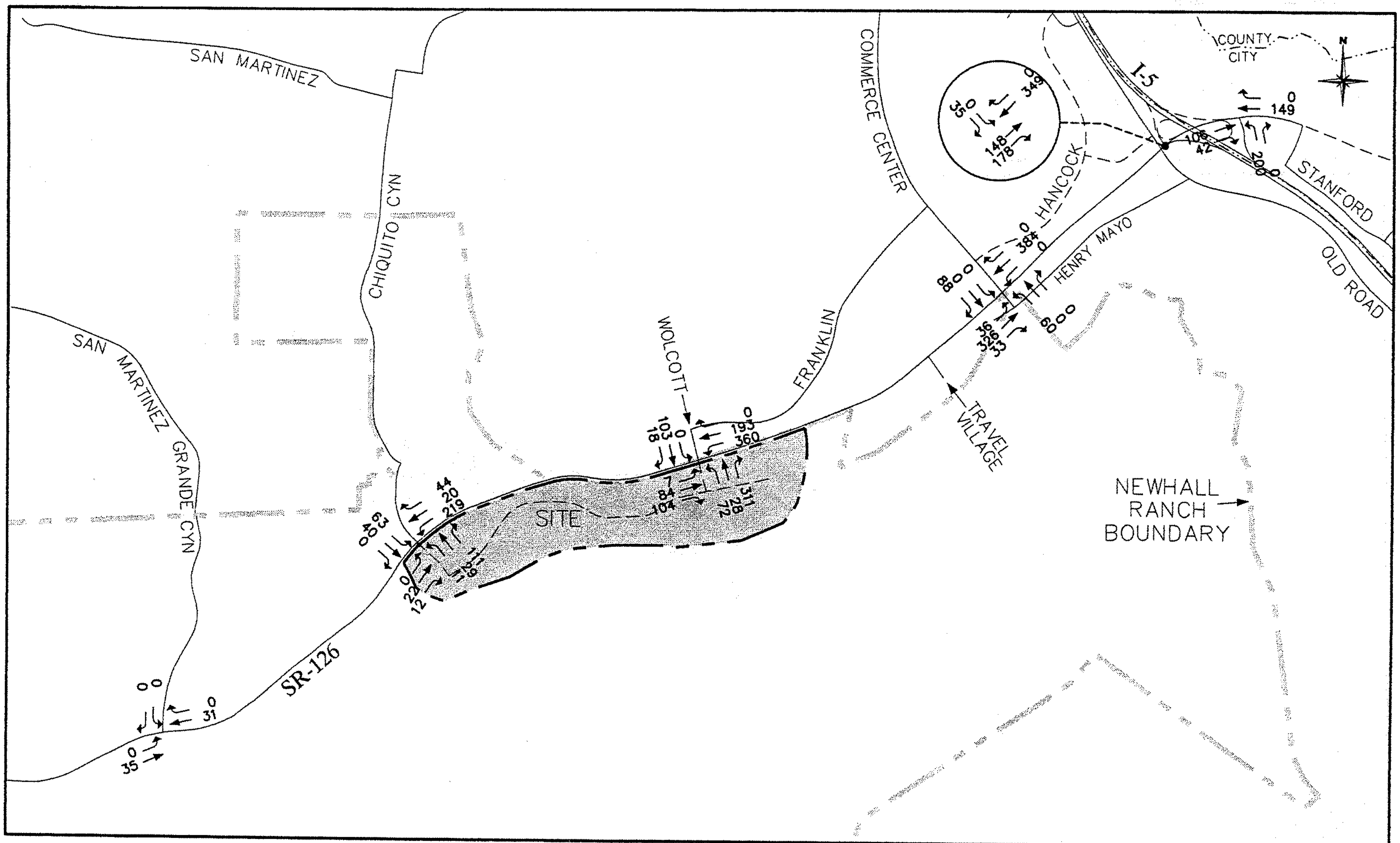
Figure 3-6

AM PEAK HOUR TURNING MOVEMENT VOLUMES -PROJECT PHASE 2 TRIPS ONLY



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Future Roadway

Figure 3-7

PM PEAK HOUR TURNING MOVEMENT VOLUMES
-PROJECT PHASES 1 + 2 TRIPS ONLY

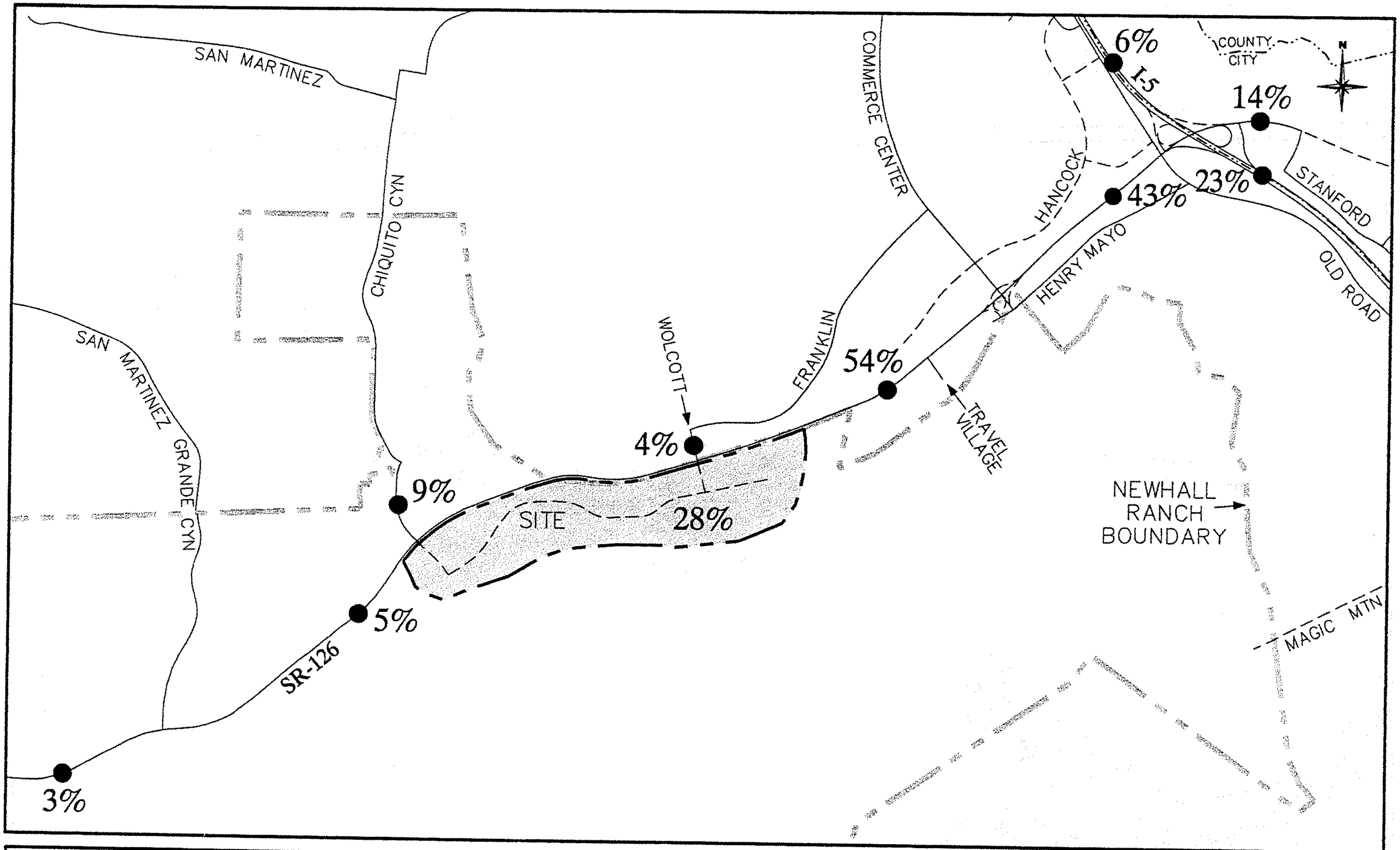

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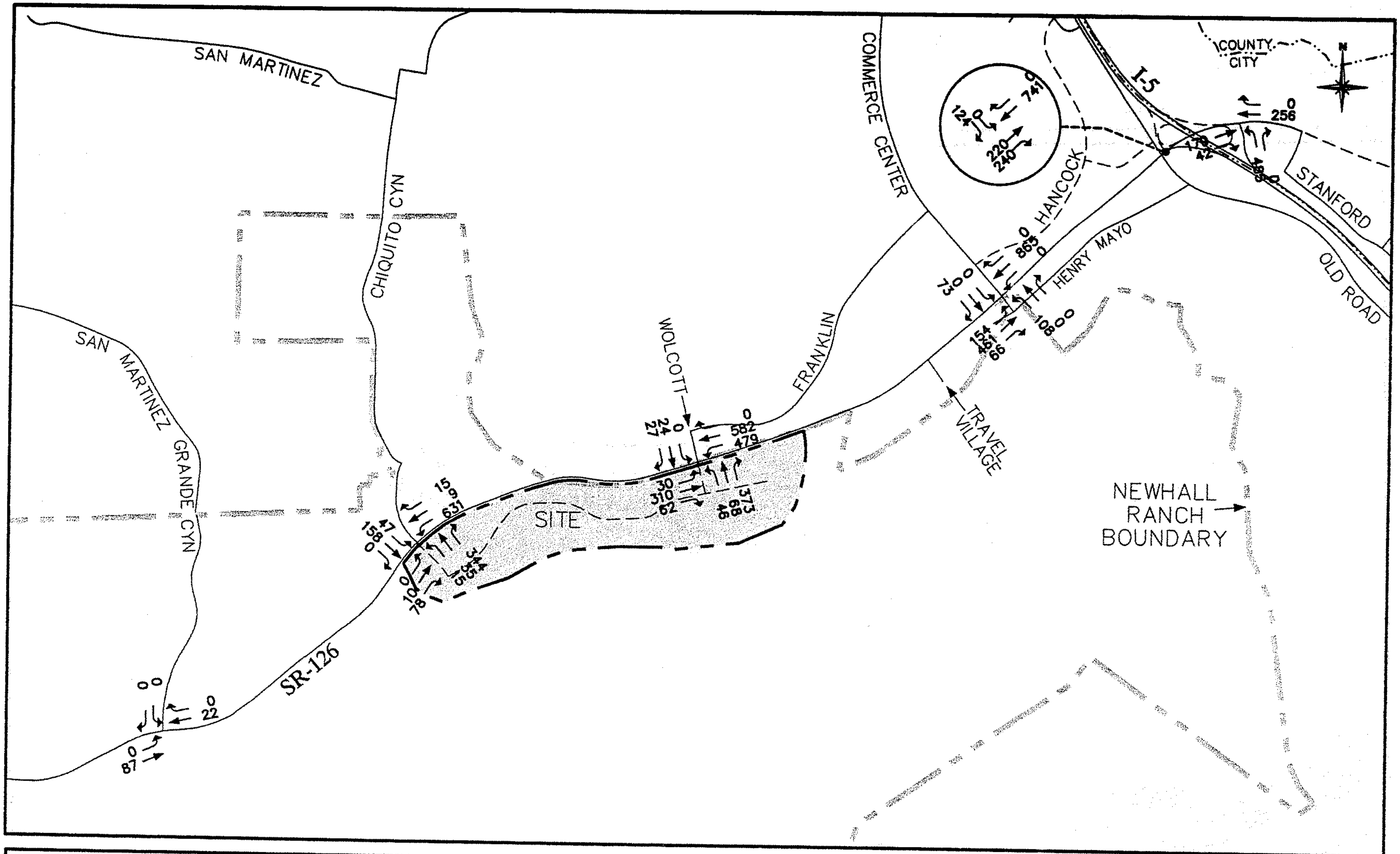
Figure 3-8

PROJECT DISTRIBUTION - PROJECT BUILDOUT
(PHASES 1 + 2 + 3)



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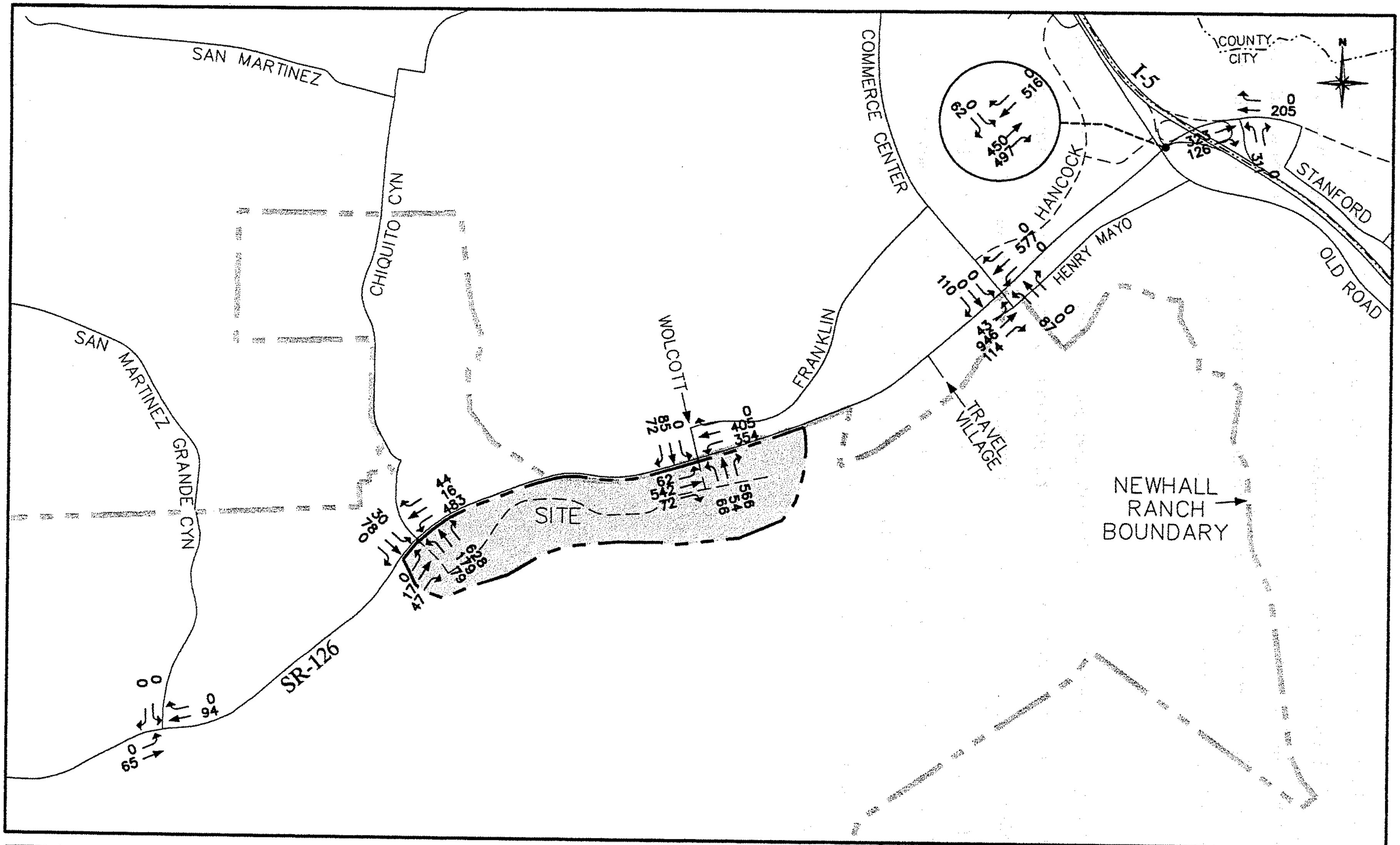
- - - - Future Roadway

Figure 3-9

AM PEAK HOUR TURNING MOVEMENT VOLUMES -PROJECT BUILDOUT (PHASES 1+2+3) TRIPS ONLY



Legend

Future Roadway

Figure 3-10

PM PEAK HOUR TURNING MOVEMENT VOLUMES -PROJECT BUILDOUT (PHASES 1+2+3) TRIPS ONLY figures referenced above. The change from Phase 2 to Phase 3 also results in a significant change to the mix of land uses, which has an affect on the distribution. In Phase 2, approximately 60 percent of the total tripends are generated from residential uses whereas in Phase 3, the amount of residential tripends reduces to approximately 30 percent of the total. Detailed information regarding the on-site interaction between the mixed land use types and the corresponding on-site and off-site volumes can be found in Appendix F.

When taking into account trips to and from the elementary school as well as the commercial uses on site, approximately 30 percent of the Phase 2 tripends generated by the project are for trips internal to the site. The remaining 70 percent of the Phase 2 tripends are for trips off-site. When tripends are converted to trips, approximately 18 percent of the total Phase 2 trips are internal to the site and 82 percent leave the site, as shown by Table 3-2. With the additional non-residential uses that result in buildout of the project site, the amount of trips internal to the site changes to a net total of 28 percent of the buildout tripends, and 16 percent of the trips. At buildout, 84 percent of the trips leave the site, as shown by Table 3-3.

Table 3-2

PROJECT TRIPEND AND TRIP SUMMARY – PHASES 1 + 2

	TRIPENDS	% OF TOTAL TRIPENDS	TRIPS	% OF TOTAL TRIPS
Internal	6,200	30%	3,100	18%
External	14,500	70%	14,500	82%
Total	20,700	100%	17,600	100%

Project trips are defined as follows:

Internal = Both the origin and destination tripends on-site.
External = One tripend (either origin or destination) on-site, the other tripend (either destination or origin) off-site.

Table 3-3

PROJECT TRIPEND AND TRIP SUMMARY – PROJECT BUILDOUT

	TRIPENDS	% OF TOTAL TRIPENDS	TRIPS	% OF TOTAL TRIPS
Internal	11,600	28%	5,800	16%
External	30.300	72%	30,300	84%
Total	41,900	100%	36,100	100%

Project trips are defined as follows:

Internal = Both the origin and destination tripends on-site.
External = One tripend (either origin or destination) on-site, the other tripend (either destination or origin) off-site.

4.0 IMPACT ANALYSIS

This chapter addresses the traffic impacts of the proposed project. As discussed in Section 1.3, 2007 is the time frame used in this analysis for Phase 1 of the project. Phase 2 represents a horizon year of 2008 and full buildout of the project site is estimated for 2010. Traffic conditions with and without the proposed project are described in the following sections. Project impacts are identified using the criteria outlined in Chapter 1.0.

4.1 YEAR 2007/PHASE 1

The 2007 traffic conditions are based on existing (2003) roadway conditions plus 4 years of ambient growth (two percent growth per year). This forms the basis for identifying the potential 2007 traffic impacts of the proposed Phase 1 of the project. The following sections discuss the 2007 no-project and with-project conditions.

4.1.1 Year 2007 Traffic Conditions Without Project

The 2007 no-project (existing conditions plus ambient growth) peak hour turning movement volumes for the intersections in the study area and ADT volumes for select roadway segments are provided in Appendix G. Table 4-1 provides the corresponding ICU values and also listed for comparison purposes are the ICUs for existing conditions. As noted in Section 2.3, highway improvements currently underway at the I-5/SR-126 interchange are assumed to be complete by 2007 and are accounted for in the ICU calculations (see Table 2-3 for description of committed improvements). For this analysis, it is assumed that a minimum of two through lanes in each direction are provided on SR-126 through the interchange and that three lanes are provided on each of the northbound and southbound off-ramps.

The ICU tabulations indicate that based on ambient growth only, by 2007 one intersection (Commerce Center Drive/SR-126) will change from LOS B to LOS C. Each of the remaining intersections are forecast to remain at their current LOS or improve due to improvement projects currently underway (see Section 2.3).

Table 4-1

ICU AND LOS SUMMARY – EXISTING AND 2007 NO-PROJECT CONDITIONS

INTERSECTION	EXISTING AM		EXISTING PM		2007 NO-PROJECT (EXIST+AMBIENT) AM		2007 NO-PROJECT (EXIST+AMBIENT) PM		INCREASE AM	INCREASE PM
7. I-5 SB Ramps & SR-126	.39	A	.36	A	.51	A	.48	A	.12	.12
8. I-5 NB Ramps & SR-126	.71	C	.77	C	.50	A	.50	A	-.21	-.27
80. Wolcott & SR-126	.34	A	.42	A	.36	A	.45	A	.02	.03
89. Old Road & SR-126 WB Ramps*	.34	A	.32	A	--		--		--	--
94. Commerce Center & SR-126	.52	A	.68	B	.55	B	.72	C	.03	.04
96. San Martinez Canyon & SR-126**	.31	A	.40	A	.32	A	.43	A	.01	.03
110. Chiquito Canyon & SR-126**	.36	A	.43	A	.39	A	.46	A	.03	.03
117. SR-126 EB Ramp & Henry Mayo*	.19	A	.22	A	--		--		--	--

*Removed by SR-126/I-5 Interchange Project
**Stop Sign Control

Level of service ranges:

.00 - .60	A
.61 - .70	B
.71 - .80	C
.81 - .90	D
.91 – 1.00	E
Above 1.00	F

4.1.2 Year 2007 Traffic Conditions With Project Phase 1

Year 2007 volumes that include project Phase 1 generated traffic (existing conditions plus ambient growth plus project Phase 1) and ADT volumes for select roadway segments are provided in Appendix G. Peak hour ICU values can be found in Table 4-2 which provides a comparison between 2007 no-project and 2007 with-project conditions. The table shows that no intersections experience a significant impact due solely to the project generated traffic for phase 1 (see Table 1-3 for significant impact criteria).

Table 4-2

ICU AND LOS SUMMARY – 2007 WITH AND WITHOUT PROJECT PHASE 1

INTERSECTION	2007 NO-PROJECT AM		2007 NO-PROJECT PM		2007 WITH PROJECT PHASE 1 AM		2007 WITH PROJECT PHASE 1 PM		INCREASE AM	INCREASE PM
7. I-5 SB Ramps & SR-126	.51	A	.48	A	.53	A	.54	A	.02	.06
8. I-5 NB Ramps & SR-126	.50	A	.50	A	.54	A	.56	A	.04	.06
80. Wolcott & SR-126	.36	A	.45	A	.52	A	.69	B	.16	.24
94. Commerce Center & SR-126	.55	B	.72	C	.61	B	.80	C[1]	.06	.08
96. San Martinez Canyon & SR-126	.32	A	.43	A	.32	A	.43	A	.00	.00
110. Chiquito/Long Canyon & SR-126	.39	A	.46	A	.41	A	.49	A	.02	.03

[1] Since this intersection achieves LOS C and since LOS D is the established design LOS for intersections serving (and within) the Valencia Commerce Center, there is not a significant project impact for this scenario. This intersection is planned for reconstruction as a grade separated interchange by 2008 (see Section 2.3 for discussion).

Level of service ranges:
.00 - .60 A
.61 - .70 B
.71 - .80 C
.81 - .90 D
.91 – 1.00 E
Above 1.00 F

4.2 YEAR 2008/PHASE 2

The 2008 traffic conditions are based on existing (2003) roadway conditions plus 5 years of ambient growth. This forms the basis for identifying the potential 2008 traffic impacts of the proposed project. The following sections discuss the 2008 no-project and with-project conditions.

4.2.1 Year 2008 Traffic Conditions Without Project

The 2008 no-project (existing conditions plus ambient growth) peak hour turning movement volumes for the intersections in the study area and ADT volumes for select roadway segments are shown in Appendix G.

4.2.2 Year 2008 Traffic Conditions With Project Phase 2

The analysis presented in previous sections was based on Phase 1 of the proposed project. As discussed in Section 3.1, Phase 2 of the River Village site adds the remaining residential units, the elementary school and 100,000 square feet of commercial uses to Phase 1. To assess the impact of project Phase 2, the traffic volumes generated by the project were added to the 2008 no-project (existing plus ambient) traffic volumes presented in Section 4.2.1.

Year 2008 volumes that include project Phase 2 generated traffic (existing conditions plus ambient growth plus project Phases 1 & 2) are provided in Appendix G. Peak hour ICU values can be found in Table 4-3 which provides a comparison between 2008 no-project and 2008 with-project conditions. The table shows that the following two intersections experience a significant impact due solely to the project generated traffic for Phases 1 & 2 (see Table 1-3 for significant impact criteria).

- Wolcott & SR-126
- Commerce Center Drive & SR-126

Mitigation that addresses the significantly impacted intersections is addressed in Chapter 6.0. For the intersection of Commerce Center Drive & SR-126, an improvement is planned for this location which would reconstruct the intersection into a grade separated interchange. This improvement is estimated to be in place by 2008 (see list of planned improvements in Table 2-3). Because of this significant pending

Table 4-3

ICU AND LOS SUMMARY – 2008 WITH AND WITHOUT PROJECT PHASES 1 & 2

INTERSECTION	2008 NO-PROJECT AM		PM		2008 WITH PROJECT PHASES 1 & 2 AM		PM		INCREASE AM	PM
7. I-5 SB Ramps & SR-126	.51	A	.48	A	.57	A	.59	A	.06	.11
8. I-5 NB Ramps & SR-126	.50	A	.51	A	.58	A	.62	B	.08	.11
80. Wolcott & SR-126	.36	A	.46	A	.80	C	1.00	E	.44*	.54*
94. Commerce Center & SR-126	.55	A	.74	C	.68	B	.92	E	.13	.18*
96. San Martinez Canyon & SR-126	.33	A	.43	A	.33	A	.44	A	.00	.01
110. Chiquito/Long Canyon & SR-126	.40	A	.46	A	.56	A	.73	C	.27	.27

*Significant Project Impact (See Table 1-3 for criteria). See Chapter 6.0 for mitigation.

Level of service ranges:		
	.00 - .60	A
	.61 - .70	B
	.71 - .80	C
	.81 - .90	D
	.91 – 1.00	E
	Above 1.00	F

project, an interim improvement to mitigate just the impacts of the project's Phase 2 would not be feasible.

4.3 YEAR 2010/PHASE 3

The 2010 traffic conditions are based on existing (2003) roadway conditions plus 7 years of ambient growth. This forms the basis for identifying the potential 2010 traffic impacts of the proposed project. The following sections discuss the 2010 no-project and with-project conditions.

4.3.1 Year 2010 Traffic Conditions Without Project

The 2010 no-project (existing conditions plus ambient growth) peak hour turning movement volumes for the intersections in the study area and ADT volumes for select roadway segments are shown in Appendix G.

4.3.2 Year 2010 Traffic Conditions With Project Buildout

The analysis presented in previous sections were based on Phase 1 and Phase 2 of the proposed project. As discussed in Section 3.1, full buildout (Phase 3) of the River Village site adds an additional 940,000 square feet of commercial (retail and office) uses to Phase 2. To assess the impact of project buildout, the traffic volumes generated by the full project were added to the 2010 no-project (existing plus ambient) traffic volumes presented in Section 4.3.1.

Year 2010 volumes that include project Phase 3 generated traffic (existing conditions plus ambient growth plus project Phases 1, 2 & 3) are provided in Appendix G. Peak hour ICU values can be found in Table 4-4 which provides a comparison between 2010 no-project and 2010 with-project conditions. The table shows that the following intersections experience a significant impact due solely to the traffic generated by the full project (see Table 1-3 for significant impact criteria).

- I-5 Southbound Ramps & SR-126
- Wolcott & SR-126
- Commerce Center Drive & SR-126
- Chiquito/Long Canyon & SR-126

Table 4-4

ICU AND LOS SUMMARY – 2010 WITH AND WITHOUT PROJECT BUILDOUT

INTERSECTION	2010 NO-PROJECT AM		PM		2010 WITH PROJECT BUILDOUT AM		PM		INCREASE AM	PM
7. I-5 SB Ramps & SR-126	.54	A	.49	A	.79	C	.66	B	.25*	.17
8. I-5 NB Ramps & SR-126	.52	A	.53	A	.74	C	.73	C	.22	.20
80. Wolcott & SR-126	.37	A	.47	A	1.05	F	1.31	F	.68*	.84*
94. Commerce Center & SR-126	.58	A	.77	C	.95	E	1.08	F	.37*	.31*
96. San Martinez Canyon & SR-126	.34	A	.44	A	.36	A	.47	A	.02	.03
110. Chiquito/Long Canyon & SR-126	.40	A	.48	A	1.08	F	1.35	F	.68*	.87*

*Significant Project Impact (See Table 1-3 for criteria). See Chapter 6.0 for mitigation.

Level of service ranges:		
	.00 - .60	A
	.61 - .70	B
	.71 - .80	C
	.81 - .90	D
	.91 – 1.00	E
	Above 1.00	F

Mitigation which addresses the cumulative significant impacts is presented in Chapter 6.0. For the intersection of Commerce Center Drive & SR-126, an improvement is planned for this location which would reconstruct the intersection into a grade separated interchange. This improvement is estimated to be in place by 2008 (see list of planned improvements in Table 2-3). Because of this significant pending project, an interim improvement to mitigate just the impacts of the project would not be feasible.

4.3.3 Year 2010 Traffic Conditions With Project Buildout and Related Projects

Related projects consist of future development that is reasonably expected to be in place by the buildout year of project. This analysis takes into account all pending, approved, recorded or constructed projects that are not occupied at the time of the existing traffic counts. The County Department of Regional Planning (DRP) was contacted to obtain the latest listing of projects in the area and the project applicant, who has a number of other projects planned for the area, was consulted for a comprehensive list of planned development. A summary of the related projects within an approximate three mile radius of the project site is provided in Table 4-5 and the locations of these projects are illustrated in Figure 4-1. Note that the cumulative analysis takes into account these as well as other future development as described in the following paragraph. Appendix C contains the computerized listing of development activity obtained from the DRP. An evaluation of related project conditions is prepared for the full project (not preliminary phases) according to instructions provided by County Traffic and Lighting Department staff.

The Interim Year version of the SCVCTM was updated as necessary to include the aforementioned related projects. The SCVCTM includes future cumulative projects for the entire Santa Clarita Valley and also accounts for regional projections for growth outside the valley. The Interim Year model also includes the pending roadway improvements previously identified in Section 2.3 since these improvements have been identified in previous traffic studies as needed with the various related projects. Trip generation for the related projects was calculated by the SCVCTM using rates that are consistent with ITE and the County's guidelines and the distribution and assignment of related project traffic was calculated by the model.

Section 2.3 describes the roadway network that will be in place by 2010 in conjunction with the related projects. An important consideration regarding this scenario involves how existing traffic volumes utilize the 2010 related project roadway network. Since the network includes both new facilities and the removal of some existing facilities, the traffic model reassigns existing traffic volumes together with the

Table 4-5

RELATED PROJECTS SUMMARY

PROJECT	DESCRIPTION	STATUS/OCCUPANCY ESTIMATE
Homestead Phase 1 (Newhall Ranch)	1,500 DU Residential (850 Multi-Family, 650 Single Family)	Pending/2008 (Specific Plan Approved)
Mesas East (Newhall Ranch)	6,146 DU Residential (4,746 Multi-Family, 1,400 Single Family) 1,500 TSF Commercial Office/Retail 26 AC Park	Pending/2008 (Specific Plan Approved)
Valencia Commerce Center/ Hasley Canyon Village (including PM 26363)	8,360 TSF (13,516 TSF including existing) Industrial Park/Commercial Retail	Approved/2003-2007
Sterling Commercial Center	1,300 TSF Industrial Park	Pending/2005-2007
Sterling Residential	400 DU Residential (150 Multi-Family, 250 Single Family) 50 TSF Commercial Retail	Pending/2005
Castaic Junction	1,000 TSF Industrial Park 534 TSF Business Park 65 TSF Commercial Center 500 Apartment Units	Pending/2007
Old Road Commercial	120 TSF Commercial Retail	Pending/2005
Area Around Six Flags	1,300 DU Residential 1,160 TSF Commercial Retail/Business Park 700 Room Hotel	Pending/2007
Westridge (including TR 45433 & PM 19050)	1,515 DU Residential 192 TSF Commercial Retail 460 STU Elementary School 208 AC Golf Course	Approved & Under Construction/2005
Valencia Industrial Center/Centerpoint	1,006.55 TSF Industrial Park 150 TSF Commercial Retail	Approved/2004
TR 52584	216 DU Residential 18 Hole Golf Course	Approved/2004
TR 52475	63 DU Residential	Pending/2005
TR 60319 (Tincher)	36 Multi-Family Dwelling Units	Pending/2005
Tourney North	450 TSF Office	Pending/2007
Tourney South	165 TSF Office	Pending/2007
Legacy (Rye Cyn) Business Park	4,016 TSF Industrial Park (including existing) 134 TSF Walmart	Approved/2003-2006

SF = Single Family
MF = Multi-Family
TSF = Thousand Square Feet

STU = Student
AC = Acre
FAR = Floor Area Ratio

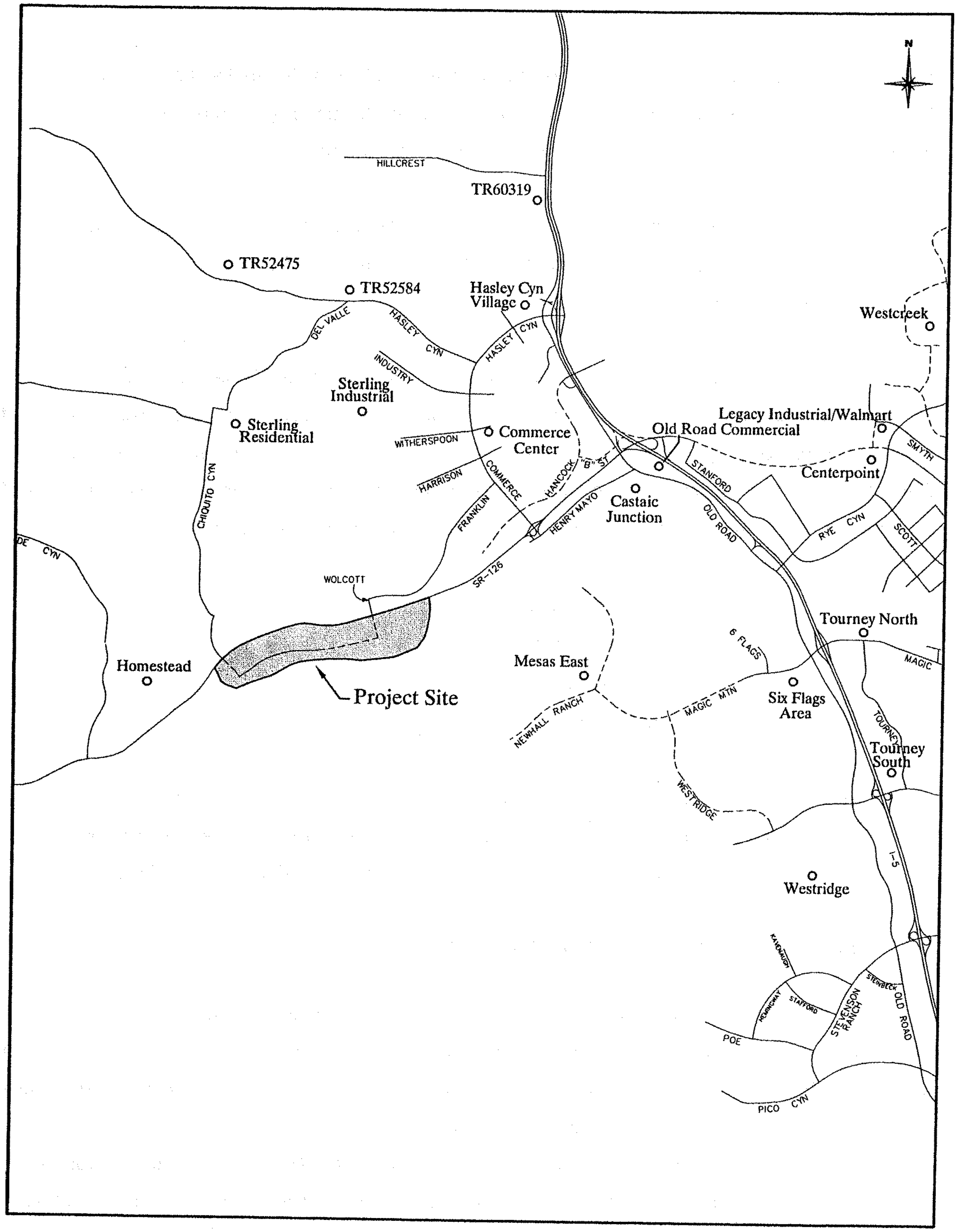


Figure 4-1

RELATED PROJECT LOCATIONS

future land uses based on the new network. Illustrations of 2010 conditions for the AM and PM peak hours, respectively, with the new roadway network, existing traffic, project traffic and related project traffic, as well as ADT volumes for this scenario, are provided in Appendix G.

Illustrations of 2010 conditions for the AM and PM peak hours, respectively, with the new roadway network, existing traffic, project traffic and related project traffic, as well as ADT volumes for this scenario, are provided in Appendix G.

Peak hour ICU values for project buildout plus related project conditions can be found in Table 4-6 which provides a comparison between the 2010 no-project conditions and the 2010 with project buildout plus related projects. The ICU table shows that four intersections experience a significant impact due to the cumulative impact of project buildout (see Table 1-3 for significant impact criteria) and related projects. The following intersections are those significantly impacted for this scenario:

- I-5 Southbound Ramps & SR-126
- I-5 Northbound Ramps & SR-126
- Wolcott & SR-126
- Chiquito/Long Canyon & SR-126

Mitigation which addresses the cumulative significant impacts is presented in Chapter 6.0. Note that the related project analysis includes the completion of the planned grade separated intersection at Commerce Center Drive and SR-126, of which the project will be responsible for a fair share.

4.4 TRAFFIC SIGNAL WARRANTS

A number of study locations are currently stop sign controlled intersections. One of these, the I-5 northbound off-ramp at SR-126, will be signalized as part of the current construction project at that location. Table 4-7 summarizes peak hour forecast traffic volumes for the other locations (including applicable on-site intersections, see Chapter 5.0 for on-site volumes) and evaluates them using the Caltrans peak hour volume warrant (see Reference 3 in Section 1.7). The peak hour volume warrant for rural areas (or major street speed of 40 MPH or greater) is illustrated in Figure 4-2 and the peak hour volume warrant for urban areas (or major street speed of 35 MPH or less) is illustrated in Figure 4-3. For

Table 4-6

ICU AND LOS SUMMARY – 2010 WITH PROJECT BUILDOUT AND RELATED PROJECTS

INTERSECTION	2010 NO-PROJECT (EXIST+AMBIENT) AM		PM		2010 WITH PROJ. BUILDOUT & RELATED PROJS AM		PM		INCREASE AM	PM
7. I-5 SB Ramps & SR-126	.54	A	.49	A	1.14	F	1.06	F	.60*	.57*
8. I-5 NB Ramps & SR-126	.52	A	.53	A	1.40	F	1.34	F	.88*	.81*
80. Wolcott & SR-126	.37	A	.47	A	.82	D	.90	D	.45*	.43*
81. Commerce Center & Henry Mayo**	--		--		.66	A	.44	A	--	--
82. Commerce Center & SR-126 EB**	--		--		.28	A	.27	A	--	--
83. Commerce Center & SR-126 WB**	--		--		.78	C	.64	B	--	--
94. Commerce Center & SR-126	.58	A	.77	C	--		--		--	--
96. San Martinez Canyon & SR-126	.34	A	.44	A	.57	A	.52	A	.23	.08
110. Chiquito/Long Canyon & SR-126	.40	A	.48	A	1.07	F	.81	D	.67*	.33*

*Significant Project Impact (See Table 1-3 for criteria). See Chapter 6.0 for mitigation.

**New Intersection

Level of service ranges: .00 - .60 A
.61 - .70 B
.71 - .80 C
.81 - .90 D
.91 – 1.00 E
Above 1.00 F

Table 4-7

TRAFFIC SIGNAL PEAK HOUR VOLUME WARRANT

INTERSECTION		NO-PROJECT AM	NO-PROJECT PM	WITH PROJECT AM	WITH PROJECT PM	WITH PROJECT & RELATED PROJECTS AM	WITH PROJECT & RELATED PROJECTS PM	PROJECT SHARE
2007 / PROJECT PHASE 1								
110. Chiquito/Long Canyon & SR-126								
Major Approach	Eastbound	722	1,017	724	1,023	896	1,039	
	Westbound	794	1,103	807	1,138	965	1,238	
	Total	1,516	2,120	1,531	2,161	1,861	2,277	
Minor Approach	Southbound	89	63	92	73	202	161	
Satisfies Warrant? (Rural)		NO	NO	NO	NO	**YES**	**YES**	3%
2008 / PROJECT PHASE 2								
110. Chiquito/Long Canyon & SR-126								
Major Approach	Eastbound	736	1,037	753	1,071	1,456	1,220	
	Westbound	808	1,124	864	1,407	1,195	2,004	
	Total	1,544	2,161	1,617	2,478	2,651	3,224	
Minor Approach	Southbound/Northbound	90	64	228	167	571	354	
Satisfies Warrant? (Rural)		NO	NO	**YES**	**YES**	**YES**	**YES**	100%
On-site #2: Long Canyon & A Street								
Major Approach	Eastbound	--	--	63	27	--	--	
	Westbound	--	--	144	92	--	--	
	Total	--	--	207	119	--	--	
Minor Approach	Southbound	--	--	37	284	--	--	
Satisfies Warrant? (Urban)				NO	NO			N/A
On-site #17: School/U Street & A St.								
Major Approach	Eastbound	--	--	200	182	--	--	
	Westbound	--	--	148	167	--	--	
	Total	--	--	348	349	--	--	
Minor Approach	Southbound	--	--	116	61	--	--	
Satisfies Warrant? (Urban)				NO	NO			N/A
On-site #21: M Street & A Street								
Major Approach	Eastbound	--	--	269	223	--	--	
	Westbound	--	--	218	258	--	--	
	Total	--	--	487	481	--	--	
Minor Approach	Southbound	--	--	27	143	--	--	
Satisfies Warrant? (Urban)				NO	NO			N/A
2010 / PROJECT PHASE 3								
96. San Martinez Canyon & SR-126								
Major Approach	Eastbound	742	1,068	829	1,133	1,490	1,232	
	Westbound	752	1,071	774	1,165	1,018	1,283	
	Total	1,494	2,139	1,603	2,298	2,508	2,515	
Minor Approach	Southbound	7	11	7	11	12	17	
Satisfies Warrant? (Rural)		NO	NO	NO	NO	NO	NO	N/A
On-site #2: Long Canyon & A Street								
Major Approach	Northbound	--	--	--	--	1,827	670	
	Southbound	--	--	--	--	496	1,671	
	Total	--	--	--	--	2,323	2,341	
Minor Approach	Westbound	--	--	--	--	315	816	
Satisfies Warrant? (Urban)						**YES**	**YES**	100%
On-site #4: Commercial Dwy & A St.								
Major Approach	Eastbound	--	--	436	692	--	--	
	Westbound	--	--	313	444	--	--	
	Total	--	--	749	1,136	--	--	
Minor Approach	Southbound	--	--	22	214	--	--	
Satisfies Warrant? (Urban)				NO	NO			N/A

(Continued)

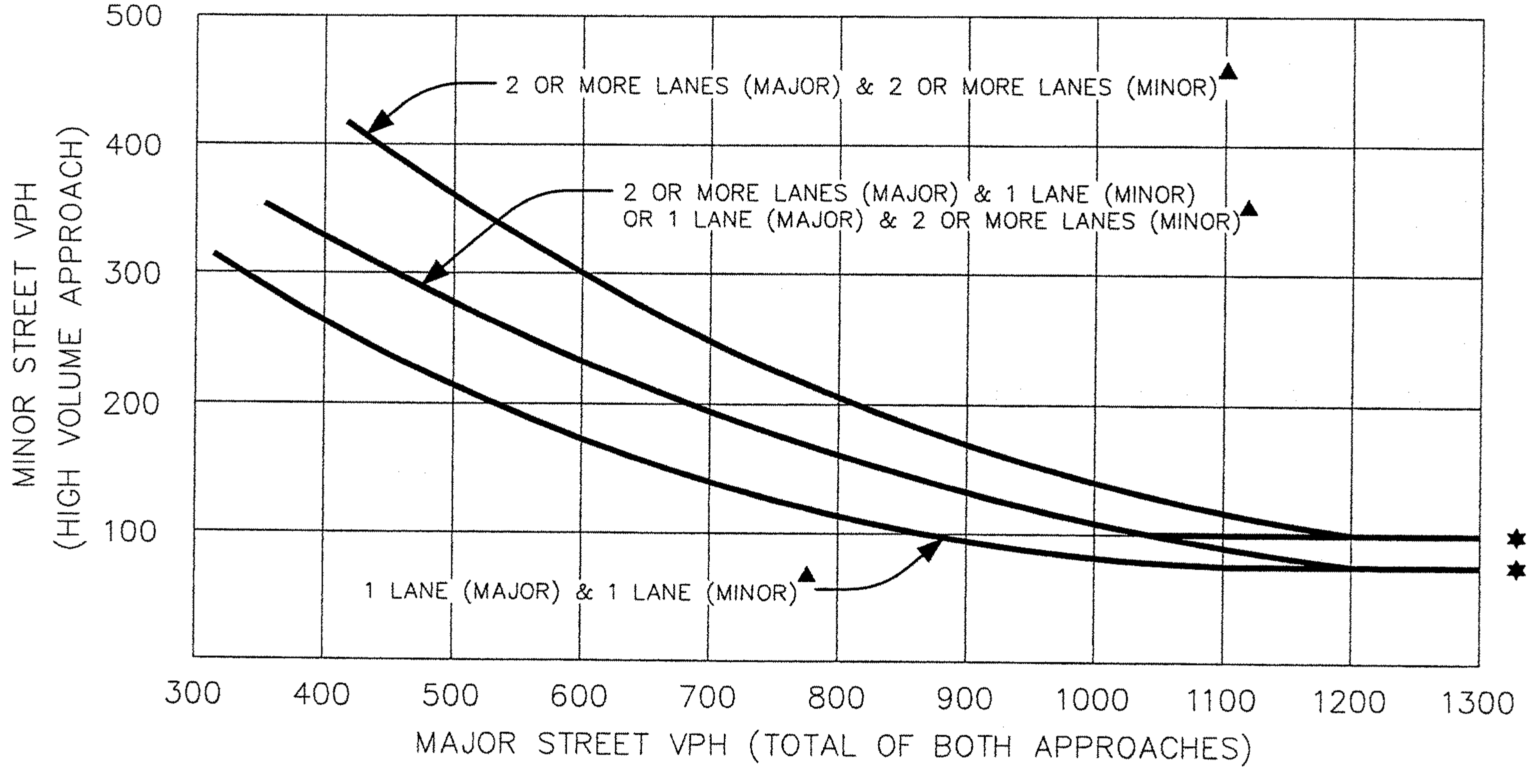
Table 4-7 (Continued)
TRAFFIC SIGNAL PEAK HOUR VOLUME WARRANT

INTERSECTION		NO-PROJECT AM	NO-PROJECT PM	WITH PROJECT AM	WITH PROJECT PM	WITH PROJECT & RELATED PROJECTS AM	WITH PROJECT & RELATED PROJECTS PM	PROJECT SHARE
On-site #6: Commercial Dwy & A St.								
Major Approach	Eastbound	--	--	108	227	--	--	
	Westbound	--	--	405	137	--	--	
	Total	--	--	513	414	--	--	
Minor Approach	Northbound/Southbound	--	--	35	154	--	--	
Satisfies Warrant? (Urban)				NO	NO			N/A
On-site #17: School/U Street & A St.								
Major Approach	Eastbound	--	--	218	193	--	--	
	Westbound	--	--	318	187	--	--	
	Total	--	--	536	380	--	--	
Minor Approach	Southbound	--	--	108	52	--	--	
Satisfies Warrant? (Urban)				NO	NO			N/A
On-site #21: M Street & A Street								
Major Approach	Eastbound	--	--	238	171	--	--	
	Westbound	--	--	421	207	--	--	
	Total	--	--	659	378	--	--	
Minor Approach	Southbound	--	--	34	198	--	--	
Satisfies Warrant? (Urban)				NO	NO			N/A

N/A = Not applicable.

Note: Signal warrant analysis for on-site locations is provided only for locations that meet the minimum site street volume of 100 VPH.

See Figures 4-2 and 4-3 for the rural and urban peak hour volume signal warrant criteria, respectively.

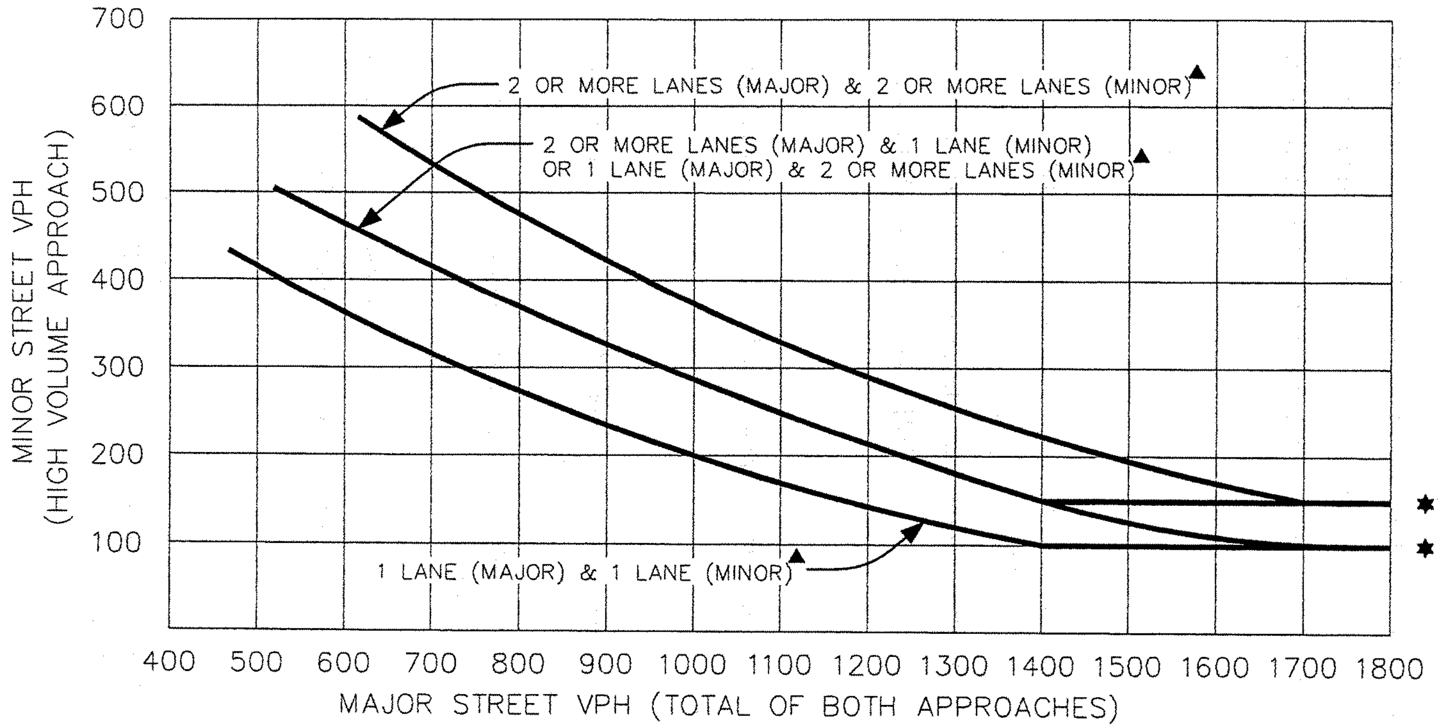


▲ NOTE: THESE CURVES ARE RECOMMENDED FOR USE IN AREAS OF RURAL CLASSIFICATION (i.e. POSTED SPEED LIMIT ON THE MAJOR STREET IS 40 MPH OR HIGHER).

✱ NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES, AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH ONE LANE.

Figure 4-2

PEAK HOUR VOLUME WARRANT
(RURAL AREAS)



▲ NOTE: THESE CURVES ARE RECOMMENDED FOR USE IN AREAS OF URBAN CLASSIFICATION (i.e. POSTED SPEED LIMIT ON THE MAJOR STREET IS 35 MPH OR LESS).

✱ NOTE: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES, AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH ONE LANE.

Figure 4-3

PEAK HOUR VOLUME WARRANT
(URBAN AREAS)

on-site intersections the warrant analysis is performed only for the intersections that meet the minimum criteria of 100 VPH for side street volumes.

At one location, Chiquito Canyon Road/Long Canyon Road/SR-126, the warrant is met for Phase 1 conditions when project traffic and related project traffic is added to background conditions. On-site, the warrant is met at the Long Canyon Road/"A" Street intersection for buildout conditions. Since each location is providing access to the project site, the project is responsible for 100 percent of the cost for installation of the signals.

4.5 CMP ANALYSIS

The Congestion Management Program (CMP) for Los Angeles County (see Reference 7 in Section 1.7) requires that a proposed development address two major subject areas with respect to traffic impacts; the project's impacts on the CMP highway system and the project's impacts on the local and regional transit systems. The specific requirements for the CMP analysis are spelled out in the CMP Land Use Analysis Program.

The geographical area examined in a CMP traffic impact analysis (TIA) consists of the CMP monitoring locations that meet the following criteria:

1. CMP intersections where the proposed project will add 50 or more trips during the AM or PM weekday peak hours (of adjacent street traffic).
2. Mainline freeway locations where the project will add 150 or more trips, in either direction, during either the AM or PM weekday peak hours.

Phase 1 and Phase 2 of the project meets the above criteria at one location, the intersection of Chiquito Canyon Road and SR-126. Buildout of the project site also meets the above criteria at two additional locations, as shown in the following list:

- Chiquito Canyon Road & SR-126 Intersection (Phases 1, 2 and Full Project)
- Valencia Boulevard & Magic Mountain Parkway Intersection (Full Project Only)
- I-5 North of SR-14 (Full Project Only)

Table 4-8 summarizes the intersection ICUs and LOS for the two CMP intersections based on the CMP ICU calculation methodology (equivalent to the County methodology used throughout the report). Included in the table are the relevant ICUs and LOS after taking into account the project mitigation identified in Chapter 6.

CMP methodology states that a significant project impact occurs when the proposed project increases traffic demand at a CMP monitoring location by two percent of capacity ($V/C \geq .02$), causing or worsening LOS "F". Table 4-8 shows that no CMP intersection experiences a significant impact due to the project. Table 4-9 summarizes the CMP freeway segments the meet the criteria for analysis. The table shows that based on CMP criteria, no significant freeway impacts occur due to the project.

Another component of the CMP transportation impact analysis is a review of transit impacts. This review includes evidence that transit operators received the Notice of Preparation (included in the project EIR), identification of existing transit services near the project (see Section 2.1.3), estimation of the number of project trips assigned to transit, information on facilities and/or programs that will encourage public transit use, and an analysis of project impacts on transit service.

Buildout of the proposed project is forecast to generate 41,884 ADT (20,669 Phase 2). The conversion to person trips is accomplished by using the MTA guidelines (multiplying the ADT by an occupancy factor of 1.4) which results in a total of 58,637 (28,935 Phase 2) average daily person trips. Applying the MTA's factor for converting total person trips to transit trips (.035) results in approximately 2,052 (1,013 Phase 2) total daily transit trips and approximately 200 (100 Phase 2) peak hour transit trips (based on the peak hour representing ten percent of the total daily trips).

The County does not have level of service standards for transit service that are applicable to future development such as the proposed project. Transit service is evaluated and funded on an as-needed basis. If additional fixed route service will be needed near the project site in the future, the project should coordinate with the transit provider to identify appropriate bus stop/turnout locations.

Table 4-8

ICU AND LOS SUMMARY – CMP MONITORING INTERSECTIONS

INTERSECTION	WITHOUT PROJECT AM		WITHOUT PROJECT PM		WITH PROJECT AM		WITH PROJECT PM		INCREASE AM	INCREASE PM
2007/PHASE 1										
110. Chiquito Cyn & SR-126	.51	A	.52	A	.52	A	.52	A	.01	.00
2008/PHASE 2										
110. Chiquito Cyn & SR-126	.86	D	.64	B	.78	C	.73	B	-.08	.09
2010/PHASE 3										
57. Valencia & Magic Mountain	.92	E	1.22	F	.93	E	1.23	F	.01	.01
110. Chiquito Cyn & SR-126	.81	D	.57	A	.79	C	.64	B	-.02	.07

A Significant Project Impact as defined by the CMP is a V/C increase of ≥ .02 causing or worsening LOS "F"

ICUs calculated using Los Angeles County CMP methodology. With project scenario includes mitigation measures (See Section 6.2).

Level of service ranges:

.00 - .60	A
.61 - .70	B
.71 - .80	C
.81 - .90	D
.91 – 1.00	E
Above 1.00	F

Table 4-9

FREEWAY V/C AND LOS SUMMARY – CMP MONITORING LOCATIONS

LOCATION		WITHOUT-PROJECT CAPACITY	WITHOUT-PROJECT VOLUME	V/C	LOS	WITH PROJECT CAPACITY	WITH PROJECT VOLUME	V/C	LOS
I. AM PEAK HOUR									
I-5 n/o SR-14	NB	10,000	9,000	.90	D	10,000	9,174	.92	D
II. PM PEAK HOUR									
I-5 n/o SR-14	SB	10,000	9,000	.90	D	10,000	9,150	.92	D

Level of service ranges:

.00 - .35	A
.36 - .54	B
.55 - .77	C
.78 - .93	D
.94 – 1.00	E
Above 1.00	F

Notes:
V/C shown in parentheses represent the project's increment of the total V/C
Source of Capacities LOS ranges: 2002 Los Angeles County CMP (see Reference 6 in Section 1.6)

4.6 STATE HIGHWAYS

The project is located south of and adjacent to SR-126 which is a four lane highway. Approximately two miles east of the project site is the I-5 Freeway which provides regional access for residents of the site.

The project site will obtain access from SR-126 via two existing intersections; Chiquito Canyon Road and Wolcott Way.

The I-5/SR-126 interchange is currently being reconstructed based on a design developed to accommodate the buildout traffic demands of the area. As part of the reconstruction, additional ramps providing direct access to and from the east will be added and the SR-126 over-crossing will be widened to accommodate additional lanes.

Phase 2 of the I-5/SR-126 interchange reconstruction project is the construction of a grade separated interchange at Commerce Center Drive and SR-126. That project replaces the existing at-grade intersection with a partial cloverleaf interchange designed to increase capacity and improve access to the Valencia Commerce Center area.

A detailed analysis of the SR-126 corridor using the analysis methodology outlined in the Caltrans guide for the preparation of traffic impact studies (see Reference 9 in Section 1.6) is provided in Section 6.2. Table 4-10 summarizes the volume of project traffic forecast to use Interstate 5, including the I-5/SR-126 interchange.

4.7 VENTURA COUNTY

The Newhall Ranch Environmental Impact Report (EIR) included an analysis of locations within Ventura County and, consistent with that initial analysis, each phase of the River Village project is evaluated in regards to Ventura County impacts.

Table 4-10

PROJECT VOLUMES ON STATE HIGHWAYS

LOCATION	PHASES 1 + 2 AM PEAK HOUR	PHASES 1 + 2 PM PEAK HOUR	SITE BUILDOUT AM PEAK HOUR	SITE BUILDOUT PM PEAK HOUR
I-5 Mainline				
North of SR-126/Newhall Ranch Road - Northbound	21	42	43	126
North of Magic Mountain Parkway - Northbound	85	200	486	311
North of SR-14 - Northbound	28	62	174	104
North of SR-126/Newhall Ranch Road - Southbound	27	35	124	62
North of Rye Canyon Road - Southbound	170	178	240	497
North of Magic Mountain Parkway - Southbound	183	166	248	487
North of SR-14 - Southbound	60	47	84	150
I-5/SR-126 Interchange				
Northbound Off-Ramp	84	200	485	311
Northbound Loop On-Ramp	19	42	42	126
Northbound Direct On-Ramp (future)	0	0	0	0
Southbound Off-Ramp	27	35	124	62
Southbound Loop On-Ramp (future)	0	0	0	0
Southbound Direct On-Ramp	170	178	240	497

24 hour traffic counts were obtained from the published Caltrans count data report (2002 AADT) for seven locations within Ventura County. Traffic volumes for future years are derived by interpolating between the 2003 counts and long-range forecasts for the year 2020.

Table 4-11 summarizes the existing traffic volumes together with the 2007 forecasts with Phase 1 of the proposed project. Table 4-12 provides the 2008 Phases 1 + 2 forecasts and Table 4-13 provides the 2010 Project Buildout forecasts. The tables show that with buildout of the River Village project, the highest amount of project traffic is 130 ADT, which is less than one-half of one percent of the total forecast volume for that location. Therefore, it can be concluded that the project does not result in a significant impact at these locations.

Table 4-11

2007 VENTURA COUNTY ADT TRAFFIC VOLUMES

LOCATION	2003 ADT	2007 ADT	2020 ADT	NEWHALL RANCH VOLUME AT BUILDOUT	RIVER VILLAGE VOLUME	2003 + PROJECT	2007 + PROJECT
SR-126							
Ventura Co./Los Angeles Co. Line	25,000	26,000	31,000	1,038	15	25,015	26,015
West of Center Street (Piru)	25,000	26,000	31,000	1,033	15	25,015	26,015
Fillmore East City Limits	26,000	28,000	33,000	1,009	15	26,015	28,015
West of SR-23 (Fillmore)	30,000	31,000	36,000	869	13	30,013	31,013
West of Los Serenos Road (Fillmore)	29,000	31,000	37,000	835	12	29,012	31,012
Little Red School House	33,000	34,000	38,000	835	12	33,012	34,012
SR-23							
North of Casey Road (Moorpark)	8,000	8,000	9,000	78	1	8,001	8,001

Notes:

Newhall Ranch Buildout - Total ADT	334,000
River Village – Phase 1 ADT	4,950
Cumulative Growth Factor[1]:	23.5%
[1](2007-2003)/(2020-2003)	

Table 4-12

2008 VENTURA COUNTY ADT TRAFFIC VOLUMES

LOCATION	2003 ADT	2008 ADT	2020 ADT	NEWHALL RANCH VOLUME AT BUILDOUT	RIVER VILLAGE VOLUME	2003 + PROJECT	2008 + PROJECT
SR-126							
Ventura Co./Los Angeles Co. Line	25,000	27,000	31,000	1,038	64	25,064	27,064
West of Center Street (Piru)	25,000	27,000	31,000	1,033	64	25,064	27,064
Fillmore East City Limits	26,000	28,000	33,000	1,009	62	26,062	28,062
West of SR-23 (Fillmore)	30,000	32,000	36,000	869	54	30,054	32,054
West of Los Serenos Road (Fillmore)	29,000	31,000	37,000	835	52	29,052	31,052
Little Red School House	33,000	34,000	38,000	835	52	33,052	34,052
SR-23							
North of Casey Road (Moorpark)	8,000	8,000	9,000	78	5	8,005	8,005

Notes:

Newhall Ranch Buildout - Total ADT	334,000
River Village – Phase 2 ADT	20,668
Cumulative Growth Factor[1]:	29.4%

[1](2007-2003)/(2020-2003)

Table 4-13

2010 VENTURA COUNTY ADT TRAFFIC VOLUMES

LOCATION	2003 ADT	2010 ADT	2020 ADT	NEWHALL RANCH VOLUME AT BUILDOUT	RIVER VILLAGE VOLUME	2003 + PROJECT	2010 + PROJECT
SR-126							
Ventura Co./Los Angeles Co. Line	25,000	27,000	31,000	1,038	130	25,130	27,130
West of Center Street (Piru)	25,000	27,000	31,000	1,033	130	25,130	27,130
Fillmore East City Limits	26,000	29,000	33,000	1,009	127	26,127	29,127
West of SR-23 (Fillmore)	30,000	32,000	36,000	869	109	30,109	32,109
West of Los Serenos Road (Fillmore)	29,000	32,000	37,000	835	105	29,105	32,105
Little Red School House	33,000	35,000	38,000	835	105	33,105	35,105
SR-23							
North of Casey Road (Moorpark)	8,000	8,000	9,000	78	10	8,010	8,010

Notes:

Newhall Ranch Buildout - Total ADT	334,000
River Village – Total ADT	41,884
Cumulative Growth Factor[1]:	41.2%

[1](2007-2003)/(2020-2003)

4.8 COMPARISON TO EXISTING CONDITIONS

A comparison of the full project to existing conditions has been prepared for CEQA documentation. ICU calculation worksheets for existing conditions, existing conditions plus Project Buildout (Phases 1 + 2 + 3) and existing conditions plus Project Buildout with mitigation are provided in Appendix A. Table 4-14 summarizes the ICUs and Levels of Service for existing conditions with and without the project. Mitigation for the significantly impacted intersections is provided in Chapter 6.

Table 4-14

ICU AND LOS SUMMARY – EXISTING PLUS PROJECT BUILDOUT (PHASES 1 + 2 + 3)

INTERSECTION	EXISTING (2003) CONDITIONS AM		PM		EXISTING (2003) CONDITIONS PLUS PROJECT BUILDOUT AM		PM		INCREASE AM	INCREASE PM
7. I-5 SB Ramps & SR-126	.39	A	.36	A	.63	B	.52	A	.24	.16
8. I-5 NB Ramps & SR-126	.71	C	.77	C	1.15	F	1.18	F	.44*	.41*
80. Wolcott & SR-126	.34	A	.42	A	1.03	F	1.26	F	.69*	.84*
94. Commerce Center & SR-126	.52	A	.68	B	.88	D	.99	E	.36*	.31*
96. San Martinez Canyon & SR-126	.31	A	.40	A	.33	A	.43	A	.02	.03
110. Chiquito/Long Canyon & SR-126	.36	A	.43	A	1.05	F	1.31	F	.69*	.88*

*Significant Project Impact (See Table 1-3 for criteria). See Chapter 6.0 for mitigation.

Level of service ranges:
.00 - .60 A
.61 - .70 B
.71 - .80 C
.81 - .90 D
.91 – 1.00 E
Above 1.00 F

5.0 ON-SITE CIRCULATION

This chapter discusses the on-site circulation system and project access. It supplements the off-site impact analysis findings of the previous chapter by addressing the adequacy of the internal circulation system.

5.1 OVERVIEW

The River Village circulation plan is characterized by a system of local streets that draw access from a curvilinear spine road ("A" Street) that traverses the site in an east/west direction. Two north south roadways, Wolcott Way and Long Canyon Road, connect the spine road to the off-site highway system. The site plan presented in Chapter 3.0 provides an illustration of the proposed system.

The spine road and the local roads have been designed to incorporate traffic calming treatments such as curb bulb-outs at intersections and at mid-block locations. With just a few exceptions, the spine road and local roadways feature one travel lane in each direction and allow on-street parking.

Two modern roundabouts are included in the circulation plan. One provides access to the large commercial center on westerly side of the site and the other is at the intersection of Wolcott Way and the spine road.

To evaluate the proposed plan, a special traffic model was developed specifically for the River Village project site (see Appendix F). A detailed zone system allows for the use of a fine-grain network that can be used to assign traffic to virtually all of the local streets. The overall distribution of site traffic was calibrated to match the SCVCTM forecasts used in the off-site impact analysis. The following sections utilize this local area model to evaluate the proposed plan in greater detail than is capable with a large area model such as the SCVCTM.

5.2 ROADWAYS

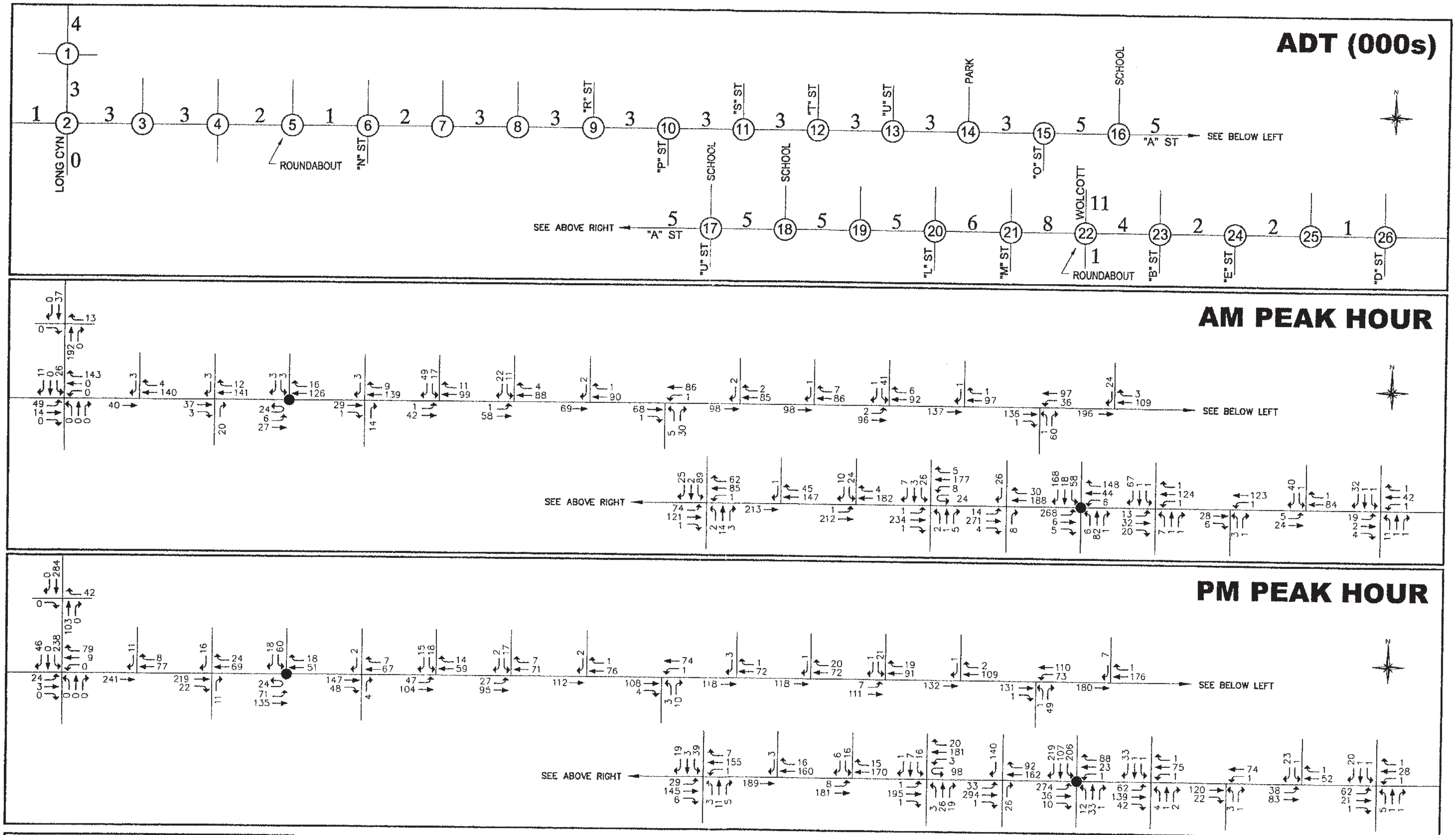
5.2.1 Spine Road ("A" Street)

The primary function of the spine road ("A" Street) is to provide connectivity between the River Village neighborhoods and to provide access from the local streets to the arterial highway system.

Figure 5-1 illustrates turning movement volumes along the spine roadway that correspond to Phases 1 & 2 of the project. Since some of the side streets represent private driveways without assigned names, each intersection is numbered for reference. For example, intersection 2 is the spine road's intersection with Long Canyon Road and the roundabout at Wolcott Way is labeled as location 22. The second proposed roundabout is represented at location 5. Turning movement volumes that correspond to buildout of the project site are shown in Figure 5-2. The buildout volumes are also based on buildout of the entire Newhall Ranch site and thus include the resulting increase to traffic volumes along Long Canyon Road.

One of the design goals of the spine road was to prevent the need for traffic signals for all locations, other than the intersection with Long Canyon Road, by utilizing roundabouts at the high volume locations. While the traffic volume figures referenced above illustrate the main street and side street volumes, traffic signal warrants have been prepared for each of the conventional intersections in which the side street volumes meet the minimum warrant criteria of 100 VPH. These warrants (see Section 4.4) show that only the Long Canyon Road/"A" Street intersection meet the minimum peak hour volume warrant. The two locations with the heaviest turning movement volumes, Wolcott Way and the main commercial center entrance (location 5), are proposed to be modern roundabouts (see Section 5.2.3 for evaluation).

A second design goal of the spine road involves configuring the roadway in such a manner that non-local (through) traffic is discouraged from using the roadway as an alternative to SR-126. This is accomplished by using a curvilinear alignment that lengthens the total distance of the road as well as traffic calming design features such as curb bulb-outs and on-street parking. Figure 5-3 illustrates the recommended intersection lane geometry for the spine road.



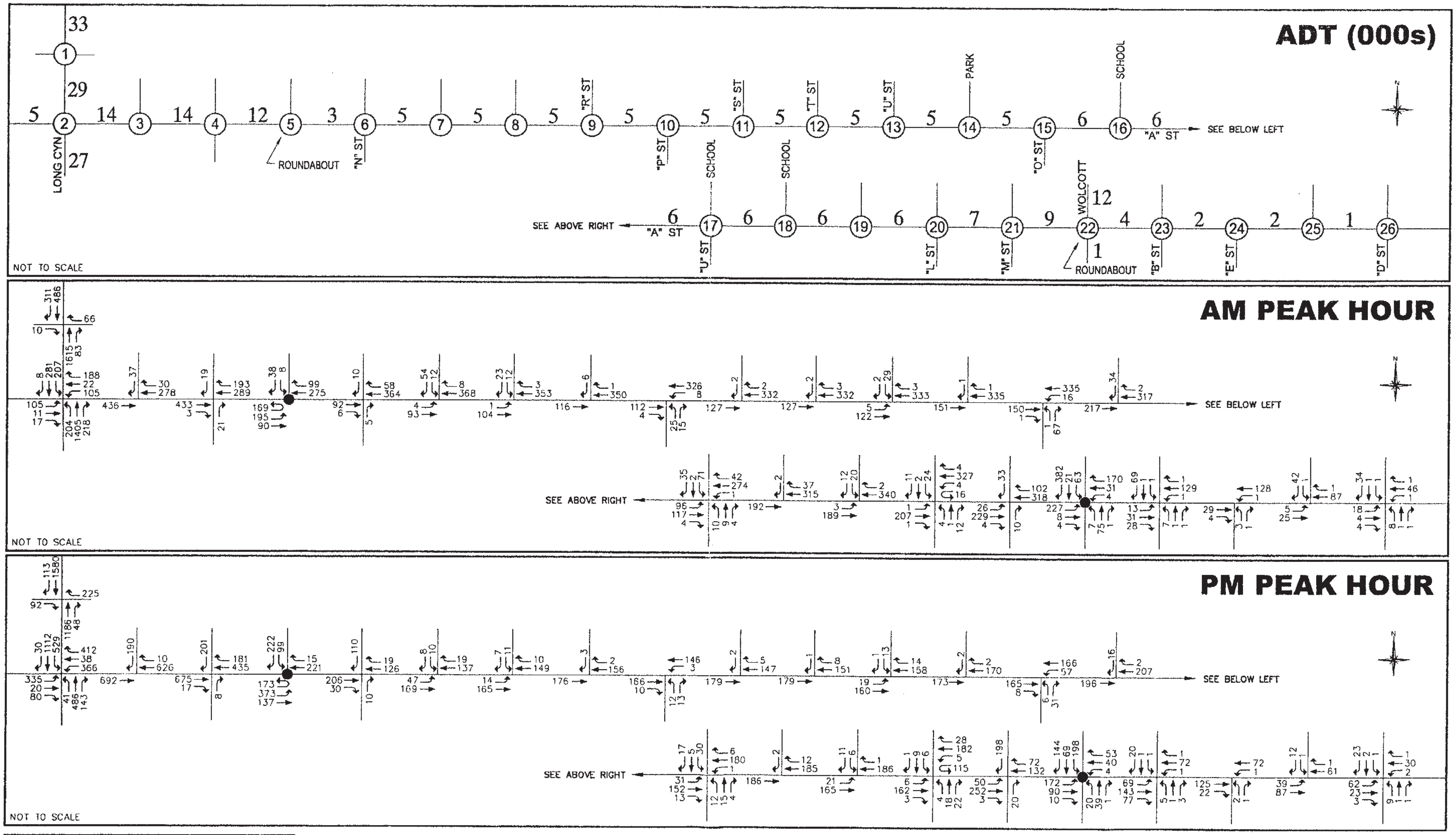
Legend

(X) Intersection Identification Number

● Roundabout

Figure 5-1

ON-SITE ADT AND PEAK HOUR VOLUMES -RIVER VILLAGE PHASES 1 & 2



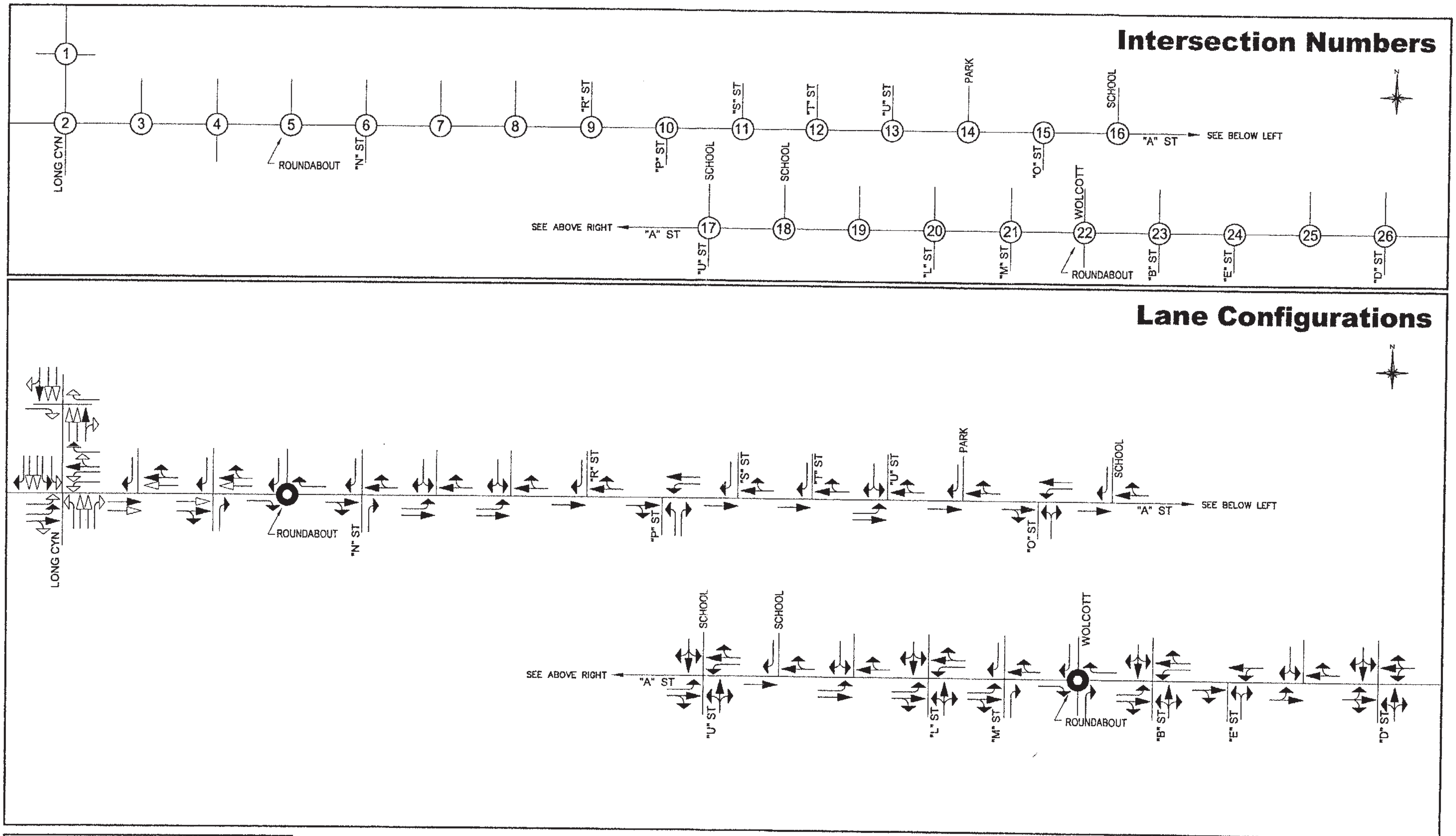
Legend

Ⓧ Intersection Identification Number

● Roundabout

Figure 5-2

ON-SITE ADT AND PEAK HOUR VOLUMES
-RIVER VILLAGE BUILDOUT
AND NEWHALL RANCH BUILDOUT



Legend
Modern Roundabout
Phases 1 & 2 Lanes
Buildout Lanes

Figure 5-3

ON-SITE LANE CONFIGURATIONS

The spine road is shown in the Newhall Ranch Specific Plan as a four lane Secondary Highway. It is recommended, however, that the Specific Plan be amended for the roadway to be reclassified as a two lane Collector. This recommendation is based on the design goals outlined above and supported by the forecast traffic volumes. A two lane Collector can typically accommodate approximately 10,000 ADT at LOS C and the spine road will have volumes substantially less than that for it's entire length except for the short segment between Long Canyon Road and the roundabout. For that segment, which will have volumes ranging from 16,000 ADT to 20,000 ADT, two lanes each way are recommended. From the traffic volumes forecast for this roadway, it can be concluded that the roadway can be downgraded from a Secondary Highway to a Collector.

5.2.2 Long Canyon Road

Long Canyon Road is a roadway that, together with Wolcott Way, provides access to SR-126. Ultimately, Long Canyon Road will be one of the primary north/south roadways through Newhall Ranch.

The Phase 2 traffic forecasts presented in the previous chapter are based on Long Canyon Road terminating at the spine road. The River Village buildout forecasts used for the on-site analysis include the full buildout of Newhall Ranch and include the corresponding through traffic volumes on Long Canyon Road. Initially, Long Canyon Road will need to be constructed as a two lane (one lane each direction) roadway to serve Phase 2 traffic volumes.

The Newhall Ranch specific plan identifies Long Canyon Road as a Major Highway (six lanes) from just south of the Santa Clara River to SR-126. To allow for the buildout needs of this roadway, sufficient right-of-way should be reserved to accommodate a major class roadway. The buildout traffic forecast volumes for the intersection of Long Canyon Road with the spine road indicate that two through lanes in the north/south direction together with separate turn pockets for right and left turning vehicles will result in LOS C for the AM peak hour and LOS B for the PM peak hour (see Appendix A for ICU worksheets).

5.2.3 Roundabouts

The proposed modern roundabouts on the spine road at Wolcott Way and at the main commercial center entrance (Location 5) have been evaluated using the *Sidra* software package using the Highway Capacity Manual delay and queue models.

The evaluation shows that each roundabout will operate at LOS A. Appendix E contains a complete summary of the *Sidra* calculations.

5.2.4 Elementary School Access

The community's elementary school site is located north of the spine road near to where the spine road intersects with "U" Street. While a proposed site plan for the school has not yet been prepared, a conceptual plan indicates potential access for the school parking lot from three driveways along the spine road. The center driveway creates a four-way intersection with the spine road and "U" Street and the remaining two driveways are located just east and west of that intersection, respectively.

The school intersections will not meet the traffic warrant for minimum volumes as was shown in previous sections. A traffic signal would also be inconsistent with the overall traffic control system developed for the spine road which consists of modern roundabouts as the control measures at the primary intersections. At a minimum, a painted school pedestrian crossing with associated signing should be installed across the spine road ("A" Street) and across "U" Street.

While a school would typically employ crossing guards at an intersection such as the spine road/"U" Street intersection, additional measures may prove to be necessary to warn drivers of the school crossing. Equipment such as pedestrian activated in-pavement warning lights or overhead flashing lights are effective ways of bringing attention to the pedestrian crossing. These warnings can be configured with automated detection units that would activate the lights automatically given the presence of a pedestrian. The automated system is beneficial for school crossings since it doesn't rely on the children to manually engage the system.

Since it is not possible to precisely predict how drivers will behave at a future location such as this, initially a painted school pedestrian crossing with signing should be installed. Driver behavior can then be monitored as the community develops and, if necessary, additional treatments such as those discussed above can be installed to further enhance the pedestrian crossing.

6.0 MITIGATION

This chapter summarizes the transportation improvements designed to serve project traffic and to mitigate the impacts of the proposed project. Project access is first discussed, followed by a proposed program of off-site improvements.

6.1 ON-SITE CIRCULATION SYSTEM

The project is responsible for providing vehicular access onto and within the site that complies with County codes and regulations. Chapter 5.0 presented the proposed on-site circulation system and it is recommended that the roadway configurations and geometry outlined there be implemented in conjunction with the proposed land uses.

Improvements to the two intersections that will initially provide access to the site, each of which are located on SR-126, are described in the following section.

6.2 OFF-SITE MITIGATION AND ACCESS

Chapter 4.0 identified a number of off-site intersections significantly impacted by the proposed project. When impacts occur solely due to the addition of project traffic or for when improvements are to provide access to the project site, the project is fully responsible for mitigation. For impacts that are the result of the cumulative effect of project traffic together with related project traffic, the project is responsible for a fair share cost of the mitigation (see Section 6.3 for share calculations).

Mitigation measures for each of the significantly impacted intersections are listed in Table 6-1. The improvements identified for the I-5/SR-126 interchange are consistent with the improvement project currently underway at that location and represent the ultimate lane geometry determined in the Project Report for the interchange. The improvements identified for the Commerce Center Drive/SR-126 grade separated interchange also represent the configuration determined in that location's Project Study Report and which are currently in the Project Report process. The table lists each of the improvements by location by phase and the project's fair-share obligation is listed for those improvements that are due to cumulative impacts (see Section 6.3 for share calculations).

Table 6-1

PROPOSED MITIGATION – OFF-SITE & ACCESS LOCATIONS

LOCATION	MITIGATION
2007 / Phase 1 Only	
7. I-5 SB Ramps & SR-126	None
8. I-5 NB Ramps & SR-126	None
80. Wolcott & SR-126	Add NBL & NBR (for 1 NBL, 1 NBT & 1 NBR) & convert shared SBL/SBT to dedicated SBT (for 1 SBL, 1 SBT & 1 SBR)
110. Chiquito Canyon/ Long Canyon & SR-126	Add NBL & NBR (for 1 NBL, 1 NBT & 1 NBR), add SBL (for 1 SBL & 1 shared SBT/SBR), & add WBL (for 1 WBL, 2 WBT & 1 WBR)
2008 / Phase 1 + Phase 2 Only	
7. I-5 SB Ramps & SR-126	None
8. I-5 NB Ramps & SR-126	None
80. Wolcott & SR-126	Phase 1 Mitigation plus: Add 2nd NBR (for 1 NBL, 1 NBT & 2 NBR), add EBR (for 1 EBL, 2 EBT & 1 EBR), & add 2nd WBL (for 2 WBL, 2 WBT & 1 WBR)
94. Commerce Center & SR-126	None Feasible. Planned improvements to this location, to consist of replacing the existing at-grade intersection with a grade separated intersection (expected to be complete by 2008), makes it infeasible to mitigate the project's stand-alone impacts. The project is responsible for it's share (11%) of the grade separated intersection.
110. Chiquito Canyon/ Long Canyon & SR-126	Phase 1 Mitigation
2010 / Phase 1 + Phase 2 + Phase 3 Only	
7. I-5 SB Ramps & SR-126	Add 3rd WBT (for 3 WBT & 1 free flow WBR)
8. I-5 NB Ramps & SR-126	None
80. Wolcott & SR-126	Phase 2 Mitigation plus: Add 3rd EBT (for 1 EBL, 3 EBT & 1 EBR)
94. Commerce Center & SR-126	None Feasible. Planned improvements to this location, to consist of replacing the existing at-grade intersection with a grade separated intersection (expected to be complete by 2008), makes it infeasible to mitigate the project's stand-alone impacts. The project is responsible for it's share (22%) of the grade separated intersection.
110. Chiquito Canyon/ Long Canyon & SR-126	Phase 2 Mitigation plus: Add 2nd NBT & 2nd NBR (for 1 NBL, 2 NBT & 2 NBR), add SBR (for 1 SBL, 1 SBT & 1 SBR), add EBR (for 1 EBL, 2 EBT & 1 EBR) & add 2nd WBL (for 2 WBL, 2 WBT & 1 WBR)
2010 / Phase 1 + Phase 2 + Phase 3 + Related Projects	
7. I-5 SB Ramps & SR-126	Add 3rd SBL (for 2 SBL, 1 shared SBL/SBR, 1 SBR), add 3rd & 4th EBT (for 4 EBT & free flow EBR), & add 4th WBT (for 4 WBT & free flow WBR) Phase 1 Share = 7% Phase 2 Share = 7 % Phase 3 Share = 18% Total Project Share = 32%

(Continued)

Table 6-1 (Continued)
PROPOSED MITIGATION – OFF-SITE & ACCESS LOCATIONS

LOCATION	MITIGATION
2010 / Phase 1 + Phase 2 + Phase 3 + Related Projects (Continued)	
8. I-5 NB Ramps & SR-126	Add 3rd NBL (for 3 NBL & 1 NBR), add 3rd & 4th EBT (for 4 EBT & free flow EBR), & add 3rd WBT (for 3 WBT & free flow WBR) (Note: County LOS methodology indicates a 4th WBT is required while Caltrans LOS methodology results in LOS B with the 3 WBT as proposed.) Phase 1 Share = 5% Phase 2 Share = 4% Phase 3 Share = 12% Total Project Share = 21%
80. Wolcott & SR-126	Add 2nd SBL (for 2 SBL, 1 SBT & 1 SBR), add 2nd EBL (for 2 EBL, 3 EBT & 1 EBR), & add 3rd WBT (for 2 WBL, 3 WBT & 1 WBR) Phase 1 Share = 12% Phase 2 Share = 19% Phase 3 Share = 30% Total Project Share = 61%
81, 82 & 83 Commerce Center & SR-126 Grade Separated Intersection	Construct Grade Separated Interchange Phase 1 Share = 8% Phase 2 Share = 11% Phase 3 Share = 22% Total Project Share = 41%
110. Chiquito Canyon/ Long Canyon & SR-126	Add 2nd NBL (for 2 NBL, 2 NBT & 2 NBR), add 2 SBL, 2nd & 3rd SBT (for 2 SBL, 3 SBT & 1 SBR), add 2nd EBL & 3rd EBT (for 2 EBL, 3 EBT & 1 EBR) & add 3rd WBT (for 2 WBL, 3 WBT & 1 WBR) Phase 1 Share = 3% Phase 2 Share = 16% Phase 3 Share = 43% Total Project Share = 62%

See Section 6.3 for Share Calculations

Since each of the impacted intersections are located on a state highway, the Highway Capacity Manual signalized intersection methodology has been used to evaluate capacity and LOS. This is the evaluation methodology prescribed by Caltrans in their guide for the preparation of traffic impact studies (see Reference 9 in Section 1.6). The procedure determines level of service from the average control delay per vehicle during the peak hours and in this way is different from the County's ICU methodology which determines level of service from percent of used capacity. Related project volumes are also included with the calculations as prescribed by the Caltrans traffic study guidelines.

Table 6-2 summarizes the average control delay per vehicle and level of service for each intersection by phase. Average control delay ranges from 8.9 seconds per vehicle (s/veh) to 39.1 s/veh, per intersection, and in no case does the level of service exceed the midpoint of LOS D.

To provide a comparison to the ICU based level of service evaluations presented in the impact analysis section of this report, ICUs calculated using the County's prescribed methodology are presented in Table 6-3.

Figure 6-1 illustrates the off-site improvement program developed for this project. For each of the intersections identified with significant impacts due to the project, the mitigation measures identified above will form the improvement program for the project phases. The SR-126 corridor between the Los Angeles/Ventura County line and Commerce Center Drive is currently being evaluated for Caltrans to develop an overall improvement program. The findings and mitigation measures outlined in this report are consistent with the traffic analysis prepared for the SR-126 study (see Reference 10 in Section 1.6).

6.3 PROJECT'S SHARE OF FUTURE TRAFFIC

For impacts that are the result of the cumulative effect of project traffic together with related project traffic, the project is responsible for a fair share cost of the mitigation. To determine the projects fair share, the total volume of project traffic during the AM and PM peak hours (P) is divided by the total volume of related project traffic (R) during the AM and PM peak hours plus project traffic, as shown in the following equation:

$$\text{Project Share} = (P) / (P + R)$$

Table 6-4 provides the traffic volumes and resulting share calculations for each of the off-site study intersections.

Table 6-2

INTERSECTION AVERAGE CONTROL DELAY – WITH MITIGATION

INTERSECTION	AM PEAK HOUR AVE. DELAY (s)	LOS	PM PEAK HOUR AVE. DELAY (s)	LOS
2007 / Phase 1 & Related Projects				
7. I-5 SB Ramps & SR-126	12.2	B	10.1	B
8. I-5 NB Ramps & SR-126	12.9	B	9.5	A
80. Wolcott & SR-126	24.6	C	33.1	C
110. Chiquito/Long Canyon & SR-126	33.0	C	31.1	C
2008 / Phase 2 & Related Projects				
7. I-5 SB Ramps & SR-126	12.7	B	9.1	A
8. I-5 NB Ramps & SR-126	14.3	B	10.0	B
80. Wolcott & SR-126	36.9	D	38.8	D
110. Chiquito/Long Canyon & SR-126	38.5	D	31.8	C
2010 / Phase 3 & Related Projects				
7. I-5 SB Ramps & SR-126	15.9	B	8.9	A
8. I-5 NB Ramps & SR-126	15.6	B	10.4	B
80. Wolcott & SR-126	28.7	C	32.8	C
110. Chiquito/Long Canyon & SR-126	39.1	D	22.3	C

Control Delay per Vehicle (s/veh)	Level of Service
0.0 – 10.0	A
10.1 – 20.0	B
20.1 – 35.0	C
35.1 – 55.0	D
55.1 – 80.0	E
Above 80.0	F

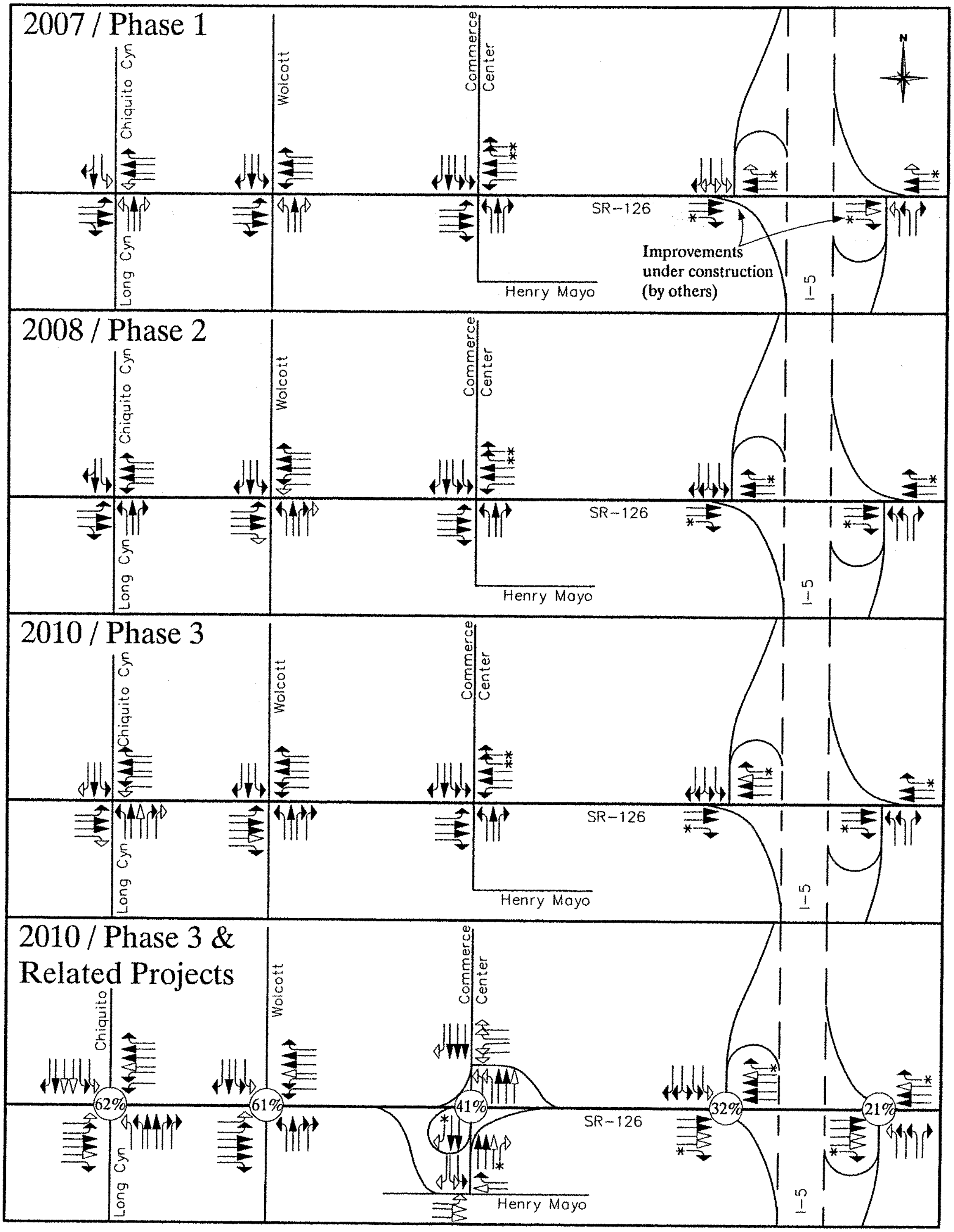
Average Control Delay measured in seconds per vehicle (s/veh) based on Highway Capacity Manual (HCM) methodology.
LOS = Level of Service
See Appendix B for HCM summary worksheets

Table 6-3

ICU AND LOS SUMMARY – WITH PROJECT MITIGATION

INTERSECTION		WITHOUT PROJECT AM		WITHOUT PROJECT PM		WITH PROJECT AM		WITH PROJECT PM		WITH PROJECT & RELATED PROJ. AM		WITH PROJECT & RELATED PROJ. PM	
2007 / Phase 1													
80. Wolcott & SR-126	– Without Mitigation	.36	A	.45	A	.52	A	.69	B				
	– *With Mitigation*					*.46*	*A*	*.62*	*B*				
110. Chiquito/Long Canyon & SR-126	– Without Mitigation	.39	A	.46	A	.41	A	.49	A				
	– *With Mitigation*					*.40*	*A*	*.46*	*A*				
2008 / Phases 1 + 2													
80. Wolcott & SR-126	– Without Mitigation	.36	A	.46	A	.80	C	1.00	E				
	– *With Mitigation*					*.51*	*A*	*.72*	*C*				
94. Commerce Center & SR-126	– Without Mitigation	.55	A	.74	C	.68	B	.92	E				
	– *With Mitigation*							(1)					
110. Chiquito/Long Canyon & SR-126	– Without Mitigation	.40	A	.46	A	.56	A	.73	A				
	– *With Mitigation*					*.50*	*A*	*.66*	*B*				
2010 / Phases 1 + 2 + 3													
7. I-5 SB Ramps & SR-126	– Without Mitigation	.54	A	.49	A	.79	C	.66	B	1.14	F	1.06	F
	– *With Mitigation*					*.60*	*A*	.51	*A*	*.88*	*D*	*.62*	*B*
8. I-5 NB Ramps & SR-126	– Without Mitigation	.52	A	.53	A	.74	C	.73	C	1.40	F	1.34	F
	– *With Mitigation*									*.88*	*D*	*.80*	*C*
80. Wolcott & SR-126	– Without Mitigation	.37	A	.47	A	1.05	F	1.31	F	.82	D	.90	D
	– *With Mitigation*					*.62*	*B*	*.71*	*C*	*.72*	*C*	*.75*	*C*
81. Commerce Center & Henry Mayo	– Without Mitigation	--		--		--		--		.66	B	.44	A
	– *With Mitigation*												
83. Commerce Center & SR-126 WB	– Without Mitigation	--		--		--		--		.78	C	.64	B
	– *With Mitigation*												
94. Commerce Center & SR-126	– Without Mitigation	.58	A	.77	C	.95	E	1.08	F	(1)		(1)	
	– *With Mitigation*					(1)		(1)					
110. Chiquito/Long Canyon & SR-126	– Without Mitigation	.40	A	.48	A	1.08	F	1.35	F	1.07	F	.81	D
	– *With Mitigation*					*.67*	*B*	*.73*	*C*	*.79*	*C*	*.64*	*B*

Notes:
(1) The Commerce Center Drive/SR-126 grade separation (see intersections 81-83) is required for the Related Project 2008 & 2010 scenarios and serves as mitigation for project stand alone and cumulative impacts.



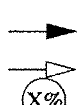


Figure 6-1

OFF-SITE IMPROVEMENT PROGRAM

Table 6-4

PROJECT SHARE CALCULATIONS

LOCATION	EXISTING + AMBIENT	EXISTING + AMBIENT + PROJECT + RELATED PROJECTS	Project Phase 1	Project Phase 2	Project Phase 3	Project Total
2007 / Phase 1						
7. I-5 SB Ramps & SR-126						
AM	2660	7335	263	243	819	1325
PM	3284	7455	353	357	815	1525
Share			7%	7%	18%	32%
8. I-5 NB Ramps & SR-126						
AM	2119	6983	160	148	654	962
PM	2257	6664	275	222	468	965
Share			5%	4%	12%	21%
80. Wolcott & SR-126						
AM	1613	5494	360	538	1103	2001
PM	2350	5433	485	795	998	2278
Share			12%	19%	30%	61%
96. San Martinez & SR-126						
AM	1501	2520	8	22	79	109
PM	2150	2532	10	56	93	159
Share			1%	6%	12%	19%
110. Chiquito Canyon/Long Canyon & SR-126						
AM	1695	4253	57	276	1009	1342
PM	2304	4466	76	495	1030	1601
Share			3%	16%	43%	62%
Commerce Center/SR-126 Interchange		*				
AM	2953	7456	300	449	978	1727
PM	3376	7713	403	524	950	1877
Share			8%	11%	22%	41%

Project Share = (Project Traffic) / (Project + Related Project Traffic)

APPENDIX A
INTERSECTION CAPACITY UTILIZATION WORKSHEETS

Peak hour intersection volume/capacity ratios are calculated by means of intersection capacity utilization (ICU) values. ICU calculations were performed for the intersections shown in Figure A-1.

The procedure is based on the critical movement methodology, and shows the amount of capacity utilized by each critical move. A "de-facto" right-turn lane is used in the ICU calculation for cases where a curb lane is wide enough to separately serve both through and right-turn traffic (typically with a width of 19 feet from curb to outside of through-lane with parking prohibited during peak periods). Such lanes are treated the same as striped right-turn lanes during the ICU calculations, but they are denoted on the ICU calculation worksheets using the letter "d" in place of a numerical entry for right-turn lanes.

The methodology also incorporates a check for right-turn capacity utilization. Both right-turn-on-green (RTOG) and right-turn-on-red (RTOR) capacity availability are calculated and checked against the total right-turn capacity need. If insufficient capacity is available, then an adjustment is made to the total capacity utilization value. The following example shows how this adjustment is made.

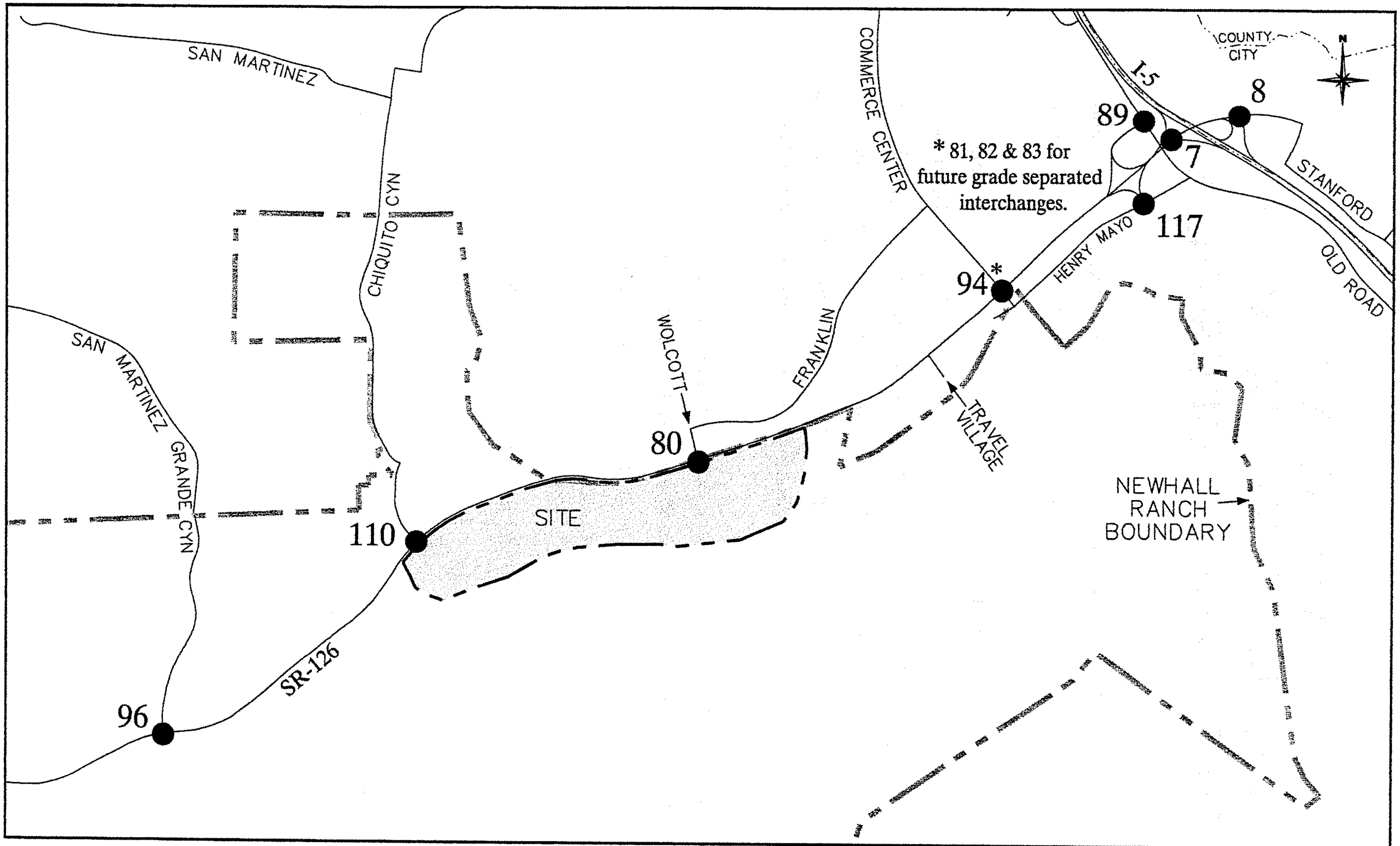
Example of Right-turn Capacity Utilization For Northbound Right

1. <u>Right-Turn-On-Green (RTOG)</u>

If NBT is critical move, then:
RTOG = V/C (NBT)
Otherwise,
RTOG = V/C (NBL) + V/C (SBT) - V/C (SBL)

2. <u>Right-Turn-On-Red (RTOR)</u>

If WBL is critical move, then:
RTOR = V/C (WBL)
Otherwise,
RTOR = V/C (EBL) + V/C (WBT) - V/C (EBT)



Legend

● Study Intersection

Figure A-1

INTERSECTION STUDY LOCATIONS

3. Right-Turn Overlap Adjustment

If the northbound right is assumed to overlap with the adjacent westbound left, adjustments to the RTOG and RTOR values are made as follows:

RTOG = RTOG + V/C (WBL)
RTOR = RTOR - V/C (WBL)

4. Total Right-Turn Capacity (RTC) Availability For NBR

RTC = RTOG + factor x RTOR
Where factor = RTOR saturation flow factor (typically 75%)

5. Right-turn Adjustment for ICU Calculation

Right-turn adjustment is then as follows: Additional ICU = V/C (NBR) - RTC

A zero or negative value indicates that adequate capacity is available and no adjustment is necessary. A positive value indicates that the available RTOR and RTOG capacity does not adequately accommodate the right-turn V/C, therefore the right-turn is essentially considered to be a critical movement. In such cases, the right-turn adjustment is noted on the ICU worksheet and it is included in the total capacity utilization value. When it is determined that a right-turn adjustment is required for more than one right-turn movement, the word "multi" is printed on the worksheet instead of an actual right-turn movement reference, and the right-turn adjustments are cumulatively added to the total capacity utilization value. In such cases, further operational evaluation is typically carried out to determine if under actual operational conditions, the critical right-turns would operate simultaneously, and therefore a right-turn adjustment credit should be applied.

Shared Lane V/C Methodology

For intersection approaches where shared usage of a lane is permitted by more than one turn movement (e.g., left/through, through/right, left/through/right), the individual turn volumes are evaluated to determine whether dedication of the shared lane is warranted to any one given turn movement. The following example demonstrates how this evaluation is carried out:

Example of Shared Lane Utilization for Shared Left/Through Lane

1. Average Lane Volume (ALV)

$$\text{ALV} = \frac{\text{Left-Turn Volume + Through Volume}}{\text{Total Left + Through Approach Lanes (including shared lane)}}$$

2. ALV for Each Approach

$$\text{ALV (Left)} = \frac{\text{Left-Turn Volume}}{\text{Left Approach Lanes (including shared lane)}}$$

$$\text{ALV (Through)} = \frac{\text{Through Volume}}{\text{Through Approach Lanes (including shared lane)}}$$

3. Lane Dedication is Warranted

If ALV (Left) is greater than ALV then full dedication of the shared lane to the left-turn approach is warranted. Left-turn and through V/C ratios for this case are calculated as follows:

$$\text{V/C (Left)} = \frac{\text{Left-Turn Volume}}{\text{Left Approach Capacity (including shared lane)}}$$

$$\text{V/C (Through)} = \frac{\text{Through Volume}}{\text{Through Approach Capacity (excluding shared lane)}}$$

Similarly, if ALV (Through) is greater than ALV then full dedication to the through approach is warranted, and left-turn and through V/C ratios are calculated as follows:

$$\text{V/C (Left)} = \frac{\text{Left-Turn Volume}}{\text{Left Approach Capacity (excluding shared lane)}}$$

$$\text{V/C (Through)} = \frac{\text{Through Volume}}{\text{Through Approach Capacity (including shared lane)}}$$

4. Lane Dedication is not Warranted

If ALV (Left) and ALV (Through) are both less than ALV, the left/through lane is assumed to be truly shared and each left, left/through or through approach lane carries an evenly distributed volume of traffic equal to ALV. A combined left/through V/C ratio is calculated as follows:

$$\text{V/C (Left/Through)} = \frac{\text{Left-Turn Volume + Through Volume}}{\text{Total Left + Through Approach Capacity (including shared lane)}}$$

This V/C (Left/Through) ratio is assigned as the V/C (Through) ratio for the critical movement analysis and ICU summary listing.

If split phasing has not been designated for this approach, the relative proportion of V/C (Through) that is attributed to the left-turn volume is estimated as follows:

If approach has more than one left-turn (including shared lane), then:

$$\text{V/C (Left)} = \text{V/C (Through)}$$

If approach has only one left-turn lane (shared lane), then:

$$\text{V/C (Left)} = \frac{\text{Left-Turn Volume}}{\text{Single Approach Lane Capacity}}$$

If this left-turn movement is determined to be a critical movement, the V/C (Left) value is posted in brackets on the ICU summary printout.

These same steps are carried out for shared through/right lanes. If full dedication of a shared through/right lane to the right-turn movement is warranted, the right-turn V/C value calculated in step three is checked against the RTOR and RTOG capacity availability if the option to include right-turns in the V/C ratio calculations is selected. If the V/C value that is determined using the shared lane methodology described here is reduced due to RTOR and RTOG capacity availability, the V/C value for the through/right lanes is posted in brackets.

When an approach contains more than one shared lane (e.g., left/through and through/right), steps one and two listed above are carried out for the three turn movements combined. Step four is carried out if dedication is not warranted for either of the shared lanes. If dedication of one of the shared lanes is warranted to one movement or another, step three is carried out for the two movements involved, and then steps one through four are repeated for the two movements involved in the other shared lane.

APPENDIX B
HIGHWAY CAPACITY MANUAL LEVEL OF SERVICE CALCULATIONS

2. Long Cyn & A Street

(On-Site) River Village/Newhall Ranch Buildout

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	204	.13	41	.03*
NBT	2	3200	1405	.44*	486	.15
NBR	1	1600	218	.14	143	.09
SBL	2	2880	207	.07*	529	.18
SBT	2	3200	281	.09	1112	.35*
SBR	1	1600	8	.01	30	.02
EBL	2	2880	105	.04*	335	.12
EBT	1	1600	11	.02	20	.06*
EBR	0	0	17		80	
WBL	2	2880	105	.04	366	.13*
WBT	0.5	3200	22	{.04}*	38	{.05}
WBR	1.5		188		412	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.69		.67

7. I-5 SB Ramps & SR-126

Existing Count (2003)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	f		147		132	
EBL	0	0	0		0	
EBT	2	3200	304	.10	425	.13
EBR	f		639		1058	
WBL	0	0	0		0	
WBT	2	3200	943	.29*	822	.26*
WBR	0	0	0		0	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.39		.36

2007 without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		275		308	.10*
SBT	0	4800	0	.09*	0	
SBR	1.5		159		143	.09
EBL	0	0	0		0	
EBT	2	3200	328	.10	459	.14
EBR	f		690		1143	
WBL	0	0	0		0	
WBT	2	3200	1018	.32*	888	.28*
WBR	f		49		173	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.51		.48

2007 with Phase 1

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		275		308	
SBT	0	4800	0	.09*	0	.10*
SBR	1.5		164		159	
EBL	0	0	0		0	
EBT	2	3200	426	.13	522	.16
EBR	f		788		1206	
WBL	0	0	0		0	
WBT	2	3200	1080	.34*	1099	.34*
WBR	f		49		173	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.53		.54

2007 with Phase 1 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		895	.28*	658	.21*
SBT	0	4800	0		0	
SBR	1.5		225	.14	214	.13
EBL	0	0	0		0	
EBT	2	3200	585	.18	989	.31
EBR	f		881		1280	
WBL	0	0	0		0	
WBT	2	3200	1796	.56*	1345	.42*
WBR	f		62		232	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.94		.73

7. I-5 SB Ramps & SR-126

2007 with Phase 1 & Related Proj & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		895	.28*	658	.21*
SBT	0	4800	0		0	
SBR	1.5		225	.14	214	.13
EBL	0	0	0		0	
EBT	2	3200	585	.18	989	.31*
EBR	f		881		1280	
WBL	0	0	0		0	
WBT	3	4800	1796	.37*	1345	.28
WBR	f		62		232	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.75		.62

7. I-5 SB Ramps & SR-126

2008 without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		281		314	.10*
SBT	0	4800	0	.09*	0	
SBR	1.5		162		145	.09
EBL	0	0	0		0	
EBT	2	3200	334	.10	468	.15
EBR	f		703		1164	
WBL	0	0	0		0	
WBT	2	3200	1037	.32*	904	.28*
WBR	f		50		176	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.51		.48

2008 with Phase 2

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		281		314	
SBT	0	4800	0	.10*	0	.10*
SBR	1.5		189		180	
EBL	0	0	0		0	
EBT	2	3200	497	.16	616	.19
EBR	f		873		1342	
WBL	0	0	0		0	
WBT	2	3200	1183	.37*	1253	.39*
WBR	f		50		176	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.57		.59

2008 with Phase 2 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		906	.28*	689	.22*
SBT	0	4800	0		0	
SBR	1.5		407	.25	308	.19
EBL	0	0	0		0	
EBT	2	3200	1038	.32	2126	.66*
EBR	f		1210		1647	
WBL	0	0	0		0	
WBT	2	3200	3254	1.02*	2034	.64
WBR	f		63		239	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				1.40		.98

2008 with Phase 2 & Related Proj & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2.5		906		689	
SBT	0	6400	0	.21*	0	{.15}*
SBR	1.5		407		308	
EBL	0	0	0		0	
EBT	4	6400	1038	.16	2126	.33*
EBR	f		1210		1647	
WBL	0	0	0		0	
WBT	4	6400	3254	.51*	2034	.32
WBR	f		63		239	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.82		.58

7. I-5 SB Ramps & SR-126

2010 without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		291		325	.10*
SBT	0	4800	0	.10*	0	
SBR	1.5		168		150	.09
EBL	0	0	0		0	
EBT	2	3200	347	.11	484	.15
EBR	f		728		1206	
WBL	0	0	0		0	
WBT	2	3200	1075	.34*	937	.29*
WBR	f		51		182	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.54		.49

2010 with Phase 3/Full Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		291		325	
SBT	0	4800	0	.12*	0	.11*
SBR	1.5		292		212	
EBL	0	0	0		0	
EBT	2	3200	567	.18	934	.29
EBR	f		968		1703	
WBL	0	0	0		0	
WBT	2	3200	1816	.57*	1453	.45*
WBR	f		51		182	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.79		.66

2010 with Phase 3 & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		291		325	
SBT	0	4800	0	.12*	0	.11*
SBR	1.5		292		212	
EBL	0	0	0		0	
EBT	2	3200	567	.18	934	.29
EBR	f		968		1703	
WBL	0	0	0		0	
WBT	3	4800	1816	.38*	1453	.30*
WBR	f		51		182	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.60		.51

2010 with Phase 3 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		926		658	.21*
SBT	0	4800	0	.29*	0	
SBR	1.5		472		330	{.00}
EBL	0	0	0		0	
EBT	2	3200	1044	.33	2386	.75*
EBR	f		1237		1769	
WBL	0	0	0		0	
WBT	3	4800	3591	.75*	2042	.43
WBR	f		65		270	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				1.14		1.06

7. I-5 SB Ramps & SR-126

2010 with Phase 3 & Related Proj & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2.5		926		658	
SBT	0	6400	0	.22*	0	.15*
SBR	1.5		472		330	
EBL	0	0	0		0	
EBT	4	6400	1044	.16	2386	.37*
EBR	f		1237		1769	
WBL	0	0	0		0	
WBT	4	6400	3591	.56*	2042	.32
WBR	f		65		270	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.88		.62

7. I-5 SB Ramps & SR-126

Existing with Phase 3/Full Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	f		271		194	
EBL	0	0	0		0	
EBT	2	3200	524	.16	875	.27
EBR	f		879		1555	
WBL	0	0	0		0	
WBT	2	3200	1684	.53*	1338	.42*
WBR	0	0	0		0	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.63		.52

Existing with Phase 3 & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	2	3200	271	.08	194	.06
EBL	0	0	0		0	
EBT	4	6400	524	.08	875	.14
EBR	f		879		1555	
WBL	0	0	0		0	
WBT	4	6400	1684	.26*	1338	.21*
WBR	0	0	0		0	
Right Turn Adjustment			SBR	.08*	SBR	.06*
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.44		.37

8. I-5 NB Ramps & SR-126

Existing Count (2003)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	639	.40*	620	.39*
NBT	0	0	0		0	
NBR	1	1600	201	.13	36	.02
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	1	1600	216	.14*	220	.14*
EBR	f		88		205	
WBL	1.5		111	.07*	251	{.14}*
WBT	0.5	3200	304	.19	202	.14
WBR	0	0	0		0	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.71		.77

2007 without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	2880	690	.24*	670	.23*
NBT	0	0	0		0	
NBR	1	1600	217	.14	39	.02
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3200	509	.16*	545	.17*
EBR	f		95		221	
WBL	0	0	0		0	
WBT	2	3200	377	.12	391	.12
WBR	f		120		271	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.50		.50

2007 with Phase 1

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	2880	723	.25*	784	.27*
NBT	0	0	0		0	
NBR	1	1600	217	.14	39	.02
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3200	593	.19*	599	.19*
EBR	f		109		230	
WBL	0	0	0		0	
WBT	2	3200	406	.13	489	.15
WBR	f		120		271	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.54		.56

2007 with Phase 1 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	2880	997	.35*	956	.33*
NBT	0	0	0		0	
NBR	1	1600	612	.38	114	.07
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3200	1172	.37*	1253	.39*
EBR	f		306		396	
WBL	0	0	0		0	
WBT	2	3200	821	.26	623	.19
WBR	f		727		1165	
Right Turn Adjustment			NBR	.03*		
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.85		.82

8. I-5 NB Ramps & SR-126

2007 with Phase 1 & Related Proj & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	2880	997	.35*	956	.33*
NBT	0	0	0		0	
NBR	1	1600	612	.38	114	.07
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	4800	1172	.24	1253	.26*
EBR	f		306		396	
WBL	0	0	0		0	
WBT	2	3200	821	.26*	623	.19
WBR	f		727		1165	
Right Turn Adjustment			NBR	.01*		
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.72		.69

8. I-5 NB Ramps & SR-126

2008 without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	2880	703	.24*	682	.24*
NBT	0	0	0		0	
NBR	1	1600	221	.14	40	.03
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3200	518	.16*	556	.17*
EBR	f		97		226	
WBL	0	0	0		0	
WBT	2	3200	384	.12	398	.12
WBR	f		122		276	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.50		.51

2008 with Phase 2

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	2880	787	.27*	882	.31*
NBT	0	0	0		0	
NBR	1	1600	221	.14	40	.03
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3200	662	.21*	662	.21*
EBR	f		116		268	
WBL	0	0	0		0	
WBT	2	3200	445	.14	547	.17
WBR	f		122		276	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.58		.62

2008 with Phase 2 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	2880	2033	.71*	1260	.44*
NBT	0	0	0		0	
NBR	1	1600	616	.39	114	.07
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3200	1615	.50*	2366	.74*
EBR	f		328		447	
WBL	0	0	0		0	
WBT	2	3200	1285	.40	1012	.32
WBR	f		729		1182	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				1.31		1.28

2008 with Phase 2 & Related Proj & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	3	4320	2033	.47*	1260	.29*
NBT	0	0	0		0	
NBR	1	1600	616	.39	114	.07
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	4	6400	1615	.25*	2366	.37*
EBR	f		328		447	
WBL	0	0	0		0	
WBT	4	6400	1285	.20	1012	.16
WBR	f		729		1182	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.82		.76

8. I-5 NB Ramps & SR-126

2010 without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	2880	728	.25*	707	.25*
NBT	0	0	0		0	
NBR	1	1600	229	.14	41	.03
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3200	537	.17*	576	.18*
EBR	f		100		234	
WBL	0	0	0		0	
WBT	2	3200	398	.12	413	.13
WBR	f		127		286	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.52		.53

2010 with Phase 3/Full Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	2880	1213	.42*	1018	.35*
NBT	0	0	0		0	
NBR	1	1600	229	.14	41	.03
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3200	716	.22*	899	.28*
EBR	f		142		360	
WBL	0	0	0		0	
WBT	2	3200	654	.20	618	.19
WBR	f		127		286	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.74		.73

2010 with Phase 3 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	2880	2265	.79*	1286	.45*
NBT	0	0	0		0	
NBR	1	1600	624	.39	114	.07
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3200	1635	.51*	2532	.79*
EBR	f		334		513	
WBL	0	0	0		0	
WBT	2	3200	1391	.43	1027	.32
WBR	f		734		1192	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				1.40		1.34

2010 with Phase 3 & Related Proj & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	3	4320	2265	.52*	1286	.30*
NBT	0	0	0		0	
NBR	1	1600	624	.39	114	.07
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	4	6400	1635	.26*	2532	.40*
EBR	f		334		513	
WBL	0	0	0		0	
WBT	4	6400	1391	.22	1027	.16
WBR	f		734		1192	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.88		.80

8. I-5 NB Ramps & SR-126

Existing with Phase 3/Full Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	1124	.70*	931	.58*
NBT	0	0	0		0	
NBR	1	1600	201	.13	36	.02
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	1	1600	395	.25	543	.34*
EBR	f		130		331	
WBL	1.5		111	.07	251	.16*
WBT	0.5	3200	560	.35*	407	.25
WBR	0	0	0		0	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION 1.15 1.18

Existing with Phase 3 & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	3	4320	1124	.26*	931	.22*
NBT	0	0	0		0	
NBR	1	1600	201	.13	36	.02
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	4	6400	395	.06	543	.08
EBR	f		130		331	
WBL	0	0	0		0	
WBT	3	4800	560	.12*	407	.08*
WBR	f		111		251	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .48 .40

57. Valencia & Magic Mtn

2010 with Related w/out Project (for CMP)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	12	.01	44	.03
NBT	3	4800	770	.24*	1241	.37*
NBR	0	0	360		546	
SBL	1	1600	113	.07*	214	.13*
SBT	3	4800	1367	.28	1286	.27
SBR	f		899		800	
EBL	2	2880	455	.16*	1092	.38*
EBT	2	3200	695	.22	1275	.40
EBR	0	0	7		5	
WBL	2	2880	608	.21	353	.12
WBT	2	3200	1123	.35*	770	.24*
WBR	1	1600	134	.08	293	.18
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.92		1.22

2010 with Related & Project (for CMP)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	13	.01	45	.03
NBT	3	4800	772	.24*	1258	.38*
NBR	0	0	362		553	
SBL	1	1600	113	.07*	214	.13*
SBT	3	4800	1375	.29	1288	.27
SBR	f		910		805	
EBL	2	2880	458	.16*	1096	.38*
EBT	2	3200	705	.22	1287	.40
EBR	0	0	8		5	
WBL	2	2880	620	.22	356	.12
WBT	2	3200	1143	.36*	779	.24*
WBR	1	1600	134	.08	293	.18
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.93		1.23

80. Wolcott & SR-126

Existing Count (2003)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	5		0	
NBT	1	1600	0	.00	0	.00
NBR	0	0	0		0	
SBL	1.5		1		2	
SBT	0.5	3200	0	.00*	0	.00*
SBR	1	1600	7	.00	20	.01
EBL	1	1600	12	.01*	4	.00
EBT	2	3200	662	.21	1030	.32*
EBR	0	0	1		0	
WBL	1	1600	3	.00	0	.00
WBT	2	3200	731	.23*	1005	.31
WBR	1	1600	2	.00	0	.00
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.34		.42

2007 without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	1	1600	0	.00	0	.00
NBR	0	0	0		0	
SBL	1.5		1		2	
SBT	0.5	3200	0	.00*	0	.00*
SBR	1	1600	8	.01	22	.01
EBL	1	1600	13	.01*	4	.00
EBT	2	3200	715	.22	1112	.35*
EBR	0	0	0		0	
WBL	1	1600	0	.00	0	.00
WBT	2	3200	789	.25*	1085	.34
WBR	1	1600	2	.00	0	.00
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.36		.45

2007 with Phase 1

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	3		2	
NBT	1	1600	42	.15*	27	.10*
NBR	0	0	196		126	
SBL	1.5		1		2	
SBT	0.5	3200	14	.01	49	.03
SBR	1	1600	8	.01	22	.01
EBL	1	1600	13	.01	4	.00
EBT	2	3200	743	.23*	1130	.35*
EBR	0	0	1		3	
WBL	1	1600	66	.04*	227	.14*
WBT	2	3200	799	.25	1118	.35
WBR	1	1600	2	.00	0	.00
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.52		.69

2007 with Phase 1 & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	3	.00	2	.00
NBT	1	1600	42	.03*	27	.02
NBR	1	1600	196	.12	126	.08
SBL	1	1600	1	.00	2	.00
SBT	1	1600	14	.01	49	.03*
SBR	1	1600	8	.01	22	.01
EBL	1	1600	13	.01	4	.00
EBT	2	3200	743	.23*	1130	.35*
EBR	0	0	1		3	
WBL	1	1600	66	.04*	227	.14*
WBT	2	3200	799	.25	1118	.35
WBR	1	1600	2	.00	0	.00
Right Turn Adjustment			NBR	.06*		
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.46		.62

80. Wolcott & SR-126

2007 with Phase 1 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	3	.00	2	.00
NBT	1	1600	42	.03*	27	.02*
NBR	1	1600	196	.12	126	.08
SBL	1	1600	14	.01*	84	.05*
SBT	1	1600	14	.01	49	.03
SBR	1	1600	13	.01	53	.03
EBL	1	1600	40	.03	21	.01
EBT	2	3200	1029	.32*	1130	.35*
EBR	0	0	1		3	
WBL	1	1600	66	.04*	227	.14*
WBT	2	3200	948	.30	1191	.37
WBR	1	1600	160	.10	13	.01
Right Turn Adjustment			NBR	.06*		
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .56 .66

80. Wolcott & SR-126

2008 without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	1	1600	0	.00	0	.00
NBR	0	0	0		0	
SBL	1.5		1		2	
SBT	0.5	3200	0	.00*	0	.00*
SBR	1	1600	8	.01	22	.01
EBL	1	1600	13	.01*	4	.00
EBT	2	3200	728	.23	1133	.35
EBR	0	0	0		0	
WBL	1	1600	0	.00	0	.00
WBT	2	3200	804	.25*	1106	.35*
WBR	1	1600	2	.00	0	.00
Right Turn Adjustment					SBR	.01*
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.36		.46

2008 with Phase 2

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	26		72	
NBT	1	1600	71	.29*	28	.26*
NBR	0	0	373		311	
SBL	1.5		1		2	
SBT	0.5	3200	7	.00	103	.06
SBR	1	1600	10	.01	40	.03
EBL	1	1600	28	.02	11	.01
EBT	2	3200	880	.29*	1217	.41*
EBR	0	0	40		104	
WBL	1	1600	184	.12*	360	.23*
WBT	2	3200	832	.26	1299	.41
WBR	1	1600	2	.00	0	.00
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.80		1.00

2008 with Phase 2 & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	26	.02	72	.05*
NBT	1	1600	71	.04*	28	.02
NBR	2	3200	373	.12	311	.10
SBL	1	1600	1	.00	2	.00
SBT	1	1600	7	.00	103	.06*
SBR	1	1600	10	.01	40	.03
EBL	1	1600	28	.02	11	.01
EBT	2	3200	880	.28*	1217	.38*
EBR	1	1600	40	.03	104	.07
WBL	2	2880	184	.06*	360	.13*
WBT	2	3200	832	.26	1299	.41
WBR	1	1600	2	.00	0	.00
Right Turn Adjustment			NBR	.03*		
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.51		.72

2008 with Phase 2 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	26	.02	72	.05*
NBT	1	1600	71	.04*	28	.02
NBR	2	3200	373	.12	311	.10
SBL	1.5		58	{.02}*	375	
SBT	0.5	3200	7	.02	103	.15*
SBR	1	1600	17	.01	184	.12
EBL	1	1600	288	.18	27	.02
EBT	2	3200	1801	.56*	1444	.45*
EBR	1	1600	40	.03	104	.07
WBL	2	2880	184	.06*	360	.13*
WBT	2	3200	1152	.36	1748	.55
WBR	1	1600	593	.37	48	.03
Right Turn Adjustment			NBR	.03*		
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.81		.88

80. Wolcott & SR-126

2008 with Phase 2 & Related Proj & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	26	.02	72	.05
NBT	1	1600	71	.04*	28	.02*
NBR	2	3200	373	.12	311	.10
SBL	2	2880	58	.02*	375	.13*
SBT	1	1600	7	.00	103	.06
SBR	1	1600	17	.01	184	.12
EBL	1	1600	288	.18	27	.02
EBT	2	3200	1801	.56*	1444	.45*
EBR	1	1600	40	.03	104	.07
WBL	2	2880	184	.06*	360	.13*
WBT	2	3200	1152	.36	1748	.55
WBR	1	1600	593	.37	48	.03
Right Turn Adjustment			NBR	.03*		
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.81		.83

80. Wolcott & SR-126

2010 without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	1	1600	0	.00	0	.00
NBR	0	0	0		0	
SBL	1.5		1		2	
SBT	0.5	3200	0	.00*	0	.00*
SBR	1	1600	8	.01	23	.01
EBL	1	1600	14	.01*	5	.00
EBT	2	3200	755	.24	1174	.37*
EBR	0	0	0		0	
WBL	1	1600	0	.00	0	.00
WBT	2	3200	833	.26*	1146	.36
WBR	1	1600	2	.00	0	.00
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.37		.47

2010 with Phase 3/Full Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	46		66	
NBT	1	1600	68	.30*	54	.43*
NBR	0	0	373		566	
SBL	1.5		1		2	
SBT	0.5	3200	24	.02	85	.05
SBR	1	1600	35	.02	95	.06
EBL	1	1600	44	.03	67	.04
EBT	2	3200	1065	.35*	1716	.56*
EBR	0	0	62		72	
WBL	1	1600	479	.30*	354	.22*
WBT	2	3200	1415	.44	1551	.48
WBR	1	1600	2	.00	0	.00
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				1.05		1.31

2010 with Phase 3 & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	46	.03*	66	.04*
NBT	1	1600	68	.04	54	.03
NBR	2	3200	373	.12	566	.18
SBL	1	1600	1	.00	2	.00
SBT	1	1600	24	.02*	85	.05*
SBR	1	1600	35	.02	95	.06
EBL	1	1600	44	.03*	67	.04*
EBT	3	4800	1065	.22	1716	.36
EBR	1	1600	62	.04	72	.05
WBL	2	2880	479	.17	354	.12
WBT	2	3200	1415	.44*	1551	.48*
WBR	1	1600	2	.00	0	.00
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.62		.71

2010 with Phase 3 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	46	.03	66	.04*
NBT	1	1600	68	.04*	54	.03
NBR	2	3200	373	.12	566	.18
SBL	1.5		51	{.02}*	304	
SBT	0.5	3200	24	.02	85	.12*
SBR	1	1600	104	.07	215	.13
EBL	1	1600	276	.17*	130	.08*
EBT	3	4800	1871	.39	1745	.36
EBR	1	1600	62	.04	72	.05
WBL	2	2880	479	.17	354	.12
WBT	2	3200	1552	.49*	1794	.56*
WBR	1	1600	588	.37	48	.03
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.82		.90

80. Wolcott & SR-126

2010 with Phase 3 & Related Proj & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	46	.03	66	.04
NBT	1	1600	68	.04*	54	.03*
NBR	2	3200	373	.12	566	.18
SBL	2	2880	51	.02*	304	.11*
SBT	1	1600	24	.02	85	.05
SBR	1	1600	104	.07	215	.13
EBL	2	2880	276	.10	130	.05
EBT	3	4800	1871	.39*	1745	.36*
EBR	1	1600	62	.04	72	.05
WBL	2	2880	479	.17*	354	.12*
WBT	3	4800	1552	.32	1794	.37
WBR	1	1600	588	.37	48	.03
Right Turn Adjustment					NBR	.03*
Clearance Interval				.10*		.10*
Note: Assumes Right-Turn Overlap for NBR						
TOTAL CAPACITY UTILIZATION				.72		.75

80. Wolcott & SR-126

Existing with Phase 3/Full Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	51		66	
NBT	1	1600	68	.31*	54	.43*
NBR	0	0	373		566	
SBL	1.5		1		2	
SBT	0.5	3200	24	.02	85	.05
SBR	1	1600	34	.02	92	.06
EBL	1	1600	42	.03	66	.04
EBT	2	3200	972	.32*	1572	.51*
EBR	0	0	63		72	
WBL	1	1600	482	.30*	354	.22*
WBT	2	3200	1313	.41	1410	.44
WBR	1	1600	2	.00	0	.00
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				1.03		1.26

Existing with Phase 3 & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	51	.03*	66	.04*
NBT	1	1600	68	.04	54	.03
NBR	2	3200	373	.12	566	.18
SBL	2	2880	1	.00	2	.00
SBT	1	1600	24	.02*	85	.05*
SBR	1	1600	34	.02	92	.06
EBL	2	2880	42	.01	66	.02
EBT	3	4800	972	.20*	1572	.33*
EBR	1	1600	63	.04	72	.05
WBL	2	2880	482	.17*	354	.12*
WBT	3	4800	1313	.27	1410	.29
WBR	1	1600	2	.00	0	.00
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.52		.64

81. Commerce Ctr & Henry Mayo

2008 with Phase 2 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	2880	58	.02*	266	.09*
SBT	0	0	0		0	
SBR	1	1600	50	.03	61	.04
EBL	1	1600	233	.15*	154	.10*
EBT	2	3200	218	.07	152	.05
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1	1600	13	.01*	13	.01*
WBR	1	1600	295	.18	355	.22
Right Turn Adjustment			WBR	.15*	WBR	.14*
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.43		.44

81. Commerce Ctr & Henry Mayo

2010 with Phase 3 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	2880	56	.02*	488	.17*
SBT	0	0	0		0	
SBR	1	1600	45	.03	54	.03
EBL	1	1600	371	.23*	132	.08*
EBT	2	3200	175	.05	226	.07
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1	1600	15	.01*	10	.01*
WBR	1	1600	532	.33	348	.22
Right Turn Adjustment			WBR	.30*	WBR	.08*
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.66		.44

82. Commerce Ctr & SR-126 EB

2008 with Phase 2 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	4800	494	.10*	364	.08
NBR	f		32		147	
SBL	0	0	0		0	
SBT	2	3200	108	.03	326	.10*
SBR	f		396		1732	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.20		.20

82. Commerce Ctr & SR-126 EB

2010 with Phase 3 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	4800	867	.18*	327	.07
NBR	f		35		155	
SBL	0	0	0		0	
SBT	2	3200	101	.03	541	.17*
SBR	f		366		1663	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.28		.27

83. Commerce Ctr & SR-126 WB

2008 with Phase 2 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	2880	94	.03*	193	.07*
NBT	3	4800	400	.08	170	.04
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	464	.10*	1988	.41*
SBR	1	1600	80	.05	228	.14
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	2880	38	.01*	68	.02*
WBT	0	0	0		0	
WBR	2	3200	1868	.58	537	.17
Right Turn Adjustment			WBR	.53*		
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.77		.60

83. Commerce Ctr & SR-126 WB

2010 with Phase 3 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	2880	197	.07*	189	.07*
NBT	3	4800	670	.14	137	.03
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	430	.09*	2142	.45*
SBR	1	1600	121	.08	226	.14
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	2880	36	.01*	61	.02*
WBT	0	0	0		0	
WBR	2	3200	1727	.54	496	.16
Right Turn Adjustment			WBR	.51*		
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.78		.64

94. Commerce Center & SR-126

Existing Count (2003)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	28	.02	64	.04*
NBT	1	1600	152	.10*	44	.03
NBR	1	1600	21	.01	41	.03
SBL	2	2880	296	.10*	677	.24*
SBT	1	1600	39	.02	141	.09
SBR	1	1600	22	.01	53	.03
EBL	1	1600	27	.02*	23	.01*
EBT	2	3200	652	.20	827	.26
EBR	1	1600	51	.03	24	.02
WBL	1	1600	24	.02	23	.01
WBT	2	3200	632	.20*	922	.29*
WBR	f		648		123	
Clearance Interval				.10*		.10*

Note: Assumes N/S Split Phasing

TOTAL CAPACITY UTILIZATION .52 .68

2007 without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	30	.02	69	.04*
NBT	1	1600	164	.10*	48	.03
NBR	1	1600	23	.01	44	.03
SBL	2	2880	320	.11*	731	.25*
SBT	1	1600	42	.03	152	.10
SBR	1	1600	24	.02	57	.04
EBL	1	1600	29	.02	25	.02*
EBT	2	3200	704	.22*	893	.28
EBR	1	1600	55	.03	26	.02
WBL	1	1600	26	.02*	25	.02
WBT	2	3200	683	.21	996	.31*
WBR	f		700		133	
Clearance Interval				.10*		.10*

Note: Assumes N/S Split Phasing

TOTAL CAPACITY UTILIZATION .55 .72

2007 with Phase 1

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	35	.02	85	.05*
NBT	1	1600	164	.10*	48	.03
NBR	1	1600	23	.01	44	.03
SBL	2	2880	320	.11*	731	.25*
SBT	1	1600	42	.03	152	.10
SBR	1	1600	29	.02	73	.05
EBL	1	1600	43	.03	34	.02*
EBT	2	3200	900	.28*	1019	.32
EBR	1	1600	69	.04	35	.02
WBL	1	1600	26	.02*	25	.02
WBT	2	3200	749	.23	1223	.38*
WBR	f		700		133	
Clearance Interval				.10*		.10*

Note: Assumes N/S Split Phasing

TOTAL CAPACITY UTILIZATION .61 .80

2007 with Phase 1 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	94	.06	118	.07*
NBT	1	1600	194	.12*	62	.04
NBR	1	1600	35	.02	155	.10
SBL	2	2880	366	.13*	873	.30*
SBT	1	1600	46	.03	271	.17
SBR	1	1600	34	.02	86	.05
EBL	1	1600	91	.06*	48	.03
EBT	2	3200	1065	.33	1241	.39*
EBR	1	1600	126	.08	128	.08
WBL	1	1600	36	.02	61	.04*
WBT	2	3200	1045	.33*	1226	.38
WBR	f		939		272	
Clearance Interval				.10*		.10*

Note: Assumes N/S Split Phasing

TOTAL CAPACITY UTILIZATION .74 .90

94. Commerce Center & SR-126

2008 without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	31	.02	70	.04*
NBT	1	1600	167	.10*	48	.03
NBR	1	1600	23	.01	45	.03
SBL	2	2880	326	.11*	745	.26*
SBT	1	1600	43	.03	155	.10
SBR	1	1600	24	.02	58	.04
EBL	1	1600	30	.02*	25	.02*
EBT	2	3200	717	.22	910	.28
EBR	1	1600	56	.04	26	.02
WBL	1	1600	26	.02	25	.02
WBT	2	3200	695	.22*	1014	.32*
WBR	f		713		135	
Clearance Interval				.10*		.10*

Note: Assumes N/S Split Phasing

TOTAL CAPACITY UTILIZATION .55 .74

2008 with Phase 2

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	53	.03	130	.08*
NBT	1	1600	167	.10*	48	.03
NBR	1	1600	23	.01	45	.03
SBL	2	2880	326	.11*	745	.26*
SBT	1	1600	43	.03	155	.10
SBR	1	1600	53	.03	146	.09
EBL	1	1600	159	.10*	61	.04*
EBT	2	3200	1050	.33	1236	.39
EBR	1	1600	119	.07	59	.04
WBL	1	1600	26	.02	25	.02
WBT	2	3200	868	.27*	1398	.44*
WBR	f		713		135	
Clearance Interval				.10*		.10*

Note: Assumes N/S Split Phasing

TOTAL CAPACITY UTILIZATION .68 .92

94. Commerce Center & SR-126

2010 without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	32	.02	73	.05*
NBT	1	1600	173	.11*	50	.03
NBR	1	1600	24	.02	47	.03
SBL	2	2880	337	.12*	772	.27*
SBT	1	1600	44	.03	161	.10
SBR	1	1600	25	.02	60	.04
EBL	1	1600	31	.02*	26	.02*
EBT	2	3200	743	.23	943	.29
EBR	1	1600	58	.04	27	.02
WBL	1	1600	27	.02	26	.02
WBT	2	3200	720	.23*	1051	.33*
WBR	f		739		140	
Clearance Interval				.10*		.10*

Note: Assumes N/S Split Phasing

TOTAL CAPACITY UTILIZATION .58 .77

2010 with Phase 3/Full Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	140	.09	160	.10*
NBT	1	1600	173	.11*	50	.03
NBR	1	1600	24	.02	47	.03
SBL	2	2880	337	.12*	772	.27*
SBT	1	1600	44	.03	161	.10
SBR	1	1600	98	.06	170	.11
EBL	1	1600	185	.12*	69	.04
EBT	2	3200	1204	.38	1889	.59*
EBR	1	1600	124	.08	141	.09
WBL	1	1600	27	.02	26	.02*
WBT	2	3200	1585	.50*	1628	.51
WBR	f		739		140	
Clearance Interval				.10*		.10*

Note: Assumes N/S Split Phasing

TOTAL CAPACITY UTILIZATION .95 1.08

94. Commerce Center & SR-126

Existing with Phase 3/Full Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	136	.09	151	.09*
NBT	1	1600	152	.10*	44	.03
NBR	1	1600	21	.01	41	.03
SBL	2	2880	296	.10*	677	.24*
SBT	1	1600	39	.02	141	.09
SBR	1	1600	95	.06	163	.10
EBL	1	1600	181	.11*	66	.04
EBT	2	3200	1113	.35	1773	.55*
EBR	1	1600	117	.07	138	.09
WBL	1	1600	24	.02	23	.01*
WBT	2	3200	1497	.47*	1499	.47
WBR	f		648		123	
Clearance Interval				.10*		.10*

Note: Assumes N/S Split Phasing

TOTAL CAPACITY UTILIZATION .88 .99

Existing with Phase 3 & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	136	.09	151	.09*
NBT	1	1600	152	.10*	44	.03
NBR	1	1600	21	.01	41	.03
SBL	2	2880	296	.10*	677	.24*
SBT	1	1600	39	.02	141	.09
SBR	1	1600	95	.06	163	.10
EBL	1	1600	181	.11*	66	.04
EBT	3	4800	1113	.23	1773	.37*
EBR	1	1600	117	.07	138	.09
WBL	1	1600	24	.02	23	.01*
WBT	3	4800	1497	.31*	1499	.31
WBR	f		648		123	
Clearance Interval				.10*		.10*

Note: Assumes N/S Split Phasing

TOTAL CAPACITY UTILIZATION .72 .81

96. Martinez/Potrero & SR-126

Existing Count (2003)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	4		8	
SBT	1	1600	0	.00*	0	.01*
SBR	0	0	2		2	
EBL	1	1600	1	.00	0	.00
EBT	2	3200	650	.20	937	.29
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	659	.21*	934	.29*
WBR	0	0	1		5	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.31		.40

2007 without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	4		9	
SBT	1	1600	0	.00*	0	.01*
SBR	0	0	2		2	
EBL	1	1600	1	.00	0	.00
EBT	2	3200	702	.22	1012	.32
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	712	.22*	1009	.32*
WBR	0	0	1		5	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.32		.43

2007 with Phase 1

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	4		9	
SBT	1	1600	0	.00*	0	.01*
SBR	0	0	2		2	
EBL	1	1600	1	.00	0	.00
EBT	2	3200	704	.22	1018	.32
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	718	.22*	1013	.32*
WBR	0	0	1		5	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.32		.43

2007 with Phase 1 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	4		9	
SBT	1	1600	0	.01*	0	.01*
SBR	0	0	7		8	
EBL	1	1600	4	.00	11	.01*
EBT	2	3200	892	.28	1029	.32
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	911	.29*	1033	.32*
WBR	0	0	1		5	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.40		.44

96. Martinez/Potrero & SR-126

2008 without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	4		9	
SBT	1	1600	0	.00*	0	.01*
SBR	0	0	2		2	
EBL	1	1600	1	.00	0	.00
EBT	2	3200	715	.22	1031	.32
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	725	.23*	1027	.32*
WBR	0	0	1		6	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.33		.43

2008 with Phase 2

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	4		9	
SBT	1	1600	0	.00*	0	.01*
SBR	0	0	2		2	
EBL	1	1600	1	.00	0	.00
EBT	2	3200	732	.23	1066	.33
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	738	.23*	1058	.33*
WBR	0	0	1		6	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.33		.44

2008 with Phase 2 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	4		9	
SBT	1	1600	0	.01*	0	.01*
SBR	0	0	9		9	
EBL	1	1600	6	.00	14	.01*
EBT	2	3200	1457	.46*	1219	.38
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	987	.31	1276	.40*
WBR	0	0	1		6	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.57		.52

96. Martinez/Potrero & SR-126

2010 without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	5		9	
SBT	1	1600	0	.00*	0	.01*
SBR	0	0	2		2	
EBL	1	1600	1	.00	0	.00
EBT	2	3200	741	.23	1068	.33
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	751	.24*	1065	.33*
WBR	0	0	1		6	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.34		.44

2010 with Phase 3/Full Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	5		9	
SBT	1	1600	0	.00*	0	.01*
SBR	0	0	2		2	
EBL	1	1600	1	.00	0	.00
EBT	2	3200	828	.26*	1133	.35
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	773	.24	1159	.36*
WBR	0	0	1		6	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.36		.47

2010 with Phase 3 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	5		9	
SBT	1	1600	0	.01*	0	.01*
SBR	0	0	7		8	
EBL	1	1600	4	.00	11	.01*
EBT	2	3200	1486	.46*	1221	.38
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	1017	.32	1277	.40*
WBR	0	0	1		6	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.57		.52

96. San Martinez Cyn & SR-126

Existing with Phase 3/Full Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	4		8	
SBT	1	1600	0	.00*	0	.01*
SBR	0	0	2		2	
EBL	1	1600	1	.00	0	.00
EBT	2	3200	737	.23*	1002	.31
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	681	.21	1028	.32*
WBR	0	0	1		5	
Clearance Interval				.10*		.10*

TOTAL CAPACITY UTILIZATION .33 .43

110. Chiquito & SR-126

Existing Count (2003)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		1	
NBT	1	1600	1	.00	0	.00
NBR	0	0	1		0	
SBL	0	0	70		50	
SBT	1	1600	0	.04*	0	.03*
SBR	1	1600	12	.01	8	.01
EBL	1	1600	6	.00	15	.01*
EBT	2	3200	663	.21	927	.29
EBR	0	0	4		0	
WBL	0	0	1		0	
WBT	2	3200	713	.22*	935	.29*
WBR	1	1600	22	.01	86	.05
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.36		.43

2007 without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	1	1600	0	.00	0	.00
NBR	0	0	0		0	
SBL	0	0	76		54	
SBT	1	1600	0	.05*	0	.03*
SBR	1	1600	13	.01	9	.01
EBL	1	1600	6	.00	16	.01*
EBT	2	3200	716	.22	1001	.31
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	770	.24*	1010	.32*
WBR	1	1600	24	.02	93	.06
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.39		.46

2007 with Phase 1

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	3		2	
NBT	1	1600	8	.02*	5	.02*
NBR	0	0	28		18	
SBL	0	0	76	{.05}*	54	{.03}*
SBT	1	1600	3	.05	10	.04
SBR	1	1600	13	.01	9	.01
EBL	1	1600	6	.00	16	.01*
EBT	2	3200	717	.22	1004	.31
EBR	0	0	1		3	
WBL	0	0	10		33	
WBT	2	3200	773	.24*	1012	.33*
WBR	1	1600	24	.02	93	.06
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.41		.49

2007 with Phase 1 & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	3	.00	2	.00
NBT	1	1600	8	.01*	5	.00*
NBR	1	1600	28	.02	18	.01
SBL	1	1600	76	.05*	54	.03*
SBT	1	1600	3	.01	10	.01
SBR	0	0	13		9	
EBL	1	1600	6	.00	16	.01
EBT	2	3200	717	.22	1004	.31*
EBR	0	0	1		3	
WBL	1	1600	10	.01	33	.02*
WBT	2	3200	773	.24*	1012	.32
WBR	1	1600	24	.02	93	.06
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.40		.46

110. Chiquito & SR-126

2007 with Phase 1 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	3	.00	2	.00
NBT	1	1600	8	.01*	5	.00*
NBR	1	1600	28	.02	18	.01
SBL	1	1600	183	.11*	132	.08*
SBT	1	1600	3	.01	10	.02
SBR	0	0	16		19	
EBL	1	1600	34	.02*	32	.02*
EBT	2	3200	861	.27	1004	.31
EBR	0	0	1		3	
WBL	1	1600	10	.01	33	.02
WBT	2	3200	892	.28*	1012	.32*
WBR	1	1600	63	.04	193	.12
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.52		.52

110. Chiquito/Long Cyn & SR-126

2008 without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	1	1600	0	.00	0	.00
NBR	0	0	0		0	
SBL	0	0	77		55	
SBT	1	1600	0	.05*	0	.03*
SBR	1	1600	13	.01	9	.01
EBL	1	1600	7	.00	17	.01*
EBT	2	3200	729	.23	1020	.32
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	784	.25*	1029	.32*
WBR	1	1600	24	.02	95	.06
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.40		.46

2008 with Phase 2

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	9		11	
NBT	1	1600	49	.14*	29	.09*
NBR	0	0	170		111	
SBL	0	0	100	{.06}*	118	{.07}*
SBT	1	1600	9	.07	40	.10
SBR	1	1600	13	.01	9	.01
EBL	1	1600	7	.00	17	.01
EBT	2	3200	743	.23	1042	.33*
EBR	0	0	3		12	
WBL	0	0	30		219	{.14}*
WBT	2	3200	789	.26*	1049	.40
WBR	1	1600	45	.03	139	.09
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.56		.73

2008 with Phase 2 & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	9	.01	11	.01
NBT	1	1600	49	.03*	29	.02*
NBR	1	1600	170	.11	111	.07
SBL	1	1600	100	.06*	118	.07*
SBT	1	1600	9	.01	40	.03
SBR	0	0	13		9	
EBL	1	1600	7	.00	17	.01
EBT	2	3200	743	.23*	1042	.33*
EBR	0	0	3		12	
WBL	1	1600	30	.02*	219	.14*
WBT	2	3200	789	.25	1049	.33
WBR	1	1600	45	.03	139	.09
Right Turn Adjustment			NBR	.06*		
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.50		.66

2008 with Phase 2 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	9	.01	11	.01
NBT	1	1600	49	.03*	29	.02*
NBR	1	1600	170	.11	111	.07
SBL	1	1600	540	.34*	288	.18*
SBT	1	1600	9	.02	40	.04
SBR	0	0	22		26	
EBL	1	1600	34	.02	32	.02
EBT	2	3200	1419	.44*	1176	.37*
EBR	0	0	3		12	
WBL	1	1600	30	.02*	219	.14*
WBT	2	3200	956	.30	1239	.39
WBR	1	1600	209	.13	546	.34
Right Turn Adjustment			NBR	.06*		
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.99		.81

110. Chiquito/Long Cyn & SR-126

2008 with Phase 2 & Related Proj & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	9	.01	11	.01
NBT	1	1600	49	.03*	29	.02*
NBR	2	3200	170	.05	111	.03
SBL	2	2880	540	.19*	288	.10*
SBT	2	3200	9	.01	40	.02
SBR	0	0	22	.01	26	
EBL	1	1600	34	.02	32	.02
EBT	2	3200	1419	.44*	1176	.37*
EBR	0	0	3		12	
WBL	1	1600	30	.02*	219	.14*
WBT	2	3200	956	.30	1239	.39
WBR	1	1600	209	.13	546	.34
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.78		.73

110. Chiquito/Long Cyn & SR-126

2010 without Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	1	1600	0	.00	0	.00
NBR	0	0	0		0	
SBL	0	0	80		57	
SBT	1	1600	0	.05*	0	.04*
SBR	1	1600	14	.01	9	.01
EBL	1	1600	7	.00	17	.01*
EBT	2	3200	756	.24	1057	.33
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	813	.25*	1066	.33*
WBR	1	1600	25	.02	98	.06
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.40		.48

2010 with Phase 3/Full Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	15		79	
NBT	1	1600	35	.25*	179	.55*
NBR	0	0	344		628	
SBL	0	0	127	{.08}*	87	{.05}*
SBT	1	1600	158	.18	78	.10
SBR	1	1600	14	.01	9	.01
EBL	1	1600	7	.00	17	.01
EBT	2	3200	766	.26*	1074	.35*
EBR	0	0	78		47	
WBL	0	0	631	{.39}*	483	{.30}*
WBT	2	3200	822	.45	1082	.49
WBR	1	1600	40	.03	142	.09
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				1.08		1.35

2010 with Phase 3 & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	15	.01*	79	.05
NBT	2	3200	35	.01	179	.06*
NBR	2	3200	344	.11	628	.20
SBL	1	1600	127	.08	87	.05*
SBT	1	1600	158	.10*	78	.05
SBR	1	1600	14	.01	9	.01
EBL	1	1600	7	.00	17	.01
EBT	2	3200	766	.24*	1074	.34*
EBR	1	1600	78	.05	47	.03
WBL	2	2880	631	.22*	483	.17*
WBT	2	3200	822	.26	1082	.34
WBR	1	1600	40	.03	142	.09
Right Turn Adjustment					NBR	.01*
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.67		.73

2010 with Phase 3 & Related Projects

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	15	.01	79	.05
NBT	2	3200	35	.01*	179	.06*
NBR	2	3200	344	.11	628	.20
SBL	1	1600	491	.31*	177	.11*
SBT	1	1600	158	.10	78	.05
SBR	1	1600	22	.01	29	.02
EBL	1	1600	34	.02	32	.02
EBT	2	3200	1374	.43*	1142	.36*
EBR	1	1600	78	.05	47	.03
WBL	2	2880	631	.22*	483	.17*
WBT	2	3200	980	.31	1169	.37
WBR	1	1600	91	.06	423	.26
Right Turn Adjustment					NBR	.01*
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				1.07		.81

110. Chiquito/Long Cyn & SR-126

2010 with Phase 3 & Related Proj & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	2880	15	.01	79	.03
NBT	2	3200	35	.01*	179	.06*
NBR	2	3200	344	.11	628	.20
SBL	2	2880	491	.17*	177	.06*
SBT	3	4800	158	.03	78	.02
SBR	1	1600	22	.01	29	.02
EBL	2	2880	34	.01	32	.01
EBT	3	4800	1374	.29*	1142	.24*
EBR	1	1600	78	.05	47	.03
WBL	2	2880	631	.22*	483	.17*
WBT	3	4800	980	.20	1169	.24
WBR	1	1600	91	.06	423	.26
Right Turn Adjustment					NBR	.01*
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.79		.64

110. Chiquito/Long Cyn & SR-126

2007 with Related w/out Project (for CMP)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	0	.00	0	.00
NBT	1	1600	0	.00*	0	.00*
NBR	1	1600	0	.00	0	.00
SBL	1	1600	183	.11*	132	.08*
SBT	1	1600	0	.01	0	.01
SBR	0	0	16		19	
EBL	1	1600	34	.02*	32	.02*
EBT	2	3200	860	.27	1001	.31
EBR	0	0	0		0	
WBL	1	1600	0	.00	0	.00
WBT	2	3200	889	.28*	1010	.32*
WBR	1	1600	63	.04	193	.12
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.51		.52

2007 with Related w/out Project (for CMP)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	0	.00	0	.00
NBT	1	1600	0	.00*	0	.00*
NBR	1	1600	0	.00	0	.00
SBL	1	1600	517	.32*	225	.14*
SBT	1	1600	0	.01	0	.02
SBR	0	0	22		26	
EBL	1	1600	34	.02	32	.02*
EBT	2	3200	1405	.44*	1154	.36
EBR	0	0	0		0	
WBL	1	1600	0	.00	0	.00
WBT	2	3200	951	.30	1219	.38*
WBR	1	1600	188	.12	502	.31
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.86		.64

2010 with Related w/out Project (for CMP)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	0	.00	0	.00
NBT	2	3200	0	.00*	0	.00*
NBR	2	3200	0	.00	0	.00
SBL	1	1600	444	.28*	147	.09*
SBT	1	1600	0	.00	0	.00
SBR	1	1600	22	.01	29	.02
EBL	1	1600	34	.02	32	.02*
EBT	2	3200	1364	.43*	1125	.35
EBR	1	1600	0	.00	0	.00
WBL	2	2880	0	.00	0	.00
WBT	2	3200	971	.30	1153	.36*
WBR	1	1600	76	.05	379	.24
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.81		.57

110. Chiquito Cyn & SR-126

Existing with Phase 3/Full Project

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	15		80	
NBT	1	1600	36	.25*	179	.55*
NBR	0	0	345		628	
SBL	0	0	117	{.07}*	80	{.05}*
SBT	1	1600	158	.17	78	.10
SBR	1	1600	12	.01	8	.01
EBL	1	1600	6	.00	15	.01
EBT	2	3200	673	.24*	944	.31*
EBR	0	0	82		47	
WBL	0	0	632	{.39}*	483	{.30}*
WBT	2	3200	722	.42	951	.45
WBR	1	1600	37	.02	130	.08
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				1.05		1.31

Existing with Phase 3 & Mitigation

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	2880	15	.01	80	.03
NBT	2	3200	36	.01*	179	.06*
NBR	2	3200	345	.11	628	.20
SBL	2	2880	117	.04*	80	.03*
SBT	3	4800	158	.03	78	.02
SBR	1	1600	12	.01	8	.01
EBL	2	2880	6	.00	15	.01
EBT	3	4800	673	.14*	944	.20*
EBR	1	1600	82	.05	47	.03
WBL	2	2880	632	.22*	483	.17*
WBT	3	4800	722	.15	951	.20
WBR	1	1600	37	.02	130	.08
Right Turn Adjustment					NBR	.01*
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				.51		.57

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3539		1770	3539	1583	1770	1863	1583	1770	1627	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3539		1770	3539	1583	1770	1863	1583	1770	1627	
Volume (vph)	34	861	1	10	892	63	3	8	28	183	3	16
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	34	861	1	10	892	63	3	8	28	183	3	16
RTOR Reduction (vph)	0	0	0	0	0	44	0	0	18	0	9	0
Lane Group Flow (vph)	34	862	0	10	892	19	3	8	10	183	10	0
Turn Type	Prot			Prot		Perm	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	1.4	19.9		2.1	20.6	20.6	0.7	21.8	23.9	8.0	29.1	
Effective Green, g (s)	1.4	19.9		2.1	20.6	20.6	0.7	21.8	23.9	8.0	29.1	
Actuated g/C Ratio	0.02	0.29		0.03	0.30	0.30	0.01	0.32	0.35	0.12	0.43	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	37	1039		55	1075	481	18	599	651	209	698	
v/s Ratio Prot	c0.02	0.24		0.01	c0.25		0.00	0.00	c0.00	c0.10	0.01	
v/s Ratio Perm						0.04			0.02			
v/c Ratio	0.92	0.83		0.18	0.83	0.04	0.17	0.01	0.02	0.88	0.01	
Uniform Delay, d1	33.1	22.4		32.0	22.0	16.6	33.3	15.7	14.3	29.4	11.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	152.6	5.8		1.6	5.6	0.0	4.4	0.0	0.0	36.3	0.0	
Delay (s)	185.8	28.2		33.6	27.6	16.7	37.6	15.7	14.3	65.7	11.1	
Level of Service	F	C		C	C	B	D	B	B	E	B	
Approach Delay (s)		34.1			26.9			16.4			60.5	
Approach LOS		C			C			B			E	

Intersection Summary			
HCM Average Control Delay	33.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	67.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539		1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539		1770	3539	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	40	1029	1	66	948	160	3	42	196	14	14	13
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	40	1029	1	66	948	160	3	42	196	14	14	13
RTOR Reduction (vph)	0	0	0	0	0	103	0	0	136	0	0	9
Lane Group Flow (vph)	40	1030	0	66	948	57	3	42	60	14	14	4
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	1.4	18.5		2.1	19.2	19.2	0.6	16.6	16.6	0.6	16.6	16.6
Effective Green, g (s)	1.4	18.5		2.1	19.2	19.2	0.6	16.6	16.6	0.6	16.6	16.6
Actuated g/C Ratio	0.03	0.34		0.04	0.36	0.36	0.01	0.31	0.31	0.01	0.31	0.31
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	46	1217		69	1263	565	20	575	488	20	575	488
v/s Ratio Prot	0.02	c0.29		c0.04	0.27		0.00	0.02		c0.01	0.01	
v/s Ratio Perm						0.10			0.12			0.01
v/c Ratio	0.87	0.85		0.96	0.75	0.10	0.15	0.07	0.12	0.70	0.02	0.01
Uniform Delay, d1	26.1	16.3		25.8	15.2	11.5	26.3	13.2	13.4	26.5	13.0	12.9
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	106.3	5.8		125.5	2.6	0.1	3.5	0.2	0.5	83.9	0.1	0.0
Delay (s)	132.4	22.2		151.3	17.8	11.6	29.8	13.4	13.9	110.5	13.0	12.9
Level of Service	F	C		F	B	B	C	B	B	F	B	B
Approach Delay (s)		26.3			24.4			14.0			46.3	
Approach LOS		C			C			B			D	

Intersection Summary			
HCM Average Control Delay	24.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	53.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱		↑↑↑	↱				↰	✢	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0				4.0	4.0	4.0
Lane Util. Factor		0.95	1.00		0.91	1.00				0.95	0.91	0.95
Frt		1.00	0.85		1.00	0.85				1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00	1.00				0.95	0.95	1.00
Satd. Flow (prot)		3539	1583		5085	1583				1681	1610	1504
Flt Permitted		1.00	1.00		1.00	1.00				0.95	0.95	1.00
Satd. Flow (perm)		3539	1583		5085	1583				1681	1610	1504
Volume (vph)	0	585	881	0	1796	62	0	0	0	895	0	225
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	585	881	0	1796	62	0	0	0	895	0	225
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	2
Lane Group Flow (vph)	0	585	881	0	1796	62	0	0	0	448	447	223
Turn Type			Free			Free				Prot		Prot
Protected Phases		4			8					1	6	6
Permitted Phases			Free			Free						
Actuated Green, G (s)		25.8	58.8		25.8	58.8				25.0	25.0	25.0
Effective Green, g (s)		25.8	58.8		25.8	58.8				25.0	25.0	25.0
Actuated g/C Ratio		0.44	1.00		0.44	1.00				0.43	0.43	0.43
Clearance Time (s)		4.0			4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0			3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1553	1583		2231	1583				715	685	639
v/s Ratio Prot		0.17			c0.35					0.27	c0.28	0.15
v/s Ratio Perm			0.56			0.04						
v/c Ratio		0.38	0.56		0.81	0.04				0.63	0.65	0.35
Uniform Delay, d1		11.1	0.0		14.3	0.0				13.2	13.4	11.4
Progression Factor		1.00	1.00		1.00	1.00				1.00	1.00	1.00
Incremental Delay, d2		0.2	1.4		2.2	0.0				1.7	2.3	1.5
Delay (s)		11.2	1.4		16.6	0.0				15.0	15.7	12.9
Level of Service		B	A		B	A				B	B	B
Approach Delay (s)		5.3			16.0			0.0			14.8	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM Average Control Delay	12.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	58.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↱		↑↑	↱	↰↰		↱			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0		4.0			
Lane Util. Factor		0.91	1.00		0.95	1.00	0.97		1.00			
Frt		1.00	0.85		1.00	0.85	1.00		0.85			
Flt Protected		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (prot)		5085	1583		3539	1583	3433		1583			
Flt Permitted		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (perm)		5085	1583		3539	1583	3433		1583			
Volume (vph)	0	1172	306	0	821	727	997	0	612	0	0	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1172	306	0	821	727	997	0	612	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	3	0	0	0
Lane Group Flow (vph)	0	1172	306	0	821	727	997	0	609	0	0	0
Turn Type			Free			Free	Prot		custom			
Protected Phases		4			8		5					
Permitted Phases			Free			Free			2			
Actuated Green, G (s)		18.0	59.0		18.0	59.0	33.0		33.0			
Effective Green, g (s)		18.0	59.0		18.0	59.0	33.0		33.0			
Actuated g/C Ratio		0.31	1.00		0.31	1.00	0.56		0.56			
Clearance Time (s)		4.0			4.0		4.0		4.0			
Vehicle Extension (s)		3.0			3.0		3.0		3.0			
Lane Grp Cap (vph)		1551	1583		1080	1583	1920		885			
v/s Ratio Prot		0.23			c0.23		0.29					
v/s Ratio Perm			0.19			0.46			0.39			
v/c Ratio		0.76	0.19		0.76	0.46	0.52		0.69			
Uniform Delay, d1		18.5	0.0		18.5	0.0	8.1		9.3			
Progression Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Incremental Delay, d2		2.2	0.3		3.2	1.0	0.2		4.4			
Delay (s)		20.7	0.3		21.8	1.0	8.3		13.7			
Level of Service		C	A		C	A	A		B			
Approach Delay (s)		16.5			12.0			10.4			0.0	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM Average Control Delay	12.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	59.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.2%	ICU Level of Service	C
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3538		1770	3539	1583	1770	1863	1583	1770	1680	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3538		1770	3539	1583	1770	1863	1583	1770	1680	
Volume (vph)	32	1004	3	33	1012	193	2	5	18	132	10	19
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	32	1004	3	33	1012	193	2	5	18	132	10	19
RTOR Reduction (vph)	0	0	0	0	0	129	0	0	12	0	11	0
Lane Group Flow (vph)	32	1007	0	33	1012	64	2	5	6	132	18	0
Turn Type	Prot			Prot		Perm	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	1.4	21.9		2.1	22.6	22.6	0.7	21.3	23.4	6.6	27.2	
Effective Green, g (s)	1.4	21.9		2.1	22.6	22.6	0.7	21.3	23.4	6.6	27.2	
Actuated g/C Ratio	0.02	0.32		0.03	0.33	0.33	0.01	0.31	0.34	0.10	0.40	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	36	1141		55	1178	527	18	584	639	172	673	
v/s Ratio Prot	0.02	0.28		c0.02	c0.29		0.00	0.00	0.00	c0.07	c0.02	
v/s Ratio Perm						0.12			0.01			
v/c Ratio	0.89	0.88		0.60	0.86	0.12	0.11	0.01	0.01	0.77	0.03	
Uniform Delay, d1	33.2	21.8		32.5	21.2	15.8	33.3	16.0	14.6	29.9	12.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	136.6	8.8		17.1	6.7	0.1	2.7	0.0	0.0	19.7	0.1	
Delay (s)	169.8	30.6		49.5	27.9	15.9	36.0	16.1	14.6	49.6	12.4	
Level of Service	F	C		D	C	B	D	B	B	D	B	
Approach Delay (s)		34.9			26.6			16.6			42.9	
Approach LOS		C			C			B			D	

Intersection Summary			
HCM Average Control Delay	31.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	67.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↱		↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3538		1770	3539	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3538		1770	3539	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	21	1130	3	227	1191	13	2	27	126	84	49	53
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	21	1130	3	227	1191	13	2	27	126	84	49	53
RTOR Reduction (vph)	0	0	0	0	0	7	0	0	94	0	0	38
Lane Group Flow (vph)	21	1133	0	227	1191	6	2	27	32	84	49	15
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	1.5	27.5		10.8	36.8	36.8	0.8	19.6	19.6	3.9	22.7	22.7
Effective Green, g (s)	1.5	27.5		10.8	36.8	36.8	0.8	19.6	19.6	3.9	22.7	22.7
Actuated g/C Ratio	0.02	0.35		0.14	0.47	0.47	0.01	0.25	0.25	0.05	0.29	0.29
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	34	1251		246	1674	749	18	469	399	89	544	462
v/s Ratio Prot	0.01	c0.32		c0.13	0.34		0.00	0.01		c0.05	0.03	
v/s Ratio Perm						0.01			0.08			0.03
v/c Ratio	0.62	0.91		0.92	0.71	0.01	0.11	0.06	0.08	0.94	0.09	0.03
Uniform Delay, d1	37.9	23.9		33.1	16.3	10.8	38.1	22.1	22.2	36.8	20.0	19.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	31.1	10.3		45.9	1.5	0.0	2.7	0.2	0.4	101.9	0.3	0.1
Delay (s)	68.9	34.3		79.0	17.7	10.8	40.9	22.3	22.6	138.7	20.4	19.8
Level of Service	E	C		E	B	B	D	C	C	F	C	B
Approach Delay (s)		34.9			27.4			22.8			73.7	
Approach LOS		C			C			C			E	

Intersection Summary			
HCM Average Control Delay	33.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	77.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱		↑↑↑	↱				↰	✥	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0				4.0	4.0	4.0
Lane Util. Factor		0.95	1.00		0.91	1.00				0.95	0.91	0.95
Frt		1.00	0.85		1.00	0.85				1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00	1.00				0.95	0.95	1.00
Satd. Flow (prot)		3539	1583		5085	1583				1681	1610	1504
Flt Permitted		1.00	1.00		1.00	1.00				0.95	0.95	1.00
Satd. Flow (perm)		3539	1583		5085	1583				1681	1610	1504
Volume (vph)	0	989	1280	0	1345	232	0	0	0	658	0	214
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	989	1280	0	1345	232	0	0	0	658	0	214
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	14
Lane Group Flow (vph)	0	989	1280	0	1345	232	0	0	0	329	329	200
Turn Type			Free			Free				Prot		Prot
Protected Phases		4			8					1	6	6
Permitted Phases			Free			Free						
Actuated Green, G (s)		20.7	51.9		20.7	51.9				23.2	23.2	23.2
Effective Green, g (s)		20.7	51.9		20.7	51.9				23.2	23.2	23.2
Actuated g/C Ratio		0.40	1.00		0.40	1.00				0.45	0.45	0.45
Clearance Time (s)		4.0			4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0			3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		1412	1583		2028	1583				751	720	672
v/s Ratio Prot		0.28			0.26					0.20	0.20	0.14
v/s Ratio Perm			0.81			0.15						
v/c Ratio		0.70	0.81		0.66	0.15				0.44	0.46	0.30
Uniform Delay, d1		13.0	0.0		12.8	0.0				9.9	10.0	9.2
Progression Factor		1.00	1.00		1.00	1.00				1.00	1.00	1.00
Incremental Delay, d2		1.6	4.7		0.8	0.2				0.4	0.5	1.1
Delay (s)		14.6	4.7		13.6	0.2				10.3	10.4	10.3
Level of Service		B	A		B	A				B	B	B
Approach Delay (s)		9.0			11.6			0.0			10.3	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM Average Control Delay	10.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	51.9	Sum of lost time (s)	0.0
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↱		↑↑	↱	↰↰		↱			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0		4.0			
Lane Util. Factor		0.91	1.00		0.95	1.00	0.97		1.00			
Frt		1.00	0.85		1.00	0.85	1.00		0.85			
Flt Protected		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (prot)		5085	1583		3539	1583	3433		1583			
Flt Permitted		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (perm)		5085	1583		3539	1583	3433		1583			
Volume (vph)	0	1253	396	0	623	1165	956	0	114	0	0	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1253	396	0	623	1165	956	0	114	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	9	0	0	0
Lane Group Flow (vph)	0	1253	396	0	623	1165	956	0	105	0	0	0
Turn Type			Free			Free	Prot		custom			
Protected Phases		4			8		5					
Permitted Phases			Free			Free			2			
Actuated Green, G (s)		20.1	55.2		20.1	55.2	27.1		27.1			
Effective Green, g (s)		20.1	55.2		20.1	55.2	27.1		27.1			
Actuated g/C Ratio		0.36	1.00		0.36	1.00	0.49		0.49			
Clearance Time (s)		4.0			4.0		4.0		4.0			
Vehicle Extension (s)		3.0			3.0		3.0		3.0			
Lane Grp Cap (vph)		1852	1583		1289	1583	1685		777			
v/s Ratio Prot		0.25			0.18		0.28					
v/s Ratio Perm			0.25			0.74			0.07			
v/c Ratio		0.68	0.25		0.48	0.74	0.57		0.13			
Uniform Delay, d1		14.8	0.0		13.5	0.0	9.9		7.7			
Progression Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Incremental Delay, d2		1.0	0.4		0.3	3.1	0.4		0.4			
Delay (s)		15.8	0.4		13.8	3.1	10.4		8.0			
Level of Service		B	A		B	A	B		A			
Approach Delay (s)		12.1			6.9			10.1			0.0	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM Average Control Delay	9.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	55.2	Sum of lost time (s)	0.0
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	0.88	0.97	0.95	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3538		1770	3539	1583	1770	1863	2787	3433	3162	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3538		1770	3539	1583	1770	1863	2787	3433	3162	
Volume (vph)	34	1419	3	30	956	209	9	49	170	540	9	22
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	34	1419	3	30	956	209	9	49	170	540	9	22
RTOR Reduction (vph)	0	0	0	0	0	116	0	0	20	0	14	0
Lane Group Flow (vph)	34	1422	0	30	956	93	9	49	150	540	17	0
Turn Type	Prot			Prot		Perm	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	3.5	43.1		5.9	45.5	45.5	0.8	19.3	25.2	18.1	36.6	
Effective Green, g (s)	3.5	43.1		5.9	45.5	45.5	0.8	19.3	25.2	18.1	36.6	
Actuated g/C Ratio	0.03	0.42		0.06	0.44	0.44	0.01	0.19	0.25	0.18	0.36	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	60	1489		102	1573	703	14	351	795	607	1130	
v/s Ratio Prot	c0.02	c0.40		0.02	0.27		0.01	0.03	c0.01	c0.16	0.01	
v/s Ratio Perm						0.13			0.05			
v/c Ratio	0.57	0.96		0.29	0.61	0.13	0.64	0.14	0.19	0.89	0.01	
Uniform Delay, d1	48.7	28.7		46.3	21.7	16.8	50.7	34.6	30.5	41.2	21.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	12.0	16.7		1.6	0.7	0.1	81.9	0.8	0.1	16.6	0.0	
Delay (s)	60.7	45.4		47.9	22.3	16.9	132.5	35.5	30.6	57.7	21.3	
Level of Service	E	D		D	C	B	F	D	C	E	C	
Approach Delay (s)		45.8			22.0			35.7			55.7	
Approach LOS		D			C			D			E	

Intersection Summary			
HCM Average Control Delay	38.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	102.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.7%	ICU Level of Service	C
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	0.88	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	3433	3539	1583	1770	1863	2787	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	3433	3539	1583	1770	1863	2787	3433	1863	1583
Volume (vph)	288	1801	40	184	1152	593	26	71	373	58	7	17
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	288	1801	40	184	1152	593	26	71	373	58	7	17
RTOR Reduction (vph)	0	0	19	0	0	303	0	0	204	0	0	13
Lane Group Flow (vph)	288	1801	21	184	1152	290	26	71	169	58	7	4
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	16.6	46.1	46.1	6.0	35.5	35.5	1.5	17.6	17.6	3.1	19.2	19.2
Effective Green, g (s)	16.6	46.1	46.1	6.0	35.5	35.5	1.5	17.6	17.6	3.1	19.2	19.2
Actuated g/C Ratio	0.19	0.52	0.52	0.07	0.40	0.40	0.02	0.20	0.20	0.03	0.22	0.22
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	331	1837	822	232	1415	633	30	369	552	120	403	342
v/s Ratio Prot	c0.16	c0.51		0.05	0.33		0.01	0.04		c0.02	0.00	
v/s Ratio Perm			0.03			0.37			0.13			0.01
v/c Ratio	0.87	0.98	0.03	0.79	0.81	0.46	0.87	0.19	0.31	0.48	0.02	0.01
Uniform Delay, d1	35.1	20.9	10.4	40.8	23.7	19.6	43.6	29.7	30.4	42.1	27.4	27.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	23.9	21.4	0.0	18.1	3.8	0.5	139.8	1.2	1.4	3.1	0.1	0.1
Delay (s)	59.0	42.3	10.4	58.8	27.5	20.1	183.3	30.8	31.8	45.1	27.5	27.4
Level of Service	E	D	B	E	C	C	F	C	C	D	C	C
Approach Delay (s)		44.0			28.2			40.1			39.9	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM Average Control Delay	36.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	88.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑↑	↱↱		↑↑↑↑	↱				↰↰	↕	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0				4.0	4.0	4.0
Lane Util. Factor		0.86	0.88		0.86	1.00				0.91	0.86	0.95
Frt		1.00	0.85		1.00	0.85				1.00	0.96	0.85
Flt Protected		1.00	1.00		1.00	1.00				0.95	0.96	1.00
Satd. Flow (prot)		6408	2787		6408	1583				3221	1482	1504
Flt Permitted		1.00	1.00		1.00	1.00				0.95	0.96	1.00
Satd. Flow (perm)		6408	2787		6408	1583				3221	1482	1504
Volume (vph)	0	1038	1210	0	3254	63	0	0	0	906	0	407
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1038	1210	0	3254	63	0	0	0	906	0	407
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1038	1210	0	3254	63	0	0	0	662	336	315
Turn Type			Free			Free				Prot		Prot
Protected Phases		4			8					1	6	6
Permitted Phases			Free			Free						
Actuated Green, G (s)		34.0	60.0		34.0	60.0				18.0	18.0	18.0
Effective Green, g (s)		34.0	60.0		34.0	60.0				18.0	18.0	18.0
Actuated g/C Ratio		0.57	1.00		0.57	1.00				0.30	0.30	0.30
Clearance Time (s)		4.0			4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0			3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		3631	2787		3631	1583				966	445	451
v/s Ratio Prot		0.16			c0.51					0.21	c0.23	0.21
v/s Ratio Perm			0.43			0.04						
v/c Ratio		0.29	0.43		0.90	0.04				0.69	0.76	0.70
Uniform Delay, d1		6.7	0.0		11.4	0.0				18.5	19.0	18.6
Progression Factor		1.00	1.00		1.00	1.00				1.00	1.00	1.00
Incremental Delay, d2		0.0	0.5		3.4	0.0				2.0	7.4	8.9
Delay (s)		6.8	0.5		14.8	0.0				20.6	26.4	27.5
Level of Service		A	A		B	A				C	C	C
Approach Delay (s)		3.4			14.6			0.0			23.7	
Approach LOS		A			B			A			C	

Intersection Summary			
HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0		4.0			
Lane Util. Factor		0.86	1.00		0.91	0.88	0.94		1.00			
Frt		1.00	0.85		1.00	0.85	1.00		0.85			
Flt Protected		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (prot)		6408	1583		5085	2787	4990		1583			
Flt Permitted		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (perm)		6408	1583		5085	2787	4990		1583			
Volume (vph)	0	1615	328	0	1285	729	2033	0	616	0	0	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1615	328	0	1285	729	2033	0	616	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1615	328	0	1285	729	2033	0	616	0	0	0
Turn Type			Free			Free	Prot		custom			
Protected Phases		4			8		5					
Permitted Phases			Free			Free			2			
Actuated Green, G (s)		18.9	59.9		18.9	59.9	33.0		33.0			
Effective Green, g (s)		18.9	59.9		18.9	59.9	33.0		33.0			
Actuated g/C Ratio		0.32	1.00		0.32	1.00	0.55		0.55			
Clearance Time (s)		4.0			4.0		4.0		4.0			
Vehicle Extension (s)		3.0			3.0		3.0		3.0			
Lane Grp Cap (vph)		2022	1583		1604	2787	2749		872			
v/s Ratio Prot		0.25			c0.25		c0.41					
v/s Ratio Perm			0.21			0.26			0.39			
v/c Ratio		0.80	0.21		0.80	0.26	0.74		0.71			
Uniform Delay, d1		18.8	0.0		18.8	0.0	10.2		9.9			
Progression Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Incremental Delay, d2		2.3	0.3		3.0	0.2	1.1		4.9			
Delay (s)		21.1	0.3		21.8	0.2	11.3		14.7			
Level of Service		C	A		C	A	B		B			
Approach Delay (s)		17.6			14.0			12.1			0.0	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM Average Control Delay	14.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	59.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.2%	ICU Level of Service	C
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	0.88	0.97	0.95	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3534		1770	3539	1583	1770	1863	2787	3433	3330	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3534		1770	3539	1583	1770	1863	2787	3433	3330	
Volume (vph)	32	1176	12	219	1239	546	11	29	111	288	40	26
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	32	1176	12	219	1239	546	11	29	111	288	40	26
RTOR Reduction (vph)	0	1	0	0	0	271	0	0	27	0	18	0
Lane Group Flow (vph)	32	1187	0	219	1239	275	11	29	84	288	48	0
Turn Type	Prot			Prot		Perm	Prot		pm+ov	Prot		
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases						8			2			
Actuated Green, G (s)	3.3	39.6		16.1	52.4	52.4	0.7	20.7	36.8	11.8	31.8	
Effective Green, g (s)	3.3	39.6		16.1	52.4	52.4	0.7	20.7	36.8	11.8	31.8	
Actuated g/C Ratio	0.03	0.38		0.15	0.50	0.50	0.01	0.20	0.35	0.11	0.31	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	56	1343		273	1780	796	12	370	1091	389	1016	
v/s Ratio Prot	0.02	c0.34		c0.12	0.35		0.01	0.02	c0.02	c0.08	0.02	
v/s Ratio Perm						0.34			0.02			
v/c Ratio	0.57	0.88		0.80	0.70	0.34	0.92	0.08	0.08	0.74	0.05	
Uniform Delay, d1	49.8	30.2		42.5	19.8	15.6	51.7	34.0	22.4	44.7	25.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	13.7	7.7		16.6	1.2	0.3	290.1	0.4	0.0	7.6	0.1	
Delay (s)	63.5	37.9		59.1	21.0	15.8	341.8	34.4	22.4	52.3	25.6	
Level of Service	E	D		E	C	B	F	C	C	D	C	
Approach Delay (s)		38.5			23.8			48.0			47.4	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM Average Control Delay	31.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	104.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	0.88	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	3433	3539	1583	1770	1863	2787	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	3433	3539	1583	1770	1863	2787	3433	1863	1583
Volume (vph)	27	1444	104	360	1748	48	72	28	311	375	103	184
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	27	1444	104	360	1748	48	72	28	311	375	103	184
RTOR Reduction (vph)	0	0	58	0	0	22	0	0	251	0	0	101
Lane Group Flow (vph)	27	1444	46	360	1748	26	72	28	60	375	103	83
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	2.3	48.1	48.1	13.5	59.3	59.3	7.3	17.0	17.0	14.3	24.0	24.0
Effective Green, g (s)	2.3	48.1	48.1	13.5	59.3	59.3	7.3	17.0	17.0	14.3	24.0	24.0
Actuated g/C Ratio	0.02	0.44	0.44	0.12	0.54	0.54	0.07	0.16	0.16	0.13	0.22	0.22
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	37	1563	699	426	1927	862	119	291	435	451	411	349
v/s Ratio Prot	0.02	0.41		c0.10	c0.49		0.04	0.02		c0.11	0.06	
v/s Ratio Perm			0.07			0.03			0.11			0.12
v/c Ratio	0.73	0.92	0.07	0.85	0.91	0.03	0.61	0.10	0.14	0.83	0.25	0.24
Uniform Delay, d1	53.0	28.7	17.5	46.7	22.3	11.5	49.4	39.4	39.6	46.1	35.0	34.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	59.9	10.6	0.0	15.4	7.1	0.0	8.6	0.7	0.7	13.2	1.5	1.6
Delay (s)	112.9	39.2	17.5	62.1	29.4	11.5	58.0	40.0	40.3	59.3	36.5	36.5
Level of Service	F	D	B	E	C	B	E	D	D	E	D	D
Approach Delay (s)		39.1			34.5			43.4			49.4	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM Average Control Delay	38.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	108.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0				4.0	4.0	4.0
Lane Util. Factor		0.86	0.88		0.86	1.00				0.91	0.86	0.95
Frt		1.00	0.85		1.00	0.85				1.00	0.96	0.85
Flt Protected		1.00	1.00		1.00	1.00				0.95	0.96	1.00
Satd. Flow (prot)		6408	2787		6408	1583				3221	1486	1504
Flt Permitted		1.00	1.00		1.00	1.00				0.95	0.96	1.00
Satd. Flow (perm)		6408	2787		6408	1583				3221	1486	1504
Volume (vph)	0	2126	1647	0	2034	239	0	0	0	689	0	308
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	2126	1647	0	2034	239	0	0	0	689	0	308
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	3	3
Lane Group Flow (vph)	0	2126	1647	0	2034	239	0	0	0	501	248	242
Turn Type			Free			Free				Prot		Prot
Protected Phases		4			8					1	6	6
Permitted Phases			Free			Free						
Actuated Green, G (s)		28.1	57.2		28.1	57.2				21.1	21.1	21.1
Effective Green, g (s)		28.1	57.2		28.1	57.2				21.1	21.1	21.1
Actuated g/C Ratio		0.49	1.00		0.49	1.00				0.37	0.37	0.37
Clearance Time (s)		4.0			4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0			3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		3148	2787		3148	1583				1188	548	555
v/s Ratio Prot		c0.33			0.32					0.16	0.17	0.16
v/s Ratio Perm			0.59			0.15						
v/c Ratio		0.68	0.59		0.65	0.15				0.42	0.45	0.44
Uniform Delay, d1		11.1	0.0		10.8	0.0				13.5	13.7	13.6
Progression Factor		1.00	1.00		1.00	1.00				1.00	1.00	1.00
Incremental Delay, d2		0.6	0.9		0.5	0.2				0.2	0.6	2.5
Delay (s)		11.7	0.9		11.3	0.2				13.7	14.3	16.1
Level of Service		B	A		B	A				B	B	B
Approach Delay (s)		7.0			10.1			0.0			14.4	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM Average Control Delay	9.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	57.2	Sum of lost time (s)	4.0
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑↑	↱		↑↑↑	↱↱	↰↰↰		↱			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0		4.0			
Lane Util. Factor		0.86	1.00		0.91	0.88	0.94		1.00			
Frt		1.00	0.85		1.00	0.85	1.00		0.85			
Flt Protected		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (prot)		6408	1583		5085	2787	4990		1583			
Flt Permitted		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (perm)		6408	1583		5085	2787	4990		1583			
Volume (vph)	0	2366	447	0	1012	1182	1260	0	114	0	0	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	2366	447	0	1012	1182	1260	0	114	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	1	0	0	0
Lane Group Flow (vph)	0	2366	447	0	1012	1182	1260	0	113	0	0	0
Turn Type			Free			Free	Prot		custom			
Protected Phases		4			8		5					
Permitted Phases			Free			Free			2			
Actuated Green, G (s)		29.1	59.1		29.1	59.1	22.0		22.0			
Effective Green, g (s)		29.1	59.1		29.1	59.1	22.0		22.0			
Actuated g/C Ratio		0.49	1.00		0.49	1.00	0.37		0.37			
Clearance Time (s)		4.0			4.0		4.0		4.0			
Vehicle Extension (s)		3.0			3.0		3.0		3.0			
Lane Grp Cap (vph)		3155	1583		2504	2787	1858		589			
v/s Ratio Prot		c0.37			0.20		c0.25					
v/s Ratio Perm			0.28			0.42			0.07			
v/c Ratio		0.75	0.28		0.40	0.42	0.68		0.19			
Uniform Delay, d1		12.1	0.0		9.5	0.0	15.6		12.5			
Progression Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Incremental Delay, d2		1.0	0.4		0.1	0.5	1.0		0.7			
Delay (s)		13.1	0.4		9.6	0.5	16.6		13.3			
Level of Service		B	A		A	A	B		B			
Approach Delay (s)		11.1			4.7			16.3			0.0	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM Average Control Delay	10.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	59.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↑↑	↱	↰↰	↑↑↑	↱	↰↰	↑↑	↱↱	↰↰	↑↑↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	0.88	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	2787	3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3539	2787	3433	5085	1583
Volume (vph)	34	1374	78	631	980	91	15	35	344	491	158	22
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	34	1374	78	631	980	91	15	35	344	491	158	22
RTOR Reduction (vph)	0	0	54	0	0	45	0	0	10	0	0	15
Lane Group Flow (vph)	34	1374	24	631	980	46	15	35	334	491	158	7
Turn Type	Prot		Perm	Prot		Perm	Prot		pm+ov	Prot		Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	2.3	36.8	36.8	24.6	59.1	59.1	1.5	20.8	45.4	19.2	38.5	38.5
Effective Green, g (s)	2.3	36.8	36.8	24.6	59.1	59.1	1.5	20.8	45.4	19.2	38.5	38.5
Actuated g/C Ratio	0.02	0.31	0.31	0.21	0.50	0.50	0.01	0.18	0.39	0.16	0.33	0.33
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	67	1594	496	719	2560	797	44	627	1173	561	1668	519
v/s Ratio Prot	0.01	c0.27		c0.18	0.19		0.00	0.01	c0.06	c0.14	0.03	
v/s Ratio Perm			0.05			0.06			0.06			0.01
v/c Ratio	0.51	0.86	0.05	0.88	0.38	0.06	0.34	0.06	0.28	0.88	0.09	0.01
Uniform Delay, d1	57.0	37.9	28.1	44.9	17.9	14.9	57.5	40.1	24.8	47.9	27.4	26.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.0	5.3	0.0	12.7	0.1	0.0	4.6	0.2	0.1	15.6	0.1	0.0
Delay (s)	63.0	43.2	28.1	57.7	18.0	14.9	62.1	40.3	24.9	63.6	27.5	26.7
Level of Service	E	D	C	E	B	B	E	D	C	E	C	C
Approach Delay (s)		42.8			32.6			27.7			53.9	
Approach LOS		D			C			C			D	

Intersection Summary			
HCM Average Control Delay	39.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	117.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	1.00	1.00	0.88	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1770	1863	2787	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	1770	1863	2787	3433	1863	1583
Volume (vph)	276	1871	62	479	1552	588	46	68	373	51	24	104
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	276	1871	62	479	1552	588	46	68	373	51	24	104
RTOR Reduction (vph)	0	0	36	0	0	259	0	0	297	0	0	83
Lane Group Flow (vph)	276	1871	26	479	1552	329	46	68	76	51	24	21

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	11.6	39.3	39.3	16.7	44.4	44.4	2.8	19.2	19.2	3.0	19.4	19.4
Effective Green, g (s)	11.6	39.3	39.3	16.7	44.4	44.4	2.8	19.2	19.2	3.0	19.4	19.4
Actuated g/C Ratio	0.12	0.42	0.42	0.18	0.47	0.47	0.03	0.20	0.20	0.03	0.21	0.21
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	423	2121	660	609	2397	746	53	380	568	109	384	326
v/s Ratio Prot	0.08	c0.37		c0.14	0.31		c0.03	0.04		0.01	0.01	
v/s Ratio Perm			0.04			0.37			0.13			0.07
v/c Ratio	0.65	0.88	0.04	0.79	0.65	0.44	0.87	0.18	0.13	0.47	0.06	0.07
Uniform Delay, d1	39.4	25.3	16.3	37.0	18.9	16.6	45.5	31.0	30.7	44.8	30.1	30.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.6	4.9	0.0	6.9	0.6	0.4	95.9	1.0	0.5	3.2	0.3	0.4
Delay (s)	43.0	30.2	16.3	43.9	19.6	17.0	141.4	32.0	31.2	48.0	30.4	30.5
Level of Service	D	C	B	D	B	B	F	C	C	D	C	C
Approach Delay (s)		31.4			23.4			41.7			35.5	
Approach LOS		C			C			D			D	

Intersection Summary

HCM Average Control Delay	28.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	94.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0				4.0	4.0	4.0
Lane Util. Factor		0.86	0.88		0.86	1.00				0.91	0.86	0.95
Frt		1.00	0.85		1.00	0.85				1.00	0.94	0.85
Flt Protected		1.00	1.00		1.00	1.00				0.95	0.97	1.00
Satd. Flow (prot)		6408	2787		6408	1583				3221	1466	1504
Flt Permitted		1.00	1.00		1.00	1.00				0.95	0.97	1.00
Satd. Flow (perm)		6408	2787		6408	1583				3221	1466	1504
Volume (vph)	0	1044	1237	0	3591	65	0	0	0	926	0	472
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1044	1237	0	3591	65	0	0	0	926	0	472
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1044	1237	0	3591	65	0	0	0	702	359	337
Turn Type			Free			Free				Prot		Prot
Protected Phases		4			8					1	6	6
Permitted Phases			Free			Free						
Actuated Green, G (s)		39.0	65.0		39.0	65.0				18.0	18.0	18.0
Effective Green, g (s)		39.0	65.0		39.0	65.0				18.0	18.0	18.0
Actuated g/C Ratio		0.60	1.00		0.60	1.00				0.28	0.28	0.28
Clearance Time (s)		4.0			4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0			3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		3845	2787		3845	1583				892	406	416
v/s Ratio Prot		0.16			c0.56					0.22	c0.24	0.22
v/s Ratio Perm			0.44			0.04						
v/c Ratio		0.27	0.44		0.93	0.04				0.79	0.88	0.81
Uniform Delay, d1		6.2	0.0		11.8	0.0				21.7	22.5	21.9
Progression Factor		1.00	1.00		1.00	1.00				1.00	1.00	1.00
Incremental Delay, d2		0.0	0.5		5.4	0.0				4.7	22.5	16.8
Delay (s)		6.3	0.5		17.2	0.0				26.5	45.0	38.7
Level of Service		A	A		B	A				C	D	D
Approach Delay (s)		3.1			16.9			0.0			34.2	
Approach LOS		A			B			A			C	

Intersection Summary			
HCM Average Control Delay	15.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0		4.0			
Lane Util. Factor		0.86	1.00		0.91	0.88	0.94		1.00			
Frt		1.00	0.85		1.00	0.85	1.00		0.85			
Flt Protected		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (prot)		6408	1583		5085	2787	4990		1583			
Flt Permitted		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (perm)		6408	1583		5085	2787	4990		1583			
Volume (vph)	0	1635	334	0	1391	734	2265	0	624	0	0	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1635	334	0	1391	734	2265	0	624	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1635	334	0	1391	734	2265	0	624	0	0	0
Turn Type			Free			Free	Prot		custom			
Protected Phases		4			8		5					
Permitted Phases			Free			Free			2			
Actuated Green, G (s)		19.0	60.0		19.0	60.0	33.0		33.0			
Effective Green, g (s)		19.0	60.0		19.0	60.0	33.0		33.0			
Actuated g/C Ratio		0.32	1.00		0.32	1.00	0.55		0.55			
Clearance Time (s)		4.0			4.0		4.0		4.0			
Vehicle Extension (s)		3.0			3.0		3.0		3.0			
Lane Grp Cap (vph)		2029	1583		1610	2787	2745		871			
v/s Ratio Prot		0.26			c0.27		c0.45					
v/s Ratio Perm			0.21			0.26			0.39			
v/c Ratio		0.81	0.21		0.86	0.26	0.83		0.72			
Uniform Delay, d1		18.8	0.0		19.3	0.0	11.1		10.0			
Progression Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Incremental Delay, d2		2.5	0.3		5.3	0.2	2.2		5.1			
Delay (s)		21.3	0.3		24.6	0.2	13.3		15.1			
Level of Service		C	A		C	A	B		B			
Approach Delay (s)		17.7			16.2			13.7			0.0	
Approach LOS		B			B			B			A	

Intersection Summary

HCM Average Control Delay	15.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↑↑	↱	↰↰	↑↑↑	↱	↰↰	↑↑	↱↱	↰↰	↑↑↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	0.97	0.95	0.88	0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	3433	3539	2787	3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	3433	3539	2787	3433	5085	1583
Volume (vph)	32	1142	47	483	1169	423	79	179	628	177	78	29
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	32	1142	47	483	1169	423	79	179	628	177	78	29
RTOR Reduction (vph)	0	0	33	0	0	236	0	0	10	0	0	21
Lane Group Flow (vph)	32	1142	14	483	1169	187	79	179	618	177	78	8
Turn Type	Prot		Perm	Prot		Perm	Prot		pm+ov	Prot		Perm
Protected Phases	7	4		3	8		5	2	3	1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	1.6	21.0	21.0	12.8	32.2	32.2	4.0	17.9	30.7	5.0	18.9	18.9
Effective Green, g (s)	1.6	21.0	21.0	12.8	32.2	32.2	4.0	17.9	30.7	5.0	18.9	18.9
Actuated g/C Ratio	0.02	0.29	0.29	0.18	0.44	0.44	0.06	0.25	0.42	0.07	0.26	0.26
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	76	1469	457	604	2252	701	189	871	1330	236	1322	412
v/s Ratio Prot	0.01	c0.22		c0.14	0.23		0.02	0.05	c0.08	c0.05	0.02	
v/s Ratio Perm			0.03			0.27			0.14			0.02
v/c Ratio	0.42	0.78	0.03	0.80	0.52	0.27	0.42	0.21	0.46	0.75	0.06	0.02
Uniform Delay, d1	35.1	23.7	18.5	28.7	14.6	12.8	33.2	21.8	15.1	33.2	20.2	20.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.8	2.7	0.0	7.6	0.2	0.2	1.5	0.5	0.3	13.2	0.1	0.1
Delay (s)	38.9	26.4	18.6	36.3	14.9	13.0	34.7	22.3	15.3	46.4	20.3	20.1
Level of Service	D	C	B	D	B	B	C	C	B	D	C	C
Approach Delay (s)		26.4			19.5			18.5			36.6	
Approach LOS		C			B			B			D	

Intersection Summary			
HCM Average Control Delay	22.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	72.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.2%	ICU Level of Service	B
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↑↑	↱	↰↰	↑↑↑	↱	↰	↑	↱↱	↰↰	↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	1.00	1.00	0.88	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	3433	5085	1583	1770	1863	2787	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	3433	5085	1583	1770	1863	2787	3433	1863	1583
Volume (vph)	130	1745	72	354	1794	48	66	54	566	304	85	215
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	130	1745	72	354	1794	48	66	54	566	304	85	215
RTOR Reduction (vph)	0	0	44	0	0	27	0	0	273	0	0	163
Lane Group Flow (vph)	130	1745	28	354	1794	21	66	54	293	304	85	52
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	7.6	38.1	38.1	13.2	43.7	43.7	6.7	18.9	18.9	11.5	23.7	23.7
Effective Green, g (s)	7.6	38.1	38.1	13.2	43.7	43.7	6.7	18.9	18.9	11.5	23.7	23.7
Actuated g/C Ratio	0.08	0.39	0.39	0.14	0.45	0.45	0.07	0.19	0.19	0.12	0.24	0.24
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	267	1983	617	464	2274	708	121	360	539	404	452	384
v/s Ratio Prot	0.04	c0.34		c0.10	0.35		0.04	0.03		c0.09	0.05	
v/s Ratio Perm			0.05			0.03			0.20			0.14
v/c Ratio	0.49	0.88	0.05	0.76	0.79	0.03	0.55	0.15	0.54	0.75	0.19	0.14
Uniform Delay, d1	43.2	27.7	18.5	40.7	23.1	15.1	44.0	32.7	35.5	41.7	29.4	29.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	5.0	0.0	7.5	1.9	0.0	5.0	0.9	4.0	8.0	0.9	0.7
Delay (s)	44.6	32.7	18.5	48.3	25.0	15.1	49.0	33.6	39.5	49.7	30.3	29.7
Level of Service	D	C	B	D	C	B	D	C	D	D	C	C
Approach Delay (s)		33.0			28.5			39.9			39.9	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM Average Control Delay	32.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	97.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0				4.0	4.0	4.0
Lane Util. Factor		0.86	0.88		0.86	1.00				0.91	0.86	0.95
Frt		1.00	0.85		1.00	0.85				1.00	0.95	0.85
Flt Protected		1.00	1.00		1.00	1.00				0.95	0.97	1.00
Satd. Flow (prot)		6408	2787		6408	1583				3221	1469	1504
Flt Permitted		1.00	1.00		1.00	1.00				0.95	0.97	1.00
Satd. Flow (perm)		6408	2787		6408	1583				3221	1469	1504
Volume (vph)	0	2386	1769	0	2042	270	0	0	0	658	0	330
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	2386	1769	0	2042	270	0	0	0	658	0	330
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	3	3
Lane Group Flow (vph)	0	2386	1769	0	2042	270	0	0	0	495	251	236
Turn Type			Free			Free				Prot		Prot
Protected Phases		4			8					1	6	6
Permitted Phases			Free			Free						
Actuated Green, G (s)		30.5	58.5		30.5	58.5				20.0	20.0	20.0
Effective Green, g (s)		30.5	58.5		30.5	58.5				20.0	20.0	20.0
Actuated g/C Ratio		0.52	1.00		0.52	1.00				0.34	0.34	0.34
Clearance Time (s)		4.0			4.0					4.0	4.0	4.0
Vehicle Extension (s)		3.0			3.0					3.0	3.0	3.0
Lane Grp Cap (vph)		3341	2787		3341	1583				1101	502	514
v/s Ratio Prot		0.37			0.32					0.15	0.17	0.16
v/s Ratio Perm			0.63			0.17						
v/c Ratio		0.71	0.63		0.61	0.17				0.45	0.50	0.46
Uniform Delay, d1		10.7	0.0		9.8	0.0				15.0	15.3	15.0
Progression Factor		1.00	1.00		1.00	1.00				1.00	1.00	1.00
Incremental Delay, d2		0.7	1.1		0.3	0.2				0.3	0.8	2.9
Delay (s)		11.4	1.1		10.2	0.2				15.3	16.1	18.0
Level of Service		B	A		B	A				B	B	B
Approach Delay (s)		7.0			9.0			0.0			16.1	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	8.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	58.5	Sum of lost time (s)	0.0
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	30		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑↑	↱		↑↑↑	↱↱	↰↰↰		↱			
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0		4.0			
Lane Util. Factor		0.86	1.00		0.91	0.88	0.94		1.00			
Frt		1.00	0.85		1.00	0.85	1.00		0.85			
Flt Protected		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (prot)		6408	1583		5085	2787	4990		1583			
Flt Permitted		1.00	1.00		1.00	1.00	0.95		1.00			
Satd. Flow (perm)		6408	1583		5085	2787	4990		1583			
Volume (vph)	0	2532	513	0	1027	1192	1286	0	114	0	0	0
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	2532	513	0	1027	1192	1286	0	114	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	1	0	0	0
Lane Group Flow (vph)	0	2532	513	0	1027	1192	1286	0	113	0	0	0
Turn Type			Free			Free	Prot		custom			
Protected Phases		4			8		5					
Permitted Phases			Free			Free			2			
Actuated Green, G (s)		29.9	59.9		29.9	59.9	22.0		22.0			
Effective Green, g (s)		29.9	59.9		29.9	59.9	22.0		22.0			
Actuated g/C Ratio		0.50	1.00		0.50	1.00	0.37		0.37			
Clearance Time (s)		4.0			4.0		4.0		4.0			
Vehicle Extension (s)		3.0			3.0		3.0		3.0			
Lane Grp Cap (vph)		3199	1583		2538	2787	1833		581			
v/s Ratio Prot		c0.40			0.20		c0.26					
v/s Ratio Perm			0.32			0.43			0.07			
v/c Ratio		0.79	0.32		0.40	0.43	0.70		0.20			
Uniform Delay, d1		12.4	0.0		9.4	0.0	16.2		12.9			
Progression Factor		1.00	1.00		1.00	1.00	1.00		1.00			
Incremental Delay, d2		1.4	0.5		0.1	0.5	1.2		0.8			
Delay (s)		13.8	0.5		9.5	0.5	17.4		13.7			
Level of Service		B	A		A	A	B		B			
Approach Delay (s)		11.6			4.7			17.1			0.0	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM Average Control Delay	10.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	59.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	30		
c Critical Lane Group			

APPENDIX C
COUNTY DEVELOPMENT ACTIVITY REPORT

SANTA CLARITA VALLEY CASES SINCE 1/1/2002

PROJECT NO	CASE NO	LOCATION	DESCRIPTION	FILED DATE	LOT TYPE	NBR of ACRES	NBR of UNITS	NBR of LOTS	STATUS DATE	STATUS
BOUQUET CANYON										
02-164										
	CP02-164	NORTH OF VASQUEZ CANYON ROAD	10 SF LOTS.40.37 ACRES & 36 ACRE REMAINDER PARCEL	6/19/2002						PENDING
	TR45123		10 SF LOTS/40.37 ACRES & 36 ACRE REMINDER PARCEL		SF	46.0	10	10		PENDING
CASTAIC CANYON										
02-005										
	PM26549	30711 ROMERO CANYON, CASTAIC	(TN) 3 SF LOTS/18.05 ACRES	1/8/2002	SF	18.1	3	3		PENDING
02-087										
	CP02-087	27900 BLOCK OF W. SLOAN CANYON ROAD	RETAIL, RESTAURANT AND DAY CARE FACILITY	4/2/2002						PENDING
02-108										
	CP02-108	WEST OF SAN FRANCISQUITO CANYON ROAD	MINOR MODIFICATIONS TO CP92-074; (TR51644)	4/30/2002						PENDING
02-116										
	CP02-116	N OF 31910 CASTAIC ROAD, CASTAIC	150 SENIOR APARTMENTS IN C-3-DP ZONE	5/9/2002					11/6/2002	APPROVED
02-152										
	CP02-152	31544 CASTAIC ROAD	PROPOSED PARKING LOT FOR MOTEL CUSTOMERS	6/10/2002						PENDING
02-196										
	CP02-196	NORTH OF TAPIA CANYON ROAD	HILLSIDE MANAGEMENT	7/29/2002						PENDING
			DENSITY CONTROLLED DEVELOPMENT							PENDING
	OT02-196		48 REMOVALS PLUS ENCROACHMENTS							PENDING
	TR53822		VESTING TENT. TR. FOR 335 SF UNITS		SF	934	335	335		PENDING
02-215										

PROJECT NO	CASE NO	LOCATION	DESCRIPTION	FILED DATE	LOT TYPE	NBR of ACRES	NBR of UNITS	NBR of LOTS	STATUS DATE	STATUS
	PM19149	30801 SLOAN CANYON ROAD	4 SF LOTS/20 AC	8/21/2002	SF	20	4	4		PENDING
03-023										
	OT03-023	30740 BURLWOOD DRIVE	DECK UNDER OAK TREE; ONE ENCROACHMENT	1/16/2003						PENDING
NEWHALL										
00-210										
	CP00-210	SW OF INTERSECTION OF OLD ROAD & CALIF. ROUTE 126	DEVELOPMENT PROGRAM/GRADING/SEA	1/28/2002						PENDING
	HR00-210		REALIGNMENT OF HENRY MAYO DR							PENDING
	OT00-210		REMOVE ONE HERITAGE OAK TREE							PENDING
	ZC00-210		FROM A-2-5 AND M1-1/2 TO M1-1/2DP							PENDING
02-010										
	PM26574	S. OF MUIRFIELD AND N. OF TURNBERRY	A 14-LOT PARCEL MAP WHICH IS A RESUBDIVISION	1/17/2002	I	11.2		14		PENDING
02-012										
	CP02-012	26900 BLOCK OF THE OLD ROAD	SALE OF ALCOHOLIC BEVERAGES FOR ALBERTSONS	1/29/2002					5/21/2002	APPROVED
02-030										
	OT02-030	SOUTH OF VALENCIA BLVD. AND EAST OF THE OLD ROAD	REMOVAL AND RELOCATION OF TWO OAKS	2/21/2002						PENDING
02-031										
	HR02-031	4000 FEET NORTHERLY OF OLD ROAD AND VALENCIA	PROPOSED LAND USE OF SCHOOL SITES	2/21/2002						PENDING
02-053										
	CP02-053	22200 N. SIERRA HWY., SYLMAR	RECREATIONAL VEHICLE AND BOAT STORAGE FACILITY	3/13/2002						PENDING
	OT02-053		31 REMOVALS AND 7 ENCROACHMENTS							PENDING
	ZC02-053		FROM A-2-1 TO M-1-DP							PENDING
02-055										
	CP02-055	SOUTH OF PICO CANYON ROAD, APPROX. 1.25 MILE WEST OF I-5 FWY.	HILLSIDE MANAGEMENT, DENSITY CONTROLLED DEVELOPMEN	3/19/2002						PENDING
	OT02-055		TWO ENCROACHMENTS; FOUR REMAIN							PENDING

PROJECT NO	CASE NO	LOCATION	DESCRIPTION	FILED DATE	LOT TYPE	NBR of ACRES	NBR of UNITS	NBR of LOTS	STATUS DATE	STATUS
	TR52905	SOUTH OF PICO CANYON ROAD, APPROX. 1.25 MILE WEST OF I-5 FWY.	23 SF LOTS ON 39.42 AC	3/19/2002	SF	39.4		23		PENDING
02-101										
	CP02-101	S. OF COPPER HILL DR. 7 EAST OF MCBEAN PKWY.	WIRELESS TELECOMMUNICATION FACILITY	4/24/2002					9/18/2002	APPROVED
02-251										
	CP02-251	W. SIDE OF OLD ROAD, APPROX. 200' SOUTH OF CHIQUELLA LANE	HOTEL USE WITH 112 ROOMS	9/18/2002						PENDING
02-298										
	CP02-298	NORTH SIDE OF POE PARKWAY, 400 FT. S. OF BROOKS CIRCLE	WIRELESS FACILITY ON NEW STREET LIGHT	10/31/2002						PENDING
02-320										
	HR02-320	S. TERMINUS VIA PRINCESSA IN TR. 47200 (FAIR OAKS RANCH)	PROPOSED REALIGNMENT TO REDUCE EARTHEN FILL	11/21/2002						PENDING
02-334										
	OT02-334	23220 N. MEAFORD AVENUE	TWO OAK TREE ENCROACHMENTS	12/16/2002						PENDING
02-341										
	CP02-341	N. OF COPPERHILL DRIVE AND E. OF HIDDEN HILLS DRIVE	SIX SF LOTS FOR CUP - HILLSIDE	12/23/2002						PENDING
	TR54073		VESTING TENT. TR. FOR 6 SF LOTS		SF	2.67	6	6		PENDING
98182										
	HR98182	WESTERLY OF STEVENSON RANCH & NORTHERLY OF PICO CANYON ROAD	HIGHWAY REALIGNMENT OF PICO CANYON ROAD	4/25/2002						PENDING
SAND CANYON										
02-029										
	CP02-029	N SIDE OF VIA PRINCESSA, CANYON COUNTRY	SPECIFIC PLAN CONFORMANCE	2/21/2002					9/25/2002	APPROVED
	LP02-029		SP: OC TO R-3 (25)U ON 9.9 AC							PENDING
	TR53795		(TN) 6 LOTS (154 NC)/9.9 AC		MF	9.9	154	6	9/25/2002	APPROVED
02-071										
	CP02-071	29100 BLOCK OF BOUQUET CANYON ROAD	INSTALLATION OF WIRELESS TELECOMMUNICATIONS FAC.	3/28/2002						PENDING
02-073										

PROJECT NO	CASE NO	LOCATION	DESCRIPTION	FILED DATE	LOT TYPE	NBR of ACRES	NBR of UNITS	NBR of LOTS	STATUS DATE	STATUS
	CP02-073	15400 BLOCK OF W. SIERRA HIGHWAY	INSTALL WIRELESS TELECOMMUNICATION FACILITIES	3/28/2002						PENDING
02-191										
	OT02-191	25200 BLOCK OF RUNNING HORSE ROAD	EIGHT OAK TREE ENCROACHMENTS	7/16/2002					10/15/2002	WITHDREW
02-234										
	CP02-234	16353-57 SIERRA HIGHWAY	UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY	8/29/2002					1/9/2003	APPROVED
02-279										
	CP02-279	15840 SIERRA HIGHWAY	STORAGE OF VINTAGE VEHICLES ON SUBJECT SITE	10/10/2002						PENDING
	ZC02-279		FROM A1-1 TO M1-DP							PENDING
SAWTELLE										
02-139										
	CP02-139	13600 BLOCK OF SIERRA HIGHWAY	WIRELESS TELECOMMUNICATIONS FACILITY	6/4/2002						PENDING
SOLEDAD										
02-050										
	CP02-050	10600 W DARLING RD, AGUA DULCE	HILLSIDE CONDITIONAL USE PERMIT	3/11/2002						PENDING
	PM26653		VESTING MINOR LAND DIVISION, 4SF LOTS/20.15 ACRES		SF	20.2	1	4		PENDING
02-072										
	CP02-072	10900 BLOCK OF W. SIERRA HIGHWAY	INSTALL WIRELESS TELECOMMUNICATION FACILITIES	3/28/2002						PENDING
02-249										
	CP02-249	SOLEDAD CANYON ROAD BET. ANTELOPE VALLEY FWY. AND LANGARD ROAD	HILLSIDE MANAGEMENT FOR 211 ACRE SITE	9/18/2002						PENDING
	PL02-249		SPECIFIC PLAN FOR 211 ACRE SITE							PENDING
	SP02-249		PLAN AMENDMENT COUNTYWIDE FOR 211 ACRE SITE							PENDING
	TR54020		DEVELOP 211 ACRE SITE WITH 568 LOTS		SF	129	568	568		PENDING
					R	0.5		4		PENDING
					OS	82.2		12		PENDING

PROJECT NO	CASE NO	LOCATION	DESCRIPTION	FILED DATE	LOT TYPE	NBR of ACRES	NBR of UNITS	NBR of LOTS	STATUS DATE	STATUS
	ZC02-249	SOLEDAD CANYON ROAD BET. ANTELOPE VALLEY FWY. AND LANGARD ROAD	FROM A-2-1 TO SPECIFIC PLAN (211.3 ACRES)	9/18/2002						PENDING
02-300										
	CP02-300	14400 BLOCK OF SIERRA HIGHWAY	REPLACE EXISTING POLE WITH 50' UTILITY POLE	10/31/2002						PENDING
02-343										
	CP02-343	14333 DAVENPORT ROAD	OUTDOOR STORAGE OF TRACTORS, TRAILERS	12/31/2002						PENDING
03-015										
	CP03-015	34037 AGUA DULCE CANYON ROAD	SENIOR CITIZEN RESIDENCE - 1,000 SQ. FT.	1/13/2003						PENDING
03-017										
	CP03-017	33314 AGUA DULCE CYN. ROAD	WATER WELL, STORAGE, TRUCK LOADING DOCK	1/14/2003						PENDING

APPENDIX D
TRAFFIC COUNT DATA SHEETS

Traffic Data Services, Inc.
TABULAR SUMMARY OF VEHICULAR TURNING MOVEMENTS

N/S STREET: SAN MARTINEZ GRANDE CANYON RD   E/W STREET: SR-126   CITY: SANTA CLARITA
DATE: 6/18/03   DAY: WEDNESDAY   FILENAME: 0631301A

15 Min Period Beginning	Northbound NL	NT	NR	Southbound SL	ST	SR	Eastbound EL	ET	ER	Westbound WL	WT	WR	TOTAL
LANES:				0	1	0	1	2			2	0	
6:00 AM													
15 AM													
30 AM													
45 AM													
7:00 AM				1		0	2	149			110	0	262
15 AM				1		0	1	151			170	0	323
30 AM				1		0	0	165			170	0	336
45 AM				1		1	0	174			176	1	353
8:00 AM				1		1	0	160			143	0	305
15 AM				3		0	2	142			136	0	283
30 AM				1		0	0	134			138	0	273
45 AM				2		0	0	149			150	0	301
9:00 AM													
15 AM													
30 AM													
45 AM													
10:00 AM													
15 AM													
30 AM													
45 AM													
AM Peak Hr Begins at 715 VOLUMES =	0	0	0	4	0	2	1	650	0	0	659	1	1317

COMMENTS:

Traffic Data Services, Inc.
TABULAR SUMMARY OF VEHICULAR TURNING MOVEMENTS

N/S STREET: SAN MARTINEZ GRANDE CANYON RD   E/W STREET: SR-126   CITY: SANTA CLARITA
DATE: 6/19/03   DAY: THURSDAY   FILENAME: 0631301P

15 Min Period Beginning	Northbound			Southbound			Eastbound			Westbound			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:				0	1	0	1	2			2	0	
2:00 PM													
15 PM													
30 PM													
45 PM													
3:00 PM													
15 PM													
30 PM													
45 PM													
4:00 PM				2		0	0	185			294	2	483
15 PM				1		2	0	213			248	1	465
30 PM				2		0	0	251			221	1	475
45 PM				3		0	0	288			171	1	463
5:00 PM				0		1	1	227			182	3	414
15 PM				1		1	0	251			229	1	483
30 PM				1		1	2	195			182	0	381
45 PM				2		0	0	242			184	0	428
6:00 PM													
15 PM													
30 PM													
45 PM													
PM Peak Hr Begins at 1600 VOLUMES =	0	0	0	8	0	2	0	937	0	0	934	5	1886

COMMENTS:

Traffic Data Services, Inc.
TABULAR SUMMARY OF VEHICULAR TURNING MOVEMENTS

N/S STREET: CHIQUITO CANYON RD   E/W STREET: SR-126   CITY: SANTA CLARITA
DATE: 6/19/03   DAY: THURSDAY   FILENAME: 0631302A

15 Min Period Beginning	Northbound			Southbound			Eastbound			Westbound			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	1	0	1	1	2	0	0	2	1	
6:00 AM													
15 AM													
30 AM													
45 AM													
7:00 AM	0	0	0	20	0	3	1	206	2	0	166	5	403
15 AM	0	0	1	18	0	3	2	150	1	0	161	8	344
30 AM	0	0	0	16	0	4	1	147	1	0	193	3	365
45 AM	0	1	0	16	0	2	2	160	0	1	193	6	381
8:00 AM	0	0	0	14	0	1	2	148	2	0	171	4	342
15 AM	0	0	0	20	0	4	2	147	0	0	150	10	333
30 AM	1	0	0	22	0	0	1	137	0	0	199	2	362
45 AM	1	0	0	13	0	0	1	125	0	1	161	3	305
9:00 AM													
15 AM													
30 AM													
45 AM													
10:00 AM													
15 AM													
30 AM													
45 AM													
AM Peak Hr Begins at 700 VOLUMES =	0	1	1	70	0	12	6	663	4	1	713	22	1493

COMMENTS:

Traffic Data Services, Inc.
TABULAR SUMMARY OF VEHICULAR TURNING MOVEMENTS

N/S STREET: CHIQUITO CANYON RD   E/W STREET: SR-126   CITY: SANTA CLARITA

DATE: 6/18/03   DAY: WEDNESDAY   FILENAME: 0631302P

15 Min Period Beginning	Northbound			Southbound			Eastbound			Westbound			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	1	0	1	0	1	1	2	0	0	2	1	
2:00 PM													
15 PM													
30 PM													
45 PM													
3:00 PM													
15 PM													
30 PM													
45 PM													
4:00 PM	0	0	1	12	0	0	3	203	0	0	270	21	510
15 PM	0	0	0	9	0	2	4	137	0	0	224	19	395
30 PM	0	0	0	3	0	5	4	237	0	0	202	10	461
45 PM	0	0	0	11	0	0	1	219	0	0	178	16	425
5:00 PM	0	0	0	12	0	0	4	210	0	0	206	24	456
15 PM	0	0	0	13	0	0	4	214	0	0	166	25	422
30 PM	1	0	0	8	0	3	3	258	0	0	189	21	483
45 PM	0	0	0	17	0	5	4	245	0	0	159	16	446
6:00 PM													
15 PM													
30 PM													
45 PM													
PM Peak Hr Begins at 1700 VOLUMES =	1	0	0	50	0	8	15	927	0	0	720 935	86	1807

COMMENTS: BALANCED UPSTREAM / DOWNSTREAM

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Traffic Data Services, Inc.
TABULAR SUMMARY OF VEHICULAR TURNING MOVEMENTS

N/S STREET: WOLCOTT WY   E/W STREET: SR-126   CITY: SANTA CLARITA
DATE: 6/19/03   DAY: THURSDAY   FILENAME: 0631303A

15 Min Period Beginning	Northbound NL	NT	NR	Southbound SL	ST	SR	Eastbound EL	ET	ER	Westbound WL	WT	WR	TOTAL
LANES:	0	1	0	1.5	0.5	1	1	2	0	1	2	1	
6:00 AM													
15 AM													
30 AM													
45 AM													
7:00 AM	2	0	0	0	0	1	2	162	0	0	175	0	342
15 AM	1	0	0	1	0	5	4	192	0	2	202	1	408
30 AM	1	0	0	0	0	1	6	159	0	1	174	0	342
45 AM	1	0	0	0	0	0	0	149	1	0	180	1	332
8:00 AM	0	0	0	0	0	0	0	150	0	0	185	0	335
15 AM	0	0	0	0	0	2	3	149	0	0	157	0	311
30 AM	0	0	0	0	0	1	0	148	0	0	160	1	310
45 AM	0	0	0	0	0	1	0	170	0	0	202	2	375
9:00 AM													
15 AM													
30 AM													
45 AM													
10:00 AM													
15 AM													
30 AM													
45 AM													
AM Peak Hr Begins at 700 VOLUMES =	5	0	0	1	0	7	12	662	1	3	731	2	1424

COMMENTS:

Traffic Data Services, Inc.
TABULAR SUMMARY OF VEHICULAR TURNING MOVEMENTS

N/S STREET: WOLCOTT WY   E/W STREET: SR-126   CITY: SANTA CLARITA

DATE: 6/19/03   DAY: THURSDAY   FILENAME: 0631303P

15 Min Period Beginning	Northbound NL	NT	NR	Southbound SL	ST	SR	Eastbound EL	ET	ER	Westbound WL	WT	WR	TOTAL
LANES:	0	1	0	1.5	0.5	1	1	2	0	1	2	1	
2:00 PM													
15 PM													
30 PM													
45 PM													
3:00 PM													
15 PM													
30 PM													
45 PM													
4:00 PM	0	0	0	2	0	5	0	211	0	0	303	0	521
15 PM	0	0	0	0	0	7	2	253	0	0	274	0	536
30 PM	0	0	0	0	0	1	0	260	0	0	218	0	479
45 PM	0	0	0	0	0	7	2	306	0	0	210	0	525
5:00 PM	0	0	0	0	0	9	2	264	0	0	211	0	486
15 PM	0	0	0	0	0	1	0	246	0	0	234	1	482
30 PM	0	0	0	0	0	2	4	235	1	1	222	1	466
45 PM	0	0	0	0	0	1	2	269	0	0	208	1	481
6:00 PM													
15 PM													
30 PM													
45 PM													
PM Peak Hr Begins at 1600 VOLUMES =	0	0	0	2	0	20	4	1030	0	0	1005	0	2061

COMMENTS:

Traffic Data Services, Inc.
TABULAR SUMMARY OF VEHICULAR TURNING MOVEMENTS

N/S STREET: COMMERCE CENTER DR   E/W STREET: SR-126   CITY: SANTA CLARITA

DATE: 6/23/03   DAY: MONDAY   FILENAME: 0631304A

15 Min Period Beginning	Northbound NL	NT	NR	Southbound SL	ST	SR	Eastbound EL	ET	ER	Westbound WL	WT	WR	TOTAL
LANES:	1	1	1	2	1	1	1	2	1	1	2	2	
6:00 AM													
15 AM													
30 AM													
45 AM													
7:00 AM	4	11	0	42	19	19	8	169	17	4	211	132	636
15 AM	1	26	1	27	6	6	7	137	12	3	145	131	502
30 AM	8	34	1	86	9	5	9	168	9	7	185	118	639
45 AM	7	43	3	55	8	7	3	156	13	6	145	133	579
8:00 AM	6	37	8	75	10	5	6	162	12	5	152	96	574
15 AM	7	38	9	80	12	5	9	166	17	6	150	102	601
30 AM	7	9	6	77	10	2	0	132	11	8	132	84	478
45 AM	4	7	10	43	6	3	9	169	8	10	125	82	476
9:00 AM													
15 AM													
30 AM													
45 AM													
10:00 AM													
15 AM													
30 AM													
45 AM													
AM Peak Hr Begins at 730 VOLUMES =	28	152	21	296	39	22	27	652	51	24	632	449	2393
											648		

COMMENTS: BALANCED TO UPSTREAM

Traffic Data Services, Inc.
TABULAR SUMMARY OF VEHICULAR TURNING MOVEMENTS

N/S STREET: COMMERCE CENTER DR E/W STREET: SR-126 CITY: SANTA CLARITA
DATE: 6/19/03 DAY: THURSDAY FILENAME: 0631304P

15 Min Period Beginning	Northbound NL	NT	NR	Southbound SL	ST	SR	Eastbound EL	ET	ER	Westbound WL	WT	WR	TOTAL
LANES:	1	1	1	2	1	1	1	2	1	1	2	2	
2:00 PM													
15 PM													
30 PM													
45 PM													
3:00 PM													
15 PM													
30 PM													
45 PM													
4:00 PM	22	9	9	57	17	10	4	173	3	2	239	27	572
15 PM	11	11	4	169	30	11	2	180	7	6	237	35	703
30 PM	19	12	8	150	30	12	4	181	7	6	238	25	692
45 PM	14	7	10	163	48	10	3	180	3	5	241	27	711
5:00 PM	20	14	19	195	33	20	14	286	7	6	206	36	856
15 PM	16	3	4	163	21	14	37	210	8	6	173	44	699
30 PM	16	3	4	103	20	13	36	208	7	6	171	41	628
45 PM	11	9	2	86	28	7	4	174	13	14	161	33	542
6:00 PM													
15 PM													
30 PM													
45 PM													
PM Peak Hr Begins at 1615 VOLUMES =	64	44	41	677	141	53	23	827	24	23	922	123	2962

COMMENTS:

Traffic Data Services, Inc.
TABULAR SUMMARY OF VEHICULAR TURNING MOVEMENTS

N/S STREET: I-5 SB OFF RMP TO WB SR-126 E/W STREET: SR-126 CITY: SANTA CLARITA
DATE: 6/19/03 DAY: THURSDAY FILENAME: 0631305A

15 Min Period Beginning	Northbound NL	NT	NR	Southbound SL	ST	SR	Eastbound EL	ET	ER	Westbound WL	WT	WR	TOTAL
LANES:						1					1		
6:00 AM													
15 AM													
30 AM													
45 AM													
7:00 AM						28					251		279
15 AM						42					243		285
30 AM						33					248		281
45 AM						36					232		268
8:00 AM						36					244		280
15 AM						49					219		268
30 AM						38					192		230
45 AM						31					181		212
9:00 AM													
15 AM													
30 AM													
45 AM													
10:00 AM													
15 AM													
30 AM													
45 AM													
AM Peak Hr Begins at 715 VOLUMES =	0	0	0	0	0	147	0	0	0	0	967	0	1114
								304	639		943		

COMMENTS: BALANCED UPSTREAM/DOWNSTREAM

Traffic Data Services, Inc.
TABULAR SUMMARY OF VEHICULAR TURNING MOVEMENTS

N/S STREET: I-5 SB OFF RMP TO WB SR-126 E/W STREET: SR-126 CITY: SANTA CLARITA
DATE: 6/18/03 DAY: WEDNESDAY FILENAME: 0631305P

15 Min Period Beginning	Northbound			Southbound			Eastbound			Westbound			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:						1					1		
2:00 PM													
15 PM													
30 PM													
45 PM													
3:00 PM													
15 PM													
30 PM													
45 PM													
4:00 PM						29					185		214
15 PM						37					193		230
30 PM						35					197		232
45 PM						31					189		220
5:00 PM						32					171		203
15 PM						37					145		182
30 PM						30					154		184
45 PM						37					133		170
6:00 PM													
15 PM													
30 PM													
45 PM													
PM Peak Hr Begins at 1600 VOLUMES =	0	0	0	0	0	132	0	0	0	0	764	0	896
								425	1058		822		

COMMENTS: BALANCED UPSTREAM / DOWNSTREAM

8

Traffic Data Services, Inc.
TABULAR SUMMARY OF VEHICULAR TURNING MOVEMENTS

N/S STREET: I-5 NB ON/OFF RAMPS E/W STREET: SR-126 CITY: SANTA CLARITA
DATE: 6/23/03 DAY: MONDAY FILENAME: 0631306A

15 Min Period Beginning	Northbound NL	NT	NR	Southbound SL	ST	SR	Eastbound EL	ET	ER	Westbound WL	WT	WR	TOTAL
LANES:	1		1					1	1	1.5	0.5		
6:00 AM													
15 AM													
30 AM													
45 AM													
7:00 AM	146		29					63	21	42	87		388
15 AM	168		30					39	18	33	69		357
30 AM	162		62					69	24	20	81		418
45 AM	163		80					45	25	16	67		396
8:00 AM	154		47					59	27	20	64		371
15 AM	116		21					34	25	19	33		248
30 AM	130		31					46	25	12	37		281
45 AM	136		23					35	39	22	44		299
9:00 AM													
15 AM													
30 AM													
45 AM													
10:00 AM													
15 AM													
30 AM													
45 AM													
AM Peak Hr Begins at 700 VOLUMES =	639	0	201	0	0	0	0	216	88	111	304	0	1559

COMMENTS:

Traffic Data Services, Inc.
TABULAR SUMMARY OF VEHICULAR TURNING MOVEMENTS

N/S STREET: I-5 NB ON/OFF RAMPS   E/W STREET: SR-126   CITY: SANTA CLARITA
DATE: 6/19/03   DAY: THURSDAY   FILENAME: 0631306P

15 Min Period Beginning	Northbound			Southbound			Eastbound			Westbound			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1		1					1	1	1.5	0.5		
2:00 PM													
15 PM													
30 PM													
45 PM													
3:00 PM													
15 PM													
30 PM													
45 PM													
4:00 PM	125		6					55	55	47	63		351
15 PM	149		11					48	39	45	50		342
30 PM	88		9					46	49	40	52		284
45 PM	103		13					52	59	62	52		341
5:00 PM	123		12					71	57	49	45		357
15 PM	116		4					54	56	81	65		376
30 PM	107		7					43	33	59	40		289
45 PM	118		8					57	47	45	36		311
6:00 PM													
15 PM													
30 PM													
45 PM													
PM Peak Hr Begins at 1645 VOLUMES =	449 620*	0	36	0	0	0	0	220	205	251	202	0	1363

COMMENTS: *2002 COUNT

89

Traffic Data Services, Inc.
TABULAR SUMMARY OF VEHICULAR TURNING MOVEMENTS

N/S STREET: THE OLD RD   E/W STREET: SR-126   CITY: SANTA CLARITA

DATE: 6/23/03   DAY: MONDAY   FILENAME: 0631307A

15 Min Period Beginning	Northbound NL	NT	NR	Southbound SL	ST	SR	Eastbound EL	ET	ER	Westbound WL	WT	WR	TOTAL
LANES:	1	2			2	1	1		1				
6:00 AM													
15 AM													
30 AM													
45 AM													
7:00 AM	58	108			51	0	0		2				219
15 AM	57	95			77	0	0		1				230
30 AM	61	109			69	5	0		1				245
45 AM	42	81			81	0	0		2				206
8:00 AM	57	92			89	0	0		4				242
15 AM	41	71			70	1	0		2				185
30 AM	34	69			82	1	0		2				188
45 AM	30	63			75	2	0		2				172
9:00 AM													
15 AM													
30 AM													
45 AM													
10:00 AM													
15 AM													
30 AM													
45 AM													
AM Peak Hr Begins at 715 VOLUMES =	217	377	0	0	316	5	0	0	8	0	0	0	923

COMMENTS: OFF RAMP CLOSED (CONSTRUCTION)

Traffic Data Services, Inc.
TABULAR SUMMARY OF VEHICULAR TURNING MOVEMENTS

N/S STREET: THE OLD RD   E/W STREET: SR-126   CITY: SANTA CLARITA
DATE: 6/19/03   DAY: THURSDAY   FILENAME: 0631307P

15 Min Period Beginning	Northbound			Southbound			Eastbound			Westbound			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	1	2			2	1	1		1				
2:00 PM													
15 PM													
30 PM													
45 PM													
3:00 PM													
15 PM													
30 PM													
45 PM													
4:00 PM	53	129			92	1	0		0				275
15 PM	46	149			82	4	0		0				281
30 PM	44	156			118	3	1		0				322
45 PM	45	154			69	3	0		0				271
5:00 PM	34	173			102	5	0		0				314
15 PM	42	186			87	6	0		1				322
30 PM	45	150			57	5	0		2				259
45 PM	50	149			66	2	0		0				267
6:00 PM													
15 PM													
30 PM													
45 PM													
PM Peak Hr Begins at 1630 VOLUMES =	165	669	0	0	376	17	1	0	1	0	0	0	1229

COMMENTS:

Traffic Data Services, Inc.
TABULAR SUMMARY OF VEHICULAR TURNING MOVEMENTS

N/S STREET: SR-126 EB ON/OFF RAMPS   E/W STREET: HENRY MAYO DR   CITY: SANTA CLARITA
DATE: 6/23/03   DAY: MONDAY   FILENAME: 0631308A

15 Min Period Beginning	Northbound NL	NT	NR	Southbound SL	ST	SR	Eastbound EL	ET	ER	Westbound WL	WT	WR	TOTAL
LANES:				2		1	1	1			1	1	
6:00 AM													
15 AM													
30 AM													
45 AM													
7:00 AM				5		4		23			21		53
15 AM				9		2		35			50		96
30 AM				4		1		20			27		52
45 AM				1		0		17			30		48
8:00 AM				4		1		21			17		43
15 AM				9		2		30			24		65
30 AM				5		2		17			19		43
45 AM				4		2		19			16		41
9:00 AM													
15 AM													
30 AM													
45 AM													
10:00 AM													
15 AM													
30 AM													
45 AM													
AM Peak Hr Begins at 700 VOLUMES =	0	0	0	19	0	7	0	95	0	0	128	0	249

COMMENTS: SR-126 EB ON RAMP CLOSED.

Traffic Data Services, Inc.
TABULAR SUMMARY OF VEHICULAR TURNING MOVEMENTS

N/S STREET: SR-126 EB ON/OFF RAMPS   E/W STREET: HENRY MAYO DR   CITY: SANTA CLARITA
DATE: 6/19/03   DAY: THURSDAY   FILENAME: 0631308P

15 Min Period Beginning	Northbound NL	NT	NR	Southbound SL	ST	SR	Eastbound EL	ET	ER	Westbound WL	WT	WR	TOTAL
LANES:				2		1	1	1			1	1	
2:00 PM													
15 PM													
30 PM													
45 PM													
3:00 PM													
15 PM													
30 PM													
45 PM													
4:00 PM				7		1		48			35		91
15 PM				11		4		24			27		66
30 PM				16		6		52			43		117
45 PM				12		5		37			34		88
5:00 PM				6		1		48			27		82
15 PM				7		2		27			24		60
30 PM				14		2		30			17		63
45 PM				12		1		18			14		45
6:00 PM													
15 PM													
30 PM													
45 PM													
PM Peak Hr Begins at 1600 VOLUMES =	0	0	0	46	0	16	0	161	0	0	139	0	362

COMMENTS: SR-126 EB ON RAMP CLOSED.

TRAFFIC DATA SERVICES, INC. LOCATION CODE 06313.001

LOCATION - CHIQUITO CANYON-N/O SR-126 AVERAGED VOLUMES FOR - WEDNESDAY 6/18/03 TO THURSDAY 6/19/03

AM							PM						
TIME	NB		SB		TOTAL		TIME	NB		SB		TOTAL	
12:00 - 12:15	6		2		8		12:00 - 12:15	14		10		24	
12:15 - 12:30	5		2		7		12:15 - 12:30	17		9		26	
12:30 - 12:45	3		0		3		12:30 - 12:45	10		14		24	
12:45 - 1:00	0	14	1	5	1	19	12:45 - 1:00	11	52	16	49	27	101
1:00 - 1:15	4		0		4		1:00 - 1:15	12		24		36	
1:15 - 1:30	0		0		0		1:15 - 1:30	10		14		24	
1:30 - 1:45	1		3		4		1:30 - 1:45	8		14		22	
1:45 - 2:00	2	7	2	5	4	12	1:45 - 2:00	12	42	12	64	24	106
2:00 - 2:15	0		1		1		2:00 - 2:15	10		12		22	
2:15 - 2:30	1		1		2		2:15 - 2:30	10		12		22	
2:30 - 2:45	1		0		1		2:30 - 2:45	19		10		29	
2:45 - 3:00	4	6	2	4	6	10	2:45 - 3:00	7	46	11	45	18	91
3:00 - 3:15	3		1		4		3:00 - 3:15	8		20		28	
3:15 - 3:30	1		1		2		3:15 - 3:30	14		16		30	
3:30 - 3:45	0		2		2		3:30 - 3:45	16		20		36	
3:45 - 4:00	2	6	3	7	5	13	3:45 - 4:00	20	58	20	76	40	134
4:00 - 4:15	2		5		7		4:00 - 4:15	26		20		46	
4:15 - 4:30	2		3		5		4:15 - 4:30	12		12		24	
4:30 - 4:45	0		8		8		4:30 - 4:45	19		19		38	
4:45 - 5:00	0	4	8	24	8	28	4:45 - 5:00	26	83	20	71	46	154
5:00 - 5:15	3		10		13		5:00 - 5:15	29		18		47	
5:15 - 5:30	3		13		16		5:15 - 5:30	26		14		40	
5:30 - 5:45	3		17		20		5:30 - 5:45	19		19		38	
5:45 - 6:00	4	13	18	58	22	71	5:45 - 6:00	22	96	16	67	38	163
6:00 - 6:15	8		21		29		6:00 - 6:15	26		22		48	
6:15 - 6:30	5		29		34		6:15 - 6:30	21		17		38	
6:30 - 6:45	9		42		51		6:30 - 6:45	21		10		31	
6:45 - 7:00	6	28	22	114	28	142	6:45 - 7:00	17	85	11	60	28	145
7:00 - 7:15	13		25		38		7:00 - 7:15	22		12		34	
7:15 - 7:30	3		15		18		7:15 - 7:30	14		10		24	
7:30 - 7:45	8		17		25		7:30 - 7:45	11		11		22	
7:45 - 8:00	7	31	13	70	20	101	7:45 - 8:00	11	58	8	41	19	99
8:00 - 8:15	8		20		28		8:00 - 8:15	9		11		20	
8:15 - 8:30	4		25		29		8:15 - 8:30	11		12		23	
8:30 - 8:45	4		14		18		8:30 - 8:45	11		10		21	
8:45 - 9:00	7	23	14	73	21	96	8:45 - 9:00	11	42	7	40	18	82
9:00 - 9:15	2		12		14		9:00 - 9:15	8		4		12	
9:15 - 9:30	7		11		18		9:15 - 9:30	21		11		32	
9:30 - 9:45	8		14		22		9:30 - 9:45	15		5		20	
9:45 - 10:00	10	27	14	51	24	78	9:45 - 10:00	14	58	4	24	18	82
10:00 - 10:15	4		10		14		10:00 - 10:15	7		6		13	
10:15 - 10:30	5		11		16		10:15 - 10:30	14		6		20	
10:30 - 10:45	4		12		16		10:30 - 10:45	7		5		12	
10:45 - 11:00	5	18	10	43	15	61	10:45 - 11:00	7	35	2	19	9	54
11:00 - 11:15	10		14		24		11:00 - 11:15	4		0		4	
11:15 - 11:30	12		14		26		11:15 - 11:30	4		1		5	
11:30 - 11:45	6		10		16		11:30 - 11:45	8		0		8	
11:45 - 12:00	4	32	8	46	12	78	11:45 - 12:00	2	18	3	4	5	22
TOTALS		209		500		709			673		560		1,233
ADT'S									882		1,060		1,942

TRAFFIC DATA SERVICES, INC. LOCATION CODE 06313.C02

LOCATION - WOLCOTT-N/O SR-126

AVERAGED VOLUMES FOR - WEDNESDAY 6/18/03 TO THURSDAY 6/19/03

AM TIME	NB		SB		TOTAL		PM TIME	NB		SB		TOTAL	
12:00 - 12:15	0		2		2		12:00 - 12:15	3		3		6	
12:15 - 12:30	2		2		4		12:15 - 12:30	3		2		5	
12:30 - 12:45	0		1		1		12:30 - 12:45	0		4		4	
12:45 - 1:00	0	2	1	6	1	8	12:45 - 1:00	4	10	1	10	5	20
1:00 - 1:15	0		2		2		1:00 - 1:15	2		1		3	
1:15 - 1:30	0		0		0		1:15 - 1:30	1		0		1	
1:30 - 1:45	0		1		1		1:30 - 1:45	4		2		6	
1:45 - 2:00	3	3	0	3	3	6	1:45 - 2:00	1	8	2	5	3	13
2:00 - 2:15	0		0		0		2:00 - 2:15	2		1		3	
2:15 - 2:30	0		0		0		2:15 - 2:30	0		3		3	
2:30 - 2:45	0		1		1		2:30 - 2:45	1		6		7	
2:45 - 3:00	0	0	0	1	0	1	2:45 - 3:00	2	5	4	14	6	19
3:00 - 3:15	1		1		2		3:00 - 3:15	1		6		7	
3:15 - 3:30	0		2		2		3:15 - 3:30	1		2		3	
3:30 - 3:45	0		0		0		3:30 - 3:45	1		10		11	
3:45 - 4:00	0	1	0	3	0	4	3:45 - 4:00	1	4	6	24	7	28
4:00 - 4:15	0		0		0		4:00 - 4:15	3		7		10	
4:15 - 4:30	0		0		0		4:15 - 4:30	0		2		2	
4:30 - 4:45	0		0		0		4:30 - 4:45	0		5		5	
4:45 - 5:00	0	0	0	0	0	0	4:45 - 5:00	4	7	5	19	9	26
5:00 - 5:15	0		0		0		5:00 - 5:15	0		4		4	
5:15 - 5:30	0		0		0		5:15 - 5:30	1		3		4	
5:30 - 5:45	2		1		3		5:30 - 5:45	0		1		1	
5:45 - 6:00	3	5	0	1	3	6	5:45 - 6:00	1	2	3	11	4	13
6:00 - 6:15	1		1		2		6:00 - 6:15	2		0		2	
6:15 - 6:30	6		0		6		6:15 - 6:30	1		0		1	
6:30 - 6:45	3		3		6		6:30 - 6:45	2		0		2	
6:45 - 7:00	6	16	0	4	6	20	6:45 - 7:00	1	6	1	1	2	7
7:00 - 7:15	2		1		3		7:00 - 7:15	1		2		3	
7:15 - 7:30	3		2		5		7:15 - 7:30	0		0		0	
7:30 - 7:45	4		3		7		7:30 - 7:45	0		0		0	
7:45 - 8:00	8	17	4	10	12	27	7:45 - 8:00	0	1	0	2	0	3
8:00 - 8:15	2		1		3		8:00 - 8:15	0		0		0	
8:15 - 8:30	0		4		4		8:15 - 8:30	0		0		0	
8:30 - 8:45	2		4		6		8:30 - 8:45	0		0		0	
8:45 - 9:00	2	6	1	10	3	16	8:45 - 9:00	0	0	0	0	0	0
9:00 - 9:15	4		4		8		9:00 - 9:15	1		1		2	
9:15 - 9:30	0		2		2		9:15 - 9:30	0		0		0	
9:30 - 9:45	4		1		5		9:30 - 9:45	0		1		1	
9:45 - 10:00	0	8	2	9	2	17	9:45 - 10:00	1	2	0	2	1	4
10:00 - 10:15	0		0		0		10:00 - 10:15	0		1		1	
10:15 - 10:30	1		0		1		10:15 - 10:30	0		0		0	
10:30 - 10:45	3		1		4		10:30 - 10:45	2		0		2	
10:45 - 11:00	10	14	0	1	10	15	10:45 - 11:00	1	3	0	1	1	4
11:00 - 11:15	2		6		8		11:00 - 11:15	0		0		0	
11:15 - 11:30	2		0		2		11:15 - 11:30	1		0		1	
11:30 - 11:45	0		0		0		11:30 - 11:45	0		6		6	
11:45 - 12:00	2	6	0	6	2	12	11:45 - 12:00	0	1	1	7	1	8
TOTALS		78		54		132			49		96		145
ADT'S									127		150		277

mtv — CALTRANS TRAFFIC VOLUMES

06/18/2003
05:00:29

Detail All Vehicle Hourly Count Report

District	County	Route	Prefix	Postmile	Leg
07	VEN	126		34.637	O

Location Description
VENTURA/LOS ANGELES COUNTY

Traffic Station: 724
Location Type: Control Station
Lanes: 1
Lane Code: 1

Direction of Count: East

Year	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri
2003	APR 04	APR 05	APR 06	APR 07	APR 08	APR 09	APR 10	APR 11
0-1	92 A	126 A	105 A	69 A	138 A	112 A	100 A	133 A
1-2	95 A	84 A	54 A	46 A	73 A	71 A	71 A	110 A
2-3	109 A	92 A	52 A	54 A	74 A	62 A	76 A	78 A
3-4	131 A	113 A	51 A	107 A	125 A	150 A	112 A	148 A
4-5	213 A	199 A	56 A	205 A	206 A	198 A	188 A	279 A
5-6	532 A	289 A	111 A	450 A	486 A	489 A	529 A	506 A
6-7	863 A	413 A	195 A	836 A	911 A	895 A	941 A	916 A
7-8	702 A	479 A	282 A	683 A	731 A	710 A	715 A	732 A
8-9	738 A	602 A	382 A	614 A	678 A	748 A	717 A	694 A
9-10	720 A	819 A	476 A	565 A	731 A	645 A	750 A	807 A
10-11	761 A	773 A	668 A	715 A	774 A	759 A	760 A	815 A
11-12	831 A	818 A	774 A	756 A	702 A	742 A	680 A	800 A
12-13	823 A	732 A	824 A	716 A	709 A	656 A	687 A	921 A
13-14	888 A	768 A	840 A	676 A	719 A	717 A	766 A	883 A
14-15	973 A	758 A	831 A	786 A	727 A	698 A	827 A	1024 A
15-16	1122 A	736 A	834 A	832 A	883 A	854 A	900 A	1066 A
16-17	1034 A	784 A	1000 A	879 A	988 A	977 A	1041 A	1191 A
17-18	1118 A	708 A	1001 A	839 A	947 A	1046 A	994 A	1094 A
18-19	940 A	609 A	800 A	713 A	736 A	712 A	762 A	968 A
19-20	688 A	467 A	576 A	407 A	428 A	494 A	544 A	758 A
20-21	480 A	386 A	479 A	338 A	295 A	347 A	388 A	613 A
21-22	334 A	327 A	334 A	285 A	245 A	308 A	324 A	369 A
22-23	211 A	279 A	203 A	271 A	229 A	207 A	219 A	298 A
23-24	186 A	134 A	149 A	204 A	140 A	159 A	132 A	193 A
Day Total	14584 A	11495 A	11077 E	12046 A	12675 A	12756 A	13223 A	15396 A
AM Peak Hour	06-07	09-10	11-12	06-07	06-07	06-07	06-07	06-07
AM Peak Traffic	863	819	774	836	911	895	941	916
PM Peak Hour	15-16	16-17	17-18	16-17	16-17	17-18	16-17	16-17
PM Peak Traffic	1122	784	1001	879	988	1046	1041	1191

916 AVE

1025 AVE

CALTRANS TRAFFIC VOLUMES
Detail All Vehicle Hourly Count Report

District	County	Route	Prefix	Postmile	Leg
07	VEN	126		34.637	O

Location Description
VENTURA/LOS ANGELES COUNTY

Traffic Station: 724
Location Type: Control Station
Lanes: 1
Lane Code: 1

7-Day Periods

EAST

	7-Day Total	Daily Average
1st	87856	12551
2nd		
3rd		
4th		

5-Day Periods

EAST

	5-Day Total	Weekday Average
1st	65284	13057
2nd		
3rd		
4th		

mtv

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05:00:29

CALTRANS TRAFFIC VOLUMES
Detail All Vehicle Hourly Count Report

District	County	Route	Prefix	Postmile	Leg
07	VEN	126		34.637	O

Location Description
VENTURA/LOS ANGELES COUNTY

Traffic Station: 724
Location Type: Control Station
Lanes: 1
Lane Code: 1

Direction of Count: West

Year	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	
2003	APR 04	APR 05	APR 06	APR 07	APR 08	APR 09	APR 10	APR 11	
0-1	79 A	122 A	135 A	89 A	115 A	93 A	93 A	108 A	
1-2	59 A	91 A	71 A	73 A	93 A	65 A	80 A	96 A	
2-3	75 A	48 A	55 A	68 A	57 A	64 A	70 A	82 A	
3-4	80 A	139 A	59 A	55 A	99 A	90 A	115 A	97 A	
4-5	161 A	230 A	53 A	159 A	133 A	183 A	189 A	184 A	
5-6	408 A	313 A	76 A	439 A	394 A	418 A	444 A	455 A	
6-7	762 A	349 A	148 A	668 A	644 A	718 A	682 A	665 A	
7-8	790 A	474 A	271 A	783 A	794 A	829 A	809 A	779 A	
8-9	645 A	579 A	330 A	713 A	748 A	719 A	738 A	675 A	
9-10	618 A	723 A	460 A	594 A	677 A	602 A	623 A	669 A	
10-11	702 A	738 A	612 A	669 A	598 A	655 A	670 A	768 A	
11-12	742 A	781 A	737 A	687 A	699 A	674 A	743 A	731 A	
12-13	744 A	724 A	784 A	678 A	611 A	597 A	619 A	790 A	
13-14	786 A	765 A	735 A	636 A	641 A	635 A	676 A	752 A	
14-15	883 A	711 A	832 A	724 A	697 A	666 A	712 A	914 A	
15-16	1100 A	690 A	839 A	918 A	907 A	970 A	896 A	1133 A	
16-17	1077 A	639 A	814 A	844 A	840 A	810 A	998 A	1114 A	
17-18	911 A	686 A	815 A	733 A	697 A	757 A	807 A	1012 A	
18-19	718 A	531 A	660 A	603 A	531 A	564 A	641 A	768 A	
19-20	610 A	465 A	705 A	466 A	394 A	435 A	454 A	612 A	
20-21	420 A	346 A	589 A	316 A	299 A	299 A	317 A	497 A	
21-22	293 A	337 A	459 A	283 A	206 A	258 A	259 A	356 A	
22-23	232 A	283 A	315 A	189 A	195 A	195 A	207 A	311 A	
23-24	195 A	188 A	185 A	152 A	204 A	158 A	161 A	206 A	
Day Total	13090 A	10952 A	10739 E	11539 A	11273 A	11454 A	12003 A	13774 A	
AM Peak Hour	07-08	11-12	11-12	07-08	07-08	07-08	07-08	07-08	
AM Peak Traffic	790	781	737	783	794	829	809	779	811 AVE
PM Peak Hour	15-16	13-14	15-16	15-16	15-16	15-16	16-17	15-16	
PM Peak Traffic	1100	765	839	918	907	970	998	1133	955 AVE

District	County	Route	Prefix	Postmile	Leg
07	VEN	126		34.637	O

Location Description
VENTURA/LOS ANGELES COUNTY

Traffic Station: 724
Location Type: Control Station
Lanes: 1
Lane Code: 1

7-Day Periods

WEST

	7-Day Total	Daily Average
1st	81050	11579
2nd		
3rd		
4th		

5-Day Periods

WEST

	5-Day Total	Weekday Average
1st	59359	11872
2nd		
3rd		
4th		

DISTRICT	ROUTE	RTE SUF	COUNTY	Postmile Prefix	POSTMILE	DESCRIPTION	BACK PEAK HR	BACK PEAK MONTH	BACK AADT	AHEAD PEAK HR	AHEAD PEAK MONTH	AHEAD AADT	
7	126		VEN		1.45	VENTURA, VICTORIA AVENUE	4350	47500	43500	4400	48000	44500	
7	126		VEN		2.78	VENTURA, KIMBALL ROAD	4400	48000	44500	3500	39000	36000	
7	126		VEN	R	5.03	JCT. RTE. 118 EAST, WELLS ROAD	3500	39000	36000	4850	54000	50000	
7	126		VEN	R	8.91	BRIGGS ROAD	4850	54000	50000	4650	52000	48500	
7	126		VEN	R	10.38	SANTA PAULA, PECK ROAD	4650	52000	48500	3750	42000	39500	
7	126		VEN	R	11.37	SANTA PAULA, PALM AVENUE	3750	42000	39500	3350	38000	35000	
7	126		VEN	R	12.04	JCT. RTE. 150 NORTH; TENTH STREET	3350	38000	35000	2750	31000	28500	
7	126		VEN	R	13.14	END FREEWAY							
7	126		VEN	R	13.25	HALLOCK DRIVE	2750	31000	28500	3050	33000	32000	
7	126		VEN	T	16.73	SESPE RANCH	3050	33000	32000	2750	29500	28000	
7	126		VEN		20.33	LOS SERENOS ROAD	2750	29500	28000	2800	27500	26500	
7	126		VEN		21.14	FILLMORE, JCT. RTE. 23 SOUTH; A STREET	3150	31000	29500	3050	30000	28500	
7	126		VEN		22.48	FILLMORE EAST CITY LIMITS	2300	21800	20800	2300	21800	20800	
7	126		VEN		29.28	PIRU, CENTER STREET	2000	22900	19200	2050	23400	19600	
7	126		VEN		34.64	VENTURA COUNTY-LOS ANGELES COUNTY	2450	23300	19600	2450	23300	19600	-25,0
7	126		LA		3.57	WALCOTT WAY	2450	23300	19600	2500	23900	20100	25,50
7	126		LA	R	5.21	BEGIN FREEWAY							
7	126		LA	R	5.42	CASTAIC JUNCTION	2900	27500	23100	2950	28000	23700	29,10
7	126		LA	R	5.83	CASTAIC JUNCTION, NORTH JCT. RTE. 5, GOLDEN STATE FREEWAY; END FREEWAY	2950	28000	23700				
7	126		LA			(BREAK IN ROUTE)							
7	126		LA	R	5.84	SANTA CLARITA, SAUGUS JUNCTI SOUTH JCT. RTE. 5, GOLDEN STATE FREEWAY				2800	37500	31500	
7	126		LA		7.86	SANTA CLARITA, VALENCIA BOULEVARD	2600	31500	29500	970	11700	11000	
7	126		LA		8.42	SANTA CLARITA, BOUQUET CANYON ROAD	940	11400	10700	2800	33500	31500	
7	126		LA		10.19	SANTA CLARITA, 15TH STREET	2800	33500	31500	2550	31000	29000	
7	126		LA		10.76	SANTA CLARITA, LYONS AVENUE/SPRUCE STREET	2700	33000	31000	2350	29000	27000	
7	126		LA		11.15	SANTA CLARITA, 5TH STREET/ NEWHALL AVENUE	2050	25500	24000	2950	37000	35000	
7	126		LA	T	12.52	SANTA CLARITA, SIERRA HIGHWAY	3000	37500	35500	3000	34500	33500	
7	126		LA	T	12.68	SANTA CLARITA, JCT. RTE. 14, ANTELOPE VALLEY FREEWAY	3000	34500	33500	290	3300	2200	
7	126		LA	T	12.81	SANTA CLARITA, END ROUTE 126	290	3300	2200				
8	127		SBD			SAN BERNARDINO COUNTY							
8	127		SBD	L	0	BAKER, JCT. RTE. 15				990	7400	5500	
8	127		SBD	L	0.17	BAKER, JUNCTION OLD STATE HIGHWAY; BAKER BOULEVARD	990	7400	5500	250	2300	1800	
8	127		SBD		0.64	SCHOOL ROAD	250	2300	1800	110	1000	870	
8	127		SBD		29.71	IRWIN/SARATOGA SPRINGS ROADS	100	920	800	130	1250	700	
8	127		SBD		41.47	SAN BERNARDINO-INYO COUNTY LINE	130	1250	700				
9	127		INY		0	SAN BERNARDINO-INYO COUNTY LINE				130	1250	700	
9	127		INY		14.75	SHOSHONE, SOUTH JCT. RTE. 178 EAST	140	1100	900				
9	127		INY		16.43	NORTH JCT. RTE. 178 WEST; SHOSHONE, NORTH	80	750	500	60	550	350	
9	127		INY		41.99	SOUTH OF STATELINE ROAD	60	600	350	130	1100	850	
9	127		INY		42.15	DEATH VALLEY JUNCTION, JCT. RTE. 190 WEST	130	1100	850	80	720	700	
9	127		INY		49.42	NEVADA STATE LINE	80	710	700				
1	128		MEN			MENDOCINO COUNTY							
1	128		MEN		0	JCT. RTE. 1; ALBION, SOUTH				260	2400	1900	
1	128		MEN		11.67	FLYNN CREEK ROAD	260	2400	1900	300	2750	2200	
1	128		MEN		22.59	WEST LIMITS PHILO	480	4400	3500	550	5000	4000	
1	128		MEN	R	26.84	CON CREEK	400	4650	4050	530	4850	3850	
1	128		MEN	R	28.09	BOONVILLE STATE HIGHWAY MAINTENANCE STATION	590	5100	4000	740	6000	4550	
1	128		MEN		28.4	MOUNTAIN VIEW ROAD	740	6000	4550	1000	7400	5400	

APPENDIX E
ROUNDABOUT DATA

Movement Summary

akcelik & associates
aaTraffic SIDRA

Wolcott & A Street - AM Peak Hour

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Eff. Stop Rate	Aver Speed (mi/h)	Oper Cost ($/h)
South Approach (Wolcott)										
32	L	8	1025	0.090	1.7	LOS A	12	0.22	23.7	16
32	T	82	1025	0.090	1.7	LOS A	12	0.22	23.7	16
32	R	1	1025	0.090	1.7	LOS A	12	0.22	23.7	16
Approach		**92**	**1025**	**0.090**	**1.7**	**LOS A**	**12**	**0.22**	**23.7**	**16**
East Approach (A Street)										
22	L	4	1067	0.211	1.7	LOS A	32	0.24	23.7	40
22	T	35	1067	0.211	1.7	LOS A	32	0.24	23.7	40
22	R	185	1067	0.211	1.7	LOS A	32	0.24	23.7	40
Approach		**225**	**1067**	**0.211**	**1.7**	**LOS A**	**32**	**0.24**	**23.7**	**40**
North Approach (Wolcott)										
42	L	68	1169	0.078	3.9	LOS A	10	0.35	23.2	18
42	T	23	1169	0.078	3.9	LOS A	10	0.35	23.2	18
43	R	415	1897	0.219	3.8	LOS A	30	0.35	34.9	52
Approach		**506**	**3066**	**0.219**	**3.8**	**LOS A**	**30**	**0.35**	**31.8**	**70**
West Approach (A Street)										
12	L	247	1879	0.140	4.8	LOS A	19	0.44	22.9	53
12	T	10	1879	0.140	4.8	LOS A	19	0.44	22.9	53
12	R	4	1879	0.140	4.8	LOS A	19	0.44	22.9	53
Approach		**263**	**2336**	**0.140**	**4.8**	**LOS A**	**19**	**0.44**	**22.9**	**53**
All Vehicles		**1086**	**7495**	**0.219**	**3.4**	**LOS A**	**32**	**0.34**	**26.5**	**179**

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Movement Summary

akcelik & associates
aaTraffic SIDRA

Wolcott & A Street - PM Peak Hour

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Eff. Stop Rate	Aver Speed (mi/h)	Oper Cost ($/h)
South Approach (Wolcott)										
32	L	22	916	0.073	3.6	LOS A	10	0.39	23.2	13
32	T	42	916	0.073	3.6	LOS A	10	0.39	23.2	13
32	R	1	916	0.073	3.6	LOS A	10	0.39	23.2	13
Approach		**67**	**916**	**0.073**	**3.6**	**LOS A**	**10**	**0.39**	**23.2**	**13**
East Approach (A Street)										
22	L	4	1091	0.099	1.2	LOS A	14	0.17	23.9	19
22	T	46	1091	0.099	1.2	LOS A	14	0.17	23.9	19
22	R	58	1091	0.099	1.2	LOS A	14	0.17	23.9	19
Approach		**108**	**1091**	**0.099**	**1.2**	**LOS A**	**14**	**0.17**	**23.9**	**19**
North Approach (Wolcott)										
42	L	215	2187	0.133	3.8	LOS A	18	0.35	23.2	56
42	T	75	2187	0.133	3.8	LOS A	18	0.35	23.2	56
43	R	157	1177	0.133	3.9	LOS A	18	0.36	34.7	20
Approach		**446**	**3364**	**0.133**	**3.8**	**LOS A**	**18**	**0.35**	**26.1**	**76**
West Approach (A Street)										
12	L	187	2061	0.143	4.1	LOS A	20	0.40	23.0	58
12	T	95	2061	0.143	4.1	LOS A	20	0.40	23.0	58
12	R	11	2061	0.143	4.1	LOS A	20	0.40	23.0	58
Approach		**294**	**2156**	**0.143**	**4.1**	**LOS A**	**20**	**0.40**	**23.0**	**58**
All Vehicles		**915**	**7527**	**0.143**	**3.6**	**LOS A**	**20**	**0.35**	**24.5**	**165**

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Movement Summary

akcelik & associates
aaTraffic SIDRA

Commercial Center & A Street - AM Peak Hour

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Eff. Stop Rate	Aver Speed (mi/h)	Oper Cost ($/h)
East Approach (A Street)										
22	T	299	1378	0.295	4.6	LOS A	47	0.44	33.6	54
22	R	108	1378	0.295	4.6	LOS A	47	0.44	33.6	54
Approach		**406**	**1378**	**0.295**	**4.6**	**LOS A**	**47**	**0.44**	**33.6**	**54**
North Approach (Coml Ctr)										
42	L	4	959	0.048	2.3	LOS A	6	0.29	23.5	8
42	R	41	959	0.048	2.3	LOS A	6	0.29	23.5	8
Approach		**46**	**959**	**0.048**	**4.7**	**LOS A**	**6**	**0.58**	**23.5**	**16**
West Approach (A Street)										
12	L	199	3077	0.101	3.9	LOS A	13	0.34	23.4	59
12	T	113	3077	0.101	3.9	LOS A	13	0.34	23.4	59
Approach		**312**	**3540**	**0.101**	**3.9**	**LOS A**	**13**	**0.34**	**23.4**	**59**
All Vehicles		**764**	**5877**	**0.295**	**4.2**	**LOS A**	**47**	**0.39**	**27.7**	**120**

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Movement Summary

akcelik & associates
aaTraffic SIDRA

Commercial Center & A Street - PM Peak Hour

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Eff. Stop Rate	Aver Speed (mi/h)	Oper Cost ($/h)
East Approach (A Street)										
22	T	241	1051	0.245	5.3	LOS A	38	0.51	33.1	35
22	R	16	1051	0.245	5.3	LOS A	38	0.51	33.1	35
Approach		**258**	**1051**	**0.245**	**5.3**	**LOS A**	**38**	**0.51**	**33.1**	**35**
North Approach (Coml Ctr)										
42	L	54	1150	0.257	2.6	LOS A	38	0.30	23.4	53
42	R	241	1150	0.257	2.6	LOS A	38	0.30	23.4	53
Approach		**295**	**1150**	**0.257**	**5.2**	**LOS A**	**38**	**0.59**	**23.4**	**107**
West Approach (A Street)										
12	L	318	3334	0.169	3.5	LOS A	23	0.30	23.3	106
12	T	247	3334	0.169	3.5	LOS A	23	0.30	23.3	106
Approach		**565**	**3400**	**0.169**	**3.5**	**LOS A**	**23**	**0.30**	**23.3**	**106**
All Vehicles		**1118**	**5601**	**0.257**	**3.7**	**LOS A**	**38**	**0.35**	**25.0**	**194**

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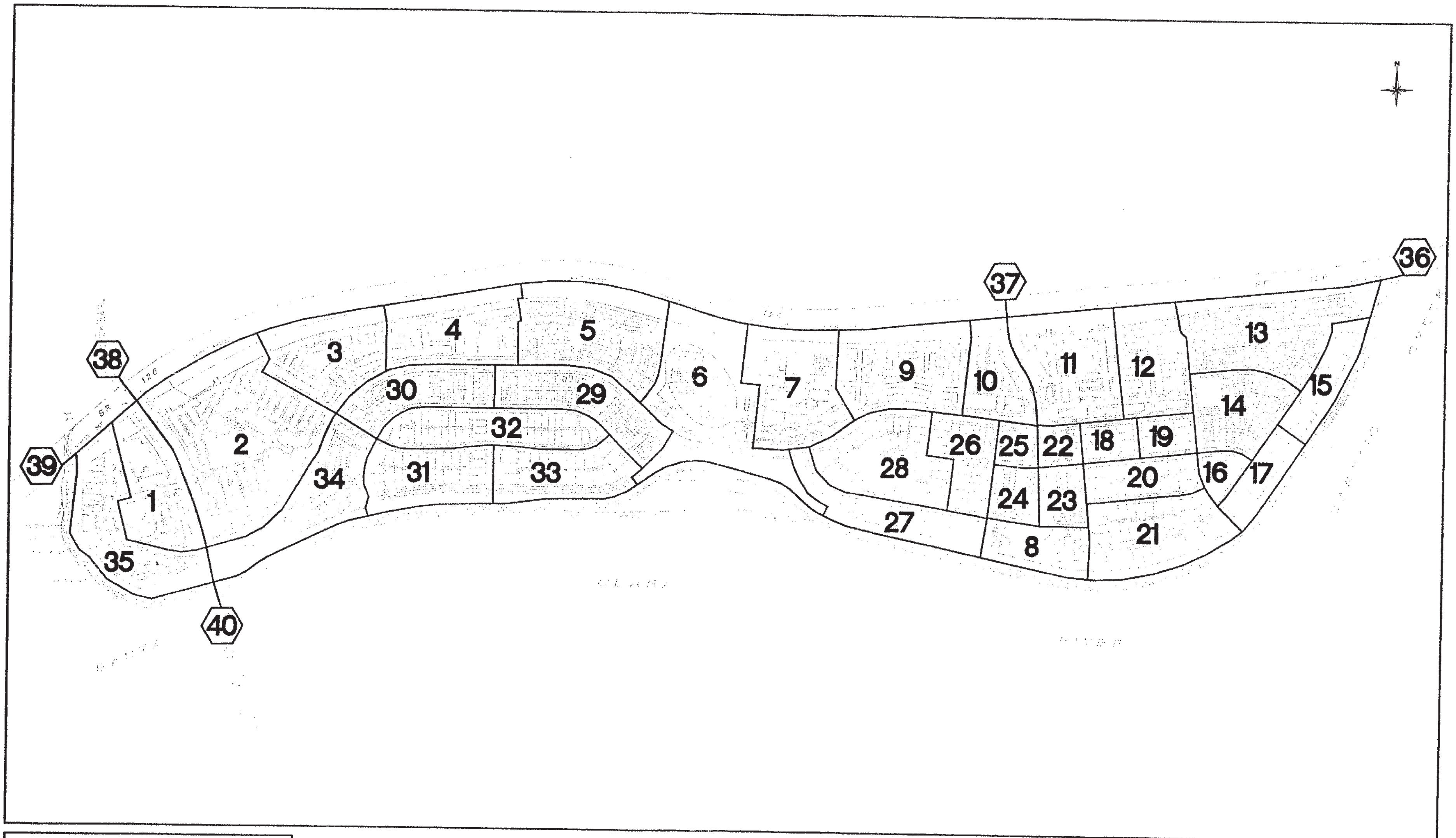
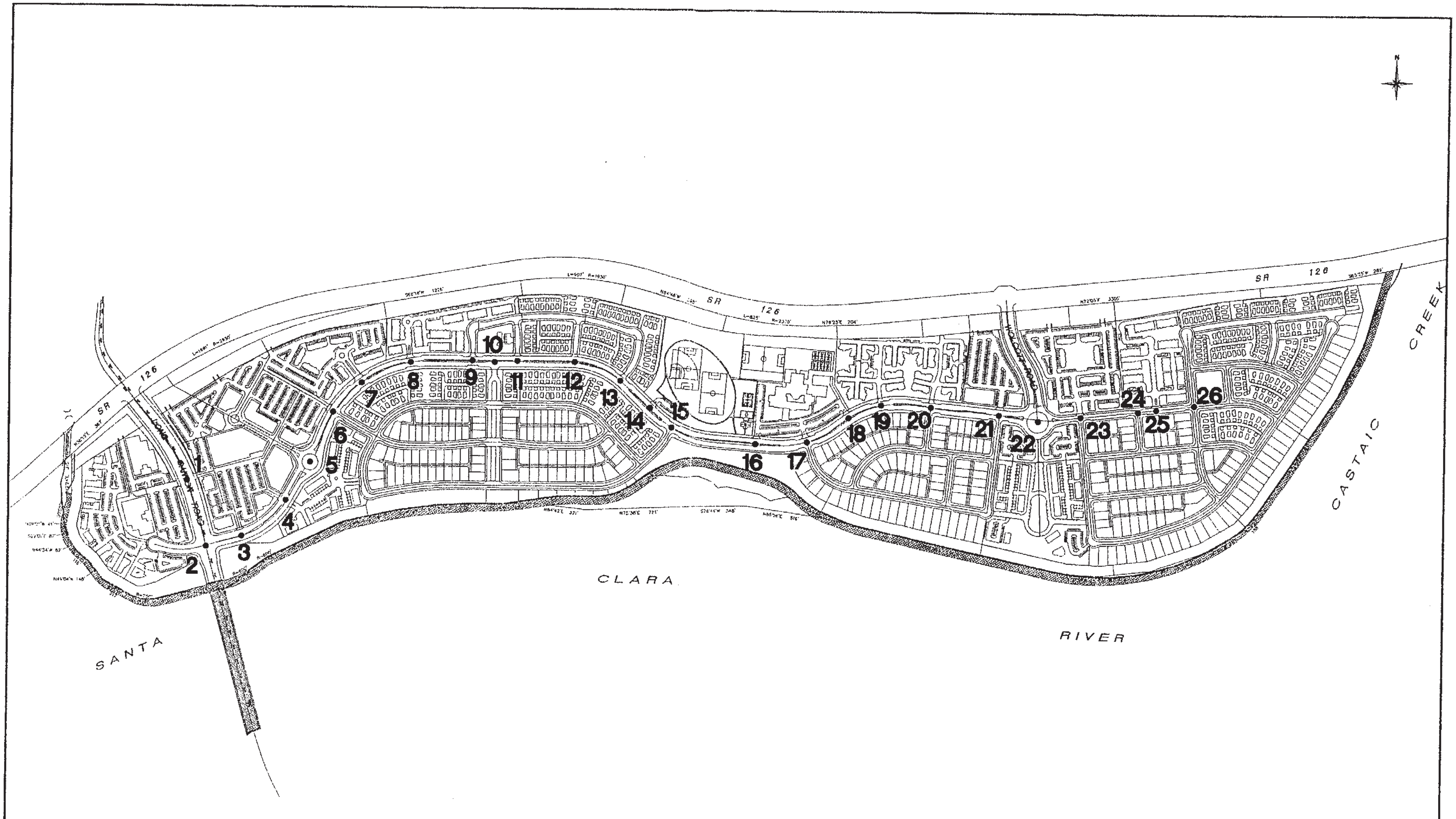
APPENDIX F
RIVER VILLAGE TRAFFIC MODEL DATA



Legend
X Zone Number
Zone Boundary
(X) Cordon Number

Figure F-1

RIVER VILLAGE TRAFFIC MODEL
- TRAFFIC ANALYSIS ZONES



Legend

● Intersection Location

X Intersection Number

Figure F-2

RIVER VILLAGE TRAFFIC MODEL
- INTERSECTION NUMBERING SYSTEM

RIVER VILLAGE PHASE 2 ZONAL LAND USE AND TRIP GENERATION

Zone		Land Use Type	Units	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	ADT
2	12.	Commercial Center (<10ac)	42.50 TSF	46	29	75	141	153	294	3615
		SUB-TOTAL		46	29	75	141	153	294	3615
3	5.	Apartment	152.00 DU	12	65	77	62	32	94	1049
		SUB-TOTAL		12	65	77	62	32	94	1049
4	4.	Condominium/Townhouse	69.00 DU	4	33	37	32	18	50	552
		SUB-TOTAL		4	33	37	32	18	50	552
5	3.	Single Family (6-10du/ac)	18.00 DU	3	10	13	12	6	18	178
	3.	Single Family (6-10du/ac)	19.00 DU	4	11	15	12	7	19	188
	3.	Single Family (6-10du/ac)	37.00 DU	7	21	28	24	13	37	366
		SUB-TOTAL		14	42	56	48	26	74	732
6	51.	Developed Park	17.40 AC	0	0	0	1	1	2	45
		SUB-TOTAL		0	0	0	1	1	2	45
7	20.	Elementary/Middle School	750.00 STU	195	150	345	60	68	128	1088
		SUB-TOTAL		195	150	345	60	68	128	1088
8	51.	Developed Park	3.50 AC	0	0	0	0	0	0	9
		SUB-TOTAL		0	0	0	0	0	0	9
9	4.	Condominium/Townhouse	144.00 DU	9	69	78	68	37	105	1152
		SUB-TOTAL		9	69	78	68	37	105	1152
10	12.	Commercial Center (<10ac)	38.50 TSF	42	27	69	128	139	267	3275
		SUB-TOTAL		42	27	69	128	139	267	3275
11	5.	Apartment	159.00 DU	13	68	81	65	33	98	1097
		SUB-TOTAL		13	68	81	65	33	98	1097
12	4.	Condominium/Townhouse	84.00 DU	5	40	45	39	22	61	672
		SUB-TOTAL		5	40	45	39	22	61	672
13	3.	Single Family (6-10du/ac)	9.00 DU	2	5	7	6	3	9	89
	3.	Single Family (6-10du/ac)	9.00 DU	2	5	7	6	3	9	89
	3.	Single Family (6-10du/ac)	10.00 DU	2	6	8	7	4	11	99
	3.	Single Family (6-10du/ac)	23.00 DU	4	13	17	15	8	23	228
	3.	Single Family (6-10du/ac)	28.00 DU	5	16	21	18	10	28	277
		SUB-TOTAL		15	45	60	52	28	80	782
14	3.	Single Family (6-10du/ac)	36.00 DU	7	20	27	23	13	36	356
		SUB-TOTAL		7	20	27	23	13	36	356
15	3.	Single Family (6-10du/ac)	13.00 DU	2	7	9	8	5	13	129
		SUB-TOTAL		2	7	9	8	5	13	129

RIVER VILLAGE PHASE 2 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone	Land Use Type	Units	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	ADT
16	3. Single Family (6-10du/ac)	7.00 DU	1	4	5	5	3	8	69
	SUB-TOTAL		1	4	5	5	3	8	69
17	3. Single Family (6-10du/ac)	11.00 DU	2	6	8	7	4	11	109
	SUB-TOTAL		2	6	8	7	4	11	109
18	3. Single Family (6-10du/ac)	12.00 DU	2	7	9	8	4	12	119
	SUB-TOTAL		2	7	9	8	4	12	119
19	3. Single Family (6-10du/ac)	12.00 DU	2	7	9	8	4	12	119
	SUB-TOTAL		2	7	9	8	4	12	119
20	3. Single Family (6-10du/ac)	22.00 DU	4	12	16	14	8	22	218
	SUB-TOTAL		4	12	16	14	8	22	218
21	3. Single Family (6-10du/ac)	16.00 DU	3	9	12	10	6	16	158
	3. Single Family (6-10du/ac)	21.00 DU	4	12	16	14	8	22	208
	SUB-TOTAL		7	21	28	24	14	38	366
22	40. Commercial Office	9.50 TSF	15	2	17	2	12	14	110
	SUB-TOTAL		15	2	17	2	12	14	110
23	4. Condominium/Townhouse	26.00 DU	2	12	14	12	7	19	208
	SUB-TOTAL		2	12	14	12	7	19	208
24	4. Condominium/Townhouse	25.00 DU	2	12	14	12	7	19	200
	SUB-TOTAL		2	12	14	12	7	19	200
25	13. Commercial Shops	9.50 TSF	7	5	12	17	17	34	352
	SUB-TOTAL		7	5	12	17	17	34	352
26	3. Single Family (6-10du/ac)	10.00 DU	2	6	8	7	4	11	99
	3. Single Family (6-10du/ac)	16.00 DU	3	9	12	10	6	16	158
	SUB-TOTAL		5	15	20	17	10	27	257
27	3. Single Family (6-10du/ac)	22.00 DU	4	12	16	14	8	22	218
	SUB-TOTAL		4	12	16	14	8	22	218
28	3. Single Family (6-10du/ac)	19.00 DU	4	11	15	12	7	19	188
	3. Single Family (6-10du/ac)	28.00 DU	5	16	21	18	10	28	277
	SUB-TOTAL		9	27	36	30	17	47	465
29	3. Single Family (6-10du/ac)	51.00 DU	10	29	39	33	18	51	505
	SUB-TOTAL		10	29	39	33	18	51	505
30	3. Single Family (6-10du/ac)	41.00 DU	8	23	31	27	15	42	406
	SUB-TOTAL		8	23	31	27	15	42	406

RIVER VILLAGE PHASE 2 ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone	Land Use Type	Units	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	ADT
31	3. Single Family (6-10du/ac)	28.00 DU	5	16	21	18	10	28	277
	SUB-TOTAL		5	16	21	18	10	28	277
32	3. Single Family (6-10du/ac)	23.00 DU	4	13	17	15	8	23	228
	3. Single Family (6-10du/ac)	23.00 DU	4	13	17	15	8	23	228
	SUB-TOTAL		8	26	34	30	16	46	456
33	3. Single Family (6-10du/ac)	27.00 DU	5	15	20	18	10	28	267
	SUB-TOTAL		5	15	20	18	10	28	267
34	4. Condominium/Townhouse	50.00 DU	3	24	27	24	13	37	400
	SUB-TOTAL		3	24	27	24	13	37	400
35	5. Apartment	144.00 DU	12	62	74	59	30	89	994
	SUB-TOTAL		12	62	74	59	30	89	994

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RIVER VILLAGE PHASE 2 LAND USE AND TRIP GENERATION SUMMARY

Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
3. Single Family (6-10du/ac)	591.00 DU	110	334	444	384	213	597	5850
4. Condominium/Townhouse	398.00 DU	25	190	215	187	104	291	3184
5. Apartment	455.00 DU	37	195	232	186	95	281	3140
12. Commercial Center (<10ac)	81.00 TSF	88	56	144	269	292	561	6890
13. Commercial Shops	9.50 TSF	7	5	12	17	17	34	352
20. Elementary/Middle School	750.00 STU	195	150	345	60	68	128	1088
40. Commercial Office	9.50 TSF	15	2	17	2	12	14	110
51. Developed Park	20.90 AC	0	0	0	1	1	2	54
TOTAL		477	932	1409	1106	802	1908	20668

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RIVER VILLAGE BUILDOUT ZONAL LAND USE AND TRIP GENERATION

Zone	Land Use Type	Units	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	ADT
1	12. Commercial Center (<10ac)	27.10 TSF	30	19	49	90	98	188	2305
	40. Commercial Office	322.90 TSF	500	61	561	68	417	485	3733
	SUB-TOTAL		530	80	610	158	515	673	6038
2	11. Commercial Center(10-30a)	252.00 TSF	184	118	302	600	650	1250	13623
	40. Commercial Office	307.00 TSF	476	58	534	64	396	460	3549
	SUB-TOTAL		660	176	836	664	1046	1710	17172
3	5. Apartment	152.00 DU	12	65	77	62	32	94	1049
	SUB-TOTAL		12	65	77	62	32	94	1049
4	4. Condominium/Townhouse	69.00 DU	4	33	37	32	18	50	552
	SUB-TOTAL		4	33	37	32	18	50	552
5	3. Single Family (6-10du/ac)	18.00 DU	3	10	13	12	6	18	178
	3. Single Family (6-10du/ac)	19.00 DU	4	11	15	12	7	19	188
	3. Single Family (6-10du/ac)	37.00 DU	7	21	28	24	13	37	366
	SUB-TOTAL		14	42	56	48	26	74	732
6	51. Developed Park	17.40 AC	0	0	0	1	1	2	45
	SUB-TOTAL		0	0	0	1	1	2	45
7	20. Elementary/Middle School	750.00 STU	195	150	345	60	68	128	1088
	SUB-TOTAL		195	150	345	60	68	128	1088
8	51. Developed Park	3.50 AC	0	0	0	0	0	0	9
	SUB-TOTAL		0	0	0	0	0	0	9
9	4. Condominium/Townhouse	144.00 DU	9	69	78	68	37	105	1152
	SUB-TOTAL		9	69	78	68	37	105	1152
10	12. Commercial Center (<10ac)	38.50 TSF	42	27	69	128	139	267	3275
	40. Commercial Office	52.50 TSF	81	10	91	11	68	79	607
	SUB-TOTAL		123	37	160	139	207	346	3882
11	5. Apartment	159.00 DU	13	68	81	65	33	98	1097
	SUB-TOTAL		13	68	81	65	33	98	1097
12	4. Condominium/Townhouse	84.00 DU	5	40	45	39	22	61	672
	SUB-TOTAL		5	40	45	39	22	61	672
13	3. Single Family (6-10du/ac)	9.00 DU	2	5	7	6	3	9	89
	3. Single Family (6-10du/ac)	9.00 DU	2	5	7	6	3	9	89
	3. Single Family (6-10du/ac)	10.00 DU	2	6	8	7	4	11	99
	3. Single Family (6-10du/ac)	23.00 DU	4	13	17	15	8	23	228
	3. Single Family (6-10du/ac)	28.00 DU	5	16	21	18	10	28	277
	SUB-TOTAL		15	45	60	52	28	80	782

RIVER VILLAGE BUILDOUT ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone	Land Use Type	Units	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	ADT
14	3. Single Family (6-10du/ac)	36.00 DU	7	20	27	23	13	36	356
	SUB-TOTAL		7	20	27	23	13	36	356
15	3. Single Family (6-10du/ac)	13.00 DU	2	7	9	8	5	13	129
	SUB-TOTAL		2	7	9	8	5	13	129
16	3. Single Family (6-10du/ac)	7.00 DU	1	4	5	5	3	8	69
	SUB-TOTAL		1	4	5	5	3	8	69
17	3. Single Family (6-10du/ac)	11.00 DU	2	6	8	7	4	11	109
	SUB-TOTAL		2	6	8	7	4	11	109
18	3. Single Family (6-10du/ac)	12.00 DU	2	7	9	8	4	12	119
	SUB-TOTAL		2	7	9	8	4	12	119
19	3. Single Family (6-10du/ac)	12.00 DU	2	7	9	8	4	12	119
	SUB-TOTAL		2	7	9	8	4	12	119
20	3. Single Family (6-10du/ac)	22.00 DU	4	12	16	14	8	22	218
	SUB-TOTAL		4	12	16	14	8	22	218
21	3. Single Family (6-10du/ac)	16.00 DU	3	9	12	10	6	16	158
	3. Single Family (6-10du/ac)	21.00 DU	4	12	16	14	8	22	208
	SUB-TOTAL		7	21	28	24	14	38	366
22	12. Commercial Center (<10ac)	10.50 TSF	11	7	18	35	38	73	893
	40. Commercial Office	9.50 TSF	15	2	17	2	12	14	110
	SUB-TOTAL		26	9	35	37	50	87	1003
23	4. Condominium/Townhouse	26.00 DU	2	12	14	12	7	19	208
	SUB-TOTAL		2	12	14	12	7	19	208
24	4. Condominium/Townhouse	25.00 DU	2	12	14	12	7	19	200
	SUB-TOTAL		2	12	14	12	7	19	200
25	13. Commercial Shops	9.50 TSF	7	5	12	17	17	34	352
	40. Commercial Office	10.50 TSF	16	2	18	2	14	16	121
	SUB-TOTAL		23	7	30	19	31	50	473
26	3. Single Family (6-10du/ac)	10.00 DU	2	6	8	7	4	11	99
	3. Single Family (6-10du/ac)	16.00 DU	3	9	12	10	6	16	158
	SUB-TOTAL		5	15	20	17	10	27	257
27	3. Single Family (6-10du/ac)	22.00 DU	4	12	16	14	8	22	218
	SUB-TOTAL		4	12	16	14	8	22	218
28	3. Single Family (6-10du/ac)	19.00 DU	4	11	15	12	7	19	188
	3. Single Family (6-10du/ac)	28.00 DU	5	16	21	18	10	28	277
	SUB-TOTAL		9	27	36	30	17	47	465

RIVER VILLAGE BUILDOUT ZONAL LAND USE AND TRIP GENERATION (cont.)

Zone	Land Use Type	Units	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	ADT
29	3. Single Family (6-10du/ac)	51.00 DU	10	29	39	33	18	51	505
	SUB-TOTAL		10	29	39	33	18	51	505
30	3. Single Family (6-10du/ac)	41.00 DU	8	23	31	27	15	42	406
	SUB-TOTAL		8	23	31	27	15	42	406
31	3. Single Family (6-10du/ac)	28.00 DU	5	16	21	18	10	28	277
	SUB-TOTAL		5	16	21	18	10	28	277
32	3. Single Family (6-10du/ac)	23.00 DU	4	13	17	15	8	23	228
	3. Single Family (6-10du/ac)	23.00 DU	4	13	17	15	8	23	228
	SUB-TOTAL		8	26	34	30	16	46	456
33	3. Single Family (6-10du/ac)	27.00 DU	5	15	20	18	10	28	267
	SUB-TOTAL		5	15	20	18	10	28	267
34	4. Condominium/Townhouse	50.00 DU	3	24	27	24	13	37	400
	SUB-TOTAL		3	24	27	24	13	37	400
35	5. Apartment	144.00 DU	12	62	74	59	30	89	994
	SUB-TOTAL		12	62	74	59	30	89	994

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RIVER VILLAGE BUILDOUT LAND USE AND TRIP GENERATION SUMMARY

	Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
3.	Single Family (6-10du/ac)	591.00 DU	110	334	444	384	213	597	5850
4.	Condominium/Townhouse	398.00 DU	25	190	215	187	104	291	3184
5.	Apartment	455.00 DU	37	195	232	186	95	281	3140
11.	Commercial Center(10-30a)	252.00 TSF	184	118	302	600	650	1250	13623
12.	Commercial Center (<10ac)	76.10 TSF	83	53	136	253	275	528	6473
13.	Commercial Shops	9.50 TSF	7	5	12	17	17	34	352
20.	Elementary/Middle School	750.00 STU	195	150	345	60	68	128	1088
40.	Commercial Office	702.40 TSF	1088	133	1221	147	907	1054	8120
51.	Developed Park	20.90 AC	0	0	0	1	1	2	54
	TOTAL		1729	1178	2907	1835	2330	4165	41884

ADT AND PEAK HOUR TRIP RATE SUMMARY

	Land Use Type	Units	-- AM Peak Hour -- In	Out	Total	-- PM Peak Hour -- In	Out	Total	ADT
1.	Single Family (<1du/ac)	DU	0.29	0.67	0.96	0.84	0.36	1.20	9.90
2.	Single Family (1-5du/ac)	DU	0.19	0.56	0.75	0.65	0.36	1.01	9.90
3.	Single Family (6-10du/ac)	DU	0.19	0.56	0.75	0.65	0.36	1.01	9.90
4.	Condominium/Townhouse	DU	0.06	0.48	0.54	0.47	0.26	0.73	8.00
5.	Apartment	DU	0.08	0.43	0.51	0.41	0.21	0.62	6.90
6.	Mobile Home	DU	0.08	0.32	0.40	0.35	0.21	0.56	6.90
10.	Commercial Center (>30ac)	TSF	0.47	0.30	0.77	1.64	1.78	3.42	40.06
11.	Commercial Center(10-30a)	TSF	0.73	0.47	1.20	2.38	2.58	4.96	54.06
12.	Commercial Center (<10ac)	TSF	1.09	0.69	1.78	3.32	3.60	6.92	85.06
13.	Commercial Shops	TSF	0.72	0.48	1.20	1.80	1.80	3.60	37.06
14.	Hotel	ROOM	0.34	0.22	0.56	0.32	0.29	0.61	8.23
15.	Sit-Down Restaurant	TSF	4.82	4.45	9.27	6.52	4.34	10.86	130.34
16.	Fast Food Restaurant	TSF	25.43	24.43	49.86	17.41	16.07	33.48	496.12
17.	Movie Theater	SEAT	0.00	0.00	0.00	0.05	0.02	0.07	1.76
18.	Health Club	TSF	0.96	0.64	1.60	2.16	1.44	3.60	40.00
19.	Car Dealership	TSF	1.61	0.60	2.21	1.12	1.68	2.80	37.50
20.	Elementary/Middle School	STU	0.26	0.20	0.46	0.08	0.09	0.17	1.45
21.	High School	STU	0.32	0.14	0.46	0.06	0.09	0.15	1.79
22.	College	STU	0.13	0.01	0.14	0.12	0.05	0.17	1.54
23.	Hospital	TSF	0.71	0.26	0.97	0.22	0.70	0.92	16.80
24.	Library	TSF	0.76	0.30	1.06	3.40	3.69	7.09	84.98
25.	Church	TSF	0.39	0.33	0.72	0.36	0.30	0.66	9.30
26.	Day Care	STU	0.43	0.38	0.81	0.40	0.46	0.86	4.52
30.	Industrial Park	TSF	0.55	0.10	0.65	0.13	0.52	0.65	6.00
31.	Business Park	TSF	1.20	0.23	1.43	0.30	0.99	1.29	10.20
32.	Manufacturing/Warehouse	TSF	0.56	0.17	0.73	0.27	0.47	0.74	5.10
33.	Science/Research	TSF	1.03	0.21	1.24	0.16	0.92	1.08	10.20
34.	Utilities	TSF	0.00	0.00	0.00	0.00	0.00	0.00	2.38
40.	Commercial Office	TSF	1.55	0.19	1.74	0.21	1.29	1.50	11.56
41.	High-Rise Office	TSF	1.37	0.19	1.56	0.25	1.24	1.49	10.88
42.	Medical Office	TSF	1.94	0.49	2.43	0.99	2.67	3.66	34.20
50.	Golf Course	AC	0.15	0.06	0.21	0.10	0.20	0.30	7.96
51.	Developed Park	AC	0.00	0.00	0.00	0.03	0.04	0.07	2.60
52.	Undeveloped Park	AC	0.00	0.00	0.00	0.00	0.00	0.00	0.50
53.	Wayside Honor Ranch	SG	3.00	2.00	5.00	4.00	4.00	8.00	100.00
54.	Six Flags Magic Mtn	SG	3.00	2.00	5.00	4.00	4.00	8.00	100.00
55.	Travel Village	SG	3.00	2.00	5.00	4.00	4.00	8.00	100.00
56.	CHP Office	SG	3.00	2.00	5.00	4.00	4.00	8.00	100.00
57.	Agua Dulce Airport	SG	3.00	2.00	5.00	4.00	4.00	8.00	100.00

A) Phase 2 Trip Data

Table 1

TRIP DISTRIBUTION SUMMARY (PHASE 2)

		To				
AM Peak Hour		Residential	Schools/Parks	Commercial	Off-Site	Total
From	Residential Areas	0	128	65	537 (74%)	730
	Schools/Parks	22	0	12	106 (76%)	140
	Commercial Areas	0	5	0	54 (92%)	59
	Off-Site	154 (88%)	62 (32%)	60 (44%)	0	276
Total		176	195	137	697	1,205
Total AM Off-Site = 973 (68%)						

		To				
PM Peak Hour		Residential	Schools/Parks	Commercial	Off-Site	Total
From	Residential Areas	0	19	78	326 (77%)	423
	Schools/Parks	23	0	10	35 (51%)	68
	Commercial Areas	121	8	31	175 (52%)	335
	Off-Site	605 (81%)	36 (57%)	169 (59%)	0	810
Total		749	63	288	536	1,636
Total PM Off-Site = 1,346 (70%)						

		To				
ADT		Residential	Schools/Parks	Commercial	Off-Site	Total
From	Residential Areas	0	275	1,223	4,575 (75%)	6,072
	Schools/Parks	214	0	53	295 (52%)	562
	Commercial Areas	1,227	53	122	2,366 (63%)	3,767
	Off-Site	4,627 (76%)	247 (43%)	2,328 (62%)	0	7,202
Total		6,068	575	3,725	7,235	17,604
Total ADT Off-Site = 14,438 (70%)						

Table 2

TRIP GENERATION COMPARISON
– Final Trip Tables vs. Trip Generation Calculations

	IB	OB	TOTAL	IB	OB	TOTAL	ADT
Trip Rate Based Trip Generation (Traffic Study Table 3-1)	478	930	1,408	1,107	801	1,908	20,668
Traffic Model Trip Tables (Shown Above)	508	929	1,437	1,100	826	1,926	20,771
Percent Difference	6.3%	-0.1%	2.1%	-0.6%	3.1%	0.9%	0.5%

B) Full Project Trip Data (Related Project Scenario)

Table 3

TRIP DISTRIBUTION SUMMARY (RELATED PROJECT SCENARIO)

		To				
AM Peak Hour		Residential	Schools/Parks	Commercial	Off-Site	Total
From	Residential Areas	0	88	141	507 (69%)	736
	Schools/Parks	16	0	32	97 (67%)	145
	Commercial Areas	0	9	49	249 (81%)	307
	Off-Site	151 (90%)	92 (49%)	1,154 (84%)	0	1,397
Total		167	189	1,376	853	2,585

Total AM Off-Site = 2,250 (77%)

		To				
PM Peak Hour		Residential	Schools/Parks	Commercial	Off-Site	Total
From	Residential Areas	0	23	86	307 (74%)	416
	Schools/Parks	24	0	10	37 (52%)	71
	Commercial Areas	184	18	421	1,197 (66%)	1,820
	Off-Site	554 (73%)	23 (36%)	509 (50%)	0	1,086
Total		762	64	1,026	1,541	3,393

Total PM Off-Site = 2,627 (63%)

		To				
ADT		Residential	Schools/Parks	Commercial	Off-Site	Total
From	Residential Areas	0	220	1,893	3,997 (65%)	6,110
	Schools/Parks	188	0	87	286 (51%)	562
	Commercial Areas	1,866	90	1,427	10,845 (76%)	14,229
	Off-Site	4,031 (66%)	260 (46%)	10,936 (76%)	0	15,228
Total		6,085	571	14,343	15,129	36,128

Total ADT Off-Site = 30,356 (72%)

Table 4

TRIP GENERATION COMPARISON
– Final Trip Tables vs. Trip Generation Calculations

	IB	OB	TOTAL	IB	OB	TOTAL	ADT
Trip Rate Based Trip Generation (Traffic Study Table 3-1)	1,731	1,177	2,908	1,837	2,327	4,164	41,884
Traffic Model Trip Tables (Shown Above)	1,732	1,188	2,920	1,852	2,307	4,159	41,899
Percent Difference	0.1%	0.9%	0.4%	0.8%	-0.9%	-0.1%	0.0%

C) Full Project Trip Data (Newhall Ranch Buildout Scenario)

Table 5

TRIP DISTRIBUTION SUMMARY (NEWHALL RANCH BUILDOUT SCENARIO)

		To				
AM Peak Hour		Residential	Schools/Parks	Commercial	Off-Site	Total
From	Residential Areas	0	80	87	566 (77%)	733
	Schools/Parks	16	0	33	95 (66%)	144
	Commercial Areas	0	15	18	282 (90%)	315
	Off-Site	147 (90%)	91 (49%)	1,241 (90%)	6,580	8,059
Total		163	186	1,379	7,523	9,251
Total AM Off-Site = 2,422 (83%)						

		To				
PM Peak Hour		Residential	Schools/Parks	Commercial	Off-Site	Total
From	Residential Areas	0	38	170	173 (45%)	381
	Schools/Parks	38	0	2	30 (43%)	70
	Commercial Areas	273	4	44	1,518 (83%)	1,839
	Off-Site	432 (58%)	24 (36%)	806 (79%)	6,741	8,003
Total		743	66	1,022	8,462	10,293
Total PM Off-Site = 2,983 (72%)						

		To				
ADT		Residential	Schools/Parks	Commercial	Off-Site	Total
From	Residential Areas	0	286	1,083	4,435 (76%)	5,803
	Schools/Parks	296	0	61	261 (42%)	618
	Commercial Areas	1,387	37	156	12,946 (89%)	14,526
	Off-Site	4,359 (72%)	247 (43%)	13,024 (91%)	73,318	90,949
Total		6,042	571	14,324	90,960	111,897
Total ADT Off-Site = 35,273 (84%)						

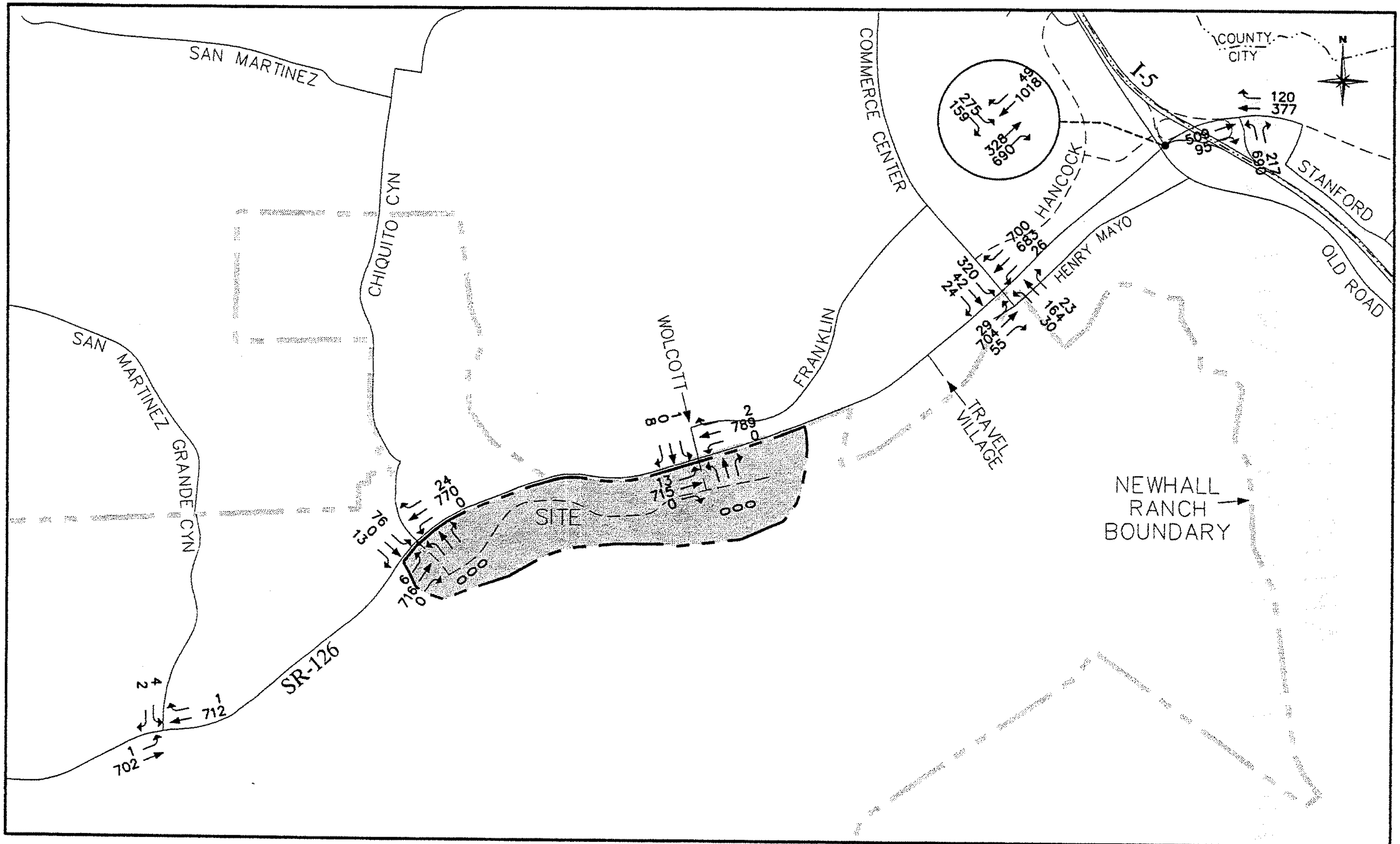
Note: tables include non-project through trips (off-site to off-site)

Table 6

TRIP GENERATION COMPARISON
– Final Trip Tables vs. Trip Generation Calculations

	IB	OB	TOTAL	IB	OB	TOTAL	ADT
Trip Rate Based Trip Generation (Traffic Study Table 3-1)	1,731	1,177	2,908	1,837	2,327	4,164	41,884
Traffic Model Trip Tables (Shown Above)	1,728	1,192	2,920	1,831	2,290	4,121	41,884
Percent Difference	-0.2%	1.3%	0.4%	-0.3%	-1.6%	-1.0%	0.0%

APPENDIX G
TRAFFIC VOLUME FORECAST EXHIBITS

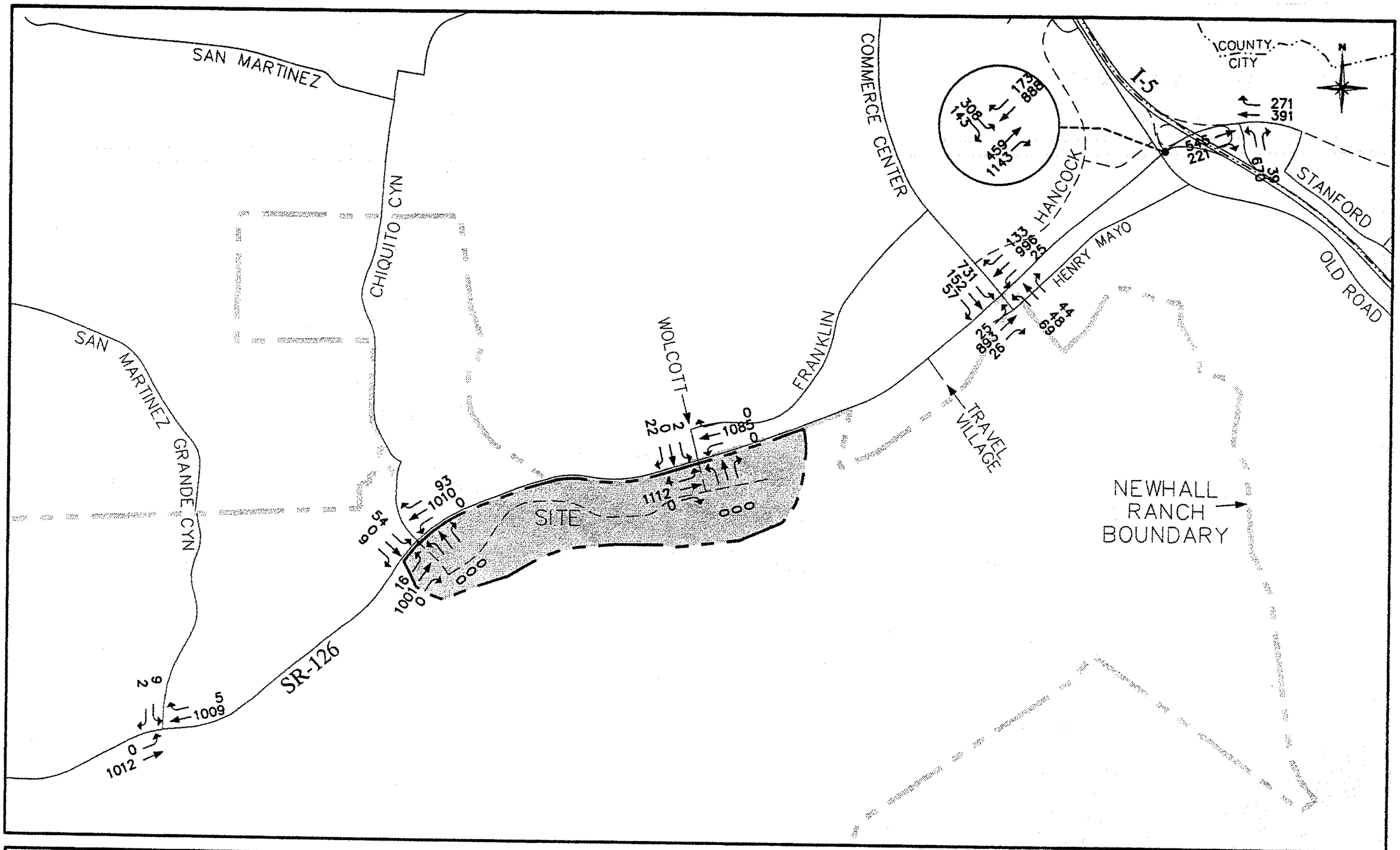


Legend

Future Roadway

Figure G-1

AM PEAK HOUR TURNING MOVEMENT VOLUMES
-2007 WITHOUT PROJECT

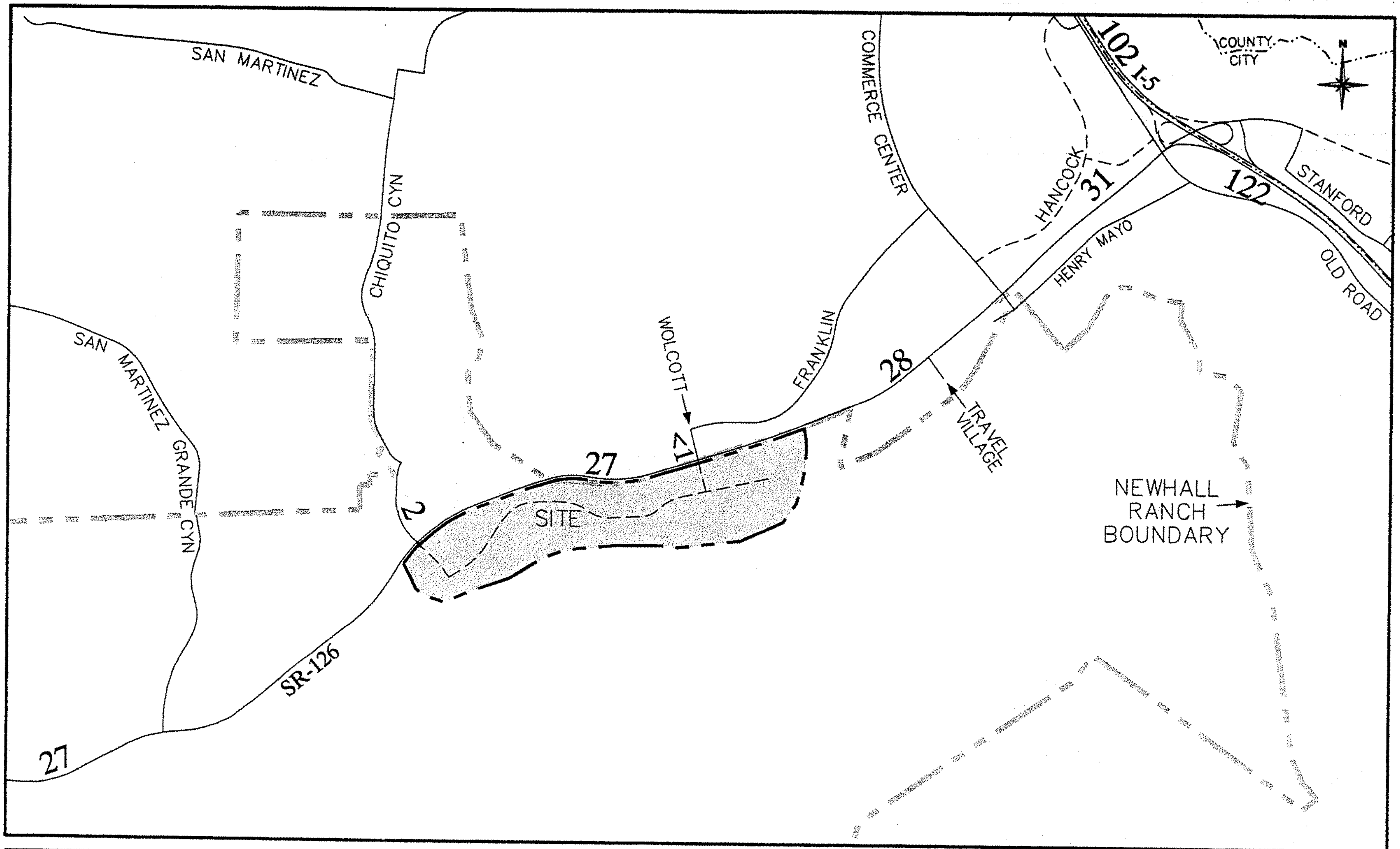


Legend

– – – – Future Roadway

Figure G-2

PM PEAK HOUR TURNING MOVEMENT VOLUMES -2007 WITHOUT PROJECT

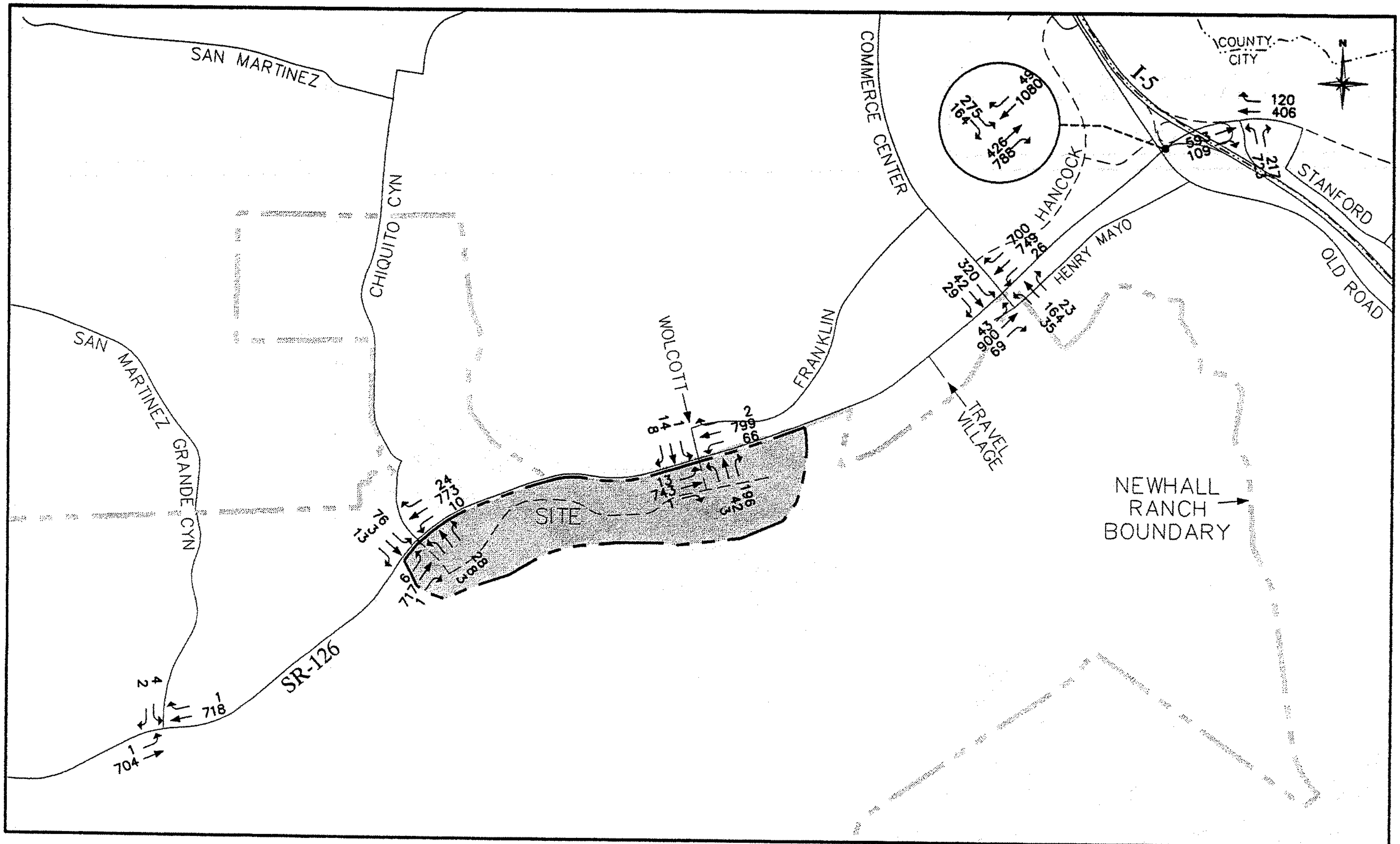


Legend

Future Roadway

Figure G-3

AVERAGE DAILY TRAFFIC VOLUMES (000s)
-2007 WITHOUT PROJECT

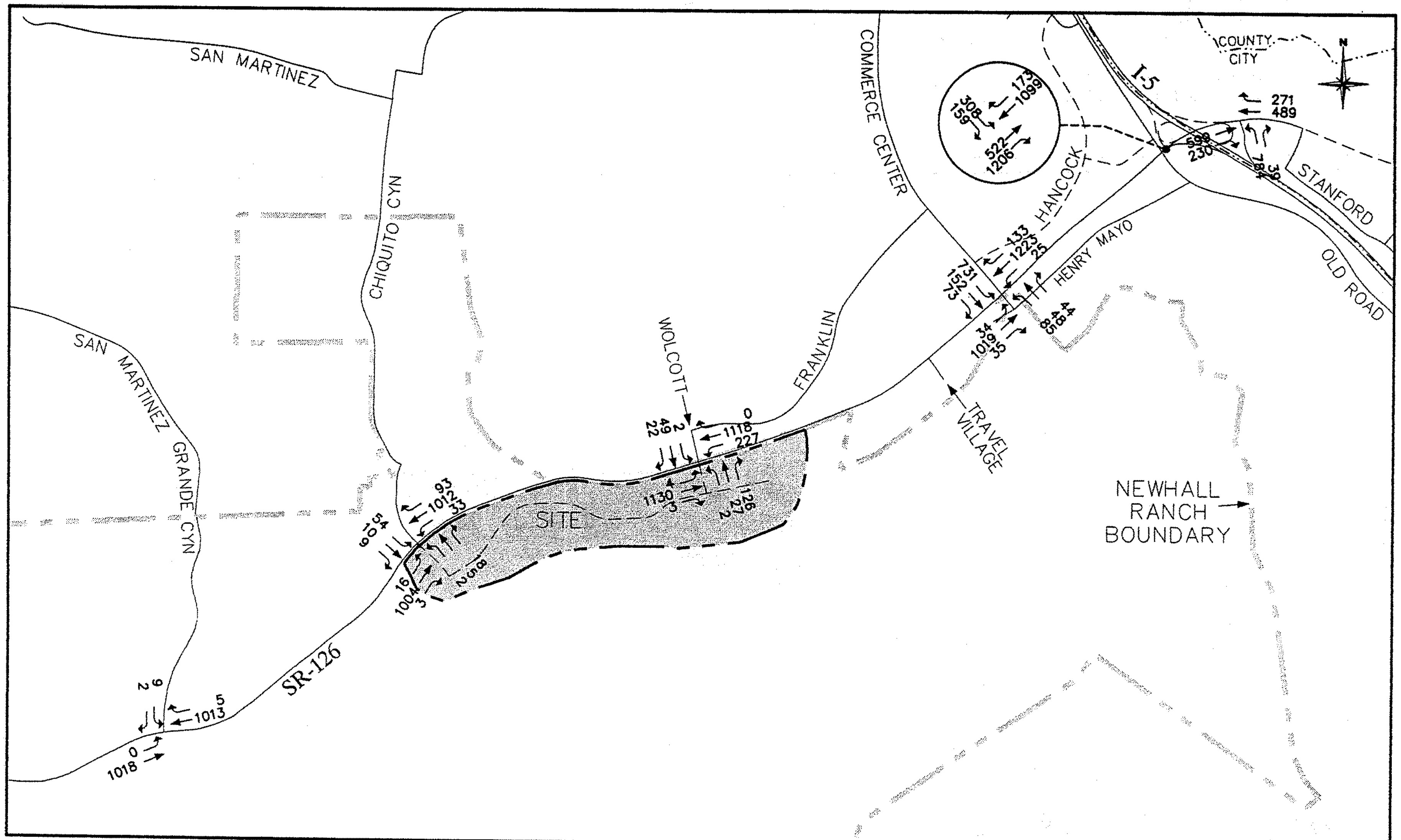


Legend

— — — — Future Roadway

Figure G-4

AM PEAK HOUR TURNING MOVEMENT VOLUMES -2007 WITH PROJECT PHASE 1

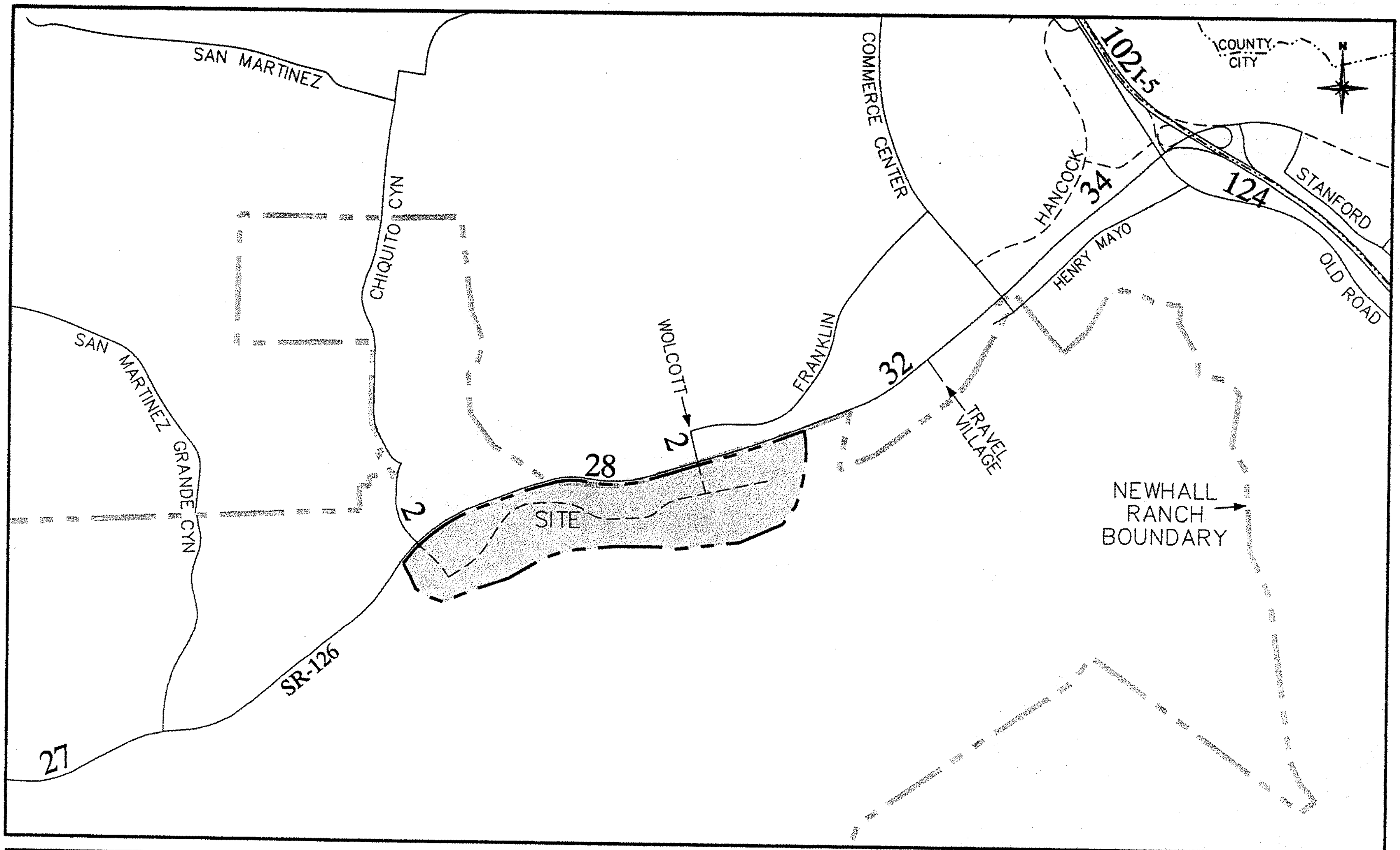


Legend

– – – – Future Roadway

Figure G-5

PM PEAK HOUR TURNING MOVEMENT VOLUMES -2007 WITH PROJECT PHASE 1

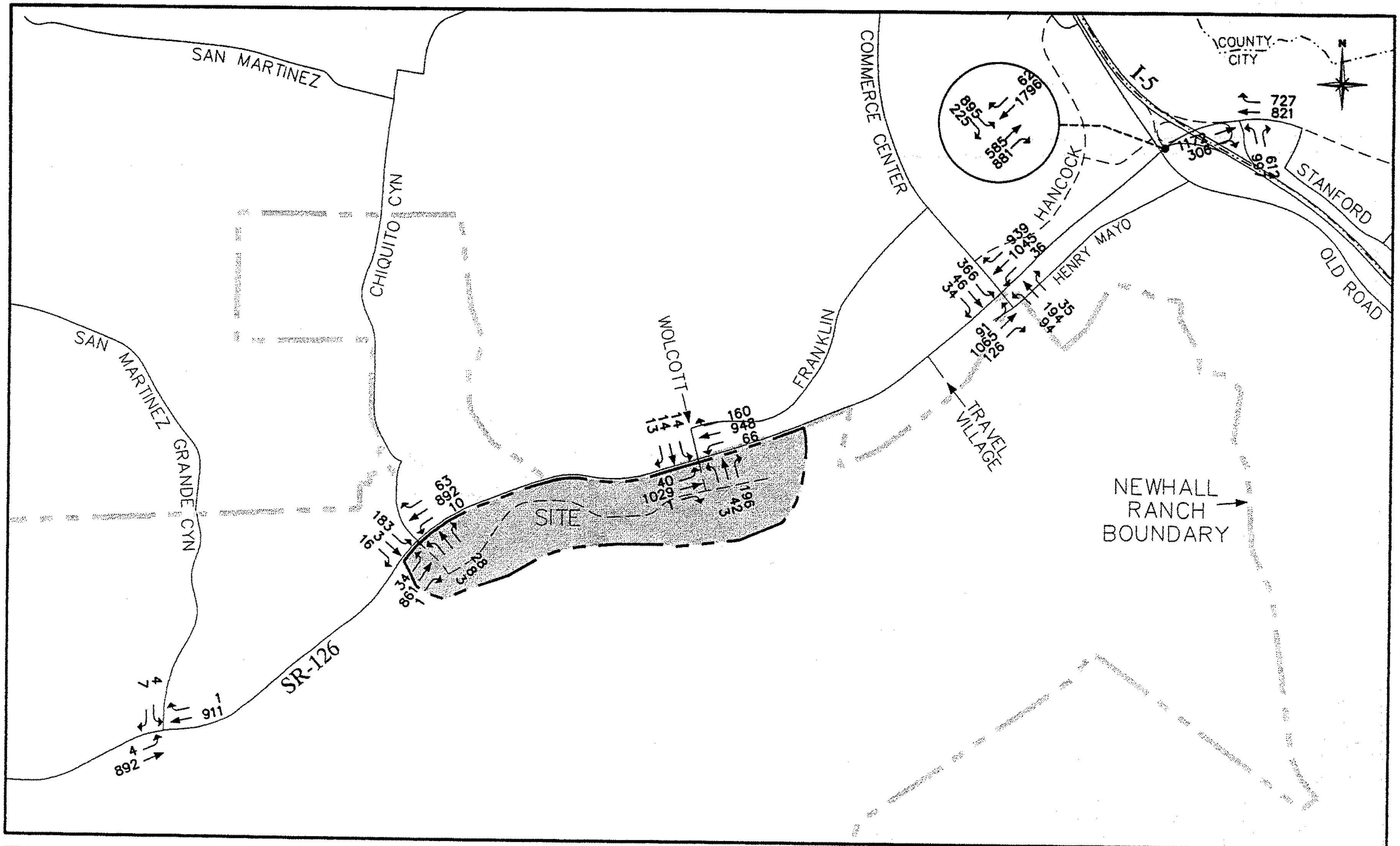


Legend

– – – – Future Roadway

Figure G-6

AVERAGE DAILY TRAFFIC VOLUMES (000s) -2007 WITH PROJECT PHASE 1

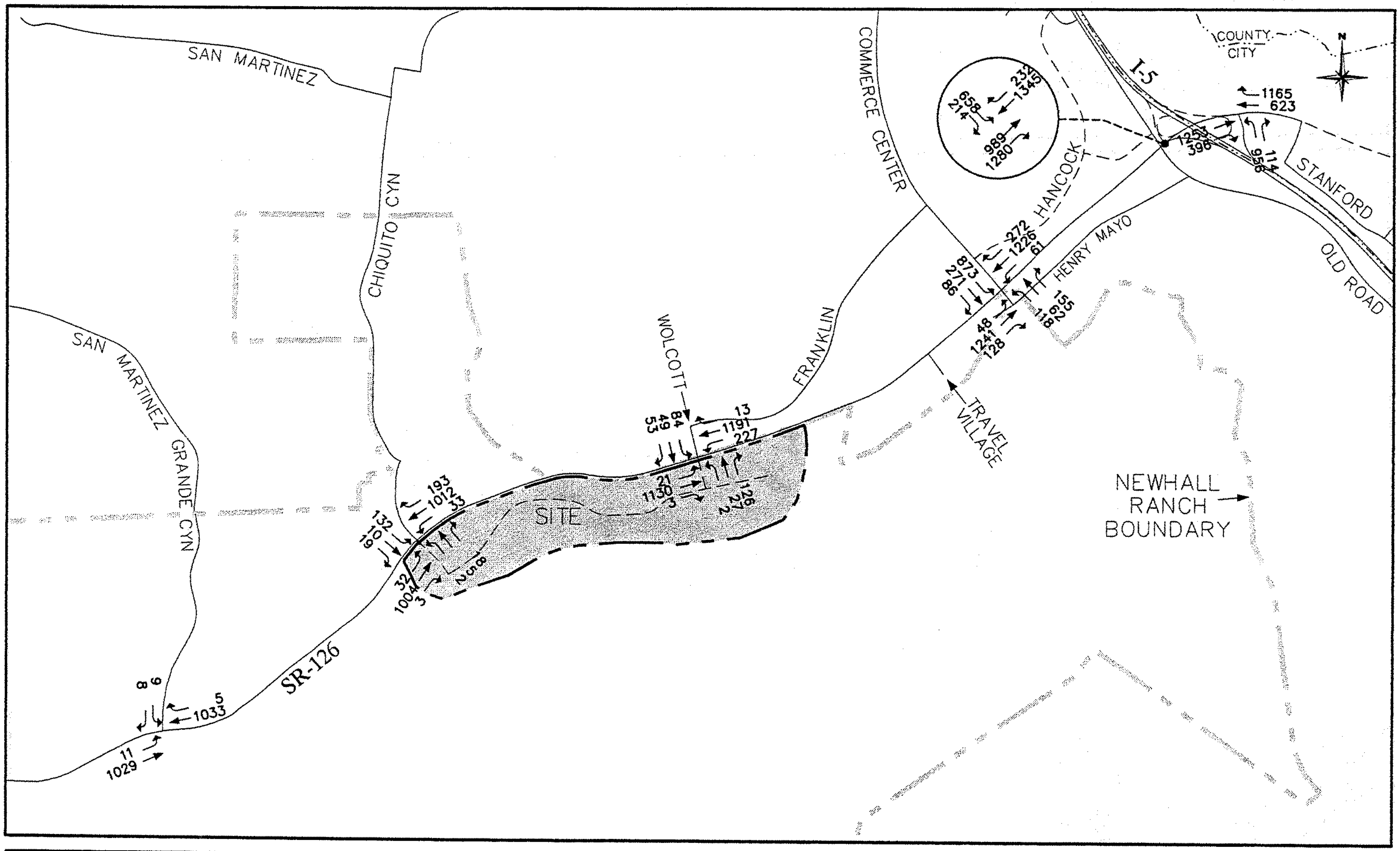


Legend

— — — — Future Roadway

Figure G-7

AM PEAK HOUR TURNING MOVEMENT VOLUMES -2007 WITH PROJECT PHASE 1 AND RELATED PROJECTS

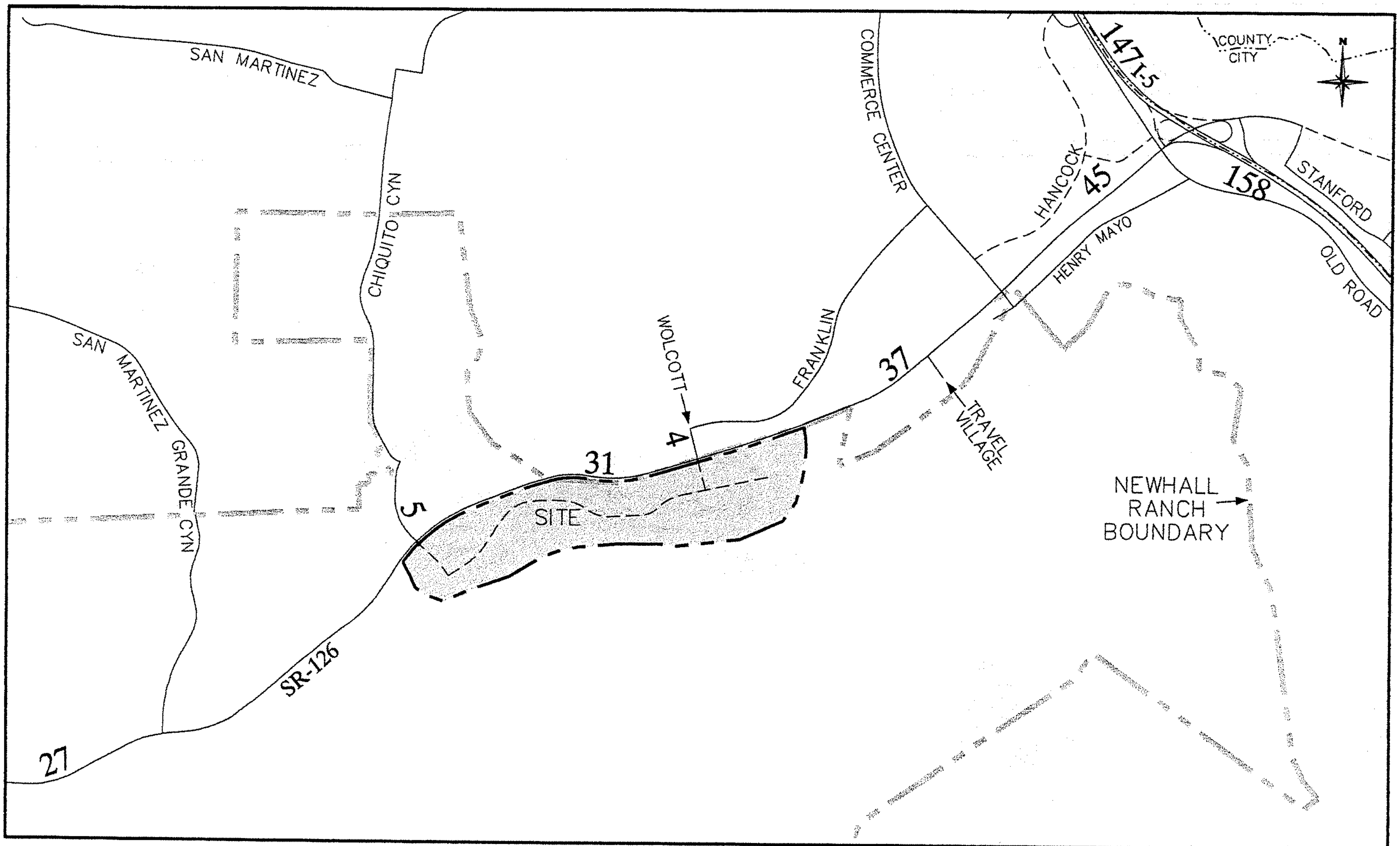


Legend

– – – – Future Roadway

Figure G-8

PM PEAK HOUR TURNING MOVEMENT VOLUMES -2007 WITH PROJECT PHASE 1 AND RELATED PROJECTS

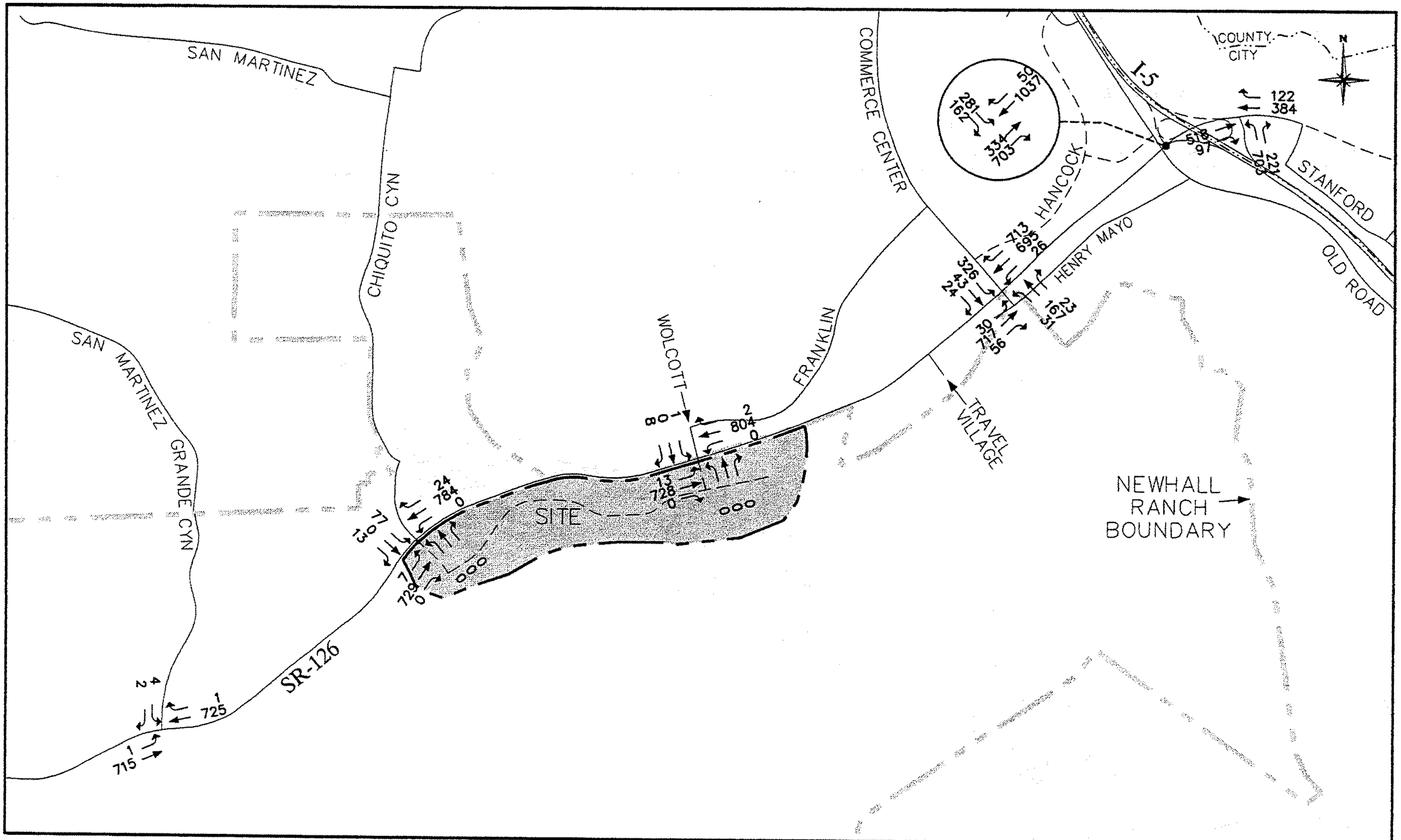


Legend

— — — Future Roadway

Figure G-9

AVERAGE DAILY TRAFFIC VOLUMES (000s) -2007 WITH PROJECT PHASE 1 AND RELATED PROJECTS

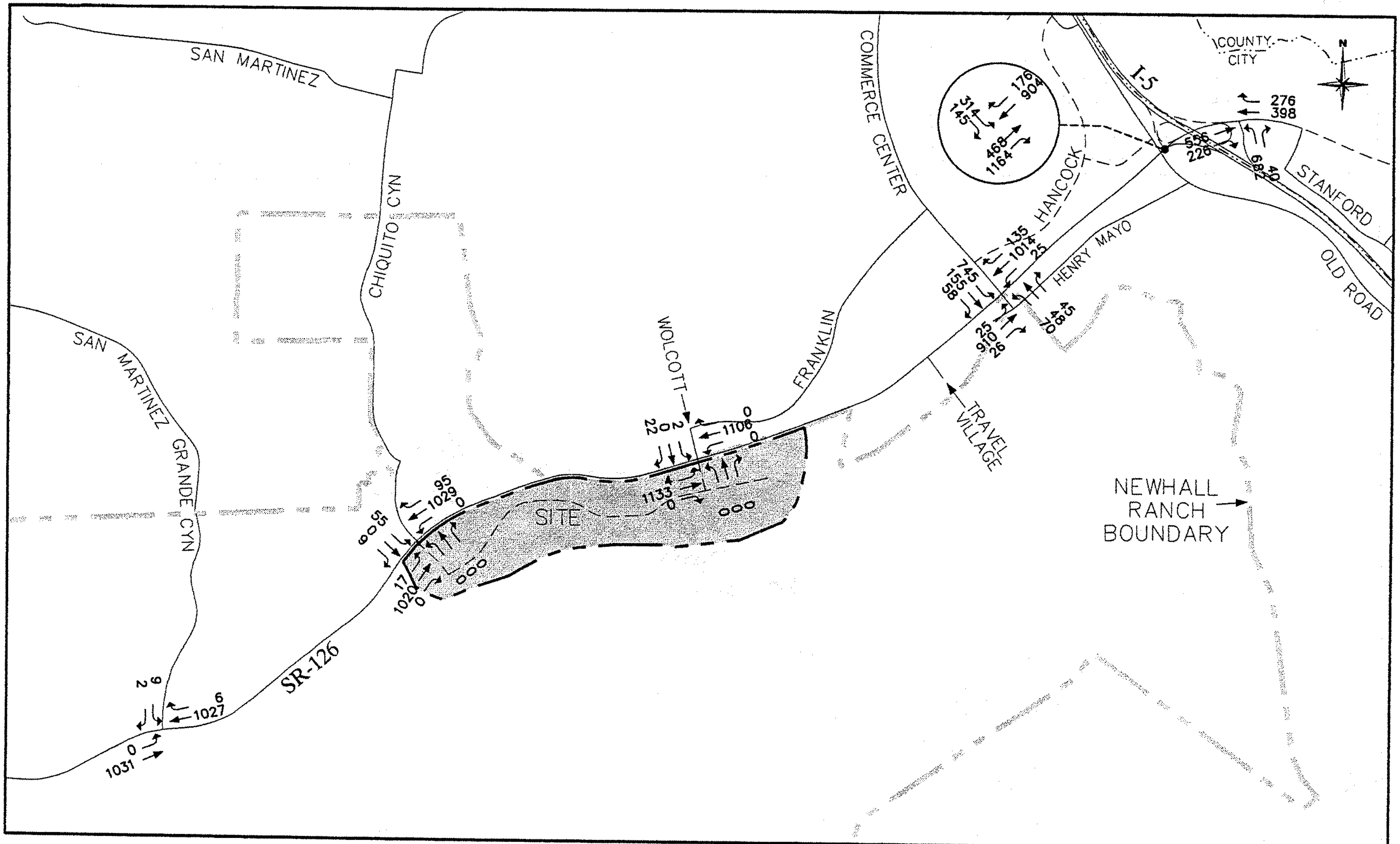


Legend

— — — — Future Roadway

Figure G-10

AM PEAK HOUR TURNING MOVEMENT VOLUMES -2008 WITHOUT PROJECT

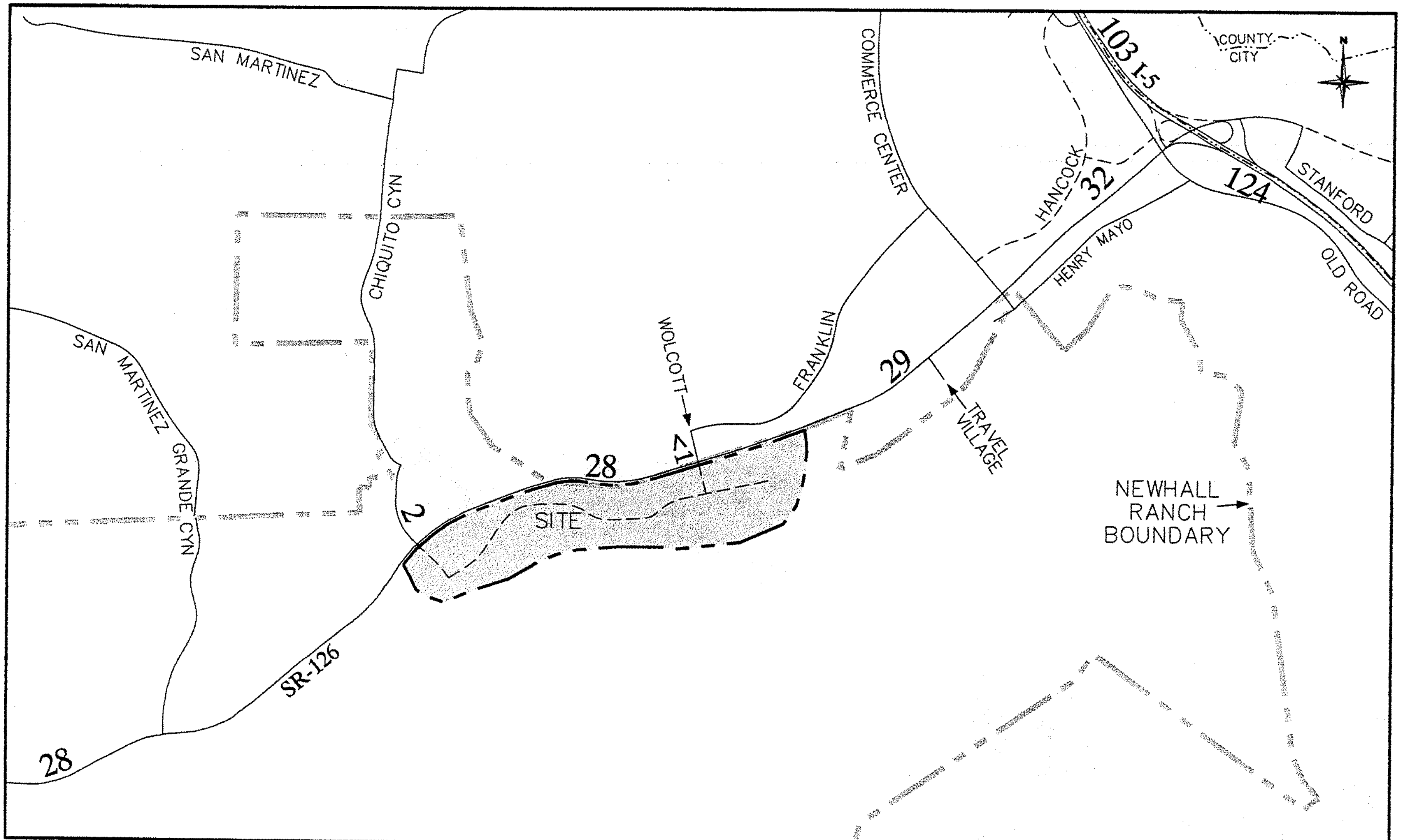


Legend

– – – – Future Roadway

Figure G-11

PM PEAK HOUR TURNING MOVEMENT VOLUMES
-2008 WITHOUT PROJECT

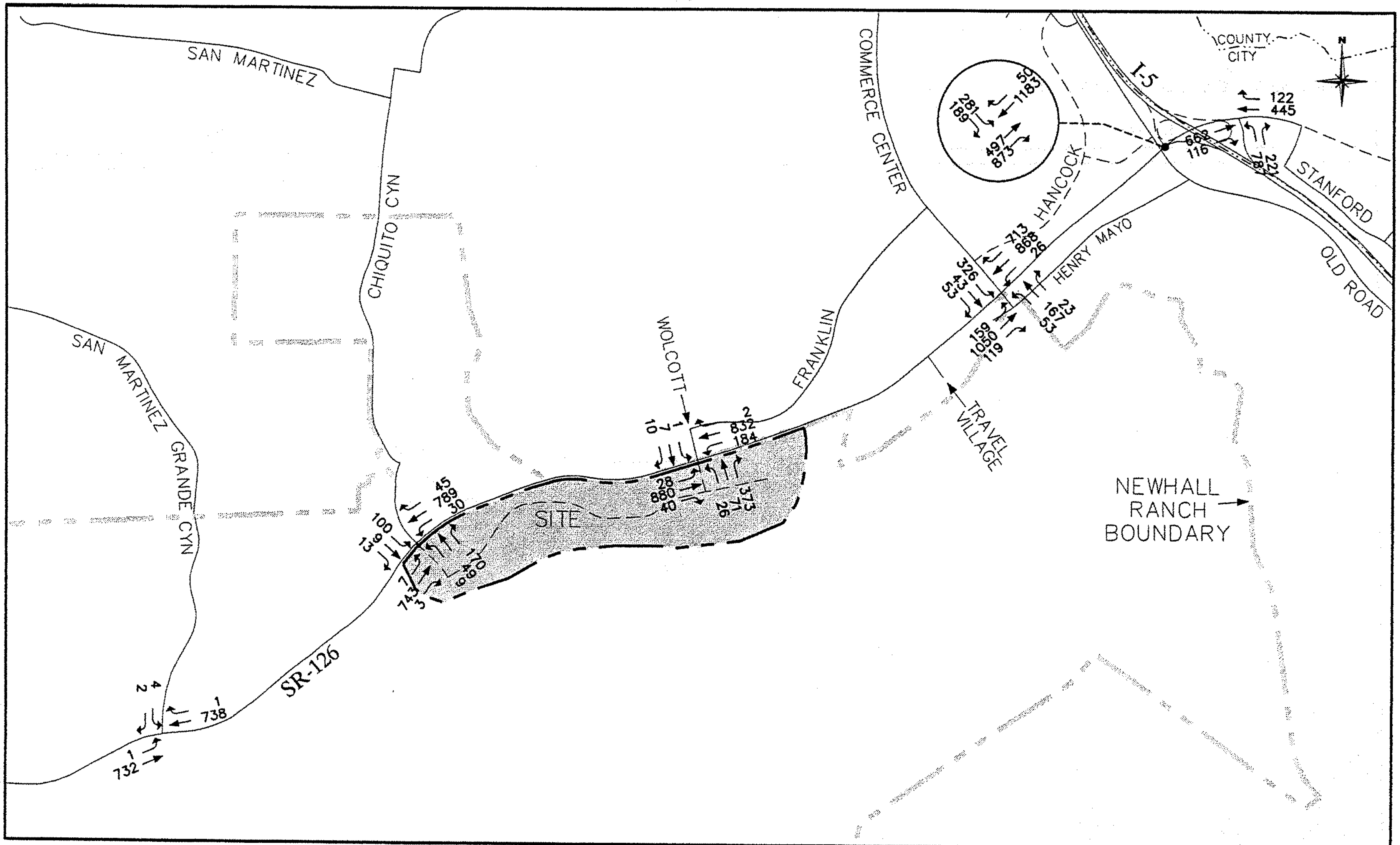


Legend

– – – – Future Roadway

Figure G-12

AVERAGE DAILY TRAFFIC VOLUMES (000s)
-2008 WITHOUT PROJECT

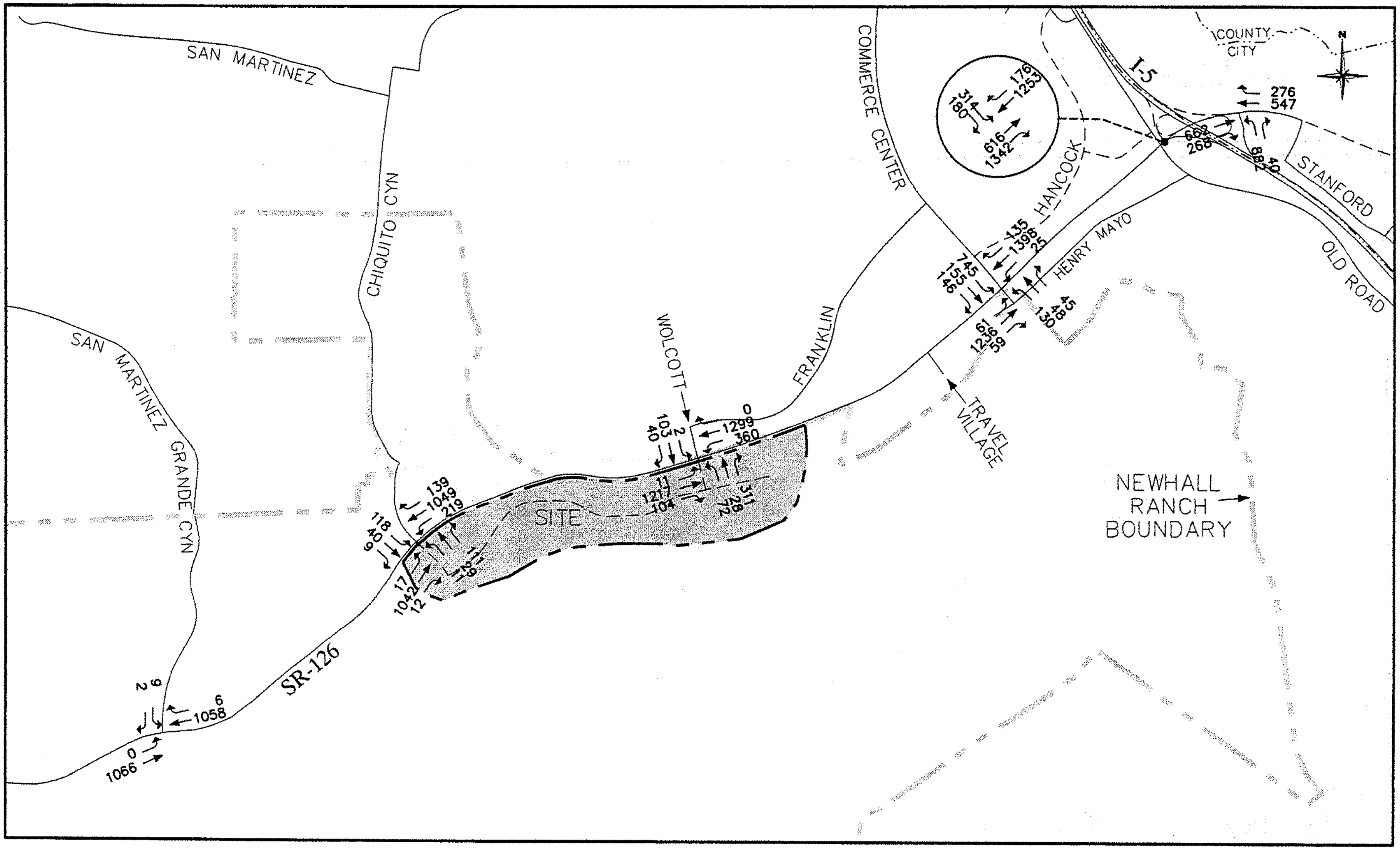


Legend

– – – – Future Roadway

Figure G-13

AM PEAK HOUR TURNING MOVEMENT VOLUMES
-2008 WITH PROJECT PHASE 2

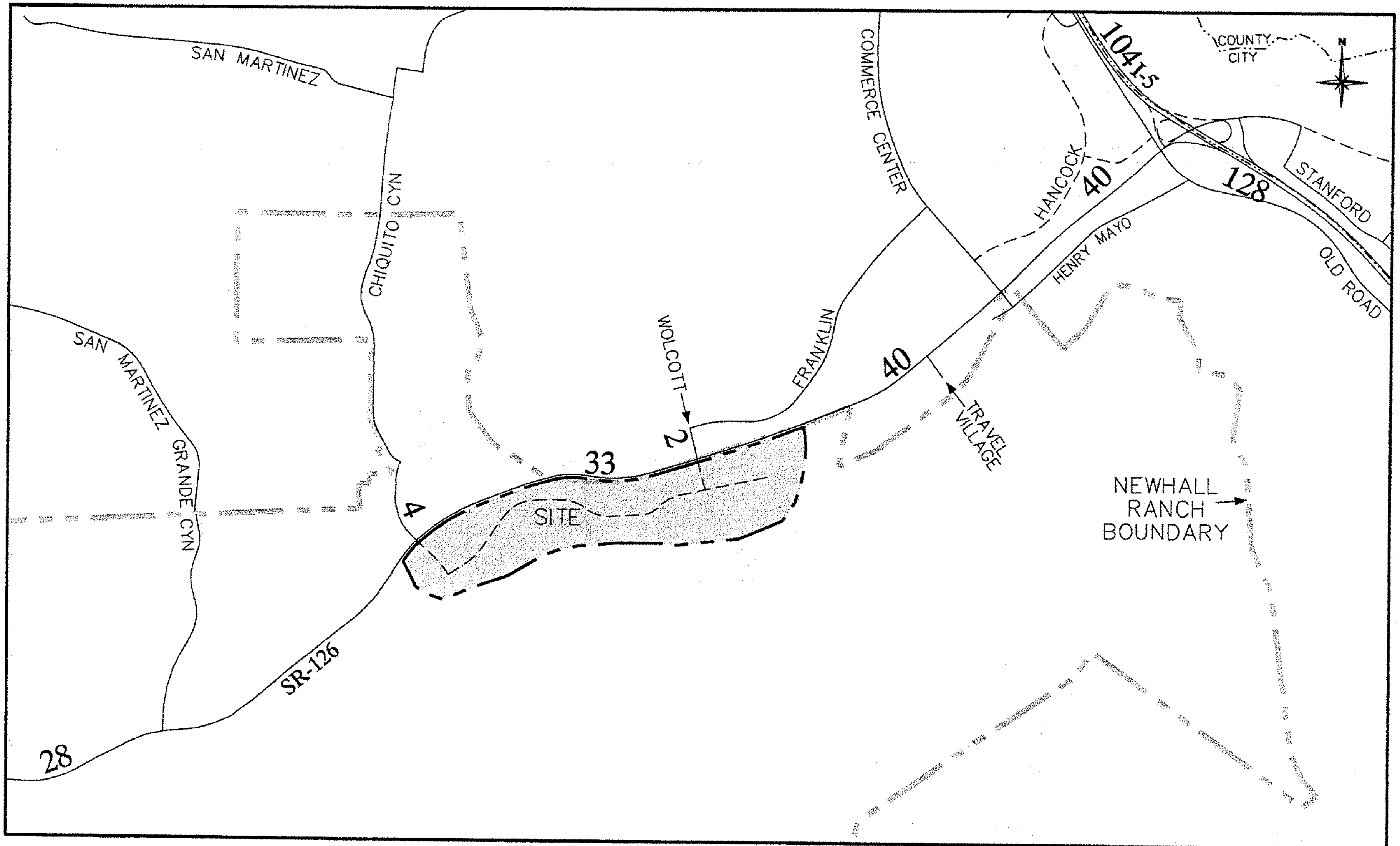


Legend

– – – – Future Roadway

Figure G-14

PM PEAK HOUR TURNING MOVEMENT VOLUMES
-2008 WITH PROJECT PHASE 2

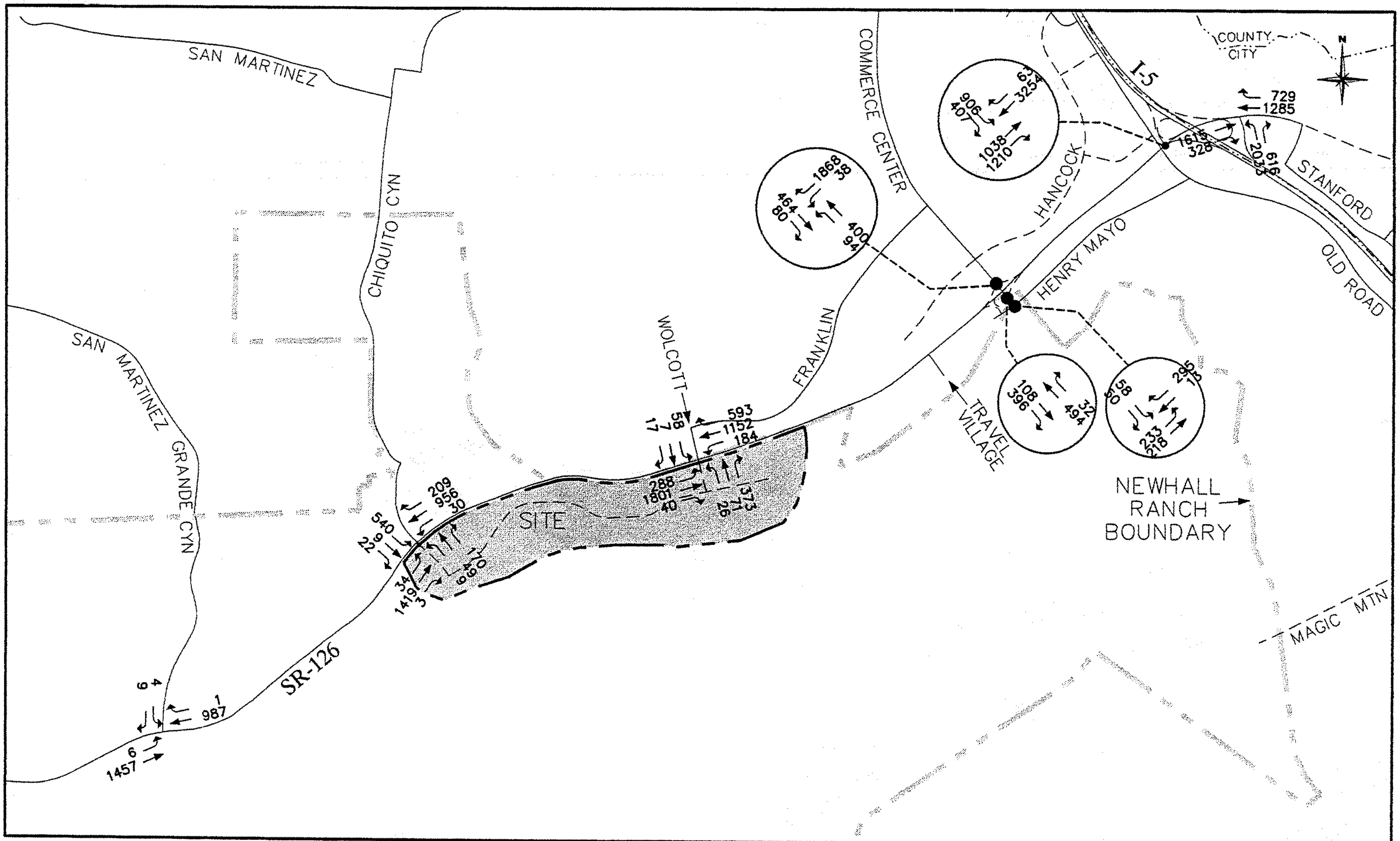


Legend

- - - - Future Roadway

Figure G-15

AVERAGE DAILY TRAFFIC VOLUMES (000s)
-2008 WITH PROJECT PHASE 2

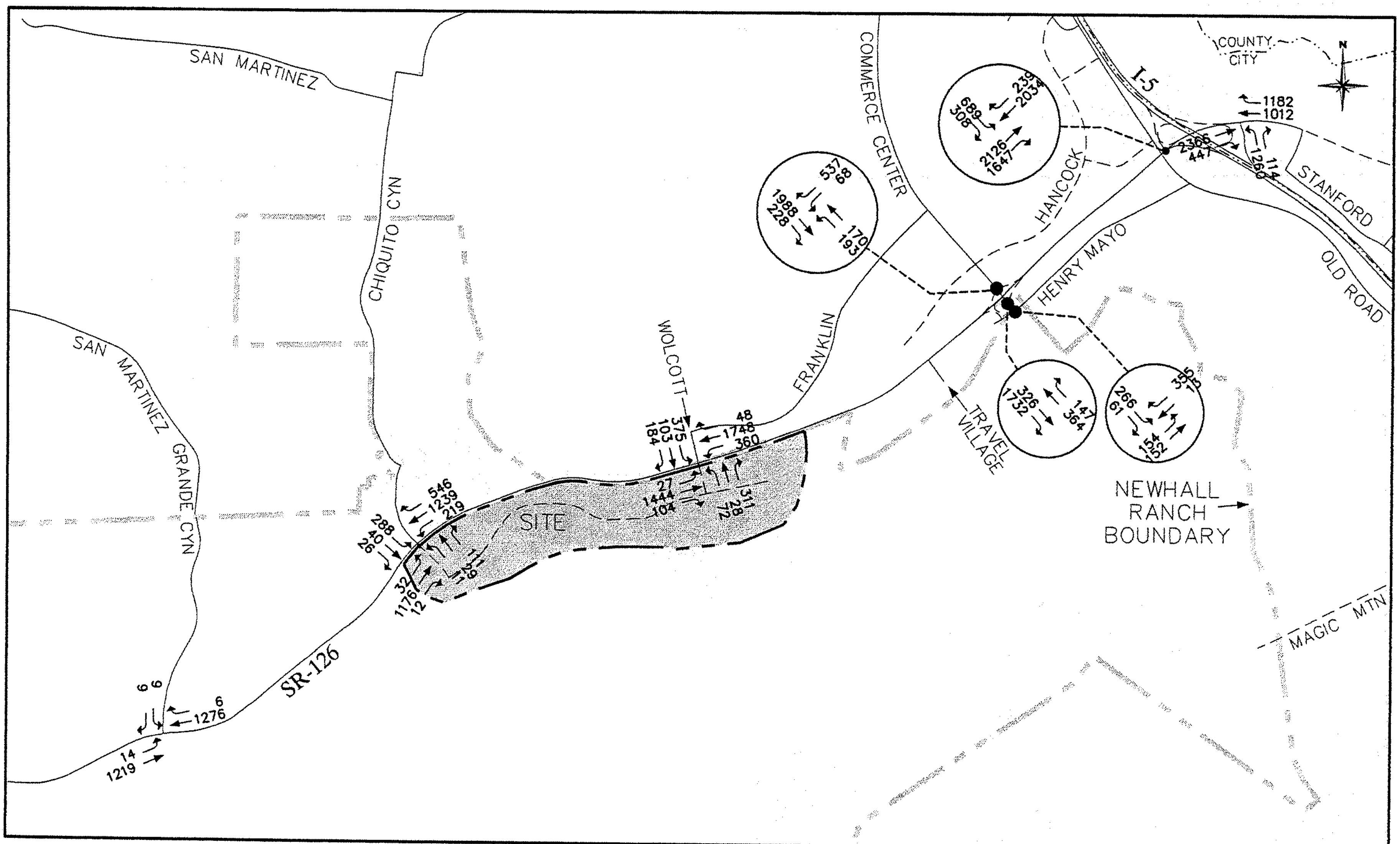


Legend

Future Roadway

Figure G-16

AM PEAK HOUR TURNING MOVEMENT VOLUMES -2008 WITH PROJECT PHASE 2 AND RELATED PROJECTS

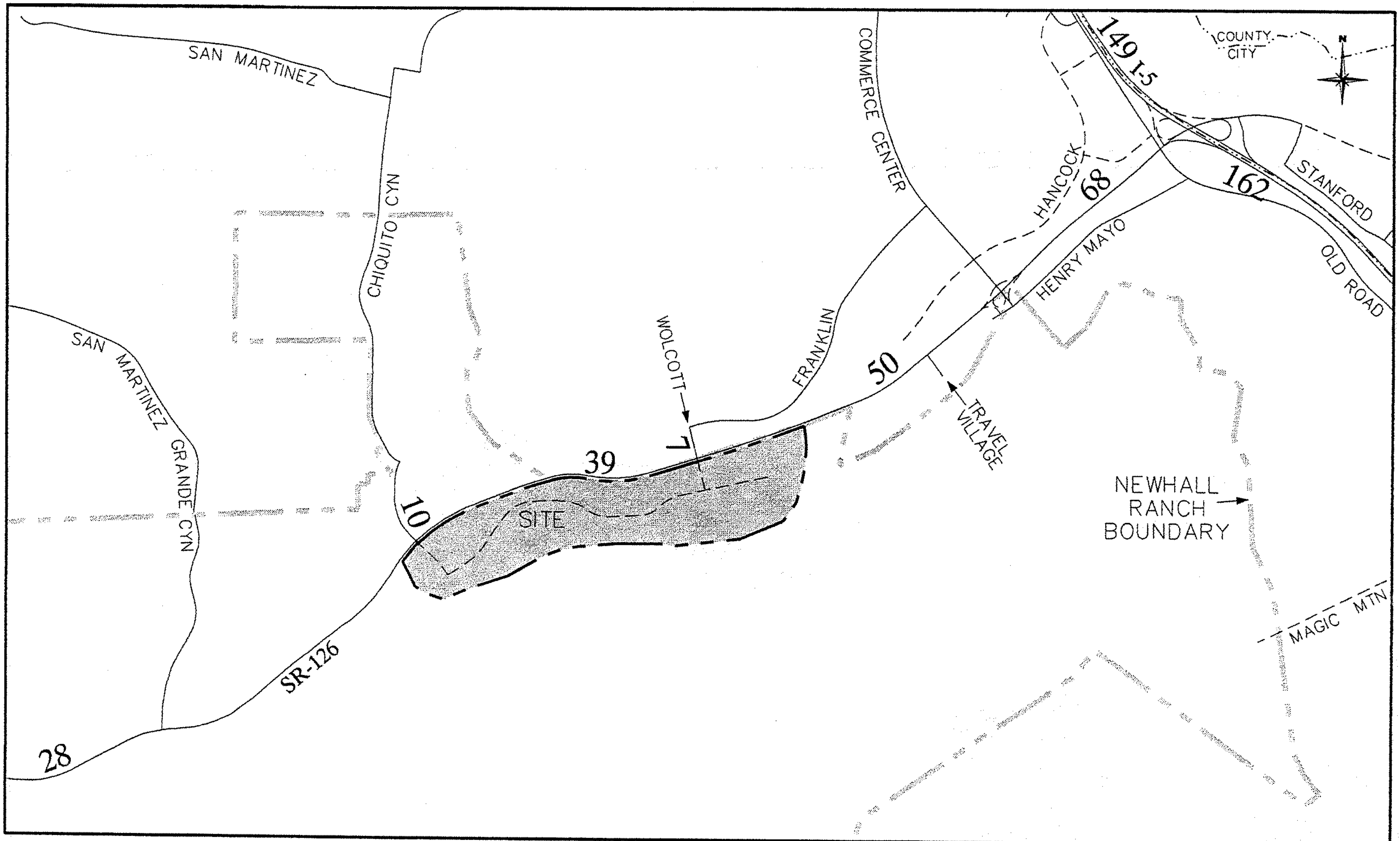


Legend

Future Roadway

Figure G-17

PM PEAK HOUR TURNING MOVEMENT VOLUMES -2008 WITH PROJECT PHASE 2 AND RELATED PROJECTS

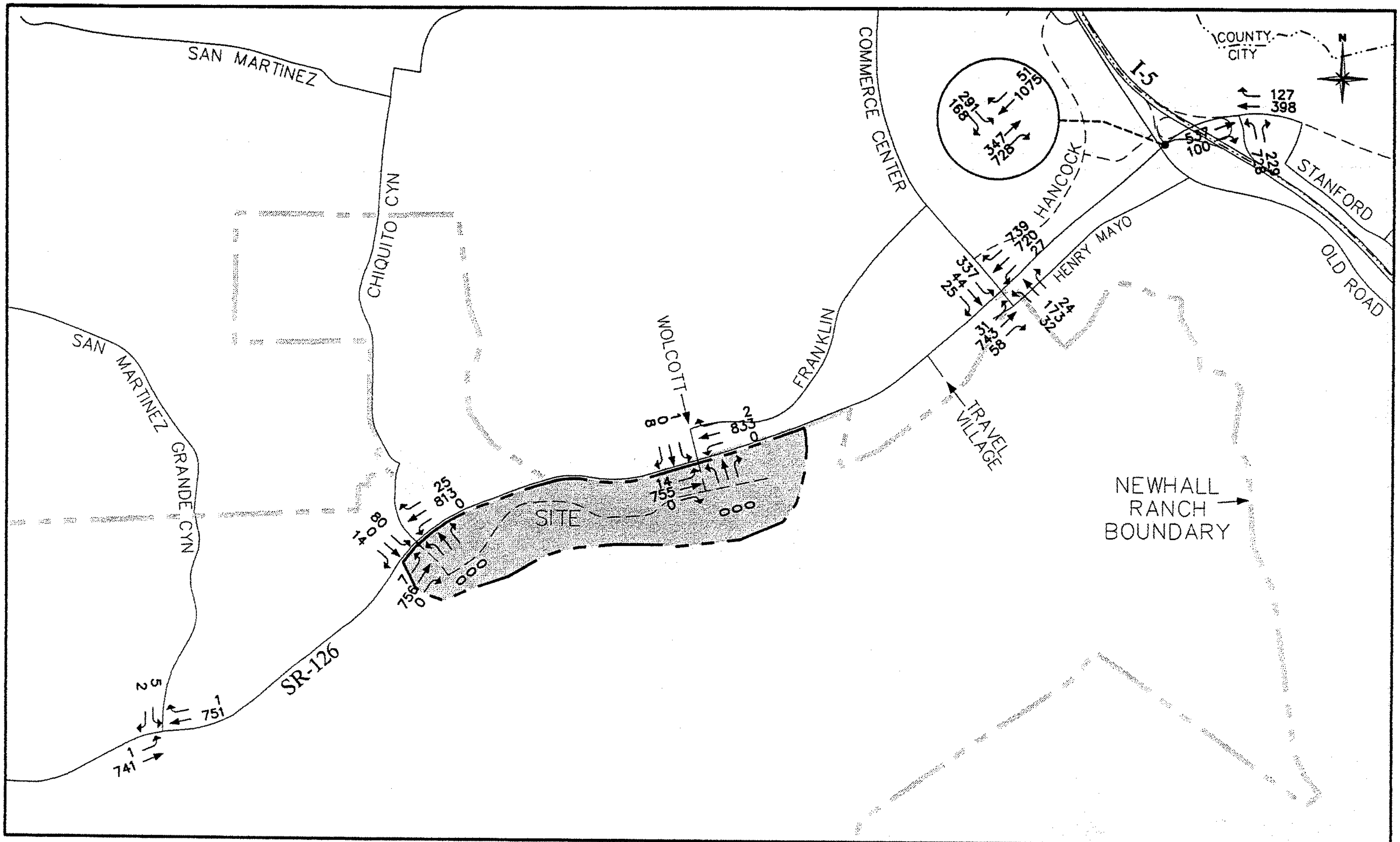


Legend

Future Roadway

Figure G-18

AVERAGE DAILY TRAFFIC VOLUMES (000s)
-2008 WITH PROJECT PHASE 2
AND RELATED PROJECTS

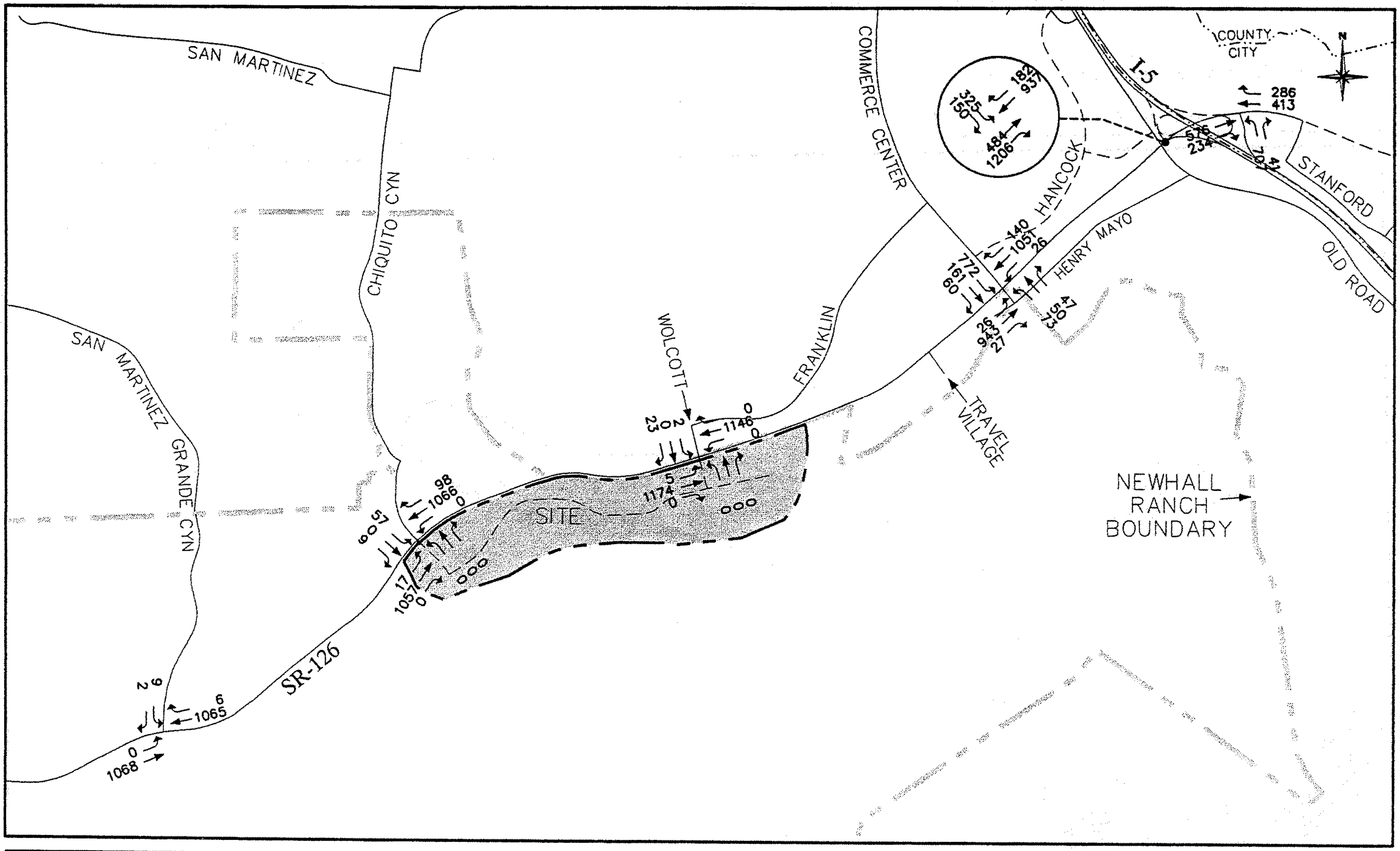


Legend

— — — — Future Roadway

Figure G-19

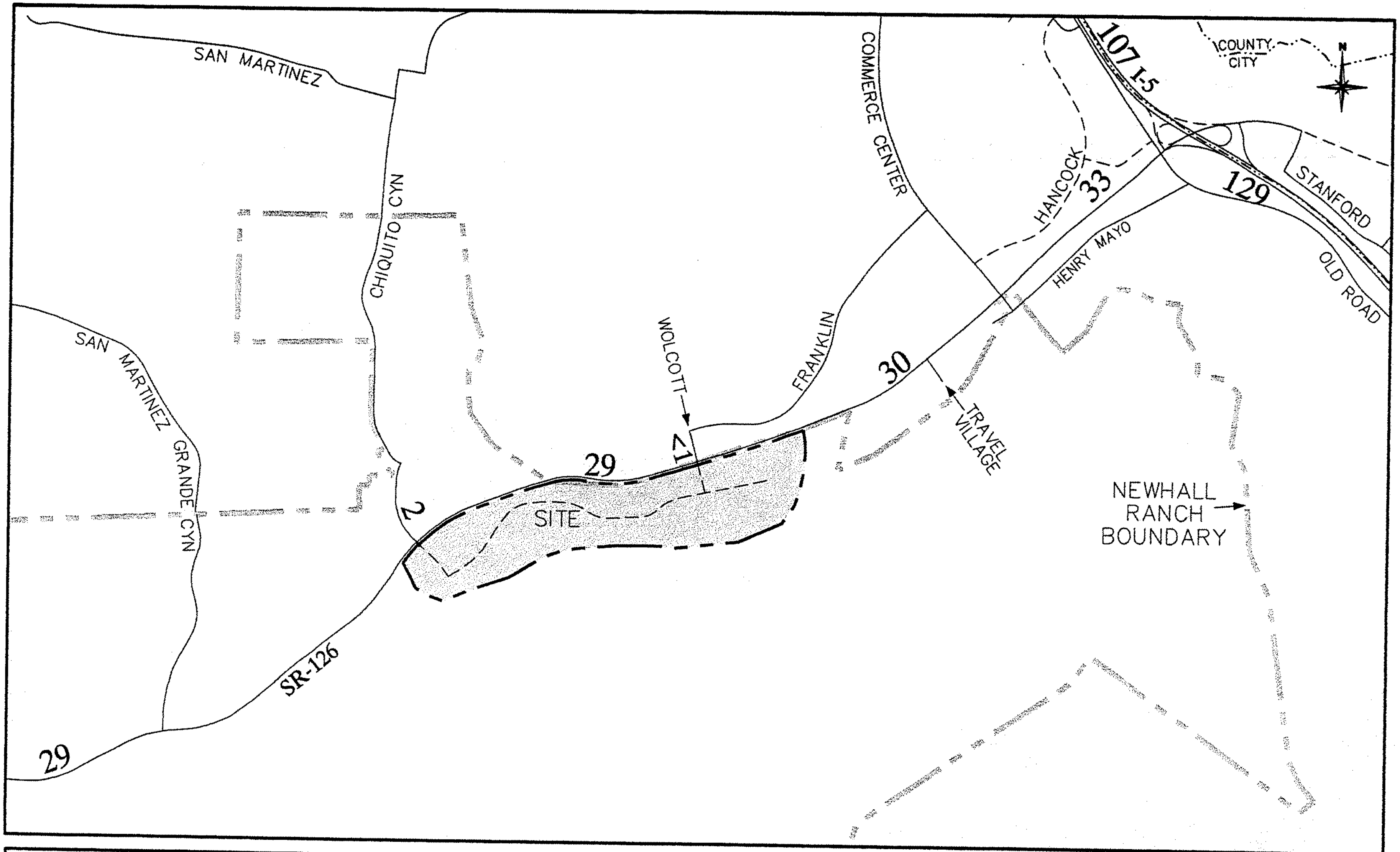
AM PEAK HOUR TURNING MOVEMENT VOLUMES -2010 WITHOUT PROJECT



Legend
— — — — Future Roadway

Figure G-20

PM PEAK HOUR TURNING MOVEMENT VOLUMES -2010 WITHOUT PROJECT

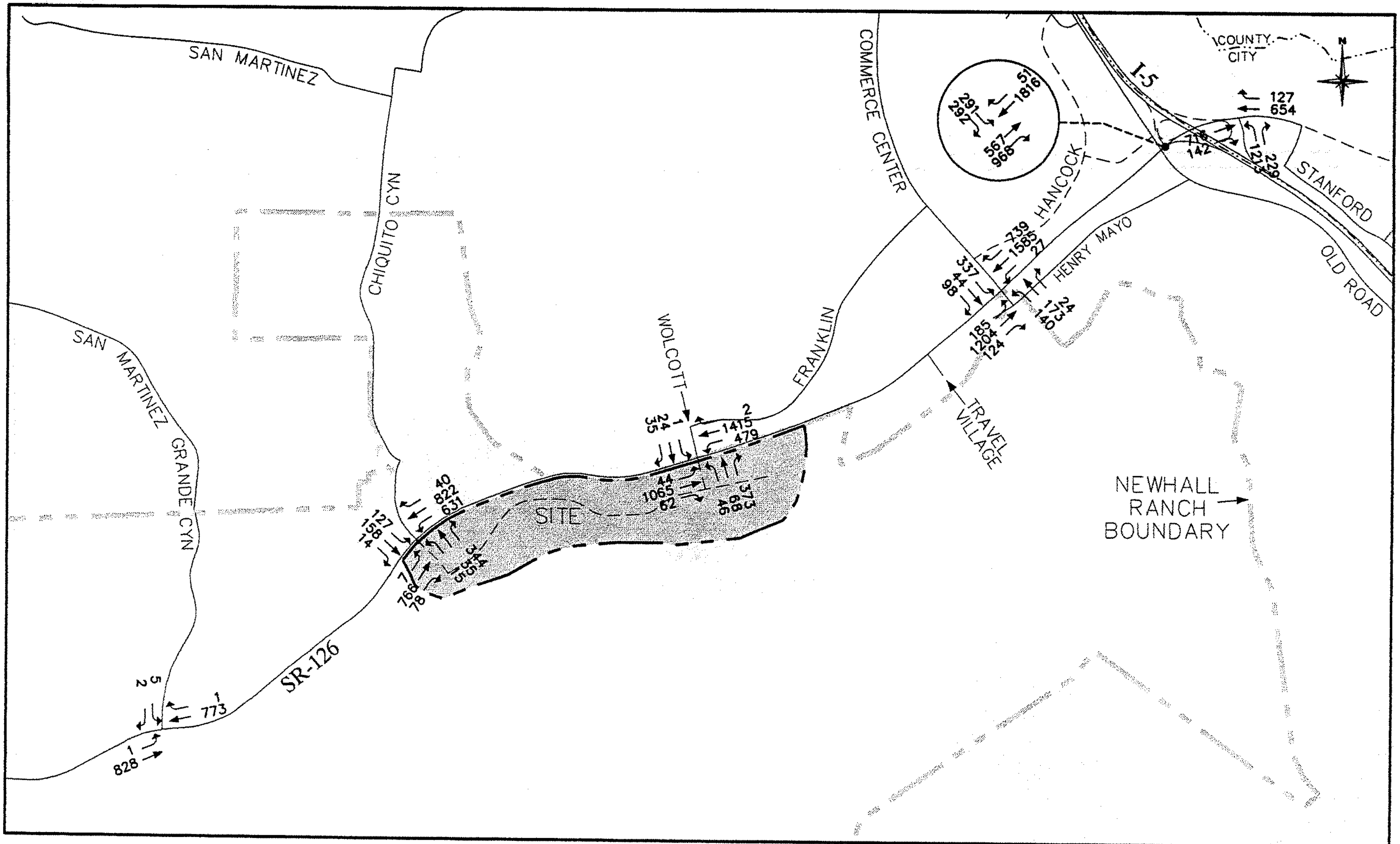


Legend

- - - - Future Roadway

Figure G-21

AVERAGE DAILY TRAFFIC VOLUMES (000s)
-2010 WITHOUT PROJECT

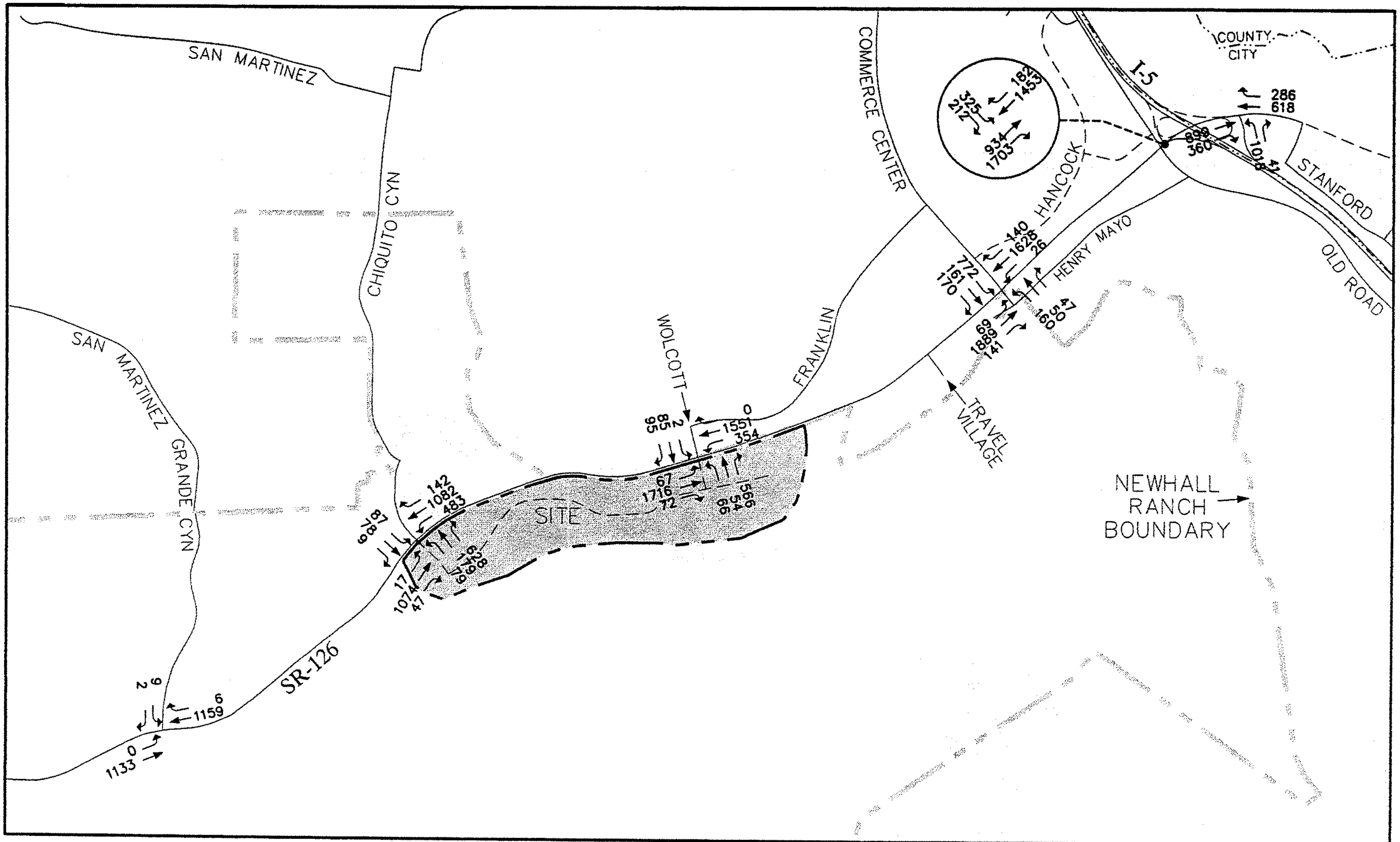


Legend

Future Roadway

Figure G-22

AM PEAK HOUR TURNING MOVEMENT VOLUMES -2010 WITH PROJECT PHASE 3

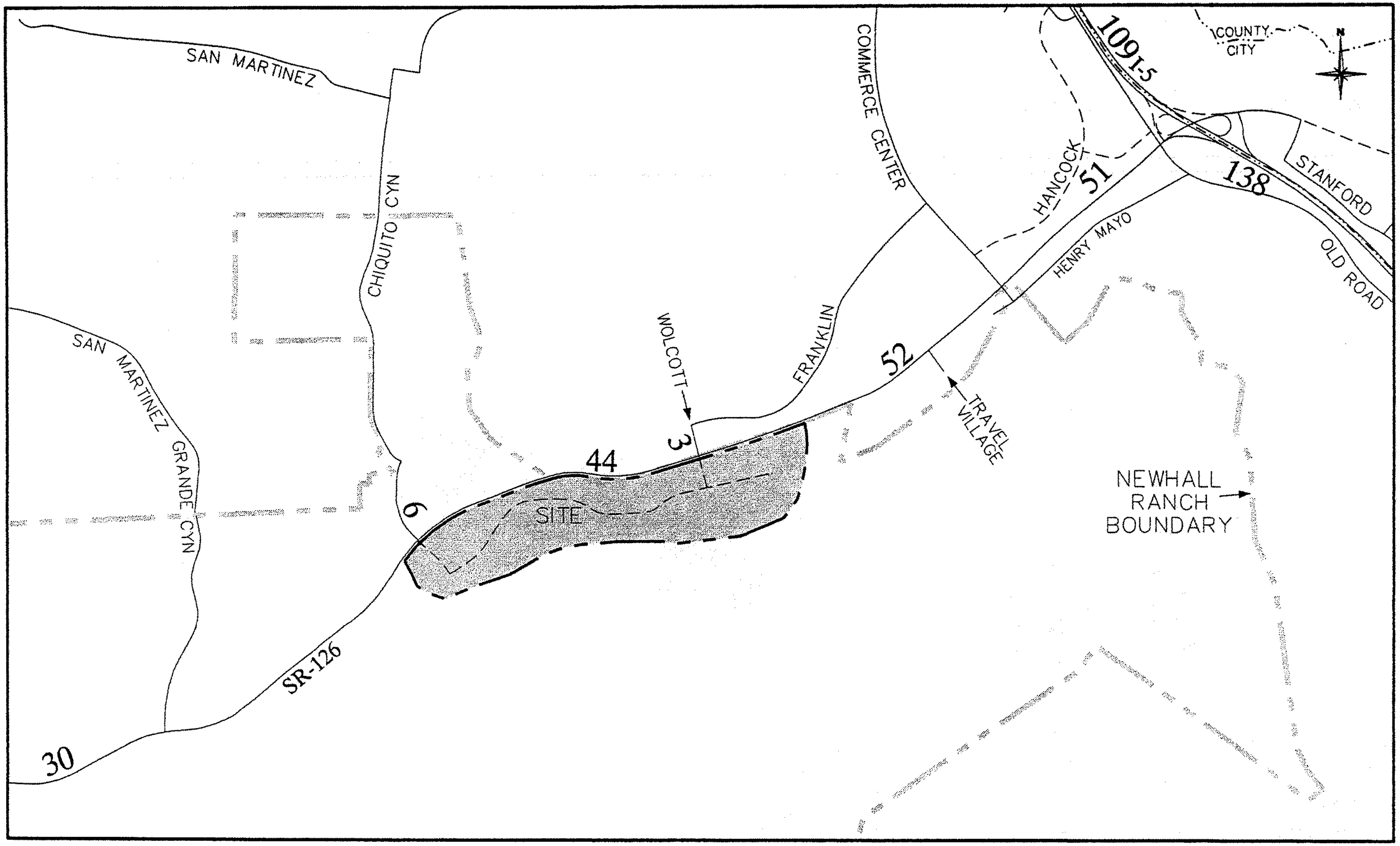


Legend

– – – – Future Roadway

Figure G-23

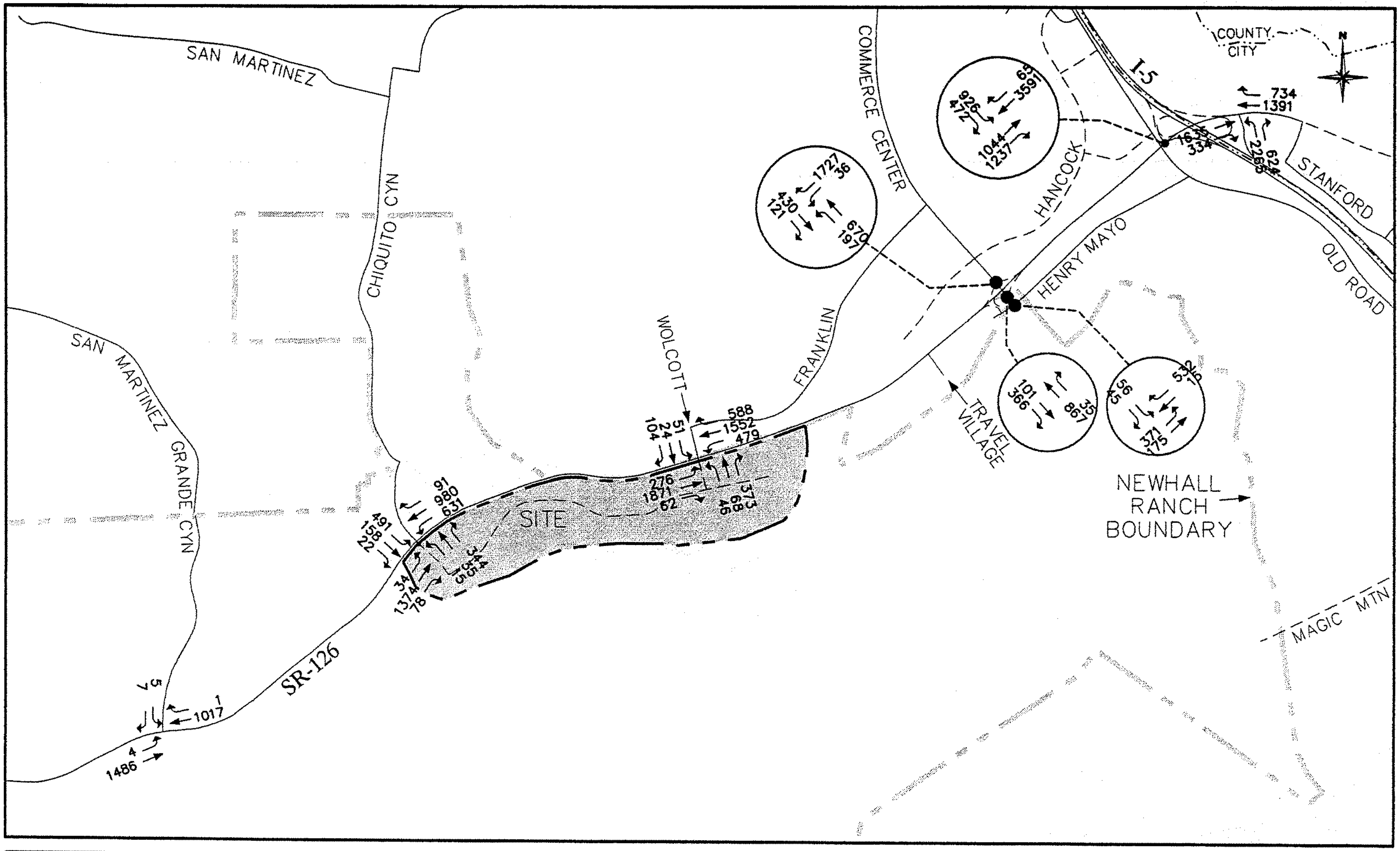
PM PEAK HOUR TURNING MOVEMENT VOLUMES -2010 WITH PROJECT PHASE 3



Legend
— — — — Future Roadway

Figure G-24

AVERAGE DAILY TRAFFIC VOLUMES (000s) -2010 WITH PROJECT PHASE 3

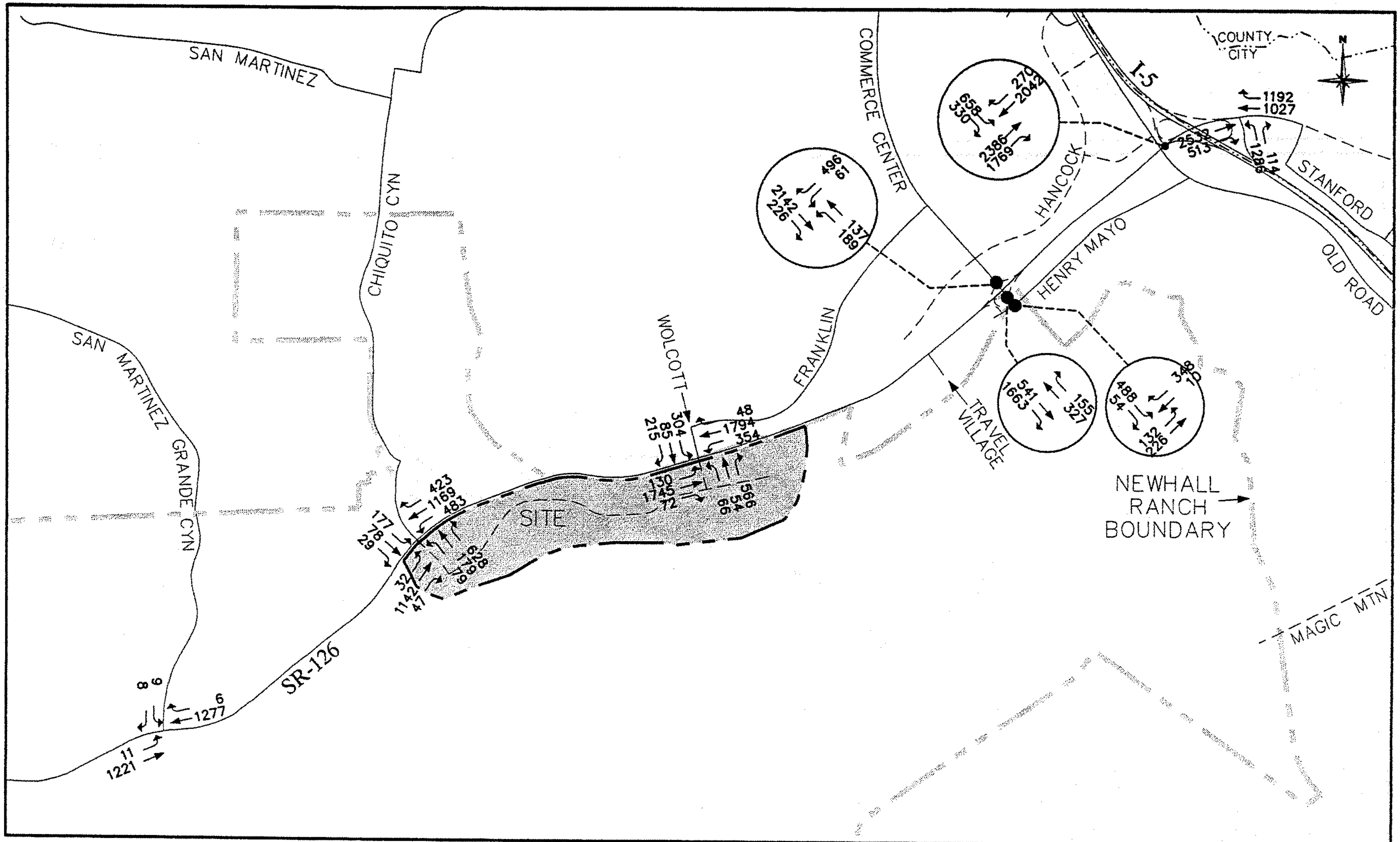


Legend

– – – – Future Roadway

Figure G-25

AM PEAK HOUR TURNING MOVEMENT VOLUMES -2010 WITH PROJECT BUILDOUT AND RELATED PROJECTS

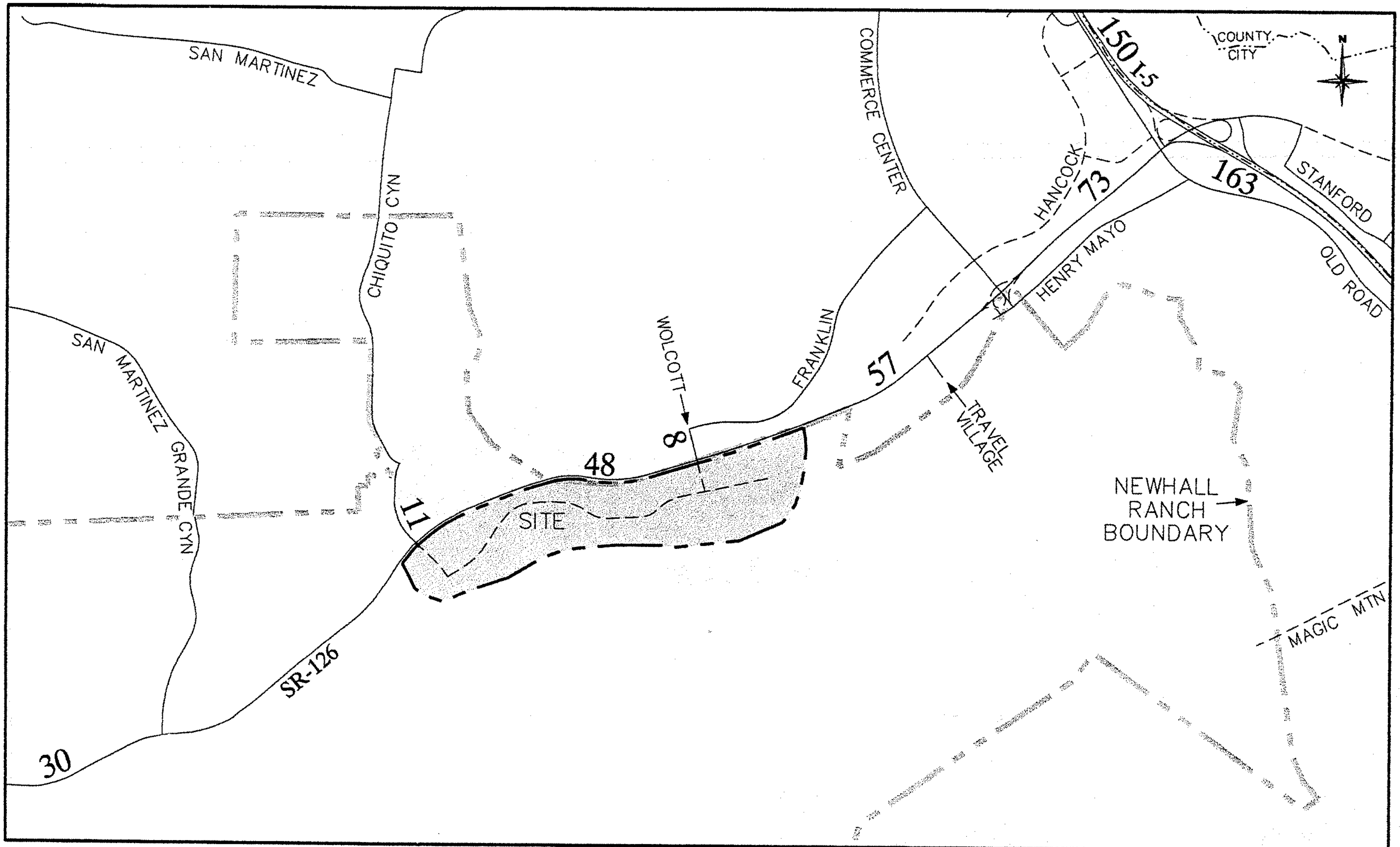


Legend

– – – – Future Roadway

Figure G-26

PM PEAK HOUR TURNING MOVEMENT VOLUMES -2010 WITH PROJECT BUILDOUT AND RELATED PROJECTS



Legend

– – – – Future Roadway

Figure G-27

AVERAGE DAILY TRAFFIC VOLUMES (000s)
-2010 WITH PROJECT BUILDOUT
AND RELATED PROJECTS

SR-126 TRAFFIC ANALYSIS FOR COMMUNITY OF PIRU IN VENTURA COUNTY

Prepared by:

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2020 North Tustin Avenue
Santa Ana, California 92705-7827
(714) 667-0496

April 11, 2006

SR-126 TRAFFIC ANALYSIS FOR COMMUNITY OF PIRU IN VENTURA COUNTY

This analysis evaluates long-range traffic volumes at two intersections with Telegraph Road (SR-126) in the community of Piru near the Ventura County/Los Angeles County line. The purpose is to identify potential improvements at these locations and the traffic shares attributable to the Newhall Ranch project in Los Angeles County.

ANALYSIS

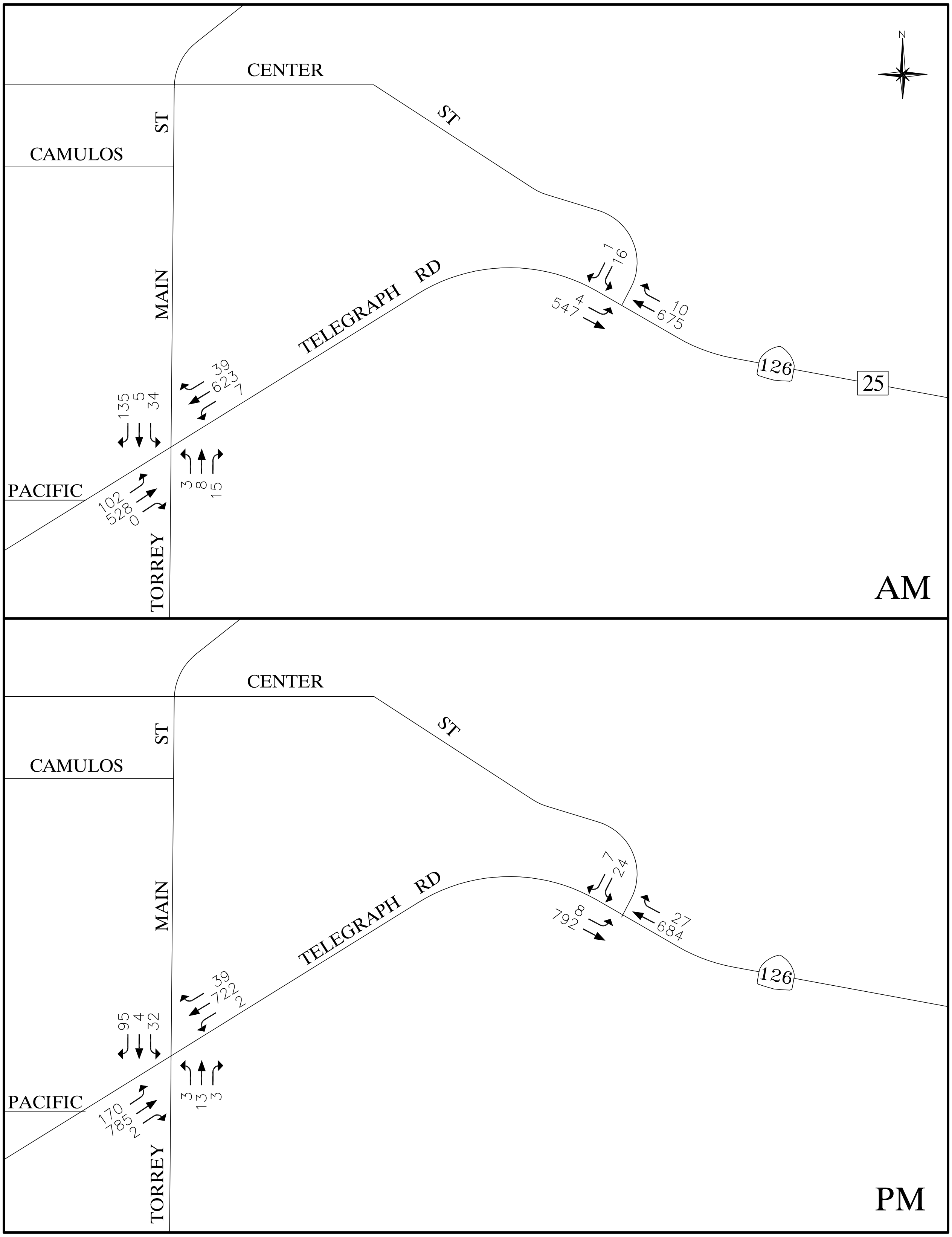
Existing peak hour turning movement volumes were collected in January 2004 at the intersections of Main Street/Torrey Road at Telegraph Road, and Center Street at Telegraph Road. These volumes and are illustrated in Figure 1. The Main Street/Torrey Road intersection is signalized while the Center Street intersection is under stop sign control. In June 2003, Caltrans collected a 24-hour volume on Telegraph Road in this vicinity of approximately 25,000 vehicles per day (shown in the top half of Figure 1).

The peak hour turning movement volumes were used to calculate intersection levels of service (LOS) using the intersection capacity utilization (ICU) methodology for the signalized intersection and Highway Capacity Manual (HCM) methodology for both the signalized and the unsignalized intersections. The results are summarized in Table 1.

Table 1: Existing LOS Summary

Intersection	AM Peak Hour	PM Peak Hour
1. Main St/Torrey Rd & Telegraph Rd		
ICU/LOS	.38 (A)	.43 (A)
Average Delay (s)/LOS	16.9 (B)	16.3 (B)
2. Center St & Telegraph Rd		
SB Approach Delay (s)/LOS	22.2 (C)	26.4 (D)

As shown here, the intersection of Main Street/Torrey Road and Telegraph Road (signalized) operates at LOS A under the ICU methodology, and LOS B under the HCM delay analysis methodology. Using the HCM delay analysis methodology for the unsignalized intersection of Center Street and Telegraph Road results in a LOS C in the AM peak hour and LOS D in the PM peak hour (note that the delay is calculated only for the southbound approach since traffic on Telegraph Road is uncontrolled).



LEGEND

792 → Peak Hour Volumes

25 Daily Volume (in 000s)

Figure 1

PEAK HOUR INTERSECTION VOLUMES
EXISTING

Long-range (2025) peak hour volumes for buildout were obtained by factoring side-street volumes to account for growth in the community of Piru (described below), and deriving thru-traffic volumes on Telegraph Road (SR-126) from the buildout version of the Ventura County Traffic Model (VCTM). The VCTM long-range volumes include Newhall Ranch Specific Plan build-out traffic.

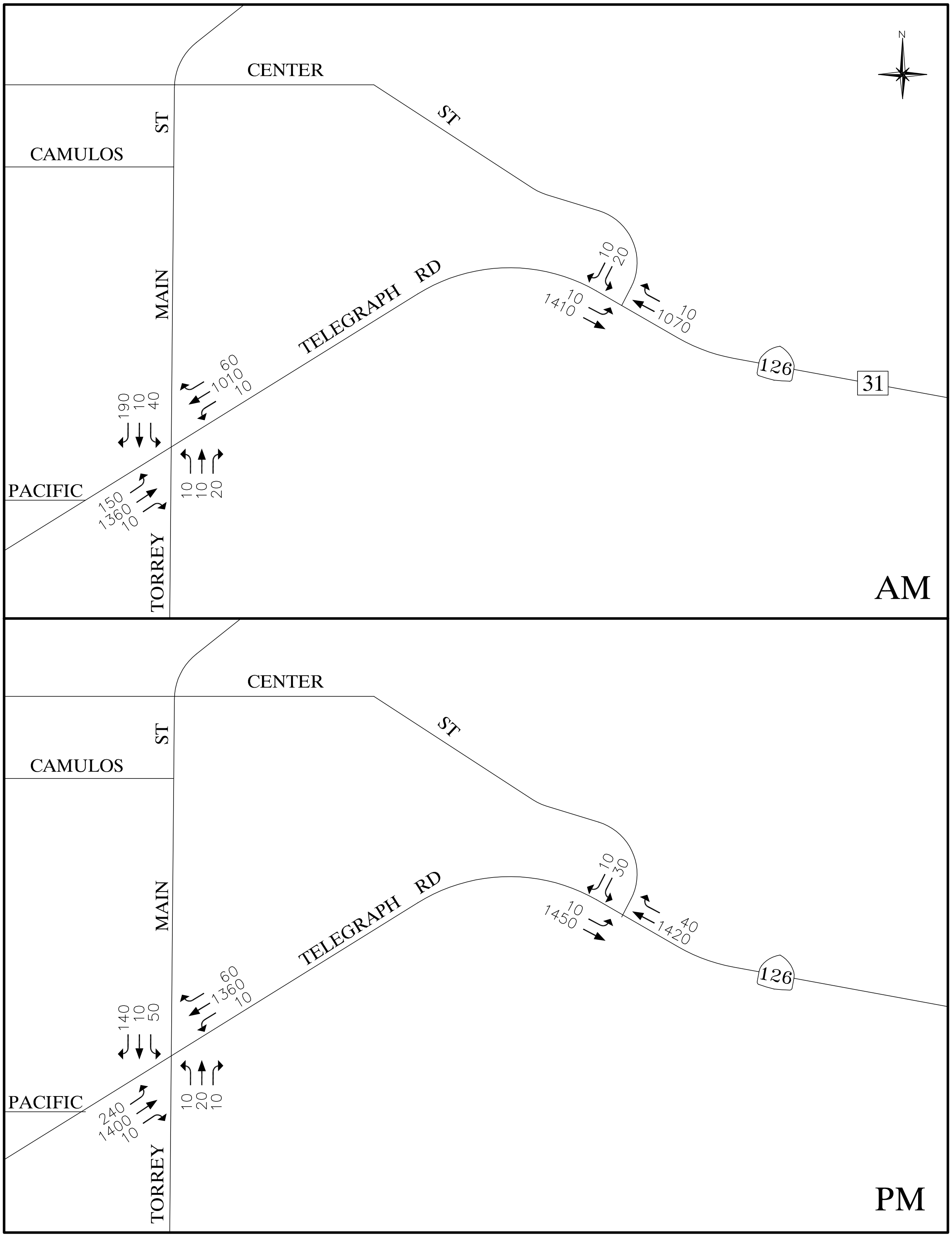
For the side-street volumes, demographic data from the VCTM was utilized. Piru is represented in the VCTM as one entire zone, and comparing existing demographic and trip generation data with buildout (Year 2020) forecasts yields a 2.6 percent annual growth rate factor. For the 16-year time period from 2004 to 2020, this translates to 42 percent growth, which was applied to the existing side-street volumes. These side-street volumes were then added to the thru volumes on Telegraph Road (SR-126) and the resulting turn movements were used to calculate buildout LOS.

Buildout peak hour intersection volumes are illustrated in Figure 2 and the corresponding levels of service are summarized in Table 2.

Table 2: Buildout LOS Summary

	Existing		**Buildout**	
Intersection	**AM**	**PM**	**AM**	**PM**
1. Main St/Torrey Rd & Telegraph Rd				
ICU/LOS	.38 (A)	.43 (A)	.60 (B)	.73 (C)
Average Delay (s)/LOS	16.9 (B)	16.3 (B)	20.6 (C)	34.6 (C)
2. Center St & Telegraph Rd				
SB Approach Delay/LOS	22.2 (C)	26.4 (D)	55.0 (F)	199.2 (F)

As shown by the ICU's under buildout conditions, the intersection of Main Street/Torrey Road at Telegraph Road will operate at LOS "B" and "C" in the AM and PM peak hours, respectively. Using the HCM delay analysis methodology produces a LOS of "C" in both the AM and PM peak hour. At the intersection of Center Street and Telegraph Road, the LOS is "F" for the southbound approach in both the AM and PM peak hours, respectively, using the HCM delay analysis methodology for unsignalized intersections.



LEGEND

792 → Peak Hour Volumes

25 Daily Volume (in 000s)

Figure 2

PEAK HOUR INTERSECTION VOLUMES
BUILDOUT

SIGNAL WARRANT

The intersection of Main Street/Torrey Road at Telegraph Road is currently signalized, and the intersection of Center Street at Telegraph Road is stop sign controlled on Center Street. Table 3 summarizes the signal warrant volumes for buildout conditions at the unsignalized intersection.

Table 3: Buildout Signal Warrant Volumes

Intersection		**AM**	**PM**
2. Center St & Telegraph Rd			
Major Approach	Eastbound	1420	1460
	Westbound	1080	1460
	Total	2500	2920
Minor Approach	Southbound	30	40
Satisfies Warrant?		No	No

As shown, the projected future peak hour traffic volumes will not meet the criteria for intersection signalization given the above forecasts of side street (Center Street) traffic. However, the volume of main street (Telegraph Road) traffic will warrant the installation of a traffic signal with just a slight increase in side street traffic. As this analysis is based upon the conceptual build-out of the Community of Piru and long-term projected future traffic levels in Ventura County, a small increase in future traffic volumes above those presently forecast would trigger the requirement that a traffic signal be installed at this location. Therefore, the future installation of a traffic signal at this intersection can be reasonably anticipated as a necessary future intersection improvement.

INTERSECTION IMPROVEMENTS

Three intersection improvements are identified here to improve safety and reduce delay at the Center Street intersection:

1. Stripe southbound leg to have separate left turn and right turn lanes.
2. Provide a westbound right turn deceleration lane.
3. Install traffic signal when warranted.

These lane improvements will reduce the stopped delay in the AM from 55.0 seconds to 52.9 and in the PM from 199.2 to 170.1 seconds. In combination, there is a 12 percent reduction in delay. The installation of a traffic signal will result in LOS A conditions for both the AM and PM peak hours, with average vehicle delays of 4.6 seconds and 5.6 seconds, respectively (see Appendix for LOS calculations).

TRAFFIC SHARES

The "*Newhall Ranch Supplemental Traffic Analysis, Ventura County Impact Analysis*" prepared in February 2001, determined the impacts of the Newhall Ranch Specific Plan on arterial roads in Ventura County. This document identified a Year 2020 ADT forecast of 31,000 on Telegraph Road (SR-126) in Piru. The Newhall Ranch contribution to this forecast was determined to be approximately 1,000 vehicles per day (vpd).

Comparing the buildout forecast of 31,000 ADT on Telegraph Road (SR-126) to the existing volume of 20,000 ADT (at the time the above referenced report was prepared), results in an increase of approximately 11,000 vpd in the future. Based on the 1,000 vpd determined to be Newhall Ranch project traffic, the project share of traffic at this location is approximately nine percent. Accordingly, the improvements noted above could be considered as a reasonable mitigation for project impacts, since they will result in a 12 percent reduction in peak hour delay with the lane improvements only, and LOS A conditions with the installation of a traffic signal.

APPENDIX

ICU AND HCM CALCULATIONS

1. Main St/Torrey Rd & Telegraph Rd

Existing (2004)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	3		3	
NBT	1	1600	8	.02	13	.01
NBR	0	0	15		3	
SBL	0	0	34		32	
SBT	1	1600	5	.11*	4	.08*
SBR	0	0	135		95	
EBL	1	1600	102	.06*	170	.11*
EBT	2	3200	528	.17	785	.25
EBR	0	0	0		2	
WBL	1	1600	7	.00	2	.00
WBT	2	3200	623	.21*	722	.24*
WBR	0	0	39		39	
TOTAL CAPACITY UTILIZATION				.38		.43

Buildout

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	10	{.01}*	10	{.01}*
NBT	1	1600	10	.03	20	.03
NBR	0	0	20		10	
SBL	0	0	40		50	
SBT	1	1600	10	.15*	10	.13*
SBR	0	0	190		140	
EBL	1	1600	150	.09	240	.15*
EBT	2	3200	1360	.43*	1400	.44
EBR	0	0	10		10	
WBL	1	1600	10	.01*	10	.01
WBT	2	3200	1010	.33	1360	.44*
WBR	0	0	60		60	
TOTAL CAPACITY UTILIZATION				.60		.73

SHORT REPORT

General Information		Site Information	
Analyst	DZ	Intersection	SR-126/Main
Agency or Co.	AFA	Area Type	All other areas
Date Performed	1/29/2004	Jurisdiction	Ventura Co. (Piru)
Time Period	AM Peak Hour	Analysis Year	2004

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	0	1	2	0	0	1	0	0	1	0
Lane group	L	TR		L	TR			LTR			LTR	
Volume (vph)	102	528	0	7	623	39	3	8	15	34	5	135
% Heavy veh	0	5	0	0	5	0	0	0	0	0	0	0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0		2.0	2.0			2.0			2.0	
Ext. eff. green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0		0	0		2	0		2	0		2
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0			0			0	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	

Phasing	Excl. Left	EB Only	Thru & RT	04	NS Perm	06	07	08
Timing	G = 7.4	G = 11.5	G = 19.1	G = 0.0	G = 10.5	G = 0.0	G = 0.0	G = 0.0
	Y =	Y = 0	Y = 5	Y =	Y = 5	Y =	Y = 0	Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 58.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adj. flow rate	113	587		8	733			26			192	
Lane group cap.	588	1814		231	1125			307			287	
v/c ratio	0.19	0.32		0.03	0.65			0.08			0.67	
Green ratio	0.33	0.53		0.13	0.33			0.18			0.18	
Unif. delay d1	14.1	7.8		22.2	16.6			19.8			22.1	
Delay factor k	0.50	0.50		0.50	0.50			0.50			0.50	
Increm. delay d2	0.7	0.5		0.3	2.9			0.5			11.7	
PF factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control delay	14.8	8.3		22.4	19.6			20.3			33.9	
Lane group LOS	B	A		C	B			C			C	
Apprch. delay	9.3			19.6			20.3			33.9		
Approach LOS	A			B			C			C		
Intersec. delay	16.9			Intersection LOS						B		

HCS2000™ Version 4.1a

SHORT REPORT

General Information		Site Information	
Analyst	DZ	Intersection	SR-126/Main
Agency or Co.	AFA	Area Type	All other areas
Date Performed	1/29/2004	Jurisdiction	Ventura Co. (Piru)
Time Period	PM Peak Hour	Analysis Year	2004

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	0	1	2	0	0	1	0	0	1	0
Lane group	L	TR		L	TR			LTR			LTR	
Volume (vph)	170	785	2	2	722	39	3	13	3	32	4	95
% Heavy veh	0	5	0	0	5	0	0	0	0	0	0	0
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0		2.0	2.0			2.0			2.0	
Ext. eff. green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0		0	0		2	0		2	0		2
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0			0			0	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	

Phasing	Excl. Left	EB Only	Thru & RT	04	NS Perm	06	07	08
Timing	G = 8.5	G = 12.4	G = 22.0	G = 0.0	G = 9.8	G = 0.0	G = 0.0	G = 0.0
	Y =	Y = 0	Y = 5	Y =	Y = 5	Y =	Y = 0	Y =
Duration of Analysis (hrs) = 0.25					Cycle Length C = 62.2			

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adj. flow rate	189	874		2	843			18			143	
Lane group cap.	607	1901		247	1210			280			246	
v/c ratio	0.31	0.46		0.01	0.70			0.06			0.58	
Green ratio	0.34	0.55		0.14	0.35			0.16			0.16	
Unif. delay d1	15.3	8.3		23.2	17.2			22.3			24.3	
Delay factor k	0.50	0.50		0.50	0.50			0.50			0.50	
Increm. delay d2	1.3	0.8		0.1	3.3			0.4			9.7	
PF factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control delay	16.6	9.1		23.2	20.6			22.8			34.0	
Lane group LOS	B	A		C	C			C			C	
Apprch. delay	10.5			20.6			22.8			34.0		
Approach LOS	B			C			C			C		
Intersec. delay	16.3			Intersection LOS						B		

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SHORT REPORT

General Information		Site Information	
Analyst	DZ	Intersection	SR-126/Main
Agency or Co.	AFA	Area Type	All other areas
Date Performed	1/29/2004	Jurisdiction	Ventura Co. (Piru)
Time Period	AM Peak Hour	Analysis Year	Buildout

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	0	1	2	0	0	1	0	0	1	0
Lane group	L	TR		L	TR			LTR			LTR	
Volume (vph)	150	1360	10	10	1010	60	10	10	20	40	10	190
% Heavy veh	0	5	0	0	5	0	0	0	0	0	0	0
PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0		2.0	2.0			2.0			2.0	
Ext. eff. green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0		0	0		2	0		2	0		2
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0			0			0	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	

Phasing	Excl. Left	EB Only	Thru & RT	04	NS Perm	06	07	08
Timing	G = 7.4	G = 11.5	G = 25.0	G = 0.0	G = 10.5	G = 0.0	G = 0.0	G = 0.0
	Y =	Y = 0	Y = 5	Y =	Y = 5	Y =	Y = 0	Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 63.9		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adj. flow rate	150	1370		10	1068			38			238	
Lane group cap.	534	1962		209	1337			264			261	
v/c ratio	0.28	0.70		0.05	0.80			0.14			0.91	
Green ratio	0.30	0.57		0.12	0.39			0.16			0.16	
Unif. delay d1	17.3	9.8		25.1	17.2			22.9			26.3	
Delay factor k	0.50	0.50		0.50	0.50			0.50			0.50	
Increm. delay d2	1.3	2.1		0.4	5.1			1.1			36.9	
PF factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control delay	18.6	11.9		25.5	22.3			24.0			63.2	
Lane group LOS	B	B		C	C			C			E	
Apprch. delay	12.5			22.3			24.0			63.2		
Approach LOS	B			C			C			E		
Intersec. delay	20.6			Intersection LOS						C		

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SHORT REPORT

General Information		Site Information	
Analyst	DZ	Intersection	SR-126/Main
Agency or Co.	AFA	Area Type	All other areas
Date Performed	1/29/2004	Jurisdiction	Ventura Co. (Piru)
Time Period	PM Peak Hour	Analysis Year	Buildout

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	0	1	2	0	0	1	0	0	1	0
Lane group	L	TR		L	TR			LTR			LTR	
Volume (vph)	240	1400	10	10	1360	60	10	20	10	50	10	140
% Heavy veh	0	5	0	0	5	0	0	0	0	0	0	0
PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Actuated (P/A)	P	P	P	P	P	P	P	P	P	P	P	P
Startup lost time	2.0	2.0		2.0	2.0			2.0			2.0	
Ext. eff. green	2.0	2.0		2.0	2.0			2.0			2.0	
Arrival type	3	3		3	3			3			3	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	
Ped/Bike/RTOR Volume	0		0	0		2	0		2	0		2
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
Parking/Grade/Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking/hr												
Bus stops/hr	0	0		0	0			0			0	
Unit Extension	3.0	3.0		3.0	3.0			3.0			3.0	

Phasing	Excl. Left	EB Only	Thru & RT	04	NS Perm	06	07	08
Timing	G = 10.5	G = 10.0	G = 35.0	G = 0.0	G = 20.0	G = 0.0	G = 0.0	G = 0.0
	Y =	Y = 0	Y = 5	Y =	Y = 5	Y =	Y = 0	Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 85.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adj. flow rate	240	1410		10	1418			38			198	
Lane group cap.	435	1819		223	1410			400			372	
v/c ratio	0.55	0.78		0.04	1.01			0.09			0.53	
Green ratio	0.24	0.53		0.12	0.41			0.24			0.24	
Unif. delay d1	28.2	16.0		32.8	25.0			25.4			28.4	
Delay factor k	0.50	0.50		0.50	0.50			0.50			0.50	
Increm. delay d2	5.0	3.3		0.4	25.3			0.5			5.4	
PF factor	1.000	1.000		1.000	1.000			1.000			1.000	
Control delay	33.2	19.3		33.2	50.3			25.9			33.8	
Lane group LOS	C	B		C	D			C			C	
Apprch. delay	21.3			50.2			25.9			33.8		
Approach LOS	C			D			C			C		
Intersec. delay	34.6			Intersection LOS						C		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	DZ	Intersection	SR-126/Center
Agency/Co.	AFA	Jurisdiction	Ventura Co. (Piru)
Date Performed	1/29/2004	Analysis Year	2004
Analysis Time Period	AM Peak Hour		

Project Description

East/West Street: *Telegraph Road (SR-126)* North/South Street: *Center Street*

Intersection Orientation: *East-West* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	4	547	0	0	675	10
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	4	607	0	0	750	11
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	0
Configuration	L	T			T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	16	0	1
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	0	0	0	17	0	1
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	1	0
Configuration					LTR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L						LTR	
v (vph)	4						18	
C (m) (vph)	860						227	
v/c	0.00						0.08	
95% queue length	0.01						0.26	
Control Delay	9.2						22.2	
LOS	A						C	
Approach Delay	--	--				22.2		
Approach LOS	--	--				C		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	DZ	Intersection	SR-126/Center
Agency/Co.	AFA	Jurisdiction	Ventura Co. (Piru)
Date Performed	1/29/2004	Analysis Year	2004
Analysis Time Period	PM Peak Hour		

Project Description

East/West Street: *Telegraph Road (SR-126)* North/South Street: *Center Street*

Intersection Orientation: *East-West* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	8	792	0	0	684	27
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	8	880	0	0	760	30
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	0
Configuration	L	T			T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	24	0	7
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	0	0	0	26	0	7
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	1	0
Configuration					LTR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L						LTR	
v (vph)	8						33	
C (m) (vph)	839						201	
v/c	0.01						0.16	
95% queue length	0.03						0.57	
Control Delay	9.3						26.4	
LOS	A						D	
Approach Delay	--	--				26.4		
Approach LOS	--	--				D		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	DZ	Intersection	SR-126/Center
Agency/Co.	AFA	Jurisdiction	Ventura Co. (Piru)
Date Performed	1/29/2004	Analysis Year	Buildout
Analysis Time Period	AM Peak Hour		

Project Description

East/West Street: Telegraph Road (SR-126) | North/South Street: Center Street

Intersection Orientation: East-West | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	1410	0	0	1070	10
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR	10	1410	0	0	1070	10
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	0
Configuration	L	T			T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	20	0	10
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR	0	0	0	20	0	10
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	1	0
Configuration					LTR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L						LTR	
v (vph)	10						30	
C (m) (vph)	653						101	
v/c	0.02						0.30	
95% queue length	0.05						1.13	
Control Delay	10.6						55.0	
LOS	B						F	
Approach Delay	--	--				55.0		
Approach LOS	--	--				F		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	DZ	Intersection	SR-126/Center
Agency/Co.	AFA	Jurisdiction	Ventura Co. (Piru)
Date Performed	1/29/2004	Analysis Year	Buildout
Analysis Time Period	PM Peak Hour		

Project Description

East/West Street: Telegraph Road (SR-126)	North/South Street: Center Street
Intersection Orientation: East-West	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	1450	0	0	1420	40
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR	10	1450	0	0	1420	40
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	0
Configuration	L	T			T	TR
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	30	0	10
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR	0	0	0	30	0	10
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	1	0
Configuration					LTR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L						LTR	
v (vph)	10						40	
C (m) (vph)	469						50	
v/c	0.02						0.80	
95% queue length	0.07						3.30	
Control Delay	12.8						199.2	
LOS	B						F	
Approach Delay	--	--				199.2		
Approach LOS	--	--				F		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	DZ	Intersection	SR-126/Center
Agency/Co.	AFA	Jurisdiction	Ventura Co. (Piru)
Date Performed	1/29/2004	Analysis Year	Buildout
Analysis Time Period	AM Peak Hour		

Project Description *Separate Left & Right Turn Lanes*

East/West Street: *Telegraph Road (SR-126)* North/South Street: *Center Street*

Intersection Orientation: *East-West* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	1410	0	0	1070	10
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR	10	1410	0	0	1070	10
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	1
Configuration	L	T			T	R
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	20	0	10
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR	0	0	0	20	0	10
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L					L		R
v (vph)	10					20		10
C (m) (vph)	653					72		495
v/c	0.02					0.28		0.02
95% queue length	0.05					1.00		0.06
Control Delay	10.6					73.2		12.4
LOS	B					F		B
Approach Delay	--	--				52.9		
Approach LOS	--	--				F		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	DZ	Intersection	SR-126/Center
Agency/Co.	AFA	Jurisdiction	Ventura Co. (Piru)
Date Performed	1/29/2004	Analysis Year	Buildout
Analysis Time Period	PM Peak Hour		

Project Description *Separate Left & Right Lanes*

East/West Street: *Telegraph Road (SR-126)* North/South Street: *Center Street*

Intersection Orientation: *East-West* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	10	1450	0	0	1420	40
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR	10	1450	0	0	1420	40
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	1
Configuration	L	T			T	R
Upstream Signal		0			0	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	30	0	10
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR	0	0	0	30	0	10
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	1	0	1
Configuration				L		R

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L					L		R
v (vph)	10					30		10
C (m) (vph)	469					40		381
v/c	0.02					0.75		0.03
95% queue length	0.07					2.79		0.08
Control Delay	12.8					221.9		14.7
LOS	B					F		B
Approach Delay	--	--				170.1		
Approach LOS	--	--				F		

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SHORT REPORT

General Information		Site Information	
Analyst	DZ	Intersection	SR-126/Center
Agency or Co.	AFA	Area Type	All other areas
Date Performed	1/29/2004	Jurisdiction	Ventura Co. (Piru)
Time Period	AM Peak Hour	Analysis Year	Buildout

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	0	0	2	1	0	0	0	1	0	1
Lane group	L	T			T	R				L	LR	R
Volume (vph)	10	1410			1070	10				20		10
% Heavy veh	0	5			5	0				0		0
PHF	1.00	1.00			1.00	1.00				1.00		1.00
Actuated (P/A)	P	P			P	P				P		P
Startup lost time	2.0	2.0			2.0	0.0				0.0	2.0	0.0
Ext. eff. green	2.0	2.0			2.0	0.0				0.0	2.0	0.0
Arrival type	3	3			3	3				3	3	3
Unit Extension	3.0	3.0			3.0	0.0				0.0	3.0	0.0
Ped/Bike/RTOR Volume				0		2	0			0		2
Lane Width	12.0	12.0			12.0	12.0				12.0	12.0	12.0
Parking/Grade/Parking	N	0	N	N	0	N	N		N	N	0	N
Parking/hr												
Bus stops/hr	0	0			0	0				0	0	0
Unit Extension	3.0	3.0			3.0	0.0				0.0	3.0	0.0

Phasing	EB Only	EW Perm	03	04	SB Only	06	07	08
Timing	G = 10.2	G = 66.0	G = 0.0	G =	G = 6.3	G = 0.0	G = 0.0	G = 0.0
	Y = 0	Y = 5	Y =	Y =	Y = 4.5	Y =	Y = 0	Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 92.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adj. flow rate	10	1410			1070	8				20	0	8
Lane group cap.	500	2853			2471	1159				124	130	111
v/c ratio	0.02	0.49			0.43	0.01				0.16	0.00	0.07
Green ratio	0.83	0.83			0.72	0.72				0.07	0.07	0.07
Unif. delay d1	2.1	2.3			5.3	3.7				40.4	39.9	40.1
Delay factor k	0.50	0.50			0.50	0.50				0.50	0.50	0.50
Increm. delay d2	0.1	0.6			0.6	0.0				2.8	0.0	1.3
PF factor	1.000	1.000			1.000	1.000				1.000	1.000	1.000
Control delay	2.2	2.9			5.9	3.7				43.1	39.9	41.4
Lane group LOS	A	A			A	A				D	D	D
Apprch. delay	2.9			5.9						42.6		
Approach LOS	A			A						D		
Intersec. delay	4.6			Intersection LOS						A		

SHORT REPORT

General Information		Site Information	
Analyst	*DZ*	Intersection	*SR-126/Center*
Agency or Co.	*AFA*	Area Type	*All other areas*
Date Performed	*1/29/2004*	Jurisdiction	*Ventura Co. (Piru)*
Time Period	*PM Peak Hour*	Analysis Year	*Buildout*

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	1	2	0	0	2	1	0	0	0	1	0	1
Lane group	L	T			T	R				L	LR	R
Volume (vph)	10	1450			1420	40				30		10
% Heavy veh	0	5			5	0				0		0
PHF	1.00	1.00			1.00	1.00				1.00		1.00
Actuated (P/A)	P	P			P	P				P		P
Startup lost time	2.0	2.0			2.0	0.0				0.0	2.0	0.0
Ext. eff. green	2.0	2.0			2.0	0.0				0.0	2.0	0.0
Arrival type	3	3			3	3				3	3	3
Unit Extension	3.0	3.0			3.0	0.0				0.0	3.0	0.0
Ped/Bike/RTOR Volume				0		2	0			0		2
Lane Width	12.0	12.0			12.0	12.0				12.0	12.0	12.0
Parking/Grade/Parking	N	0	N	N	0	N	N		N	N	0	N
Parking/hr												
Bus stops/hr	0	0			0	0				0	0	0
Unit Extension	3.0	3.0			3.0	0.0				0.0	3.0	0.0

Phasing	EB Only	EW Perm	03	04	SB Only	06	07	08
Timing	G = 10.2	G = 66.0	G = 0.0	G =	G = 6.3	G = 0.0	G = 0.0	G = 0.0
	Y = 0	Y = 5	Y =	Y =	Y = 4.5	Y =	Y = 0	Y =
Duration of Analysis (hrs) = 0.25						Cycle Length C = 92.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adj. flow rate	10	1450			1420	38				30	0	8
Lane group cap.	385	2853			2471	1159				124	130	111
v/c ratio	0.03	0.51			0.57	0.03				0.24	0.00	0.07
Green ratio	0.83	0.83			0.72	0.72				0.07	0.07	0.07
Unif. delay d1	3.3	2.3			6.3	3.8				40.6	39.9	40.1
Delay factor k	0.50	0.50			0.50	0.50				0.50	0.50	0.50
Increm. delay d2	0.1	0.7			1.0	0.1				4.6	0.0	1.3
PF factor	1.000	1.000			1.000	1.000				1.000	1.000	1.000
Control delay	3.4	3.0			7.2	3.8				45.2	39.9	41.4
Lane group LOS	A	A			A	A				D	D	D
Apprch. delay	3.0			7.1						44.4		
Approach LOS	A			A						D		
Intersec. delay	5.6			Intersection LOS						A		

NEWHALL RANCH TRAFFIC ANALYSIS
Fillmore Traffic Impacts

Prepared by:

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April 11, 2006

NEWHALL RANCH TRAFFIC ANALYSIS
Fillmore Traffic Impacts

This report examines the impacts of the Newhall Ranch development on intersections within the City of Fillmore. It is presented as supplemental information to the previous traffic impact information prepared for Ventura County.

BACKGROUND AND METHODOLOGY

The original supplemental traffic analysis for Newhall Ranch analyzed long-range traffic volume impacts on roadways in Ventura County. An average daily traffic (ADT) methodology was used, similar to that used for Los Angeles County in the original traffic study.

To identify impacts in Fillmore, it was proposed to examine peak hour volumes at individual intersections and determine the degree to which the project contributes to the capacity needs at each location. Accordingly, a condition was placed on the project that a traffic study would be carried out within the City of Fillmore and the community of Piru to fulfill this obligation. This document addresses the Fillmore intersections and the Piru locations are presented as part of a separate document.

The City of Fillmore has carried out a citywide Traffic Impact Study to determine long-range traffic needs in the City in relation to its General Plan (see Reference 1 at the end of this report). As part of that study, peak hour intersection data was prepared for the year 2020 which provided a detailed database for all the major intersections within the City. With the availability of this information a more detailed impact analysis has thereby been possible for the City of Fillmore.

The methodology used here has been to use the 2020 traffic data prepared by the City as a base and then deduct the increment of traffic anticipated as a result of the Newhall Ranch development (the City's traffic forecasts include traffic due to Newhall Ranch, and hence the Newhall Ranch impact volumes were deducted to produce the results presented here).

RESULTS

Newhall Ranch traffic through the City was estimated for the three sections of roadway that would be affected. These sections are SR-23 (A Street), and SR-126 (Ventura Street) east and west of SR-23. Table 1 summarizes these peak hour project impact volumes.

Table 1: Peak Hour Project Volumes - City of Fillmore

	AM Peak Hour			PM Peak Hour		
Location	**EB/NB**	**WB/SB**	**Total**	**EB/NB**	**WB/SB**	**Total**
Ventura Street (SR-126)						
East of A Street	25	54	79	53	35	88
West of A Street	22	49	71	48	31	79
A Street (SR-23)						
South of Ventura Street	3	5	8	5	4	9

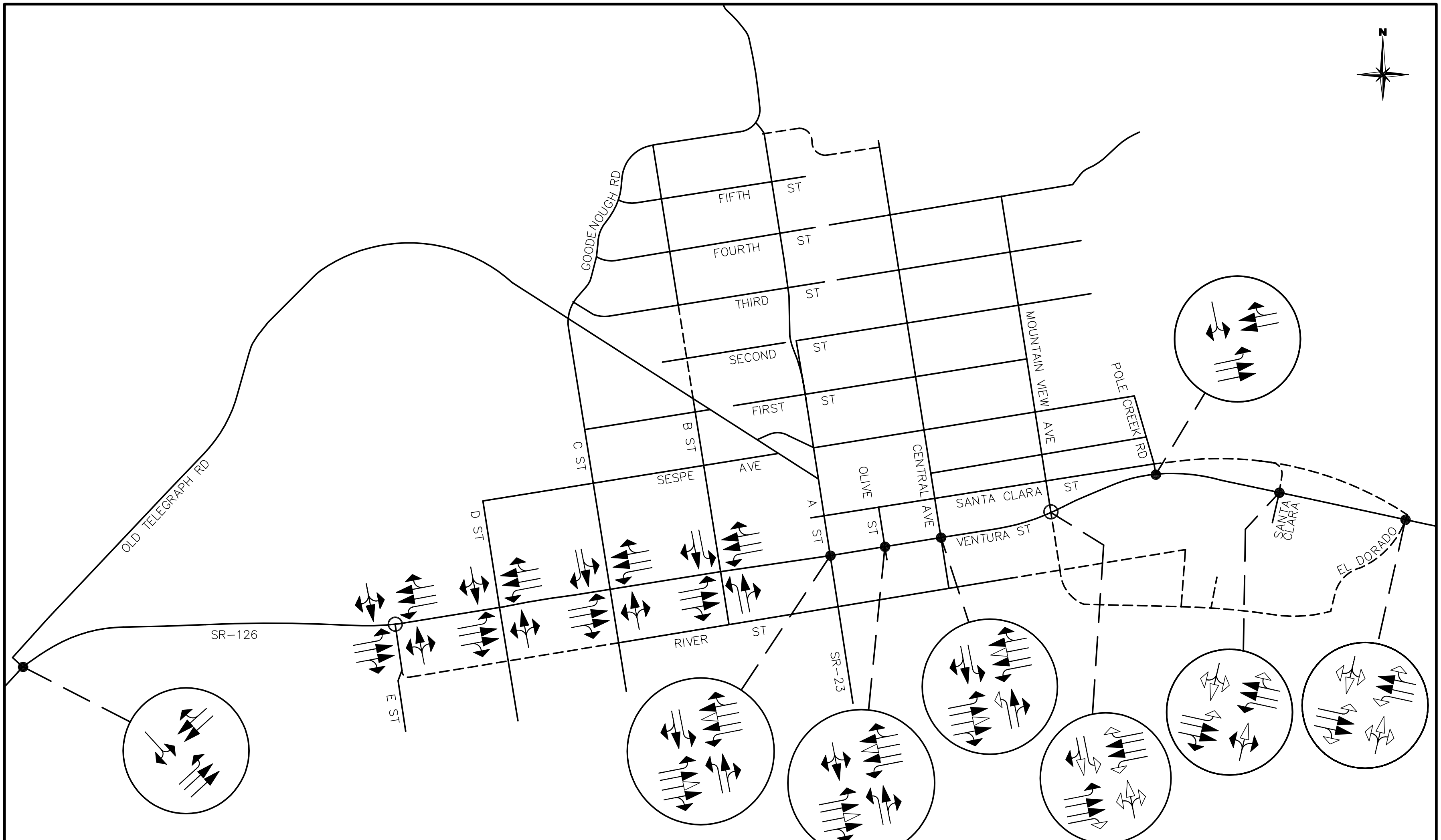
These peak hour volumes were deducted from the 2020 data for the intersections within Fillmore and the resulting volumes are used to calculate intersection capacity utilization (ICU) values. Figure 1 shows the existing intersection lane configurations together with improvements the City has identified and has proposed to be implemented as part of the City's long-range development plans.

Table 2 summarizes the ICUs and an intersection reference map can be found in Figure 2. The City of Fillmore uses the following level of service (LOS) goals for peak hour intersection performance within the City:

- LOS A through E – Ventura Street/SR-126 at A Street/SR-23 Intersection
- LOS A through D – all other SR-126 & SR-23 Intersections
- LOS A through C – all other City Roadway Intersections

In the evaluation carried out by the City, all intersections achieve the above standards with the Newhall Ranch project and with the proposed improvements.

The impact criteria applied here for the Newhall Ranch Specific Plan impacts on SR-126 intersections is the same criteria identified in the Newhall Ranch Specific Plan Program EIR for traffic impacts on state highways in Ventura County. (See, specifically, Newhall Ranch Revised Additional Analysis, Volume VIII (May 2003), Section 2.1, Table 2.1-3 [significance threshold criteria for state highways and freeways].) Under the applicable significance criteria, build-out of the Newhall Ranch Specific Plan would result in a



Source: Citywide Traffic and Circulation Impact Study, 2002

Legend

◄—	Existing Intersection Lane
◁—	Future Intersection Lane
– – – –	Future Roadway
○	Future Traffic Signal

Figure 1

INTERSECTION LANE CONFIGURATIONS
- EXISTING AND YEAR 2020 CIRCULATION
SYSTEM IMPROVEMENTS

Table 2: PM Peak Hour ICU Values - City of Fillmore

	PM Peak Hour (with Planned Improvements)				
	Without Project		With Project		
Intersection	**ICU**	**LOS**	**ICU**	**LOS**	**Difference**
1. Old Telegraph & SR-126	.47	A	.48	A	.01
2. E Street & Ventura Street (SR-126)	.66	B	.68	B	.02*
3. D Street & Ventura Street (SR-126)	.78	C	.80	C	.02
4. C Street & Ventura Street (SR-126)	.75	C	.76	C	.01
5. B Street & Ventura Street (SR-126)	.83	D	.85	D	.02
6. A Street & Ventura Street (SR-126)	.88	D	.89	D	.01
7. Olive Street & Ventura Street (SR-126)	.61	B	.62	B	.01
8. Central & Ventura Street (SR-126)	.86	D	.86	D	.00
9. Mountain View Street & Ventura Street (SR-126)	.68	B	.69	B	.01
10. Pole Creek Road & Ventura Street (SR-126)	.50	A	.52	A	.02
11. Santa Clara Street & Ventura Street (SR-126)	.71	C	.72	C	.01
12. El Dorado Road & Ventura Street (SR-126)	.78	C	.80	C	.02*

*Project Impact (ICU increment > .01 and the additional traffic results in deficient conditions without improvements)

Level of service ranges: .00 - .60 A; .61 - .70 B; .71 - .80 C; .81 - .90 D; .91 – 1.00 E; Above 1.00 F

Legend

● Intersection Location

Figure 2

INTERSECTION LOCATIONS

significant impact if the addition of project traffic increases the ICU by more than .01, and the additional traffic results in deficient conditions.

As shown on Table 2, build-out of the Specific Plan would result in ICU increases greater than .01 at five of the SR-126 intersections in the City. However, the additional traffic would not result in deficient conditions at all of these intersections. Based on the Citywide Traffic and Circulation Impact Study, roadway improvements, indicative of deficient conditions, are proposed to maintain acceptable LOS conditions in the year 2020 at two of the five intersections. By reference to Table 2 and Figure 1, the two deficient intersections, and the improvements proposed for each, are:

Intersection No. 2	E Street & Ventura Street (SR-126) [add a traffic signal]; and,
Intersection No. 12	El Dorado Road & Ventura Street [add left turn lane on SR-126 westbound, add left turn lane on SR-126 eastbound, add a new southbound intersecting road, add a new northbound intersecting road].

It should be noted that the roadway improvements proposed to create the intersection of El Dorado and Ventura Street are necessary, in part, due to the construction of new roadways that will intersect with SR-126 and are not required to maintain acceptable LOS conditions due solely to projected increases in future traffic volumes on SR-126.

REFERENCES

1. "Citywide Traffic and Circulation Impact Study prepared for City of Fillmore," Willdan, August 2002.

APPENDIX
INTERSECTION CAPACITY UTILIZATION WORKSHEETS

1. Telegraph & SR-126

Long Range 2020 Without Project

	LANES	CAPACITY			PM PK HOUR VOL	V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	0		1	
SBT	1	1600	0	.00*	0	.06*
SBR	0	0	0		95	
EBL	1	1600	0	.00	91	.06*
EBT	2	3200	0	.00	1224	.38
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	0	.00*	1123	.35*
WBR	0	0	0		9	

TOTAL CAPACITY UTILIZATION .00 .47

Long Range 2020 With Project

	LANES	CAPACITY			PM PK HOUR VOL	V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	0		1	
SBT	1	1600	0	.00*	0	.06*
SBR	0	0	0		95	
EBL	1	1600	0	.00	91	.06*
EBT	2	3200	0	.00	1272	.40
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	0	.00*	1154	.36*
WBR	0	0	0		9	

TOTAL CAPACITY UTILIZATION .00 .48

2. E St & Ventura St

Long Range 2020 Without Project

	LANES	CAPACITY			PM PK HOUR VOL	V/C
NBL	0	0	0		66	
NBT	1	1600	0	.00	189	.25*
NBR	0	0	0		143	
SBL	0	0	0		7	
SBT	1	1600	0	.00*	114	.08
SBR	0	0	0		3	
EBL	1	1600	0	.00	0	.00
EBT	2	3200	0	.00	1186	.38*
EBR	0	0	0		39	
WBL	1	1600	0	.00	41	.03*
WBT	2	3200	0	.00*	1063	.34
WBR	0	0	0		10	

TOTAL CAPACITY UTILIZATION .00 .66

Long Range 2020 With Project

	LANES	CAPACITY			PM PK HOUR VOL	V/C
NBL	0	0	0		66	
NBT	1	1600	0	.00	189	.25*
NBR	0	0	0		143	
SBL	0	0	0		7	
SBT	1	1600	0	.00*	114	.08
SBR	0	0	0		3	
EBL	1	1600	0	.00	0	.00
EBT	2	3200	0	.00	1234	.40*
EBR	0	0	0		39	
WBL	1	1600	0	.00	41	.03*
WBT	2	3200	0	.00*	1094	.35
WBR	0	0	0		10	

TOTAL CAPACITY UTILIZATION .00 .68

3. D St & Ventura St

Long Range 2020 Without Project

	LANES	CAPACITY			PM PK HOUR VOL	V/C
NBL	0	0	0		31	
NBT	1	1600	0	.00	100	.22*
NBR	0	0	0		219	
SBL	0	0	0		11	{.01}*
SBT	1	1600	0	.00*	78	.07
SBR	0	0	0		16	
EBL	1	1600	0	.00	30	.02
EBT	2	3200	0	.00	1635	.51*
EBR	0	0	0		9	
WBL	1	1600	0	.00	68	.04*
WBT	2	3200	0	.00*	1312	.42
WBR	0	0	0		18	

TOTAL CAPACITY UTILIZATION .00 .78

Long Range 2020 With Project

	LANES	CAPACITY			PM PK HOUR VOL	V/C
NBL	0	0	0		31	
NBT	1	1600	0	.00	100	.22*
NBR	0	0	0		219	
SBL	0	0	0		11	{.01}*
SBT	1	1600	0	.00*	78	.07
SBR	0	0	0		16	
EBL	1	1600	0	.00	30	.02
EBT	2	3200	0	.00	1683	.53*
EBR	0	0	0		9	
WBL	1	1600	0	.00	68	.04*
WBT	2	3200	0	.00*	1343	.43
WBR	0	0	0		18	

TOTAL CAPACITY UTILIZATION .00 .80

4. C St & Ventura St

Long Range 2020 Without Project

	LANES	CAPACITY			PM PK HOUR VOL	V/C
NBL	0	0	0		28	{.02}*
NBT	1	1600	0	.00	47	.05
NBR	0	0	0		9	
SBL	0	0	0		104	
SBT	1	1600	0	.00*	33	.09*
SBR	1	1600	0	.00	58	.04
EBL	1	1600	0	.00	148	.09*
EBT	2	3200	0	.00	1857	.59
EBR	0	0	0		26	
WBL	1	1600	0	.00	11	.01
WBT	2	3200	0	.00*	1635	.55*
WBR	0	0	0		116	

TOTAL CAPACITY UTILIZATION .00 .75

Long Range 2020 With Project

	LANES	CAPACITY			PM PK HOUR VOL	V/C
NBL	0	0	0		28	{.02}*
NBT	1	1600	0	.00	47	.05
NBR	0	0	0		9	
SBL	0	0	0		104	
SBT	1	1600	0	.00*	33	.09*
SBR	1	1600	0	.00	58	.04
EBL	1	1600	0	.00	148	.09*
EBT	2	3200	0	.00	1905	.60
EBR	0	0	0		26	
WBL	1	1600	0	.00	11	.01
WBT	2	3200	0	.00*	1666	.56*
WBR	0	0	0		116	

TOTAL CAPACITY UTILIZATION .00 .76

5. B St & Ventura St

Long Range 2020 Without Project

	LANES	CAPACITY			PM PK HOUR VOL	V/C
NBL	1	1600	0	.00	37	.02
NBT	1	1600	0	.00	161	.14*
NBR	0	0	0		67	
SBL	1	1600	0	.00	62	.04*
SBT	1	1600	0	.00*	72	.11
SBR	0	0	0		102	
EBL	1	1600	0	.00	199	.12
EBT	2	3200	0	.00	1956	.62*
EBR	0	0	0		32	
WBL	1	1600	0	.00	47	.03*
WBT	2	3200	0	.00*	1531	.51
WBR	0	0	0		97	

TOTAL CAPACITY UTILIZATION .00 .83

Long Range 2020 With Project

	LANES	CAPACITY			PM PK HOUR VOL	V/C
NBL	1	1600	0	.00	37	.02
NBT	1	1600	0	.00	161	.14*
NBR	0	0	0		67	
SBL	1	1600	0	.00	62	.04*
SBT	1	1600	0	.00*	72	.11
SBR	0	0	0		102	
EBL	1	1600	0	.00	199	.12
EBT	2	3200	0	.00	2004	.64*
EBR	0	0	0		32	
WBL	1	1600	0	.00	47	.03*
WBT	2	3200	0	.00*	1562	.52
WBR	0	0	0		97	

TOTAL CAPACITY UTILIZATION .00 .85

6. A St & Ventura St

Long Range 2020 Without Project

	LANES	CAPACITY			PM PK HOUR VOL	V/C
NBL	1	1600	0	.00	173	.11
NBT	1	1600	0	.00	363	.32*
NBR	0	0	0		146	
SBL	1	1600	0	.00	139	.09*
SBT	1	1600	0	.00*	267	.26
SBR	0	0	0		156	
EBL	1	1600	0	.00	211	.13
EBT	3	4800	0	.00	1679	.38*
EBR	0	0	0		168	
WBL	1	1600	0	.00	141	.09*
WBT	3	4800	0	.00*	1311	.32
WBR	0	0	0		215	

TOTAL CAPACITY UTILIZATION .00 .88

Long Range 2020 With Project

	LANES	CAPACITY			PM PK HOUR VOL	V/C
NBL	1	1600	0	.00	173	.11
NBT	1	1600	0	.00	363	.32*
NBR	0	0	0		151	
SBL	1	1600	0	.00	139	.09*
SBT	1	1600	0	.00*	267	.26
SBR	0	0	0		156	
EBL	1	1600	0	.00	211	.13
EBT	3	4800	0	.00	1727	.39*
EBR	0	0	0		168	
WBL	1	1600	0	.00	145	.09*
WBT	3	4800	0	.00*	1342	.32
WBR	0	0	0		215	

TOTAL CAPACITY UTILIZATION .00 .89

7. Olive & Ventura St

Long Range 2020 Without Project

					PM PK HOUR	
	LANES	CAPACITY			VOL	V/C
NBL	1	1600	0	.00	112	.07
NBT	1	1600	0	.00	21	.10*
NBR	0	0	0		135	
SBL	0	0	0		5	
SBT	1	1600	0	.00*	21	.02
SBR	0	0	0		12	
EBL	1	1600	0	.00	11	.01
EBT	3	4800	0	.00	1839	.41*
EBR	0	0	0		114	
WBL	1	1600	0	.00	155	.10*
WBT	3	4800	0	.00*	1544	.33
WBR	0	0	0		17	

TOTAL CAPACITY UTILIZATION .00 .61

Long Range 2020 With Project

					PM PK HOUR	
	LANES	CAPACITY			VOL	V/C
NBL	1	1600	0	.00	112	.07
NBT	1	1600	0	.00	21	.10*
NBR	0	0	0		135	
SBL	0	0	0		5	
SBT	1	1600	0	.00*	21	.02
SBR	0	0	0		12	
EBL	1	1600	0	.00	11	.01
EBT	3	4800	0	.00	1892	.42*
EBR	0	0	0		114	
WBL	1	1600	0	.00	155	.10*
WBT	3	4800	0	.00*	1579	.33
WBR	0	0	0		17	

TOTAL CAPACITY UTILIZATION .00 .62

8. Central Ave & Ventura St

Long Range 2020 Without Project

					PM PK HOUR	
	LANES	CAPACITY			VOL	V/C
NBL	1	1600	0	.00	45	.03*
NBT	1	1600	0	.00	173	.17
NBR	0	0	0		106	
SBL	1	1600	0	.00	62	.04
SBT	1	1600	0	.00*	148	.29*
SBR	0	0	0		312	
EBL	1	1600	0	.00	389	.24*
EBT	3	4800	0	.00	1552	.33
EBR	0	0	0		38	
WBL	1	1600	0	.00	59	.04
WBT	3	4800	0	.00*	1359	.30*
WBR	0	0	0		68	

TOTAL CAPACITY UTILIZATION .00 .86

Long Range 2020 With Project

					PM PK HOUR	
	LANES	CAPACITY			VOL	V/C
NBL	1	1600	0	.00	45	.03*
NBT	1	1600	0	.00	173	.17
NBR	0	0	0		106	
SBL	1	1600	0	.00	62	.04
SBT	1	1600	0	.00*	148	.29*
SBR	0	0	0		312	
EBL	1	1600	0	.00	389	.24*
EBT	3	4800	0	.00	1605	.34
EBR	0	0	0		38	
WBL	1	1600	0	.00	59	.04
WBT	3	4800	0	.00*	1394	.30*
WBR	0	0	0		68	

TOTAL CAPACITY UTILIZATION .00 .86

9. Mountainview St & Ventura St

Long Range 2020 Without Project

	LANES	CAPACITY			PM PK HOUR VOL	V/C
NBL	0	0	0		16	{.01}*
NBT	1	1600	0	.00	49	.04
NBR	0	0	0		3	
SBL	1	1600	0	.00	63	.04
SBT	1	1600	0	.00*	48	.13*
SBR	0	0	0		155	
EBL	1	1600	0	.00	186	.12*
EBT	2	3200	0	.00	1494	.47
EBR	1	1600	0	.00	27	.02
WBL	1	1600	0	.00	6	.00
WBT	2	3200	0	.00*	1331	.42*
WBR	1	1600	0	.00	58	.04

TOTAL CAPACITY UTILIZATION .00 .68

Long Range 2020 With Project

	LANES	CAPACITY			PM PK HOUR VOL	V/C
NBL	0	0	0		16	{.01}*
NBT	1	1600	0	.00	49	.04
NBR	0	0	0		3	
SBL	1	1600	0	.00	63	.04
SBT	1	1600	0	.00*	48	.13*
SBR	0	0	0		155	
EBL	1	1600	0	.00	186	.12*
EBT	2	3200	0	.00	1547	.48
EBR	1	1600	0	.00	27	.02
WBL	1	1600	0	.00	6	.00
WBT	2	3200	0	.00*	1366	.43*
WBR	1	1600	0	.00	58	.04

TOTAL CAPACITY UTILIZATION .00 .69

10. Pole Creek & Ventura St

Long Range 2020 Without Project

	LANES	CAPACITY			PM PK HOUR VOL	V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	0		14	
SBT	1	1600	0	.00*	0	.02*
SBR	0	0	0		17	
EBL	1	1600	0	.00	16	.01
EBT	2	3200	0	.00	1544	.48*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	0	.00*	1378	.44
WBR	0	0	0		38	

TOTAL CAPACITY UTILIZATION .00 .50

Long Range 2020 With Project

	LANES	CAPACITY			PM PK HOUR VOL	V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	0		14	
SBT	1	1600	0	.00*	0	.02*
SBR	0	0	0		17	
EBL	1	1600	0	.00	16	.01
EBT	2	3200	0	.00	1597	.50*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	0	.00*	1413	.45
WBR	0	0	0		38	

TOTAL CAPACITY UTILIZATION .00 .52

11. Santa Clara & Ventura St

Long Range 2020 Without Project

	LANES	CAPACITY			PM PK HOUR VOL	V/C
NBL	0	0	0		60	{.04}*
NBT	1	1600	0	.00	25	.10
NBR	0	0	0		80	
SBL	0	0	0		109	
SBT	1	1600	0	.00*	25	.16*
SBR	0	0	0		125	
EBL	1	1600	0	.00	123	.08*
EBT	2	3200	0	.00	1323	.45
EBR	0	0	0		112	
WBL	1	1600	0	.00	56	.04
WBT	2	3200	0	.00*	1231	.43*
WBR	0	0	0		132	

TOTAL CAPACITY UTILIZATION .00 .71

Long Range 2020 With Project

	LANES	CAPACITY			PM PK HOUR VOL	V/C
NBL	0	0	0		60	{.04}*
NBT	1	1600	0	.00	25	.10
NBR	0	0	0		80	
SBL	0	0	0		109	
SBT	1	1600	0	.00*	25	.16*
SBR	0	0	0		125	
EBL	1	1600	0	.00	123	.08*
EBT	2	3200	0	.00	1376	.47
EBR	0	0	0		112	
WBL	1	1600	0	.00	56	.04
WBT	2	3200	0	.00*	1266	.44*
WBR	0	0	0		132	

TOTAL CAPACITY UTILIZATION .00 .72

12. El Dorado Rd & Ventura St

Long Range 2020 Without Project

	LANES	CAPACITY			PM PK HOUR VOL	V/C
NBL	0	0	0		144	
NBT	1	1600	0	.00	50	.16*
NBR	0	0	0		57	
SBL	0	0	0		125	{.08}*
SBT	1	1600	0	.00*	50	.13
SBR	0	0	0		25	
EBL	1	1600	0	.00	25	.02
EBT	2	3200	0	.00	1297	.46*
EBR	0	0	0		190	
WBL	1	1600	0	.00	125	.08*
WBT	2	3200	0	.00*	1250	.40
WBR	0	0	0		14	

TOTAL CAPACITY UTILIZATION .00 .78

Long Range 2020 With Project

	LANES	CAPACITY			PM PK HOUR VOL	V/C
NBL	0	0	0		144	
NBT	1	1600	0	.00	50	.16*
NBR	0	0	0		57	
SBL	0	0	0		125	{.08}*
SBT	1	1600	0	.00*	50	.13
SBR	0	0	0		25	
EBL	1	1600	0	.00	25	.02
EBT	2	3200	0	.00	1350	.48*
EBR	0	0	0		190	
WBL	1	1600	0	.00	125	.08*
WBT	2	3200	0	.00*	1285	.41
WBR	0	0	0		14	

TOTAL CAPACITY UTILIZATION .00 .80

8. I-5 NB Ramps & SR-126

Existing Conditions (2006 Post-Construction)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	3	4320	1061	.25*	638	.15*
NBT	0	0	0		0	
NBR	1	1600	231	.14	50	.03
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	4	6400	425	.07	514	.08*
EBR	f		73		189	
WBL	0	0	0		0	
WBT	3	4800	363	.08*	311	.06
WBR	f		145		334	
Clearance Interval				.10*		.10*
TOTAL CAPACITY UTILIZATION				**.43**		**.33**

MEMORANDUM

TO: Susan Tebo, Impact Sciences

FROM: Daryl Zerfass, P.E.

DATE: August 8, 2006

SUBJECT: **LANDMARK VILLAGE FIRE STATION**

A County fire station is currently being proposed for a location within the Landmark Village project site. The station will be 11,000 square feet on a 1.25 acre (net) building pad. The fire station will be in place of 11,000 square feet of what would otherwise be a commercial use.

The purpose of this memorandum is to compare the traffic generation of the fire station to what the Landmark Village traffic impact study assumed to be 11,000 square feet of commercial uses.

Based on information provided by the County Fire District, the proposed fire station will typically generate less than 75 average daily trips (ADT). By comparison, an 11,000 square foot commercial building would generate approximately 936 ADT with retail uses or approximately 127 ADT with office uses.

Unlike retail uses which experience a peak trip generation during the critical PM peak hour and office uses which experience peak trip generation during both the AM and PM peak hours, the fire station will generate trips throughout the day without a specific peak time. Therefore, the fire station will result in less of a traffic impact on both a daily trip basis as well as during the critical AM and PM peak hours.

Cc: Glenn Adamick, Newhall Land

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