DRAFT
JURISDICTIONAL DELINEATION
OF AREAS SUBJECT TO THE JURISDICTION OF
THE CALIFORNIA DEPARTMENT OF FISH AND GAME

PURSUANT TO
SECTION 1600 OF THE FISH AND GAME CODE

PREPARED FOR:

RANCHO MISSION VIEJO
P.O. BOX 9
SAN JUAN CAPISTRANO
CALIFORNIA 92639
CONTACT: LAURA COLEY EISENBERG
(949) 240-3363

PREPARED BY:

GLENN LUKOS ASSOCIATES
29 ORCHARD
LAKE FOREST, CALIFORNIA
CONTACT: TONY BOMKAMP OR INGRID CHLUP
(949) 837-0404

January 5, 2004

INTRODUCTION

Federal, state and local agencies, in cooperation with local landowners are currently engaged in a comprehensive land use and natural resource planning process for the San Juan Creek and western San Mateo Creek watersheds within southern Orange County. This comprehensive planning process includes preparation of a Special Area Management Plan/Master Streambed Alteration Agreement (SAMP/MSAA). In support of the SAMP/MSAA, the U.S. Army Corps of Engineers conducted a landscape level delineation, to identify areas of potential Corps and CDFG jurisdiction along with the mapping of areas of potential wetlands and riparian habitat within the SAMP/MSAA study area.[1]

In addition to the planning level delineation, Regulatory Specialists from Glenn Lukos Associates (GLA) conducted a project level jurisdictional delineation between October 29, 2002 and November 5, 2003 to identify and quantify the extent of areas subject to the jurisdiction of the (1) U.S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act and (2) the California Department of Fish and Game pursuant to Section 1600 of the Fish and Game Code. Appendix A includes a list of specific field dates. A total of nine planning areas were evaluated with the maximum potential limits of each planning area subject to the project-level delineation. In addition, all major roadway alignments not included within the nine planning areas were also examined.

METHODOLOGY

Prior to beginning the field delineation a 200-scale color aerial photograph, a 200-scale topographic base map of the property, and the USGS topographic maps Cañada Gobernadora (dated 1968, photo revised in 1988), San Clemente (dated 1968 and photo revised in 1975) and San Juan Capistrano (dated 1968 and photo revised in 1981) were examined to determine the locations of potential areas of Corps/CDFG jurisdiction. Prior to completing the jurisdictional delineation, GLA was provided a copy of a planning level delineation prepared by the Corps in September of 2000. All areas identified as potentially jurisdictional in the planning level delineation were evaluated for Corps and CDFG jurisdiction. All suspected jurisdictional areas were field checked for the presence of definable channels and/or wetland vegetation, soils and hydrology. Suspected wetland habitats on the site were evaluated using the methodology set forth in the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual[2] (Wetland Manual). While in the field the jurisdictional area was recorded onto a 200-scale color aerial photograph using visible landmarks. Other data were recorded onto wetland data sheets.

Beginning on March 11, 2003, Regulatory Specialists from GLA; a representative of Rancho Mission Viejo; representatives of the Corps including Mr. Russell Kaiser, Ms. Corice Farrar, and

---

[1] Lichvar, R., G. Gustina, D. MacDonald, and M. Ericsson. 2000. Planning Level Delineation and Geospatial Characterization of Riparian Ecosystems of San Diego Creek Watershed, Orange County California. Prepared for the U.S. Army Corps of Engineers, Engineering and Research Development Center (ERDC) Cold Regions Research and Engineering Laboratory (CRREL), Hanover N.H. September 2000.
[2] Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, U.S. Army Engineer Waterways Experimental Station, Vicksburg, Mississippi.

Mr. Rob Lawrence; and representatives of CDFG including Mr. Don Chadwick, Mr. Bradley Henderson, and Ms. Donna Cobb conducted a field verification of the project level delineation. Prior to beginning the field-level verification, the Corps representative Mr. Kaiser noted that the Corps would generally assert jurisdiction over drainages that conduct flows during 10-year storm events or less, and that drainages that do not conduct flows during 10-year events are not considered as waters of the United States. Following the initial site visits in early March, the area experienced a rainfall event on March 15, 2003 that averaged over five inches over most of the study area, corresponding very closely with a 10-year event. The 10-year storm event resulted in clear discharge in many of the drainages evaluated, including presence of litter and debris (e.g., oak leaves or other plant materials), sediment deposits, and destruction of terrestrial vegetation (through scouring or buried by sediments). However, many of the features failed to exhibit any signs of discharge. The 10-year storm event recorded on March 15, in at least some instances allowed for determination of (1) presence of a streambed that exhibits flowing water, and where present (2) the lateral extent of the streambed and/or associated aquatic resources.

The field verification was completed on October 27, 2003 with the exception of specific areas to be addressed during a field review scheduled for xx, 2003 with senior staff from the CDFG. Appendix A includes a list of specific field dates. During the field verification, all areas identified in the Lichevar (2000) planning level delineation as well as by GLA in the project level delineation were examined. The results of the field verification are incorporated into this document. The jurisdictional status of a few aquatic features remain unresolved and these areas are fully described in this report including discussions as to why certain specific features are not subject to CDFG jurisdiction. In all instances, the reason for excluding areas from CDFG jurisdiction is because the features are components of ongoing mining operations. Two of the areas are mining pits subject to reclamation plans that will be filled and graded during reclamation. The other feature is an artificial tailings pond that is artificially filled with wash water and tailings-laden water directly associated with mining operations. With cessation of the mining operations, this feature will quickly dry out and would not exhibit characteristics of a lake which currently are associated with this feature due to addition of well water. Those features or areas for which CDFG and Rancho Mission Viejo (RMV) concur relative to the jurisdictional status are referred to a “Resolved Areas” in this document. Features or areas for which CDFG and RMV have not reached concurrence relative to their jurisdictional status are referred to as “Unresolved Areas”.

SUMMARY OF RESULTS

A total of nine potential development areas or “bubbles” were evaluated plus areas subject to potential impacts associated with major arterials that connect the potential development bubbles. Total CDFG jurisdiction identified within the potential development areas and the potential arterial right-of-ways, which are Resolved Areas, is 398.14 acres of which 368.40 acres consist of vegetated riparian habitat. Table 1 summarizes the jurisdictional totals by planning area. An additional 91.70 acres have been evaluated in the field, including 55.88 acres of vegetated riparian habitat, for which RMV and CDFG have not reached concurrence relative to their jurisdictional status. Table 2 summarizes the unresolved totals by planning area. As noted above, these Unresolved Areas are discussed in detail in this report; whereas, Resolved Areas are summarized only and included in tabular form by drainage according to planning area. **It is the**

opinion of GLA that all of the Unresolved Areas are features that will not meet the definition of a streambed or lake under the Fish and Game Code at the time of project implementation.

TABLE 1: Study Area Jurisdictional Totals for Resolved Features

Planning Area	Riparian Vegetation[1]	Unvegetated Streambed[2]	Total CDFG[3]
Ortega Gateway	3.07	0.71	3.78
Chiquita	41.66	0.55	42.21
Gobernadora	49.46	4.87	54.33
East Ortega	44.49	3.48	47.97
Trampas	26.06	4.29	30.35
Cristianitos Meadows	9.54	0.32	9.86
Cristianitos Canyon	15.87	5.81	21.68
TRW	23.13	4.26	27.39
O'Neill Ranch	31.69	4.47	36.16
Road Gaps	123.43	0.98	124.41
Totals[4]	**368.40**	**29.74**	**398.14**

[1] Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[2] Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[3] Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

[4] These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

TABLE 2: Study Area Non-jurisdictional Totals (Unresolved Features[1])

Planning Area	Riparian Vegetation (acres)	Unvegetated Streambed (acres)	Total Acreage
Ortega Gateway	0.00	0.00	0.00
Chiquita	0.00	0.00	0.00
Gobernadora	0.00	0.00	0.00
East Ortega	0.00	0.00	0.00
Trampas	55.74	34.77	90.51
Cristianitos Meadows	0.00	0.00	0.00
Cristianitos Canyon	0.14	1.05	1.19
TRW	0.00	0.00	0.00
O'Neill Ranch	0.00	0.00	0.00
Road Gaps	0.00	0.00	0.00
Totals	**55.88**	**35.82**	**91.70**

[1]These features consist of proposed non-jurisdictional features that have been field verified but for which CDFG has not yet made a determination regarding regulatory status.

PLANNING AREA 1 (ORTEGA GATEWAY)

Planning Area 1 is located near the western edge of the study area immediately west of Antonio Parkway and includes areas on both sides of Ortega Highway. Much of the area encompassed by the Ortega Gateway area has been previously developed or under long-term agriculture. RMV and CDFG have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables below and all features in this planning area are considered Resolved Areas. CDFG jurisdiction in Planning Area 1 totals approximately 3.78 acres of which 3.07 acres consist of vegetated riparian habitat.

TABLE 3: Ortega Gateway Jurisdictional Totals (Resolved Areas)

Feature Name	Riparian Vegetation[1]	Unvegetated Streambed[2]	Total CDFG[3]
San Juan Creek	0.75	0.00	0.75
1-1	0.12	0.00	0.12
1-2	0.00	0.03	0.03
1-3	0.09	0.02	0.11
1-4	0.00	0.08	0.08
1-5	0.00	0.02	0.02
1-6	0.04	0.20	0.24
1-7	0.21	0.00	0.21
1-8	0.00	0.03	0.03
1-9	0.10	0.08	0.18
1-10	0.00	0.01	0.01
1-11	0.03	0.01	0.04
1-12	1.73	0.23	1.96
Totals[4]	**3.07**	**0.71**	**3.78**

[1] Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[2] Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[3] Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

[4] These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

TABLE 4: Ortega Gateway Non-jurisdictional Totals (Resolved Areas[1])

Feature Name	Vegetated (acres)	Unvegetated (acres)	Total Acreage
Isolated nursery pond	0.00	0.12	0.12
Nursery Ponds	0.00	0.03	0.03
Totals	**0.00**	**0.15**	**0.15**

[1] These features have been field verified and CDFG concurs they are not subject to regulation pursuant to Section 1603 of the Fish and Game Code.

PLANNING AREA 2 (CHIQUITA CANYON)

Planning Area 2 is located at the northwestern corner of the study area immediately west of Antonio Parkway and north of San Juan Creek. The planning area consists of a main canyon (Chiquita Canyon), which generally traverses the western one-third to one-quarter of the study area. The extreme western portion of the study area includes east-facing slopes that drain toward Chiquita Creek, a prominent aquatic feature/drainage that occupies the bottom of this broad canyon. Chiquita Creek supports a mosaic of wetland types including areas of southern arroyo willow riparian forest, alkali marsh, freshwater marsh, and alkali meadow. The area east of Chiquita Creek consists of a series of northeast-to-southwest trending side canyons alternating with gentle hills. Many of the side canyons are broad features that exhibit low gradients and have been subject to decades of farming, consisting mostly of winter barley or orchards (lemons and avocados). RMV and CDFG have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables below and all features in this planning area are considered Resolved Areas.

CDFG jurisdiction in Planning Area 2 totals approximately 42.21 acres of which 41.66 acres consist of vegetated riparian habitat. A number of the side canyons do not contain drainages that exhibit a bed or bank.

TABLE 5: Chiquita Jurisdictional Totals (Resolved Areas)

Feature Name	Riparian Vegetation[1]	Unvegetated Streambed[2]	Total CDFG[3]
Chiquita	29.88	0.00	29.88
2-1	0.39	0.04	0.43
2-2	0.24	0.01	0.25
2-3	0.24	0.00	0.24
2-4	0.48	0.02	0.50
2-5	1.70	0.00	1.70
2-6	0.83	0.02	0.85
2-7	0.00	0.02	0.02
2-8	2.53	0.00	2.53
2-9	0.00	0.02	0.02
2-10	0.00	0.06	0.06
2-11	0.09	0.11	0.20
2-12	0.01	0.00	0.01
2-13	5.27	0.25	5.52
2-14	0.00	0.003	0.003
Totals[4]	**41.66**	**0.55**	**42.21**

[1] Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[2] Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[3] Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

[4] These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

TABLE 6: Chiquita Non-jurisdictional Feature Totals (Resolved Areas[1])

Feature Name	Vegetated(acres)	Unvegetated (acres)	Total Acreage
Wetland A	0.11	0.00	0.11
Wetland B	0.40	0.00	0.40
Excavated Depression	0.15	0.00	0.15
Totals	**0.66**	**0.00**	**0.66**

[1] These features have been field verified and CDFG concurs that they are not subject to regulation pursuant to Section 1603 of the Fish and Game Code

PLANNING AREA 3 (GOBERNADORA)

Planning Area 3 is located near the northern edge of the study area east of Casper's Regional Park and north of San Juan Creek. The planning area generally exhibits steeper topography than Planning Area 2. A ridgeline, that trends from southwest to the northeast divides the planning area into two drainage areas with the northwest half of the planning area draining to Gobernadora Creek and the southeast half of the planning area draining to San Juan Creek. Gobernadora Creek originates in the Cleveland National Forest to the north, traversing Coto de Caza before entering the planning area at the extreme northwest corner of the planning area before exiting the planning area about 3,000 feet from the northern boundary of the planning area. Gobernadora Creek runs parallel to and outside of the planning area after exiting the planning area, ultimately discharging into San Juan Creek beyond the southwest corner of the planning area. RMV and CDFG have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables below and all features in this planning area are considered Resolved Areas.

CDFG jurisdiction in Planning Area 3 totals approximately 54.33 acres of which 49.46 acres consist of vegetated riparian habitat. A number of side canyons to the east of Gobernadora Creek do not contain drainages exhibiting a bed or bank and therefore are not subject to CDFG jurisdiction.

TABLE 7: Gobernadora Jurisdictional Feature Totals (Resolved)

Feature Name	Riparian Vegetation[1]	Unvegetated Streambed[2]	Total CDFG[3]
Gobernadora	9.40	0.00	9.40
3-1	0.23	0.00	0.23
3-2	0.04	0.02	0.06
3-3	0.29	0.24	0.53
3-4	1.07	0.05	1.12
3-5	5.49	0.53	6.02

Feature Name	Riparian Vegetation[1]	Unvegetated Streambed[2]	Total CDFG[3]
3-6	4.82	0.12	4.94
3-7	0.26	0.33	0.59
3-8	0.00	0.13	0.13
3-9	0.00	0.10	0.10
3-10	1.85	0.47	2.32
3-11	0.00	0.01	0.01
3-12	7.27	1.38	8.65
3-13	12.98	1.48	14.46
3-14	0.48	0.00	0.48
3-15	0.21	0.00	0.21
3-16	4.28	0.00	4.28
3-17	0.00	0.01	0.01
Sulfer Canyon	0.79	0.00	0.79
Totals[4]	**49.46**	**4.87**	**54.33**

[1] Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[2] Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[3] Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

[4] These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

TABLE 8: Gobernadora Non-jurisdictional Feature Totals (Resolved Areas[1])

Feature Name	Vegetated(acres)	Unvegetated (acres)	Total Acreage
Isolated Willow Seep	0.26	0.00	0.26
3-5 Seep	0.06	0.00	0.06
Mining Pits	4.36	0.00	4.36
Total	**4.68**	**0.00**	**4.68**

[1] These features have been field verified and CDFG concurs they are not subject to regulation pursuant to Section 1603 of the Fish and Game Code.

PLANNING AREA 4 (EAST ORTEGA)

Planning Area 4 is located near the northern edge of the study area immediately south of Ortega Highway and includes Verdugo Canyon. RMV and CDFG have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables below and all features in this planning area are considered Resolved Areas. CDFG jurisdiction in Planning Area 4 totals approximately 47.97 acres of which 44.49 acres consist of vegetated riparian habitat.

TABLE 9: East Ortega Jurisdictional Feature Totals (Resolved Areas)

Feature Name	Riparian Vegetation[1]	Unvegetated Streambed[2]	Total CDFG[3]
San Juan Creek	0.55	0.00	0.55
Verdugo	19.39	0.00	19.39
4-1	0.02	0.09	0.11
4-2	0.00	0.13	0.13
4-3	1.05	0.16	1.21
4-4	0.00	0.04	0.04
4-5	0.18	0.18	0.36
4-6	0.00	0.05	0.05
4-7	0.36	0.20	0.56
4-8	0.00	0.03	0.03
4-9	0.00	0.04	0.04
4-10	0.00	0.02	0.02
4-11	6.36	0.49	6.85
4-12	6.56	0.48	7.04
4-13	1.34	0.31	1.65
4-14	0.41	0.04	0.45
4-15	0.16	0.10	0.26
4-16	1.52	0.10	1.62
4-17	5.24	0.31	5.55
4-17 Pond	0.59	0.00	0.59
4-18	0.02	0.12	0.14
4-19	0.74	0.59	1.33
Totals[4]	**44.49**	**3.48**	**47.97**

[1] Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[2] Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[3] Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

[4] These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

TABLE 10: East Ortega Non-jurisdictional Feature Totals (Resolved Areas[1])

Feature Name	Vegetated (acres)	Unvegetated (acres)	Total Acreage
Nursery Ditch[2]	0.03	0.00	0.03
Total	**0.03**	**0.00**	**0.03**

[1] This feature has been field verified and CDFG concurs it is not subject to regulation pursuant to Section 1603 of the Fish and Game Code

PLANNING AREA 5 (TRAMPAS)

Planning Area 5 is located in the San Juan Creek watershed and is located immediately south of Ortega Highway. Much of the planning area is currently occupied by a sand mining and processing operation, that has operated in the southern half of the planning area since the 1960s. Sand mining and processing has required significant modifications to the landscape in the central portion of the planning area including creation of a dam on Trampas Canyon Creek and excavation of a large mining pit (Cell A) and additional areas of influence (Exhibit 5).

Based upon verification visits with CDFG, RMV and CDFG have agreed on the jurisdictional status of all areas or features within the planning area (Resolved Areas) with the following exceptions associated with the mining operation: 1) Tailings Deposition/Water Recycling Area, 2) Ridgetop Reservoir, 3) Thickener, 4) Disilting Pond and associated Ditches, 5) Temporary Storage Pond 6) Cell A Mining Pit. Outside of limits of the sand-mining area, portions of Drainage 5-7A also remain unresolved. Those features that are components of the mining operation are described below under "Sand Mining Operation". Resolved Areas are clearly distinguished from Unresolved Areas within the descriptions associated with the sand mining area. Finally, a description of the non-jurisdiction reach of Drainage 5-7A is also provided.

CDFG jurisdiction associated with Planning Area 5 totals 30.35 acres of which 26.06 acres consist of vegetated riparian habitat. A summary of features subject to CDFG verification for which RMV and the CDFG concur relative to their jurisdictional status is provided in Tables 11 and 12. Table 11 is a summary of areas subject to CDFG jurisdiction and Table 12 is a summary of areas not subject to CDFG jurisdiction due regulatory considerations (e.g., isolated wetlands or riparian habitat not associated with a lake or streambed).

TABLE 11: Trampas Jurisdictional Feature Totals (Resolved Areas)

Feature Name	Riparian Vegetation[1]	Unvegetated Streambed[2]	Total CDFG[3]
5-1A	2.76	0.21	2.97
5-1B	6.25	1.96	8.21
5-2	1.94	0.00	1.94
5-3	0.00	0.03	0.03
5-4	0.09	0.17	0.26
5-5	1.27	0.01	1.28
5-6	0.10	0.13	0.23
Slope Wetland B	0.17	0.00	0.17
5-7	7.12	1.28	8.40
5-7A	3.64	0.08	3.72
5-7B	2.72	0.42	3.14
Totals[4]	**26.06**	**4.29**	**30.35**

[1] Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[2] Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[3] Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

[4] These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

TABLE 12: Trampas Non-jurisdictional Feature Totals (Resolved Areas[1])

Feature Name	Riparian Vegetation (acres)	Unvegetated Streambed (acres)	Total Acreage
Saltgrass Swale	0.002	0.00	0.002
Seasonal Pond	0.13	0.00	0.13
Slope Wetland A	0.04	0.00	0.04
Settling Pond A	0.26	0.00	0.26
Settling Pond B	1.30	0.00	1.30
Settling Pond C	1.33	0.00	1.33
Settling Pond D	2.37	0.00	2.37
Juncus Patch	0.05	0.00	0.05
Total	**5.48**	**0.00**	**5.48**

[1] These features have been field verified and CDFG concurs they are not subject to regulation pursuant to Section 1603 of the Fish and Game Code

Sand Mining Facilities

As noted above, a substantial portion of the Trampas Planning Area has been affected by sand mining activities since the 1960s. The sand mining operation requires use of water during various steps in the process including 1) washing of the mined materials to separate silts and clays from the sand, and 2) use of water to transport silt and clay tailings to tailings storage area areas (i.e., Tailings Pond) via pumps. In order to conserve water through recycling as well as to maintain maximum flexibility in the system, an elaborate system of ponds, pipes, and ditches have been constructed that are used in the washing and recycling processes. These various components of the sand washing operation are described below and are also depicted and appropriately designated on Exhibits 5a and 5b. The features further described below include:

- Trampas Dam and associated “Tailings Deposition/ Water Recycling Area”;
- Dam-Face “V”-Ditches
- Dam-Face Leach Field and Associated Drainage Features;
- Thickener;
- Desilting Pond and Associated Recycling Ditches and Pipes;
- Ridgetop Reservor;
- Temporary Storage Pond;
- Cell A;

Trampas Dam and Associated Tailings Deposition and Water Recycling Area (Unresolved Area)

Trampas Dam was constructed in 1975 following preparation of and certification of an Environmental Impact Report (EIR) prepared pursuant to the California Environmental Quality Act. The dam was constructed in a manner that isolated Trampas Creek and its ephemeral tributaries that supported approximately 12 acres of southern coast live oak riparian forest.

Because substantial water is lost to evaporation during various steps in the washing process as well as from the Tailings Deposition/Water Recycling Area, it is necessary to pump well water into the pond to maintain water levels. If water is not regularly added to the process, the Tailings Pond Area will dry up. At its current elevation, the Tailings Deposition and Water Recycling Area covers approximately 70 acres and includes approximately 30 acres of open water with the remaining 40 acres consisting of exposed tailings which support various densities of southern cattail (*Typha domingensis*, OBL), and California bulrush (*Scirpus californicus*, OBL).

The Tailings Deposition/Water Recycling Area serves two primary functions in the processing of sand: 1) it receives all of the tailings separated from the sand during the washing process and 2) it serves as a re-circulating water source for the washing process. During the washing process, water is moved through a variety of the facilities noted above with the movement patterns of the water varying according to a number of factors directly related to the needs of the mining operation. As stated above, the goal to conserve the maximum amount of water during the washing process has resulted in the creation of a series of storage areas and conduits that allow water to be recycled at various points in the process.

All of the features associated with the sand mining operations and discussed below were created to support the mining operations and will not exist in their current state after the plant closes. The descriptions that follow address both resolved and unresolved components in the sand mining and processing operation as they exist today as well as a discussion of the aquatic characters they would be expected to retain after mining operations cease. These descriptions are intended to clearly demonstrate that none of the features associated with the mining operation would be regulated as a stream or lake under Section 1600. Although the term “lakes” is not defined in the Fish and Game Code or in CDFG regulations, the CDFG’s Legal Advisor has referred to the definition in Black’s Law Dictionary, 5th edition:

A considerable body of standing water in a depression of land or expanded part of a closed basin serving to drain surrounding country; or a body of water of considerable size surrounded by land; a widenend portion of a river or a lagoon. [Citation] Also a: Body of water, more or less, stagnant, in which the water is supplied from drainage. [Citation].[3]

[3] Ivester, Dave. December 9, 2003. Memorandum regarding CDFG jurisdiction.

Dam Face and Associated "V"-Ditches (Resolved Area)

Construction of the dam included installation of a series of V-Ditches that capture precipitation falling on the 11.5-acre dam face. There is no hydrologic connection between the Tailings Pond/Recycle Area behind the dam and the water collected on the face of the dam. The primary function of the V-Ditches on the Dam is to prevent damage to the dam through rilling and erosion. These V-Ditches have been designed to discharge all flows to an underground inlet near the face of the dam where a 24-inch pipe was installed to collect the runoff, ultimately directing it to the "Desilting Pond" via pipes and an above-ground artificial drainage ditch (NJD Feature C). By design, all water that originates on the face of the dam is directed into the recycling system for use in the mining process. The concrete v-ditches constructed on the dam face do not meet the definition of a stream set forth in the Fish and Game Code and would not be subject to regulation pursuant to Section 1600.

It should be noted that during a field visit, conducted on October 3, 2003 with representatives of Oglebay Norton, the operators of the sand mine and processing facility, GLA observed the inlet of the 24-pipe, which had been temporarily buried, and had just been uncovered. The pipe was full of sediments and was in need of maintenance. Because the pipe had become clogged, water was not discharging to NJD Feature C (which carries the water via a second pipe to the Desilting Pond before it is pumped to the "Thickener" (see below). As a result of the pipe being blocked and the resulting accumulation of water, a small area, covering approximately 50 by 100 feet has been colonized by opportunistic cattails. Maintenance of the V-Ditches and the pipe system, including the unclogging of the 24-inch pipe that connects the base of the dam to the Desilting Pond via NJD Mining Feature C, will eliminate the source of water to the opportunistic cattails at the base of the dam face.

Dam Face Leachfield and Associated Pipes (Resolved Area)

Construction of the dam also included installation of interior drains to protect the dam from seepage. Water is collected in drains, which are in turn are connected to an underground rock and gravel collection field. Much of the water is collected in a four-inch clay pipe and is carried underground to the "Temporary Storage Pond". As noted above, the leachfield is also designed to drain to the v-ditch and then into the 24-inch pipe.. By design, all of the subdrain water from the base of the dam is intended for the Temporary Storage Pond or the Desilting Pond, and ultimately to the Thickener.

Thickener (Unresolved Area)

The Thickener is a constructed circular basin that receives tailings-laden water from the washing operations and also receives fresh water that enters the washing system at this point (well water can be pumped into the system at a number of locations as needed). The thickener is mechanically "stirred" in order to maintain the tailings in suspension so that they can be pumped as a slurry to the Tailings Deposition/Water Recycling Area. The outer rim of the thickener includes a two-foot-wide concrete ditch that directs overflow water (the thickener only rarely overflows) to a metal pipe, which carries the overflow to the Temporary Storage Pond from where the water can be pumped back to the thickener or to the Desilting Pond. The Thickener does not meet the definition of a lake set forth in the Fish and Game Code and would not be subject to regulation pursuant to Section 1600 since it was constructed in upland and is not sustained by drainage from the surrounding land; but is rather supported completely from artificial irrigation.

Ridgetop Reservoir (Unresolved Area)

The Ridgetop Reservoir is located immediately adjacent to and substantially above in terms of elevation, the Tailings Pond. This feature receives water that is pumped from the Desilting Pond as well as directly from well water. This feature was constructed entirely on upland and because of its topographic position does not receive and runoff from the surrounding watershed. While it supports limited areas of hydrophytic vegetation, the only source of water for this feature (other than direct rainfall) is entirely from pumped water. The Ridgetop Reservoir does not meet the definition of a lake set forth in the Fish and Game Code and would not be subject to regulation pursuant to Section 1600 since it was constructed in upland and is not sustained by drainage from the surrounding land; but is rather supported completely from artificial irrigation.

Temporary Storage Pond (Unresolved Area)

The Temporary Storage Pond, which covers approximately 0.65 acre, is an artificial basin, constructed on upland and by design, was not constructed as an impoundment of jurisdictional waters. Rather, the Temporary Storage Pond was constructed to receive overflow from the Thickener as well as the minimal discharge from the four-inch clay pipe, generated by the drain at the base of the dam.

Accumulation of sediments generated by the sand mining and processing operation has resulted in a minor diversion of a nearby drainage such that a side channel has developed that flows into the basin during large storm events. The basin has no outlet or spillway and is, by design fully isolated from jurisdictional waters. The bottom of the basin supports California bulrush, mulefat scrub and a few individual arroyo willows.

This feature was excavated and bermed in uplands and has no connection to downstream jurisdictional streams. A side channel that migrated from the mainstem of Drainage 5-7 currently discharges to this feature; however, the feature was not designed with this connection and the feature remains isolated. The Temporary Storage Pond does not meet the definition of a lake set forth in the Fish and Game Code and would not be subject to regulation pursuant to Section 1600 since it was constructed in upland and is sustained by artificial irrigation..

Desilting Pond and Associated Ditches and Pipes (Unresolved Area)

A Desilting Pond is located immediately west of the Thickener. The Desilting Pond receives tailings-laden wash water that is drained from washed sands located in the washing facilities immediately east of the washing facilities [See exhibit 5b]. From the wet sand piles, water drains through one of two artificial drainage ditches (NJD Feature A and/or NJD Feature B). NJD Feature A is connected directly to the Desilting Pond by means of a pipe. NJD Feature B is connected directly to the Desilting Pond by means of a pipe which discharges into NJD Feature

C and a third pipe that connects NJD Feature C with the Desilting Pond. The Desilting Pond does not meet the definition of a lake set forth in the Fish and Game Code and would not be subject to regulation pursuant to Section 1600. The collection ditches that drain water from the washed sand to the Desilting Pond do not meet the definition of a stream set forth in the Fish and Game Code and would not be subject to regulation pursuant to Section 1600 since it was constructed in upland and is not sustained by drainage from the surrounding land; but is rather completely supported by artificial irrigation.

Cell A (Unresolved Area)

Cell A is located approximately 1,000 feet north of the Trampas Dam. Cell A, which covers approximately 11.56 acres of open water and exposed tailings which support various densities of southern cattail (*Typha domingensis*, OBL), and bulrush (*Scirpus californicus*, OBL). Cell A is an area of dry land that has been under excavation since the 1960's and currently consists of a mining pit that is fully isolated with no potential outlets due to the elevation. Cell A is a potential reservoir for deposition of tailings and recycling of wash water. Cell A is subject to active mining and any portions remaining at the termination of mining operations would be reclaimed pursuant to the reclamation plan developed for the site. As a result, Cell A will not meet the definition of a lake set forth in the Fish and Game Code at the time of project implementation and therefore is notsubject to regulation pursuant to Section 1600.

Abandoned Settling Ponds (Resolved Area)

A series of five abandoned settling basins constructed in upland occupy a bench below the ridgeline that runs along the western boundary of the planning area. The abandoned basins are isolated and are not connected to jurisdictional waters. None of the basins support a predominance of hydrophytic vegetation and, due to the lack of water subsidies from the mining operation, are reverting to upland habitat.

Table 13: Trampas Non-jurisdictional Feature Totals (Unresolved Areas[1])

Feature Name	Vegetated (acres)	Unvegetated (acres)	Total Acreage
Cell A Mining Pit	11.56	0.00	11.56
Desilting Pond	0.00	0.12	0.12
NJD Erosional Feature	0.00	0.04	0.04
NJD Mining Feature A	0.17	0.00	0.17
NJD Mining Feature B	0.00	0.11	0.11
NJD Mining Feature C	0.00	0.13	0.13
Ridgetop Reservoir	1.86	3.24	5.10
Thickener	0.18	1.34	1.52
ONIS Tailings Pond	41.32	29.79	71.11
Temporary Storage Pond	0.65	0.00	0.65
Total	**55.74**	**34.77**	**90.51**

[1] These features have been field verified but are still under consideration by CDFG relative to regulation pursuant to Section 1603 of the Fish and Game Code

JURISDICTIONAL STATUS OF TAILINGS DEPOSITION/WATER RECYCLING AREA

As noted above, the Tailings Deposition/Water Recycling Area was created by construction of a dam on Trampas Creek. Construction of the dam created a large basin that was intended for use a storage area for tailings that are a by-product of the sand mining operation. In addition, the basin created by the dam is also used as a facility for recycling the water used in washing/processing operations. Essentially all of the water that enters the facility is well water that is pumped into the basin. The water level in the facility is carefully monitored and maintained at a volume sufficient for operational purposes .. As described in the water budget summary below and more fully detailed in the attached water budget, in the post mining condition all water subsidies would cease and the facility will dry out in a manner of months. In the post mining condition, the facility is expected to support a minimal amount of wetland vegetation in small isolated patches, and would not meet the definition of a lake set forth in the Fish and Game Code and would not be subject to regulation pursuant to Section 1600.

WATER BUDGET FOR TAILINGS POND

In the post-mining condition, the Tailings Pond will dry out if not subsidized with well water. For purposes of understanding the ambient conditions, GLA and Wildermuth Environmental prepared a water budget for the Tailings Pond/Recycle Area that considers the conditions expected behind the dam in the absence of any water subsidies from mining. Based on rainfall data using the last 75 years, the area occupied by the tailings area would support approximately five to six acres of emergent marsh habitat once all artificial water subsidies are eliminated. The marsh habitat would occur in small isolated patches and would not meet the definition of a lake. Some of the wetland areas would likely form at the edge of the stored tailings, where ephemeral drainages would discharge to the facility. At least a portion of the wetland vegetation that would occur in these isolated areas would be associated with a “stream” and may be subject to regulation by CDFG under Section 1600.

Overall Approach

In order to accurately determine the extent of hydrophytic vegetation and/or open water in the post-mining condition, the following factors were considered/evaluated.

- Post-mining dry-out of the tailings;
- Hydrologic input from watershed runoff;
- Hydrologic input from precipitation;
- Water consumption by hydrophytic vegetation (amounts); and
- Water consumption by hydrophytic vegetation (seasonality)

Post-Mining Dryout of Tailings

Currently, water depths for areas occupied by cattails, which accounts for approximately 55 acres of the Tailings Pond, average less than two feet. Cattails and bulrush will use up to ten feet of water per year when it is available and require a minimum of about four feet of water seasonally to survive and persist on a site. Cattails and bulrush exhibit winter dormancy with most of the water consumption occurring during the period from May to November. Cattails and bulrush are both shallow-rooted species with the entire root zone located in the upper two feet (three feet maximum). Without water subsidies from the mining operation, essentially all of the water within the root zone of the cattails and bulrush would be depleted by the end of one growing season.[4]

While the Tailings Pond is drying out during the first year without water subsidies, the exposed substrate will quickly be colonized by propagules from non-native grasses and forbs that are found throughout the watershed of the Tailings Pond including wild oats (*Avena fatua*, UPL), slender oats (*Avena barbata*, UPL), ripgut (*Bromus diandrus*, UPL), soft chess (*Bromus hordeaceus*, UPL), red brome (*Bromus madritensis rubens*, UPL), rattail fescue (*Vulpia myuros*, UPL), Italian ryegrass (*Lolium multiflorum*, UPL), black mustard (*Brassica nigra*, UPL), field mustard (*Brassica rapa*, UPL), wild radish (*Raphanus sativus*, UPL), tocalote (*Centaurea melitensis*, UPL) and three species of filaree (*Erodium* spp., UPL). These species, as a group, germinate during winter and early spring, consuming most available soil moisture by late spring or early summer, meaning that they are most active during the winter dormancy of the cattails and bulrush, substantially limiting soil moisture that might be available to any surviving wetland plants. Direct evaporation and evapotranspiration will consume most direct precipitation falling on the tailings such that water would be available in very limited amounts to wetland plant species.

Input from Watershed Runoff

The hydrological model set forth in Appendix C determined that approximately 43.5 acre-feet of water would reach the tailings during an average rainfall year.[5] Essentially all of the hydrological input from watershed runoff would occur during the rainy season, which is between October 15 and April 15. This runoff would reach the outer edges of the Tailings Pond, at points where the ephemeral drainages intersect the Tailings. Tailings at these locations would be shallowest and much of the water would be stored in the upper few feet, meaning that it would be available to whatever plants are growing at the discharge point. As noted above, substantial amounts of this water would be consumed by opportunistic spring annuals, which germinate as early as November or December (coincident with the first one to two inches of rainfall) and

---

[4] This includes surface water up to three feet and subsurface water at depths to three feet.

[5] Wildermuth Environmental has, on a preliminary basis, conducted more detailed modeling of the Tailings Pond, that reduces the estimated watershed runoff (as set forth using the TR-55 methodology) from approximately 43.5 acre feet to between 25 and 30 acre feet. The more conservative number of 43.5 acre feet is incorporated into this analysis because the Wildermuth report has not yet been completed; however, upon its completion, it is expected to reduce the watershed runoff totals.

reach their peak growth during February and March (some species such as Italian Rygrass geminate a little later and reach peak growth in March and April). The 43.5 acre feet of runoff would generally be sufficient to support up to seven acres of cattails, bulrush and other native and non-native hydrophytes. However, direct evaporation coupled with water consumption by spring annuals, which would germinate and reach maximum growth during the winter dormancy period exhibited by the cattails and bulrush, would reduce to amount of wetland vegetation to between five and six acres.

Input from Direct Precipitation

During average rainfall years, approximately 75 acre-feet would fall on the area occupied by the mine tailings. Essentially all of the hydrological input from direct precipitation would occur during the rainy season, which is between October 15 and April 15, which as noted above coincides with the winter dormancy period of native hydrophytes and the germination and maximum growth period of non-native spring annual grasses and forbs. It is expected that direct evaporation and evapotranspiration by the spring annuals would utilize essentially all of the water reaching the tailings.

Summary/Conclusions

In the post-mining condition, the available surface and subsurface water in the Tailings Pond would be consumed by the existing hydrophytic vegetation, which exhibits high water consumption rates, beginning in late spring and continuing until late fall. Natural hydrologic input from storm runoff and direct precipitation would coincide with the germination and maximum growth period of the (mostly) non-native annual grasses and forbs expected to rapidly colonize the drying tailings. Available water for native hydrophytes would be between 30 and 35 acre feet which would be sufficient to allow persistence of between five and six acres of hydrophytic vegetation. At least a portion of this vegetation would occur at the points where existing ephemeral drainages discharge into the stored tailings, resulting in some wetland or riparian vegetation at these discharge points that would be associated with the ephemeral drainages. Based on total hydrologic inputs to the tailings, the total area could not exceed five to six acres with the actual area potentially subject to Section 1600 jurisdiction clearly less than the maximum of five to six acres predicted by the water budget.

PLANNING AREA 6 (CRISTIANITOS MEADOWS)

Planning Area 6 is located near the southeastern edge of the study area immediately north of the O'Neill Land Conservancy. RMV and CDFG have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables below and all features in this planning area are considered Resolved Areas. CDFG jurisdiction in Planning Area 6 totals approximately 9.86 acres of which 9.54 acres consist of vegetated riparian habitat.

TABLE 14: Cristianitos Meadows Jurisdictional Feature Totals (Resolved Areas)

Feature Name	Riparian Vegetation[1]	Unvegetated Streambed[2]	Total CDFG[3]
Cristianitos Stock Pond	1.00	0.00	1.00
6-1	0.00	0.01	0.01
6-2	2.20	0.02	2.22
6-3	0.22	0.18	0.40
6-4	6.12	0.11	6.23
Totals[4]	**9.54**	**0.32**	**9.86**

[1] Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[2] Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[3] Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

[4] These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

TABLE 15: Cristianitos Meadows Non-jurisdictional Feature Totals (Resolved Areas[1])

Feature Name	Vegetated (acres)	Unvegetated (acres)	Total Acreage
Vernal Marsh	0.17	0.00	0.17
Total	**0.17**	**0.00**	**0.17**

[1] This feature has been field verified and CDFG concurs that it is not subject to regulation pursuant to Section 1603 of the Fish and Game Code

PLANNING AREA 7 (CRISTIANITOS CANYON)

Planning Area 7 is located near the southern portion of the study area and immediately east of the O'Neill Land Conservancy. For this report, the planning area is divided into two distinct areas: the eastern half which is characterized by fairly steep topography with deep canyons that drain toward Gabino Creek that runs generally parallel to and beyond the limits of the southern planning area boundary. The western half of the planning area exhibits more gentle topography and drains to the upper reach of Cristianitos Creek. Gabino Creek and the upper reach of Cristianitos Creek join just southwest of the planning area boundary.

The southern portion of the planning area exhibits a number of clay mines that have been under operation since the 1930s. Mining is currently not in operation; however the lease holders continue maintenance operations and all but one of the mining operations are subject to reclamation pursuant to plans submitted to and administered by the County of Orange.[6] As recently as September of 2002, representatives of Riverside Cement met with officials of the

[6] No jurisdictional waters are associated with clay mine that is not subject to County of Orange reclamation requirements.

County of Orange onsite to review reclamation plans and discuss plant palettes to be used upon implementation of the reclamation programs.[7]

Resolved Areas

CDFG jurisdiction in Planning Area 7 totals approximately 21.68 acres of which 15.87 acres consist of vegetated riparian habitat.

TABLE 16: Cristianitos Canyon Jurisdictional Feature Totals (Resolved Areas)

Feature Name	Riparian Vegetation[1]	Unvegetated Streambed[2]	Total CDFG[3]
7-1	0.22	0.44	0.66
7-2	0.17	0.57	0.74
7-3	0.00	0.13	0.13
7-4	0.00	0.29	0.29
7-5	0.00	0.09	0.09
7-6	1.18	0.13	1.31
7-7	7.29	1.17	8.46
7-8	0.00	0.08	0.08
7-9	0.02	0.08	0.10
7-10	0.00	0.15	0.15
7-11	0.07	0.04	0.11
7-12	2.11	0.25	2.36
7-13	3.78	2.18	5.96
7-14	0.16	0.00	0.16
7-15	0.22	0.02	0.24
7-16	0.60	0.02	0.62
7-17	0.05	0.02	0.07
7-18	0.00	0.01	0.01
7-19	0.00	0.14	0.14
Totals[4]	**15.87**	**5.81**	**21.68**

[1] Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[2] Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[3] Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

[4] These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

[7] Bomkamp, Tony. Personal observation as attendee at two meetings to address reclamation of the sites.

TABLE 17: Cristianitos Canyon Non-jurisdictional Feature Totals (Resolved Areas[1])

Feature Name	Vegetated (acres)	Unvegetate d (acres)	Total Acreage
Cattail pond	0.01	0.00	0.01
7-11 Isolated seasonal pond[1]	0.04	0.00	0.04
7-12 Isolated Stock Pond[1]	0.03	0.00	0.03
Isolated Willow Patch[2]	0.15	0.00	0.15
Totals	**0.28**	**0.00**	**0.23**

[1] These features have been field verified and CDFG concurs that they are not subject to regulation pursuant to Section 1603 of the Fish and Game Code

Unresolved Areas

Feature 7-13 Stock Pond – is an unvegetated stock pond that results from precipitation ponding at the base of a very small watershed that was impounded as a result of mining activities. The pond has no jurisdictional streambeds discharging into it.

Feature 7-19 Mining Pit– is a clay mining pit, already in the early stages of construction in a 1938 aerial photograph that is located near the southwest corner of the planning area. This pit was excavated near the top of a prominent ridgeline and exhibits vertical slopes on all but the western edge. Although water levels vary seasonally, this pit exhibits ponded water year-round due to groundwater seepage. As discussed above, although mining is currently not being conducted in this pit, it continues to be subject to ongoing maintenance by the lease holder and is subject to reclamation pursuant to County of Orange requirements and is not considered to be abandoned. This feature is expected to be filled and will not exist at the time of project implementation.

Two branches of an erosional feature/ephemeral drainage, that originate in upper portions of the mined area drain to the mining pit approximately 400 feet below their confluence. The area occupied by the ephemeral drainage channels is highly disturbed and the channels are mostly unvegetated with a few individuals of mulefat in the lower reach of the drainage below the confluence of the two branches.

TABLE 18: Cristianitos Canyon Non-jurisdictional Feature Totals (Unresolved Areas[1])

Feature Name	Riparian Vegetation (acres)	Unvegetated Streambed (acres)	Total Acreage
7-13 Stock Pond	0.00	0.28	0.28
7-19 Mining Pit	0.14	0.77	0.91
Total	**0.14**	**1.05**	**1.19**

[1] These features have been field verified but are still under consideration by CDFG relative to regulation pursuant to Section 1603 of the Fish and Game Code

PLANNING AREA 8 (TRW)

Planning Area 8 is located near the southern edge of the study area east of Avenida Pico and north of Talega Creek. RMV and CDFG have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables and examined in the field and all features in this planning area are considered Resolved Areas. The middle reaches of Features 8-1, 8-4 and 8-8, as well as the middle reach of the southern Blind Canyon tributary and the upper reach of northern Blind Canyon tributary have not yet been subject to field verification. CDFG jurisdiction in Planning Area 8 totals approximately 27.39 acres of which 23.13 acres consist of vegetated riparian habitat.

TABLE 19: TRW Jurisdictional Feature Totals (Resolved)

Feature Name	Riparian Vegetation[1]	Unvegetated Streambed[2]	Total CDFG[3]
Blind Canyon	18.90	0.96	19.86
8-1	0.33	0.17	0.50
8-2	0.00	0.01	0.01
8-3	0.00	0.03	0.03
8-4	0.57	0.05	0.62
8-5	0.00	0.10	0.10
8-6	0.07	0.03	0.10
8-7	0.06	0.19	0.25
8-8	0.00	0.09	0.09
8-9	0.18	0.14	0.32
8-10	0.00	0.05	0.05
8-11	0.09	0.05	0.14
8-12	0.06	0.08	0.14
8-13	0.00	0.07	0.07
8-14	0.00	0.05	0.05
8-15	0.83	0.06	0.89
8-16	0.20	0.02	0.21
8-17	0.01	0.05	0.07
8-18	0.00	0.01	0.01
8-19	0.00	0.01	0.01
8-20	0.10	0.06	0.16
8-21	0.00	0.02	0.02
8-22	0.06	0.48	0.54
8-23	0.02	0.33	0.35
8-24	1.65	0.27	1.92
8-25	0.00	0.14	0.14
8-26	0.00	0.16	0.16
8-27	0.00	0.10	0.10

Feature Name	Riparian Vegetation[1]	Unvegetated Streambed[2]	Total CDFG[3]
8-28	0.00	0.13	0.13
8-29	0.00	0.16	0.16
8-30	0.00	0.00	0.00
8-31	0.00	0.14	0.14
8-32	0.00	0.02	0.02
8-33	0.00	0.02	0.02
8-34	0.00	0.01	0.01
Totals[4]	**23.13**	**4.26**	**27.39**

[1] Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[2] Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[3] Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

[4] These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

TABLE 20: TRW Non-jurisdictional Feature Totals (Resolved Areas[1])

Feature Name	Vegetated (acres)	Unvegetated (acres)	Total Acreage
Isolated Seasonal Pond	0.58	0.00	0.58
Total	**0.58**	**0.00**	**0.58**

[1] This feature has been field verified and CDFG concurs it is not subject to regulation pursuant to Section 1603 of the Fish and Game Code

PLANNING AREA 9 (O'NEILL RANCH)

Planning Area 9 is located near the eastern edge of the study area within portions of Gabino Canyon. RMV and CDFG have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables below and all features in this planning area are considered Resolved Areas. CDFG jurisdiction in Planning Area 9 totals approximately 36.16 acres of which 31.69 acres consist of vegetated riparian habitat.

TABLE 21: O'Neill Ranch Jurisdictional Feature Totals (Resolved Areas)

Feature Name	Riparian Vegetation[1]	Unvegetated Streambed[2]	Total CDFG[3]
Gabino	18.89	0.05	18.94
9-1	0.60	0.61	1.21
9-2	3.55	0.32	3.87
9-3	0.69	0.10	0.79
9-4	1.64	0.33	1.97
9-5	0.38	0.02	0.40
9-6	0.13	0.17	0.30

9-7	0.00	0.003	0.003
9-8	0.00	0.01	0.01
9-9	0.00	0.01	0.01
9-10	0.00	0.04	0.04
9-11	0.29	0.15	0.44
9-12	0.00	0.03	0.03
9-13	0.10	0.11	0.21
9-14	2.55	0.12	2.67
9-15	0.05	0.22	0.27
Gabino/Jerome Lake Wetland	1.87	0.00	1.87
Jerome Lake	0.95	2.18	3.13
Totals[4]	**31.69**	**4.47**	**36.16**

[1] Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[2] Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[3] Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

[4] These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

ROAD GAPS

Road Gaps are located throughout the study area. RMV and CDFG have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables below and all features in this planning area are considered Resolved Areas. CDFG jurisdiction in the road gaps totals approximately 124.41 acres of which 123.43 acres consist of vegetated riparian habitat.

TABLE 22: Road Gap Jurisdictional Feature Totals (Resolved)

Feature Name	**Riparian Vegetation[1]**	**Unvegetated Streambed[2]**	**Total CDFG[3]**
Blind Canyon	0.84	0.00	0.84
Chiquita	1.72	0.00	1.72
Chiquita Wetland	12.60	0.00	12.60
Cristianitos Creek	9.79	0.00	9.79
Gabino Creek	5.50	0.00	5.50
Gobernadora	3.03	0.00	3.03
Road Gap-1	0.64	0.06	0.70
Road Gap-10/1-7	0.29	0.00	0.29
Road Gap-11/2-11	0.30	0.00	0.30
Road Gap 12/2-12	0.32	0.00	0.32
Road Gap-13/2-14	0.35	0.00	0.35
Road Gap-14/2-13	0.62	0.00	0.62
Road Gap-15/3-16	2.49	0.00	2.49
Road Gap-16/3-13	0.45	0.00	0.45
Road Gap-17/5-1	0.00	0.40	0.40

Feature Name	Riparian Vegetation[1]	Unvegetated Streambed[2]	Total CDFG[3]
Road Gap-18	0.00	0.01	0.01
Road Gap 19/5-7A	0.23	0.01	0.24
Road Gap 2	0.00	0.02	0.02
Road Gap-20/8-21	0.00	0.06	0.06
Road Gap 21	0.00	0.01	0.01
Road Gap-22	1.25	0.00	1.25
Road Gap-3	0.00	0.01	0.01
Road Gap-4	0.00	0.02	0.02
Road Gap-5/2-1	2.85	0.08	2.93
Road Gap-6/2-4	0.00	0.07	0.07
Road Gap-7/2-5	0.00	0.05	0.05
Road Gap-8	1.44	0.04	1.48
Road Gap-9	0.00	0.14	0.14
San Juan Creek A	6.12	0.00	6.12
San Juan Creek B	16.56	0.00	16.56
San Juan Creek C	17.77	0.00	17.77
San Juan Creek D	22.57	0.00	22.57
San Juan Creek E	10.28	0.00	10.28
Sulfer Canyon Creek	5.42	0.00	5.42
Totals[4]	**123.43**	**0.98**	**124.41**

[1] Total area (acres) of Riparian Vegetation subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[2] Total area (acres) of unvegetated streambed subject to CDFG jurisdiction pursuant to Section 1603 of the Fish and Game Code.

[3] Total area (acres) of features subject to CDFG jurisdiction (consists of both riparian vegetation and unvegetated streambed).

[4] These totals may change depending upon CDFG determinations regarding proposed non-jurisdictional.

TABLE 23: Road Gap Non-jurisdictional Feature Totals (Resolved Areas[1])

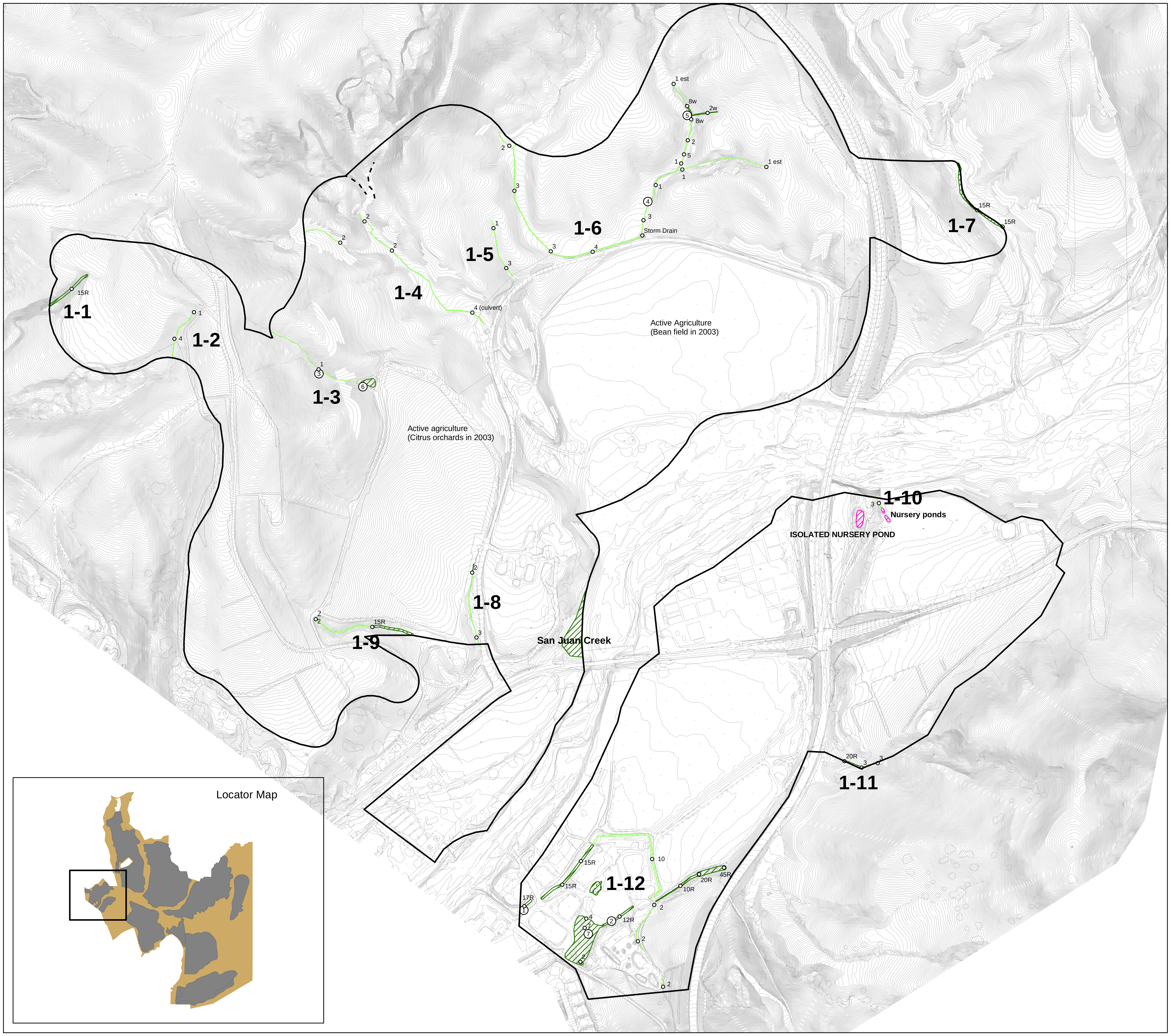
Feature Name	Vegetated(acres)	Unvegetated (acres)	Total Acreage
Sulfer Slope Wetland	0.16	0.00	0.16
Totals	**0.16**	**0.00**	**0.16**

[1] This feature has been field verified and CDFG concurs that it is not subject to regulation pursuant to Section 1603 of the Fish and Game Code

s:0239GENERAL/0239-15/0239-15b.GLAjd.CDFG.032304.doc

APPENDIX A
Delineation and Verification Site Visit Dates

Type	Month and Year	Individual Dates
Delineation	October 2002	29, 30, 31
Delineation	November 2003	1, 4, 7, 11, 12, 14, 21, 25, 26
Delineation	December 2002	6, 16
Delineation	January 2003	15
Delineation	February 2003	19, 21, 24, 27
Delineation	March 2003	3, 5, 6, 8, 21, 24, 26
Delineation	April 2003	1, 8, 16, 22, 23, 24, 25, 28
Delineation	May 2003	1, 2, 13, 22, 23
Delineation	June 2003	2, 5, 9, 11, 12, 13, 26, 27
Delineation	July 2003	9, 10, 11, 14
Delineation	October 2003	6, 7, 17
Delineation	November 2003	5
Verification	March 2003	11, 14, 19
Verification	April 2003	1, 11, 29, 30
Verification	May 2003	21, 23
Verification	June 2003	18, 25
Verification	July 2003	2, 3, 8, 9, 14, 22, 23, 30, 31
Verification	August 2003	6, 15
Verification	October 2003	27



RANCHO MISSION VIEJO ORTEGA GATEWAY

Jurisdictional Delineation Map (CDFG)

GLENN LUKOS ASSOCIATES

FINAL DRAFT
Supercedes versions dated July 2003

N
W E
S

400 200 0 Feet

Legend

- Study Area
- Streambed ("R" represents riparian vegetation)
- Soil Pit Location
- No OHWM
- Riparian Vegetation
- Jurisdictional Streambed
- Non-jurisdictional Feature

c://GIS PROJECTS/239-15/PA1/Rev2/REV2MAPcolorcdfg.mxd October 29, 2003

RANCHO MISSION VIEJO CHIQUITA

Jurisdictional Delineation Map (CDFG)

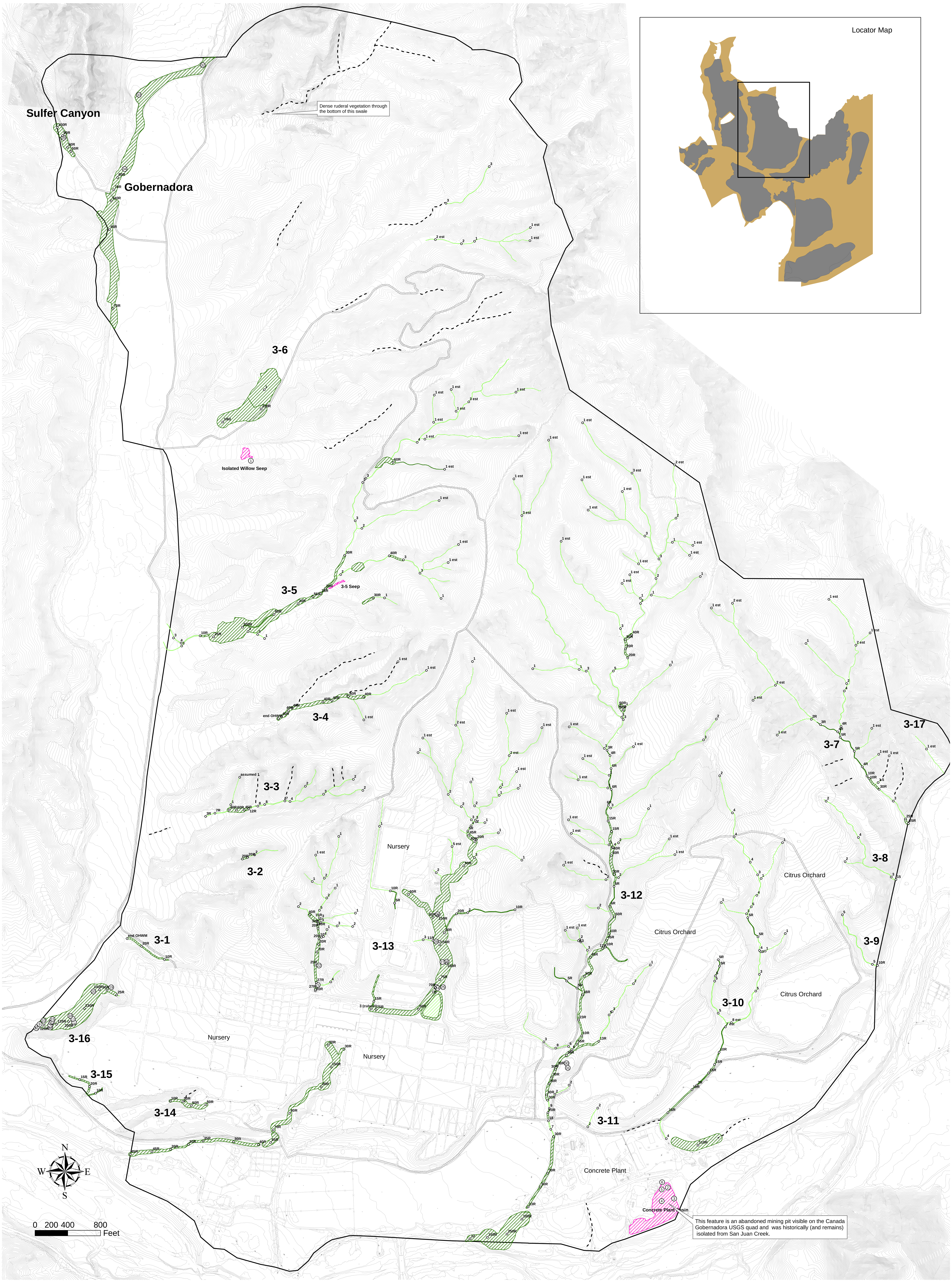
GLENN LUKOS ASSOCIATES

FINAL DRAFT
Supercedes version dated July 2003

Legend

- Study Area Boundary
- No OHWM
- Existing Ranch Road
- Streambed Width ("R" represents Riparian vegetation)
- Soil Pit Location
- Riparian Vegetation
- Jurisdictional Streambed
- Non-jurisdictional Feature

C://GIS PROJECTS/239-15SAMP/PA2/Delineation REV1/rev2/REV2MAPcolorcdfg.mxd October 29, 2003



RANCHO MISSION VIEJO GOBERNADORA

Jurisdictional Delineation Map (CDFG)

GLENN LUKOS ASSOCIATES

FINAL DRAFT
Superceded versions dated July 2003

Legend

Study Area Boundary

Existing Ranch Roads

Streambed Width ("R" indicates the presence of Riparian Vegetation)

Soil Pit Location

No OHWM

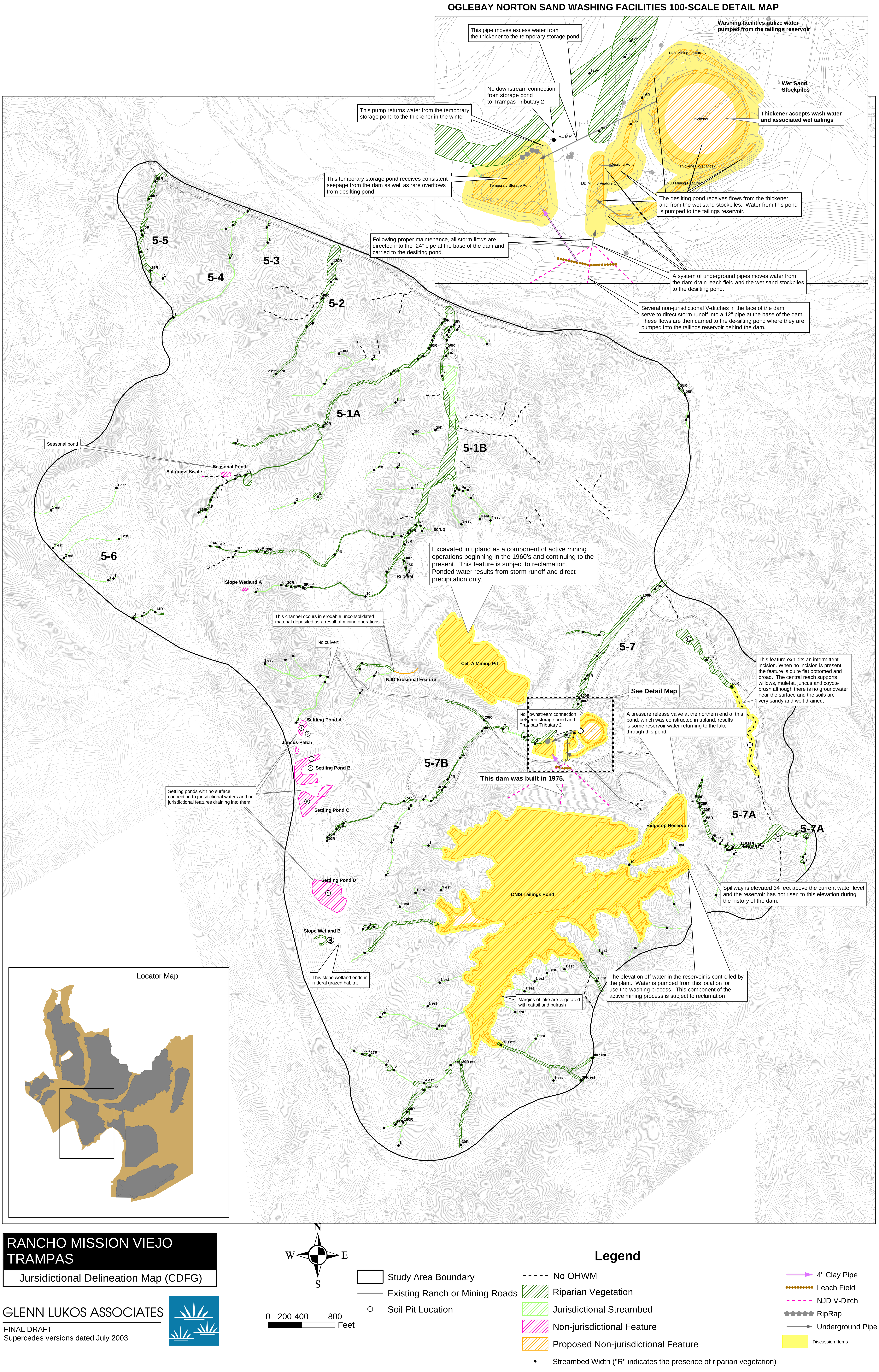
Non-jurisdictional Feature

Riparian Vegetation

Jurisdictional Streambed

c://GIS PROJECTS/239-15SAMP/PA3/PA3Delineationrev1/PA3REV2cdfgcolor.mxd October 29, 2003

Locator Map
4-1
4-2
4-3
4-4
4-5
4-6
4-7
4-8
4-9
4-10
4-11
4-12
4-13
4-14
4-15
4-16
4-17
4-18
4-19
4-19
Verdugo
San Juan Creek
4-17 Pond
CDFG Riparian Vegetation and Corps OHWM estimates were based on similar more accessible drainages
Ruderal habitat (not farmed)
The OHWM for these features end in ruderal or scrub habitat
OHWM ends in ruderal habitat
Ruderal habitat (not farmed)
Seep Boundaries have been re-mapped
Legend
Study Area Boundary
Existing Ranch Roads
NO OHWM
Streambed Width ("R" indicates the presence of Riparian Vegetation)
Soil Pit Locations
Riparian Vegetation
Jurisdictional Streambed
Non-jurisdictional Feature
RANCHO MISSION VIEJO
ORTEGA EAST
Jurisdictional Delineation Map (CDFG)
GLENN LUKOS ASSOCIATES
FINAL DRAFT
Supercedes versions dated July 2003
N
0 200 400 800
Feet
c://GIS PROJECTS/PA4/PA4/cdfgcolor.mxd
October 29, 2003



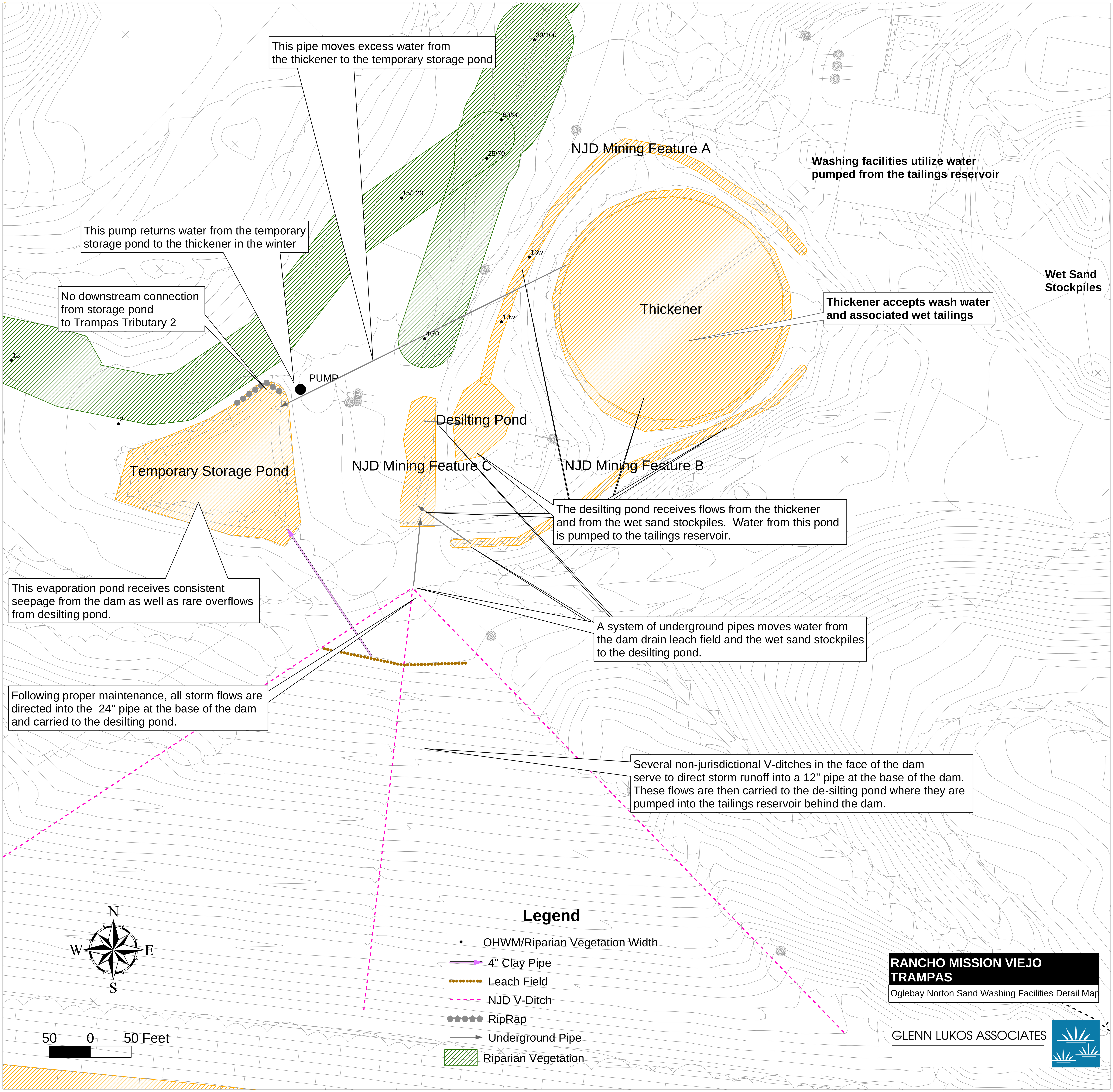
RANCHO MISSION VIEJO TRAMPAS

Jursidictional Delineation Map (CDFG)

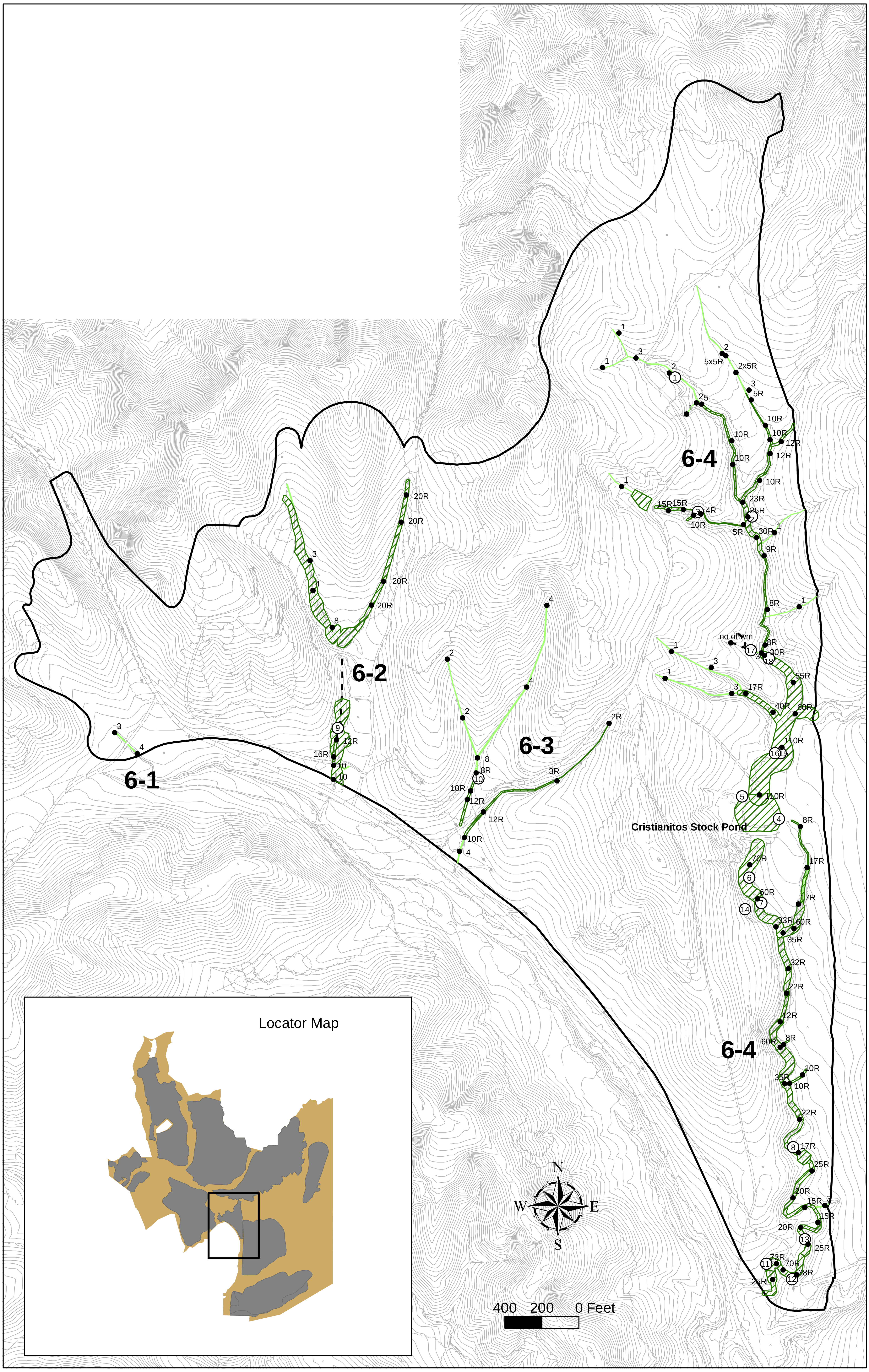
GLENN LUKOS ASSOCIATES

FINAL DRAFT
Supercedes versions dated July 2003

c://GIS PROJECTS/239-15SAMP/PA5/PA5cdfgcolor.mxd October 29, 2003



C:GIS PROJECTS/239-15SAMP/PA5/cdfgdetail.mxd November 19, 2003



RANCHO MISSION VIEJO
CHRISTIANITOS MEADOWS

Jurisdictional Delineation Map (CDFG)

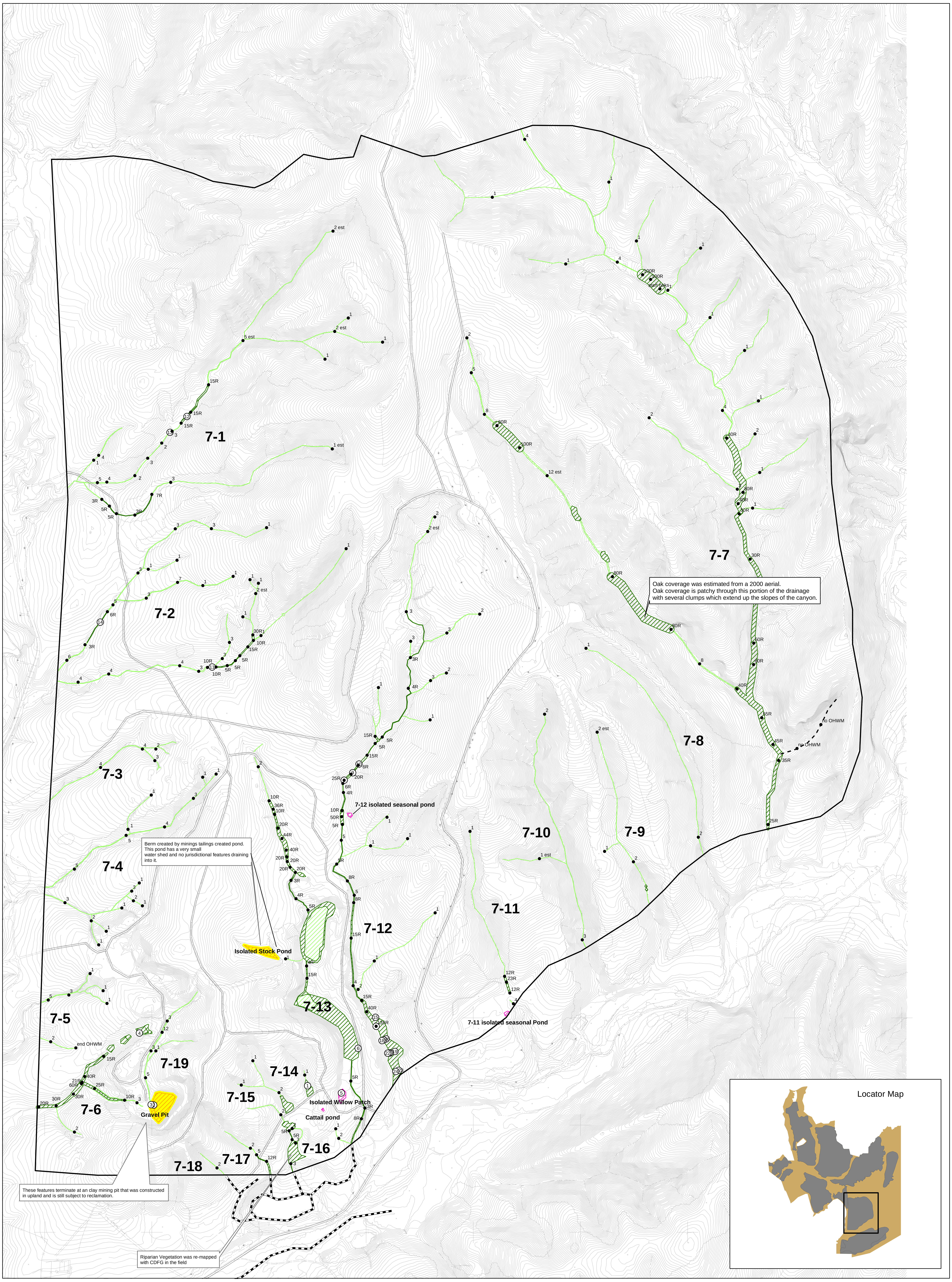
GLENN LUKOS ASSOCIATES

FINAL DRAFT
Supercedes version dated July 2003

Legend

- Streambed Width ("R" indicates the presence of riparian vegetation)
- Study Area Boundary
- Soil Pit Location
- No OHWM
- Riparian Vegetation
- Jurisdictional Streambed

c://GIS PROJECTS/239-15SAMP/PA6/PA6CDFG.mxd October 29, 2003



RANCHO MISSION VIEJO
CRISTIANITOS CANYON

Jurisdictional Delineation Map (CDFG)

GLENN LUKOS ASSOCIATES

FINAL DRAFT
Supercedes versions dates July 2003

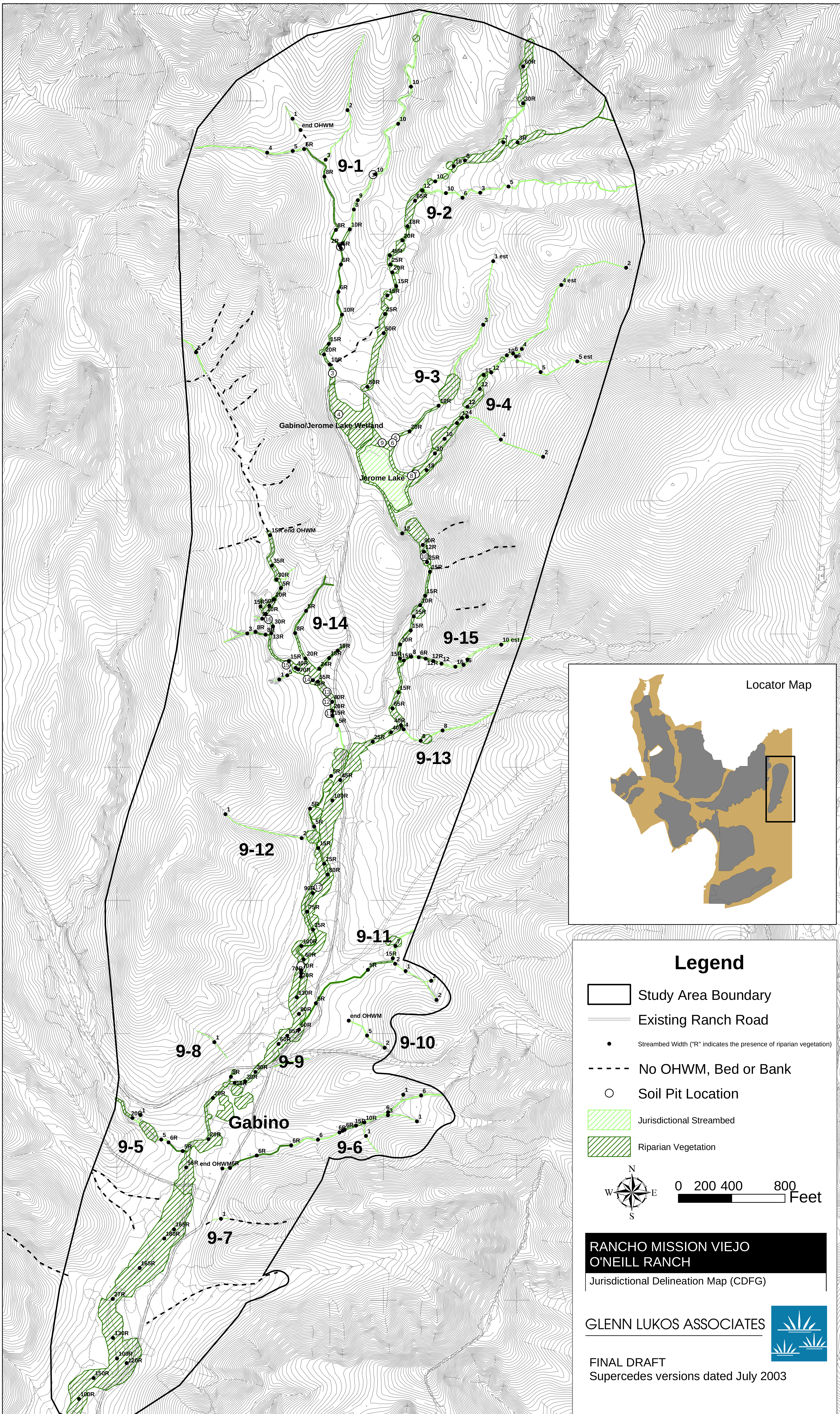
400 200 0 Feet

Legend

- Study Area Boundary
- Exisiting or Abandoned Roads
- Streambed Width ("R" indicates the presence of riparian vegetation)
- Soil Pit Location
- No OHWM, bed or bank
- Riparian Vegetation
- Jurisdictional Streambed
- Non-jurisdictional Feature
- Proposed Non-jurisdictional Feature
- Discussion Items
- Off-Site Features

C://GIS PROJECTS/239-15SAMP/PA7/PA7cdfgfinal.mxd October 29, 2003

Locator Map
Blind Canyon
Blind Canyon
Blind Canyon
Stock Pond/Impoundment
Isolated Seasonal Pond
8-1
8-2
8-3
8-4
8-5
8-6
8-7
8-8
8-9
8-10
8-11
8-12
8-13
8-14
8-15
8-16
8-17
8-18
8-19
8-20
8-21
8-22
8-23
8-24a
8-24b
8-25
8-26
8-27
8-28
8-29
8-30
8-31
8-32
8-33
8-34
no OHWM
Legend
Study Area Boundary
Streambed Width ("R" indicates the presence of riparian vegetation)
Soil Pit Locations
No OHWM, bed or bank
Non-jurisdictional Feature
Riparian Vegetation
Jurisdictional Streambed
Features Not Yet Field Verified
Rancho Mission Viejo
TRW
Jurisdictional Delineation Map (CDFG)
400 200 0 Feet
GLENN LUKOS ASSOCIATES
FINAL DRAFT
Supercedes versions dated July 2003
c://GIS PROJECTS/239-15SAMP/PA8/delineation/
PA8/PA8cdfgfinal.mxd October 29, 2003


9-1
9-2
9-3
9-4
9-5
9-6
9-7
9-8
9-9
9-10
9-11
9-12
9-13
9-14
9-15
Gabino/Jerome Lake Wetland
Jerome Lake
Gabino
Locator Map
Legend
Study Area Boundary
Existing Ranch Road
Streambed Width ("R" indicates the presence of riparian vegetation)
No OHWM, Bed or Bank
Soil Pit Location
Jurisdictional Streambed
Riparian Vegetation
N
S
E
W
0 200 400 800
Feet
RANCHO MISSION VIEJO
O'NEILL RANCH
Jurisdictional Delineation Map (CDFG)
GLENN LUKOS ASSOCIATES
FINAL DRAFT
Supercedes versions dated July 2003

RANCHO MISSION VIEJO ROAD GAP ANALYSIS

Jurisdictional Delineation Key Map

GLENN LUKOS ASSOCIATES

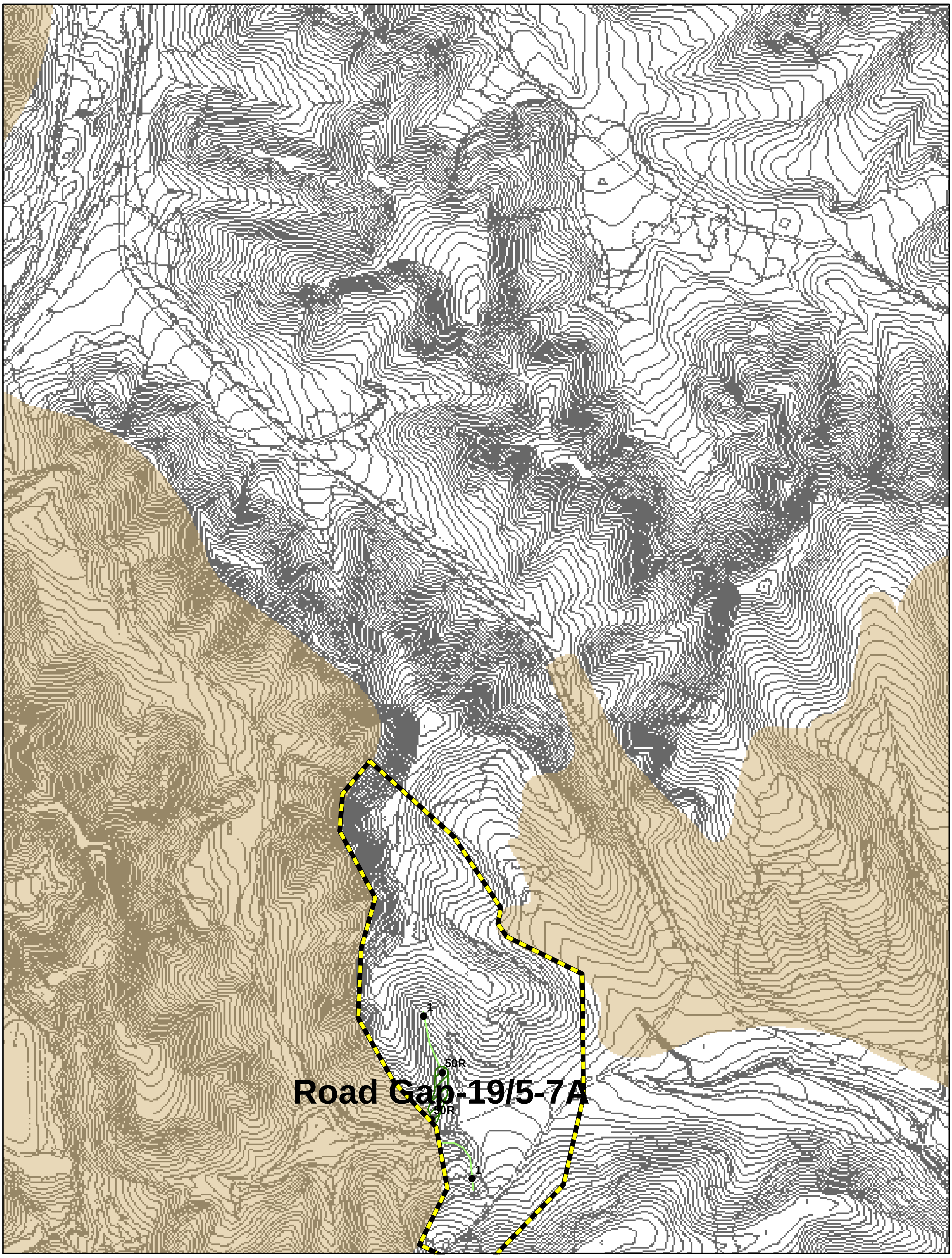
Legend

Conceptual Road Alignments

Study Area Boundaries

Property Boundary

This gap analysis was based on the conceptual road alignments above, which have not yet been subject to final engineereing.



RANCHO MISSION VIEJO
ROAD GAP ANALYSIS

Jurisdictional Delineation Map (CDFG) Sheet 10

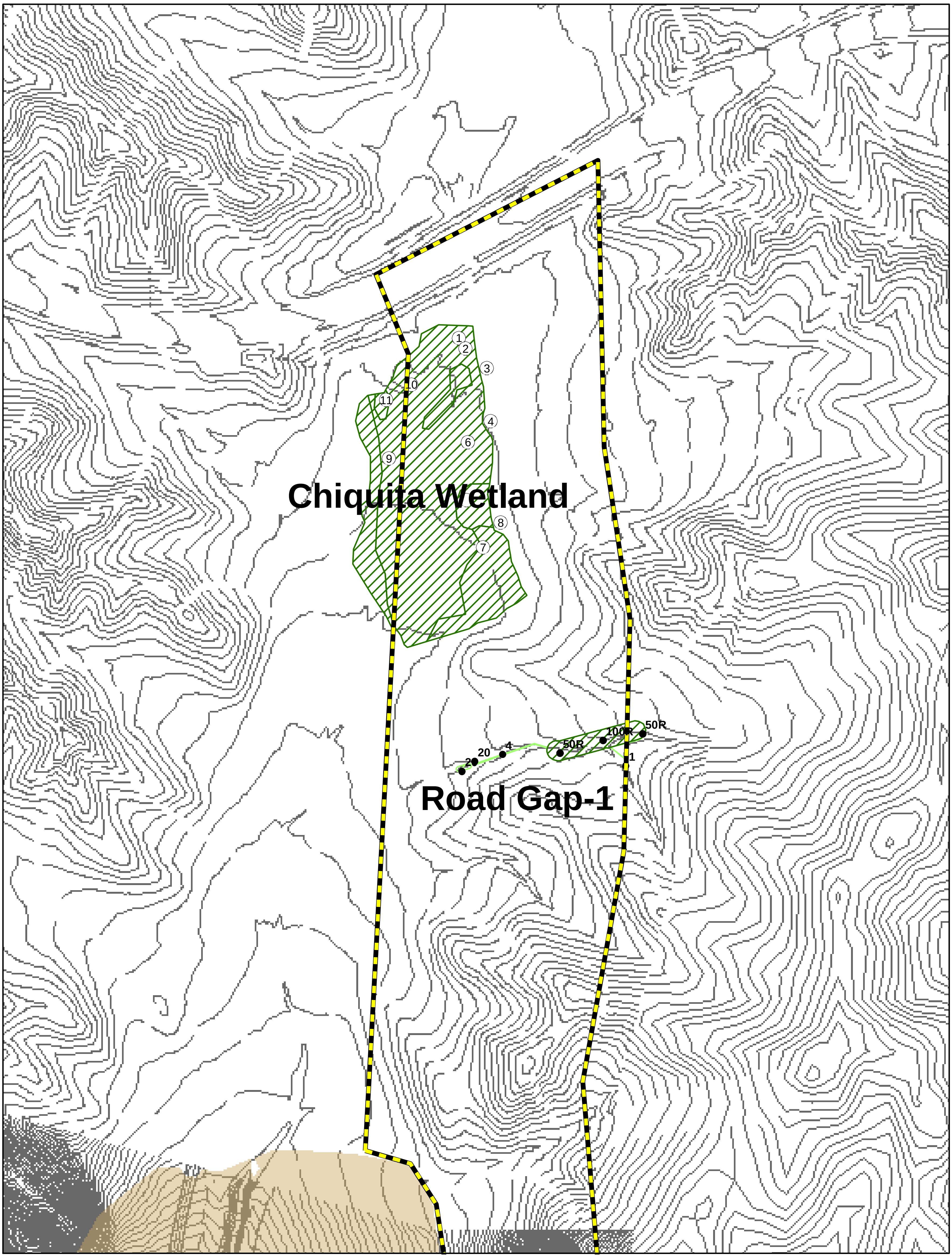
GLENN LUKOS ASSOCIATES

N

400 0 Feet

- Study Area Boundaries
- Soil Pit Location
- Streambed Width ("R" indicates the presence of Riparian Vegetation)
- No OHWM, bed or bank
- Riparian Vegetation
- Non-jurisdictional Feature
- Jurisdictional Streambed
- Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscdfg.mxd November 9, 2003



RANCHO MISSION VIEJO
ROAD GAP ANALYSIS

Jurisdictional Delineation Map (CDFG) Sheet 1

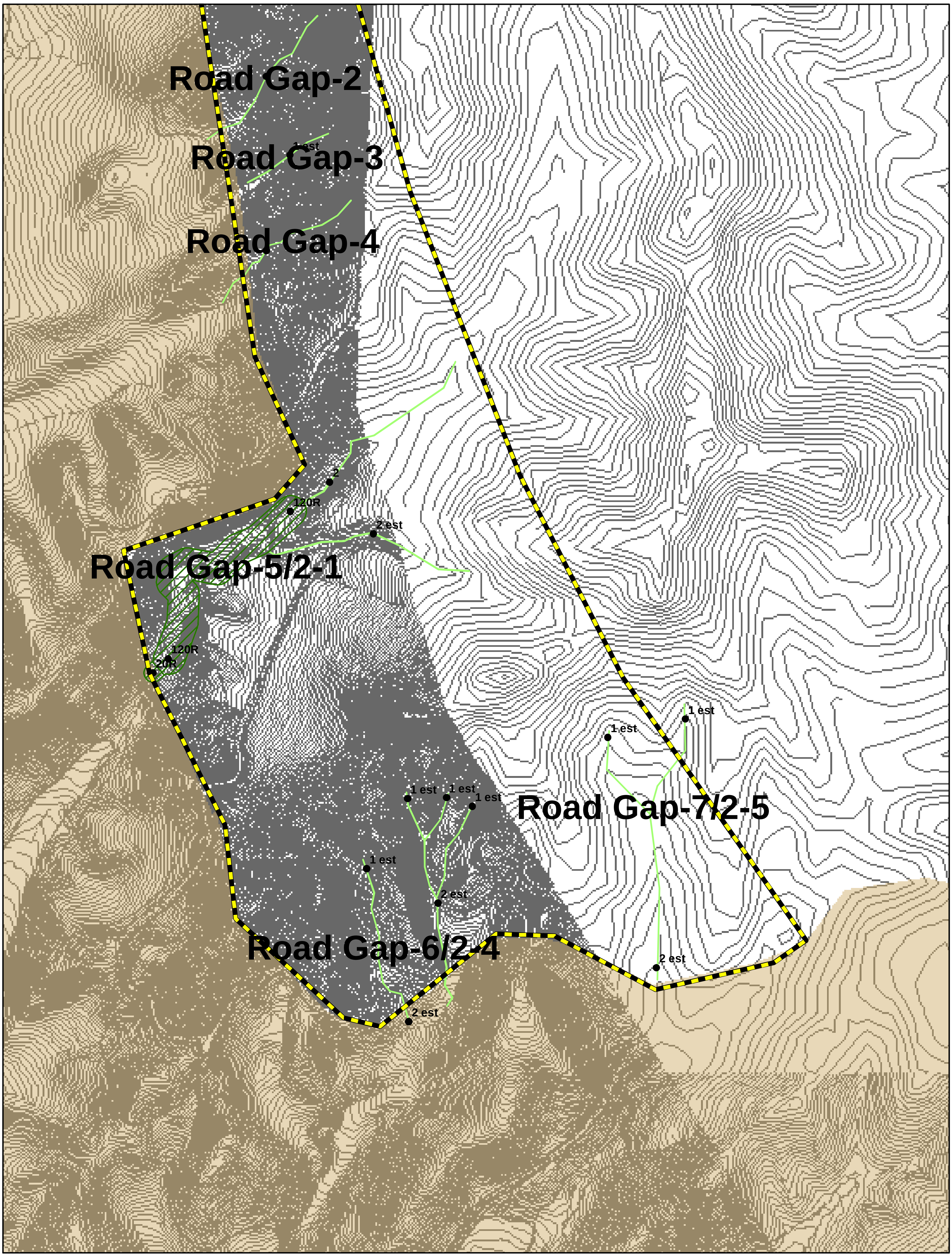
GLENN LUKOS ASSOCIATES

N

400 0 Feet

- Study Area Boundaries
- Soil Pit Location
- Streambed Width ("R" indicates the presence of Riparian Vegetation)
- No OHWM, bed or bank
- Riparian Vegetation
- Non-jurisdictional Feature
- Jurisdictional Streambed
- Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscdfg.mxd November 9, 2003



RANCHO MISSION VIEJO
ROAD GAP ANALYSIS

Jurisdictional Delineation Map (CDFG) Sheet 2

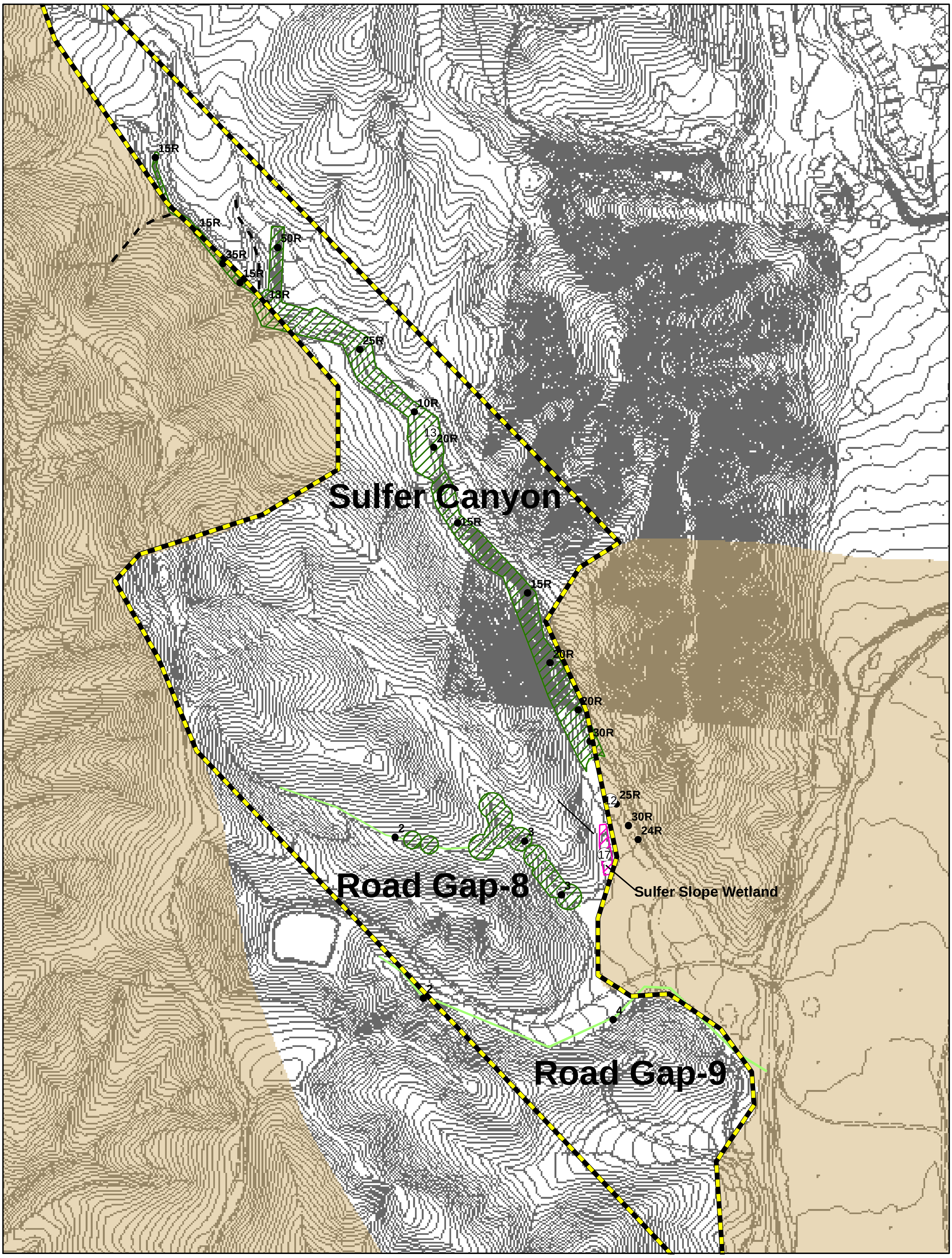
GLENN LUKOS ASSOCIATES

N

400 0 Feet

- Study Area Boundaries
- Soil Pit Location
- Streambed Width ("R" indicates the presence of Riparian Vegetation)
- No OHWM, bed or bank
- Riparian Vegetation
- Non-jurisdictional Feature
- Jurisdictional Streambed
- Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscdfg.mxd November 9, 2003



RANCHO MISSION VIEJO
ROAD GAP ANALYSIS

Jurisdictional Delineation Map (CDFG) Sheet 3

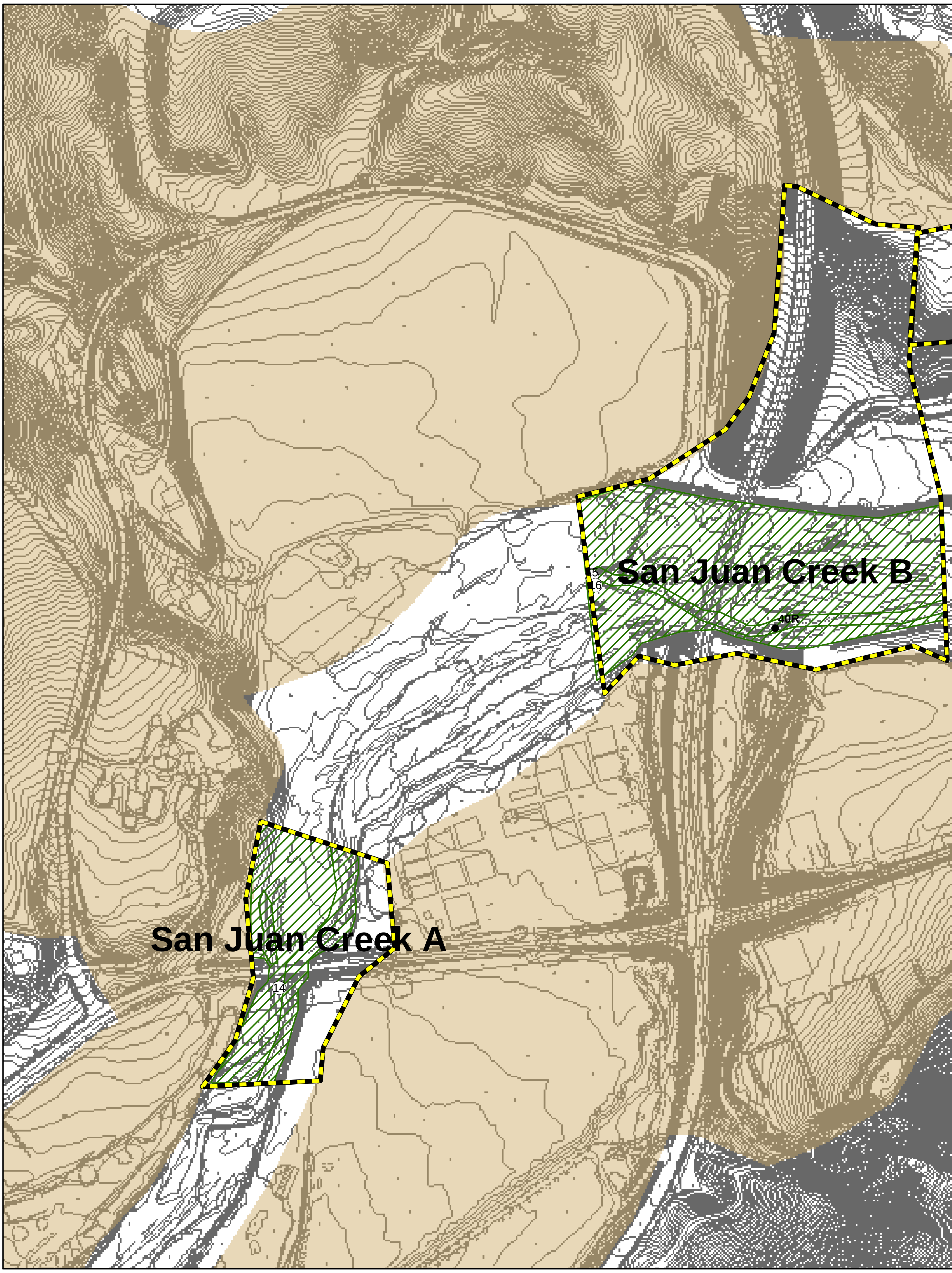
GLENN LUKOS ASSOCIATES

N

400 0 Feet

Study Area Boundaries
Soil Pit Location
Streambed Width ("R" indicates the presence of Riparian Vegetation)
No OHWM, bed or bank
Riparian Vegetation
Non-jurisdictional Feature
Jurisdictional Streambed
Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscdfg.mxd November 9, 2003



RANCHO MISSION VIEJO ROAD GAP ANALYSIS

Jurisdictional Delineation Map (CDFG) Sheet 4

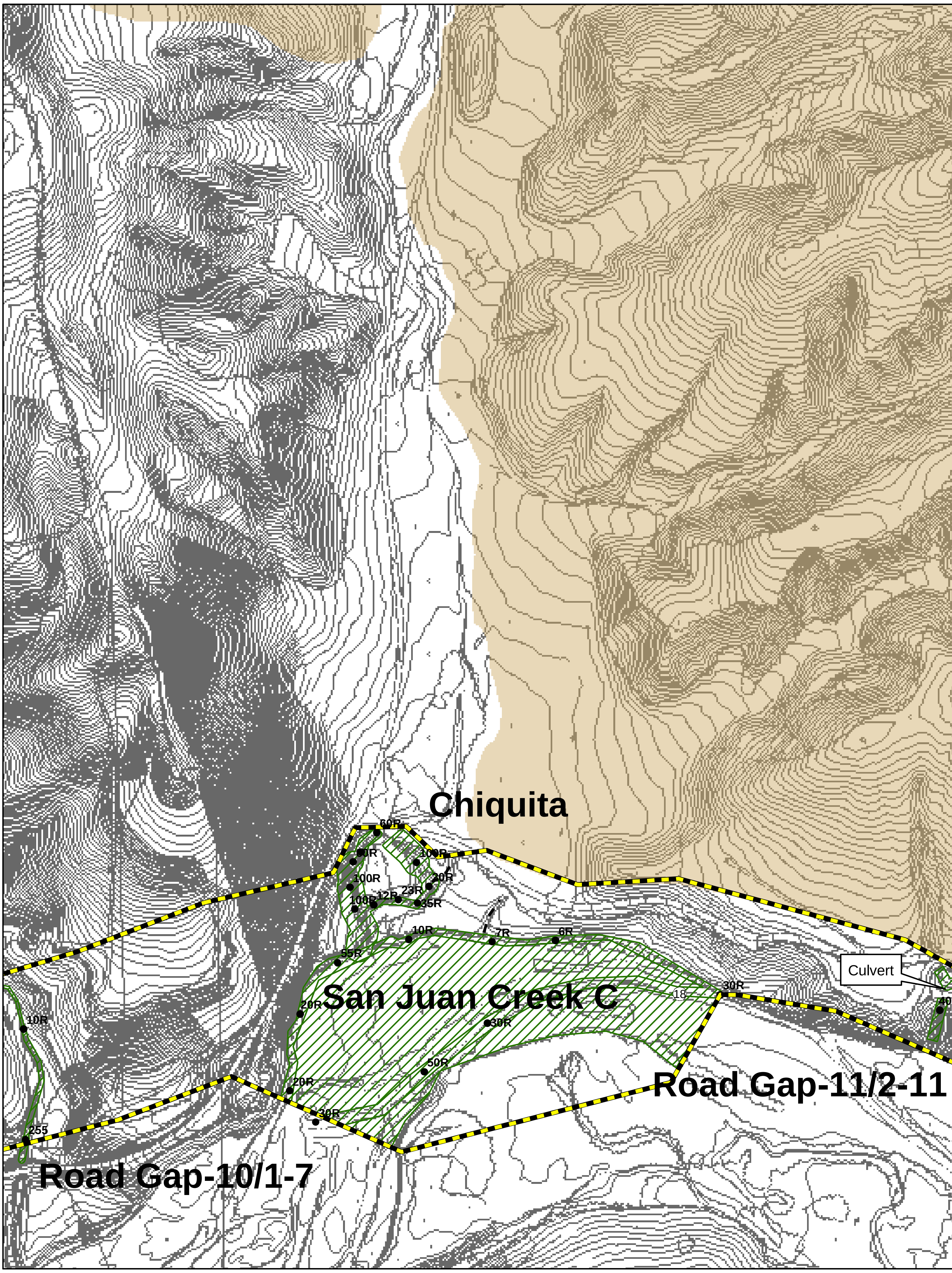
GLENN LUKOS ASSOCIATES

N

400 0 Feet

Study Area Boundaries
Soil Pit Location
Streambed Width ("R" indicates the presence of Riparian Vegetation)
No OHWM, bed or bank
Riparian Vegetation
Non-jurisdictional Feature
Jurisdictional Streambed
Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscdfg.mxd November 9, 2003



RANCHO MISSION VIEJO ROAD GAP ANALYSIS

Jurisdictional Delineation Map (CDFG) Sheet 5

GLENN LUKOS ASSOCIATES

N

400 0 Feet

Study Area Boundaries

Soil Pit Location

Streambed Width ("R" indicates the presence of Riparian Vegetation)

No OHWM, bed or bank

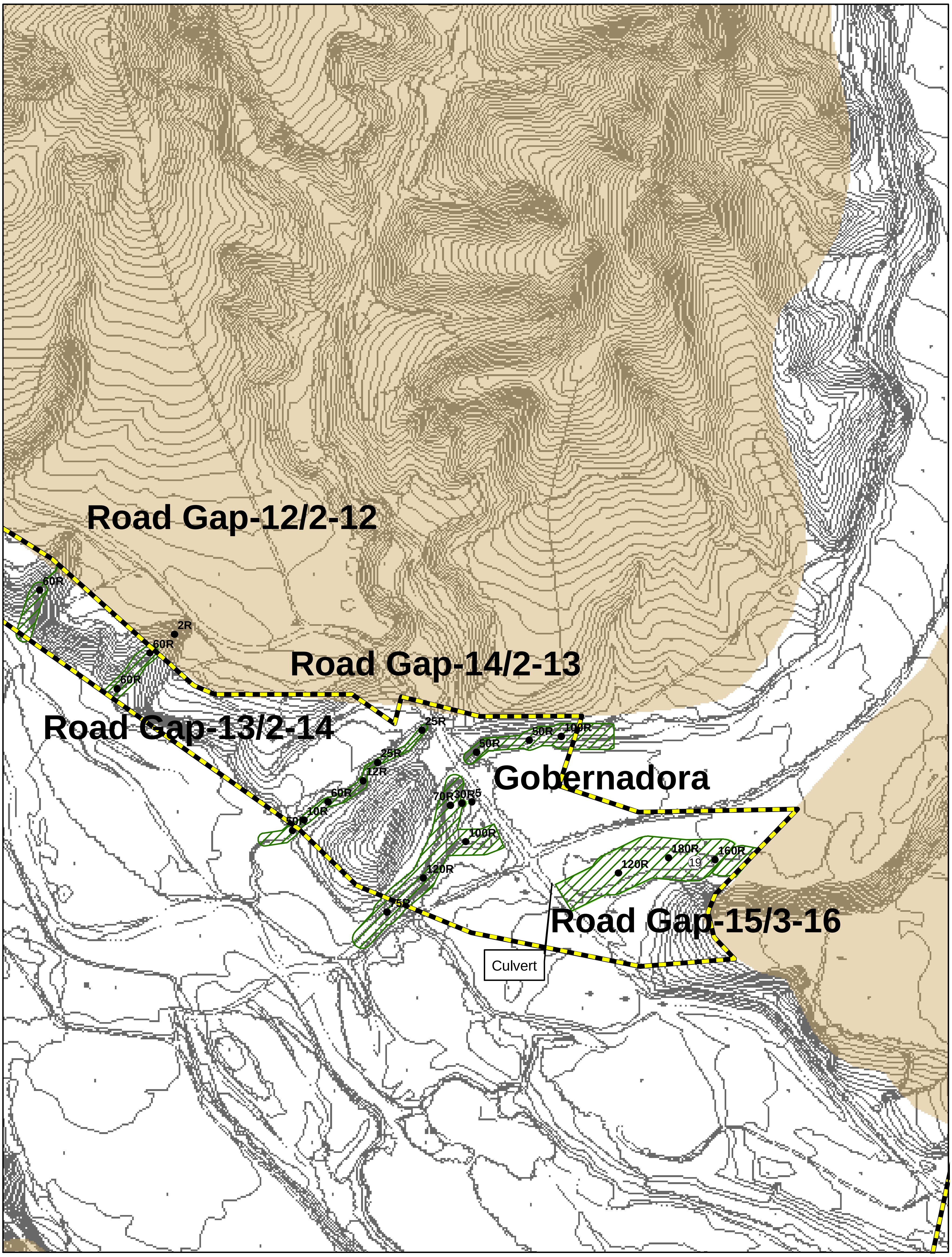
Riparian Vegetation

Non-jurisdictional Feature

Jurisdictional Streambed

Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscdfg.mxd November 9, 2003



RANCHO MISSION VIEJO
ROAD GAP ANALYSIS

Jurisdictional Delineation Map (CDFG) Sheet 6

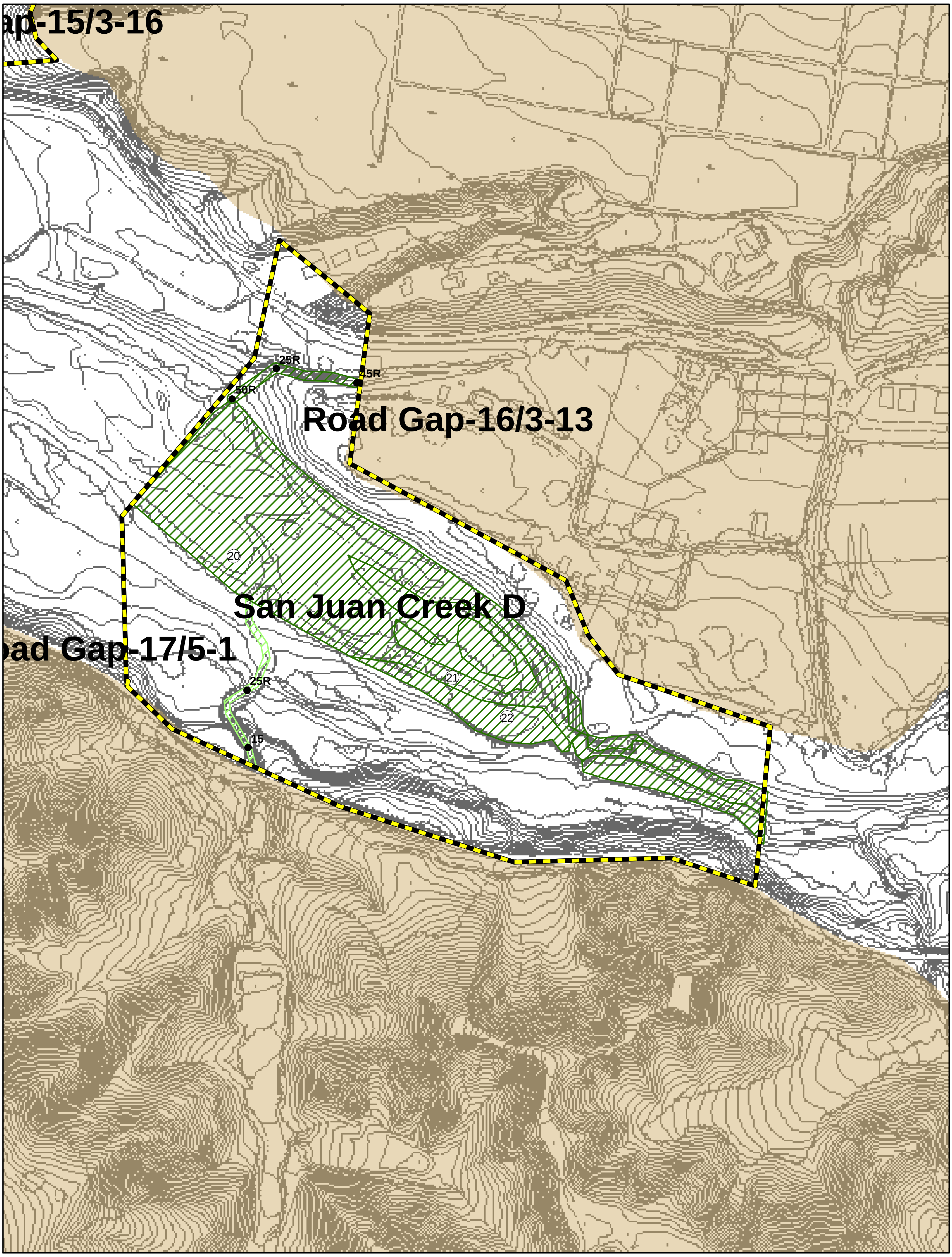
GLENN LUKOS ASSOCIATES

N

400 0 Feet

- Study Area Boundaries
- Soil Pit Location
- Streambed Width ("R" indicates the presence of Riparian Vegetation)
- No OHWM, bed or bank
- Riparian Vegetation
- Non-jurisdictional Feature
- Jurisdictional Streambed
- Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscdfg.mxd November 9, 2003



RANCHO MISSION VIEJO
ROAD GAP ANALYSIS

Jurisdictional Delineation Map (CDFG) Sheet 7

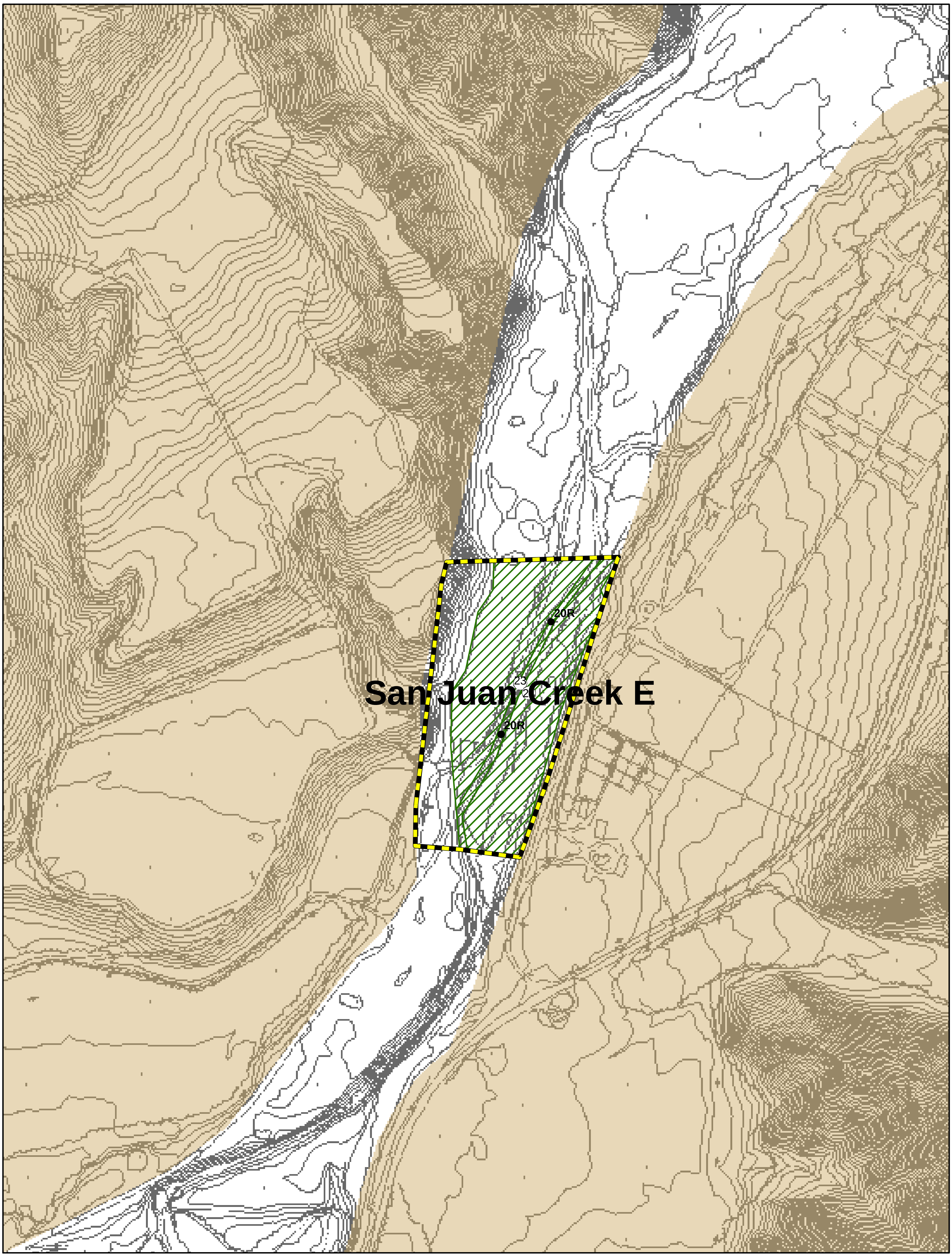
GLENN LUKOS ASSOCIATES

N

400 0 Feet

Study Area Boundaries
Soil Pit Location
Streambed Width ("R" indicates the presence of Riparian Vegetation)
No OHWM, bed or bank
Riparian Vegetation
Non-jurisdictional Feature
Jurisdictional Streambed
Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscdfg.mxd November 9, 2003



RANCHO MISSION VIEJO
ROAD GAP ANALYSIS

Jurisdictional Delineation Map (CDFG) Sheet 8

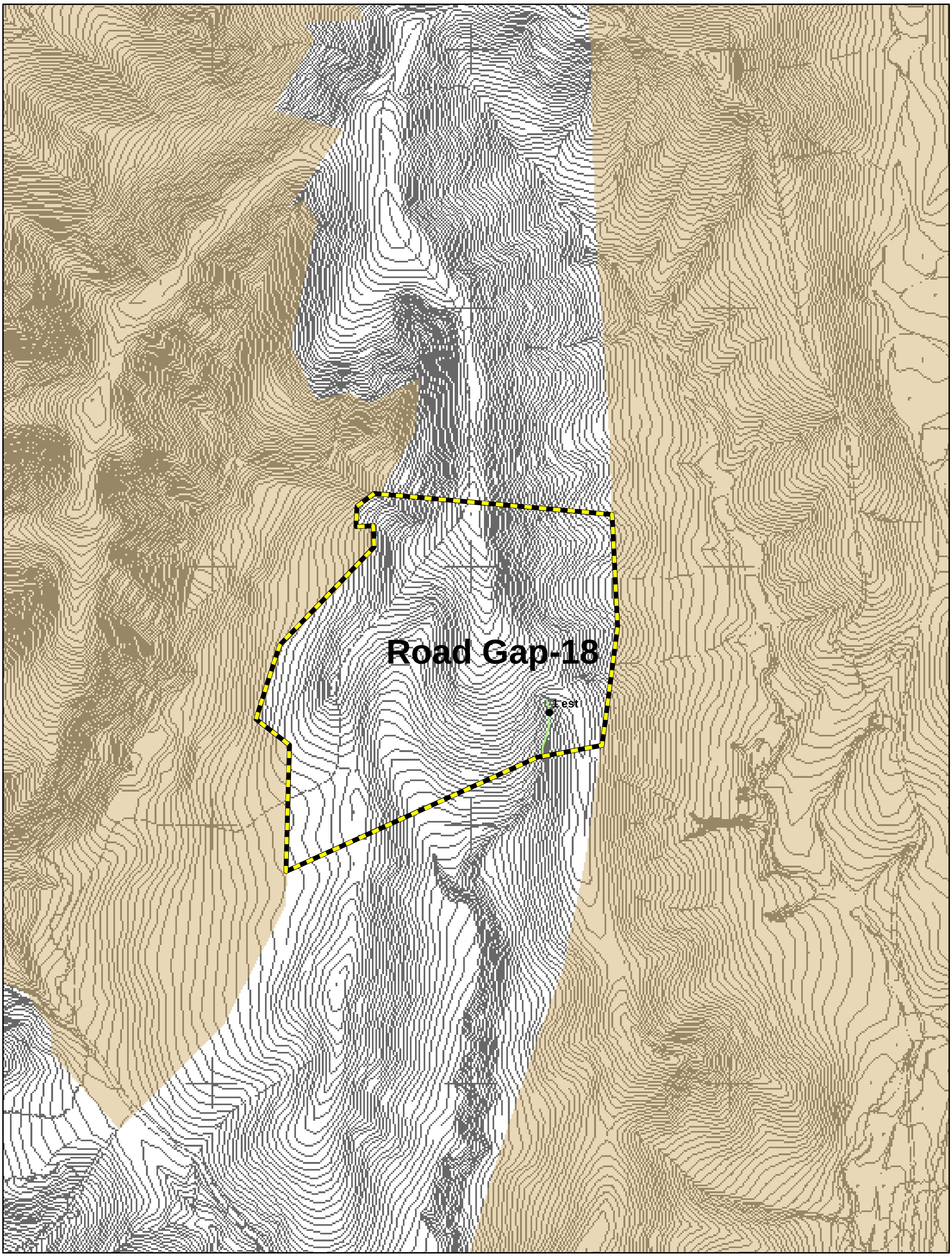
GLENN LUKOS ASSOCIATES

N

400 0 Feet

Study Area Boundaries
Soil Pit Location
Streambed Width ("R" indicates the presence of Riparian Vegetation)
No OHWM, bed or bank
Riparian Vegetation
Non-jurisdictional Feature
Jurisdictional Streambed
Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscdfg.mxd November 9, 2003



RANCHO MISSION VIEJO ROAD GAP ANALYSIS

Jurisdictional Delineation Map (CDFG) Sheet 9

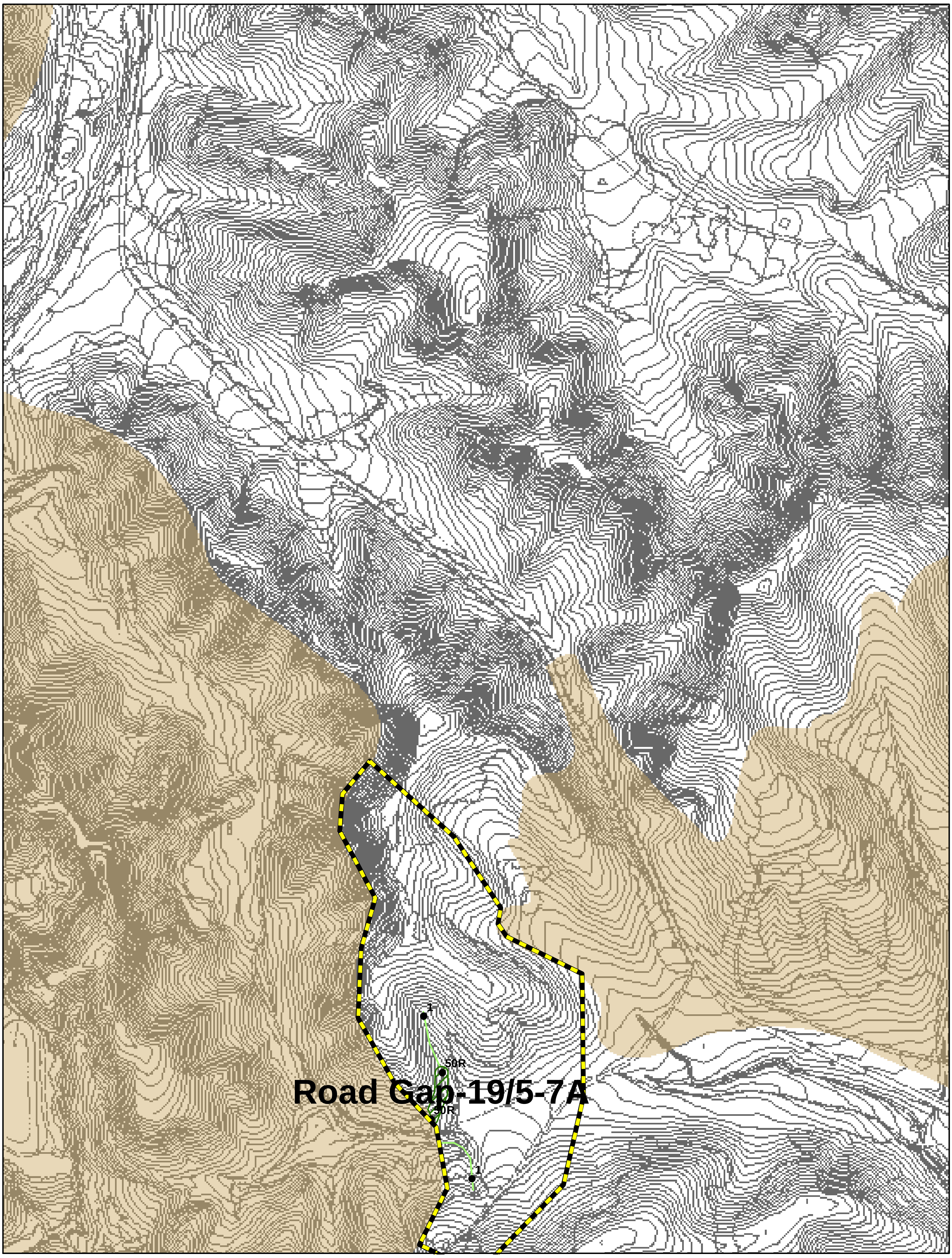
GLENN LUKOS ASSOCIATES

N

400 0 Feet

- Study Area Boundaries
- Soil Pit Location
- Streambed Width ("R" indicates the presence of Riparian Vegetation)
- No OHWM, bed or bank
- Riparian Vegetation
- Non-jurisdictional Feature
- Jurisdictional Streambed
- Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscdfg.mxd November 9, 2003



RANCHO MISSION VIEJO
ROAD GAP ANALYSIS

Jurisdictional Delineation Map (CDFG) Sheet 10

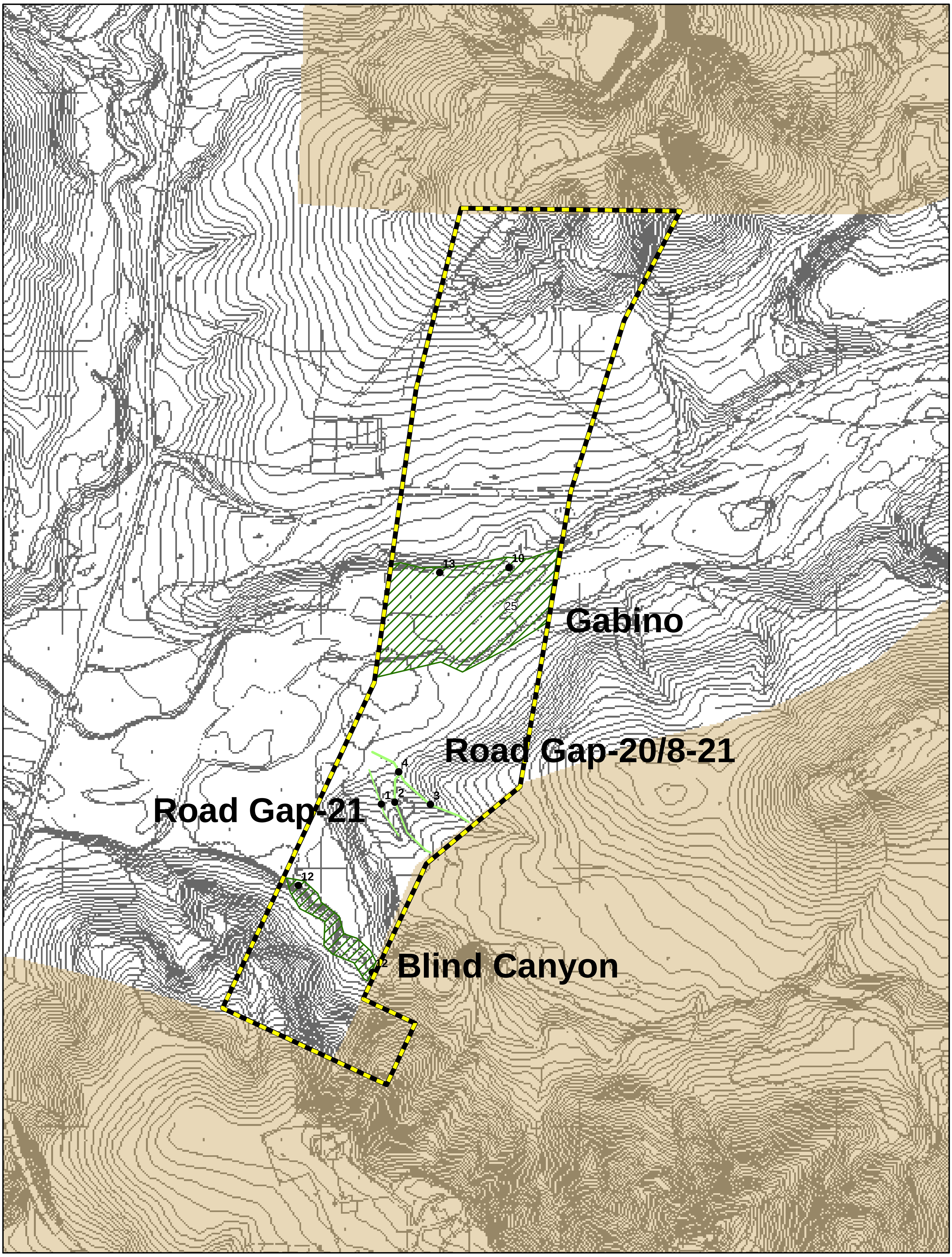
GLENN LUKOS ASSOCIATES

N

400 0 Feet

- Study Area Boundaries
- Soil Pit Location
- Streambed Width ("R" indicates the presence of Riparian Vegetation)
- No OHWM, bed or bank
- Riparian Vegetation
- Non-jurisdictional Feature
- Jurisdictional Streambed
- Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscdfg.mxd November 9, 2003



RANCHO MISSION VIEJO
ROAD GAP ANALYSIS

Jurisdictional Delineation Map (CDFG) Sheet 11

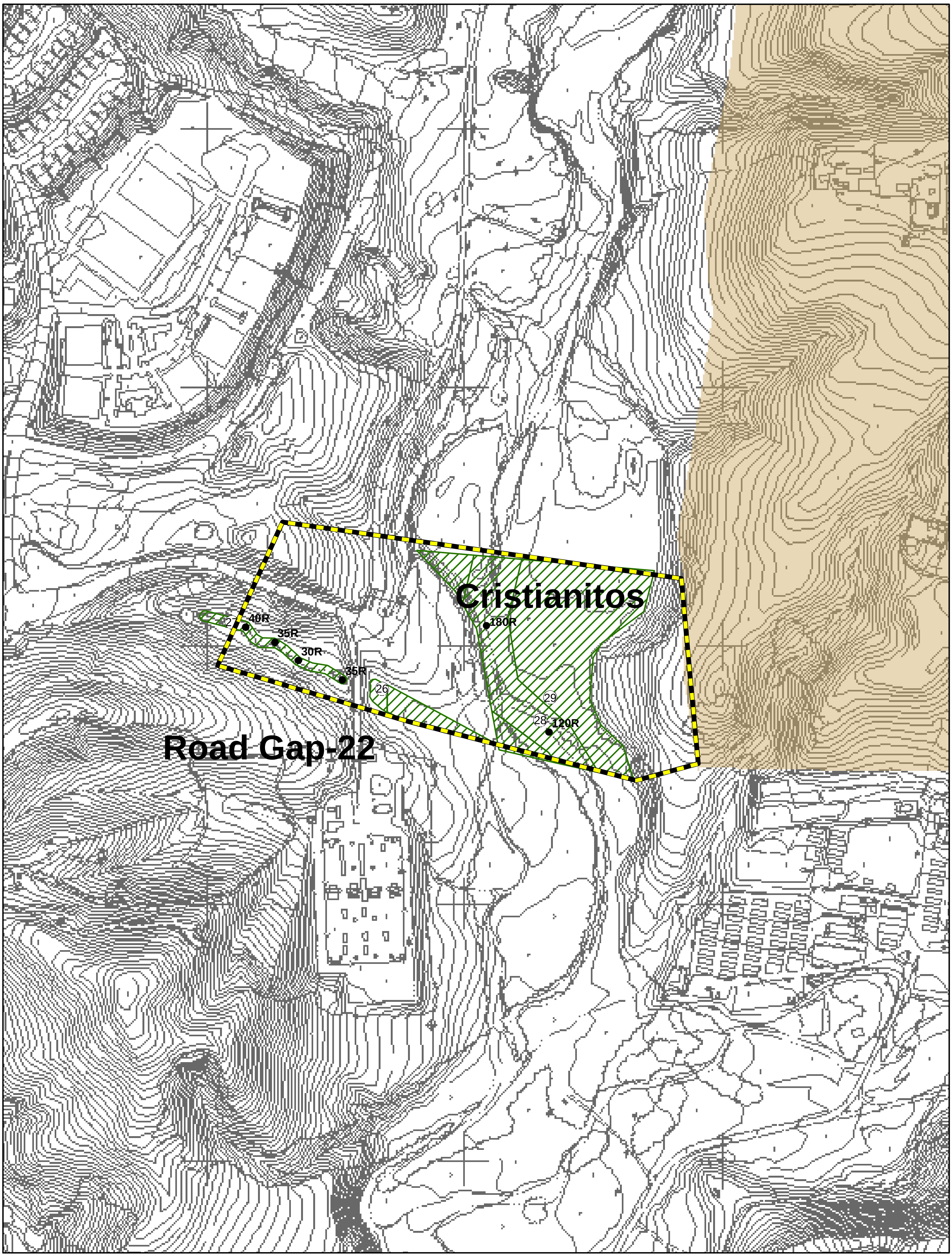
GLENN LUKOS ASSOCIATES

N

400 0 Feet

Study Area Boundaries
Soil Pit Location
Streambed Width ("R" indicates the presence of Riparian Vegetation)
No OHWM, bed or bank
Riparian Vegetation
Non-jurisdictional Feature
Jurisdictional Streambed
Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscdfg.mxd November 9, 2003



RANCHO MISSION VIEJO
ROAD GAP ANALYSIS

Jurisdictional Delineation Map (CDFG) Sheet 12

GLENN LUKOS ASSOCIATES

N

400 0 Feet

Study Area Boundaries
Soil Pit Location
Streambed Width ("R" indicates the presence of Riparian Vegetation)
No OHWM, bed or bank
Riparian Vegetation
Non-jurisdictional Feature
Jurisdictional Streambed
Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscdfg.mxd November 9, 2003

APPENDIX A

WETLAND DATA SHEETS ARE AVAILABLE FROM:

GLENN LUKOS ASSOCIATES
29 ORCHARD
LAKE FOREST, CA 92630
(949) 837-0404

November 14, 2003

Laura Coley Eisenberg
Rancho Mission Viejo
P.O. Box 9
San Juan Capistrano, CA 92693

SUBJECT: Graphical Peak Discharge Report, Trampas Dam Watershed, Rancho Mission Viejo, Orange County, California.

Dear Ms. Coley Eisenberg:

Glenn Lukos Associates (GLA) is currently assisting Rancho Mission Viejo (RMV) in preparing a jurisdictional delineation in support of the Special Area Management Plan/Master Streambed Alteration Agreement (SAMP/MSAA) that RMV is preparing in consultation with the U.S. Army Corps of Engineers (Corps) and California Department of Fish and Game (CDFG). The jurisdictional delineation covers all areas identified by the SAMP/MSAA alternatives as potentially developable. A development bubble (Planning Area 5) has been identified in the Trampas sub-basin. Currently Oglebay Norton Industrial Sands (ONIS) is located in this sub-basin, and conducts a sand mining operation on a portion of the sub-basin. Trampas Dam was constructed in 1975, prior to the July 1, 1977 phase-in-date for Section 404 permits for ephemeral tributaries, to support mining operations within this sub-basin. Water used in the sand processing operation, along with the tailings generated by the processing operation, are stored behind the dam. Since construction of the dam isolated all of the area above the dam from downstream jurisdictional waters prior to regulation under the Clean Water Act, the dam does not represent an impoundment of waters of the United States. It is therefore the position of RMV and GLA that the Tailings Pond/Recycle Area behind Trampas Canyon Dam is not subject to Corps jurisdiction as it is isolated pursuant to the recent Supreme Court decision in *Solid Waste Agency of Northernn Cook County v. United States Army Corps of Engineers et al* (SWANCC).

To date, the Corps has not concurred with this position and, during a review of the Tailings Pond/Recycle Area suggested that most effective way to evaluate the post-mining condition would be to “turn off the water”. The analysis summarized in this letter report was performed to respond to the Corps request and models the amount of U.S. Army Corps of Engineers (Corps) and California Department of Fish and Game (CDFG) jurisdiction for the Tailings Pond/Recycle Area in the post mining condition when all artificial water subsidies associated with current mining practices are withdrawn (It is not possible to literally “turn off the water” as the mining operator has a lease with RMV and is expected to continue mining until 2013).

Rather than turning off the water supply, a regulatory specialist/hydrologist GLA conducted an analysis of the amount of water that could potentially accumulate in the "Tailings Pond/Water Recycling Area" under natural hydrological conditions (i.e., with no artificial irrigation provided by the mining operation). As noted, in 1975, the Trampas Dam was constructed in such a manner that it isolated Trampas Canyon Creek and its ephemeral tributaries. It is important to note that prior to construction of the dam, GLA has determined (based on a Corps-verified delineation of upstream and downstream drainages) that the amount of ephemeral drainage channels isolated behind the dam was between 0.8 and 1.2 acres with no wetlands. In the post-mining condition, sufficient hydrology would exist, at the site under natural conditions (i.e., no irrigation subsidies) to support between 5 and 6 acres of hydrophytic vegetation, which would be isolated and not subject to Corps jurisdiction.

The watershed of the Trampas Canyon Dam (Dam) is located in Orange County [Exhibit 1] and covers approximately 362.6 acres of which 71.1 acres is open water or mine tailings [Exhibit 2].

I. METHODOLOGY

The most widely used rainfall-runoff model for routine design purposes in the United States is the SCS method, which was developed by the U.S. Soil Conservation Service (now the U.S. Natural Resources Conservation Service, NRCS). Technical Release 55 (TR-55) presents simplified procedures for estimating runoff and peak discharges in small watersheds. To save time, the procedures in TR-55 are simplified by assumptions, approximations and generalizations about certain parameters, which can provide results that are less refined than more detailed methods.[1] Runoff is determined primarily by the amount of precipitation and by infiltration characteristics related to soil type, soil moisture, antecedent rainfall, cover type, impervious surfaces and surface retention. Travel time is determined using slope, length of flow path, depth of flow, and roughness of flow surfaces. Peak discharges are based on the relationship of these parameters and on the total drainage area of the watershed, the effect of any natural or man-made storage, and the distribution of rainfall during a given storm event. A peak discharge was calculated for the watershed surrounding the Trampas Canyon Dam. The amount of water that would be impounded by the Tailings Pond and Recycle Area was calculated using the Rational Method, which will be discussed below.

---

[1] Wildermuth Environmental has, on a preliminary basis, conducted more detailed modeling of the Tailings Pond, that reduces the estimated watershed runoff (as set forth using the TR-55 methodology) from approximately 43.5 acre feet to between 25 and 30 acre feet. The more conservative number of 43.5 acre feet is incorporated into this analysis because the Wildermuth report has not yet been completed; however, upon its completion, it is expected to reduce the watershed runoff totals.

In order to determine the amount of wetland habitat that could be sustained in the post-mining condition, it was also necessary to calculate the amount of water that is required by native hydrophytes such as southern cattail (*Typha domingensis*) and California bulrush (*Scirpus californicus*). Water use data for vegetation was obtained from *Bulletin No. 50:Use of Water by Native Vegetation.*[2], Bulletin No. 50, State of California, Department of Public

A. Estimating Runoff

The Soil Conservation Service uses the Runoff Curve Number (CN) method to estimate runoff from storm rainfall. SCS runoff equation is:

$$Q = \frac{(P - I_a)^2}{(P - I_a) + S}$$

where Q = runoff (in)
P = rainfall (in)
S = potential maximum retention after runoff begins (in) and
I_a = initial abstraction

Initial Abstraction (I_a)

Initial abstraction is all losses before runoff begins. It includes water retained in surface depressions, water intercepted by vegetation, evaporation, and infiltration. I_a is highly variable and is correlated with soil and cover parameters. I_a is approximated in this method by the following empirical equation:

$$I_a = 0.2S$$

Substituting 0.2S for I_a in the runoff equation gives:

$$Q = \frac{(P - 0.2S)^2}{(P - 0.2S) + S}$$

S is related to the soil and cover conditions of the watershed through CN by:

[2] State of California, Department of public Works, Division of Water Resources. 1942. *Bulletin No. 50: Use of Water by Native Vegetation*, 160pp.

$$S = \frac{1000}{CN} - 10$$

Determination of CN depends on the soil and cover conditions of the watershed. Hydrologic soil group (HSG), cover type, treatment, hydrologic condition and antecedent runoff coefficient (ARC) are the five parameters analyzed to represent the soil and cover conditions.

Hydrologic Soil Groups (HSG)

Infiltration rates of soils vary widely and are affected by subsurface permeability as well as surface intake rates. Soils are classified into four HSG's (A, B, C, and D) according to their minimum infiltration rate, which is obtained for bare soil after prolonged wetting [Exhibit 3]. Soils in Group A have the lowest runoff potential and the highest infiltration rates, while Group D soils exhibit opposite characteristics.

The Soil Conservation Service (SCS) soil survey of the Orange County and Western Riverside Counties (1978) identified the soils in the area of interest. Table 1 lists each of the soil types located in the general vicinity of the study area along with their HSG classification and their watershed composition percentage.

Table 1. Soil Types and HSG Classifications for Watershed

Soil Type	*HSG Classification*	*Composition of Watershed*
Bosanko Clay (128)	Group D	25%
Cieneba Sandy Loam (142)	Group C	60%
Soper Gravelly Loam (202)	Group C	15%

Cover Type

Cover types address vegetation, bare soil and impervious surfaces of the study area. Field reconnaissance and aerial photographs were the methods used to determine the cover types. Arid and semiarid rangelands runoff curve numbers were used for this method [Exhibit 4].

Treatment

Treatment is a cover type modifier that is used to describe the management of cultivated agricultural lands. This is not applicable to the study area.

Hydrologic Condition

Hydrologic Condition indicates the effects of cover type on infiltration and runoff and is generally estimated from density of plant and residue cover on sample areas. Good hydrologic condition indicates that soil usually has a low runoff potential for that specific hydrologic soil group and cover type. Table 2 lists the cover type and hydrologic condition for each of the soils identified for the site.

Table 2. Cover Types and Hydrologic Conditions for Watershed

Soil Type	*Cover Type*	*Hydrologic Condition*
Bosanko Clay (128)	Oak-Aspen	Good
Cieneba Sandy Loam (142)	Oak-Aspen	Good
Soper Gravelly Loam (202)	Oak-Aspen	Good

Antecedent Runoff Condition (ARC)

The index of runoff potential before a storm event is the antecedent runoff condition. CN for the average ARC at a site is the median value as taken from sample rainfall and runoff data. Average runoff condition was assumed for this calculation.

Results

Table 3. Results from Runoff Calculations

Parameter	*Result*
Curve Number (CN)	43
Maximum Potential Retention After Runoff Begins (S)	13.26 in
Runoff (Q)	0.0024 in

Calculations for the runoff curve number and runoff for can be found on Worksheet 2 in Appendix A. The 2-year, 24-hour precipitation event was obtained from the NOAA Atlas 2.

Estimating Time of Concentration and Time of Travel

Travel time (T_t) is the time it takes water to travel from one location to another in a watershed. T_t is a component of time concentration (T_c), which is the time for runoff to travel from the hydraulically most distant point of the watershed to a point of interest within the watershed. T_c is computed by summing up all the travel times for consecutive components of the drainage conveyance system.

Time of travel and time of concentration is affected by surface roughness, channel shape, flow patterns, and slopes. Water moves through a watershed as sheet flow, shallow concentrated flow, open channel flow, or some combination of these. Sheet flow is flow over plane surfaces until it becomes shallow concentrated flow and then open channel flow. A detailed description of these types of flow along with the figure to determine average velocity for shallow concentrated flow is in Exhibit 5.

Table 4. Results from Time of Concentration and Travel Calculations

Flow Type	*Segment ID*	T_t
Sheet Flow	AB	0.21 hr
Shallow Concentrated Flow	BC	0.02 hr
Channel Flow	CD	0.02 hr
	T_c	**0.25 hr**

Calculations for the time of travel and time of concentration can be found on Worksheet 3 in Appendix A.

B. Graphical Peak Discharge Method

The graphical peak discharge method computes peak discharge from rural and urban areas. A detailed description of this method is in Exhibit 6, while the calculations can be found on Worksheet 4 in Appendix A.

Results

The peak discharge for the Trampas Dam watershed was determined to be 0.06 cubic feet per second (ft^3/s) or 43.5 af/yr.

C. Rational Method

To calculate the amount of water that will accumulate in the area behind the Dam through direct precipitation, a modified version of the Rational Method was applied.

$$Q = CIA$$

where: Q = peak discharge (ft^3/s)
C = runoff coefficient (dimensionless)
I = average available rainfall (ft/yr)
A = area (acres)

Average available rainfall (I) was calculated by subtracting the average monthly evaporation rates from the average monthly rainfall rates to determine the amount of rainfall that would remain in the Tailings Pond/Recycling Area (see Appendix B). Sulphur Creek Dam data was used because it is the closest recording station to Trampas Canyon Dam.

The peak discharge into the 71.1-acre area behind the dam, calculated from an average available rainfall of 3.58 inches with a runoff coefficient of 1.0 is 21.2 af/yr.

II. CONCLUSIONS/DISCUSSION

Under natural conditions, the area behind Trampas Dam will receive approximately 64.7 acre-feet of water in an average rainfall year including 43.5 acre-feet from the surrounding watershed and an additional 21.2 acres of "available" water from direct precipitation.

A. Overall Approach

In order to accurately determine the extent of hydrophytic vegetation in the post-mining condition, the following factors were considered/evaluated.

- Post-mining dry-out of the tailings;
- Hydrologic input from watershed runoff (provided in detail above);
- Hydrologic input from precipitation (provided in detail above);
- Water consumption by hydrophytic vegetation (amounts); and
- Water consumption by hydrophytic vegetation (seasonality)

B. Post-Mining Dryout of Tailings

Currently, water depths for areas occupied by cattails, which accounts for approximately 55 acres of the Tailings Pond, average less than two feet. Cattails and bulrush will use up to eight feet of water per year when it is available and require a minimum of about five feet of water seasonally to survive and persist on a site.[3] Cattails and bulrush exhibit winter dormancy with most of the water consumption occurring during the period from May to November. Cattails and bulrush are both shallow-rooted species with nearly all of root zone located in the upper two feet.

[3] California bulrush grown in tanks will use up to 184 inches (15.3 feet) of water per year. In the field, under optimal hydrological conditions the actual water use is substantially less, varying between five and eight feet

Without water subsidies from the mining operation, essentially all of the water within the root zone of the cattails and bulrush would be depleted by the end of one growing season.[4]

While the Tailings Pond is drying out during the first year without water subsidies, the exposed substrate will quickly be colonized by propagules from non-native grasses and forbs that are found throughout the watershed of the Tailings Pond including wild oats (*Avena farua*, UPL), slender oats (*Avena barbata*, UPL), ripgut (*Bromus diandrus*, UPL), soft chess (*Bromus hordeaceus*, UPL), red brome (*Bromus madritensis rubens*, UPL), rattail fescue (*Vulpia myuros*, UPL), Italian ryegrass (*Lolium multiflorum*, UPL), black mustard (*Brassica nigra*, UPL), field mustard (*Brassica rapa*, UPL), wild radish (*Raphanus sativus*, UPL), tocalote (*Centaurea melitensis*, UPL) and three species of filaree (*Erodium* spp., UPL). These species, as a group, germinate during winter and early spring, consuming most available soil moisture by late spring or early summer, meaning that they are most active during the winter dormancy of the cattails and bulrush, substantially limiting soil moisture that might be available to any surviving wetland plants. Direct evaporation and evapotranspiration will consume most direct precipitation falling on the tailings such that water would be available in very limited amounts to wetland plant species.[5]

C. Input from Watershed Runoff

The hydrological model determined that a maximum of 43.5 acre-feet of water would reach the tailings during an average rainfall year.[6] Essentially all of the hydrological input from watershed runoff would occur during the rainy season, which is between October 15 and April 15. This runoff would reach the outer edges of the Tailings Pond, at points where the ephemeral drainages intersect the Tailings. Tailings at these locations would be shallowest and much of the water would be stored in the upper few feet, meaning that it would be available to whatever plants are growing at the discharge point. As noted above, substantial amounts of this water would be consumed by opportunistic spring annuals, which germinate as early as November or December (coincident with the first one to two inches of rainfall) and reach their peak growth during February and March (some species such as Italian Ryegrass geminate a little later and reach peak growth in March and April). The approximately 43.5 acre feet of runoff would generally be

[4] This includes surface water up to three feet and subsurface water at depths to three feet. Evaporation and transpiration combined could account for up to 12 feet of water loss in the first year if sufficient water supplies were available.
[5] According to Water Bulletin 50, native grasses and weeds will use between 10.0 and 15.5 inches of water per year and in most years will use all available soil moisture except in above-average rainfall years when limited amounts of water penetrate to below the root zone before the water is transpired.
[6] As noted in footnote 1 above, a more detailed analysis is expected to reduce the total to between 25 and 30 acre feet.

sufficient to support up to 7.0 acres of cattails, bulrush and other native and non-native hydrophytes. However, direct evaporation coupled with water consumption by spring annuals, which would germinate and reach maximum growth during the winter dormancy period exhibited by the cattails and bulrush, would reduce to amount of wetland vegetation to between 5.0 and 6.0 acres.[7]

D. **D. Input from Direct Precipitation**

During average rainfall years, approximately 75 acre-feet would fall on the area occupied by the mine tailings. Essentially all of the hydrological input from direct precipitation would occur during the rainy season, which is between October 15 and April 15, which as noted above coincides with the winter dormancy period of native hydrophytes and the germination and maximum growth period of non-native spring annual grasses and forbs. Evaporation rates exceed rainfall rates in all months except for February and March, leaving about 21 acre feet of available water. Up to 15 inches of water could be used by the weedy annual vegetation with the rest lost to evaporation leaving essentially no additional water to support wetland vegetation.

E. E. Summary/Conclusions

In the post-mining condition, the available surface and subsurface water in the Tailings Pond would be consumed by the existing hydrophytic vegetation, which exhibits high water consumption rates, beginning in late spring and continuing until late fall. Natural hydrologic input from storm runoff and direct precipitation would coincide with the germination and maximum growth period of the (mostly) non-native annual grasses and forbs expected to rapidly colonize the drying tailings. Available water for native hydrophytes would be a maximum of 30 and 35 acre feet which would be sufficient to allow persistence of between 5.0 and 6.0 acres of hydrophytic vegetation.

---

[7] A reduction in the runoff from 43.5 to 25 to 30 acre feet would result in a reduction of potential wetland habitat to between approximately three and four acres.

If you have any questions about this letter report, please contact either Tony Bomkamp or Cherylee Sevilla at (949) 837-0404.

Sincerely,

GLENN LUKOS ASSOCIATES, INC.

Tony Bomkamp
Senior Biologist

s:0239-15TrampasDam2.rpt

Adapted from USGS Santa Ana Quadrangle

NORTH

SCALE IN MILES

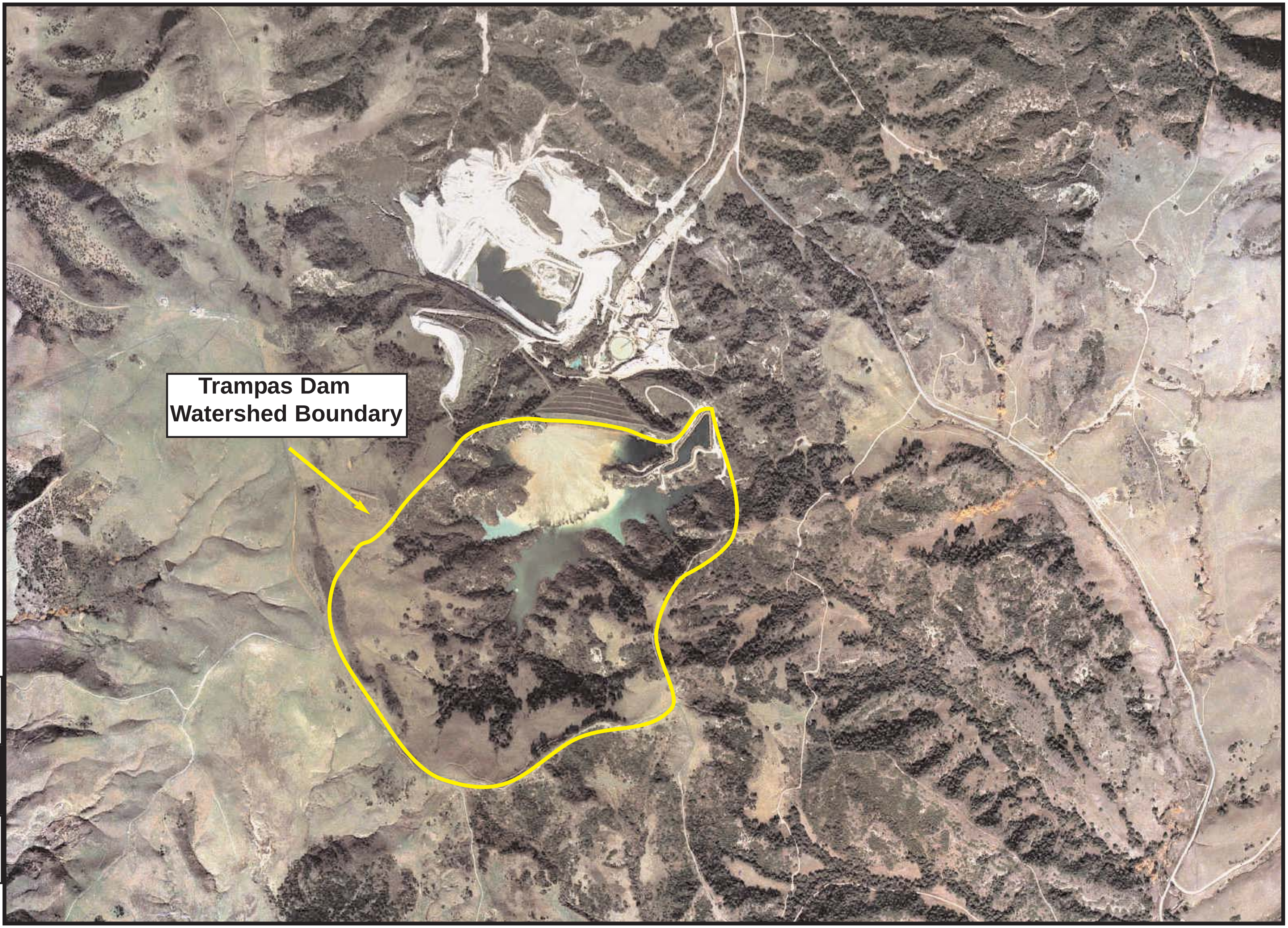
TRAMPAS CANYON DAM

Regional Map

GLENN LUKOS ASSOCIATES

EXHIBIT 1

Adapted from Rancho Mission Viejo
Interactive Aerial Photograph GIS Index



NORTH

0 1000 2000 3000
FEET

TRAMPAS CANYON DAM

Watershed Boundary

GLENN LUKOS ASSOCIATES

EXHIBIT 2

Hydrologic Soil Groups

Soils are classified into hydrologic soil groups (HSG's) to indicate the minimum rate of infiltration obtained for bare soil after prolonged wetting. The HSG's, which are A, B, C, and D, are one element used in determining runoff curve numbers (see chapter 2). For the convenience of TR-55 users, exhibit A-1 lists the HSG classification of United States soils.

The infiltration rate is the rate at which water enters the soil at the soil surface. It is controlled by surface conditions. HSG also indicates the transmission rate—the rate at which the water moves within the soil. This rate is controlled by the soil profile. Approximate numerical ranges for transmission rates shown in the HSG definitions were first published by Musgrave (USDA 1955). The four groups are defined by SCS soil scientists as follows:

Group Asoils have low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sand or gravel and have a high rate of water transmission (greater than 0.30 in/hr).

Group Bsoils have moderate infiltration rates when thoroughly wetted and consist chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission (0.15-0.30 in/hr).

Group Csoils have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine texture. These soils have a low rate of water transmission (0.05-0.15 in/hr).

Group Dsoils have high runoff potential. They have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very low rate of water transmission (0-0.05 in/hr).

In exhibit A-1, some of the listed soils have an added modifier; for example, "Abrazo, gravelly." This refers to a gravelly phase of the Abrazo series that is found in SCS soil map legends.

Disturbed soil profiles

As a result of urbanization, the soil profile may be considerably altered and the listed group classification may no longer apply. In these circumstances, use the following to determine HSG according to the texture of the new surface soil, provided that significant compaction has not occurred (Brakensiek and Rawls 1983).

HSG	*Soil textures*
A	Sand, loamy sand, or sandy loam
B	Silt loam or loam
C	Sandy clay loam
D	Clay loam, silty clay loam, sandy clay, silty clay, or clay

Drainage and group D soils

Some soils in the list are in group D because of a high water table that creates a drainage problem. Once these soils are effectively drained, they are placed in a different group. For example, Ackerman soil is classified as A/D. This indicates that the drained Ackerman soil is in group A and the undrained soil is in group D.

Table 2-2d Runoff curve numbers for arid and semiarid rangelands 1/

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition 2/	A 3/	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

1 Average runoff condition, and I_a, = 0.2S. For range in humid regions, use table 2-2c.
2 Poor: <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: > 70% ground cover.
3 Curve numbers for group A have been developed only for desert shrub.

Sheet flow

Sheet flow is flow over plane surfaces. It usually occurs in the headwater of streams. With sheet flow, the friction value (Manning's n) is an effective roughness coefficient that includes the effect of raindrop impact; drag over the plane surface; obstacles such as litter, crop ridges, and rocks; and erosion and transportation of sediment. These n values are for very shallow flow depths of about 0.1 foot or so. Table 3-1 gives Manning's n values for sheet flow for various surface conditions.

Table 3-1 Roughness coefficients (Manning's n) for sheet flow

Surface description	n [1]
Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover ≤20%	0.06
Residue cover >20%	0.17
Grass:	
Short grass prairie	0.15
Dense grasses [2]	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods:[3]	
Light underbrush	0.40
Dense underbrush	0.80

1 The n values are a composite of information compiled by Engman (1986).
2 Includes species such as weeping lovegrass, bluegrass, buffalo grass, blue grama grass, and native grass mixtures.
3 When selecting n , consider cover to a height of about 0.1 ft. This is the only part of the plant cover that will obstruct sheet flow.

For sheet flow of less than 300 feet, use Manning's kinematic solution (Overtop and Meadows 1976) to compute T_t:

$$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5} s^{0.4}} \qquad \text{[eq. 3-3]}$$

where:

T_t = travel time (hr),
n = Manning's roughness coefficient (table 3-1)
L = flow length (ft)
P_2 = 2-year, 24-hour rainfall (in)
s = slope of hydraulic grade line (land slope, ft/ft)

This simplified form of the Manning's kinematic solution is based on the following: (1) shallow steady uniform flow, (2) constant intensity of rainfall excess (that part of a rain available for runoff), (3) rainfall duration of 24 hours, and (4) minor effect of infiltration on travel time. Rainfall depth can be obtained from appendix B.

Shallow concentrated flow

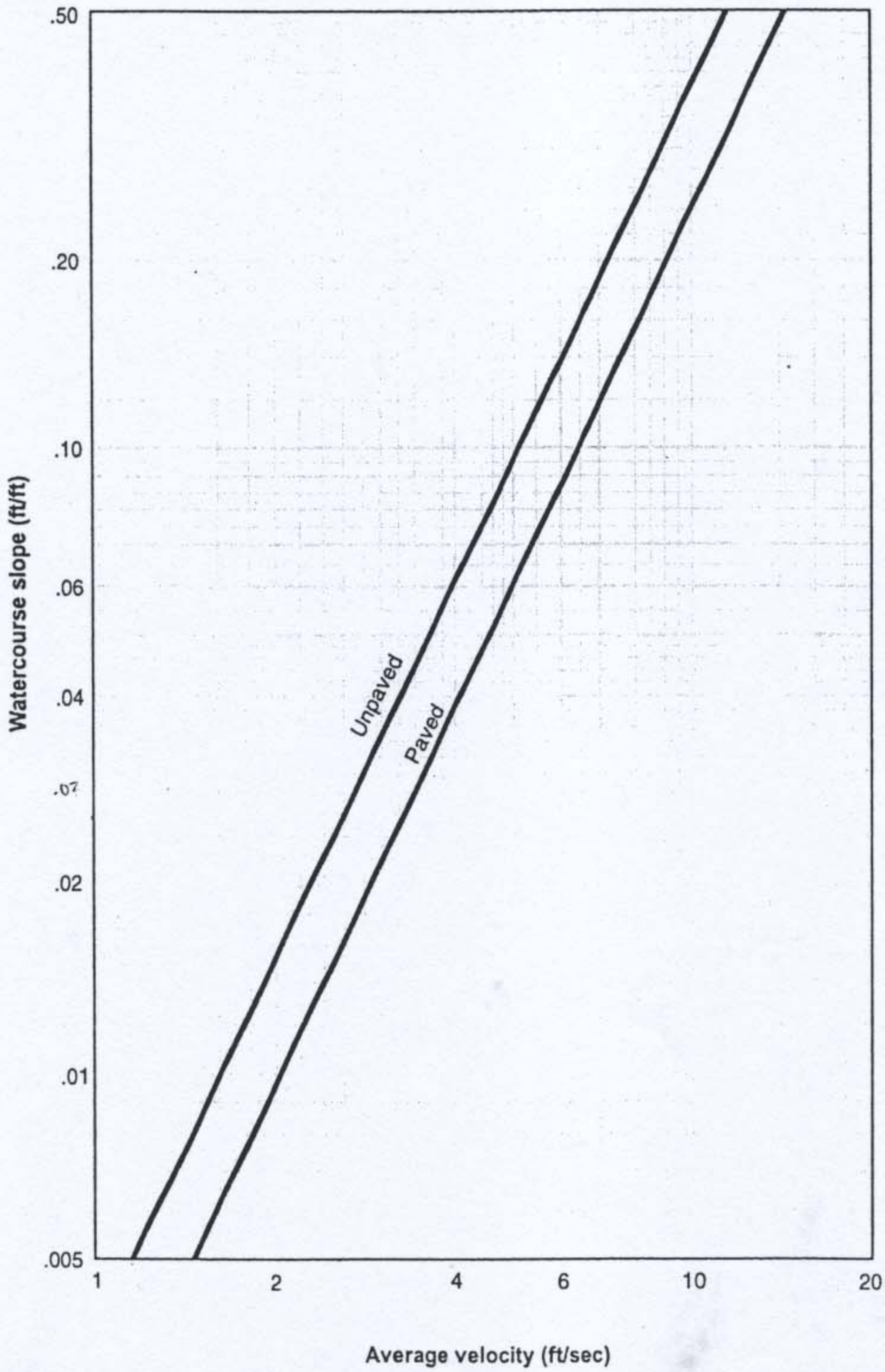
After a maximum of 300 feet, sheet flow usually becomes shallow concentrated flow. The average velocity for this flow can be determined from figure 3-1, in which average velocity is a function of watercourse slope and type of channel. For slopes less than 0.005 ft/ft, use equations given in appendix F for figure 3-1. Tillage can affect the direction of shallow concentrated flow. Flow may not always be directly down the watershed slope if tillage runs across the slope.

After determining average velocity in figure 3-1, use equation 3-1 to estimate travel time for the shallow concentrated flow segment.

Open channels

Open channels are assumed to begin where surveyed cross section information has been obtained, where channels are visible on aerial photographs, or where blue lines (indicating streams) appear on United States Geological Survey (USGS) quadrangle sheets. Manning's equation or water surface profile information can be used to estimate average flow velocity. Average flow velocity is usually determined for bank-full elevation.

Figure 3-1 Average velocities for estimating travel time for shallow concentrated flow



Chapter 4 Graphical Peak Discharge Method

This chapter presents the Graphical Peak Discharge method for computing peak discharge from rural and urban areas. The Graphical method was developed from hydrograph analyses using TR-20, "Computer Program for Project Formulation—Hydrology" (SCS 1983). The peak discharge equation used is:

$$q_p = q_u A_m Q F_p \qquad \text{[eq. 4-1]}$$

where:

q_p = peak discharge (cfs)
q_u = unit peak discharge (csm/in)
A_m = drainage area (mi^2)
Q = runoff (in)
F_p = pond and swamp adjustment factor

The input requirements for the Graphical method are as follows: (1) T_c (hr), (2) drainage area (mi^2), (3) appropriate rainfall distribution (I, IA, II, or III), (4) 24-hour rainfall (in), and (5) CN. If pond and swamp areas are spread throughout the watershed and are not considered in the T_c computation, an adjustment for pond and swamp areas is also needed.

Peak discharge computation

For a selected rainfall frequency, the 24-hour rainfall (P) is obtained from appendix B or more detailed local precipitation maps. CN and total runoff (Q) for the watershed are computed according to the methods outlined in chapter 2. The CN is used to determine the initial abstraction (I_a) from table 4-1. I_a / P is then computed.

If the computed I_a / P ratio is outside the range in exhibit 4 (4-I, 4-IA, 4-II, and 4-III) for the rainfall distribution of interest, then the limiting value should be used. If the ratio falls between the limiting values, use linear interpolation. Figure 4-1 illustrates the sensitivity of I_a / P to CN and P.

Peak discharge per square mile per inch of runoff (q_u) is obtained from exhibit 4-I, 4-IA, 4-II, or 4-III by using T_c (chapter 3), rainfall distribution type, and I_a / P ratio. The pond and swamp adjustment factor is obtained from table 4-2 (rounded to the nearest table value). Use worksheet 4 in appendix D to aid in computing the peak discharge using the Graphical method.

Figure 4-1 Variation of I_a / P for P and CN

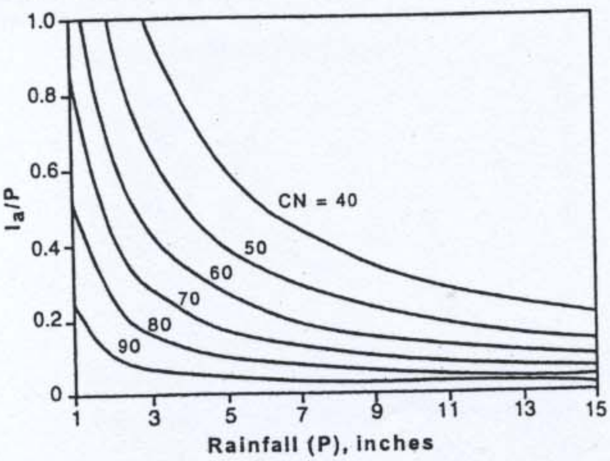
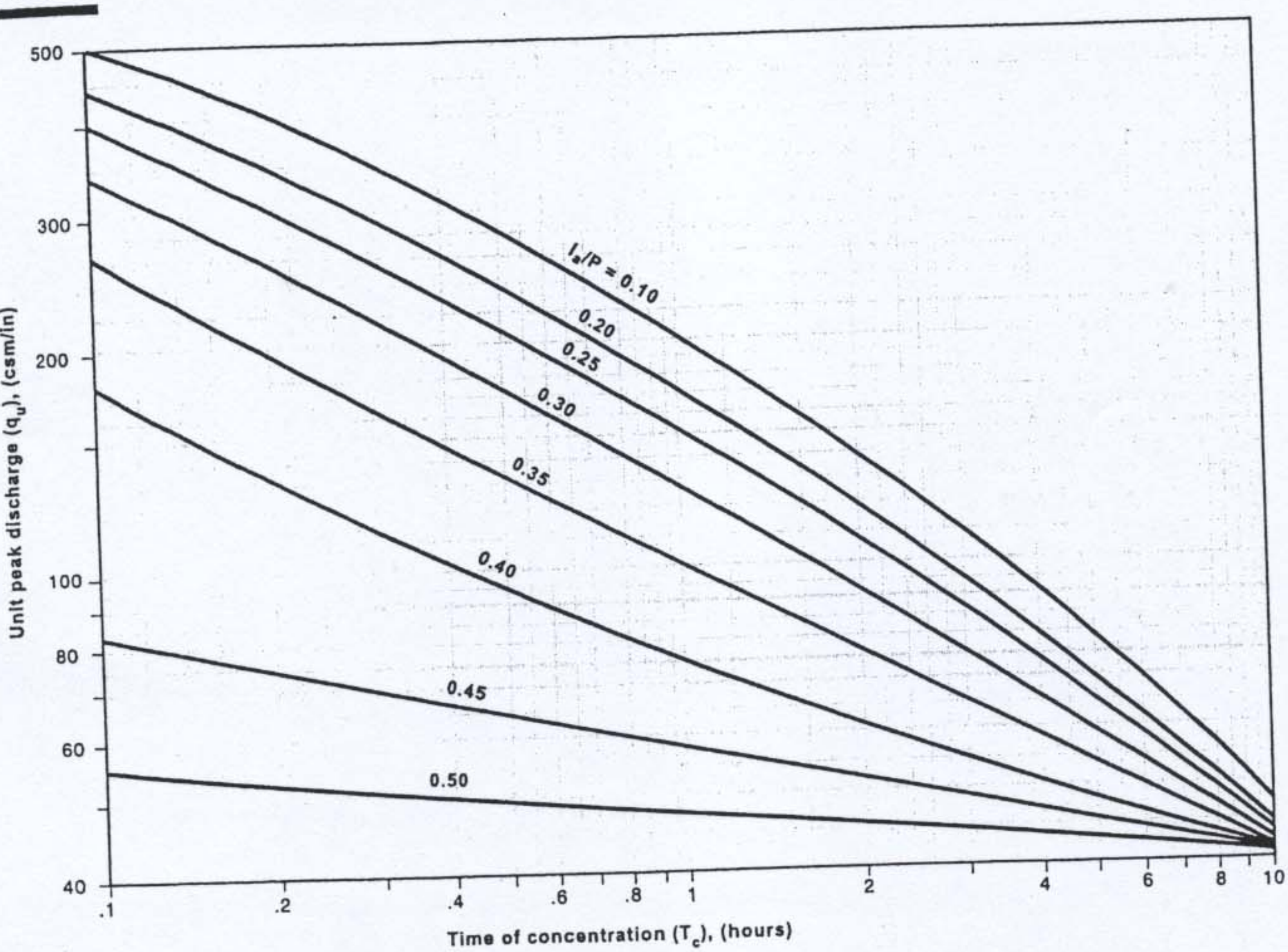


Table 4-1 I_a values for runoff curve numbers

Curve number	I_a (in)	Curve number	I_a (in)
40	3.000	70	0.857
41	2.878	71	0.817
42	2.762	72	0.778
43	2.651	73	0.740
44	2.545	74	0.703
45	2.444	75	0.667
46	2.348	76	0.632
47	2.255	77	0.597
48	2.167	78	0.564
49	2.082	79	0.532
50	2.000	80	0.500
51	1.922	81	0.469
52	1.846	82	0.439
53	1.774	83	0.410
54	1.704	84	0.381
55	1.636	85	0.353
56	1.571	86	0.326
57	1.509	87	0.299
58	1.448	88	0.273
59	1.390	89	0.247
60	1.333	90	0.222
61	1.279	91	0.198
62	1.226	92	0.174
63	1.175	93	0.151
64	1.125	94	0.128
65	1.077	95	0.105
66	1.030	96	0.083
67	0.985	97	0.062
68	0.941	98	0.041
69	0.899		

Exhibit 4-I Unit peak discharge (q_u) for NRCS (SCS) type I rainfall distribution



Worksheet 2: Runoff curve number and runoff

Project Trampas Canyon	By	Date
Location Rancho Mission Viejo	Checked	Date

Check one: ☒ Present ☐ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN [1/] Table 2-2	CN [1/] Figure 2-3	CN [1/] Figure 2-4	Area ☐ acres ☐ mi² ☒ %	Product of CN x area
cieneba, C	oak-aspen, good	41			60	2460
Soper, C	oak-aspen, good	41			15	615
Bosanko, D	oak-aspen, good	48			25	1200
						4275
				Totals ➡	100	4275

[1/] Use only one CN source per line

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{4275}{100} = 42.75;$$

Use CN ➡ 43

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2		
Rainfall, P (24-hour)	in	2.48		
Runoff, Q (Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)	in	0.0024		

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project: Trampas Canyon	By	Date
Location: Rancho Mission Viejo	Checked	Date

Check one: ☒ Present ☐ Developed

Check one: ☒ T_c ☐ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to Tc only)

Segment ID	AB		
1. Surface description (table 3-1)	Dense grass		
2. Manning's roughness coefficient, n (table 3-1)	0.24		
3. Flow length, L (total L † 300 ft) ... ft	300		
4. Two-year 24-hour rainfall, P_2 ... in	2.48		
5. Land slope, s ... ft/ft	0.33		
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{\ 0.5}\ s^{0.4}}$ Compute T_t ... hr	0.21	+	= 0.21

Shallow concentrated flow

Segment ID	BC		
7. Surface description (paved or unpaved)	unpaved		
8. Flow length, L ... ft	200		
9. Watercourse slope, s ... ft/ft	0.028		
10. Average velocity, V (figure 3-1) ... ft/s	2.8		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t ... hr	0.020	+	= 0.02

Channel flow

Segment ID	CD		
12. Cross sectional flow area, a ... ft^2	8		
13. Wetted perimeter, p_w ... ft	8		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ... ft	1		
15 Channel slope, s ... ft/ft	0.18		
16. Manning's roughness coefficient, n ...	0.025		
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ... ft/s	25.03		
18. Flow length, L ... ft	1880		
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ... hr	0.021	+	= 0.02
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ... Hr			0.25

Worksheet 4: Graphical Peak Discharge method

Project Trampas Canyon Dam	By	Date
Location Rancho Mission Viejo	Checked	Date

Check one: ☒ Present ☐ Developed

1. Data

Drainage area .... A_m = 0.45 mi^2 (acres/640)

Runoff curve number ....CN = 43 (From worksheet 2)

Time of concentration .... T_c = 0.25 hr (From worksheet 3)

Rainfall distribution .... = I (I, IA, II III)

Pond and swamp areas spread throughout watershed .... = Ø percent of A_m (Ø acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	2		
3. Rainfall, P (24-hour)	in	2.48		
4. Initial abstraction, I_a (Use CN with table 4-1)	in	2.651		
5. Compute I_a/P		1.07		
6. Unit peak discharge, q_u (Use T_c and I_a/P with exhibit 4– 1)	csm/in	55		
7. Runoff, Q (From worksheet 2) Figure 2-6	in	0.0024		
8. Pond and swamp adjustment factor, F_p (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond ans swamp area.)		1.0		
9. Peak discharge, q_p	ft^3/s	0.06		

(Where $q_p = q_u A_m Q F_p$)

(ft3/s × 1.984 × 365)

↓

43.45 af/yr + 21.21 af/yr =

64.66 af/yr

Sulphur Creek Dam Rainfall and Evaporation Data (1977-2002)

	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
Average Rainfall (in)	0.02	0.13	0.34	0.44	1.25	1.83	3.41	3.72	2.73	0.92	0.22	0.08
Average Evaporation (in)*	5.26	4.87	4.01	3.06	2.27	1.81	1.76	1.81	2.76	3.55	4.22	4.53
Difference (in)	-5.24	-4.74	-3.67	-2.62	-1.02	**0.01**	**1.66**	**1.90**	-0.03	-2.63	-3.99	-4.45

Average Available Rainfall (in) **3.58**

Source: County of Orange Public Facilities and Resources Department, 2002

*These evaporation numbers reflect the Class A land pan coefficient number of 0.70

JURISDICTIONAL DELINEATION
OF AREAS SUBJECT TO THE JURISDICTION OF
THE U.S. ARMY CORPS OF ENGINEERS

PURSUANT TO
SECTION 404 OF THE CLEAN WATER ACT

PREPARED FOR:

RANCHO MISSION VIEJO
P.O. BOX 9
SAN JUAN CAPISTRANO
CALIFORNIA 92639
CONTACT: LAURA COLEY EISENBERG
(949) 240-3363

PREPARED BY:

GLENN LUKOS ASSOCIATES
29 ORCHARD
LAKE FOREST, CALIFORNIA
CONTACT: TONY BOMKAMP OR INGRID CHLUP
(949) 837-0404

November 17, 2003
[Revised December 1, 2003]
[Revised April 18, 2004]

INTRODUCTION

Federal, state and local agencies, in cooperation with local landowners are currently engaged in a comprehensive land use and natural resource planning process for the San Juan Creek and western San Mateo Creek watersheds within southern Orange County. This comprehensive planning process includes preparation of a Special Area Management Plan/Master Streambed Alteration Agreement (SAMP/MSAA). In support of the SAMP/MSAA, the U.S. Army Corps of Engineers conducted a landscape level delineation, to identify areas of potential Corps and CDFG jurisdiction along with the mapping of areas of potential wetlands and riparian habitat within the SAMP/MSAA study area.[1]

In addition to the planning level delineation, Regulatory Specialists from Glenn Lukos Associates (GLA) conducted a project level jurisdictional delineation between October 29, 2002 and November 5, 2003 to identify and quantify the extent of areas subject to the jurisdiction of the (1) U.S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act and (2) the California Department of Fish and Game pursuant to Section 1600 of the Fish and Game Code. Appendix A includes a list of specific field dates. A total of nine planning areas were evaluated with the maximum potential limits of each planning area subject to the project-level delineation. In addition, all major roadway alignments not included within the nine planning areas were also examined.

METHODOLOGY

Prior to beginning the field delineation a 200-scale color aerial photograph, a 200-scale topographic base map of the property, and the USGS topographic maps Cañada Gobernadora (dated 1968, photo revised in 1988), San Clemente (dated 1968 and photo revised in 1975) and San Juan Capistrano (dated 1968 and photo revised in 1981) were examined to determine the locations of potential areas of Corps/CDFG jurisdiction. Prior to completing the jurisdictional delineation, GLA was provided a copy of a planning level delineation prepared by the Corps in September of 2000. All areas identified as potentially jurisdictional in the planning level delineation were evaluated for Corps and CDFG jurisdiction. All suspected jurisdictional areas were field checked for the presence of definable channels and/or wetland vegetation, soils and hydrology. Suspected wetland habitats on the site were evaluated using the methodology set forth in the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual[2] (Wetland Manual). While in the field the jurisdictional area was recorded onto a 200-scale color aerial photograph using visible landmarks. Other data were recorded onto wetland data sheets.

Beginning on March 11, 2003, Regulatory Specialists from GLA; a representative of Rancho Mission Viejo; representatives of the Corps including Mr. Russell Kaiser, Ms. Corice Farrar, and

---

[1] Lichvar, R., G. Gustina, D. MacDonald, and M. Ericsson. 2000. Planning Level Delineation and Geospatial Characterization of Riparian Ecosystems of San Diego Creek Watershed, Orange County California. Prepared for the U.S. Army Corps of Engineers, Engineering and Research Development Center (ERDC) Cold Regions Research and Engineering Laboratory (CRREL), Hanover N.H. September 2000.

[2] Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, U.S. Army Engineer Waterways Experimental Station, Vicksburg, Mississippi.

Mr. Rob Lawrence; and representatives of CDFG including Mr. Don Chadwick, Mr. Bradley Henderson, and Ms. Donna Cobb conducted a field verification of the project level delineation. Prior to beginning the field-level verification, the Corps representative Mr. Kaiser noted that the Corps would generally assert jurisdiction over drainages that conduct flows during 10-year storm events or less, and that drainages that do not conduct flows during 10-year events are not considered as waters of the United States. Following the initial site visits in early March, the area experienced a rainfall event on March 15, 2003 that averaged over five inches over most of the study area, corresponding very closely with a 10-year event. The 10-year storm event resulted in clear discharge in many of the drainages evaluated, including presence of litter and debris (e.g., oak leaves or other plant materials), sediment deposits, and destruction of terrestrial vegetation (through scouring or buried by sediments). However, many of the features failed to exhibit any signs of discharge. The 10-year storm event recorded on March 15, allowed for determination of (1) presence of an Ordinary High Water Mark (OHWM), and where present (2) the lateral extent of the (OHWM).

The field verification was completed on October 27, 2003 with the exception of specific areas to be addressed during a field review scheduled for November 20, 2003 with senior staff from the Corps. Appendix A includes a list of specific field dates. During the field verification, all areas identified in the Lichevar (2000) planning level delineation as well as by GLA in the project level delineation were examined. The results of the field verification are incorporated into this document. The jurisdictional status of a number of aquatic features remain unresolved and these areas are fully described in this report including discussions as to why certain specific features are not subject to Corps jurisdiction. In most instances, the reason for excluding areas from Corps jurisdiction is because of isolation pursuant to the SWANCC decision; although, the specific reasons for isolation vary. Other areas, such as the Ridgetop Reservoir in Planning Area 5 is excluded from Corps jurisdiction since it is present solely as a result of artificial irrigation and the 7-19 Mining Pit has been excluded because it remains an “active” mine. Areas subject to Corps jurisdiction, for which verification has been provided via an email from Mr. Kaiser (dated August 7, 2003) or verbally by either Mr. Kaiser or Mr. Lawrence, are addressed in summary or tabular form only. Those features or areas for which the Corps and Rancho Mission Viejo (RMV) concur relative to the jurisdictional status are referred to a “Resolved Areas” in this document. Features or areas for which the Corps and RMV have not reached concurrence relative to their jurisdictional status are referred to as “Unresolved Areas”.

SUMMARY OF RESULTS

A total of nine potential development areas or “bubbles” were evaluated plus areas subject to potential impacts associated with major arterials that connect the potential development bubbles. Total Corps jurisdiction identified within the potential development areas and the potential arterial right-of-ways, which are Resolved Areas, is 184.87 acres of which 77.87 acres consist of jurisdictional wetlands. Table 1 summarizes the jurisdictional totals by planning area. An additional 81.55 acres have been evaluated in the field, including 46.21 acres of wetlands, for which RMV and the Corps have not reached concurrence relative to their jurisdictional status. Table 2 summarizes the unresolved totals by planning area. As noted above, these Unresolved Areas are discussed in detail in this report; whereas, Resolved Areas are summarized only and included in tabular form by drainage according to planning area. **It is the opinion of GLA that**

all of the Unresolved Areas are isolated waters pursuant to SWANCC and do not meet the definition of waters of the United States.

TABLE 1: Study Area Jurisdictional Totals for Resolved Features

Planning Area	Wetland[1]	Non-wetland Waters[2]	Total Corps[3]
Ortega Gateway	0.04	2.19	2.23
Chiquita	11.44	2.64	14.08
Gobernadora	11.93	8.81	20.74
East Ortega	0.63	15.90	16.53
Trampas	0.82	9.48	10.30
Cristianitos Meadows	5.30	0.88	6.18
Cristianitos Canyon	4.74	7.80	12.54
TRW	1.05	7.71	8.76
O'Neill Ranch	4.57	10.18	14.75
Road Gaps	41.46	44.87	86.33
Totals[4]	**81.98**	**110.46**	**192.44**

[1] Total area (acres) of three-parameter wetland features subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[2] Total area (acres) of non-wetland tributaries subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[3] Total area (acres) of features subject to Corps jurisdiction (consists of both wetlands and non-wetland waters).

[4] These totals may change depending upon Corps determinations regarding proposed non-jurisdictional and isolated features.

PLANNING AREA 1 (ORTEGA GATEWAY)

Planning Area 1 is located near the western edge of the study area immediately west of Antonio Parkway and includes areas on both sides of Ortega Highway. Much of the area encompassed by the Ortega Gateway area has been previously developed or under long-term agriculture. RMV and the Corps have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables below and all features in this planning area are considered Resolved Areas. Corps jurisdiction in Planning Area 1 totals approximately 2.23 acres of which 0.04 acres consist of jurisdictional wetlands.

TABLE 2: Ortega Gateway Jurisdictional Totals

Feature Name	Wetland[1]	Non-wetland Waters[2]	Total Corps[3]
1-1	0.00	0.01	0.01
1-2	0.00	0.03	0.03
1-4	0.00	0.07	0.07
1-6	0.04	0.20	0.24
1-7	0.00	0.03	0.03

Feature Name	Wetland[1]	Non-wetland Waters[2]	Total Corps[3]
1-8	0.00	0.03	0.03
1-9	0.00	0.13	0.13
1-10	0.00	0.01	0.01
1-11	0.00	0.01	0.01
1-12	0.00	1.67	1.67
Totals[4]	**0.04**	**2.19**	**2.23**

[1] Total area (acres) of three-parameter wetland features subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[2] Total area (acres) of non-wetland tributaries subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[3] Total area (acres) of features subject to Corps jurisdiction (consists of both wetlands and non-wetland waters).

[4] These totals may change depending upon Corps determinations regarding proposed non-jurisdictional and isolated features.

TABLE 3: Ortega Gateway Non-jurisdictional Totals

Feature Name	Wetland (acres)	Non-wetland Waters (acres)	Total Acreage
Isolated nursery pond[1]	0.00	0.12	0.12
1-3[1]	0.09	0.02	0.11
1-4[1]	0.00	0.01	0.01
1-5[1]	0.00	0.02	0.02
1-12[1]	0.00	0.004	0.004
Nursery Ponds[2]	0.00	0.03	0.03
Totals	**0.09**	**0.20**	**0.29**

[1] This feature has been field verified and the Corps concurs it is isolated and therefore not subject to regulation pursuant to SWANCC
[2] This feature has been field verified and the Corps concurs it is not subject to regulation pursuant to Section 404 of the Clean Water Act.

PLANNING AREA 2 (CHIQUITA CANYON)

Planning Area 2 is located at the northwestern corner of the study area immediately west of Antonio Parkway and north of San Juan Creek. The planning area consists of a main canyon (Chiquita Canyon), which generally traverses the western one-third to one-quarter of the study area. The extreme western portion of the study area includes east-facing slopes that drain toward Chiquita Creek, a prominent aquatic feature/drainage that occupies the bottom of this broad canyon. Chiquita Creek supports a mosaic of wetland types including areas of southern arroyo willow riparian forest, alkali marsh, freshwater marsh, and alkali meadow. The area east of Chiquita Creek consists of a series of northeast-to-southwest trending side canyons alternating with gentle hills. Many of the side canyons are broad features that exhibit low gradients and have been subject to decades of farming, consisting mostly of winter barley or orchards (lemons and avocados).

Corps jurisdiction in Planning Area 2 totals approximately 14.08 acres of which 11.44 acres consist of jurisdictional wetlands. A number of the side canyons do not contain drainages that exhibit an OHWM. Other side canyons including those with drainage features 2-1 and 2-7 exhibited the presence of an OHWM in the upper reaches of their respective canyons; however, indicators associated with the presence of an OHWM terminated in the canyons hundreds or thousands of feet from Chiquita Creek and were determined by GLA with concurrence from the Corps to be isolated due to the absence of any hydrologic connection with Chiquita Creek.

TABLE 4: Chiquita Jurisdictional Totals

Feature Name	Wetland[1]	Non-wetland Waters[2]	Total Corps[3]
Chiquita	10.88	1.25	12.13
2-6	0.00	0.14	0.14
2-8	0.56	0.18	0.74
2-10	0.00	0.02	0.02
2-11	0.00	0.12	0.12
2-12	0.00	0.01	0.01
2-13	0.00	0.92	0.92
2-14	0.00	0.004	0.004
Totals[4]	**11.44**	**2.64**	**14.08**

[1] Total area (acres) of three-parameter wetland features subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[2] Total area (acres) of non-wetland tributaries subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[3] Total area (acres) of features subject to Corps jurisdiction (consists of both wetlands and non-wetland waters).

[4] These totals may change depending upon Corps determinations regarding proposed non-jurisdictional and isolated features.

TABLE 5: Chiquita Non-jurisdictional Feature Totals

Feature Name	Wetland (acres)	Non-wetland Waters (acres)	Totals Acreage
2-1[1]	0.00	0.02	0.02
2-2[1]	0.13	0.01	0.14
2-3[1]	0.07	0.01	0.08
2-4[1]	0.36	0.06	0.42
2-5[1]	0.00	0.11	0.11
2-7[1]	0.00	0.02	0.02
2-9[1]	0.00	0.02	0.02
2-10[1]	0.00	0.04	0.04
2-13[1]	0.00	0.04	0.04
Wetland A[1]	0.11	0.00	0.11
Wetland B	0.40	0.00	0.40
Excavated Depression[2]	NA	NA	0.15
Totals	**1.07**	**0.33**	**1.55**

[1] This feature has been field verified and the Corps concurs it is isolated and therefore not subject to regulation pursuant to SWANCC
[2] This feature has been field verified and the Corps concurs it is not subject to regulation pursuant to Section 404 of the Clean Water Act.

PLANNING AREA 3 (GOBERNADORA)

Planning Area 3 is located near the northern edge of the study area east of Casper's Regional Park and north of San Juan Creek. The planning area generally exhibits steeper topography than Planning Area 2. A ridgeline, that trends from southwest to the northeast divides the planning area into two drainage areas with the northwest half of the planning area draining to Gobernadora Creek and the southeast half of the planning area draining to San Juan Creek. Gobernadora Creek originates in the Cleveland National Forest to the north, traversing Coto de Caza before entering the planning area at the extreme northwest corner of the planning area before exiting the planning area about 3,000 feet from the northern boundary of the planning area. Gobernadora Creek runs parallel to and outside of the planning area after exiting the planning area, ultimately discharging into San Juan Creek beyond the southwest corner of the planning area.

The southeast and southernmost portions of the site drain to the south towards San Juan Creek and all of the drainages were determined to exhibit surface tributary connections by means of an OHWM with San Juan Creek with the exception of a single drainage (San Juan Creek Tributary 4) that was modified prior to regulation under the Clean Water Act and is therefore not subject to Corps jurisdiction (see discussion below under Unresolved Areas)

Corps jurisdiction in Planning Area 3 totals approximately 20.74 acres of which 11.93 acres consist of jurisdictional wetlands. A number of side canyons to the east of Gobernadora Creek do not contain drainages exhibiting an OHWM and therefore are not subject to Corps jurisdiction. Other canyons (e.g., the upper reaches of Gobernadora Tribuary 6) contain drainages with and OHWM; however, the OHWM terminates in scrub or grassland habitat thousands of feet from Gobernadora Creek with no hydrologic connection. These areas have been determined by the Corps to be isolated and not subject to their jurisdiction.

TABLE 6: Gobernadora Jurisdictional Feature Totals

Feature Name	**Wetland[1]**	**Non-wetland Waters[2]**	**Total Corps[3]**
Gobernadora	5.06	0.07	5.13
3-5	0.15	0.77	0.92
3-7	0.00	0.46	0.46
3-8	0.00	0.13	0.13
3-9	0.00	0.10	0.10
3-12	0.42	3.99	4.41
3-13	2.32	3.12	5.44
3-14	0.00	0.03	0.03
3-15	0.00	0.10	0.10
3-16	3.98	0.03	4.01
3-17	0.00	0.01	0.01
Totals[4]	**11.93**	**8.81**	**20.74**

[1] Total area (acres) of three-parameter wetland features subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[2] Total area (acres) of non-wetland tributaries subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[3] Total area (acres) of features subject to Corps jurisdiction (consists of both wetlands and non-wetland waters).

[4] These totals may change depending upon Corps determinations regarding proposed non-jurisdictional and isolated features.

TABLE 7: Gobernadora Non-jurisdictional Feature Totals

Feature Name	Wetland (acres)	Non-wetland Waters (acres)	Total Acreage
3-1	0.00	0.04	0.04
3-2	0.00	0.02	0.02
3-3	0.00	0.29	0.29
3-4	0.00	0.11	0.11
3-5	0.00	0.01	0.01
3-6	2.65	0.11	2.76
3-10	0.02	0.95	0.97
Isolated Willow Seep	0.26	0.00	0.26
Sulfer Canyon	0.26	0.00	0.26
3-11	0.00	0.01	0.01
Mining Pits	4.36	0.00	4.36
Total	**7.55**	**1.54**	**9.09**

[1] All of these feature have been field verified and the Corps concurs they are isolated and therefore not subject to regulation pursuant to SWANCC

Planning Area 4 (East Ortega)

Planning Area 4 is located near the northern edge of the study area immediately south of Ortega Highway and includes Verdugo Canyon. RMV and the Corps have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables below and all features in this planning area are considered Resolved Areas. Corps jurisdiction in Planning Area 4 totals approximately 16.53 acres of which 0.63 acres consist of jurisdictional wetlands.

TABLE 8: East Ortega Jurisdictional Feature Totals

Feature Name	Wetland[1]	Non-wetland Waters[2]	Total Corps[3]
San Juan Creek	0.00	0.55	0.55
Verdugo	0.00	11.11	11.11
4-1	0.00	0.10	0.10
4-2	0.00	0.13	0.13
4-3	0.00	0.14	0.14
4-5	0.00	0.21	0.21
4-6	0.00	0.05	0.05
4-7	0.00	0.25	0.25

Feature Name	Wetland[1]	Non-wetland Waters[2]	Total Corps[3]
4-8	0.00	0.03	0.03
4-9	0.00	0.04	0.04
4-11	0.00	1.00	1.00
4-12	0.00	0.76	0.76
4-13	0.00	0.45	0.45
4-15	0.00	0.10	0.10
4-17	0.04	0.98	1.02
4-17 Pond	0.59	0.00	0.59
Totals[4]	**0.63**	**15.90**	**16.53**

[1] Total area (acres) of three-parameter wetland features subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[2] Total area (acres) of non-wetland tributaries subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[3] Total area (acres) of features subject to Corps jurisdiction (consists of both wetlands and non-wetland waters).

[4] These totals may change depending upon Corps determinations regarding proposed non-jurisdictional and isolated features.

TABLE 9: East Ortega Non-jurisdictional Feature Totals

Feature Name	Wetland (acres)	Non-wetland Waters (acres)	Total Acreage
4-10[1]	0.00	0.02	0.02
4-14[1]	0.00	0.07	0.07
4-16[1]	0.00	0.14	0.14
4-18[1]	0.00	0.14	0.14
4-19[1]	0.00	0.64	0.64
Nursery Ditch[2]	0.03	0.00	0.03
Total	**0.03**	**1.01**	**1.04**

[1] This feature has been field verified and the Corps concurs it is isolated and therefore not subject to regulation pursuant to SWANCC
[2] This feature has been field verified and the Corps concurs it is not subject to regulation pursuant to Section 404 of the Clean Water Act.

PLANNING AREA 5 (TRAMPAS)

Planning Area 5 is located in the San Juan Creek watershed and is located immediately south of Ortega Highway. Much of the planning area is currently occupied by a sand mining and processing operation, that has operated in the southern half of the planning area since the 1960s. Sand mining and processing has required significant modifications to the landscape in the central portion of the planning area including creation of a dam on Trampas Canyon Creek and excavation of a large mining pit (Cell A) and additional areas of influence (Exhibit 5).

In addition to the mining and processing, and prior to the enactment of the Clean Water Act, bermed stockponds associated with ranching activities were created which isolated other drainages within the planning area. Based upon verification visits with the Corps, RMV and the Corps have agreed on the jurisdictional status of all areas or features within the planning area

(Resolved Areas) with three exceptions: the “Tailings Pond/Water Recycling Area”, the “Temporary Storage Pond” and a slope wetland not associated with the mining operation. Because the jurisdictional status of the Tailings Pond/Water Recycling Area and the Temporary Storage Pond is, as discussed in detail below, related to the mining operation, the primary features associated with the mining operation are described below under “Sand Mining Operation”. Resolved Areas are clearly distinguished from Unresolved Areas within the descriptions associated with the sand mining area.

Corps jurisdiction associated with Planning Area 5 totals 10.30 acres of which 0.82 acre consist of jurisdictional wetlands. A summary of features subject to Corps verification for which RMV and the Corps concur relative to their jurisdictional status is provided in Table 13 and 14. Table 13 is a summary of areas subject to Corps jurisdiction and Table 14 is a summary of areas not subject to Corps jurisdiction due to isolation or other regulatory considerations (e.g., non-tidal drainages or non-abandoned mining pits excavated in upland).

TABLE 10: Trampas Jurisdictional Feature Totals

Feature Name	Wetland[1]	Non-wetland Waters[2]	Total Corps[3]
5-1A	0.01	0.76	0.77
Seasonal Pond	0.13	0.00	0.13
5-1B	0.00	6.01	6.01
5-2	0.00	0.11	0.11
5-6	0.00	0.15	0.15
5-7	0.03	1.44	1.47
Temporary Storage Pond	0.65	0.00	0.65
5-7B	0.00	1.01	1.01
Totals[4]	**0.82**	**9.48**	**10.30**

[1] Total area (acres) of three-parameter wetland features subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[2] Total area (acres) of non-wetland tributaries subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[3] Total area (acres) of features subject to Corps jurisdiction (consists of both wetlands and non-wetland waters).

[4] These totals may change depending upon Corps determinations regarding proposed non-jurisdictional and isolated features.

TABLE 11: Trampas Non-jurisdictional Feature Totals

Feature Name	Wetland (acres)	Non-wetland Waters (acres)	Total Acreage
Saltgrass Swale[1]	0.002	0.000	0.002
5-1A[1]	0.00	0.09	0.09
5-3[1]	0.00	0.03	0.03
5-4[1]	0.00	0.19	0.19
5-5[1]	0.00	0.11	0.11
Slope Wetland A[1]	0.04	0.00	0.04
Slope Wetland B[1]	0.17	0.00	0.17

Feature Name	Wetland (acres)	Non-wetland Waters (acres)	Total Acreage
5-7A[1]	1.63	0.27	1.90
5-7B[1]	0.00	0.53	0.53
Settling Pond A[2]	NA	NA	0.26
Settling Pond B[2]	NA	NA	1.30
Settling Pond C[2]	NA	NA	1.33
Settling Pond D[2]	NA	NA	2.37
Juncus Patch[2]	NA	NA	0.05
Cell A Mining Pit[2]	11.56	0.00	11.56
Desilting Pond[2]	0.00	0.12	0.12
NJD Erosional Feature[2]	0.00	0.04	0.04
NJD Mining Feature A[2]	0.17	0.00	0.17
NJD Mining Feature B[2]	0.00	0.11	0.11
NJD Mining Feature C[2]	0.00	0.13	0.13
Ridgetop Reservoir[2]	1.86	3.24	5.10
5-7[1]	0.00	0.77	0.77
ONIS Tailings Pond[1, 2]	41.32	29.80	71.12
Thickener[2]	0.18	1.34	1.52
Total	**56.93**	**36.77**	**99.11**

[1] This feature has been field verified and the Corps concurs it is isolated and therefore not subject to regulation pursuant to SWANCC
[2] This feature has been field verified and the Corps concurs it is not subject to regulation pursuant to Section 404 of the Clean Water Act.

Sand Mining Facilities

As noted above, a substantial portion of the Trampas Planning Area has been affected by sand mining activities since the 1960s. The sand mining operation requires use of water during various steps in the process including 1) washing of the mined materials to separate silts and clays from the sand, and 2) use of water to transport silt and clay tailings to tailings areas via pumps. In order to conserve water through recycling as well as to maintain maximum flexibility in the system, an elaborate system of ponds, pipes, and ditches have been constructed that are used in the washing and recycling processes. These various components of the sand washing operation are described below and are also depicted and appropriately designated on Exhibits 5a and 5b. The features further described below include:

- Trampas Dam and associated “Tailings and Recycle Area”;
- Dam-Face “V”-Ditches
- Dam-Face Leach Field and Associated Drainage Features;
- Thickener;
- Desilting Pond and Associated Recycling Ditches and Pipes;
- Ridgetop Reservor;
- Temporary Storage Pond;
- Cell A;

Trampas Dam and Associated Tailings Pond and Recycle Area

Trampas Dam was constructed in 1975 following preparation of and certification of an Environmental Impact Report (EIR) prepared pursuant to the California Environmental Quality Act. The dam was constructed in a manner that isolated Trampas Creek and its tributaries that consisted of ephemeral drainages (based on a review of historic aerial photographs, Trampas Creek and its tributaries affected by dam construction and the associated Tailings Pond/Recycle Area supported approximately 12 acres of southern coast live oak riparian forest). The extent of the ephemeral drainages isolated behind the dam is estimated to have covered approximately 0.8 to 1.2 acres based on an extrapolation of Corps-verified drainage widths upstream and downstream of the reservoir.

Construction of the Trampas Dam in 1975 did not require authorization from the Corps because ephemeral drainages, tributary to other navigable waters were not regulated pursuant to Section 404 until July 1, 1977 when such waters were "phased" into the Section 404 Regulatory Program.[3] Creation of the dam isolated all of the drainages upstream of the dam, including the Tailings Pond and Recycle Area created by the dam. It is therefore important to note that because the dam was constructed before Trampas Creek was regulated pursuant to Section 404, it does not represent an impoundment of waters of the U.S. A spillway was constructed for the Tailings Pond and Recycle Area at the extreme eastern arm of the facility. The elevation of the Tailings Pond and Recycle Area is maintained at about 30 feet below the elevation of the spillway. During its 28-year period of operation, water has never discharged over the spillway. While the Tailings Pond and Recycle Area is clearly isolated (i.e., it is not connected to downstream jurisdictional waters), the Corps has not provided concurrence that this feature is not subject to jurisdiction under Section 404. The descriptions that follow addressing components in the sand mining and processing operation are intended to clearly demonstrate the isolation of the Tailings Pond and Recycle Area. Following the descriptions of the components associated with the mining operation, further discussion is provided relative to the jurisdictional status of the Tailings Pond.

Because substantial water is lost to evaporation during various steps in the washing process as well as from the Tailings Pondand Recycle Area, it is necessary to pump well water into the pond to maintain water levels. If water is not added to the process, the Tailings Pond Area will eventually dry up. At its current elevation, the Tailings Pond and Recycle Area covers approximately 70 acres and includes approximately 15 acres of open water with the remaining 55 acres consisting of exposed tailings which support various densities of southern cattail (*Typha domingensis*, OBL), and California bulrush (*Scirpus californicus,* OBL).

The Tailings Pond and Recycle Area serves two primary functions in the processing of sand: 1) it receives all of the tailings separated from the sand during the washing process and 2) it serves as a re-circulating water source for the washing process. During the washing process, water is moved through a variety of the facilities noted above with the movement patterns of the water varying according to a number of factors directly related to the needs of the mining operation.

---

[3] Federal Register. 1991. "CFR 330.3: Activities occurring before certain dates". Federal Register Vol. 56, No. 226, November 22, 1991, Rules and Regulations, page 59136.

As stated above, the goal to conserve the maximum amount of water during the washing process has resulted in the creation of a series of storage areas and conduits that allow water to be recycled at various points in the process.

Dam Face and Associated "V"-Ditches

Construction of the dam included installation of a series of V-Ditches that capture precipitation falling on the 11.5-acre dam face. There is no hydrologic connection between the Tailings Pond/Recycle Area behind the dam and the water collected on the face of the dam. The primary function of the V-Ditches on the Dam is to prevent damage to the dam through rilling and erosion. These V-Ditches have been designed to discharge all flows to an underground inlet near the face of the dam where a 24-inch pipe was installed to collect the runoff, ultimately directing it to the "Desilting Pond" via pipes and an above-ground artificial drainage ditch (NJD Feature C). By design, all water that originates on the face of the dam is directed into the recycling system for use in the mining process.

During a field visit, conducted on October 3, 2003 with representatives of Oglebay Norton, the operators of the sand mine and processing facility, GLA observed the inlet of the 24-pipe, which had been temporarily buried, and had just been uncovered. The pipe was full of sediments and was in need of maintenance. Because the pipe had become clogged, water was not discharging to NJD Feature C (which carries the water via a second pipe to the Desilting Pond before it is pumped to the "Thickener" (see below). As a result of the pipe being blocked and the resulting accumulation of water, a small area, covering approximately 50 by 100 feet has been colonized by opportunistic cattails. Maintenance of the V-Ditches and the pipe system, including the unclogging of the 24-inch pipe that connects the base of the dam to the Desilting Pond via NJD Mining Feature C, will eliminate the source of water to the opportunistic cattails at the base of the dam face.

Dam Face Leachfield and Associated Pipes

Construction of the dam also included installation of interior drains to protect the dam from seepage. Water is collected in drains, which are in turn are connected to an underground rock and gravel collection field. Much of the water is collected in a four-inch clay pipe and is carried underground to the "Temporary Storage Pond". The leachfield is also designed to drain to the v-ditch and then into the 24-inch pipe, which as noted above had become blocked, preventing the leachfield to drain properly with the resulting colonization of opportunistic cattails. By design, all of the subdrain water from the base of the dam is intended for the "Desilting Pond", which is then pumped to the "Thickener".

Thickener

The Thickener is a constructed circular basin that receives tailings-laden water from the washing operations and also receives fresh water that enters the washing system at this point (well water can be pumped into the system at a number of locations as needed). The thickener is mechanically "stirred" in order to maintain the tailings in suspension so that they can be pumped to the Tailings Pond. The outer rim of the thickener includes a two-foot-wide concrete ditch that directs overflow water (the thickener only rarely overflows) to a metal pipe, which carries the overflow to the "Temporary Storage Pond" from where the water can be pumped back to the thickener or to the "Desilting Pond".

Ridgetop Reservoir

The Ridgetop Reservoir is located immediately adjacent to and substantially above in terms of elevation, the Tailings Pond. This feature receives water that is pumped from the Desilting Pond as well as directly from well water. This feature was constructed entirely on upland. While is supports limited areas of hydrophytic vegetation, the only source of water for this feature (other than direct rainfall) is from pumped water.

Temporary Storage Pond

The Temporary Storage Pond is an artificial basin, constructed on upland and by design, was not constructed as an impoundment of jurisdictional waters. Rather, the Temporary Storage Pond was constructed to receive overflow from the Thickener as well as the minimal discharge from the four-inch clay pipe, generated by the drain at the base of the dam.

Accumulation of sediments generated by the sand mining and processing operation has resulted in a minor diversion of a nearby drainage such that a side channel has developed that flows into the basin during large storm events. The basin has no outlet or spillway and is, by design fully isolated from jurisdictional waters. The bottom of the basin supports California bulrush, mulefat scrub and a few individual arroyo willows.

This feature was excavated and bermed in uplands and has no connection to downstream jurisdictional waters. A side channel that migrated from the mainstem of Drainage 5-7 currently discharges to this feature; however, the feature was not designed with this connection and the feature remains isolated. As such, GLA believes that this feature is not subject to Corps jurisdiction as is an isolated feature.

Desilting Pond and Associated Ditches and Pipes

A Desilting Pond is located immediately west of the Thickener. The Desilting Pond receives tailings-laden wash water that is drained from washed sands located in the washing facilities immediately east of the washing facilities [See exhibit 5b]. From the wet sand piles, water drains through one of two artificial drainage ditches (NJD Feature A and/or NJD Feature B). NJD Feature A is connected directly to the Desilting Pond by means of a pipe. NJD Feature B is connected directly to the Desilting Pond by means of a pipe which discharges into NJD Feature C and a third pipe that connects NJD Feature C with the Desilting Pond.

Cell A

Cell A is located approximately 1,000 feet north of the Trampas Dam. Cell A, which covers approximately 11.56 acres of open water and exposed tailings which support various densities of southern cattail (*Typha domingensis*, OBL), and bulrush (*Scirpus californicus*, OBL). Cell A was excavated from dry land in the 1960s and currently consists of a mining pit that is fully isolated with no potential outlets due to the elevation. Cell A is a potential reservoir for deposition of tailings and recycling of wash water. Upon termination of the mining operations, Cell A would be reclaimed pursuant to the reclamation plan developed for the site.

Abandoned Settling Ponds

A series of five abandoned settling basins occupy a bench below the ridgeline that runs along the western boundary of the planning area. The abandoned basins are isolated and are not connected to jurisdictional waters. None of the basins support a predominance of hydrophytic vegetation and, due to the lack of water subsidies from the mining operation, are reverting to upland habitat.

JURISDICTIONAL STATUS OF TAILINGS POND

As noted above, the Tailings Pond was created by construction of a dam on Trampas Creek. The dam was constructed prior to July 1, 1977 when such waters were "phased" into the Section 404 Regulatory Program.[4] Construction of the dam resulted in the isolation of drainages upstream of the dam as well as the Tailings Pond. The spillway elevation is located approximately 30 feet above the elevation of the Tailings Pond water surface that is maintained through the daily input of well water associated with the sand mining processes. During the 28-years that the dam has been in place, water has never been discharged over the spillway, even during significant rainfall years such as 1983, 1993, 1995 or during the 1998 El Niño event. Given that the dam has not overtopped during significant storm events or storm seasons when it was receiving subsidies of water for the mining processes, it would clearly not overtop once subsidies are eliminated.

Ignoring the clear isolation of the Tailings Pond from jurisdictional waters, the Corps has suggested that the feature may be subject to Section 404 jurisdiction; however, no specific rationale has been put forward. While GLA knows of no regulatory rationale that could be used to rebut the facts regarding isolation of the Tailings Pond, we note that elimination of the artificial irrigation (i.e., water subsidies associated with the mining operation) in the post mining condition would eliminate essentially all wetland vegetation and open water behind the dam. The Preamble to CFR 328.3(b) states that the Corps generally does not consider "artificially irrigated areas which would revert to upland if irrigation ceased" to be waters of the United States. In order to identify the maximum extent of wetland vegetation or open water in the post-mining condition, a water budget based on elimination of subsidies has been prepared by GLA and Wildermuth Environmental. It is important to note that any wetland areas persisting behind the dam in the post-mining phase would be isolated by the dried out tailings, and would not be connected to jurisdictional areas and would themselves not be subject to jurisdiction under Section 404. The detailed water budget, summarized in narrative form in the paragraphs below, is attached as Appendix A.

---

[4] Federal Register. 1991. "CFR 330.3: Activities occurring before certain dates". Federal Register Vol. 56, No. 226, November 22, 1991, Rules and Regulations, page 59136.

WATER BUDGET FOR TAILINGS POND

In the post-mining condition, the Tailings Pond will dry out if not subsidized with well water. For purposes of understanding the ambient conditions, GLA and Wildermuth Environmental prepared a water budget for the Tailings Pond/Recycle Area that considers the conditions expected behind the dam in the absence of any water subsidies from mining. Based on rainfall data using the last 75 years, the area occupied by the tailings area would support approximately two to three acres of emergent marsh habitat once all artificial water subsidies are eliminated.

Overall Approach

In order to accurately determine the extent of hydrophytic vegetation and/or open water in the post-mining condition, the following factors were considered/evaluated.

- Post-mining dry-out of the tailings;
- Hydrologic input from watershed runoff;
- Hydrologic input from precipitation;
- Water consumption by hydrophytic vegetation (amounts); and
- Water consumption by hydrophytic vegetation (seasonality)

Post-Mining Dryout of Tailings

Currently, water depths for areas occupied by cattails, which accounts for approximately 55 acres of the Tailings Pond, average less than two feet. Cattails and bulrush will use up to ten feet of water per year when it is available and require a minimum of about four feet of water seasonally to survive and persist on a site. Cattails and bulrush exhibit winter dormancy with most of the water consumption occurring during the period from May to November. Cattails and bulrush are both shallow-rooted species with the entire root zone located in the upper two feet (three feet maximum). Without water subsidies from the mining operation, essentially all of the water within the root zone of the cattails and bulrush would be depleted by the end of one growing season.[5]

While the Tailings Pond is drying out during the first year without water subsidies, the exposed substrate will quickly be colonized by propagules from non-native grasses and forbs that are found throughout the watershed of the Tailings Pond including wild oats (*Avena farua*, UPL), slender oats (*Avena barbata*, UPL), ripgut (*Bromus diandrus*, UPL), soft chess (*Bromus hordeaceus*, UPL), red brome (*Bromus madritensis rubens*, UPL), rattail fescue (*Vulpia myuros*, UPL), Italian ryegrass (*Lolium multiflorum*, UPL), black mustard (*Brassica nigra*, UPL), field mustard (*Brassica rapa*, UPL), wild radish (*Raphanus sativus*, UPL), tocalote (*Centaurea melitensis*, UPL) and three species of filaree (*Erodium* spp., UPL). These species, as a group, germinate during winter and early spring, consuming most available soil moisture by late spring or early summer, meaning that they are most active during the winter dormancy of the cattails and bulrush, substantially limiting soil moisture that might be available to any surviving wetland

[5] This includes surface water up to three feet and subsurface water at depths to three feet.

plants. Direct evaporation and evapotranspiration will consume most direct precipitation falling on the tailings such that water would be available in very limited amounts to wetland plant species.

Input from Watershed Runoff

The hydrological model set forth in Appendix C determined that approximately 43.5 acre-feet of water would reach the tailings during an average rainfall year.[6] Essentially all of the hydrological input from watershed runoff would occur during the rainy season, which is between October 15 and April 15. This runoff would reach the outer edges of the Tailings Pond, at points where the ephemeral drainages intersect the Tailings. Tailings at these locations would be shallowest and much of the water would be stored in the upper few feet, meaning that it would be available to whatever plants are growing at the discharge point. As noted above, substantial amounts of this water would be consumed by opportunistic spring annuals, which germinate as early as November or December (coincident with the first one to two inches of rainfall) and reach their peak growth during February and March (some species such as Italian Rygrass geminate a little later and reach peak growth in March and April). The 43.5 acre feet of runoff would generally be sufficient to support up to seven of cattails, bulrush and other native and non-native hydrophytes. However, direct evaporation coupled with water consumption by spring annuals, which would germinate and reach maximum growth during the winter dormancy period exhibited by the cattails and bulrush, would reduce to amount of wetland vegetation to between five and six acres.

Input from Direct Precipitation

During average rainfall years, approximately 75 acre-feet would fall on the area occupied by the mine tailings. Essentially all of the hydrological input from direct precipitation would occur during the rainy season, which is between October 15 and April 15, which as noted above coincides with the winter dormancy period of native hydrophytes and the germination and maximum growth period of non-native spring annual grasses and forbs. It is expected that direct evaporation and evapotranspiration by the spring annuals would utilize essentially all of the water reaching the tailings.

Summary/Conclusions

In the post-mining condition, the available surface and subsurface water in the Tailings Pond would be consumed by the existing hydrophytic vegetation, which exhibits high water consumption rates, beginning in late spring and continuing until late fall. Natural hydrologic input from storm runoff and direct precipitation would coincide with the germination and maximum growth period of the (mostly) non-native annual grasses and forbs expected to rapidly colonize the drying tailings. Available water for native hydrophytes would be between 30 and

---

[6] Wildermuth Environmental has, on a preliminary basis, conducted more detailed modeling of the Tailings Pond, that reduces the estimated watershed runoff (as set forth using the TR-55 methodology) from approximately 43.5 acre feet to between 25 and 30 acre feet. The more conservative number of 43.5 acre feet is incorporated into this analysis because the Wildermuth report has not yet been completed; however, upon its completion, it is expected to reduce the watershed runoff totals.

35 acre feet which would be sufficient to allow persistence of between five and six acres of hydrophytic vegetation.

PLANNING AREA 6 (CRISTIANITOS MEADOWS)

Planning Area 6 is located near the southeastern edge of the study area immediately north of the O'Neill Land Conservancy. RMV and the Corps have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables below and all features in this planning area are considered Resolved Areas. Corps jurisdiction in Planning Area 6 totals approximately 6.18 acres of which 5.30 acres consist of jurisdictional wetlands.

TABLE 12: Cristianitos Meadows Jurisdictional Feature Totals

Feature Name	Wetland[1]	Non-wetland Waters[2]	Total Corps[3]
Cristianitos Stock Pond	0.73	0.00	0.73
6-1	0.00	0.01	0.01
6-2	0.04	0.03	0.07
6-3	0.00	0.27	0.27
6-4	4.36	0.57	4.93
Vernal Marsh	0.17	0.00	0.17
Totals[4]	**5.30**	**0.88**	**6.18**

[1] Total area (acres) of three-parameter wetland features subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[2] Total area (acres) of non-wetland tributaries subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[3] Total area (acres) of features subject to Corps jurisdiction (consists of both wetlands and non-wetland waters).

[4] These totals may change depending upon Corps determinations regarding proposed non-jurisdictional and isolated features.

TABLE 13: Cristianitos Meadows Non-jurisdictional Feature Totals

Feature Name	Wetland (acres)	Non-wetland Waters (acres)	Total Acreage
6-2	0.21	0.16	0.37
Total	**0.21**	**0.16**	**0.37**

[1] This feature has been field verified and the Corps concurs it is isolated and therefore not subject to regulation pursuant to SWANCC

PLANNING AREA 7 (CRISTIANITOS CANYON)

Planning Area 7 is located near the southern portion of the study area and immediately east of the O'Neill Land Conservancy. For this report, the planning area is divided into two distinct areas: the eastern half which is characterized by fairly steep topography with deep canyons that drain toward Gabino Creek that runs generally parallel to and beyond the limits of the southern planning area boundary. The western half of the planning area exhibits more gentle topography and drains to the upper reach of Cristianitos Creek. Gabino Creek and the upper reach of Cristianitos Creek join just southwest of the planning area boundary.

The southern portion of the planning area exhibits a number of clay mines that have been under operation since the 1930s. Mining is currently not in operation; however the lease holders continue maintenance operations and all but one of the mining operations are subject to reclamation pursuant to plans submitted to and administered by the County of Orange.[7] As recently as September of 2002, representatives of Riverside Cement met with officials of the County of Orange onsite to review reclamation plans and discuss plant palettes to be used upon implementation of the reclamation programs.[8]

Corps jurisdiction in Planning Area 4 totals approximately 12.54 acres of which 4.74 acres consist of jurisdictional wetlands.

TABLE 14: Cristianitos Canyon Jurisdictional Feature Totals

Feature Name	Wetland[1]	Non-wetland Waters[2]	Total Corps[3]
7-1	0.00	0.54	0.54
7-2	0.03	0.64	0.67
7-3	0.00	0.13	0.13
7-4	0.00	0.29	0.29
7-5	0.00	0.09	0.09
7-6	0.07	0.33	0.40
7-7	0.00	2.05	2.05
7-8	0.00	0.08	0.08
7-9	0.00	0.08	0.08
7-10	0.00	0.15	0.15
7-11	0.00	0.04	0.04
7-12	1.33	0.68	2.01
7-13	3.09	2.55	5.64
7-15	0.22	0.02	0.24
7-16	0.00	0.08	0.08
7-17	0.00	0.04	0.04
7-18	0.00	0.01	0.01
Totals[4]	**4.74**	**7.8**	**12.54**

[1] Total area (acres) of three-parameter wetland features subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[2] Total area (acres) of non-wetland tributaries subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[3] Total area (acres) of features subject to Corps jurisdiction (consists of both wetlands and non-wetland waters).

[4] These totals may change depending upon Corps determinations regarding proposed non-jurisdictional and isolated features.

[7] No jurisdictional waters are associated with clay mine that is not subject to County of Orange reclamation requirements.

[8] Bomkamp, Tony. Personal observation as attendee at two meetings to address reclamation of the sites.

TABLE 15: Cristianitos Canyon Non-jurisdictional Feature Totals

Feature Name	Wetland (acres)	Non-wetland Waters (acres)	Total Acreage
Cattail pond[1]	0.01	0.00	0.01
7-6[1]	0.19	0.00	0.19
7-11 Isolated seasonal pond[1]	0.04	0.00	0.04
7-13 Isolated Stock Pond[1]	0.00	0.28	0.28
7-14[1]	0.16	0.00	0.16
7-19[1]	0.00	0.14	0.14
7-19 Mining Pit[2]	0.14	0.77	0.91
Isolated Willow Patch[2]	NA	NA	0.15
Totals	**0.54**	**1.19**	**1.88**

PLANNING AREA 8 (TRW)

Planning Area 8 is located near the southern edge of the study area east of Avenida Pico and north of Talega Creek. RMV and the Corps have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables and examined in the field and all features in this planning area are considered Resolved Areas. The middle reaches of Features 8-1, 8-4 and 8-8, as well as the middle reach of the southern Blind Canyon tributary and the upper reach of northern Blind Canyon tributary eild verification. Corps jurisdiction in Planning Area 8 totals approximately 8.76 acres of which 1.05 acres consist of jurisdictional wetlands.

TABLE 16: TRW Jurisdictional Feature Totals

Feature Name	Wetland[1]	Waters[2]	Total Corps[3]
Blind Canyon	0.64	3.64	4.28
8-1	0.00	0.20	0.20
8-2	0.00	0.01	0.01
8-3	0.00	0.03	0.03
8-4	0.19	0.18	0.37
8-5	0.00	0.10	0.10
8-6	0.00	0.04	0.04
8-7	0.00	0.06	0.06
8-8	0.00	0.09	0.09
8-9	0.00	0.19	0.19
8-10	0.00	0.05	0.05
8-11	0.00	0.06	0.06
8-12	0.00	0.04	0.04

Feature Name	Wetland[1]	Waters[2]	Total Corps[3]
8-13	0.00	0.07	0.07
8-14	0.00	0.05	0.05
8-15	0.12	0.33	0.45
8-16	0.00	0.04	0.04
8-17	0.00	0.05	0.05
8-18	0.00	0.01	0.01
8-19	0.00	0.01	0.01
8-20	0.00	0.07	0.07
8-22	0.00	0.54	0.54
8-23	0.01	0.33	0.34
8-24	0.09	0.64	0.73
8-25	0.00	0.14	0.14
8-26	0.00	0.16	0.16
8-27	0.00	0.10	0.10
8-28	0.00	0.13	0.13
8-29	0.00	0.16	0.16
8-30	0.00	0.004	0.004
8-31	0.00	0.14	0.14
8-32	0.00	0.02	0.02
8-33	0.00	0.02	0.02
8-34	0.00	0.01	0.01
Totals[4]	**1.05**	**7.71**	**8.76**

[1] Total area (acres) of three-parameter wetland features subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[2] Total area (acres) of non-wetland tributaries subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[3] Total area (acres) of features subject to Corps jurisdiction (consists of both wetlands and non-wetland waters).

[4] These totals may change depending upon Corps determinations regarding proposed non-jurisdictional and isolated features.

TABLE 17: TRW Non-jurisdictional Feature Totals

Feature Name	Wetland (acres)	Non-wetland Waters (acres)	Total Acreage
Isolated Seasonal Pond	0.58	0.00	0.58
8-21	0.00	0.02	0.02
Total	**0.58**	**0.02**	**0.60**

[1] This feature has been field verified and the Corps concurs it is isolated and therefore not subject to regulation pursuant to SWANCC

PLANNING AREA 9 (O'NEILL RANCH)

Planning Area 9 is located near the eastern edge of the study area within portions of Gabino Canyon. RMV and the Corps have reached concurrence regarding the jurisdictional status for each of the features summarized in the tables below and all features in this planning area are considered Resolved Areas. Corps jurisdiction in Planning Area 9 totals approximately 14.75 acres of which 4.57 acres consist of jurisdictional wetlands.

TABLE 18: O'Neill Ranch Jurisdictional Feature Totals

Feature Name	Wetland[1]	Waters[2]	Total Corps[3]
Gabino	1.01	3.66	4.67
9-1	0.16	0.97	1.13
9-2	0.00	1.25	1.25
9-3	0.00	0.19	0.19
9-4	0.00	0.56	0.56
9-5	0.00	0.08	0.08
9-11	0.00	0.30	0.30
9-12	0.00	0.03	0.03
9-13	0.00	0.12	0.12
9-14	0.58	0.55	1.13
9-15	0.00	0.29	0.29
Gabino/Jerome Lake Wetland	1.87	0.00	1.87
Jerome Lake	0.95	2.18	3.13
Totals[4]	**4.57**	**10.18**	**14.75**

[1] Total area (acres) of three-parameter wetland features subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[2] Total area (acres) of non-wetland tributaries subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[3] Total area (acres) of features subject to Corps jurisdiction (consists of both wetlands and non-wetland waters).

[4] These totals may change depending upon Corps determinations regarding proposed non-jurisdictional and isolated features.

TABLE 19: O'Neill Ranch Non-jurisdictional Feature Totals

Feature Name	Wetland (acres)	Non-wetland Waters (acres)	Total Acreage
9-6	0.00	0.27	0.27
9-7	0.00	0.00	0.00
9-8	0.00	0.01	0.01
9-9	0.00	0.01	0.01
9-10	0.00	0.04	0.04
9-14	0.00	0.04	0.04
Total	**0.00**	**0.37**	**0.37**

[1] This feature has been field verified and the Corps concurs it is isolated and therefore not subject to regulation pursuant to SWANCC

ROAD GAPS

Road Gaps are located throughout the study area. Corps jurisdiction in the road gaps totals approximately 86.33 acres of which 41.46 acres consist of jurisdictional wetlands. All of the road gap areas are resolved with the exception of three drainages that are also addressed in Planning Area 2, that extend beyond the planning area boundary and are affected by potential road alignments. The drainages that overlap with Planning Area 2 are 5/2-1, 6/2-4 and 7/2-5.

TABLE 20: Road Gap Jurisdictional Feature Totals

Feature Name	Wetland[1]	Waters[2]	Total Corps[3]
Blind Canyon	0.00	0.15	0.15
Chiquita	0.75	0.00	0.75
Chiquita Wetland	12.60	0.00	12.60
Cristianitos Creek	3.88	3.97	7.85
Gabino Creek	0.00	3.29	3.29
Gobernadora	0.57	0.60	1.17
Road Gap-1	0.00	0.07	0.07
Road Gap-9	0.00	0.14	0.14
Road Gap-10/1-7	0.00	0.07	0.07
Road Gap-11/2-11	0.00	0.04	0.04
Road Gap-13/2-14	0.00	0.01	0.01
Road Gap-14/2-13	0.00	0.18	0.18
Road Gap-15/3-16	0.95	0.00	0.95
Road Gap-16/3-13	0.00	0.14	0.14
Road Gap-17/5-1	0.00	0.40	0.40
Road Gap-18	0.00	0.01	0.01
Road Gap-22	0.12	0.96	1.08
San Juan Creek A	1.78	2.12	3.90
San Juan Creek B	1.26	9.57	10.83
San Juan Creek C	2.19	12.78	14.97
San Juan Creek D	16.77	4.05	20.82
San Juan Creek E	0.59	6.32	6.91
Totals[4]	**41.46**	**44.87**	**86.33**

[1] Total area (acres) of three-parameter wetland features subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[2] Total area (acres) of non-wetland tributaries subject to Corps jurisdiction pursuant to Section 404 of the Clean Water Act.

[3] Total area (acres) of features subject to Corps jurisdiction (consists of both wetlands and non-wetland waters).

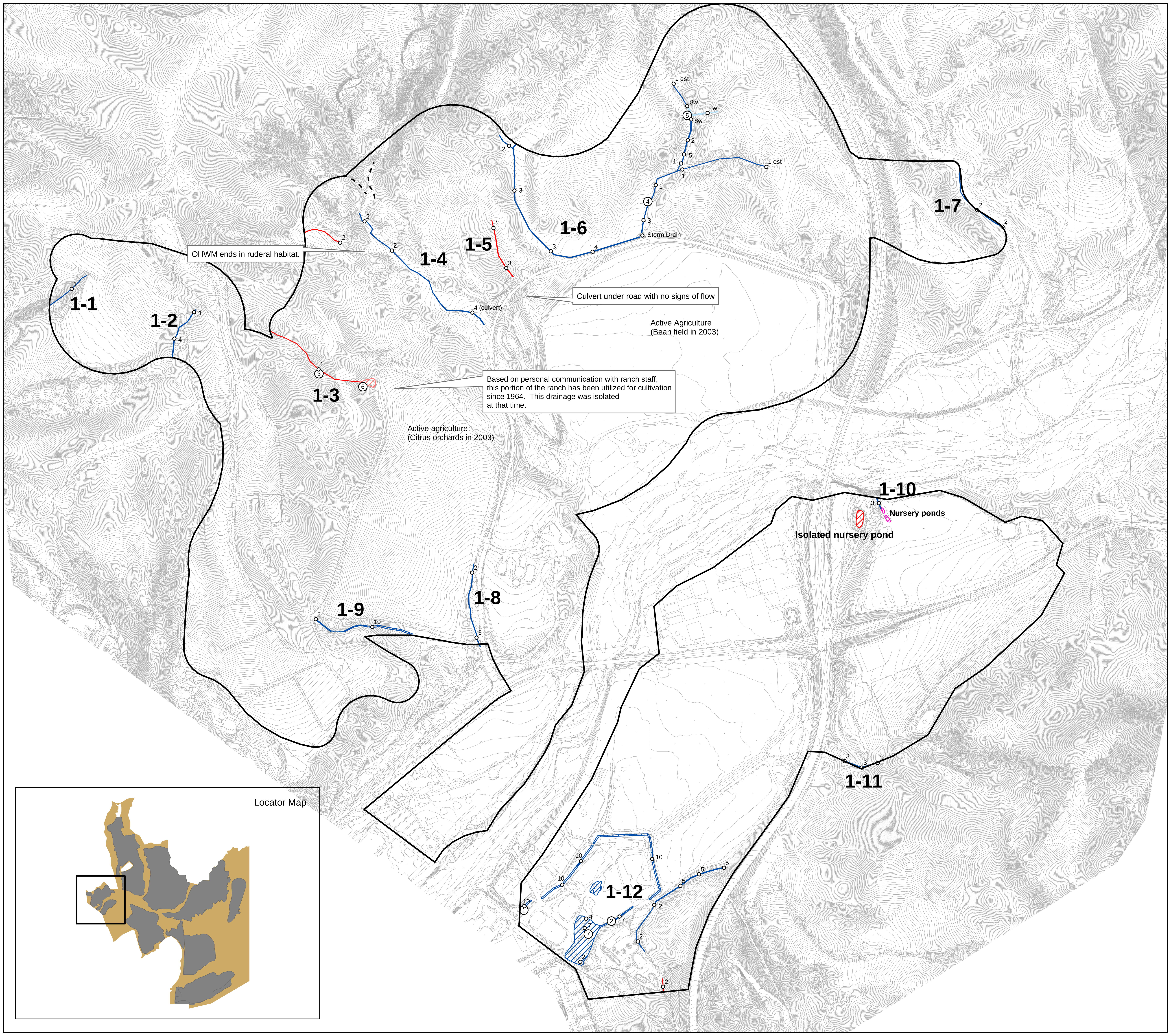
[4] These totals may change depending upon Corps determinations regarding proposed non-jurisdictional and isolated features.

TABLE 22: Road Gap Non-jurisdictional Feature Totals

Feature Name	Wetland (acres)	Non-wetland Waters (acres)	Total acreage
Road Gap-2	0.00	0.02	0.02
Road Gap-3	0.00	0.01	0.01
Road Gap-4	0.00	0.02	0.02
Road Gap-5/2-1	0.00	0.18	0.18
Road Gap-6/2-4	0.00	0.08	0.08
Road Gap-7/2-5	0.00	0.05	0.05
Road Gap-21	0.00	0.01	0.01
Road Gap-8	0.00	0.08	0.08
Sulfer Canyon Creek	1.34	0.08	1.42
Sulfer Slope Wetland	0.00	0.16	0.16
Road Gap-19/5-7A	0.00	0.03	0.03
Road Gap-20/8-21	0.00	0.06	0.06
Totals	**1.34**	**0.78**	**2.12**

[1] This feature has been field verified and the Corps concurs it is isolated and therefore not subject to regulation pursuant to SWANCC

s:0239GENERAL/0239-15/0239-15b.GLAjd.Corps.041804.doc



RANCHO MISSION VIEJO
ORTEGA GATEWAY

Jurisdictional Delineation Map (Corps)

GLENN LUKOS ASSOCIATES

FINAL DRAFT
Supercedes versions dated July 2003

N
W E
S

400 200 0 Feet

Legend

- Study Area
- Soil Pit Location
- OHWM ("w" indicates the presence of wetland)
- No OHWM
- Jurisdictional Wetlands
- Jurisdictional Waters
- Isolated Wetlands
- Isolated Waters
- Non-Jurisdictional Feature

c://GIS PROJECTS/239-15/PA1/Delineation Rev1/rev2/REV2MAPcolor October 29, 2003

RANCHO MISSION VIEJO
CHIQUITA

Jurisdictional Delineation Map (Corps)

GLENN LUKOS ASSOCIATES

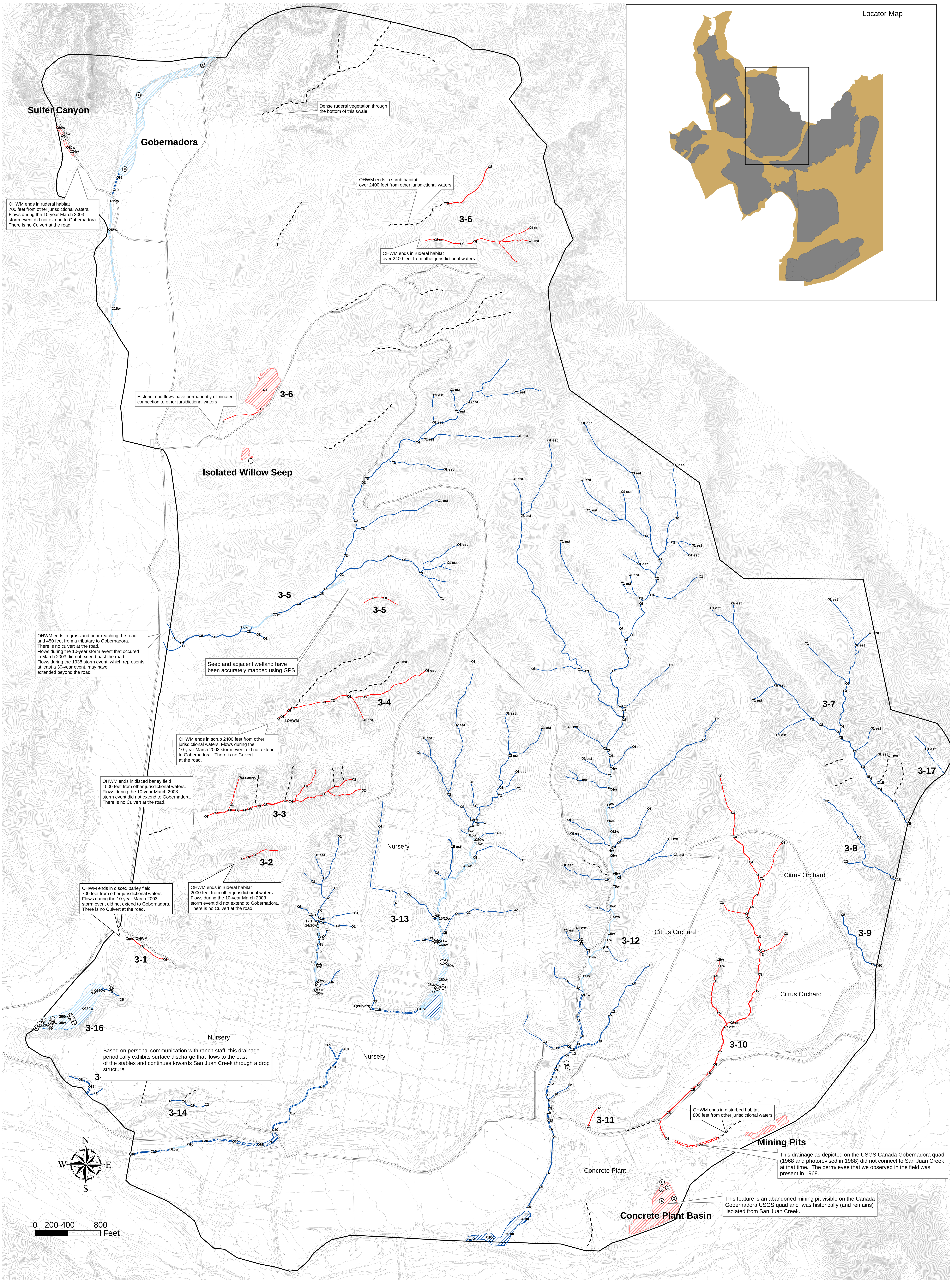
REVISION 4
Supercedes version dated December 1, 2003

Study Area Boundary
Existing Ranch Road
OHWM ("w" indicates the presence of wetlands)
Soil Pit Location

Legend

Jurisdictional Wetlands
Jurisdictional Waters
No OHWM
Isolated Wetlands
Isolated Waters
Non-Jurisdictional Feature

C://GIS PROJECTS/239-15SAMP/PA2/Delineation REV1/rev2/REV4MAPcolorcorps.mxd February 18, 2004



RANCHO MISSION VIEJO GOBERNADORA

Jurisdictional Delineation Map (Corps)

GLENN LUKOS ASSOCIATES

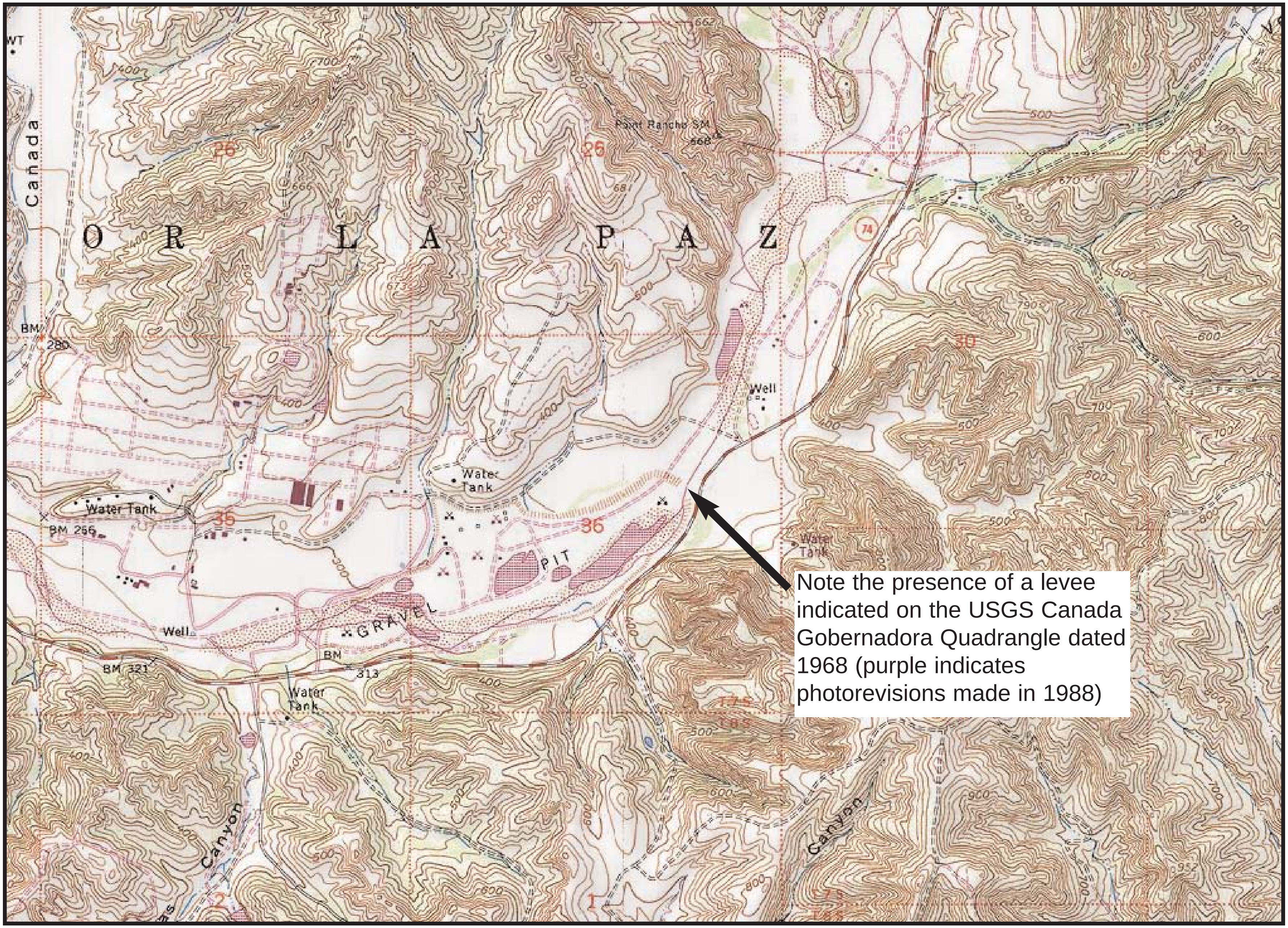
REVISION 3
Supercedes versions dated December 1, 2003

Legend

- Study Area Boundary
- Width of OHWM ("w" indicates the presence of wetlands)
- Existing Ranch Roads
- Soil Pit Location
- No OHWM
- Jurisdictional Wetlands
- Isolated Wetlands
- Isolated Waters
- Jurisdictional Waters

c://GIS PROJECTS/239-15SAMP/PA3/PA3Delineationrev1/PA3CorpsFeb18_04.mxd February 18, 2004

Adapted from USGS Canada Gobernadora quadrangle



NORTH

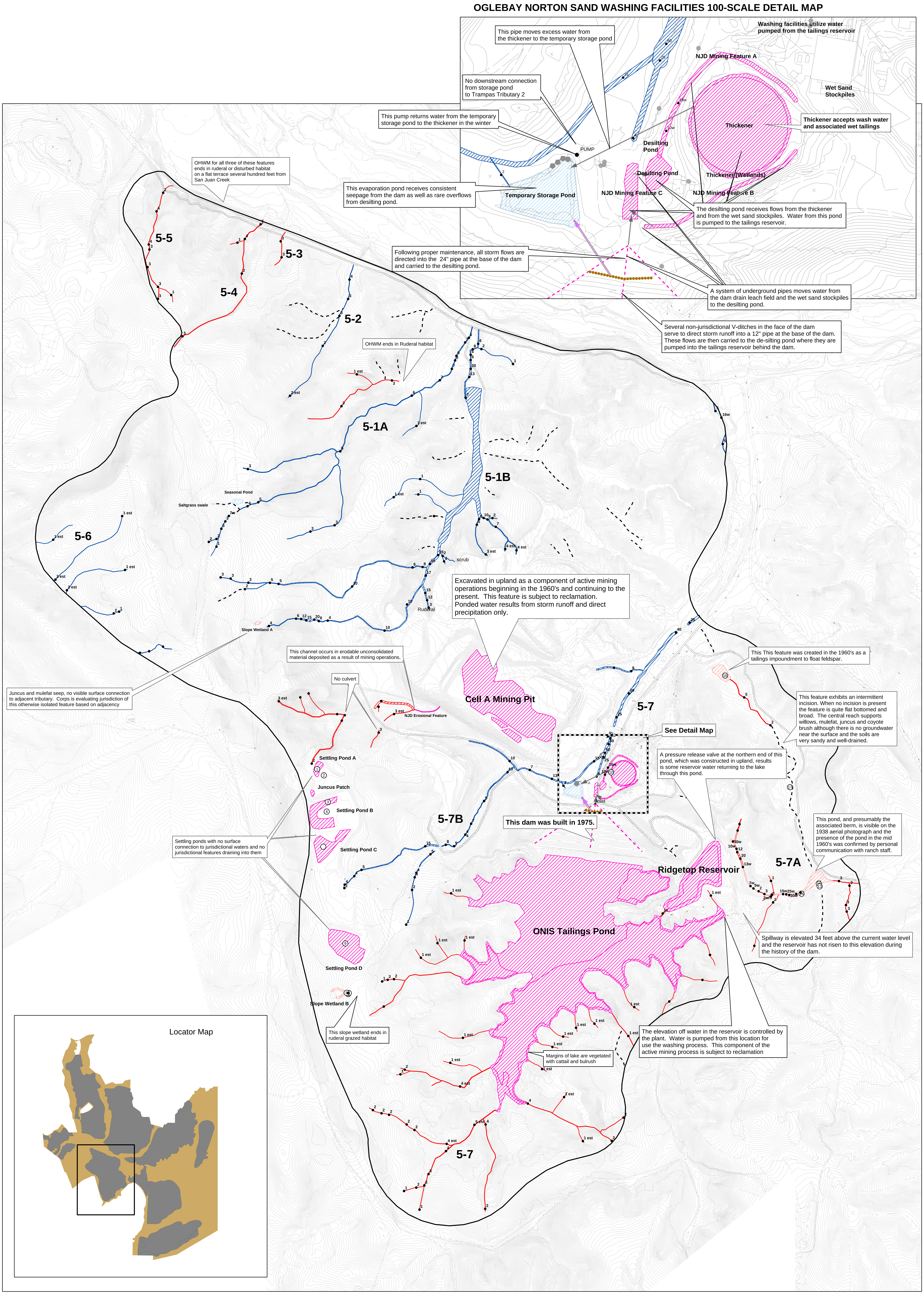
0 1000 2000 3000
FEET

RANCHO MISSION VIEJO GOBERNADORA

1968 USGS Canada Gobernadora Quadrangle

GLENN LUKOS ASSOCIATES

c://GIS PROJECTS/PA4/PA4/corpscolor.mxd October 29, 2003



RANCHO MISSION VIEJO TRAMPAS

Jurisdictional Delineation Map (Corps)

GLENN LUKOS ASSOCIATES

VERIFIED MAP
Supercedes version dated October 29, 2003

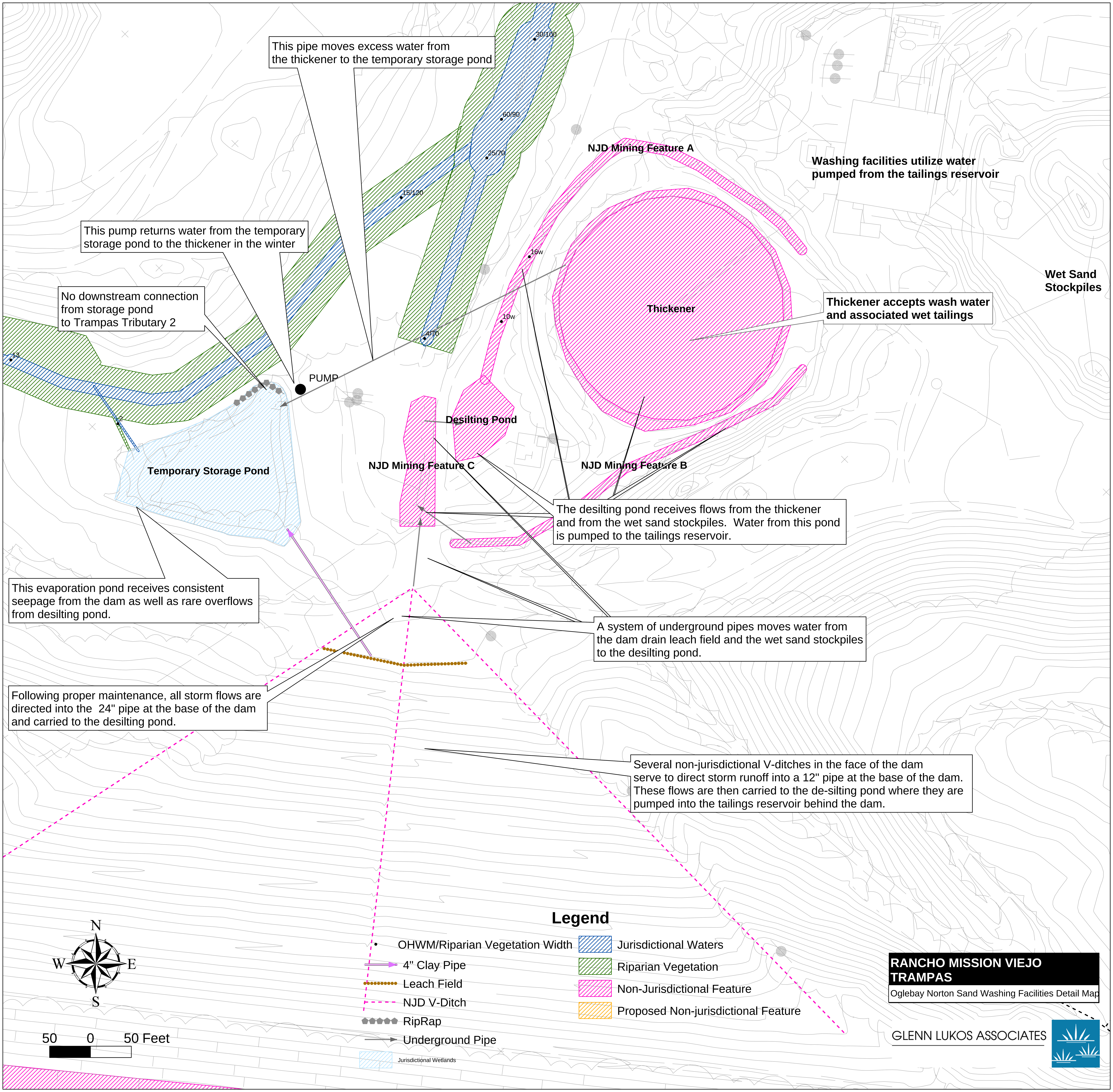
N
W E
S

0 200 400 800
Feet

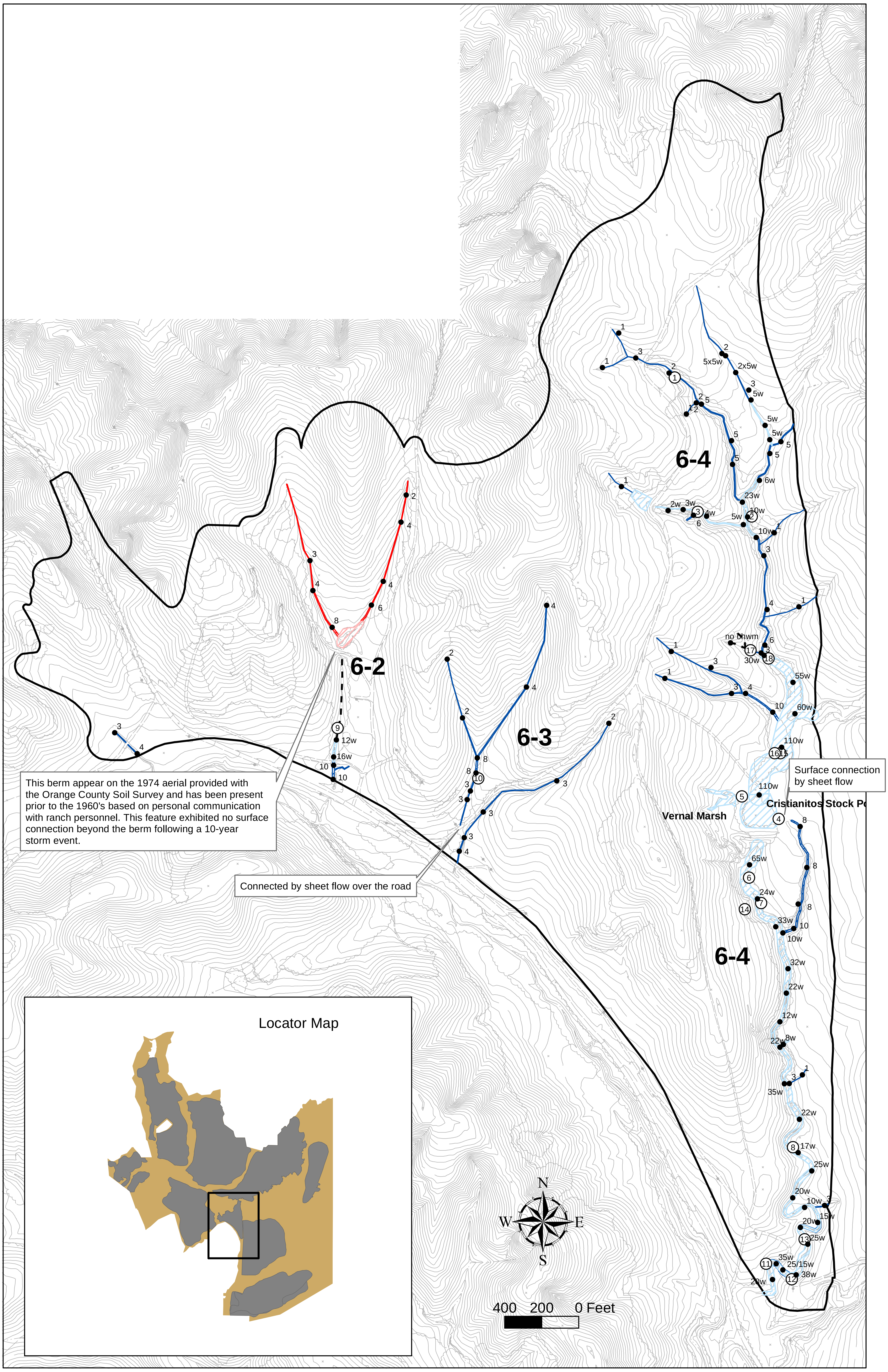
Legend

- Study Area Boundary
- Existing Ranch or Mining Roads
- OHWM ("w" indicates the presence of wetlands)
- Soil Pit Location
- corpsnoOHWM
- Jurisdictional Wetlands
- Isolated Wetlands
- Non-Jurisdictional Feature
- Isolated Waters
- Jurisdictional Waters
- 4" Clay Pipe
- Leach Field
- NJD V-Ditch
- RipRap
- Underground Pipe

c://GIS PROJECTS/239-15SAMP/PA5/PA5corps041804.mxd April 18, 2004



C;GIS PROJECTS/239-15SAMP/PA5/detail041804.mxd April 18, 2004



RANCHO MISSION VIEJO
CHRISTIANITOS MEADOWS

Jurisdictional Delineation Map (Corps)

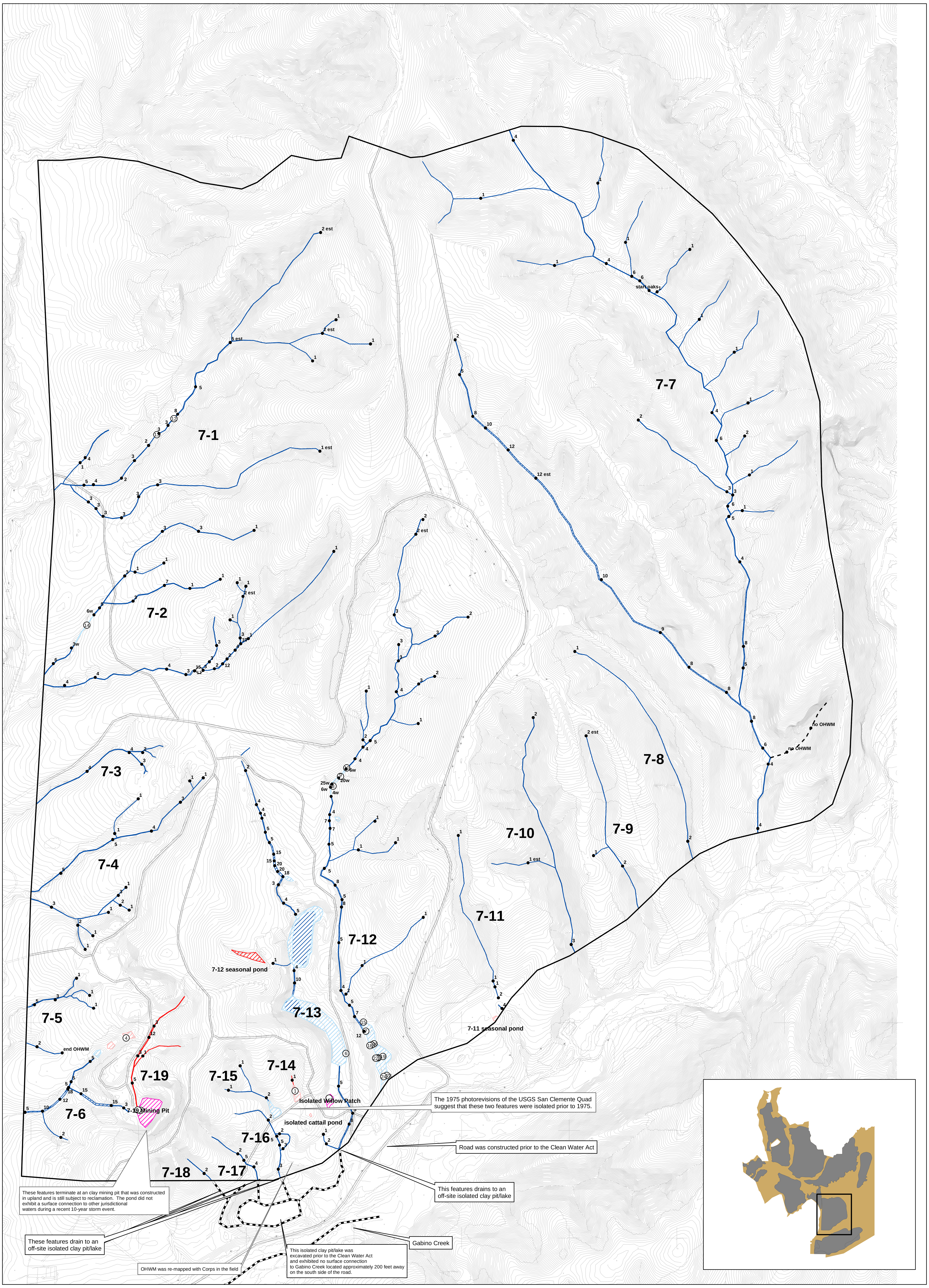
GLENN LUKOS ASSOCIATES

FINAL DRAFT
Supercedes version dated July 2003

Legend

- Study Area Boundary
- Width of OHWM ("w" indicates the presence of wetland)
- Soil Pit Location
- No OHWM
- Jurisdictional Wetlands
- Jurisdictional Waters
- Isolated Wetlands
- Isolated Waters

c://GIS PROJECTS/239-15SAMP/PA6/PA6Corps.mxd October 29, 2003



RANCHO MISSION VIEJO
CRISTIANITOS CANYON

Jurisdictional Delineation Map (Corps)

GLENN LUKOS ASSOCIATES

FINAL REVISION
Supercedes version dateed October 29, 2003

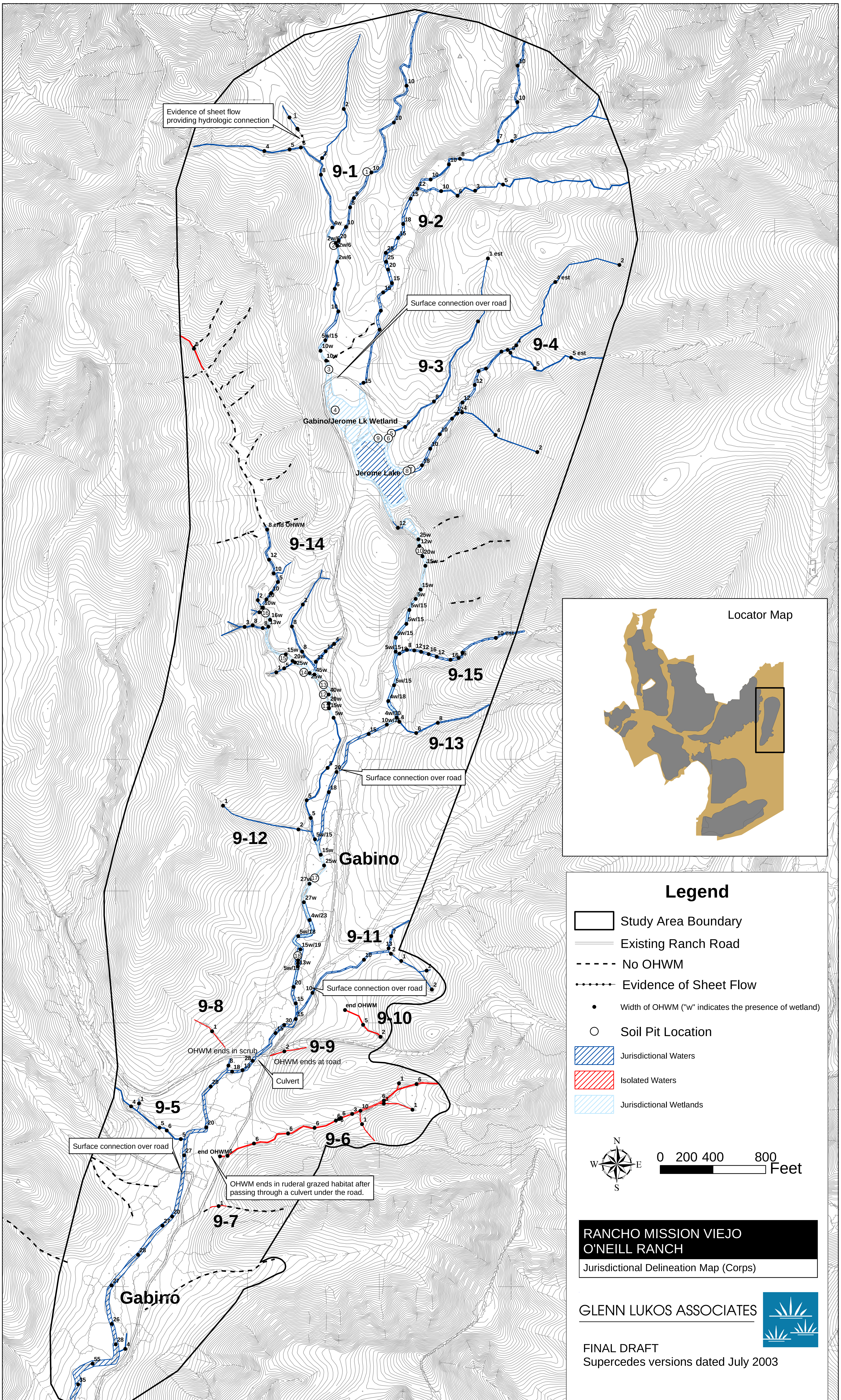
400 200 0 Feet

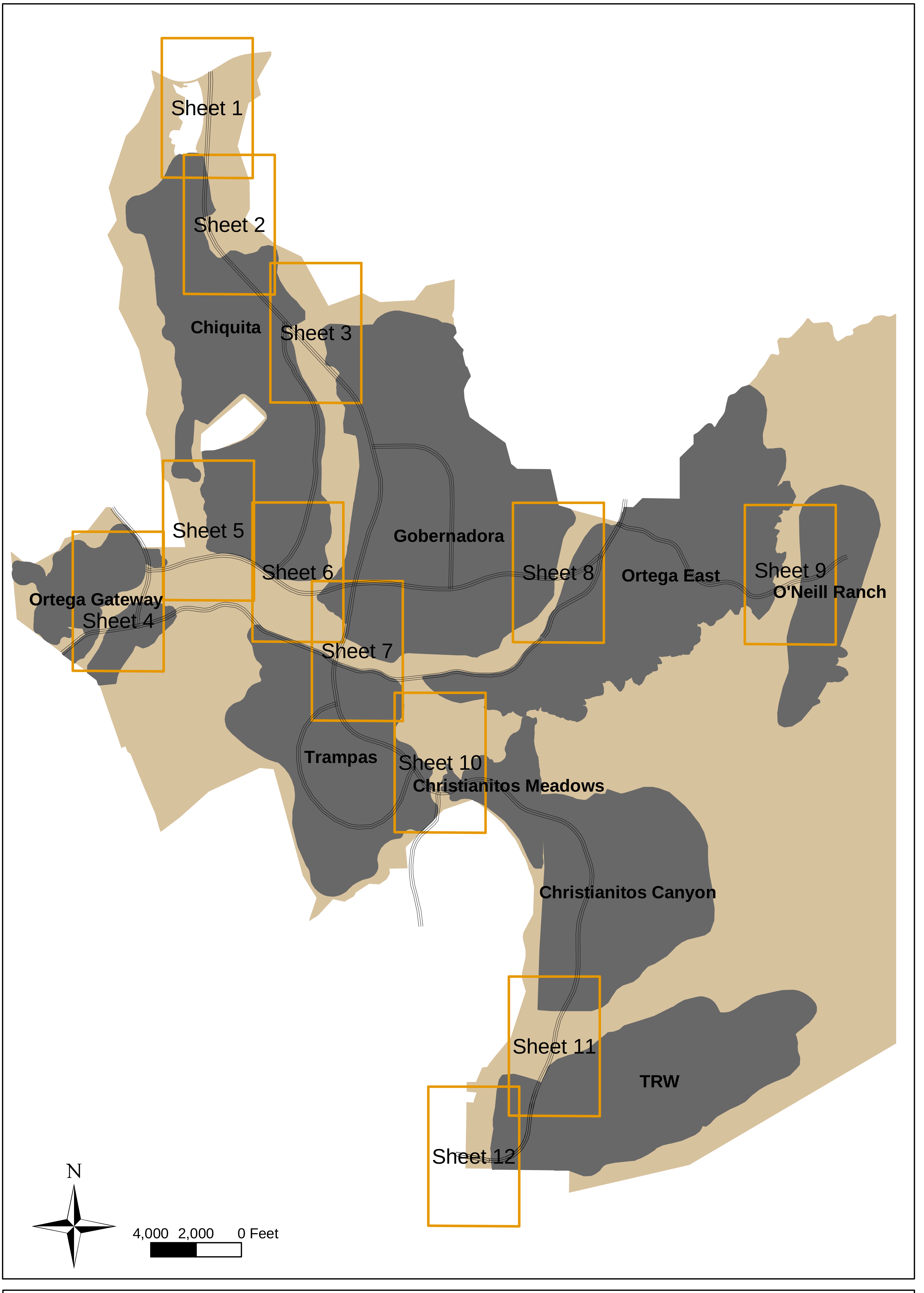
Legend

- Study Area Boundary
- Exisiting or Abandoned Roads
- Width of OHWM ("w" indicates the presence of wetlands)
- Soil Pit Location
- No OHWM, bed or bank
- Jurisdictional Wetlands
- Jurisdictional Waters
- Isolated Wetlands
- Isolated Waters
- Non-Jurisdictional Feature
- Off-Site Features
- No OHWM

C://GIS PROJECTS/239-15SAMP/PA7/PA7Corpsfinal.mxd February 18, 2004

Locator Map
Blind Canyon
Blind Canyon
Blind Canyon
Stock Pond/Impoundment
isolated seasonal pond
8-1
8-2
8-3
8-4
8-5
8-6
8-7
8-8
8-9
8-10
8-11
8-12
8-13
8-14
8-15
8-16
8-17
8-18
8-19
8-20
8-21
8-22
8-23
8-24a
8-24b
8-25
8-26
8-27
8-28
8-29
8-30
8-31
8-32
8-33
8-34
Legend
Study Area Boundary
Width of OHWM ("w" indicates the presence of wetlands)
Soil Pit Locations
No OHWM, bed or bank
Jurisdictional Wetlands
Jurisdictional Waters
Isolated Wetlands
Isolated Waters
Rancho Mission Viejo
TRW
Jurisdictional Delineation Map (Corps)
400 200 0 Feet
GLENN LUKOS ASSOCIATES
FINAL DRAFT
Supercedes versions dated July 2003
c://GIS PROJECTS/239-15SAMP/PA8/delineation/
PA8/PA8corpsfinal.mxd
March 23, 2004


Evidence of sheet flow providing hydrologic connection
9-1
9-2
Surface connection over road
9-3
9-4
Gabino/Jerome Lk Wetland
Jerome Lake
9-14
9-15
9-13
Surface connection over road
9-12
Gabino
9-11
Surface connection over road
9-8
9-10
OHWM ends in scrub
9-9
OHWM ends at road
Culvert
9-5
9-6
Surface connection over road
OHWM ends in ruderal grazed habitat after passing through a culvert under the road.
9-7
Gabino
Locator Map
Legend
Study Area Boundary
Existing Ranch Road
No OHWM
Evidence of Sheet Flow
Width of OHWM ("w" indicates the presence of wetland)
Soil Pit Location
Jurisdictional Waters
Isolated Waters
Jurisdictional Wetlands
0 200 400 800
Feet
RANCHO MISSION VIEJO
O'NEILL RANCH
Jurisdictional Delineation Map (Corps)
GLENN LUKOS ASSOCIATES
FINAL DRAFT
Supercedes versions dated July 2003



RANCHO MISSION VIEJO ROAD GAP ANALYSIS

Jurisdictional Delineation Key Map

GLENN LUKOS ASSOCIATES

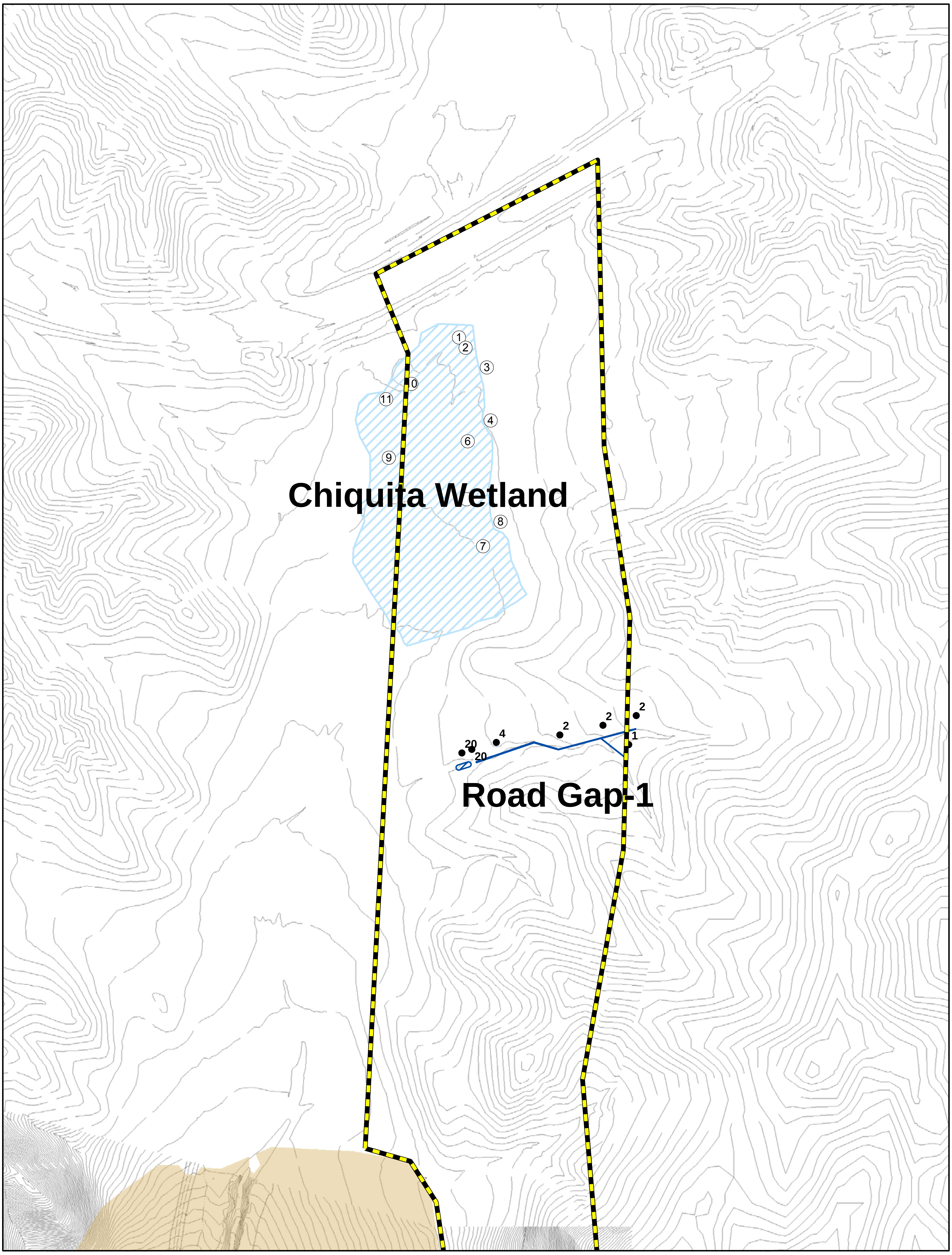
Legend

Conceptual Road Alignments

Study Area Boundaries

Property Boundary

This gap analysis was based on the conceptual road alignments above, which have not yet been subject to final engineereing.



RANCHO MISSION VIEJO
ROAD GAP ANALYSIS

Jurisdictional Delineation Map (Corps) Sheet 1

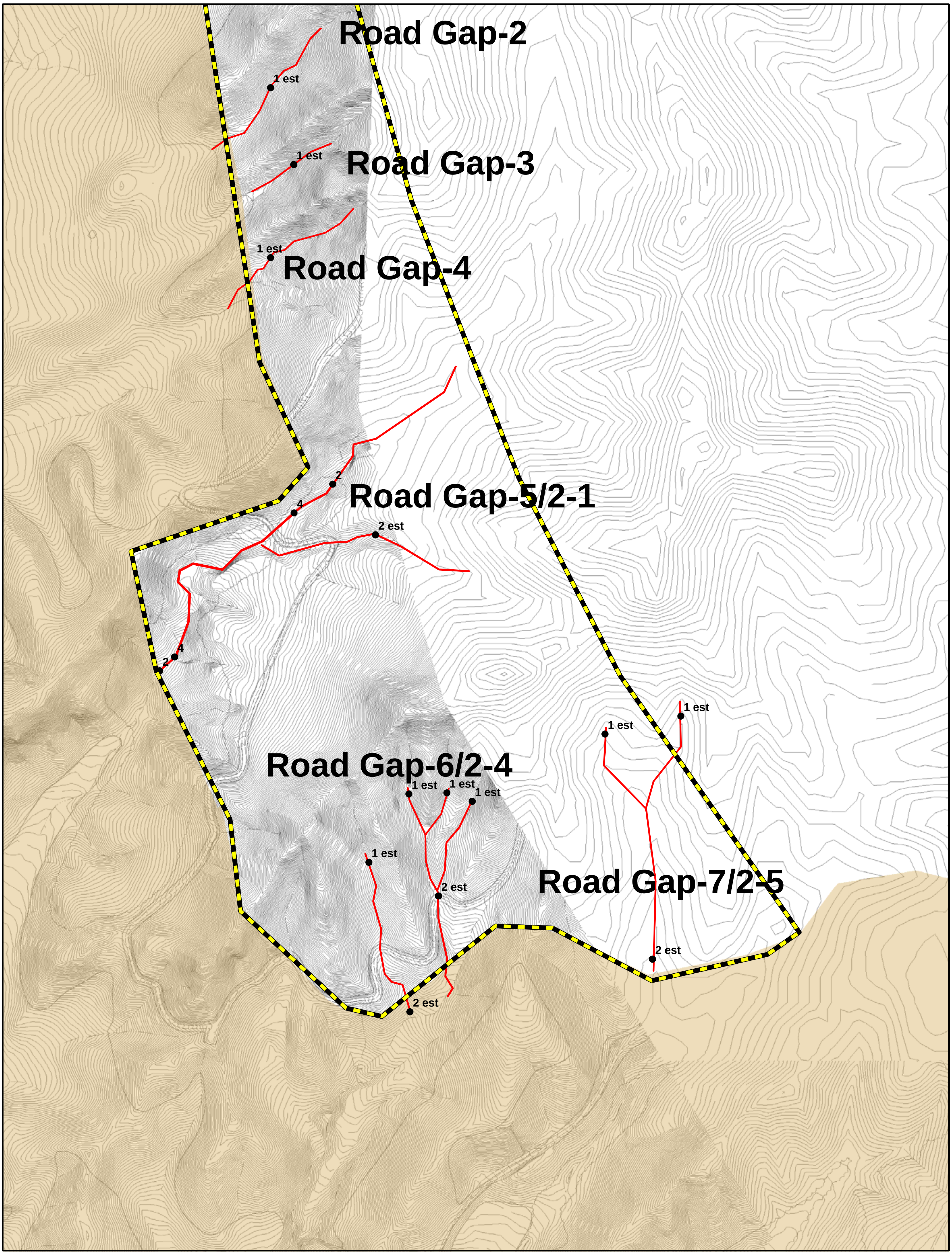
GLENN LUKOS ASSOCIATES

N

400 0 Feet

Study Area Boundaries
Soil Pit Location
Width of OHWM ("w" indicates the presence of wetland)
No OHWM, bed or bank
Jurisdictional Wetlands
Jurisdictional Waters
Isolated Wetlands
Isolated Waters
Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscorps.mxd November 9, 2003



RANCHO MISSION VIEJO
ROAD GAP ANALYSIS

Jurisdictional Delineation Map (Corps) Sheet 2

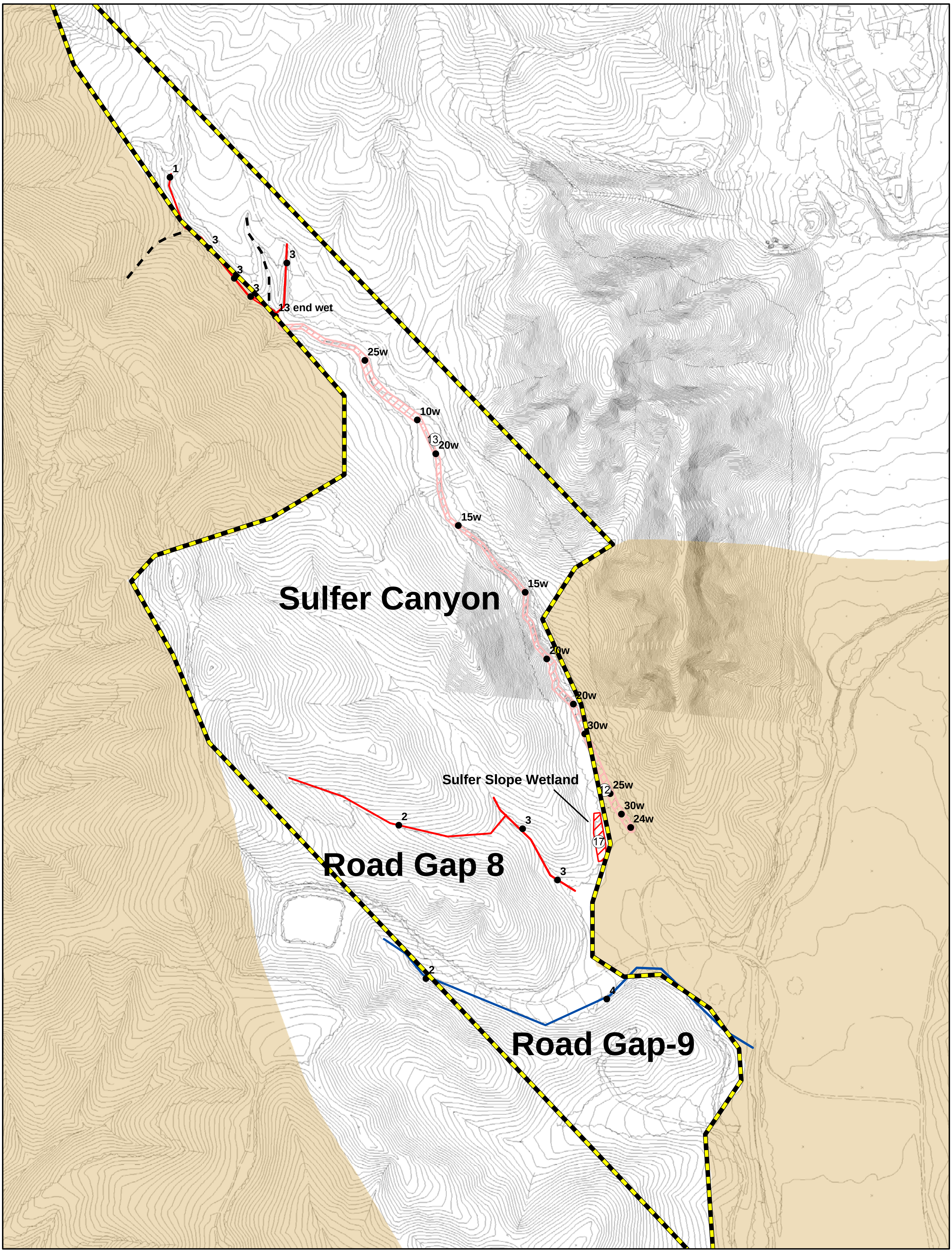
GLENN LUKOS ASSOCIATES

N

400 0 Feet

Study Area Boundaries
Soil Pit Location
Width of OHWM ("w" indicates the presence of wetland)
No OHWM, bed or bank
Jurisdictional Wetlands
Jurisdictional Waters
Isolated Wetlands
Isolated Waters
Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscorps.mxd November 9, 2003

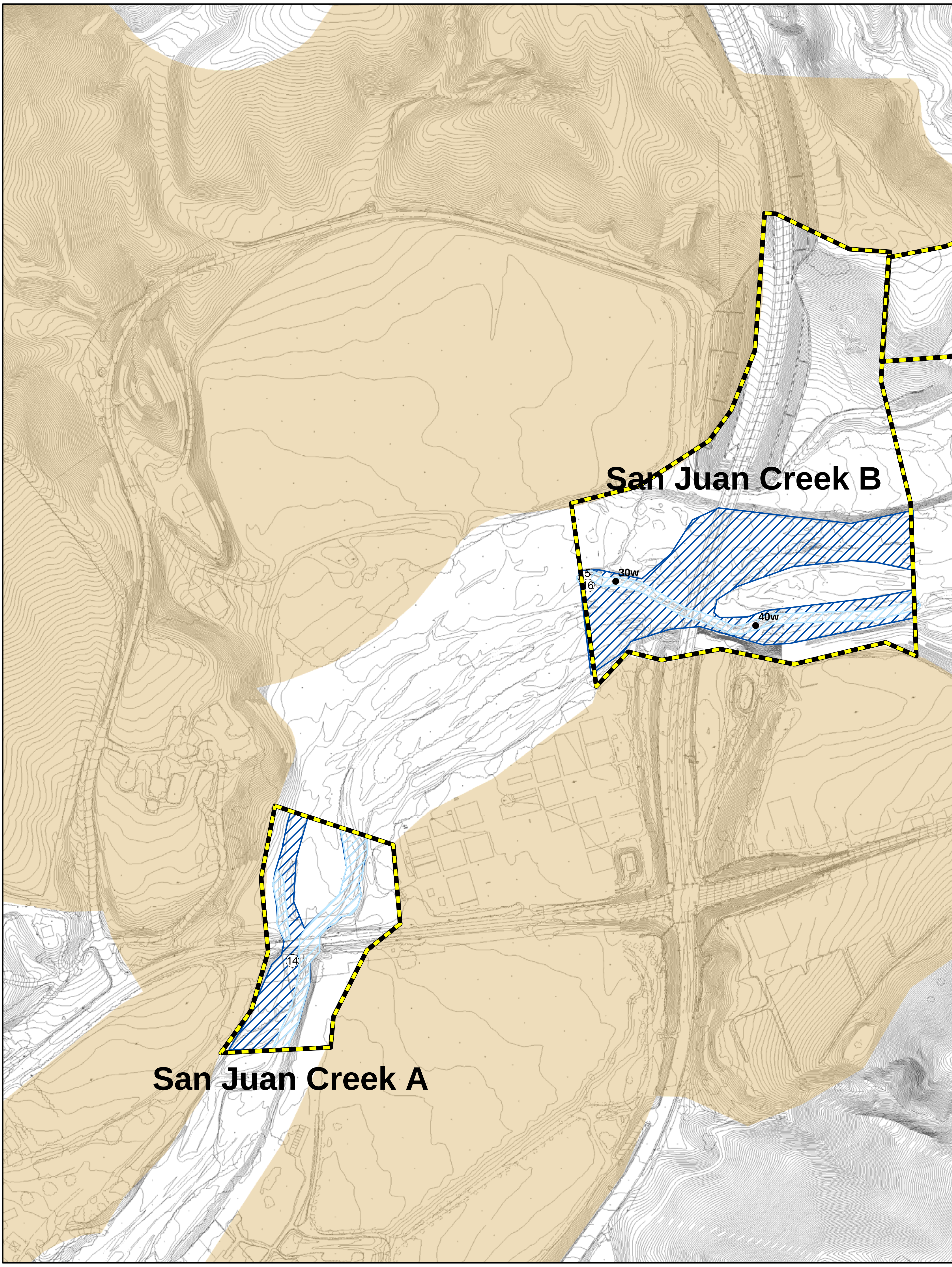


RANCHO MISSION VIEJO
ROAD GAP ANALYSIS

Jurisdictional Delineation Map (Corps) Sheet 3

GLENN LUKOS ASSOCIATES

c: GIS PROJECTS/239-15SAMP/roadgapscorps.mxd November 9, 2003



RANCHO MISSION VIEJO
ROAD GAP ANALYSIS

Jurisdictional Delineation Map (Corps) Sheet 4

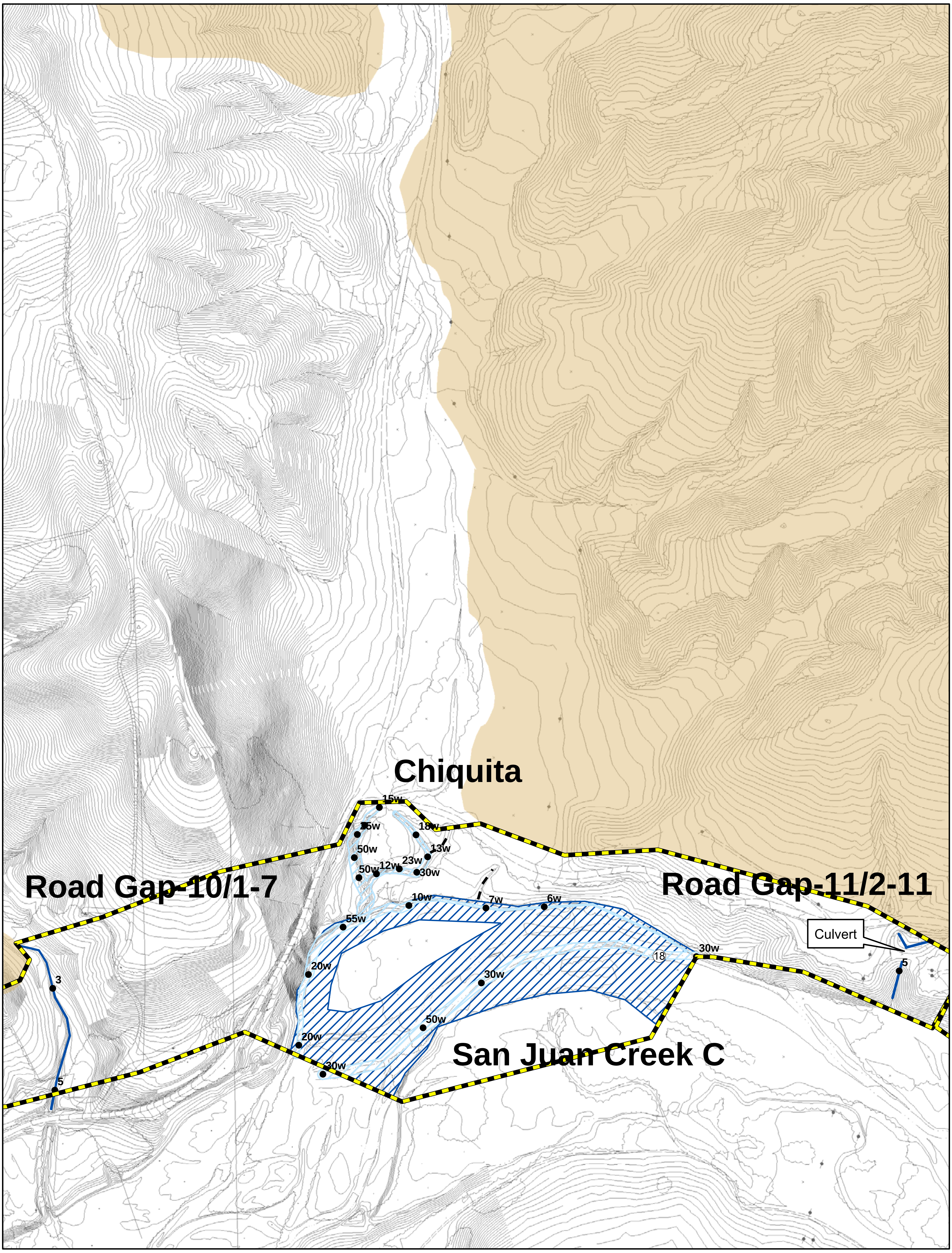
GLENN LUKOS ASSOCIATES

N

400 0 Feet

Study Area Boundaries
Soil Pit Location
Width of OHWM ("w" indicates the presence of wetland)
No OHWM, bed or bank
Jurisdictional Wetlands
Jurisdictional Waters
Isolated Wetlands
Isolated Waters
Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscorps.mxd November 9, 2003



Study Area Boundaries
Soil Pit Location
Width of OHWM ("w" indicates the presence of wetland)
No OHWM, bed or bank
Jurisdictional Wetlands
Jurisdictional Waters
Isolated Wetlands
Isolated Waters
Planning Area (see Study Area Maps)

RANCHO MISSION VIEJO
ROAD GAP ANALYSIS

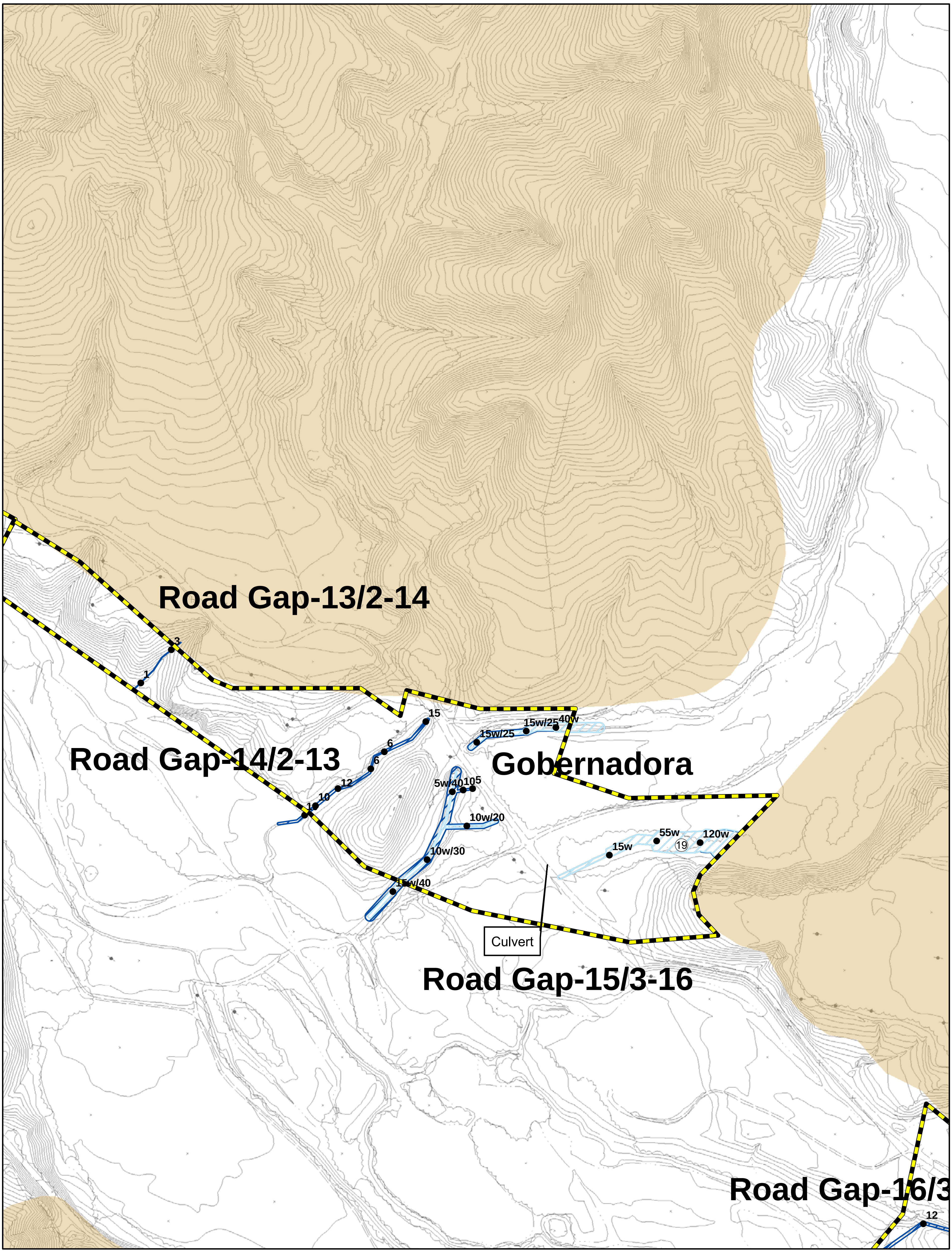
Jurisdictional Delineation Map (Corps) Sheet 5

N

400 0 Feet

GLENN LUKOS ASSOCIATES

c: GIS PROJECTS/239-15SAMP/roadgapscorps.mxd November 9, 2003



RANCHO MISSION VIEJO
ROAD GAP ANALYSIS

Jurisdictional Delineation Map (Corps) Sheet 6

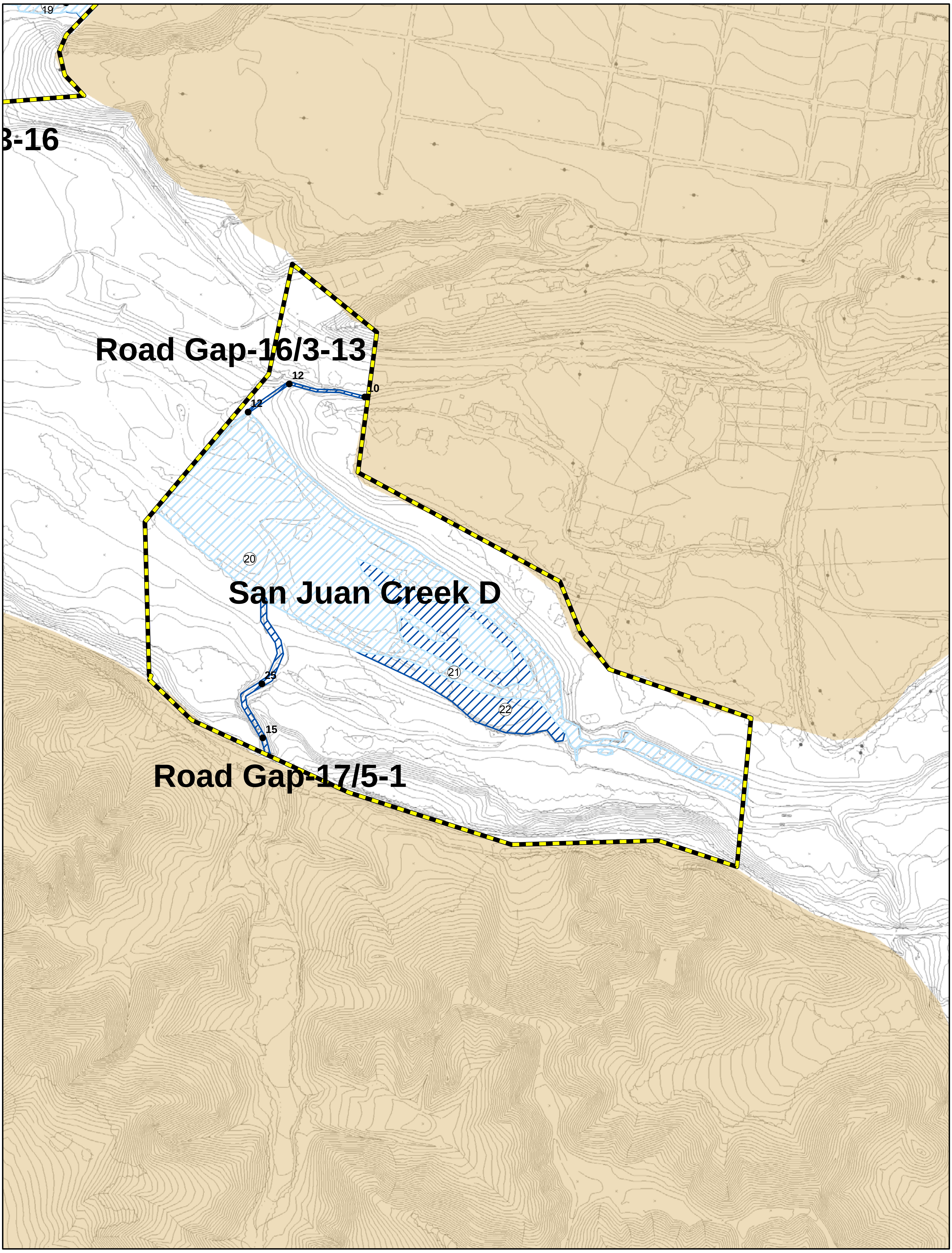
GLENN LUKOS ASSOCIATES

N

400 0 Feet

Study Area Boundaries
Soil Pit Location
Width of OHWM ("w" indicates the presence of wetland)
No OHWM, bed or bank
Jurisdictional Wetlands
Jurisdictional Waters
Isolated Wetlands
Isolated Waters
Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscorps.mxd November 9, 2003



RANCHO MISSION VIEJO
ROAD GAP ANALYSIS

Jurisdictional Delineation Map (Corps) Sheet 7

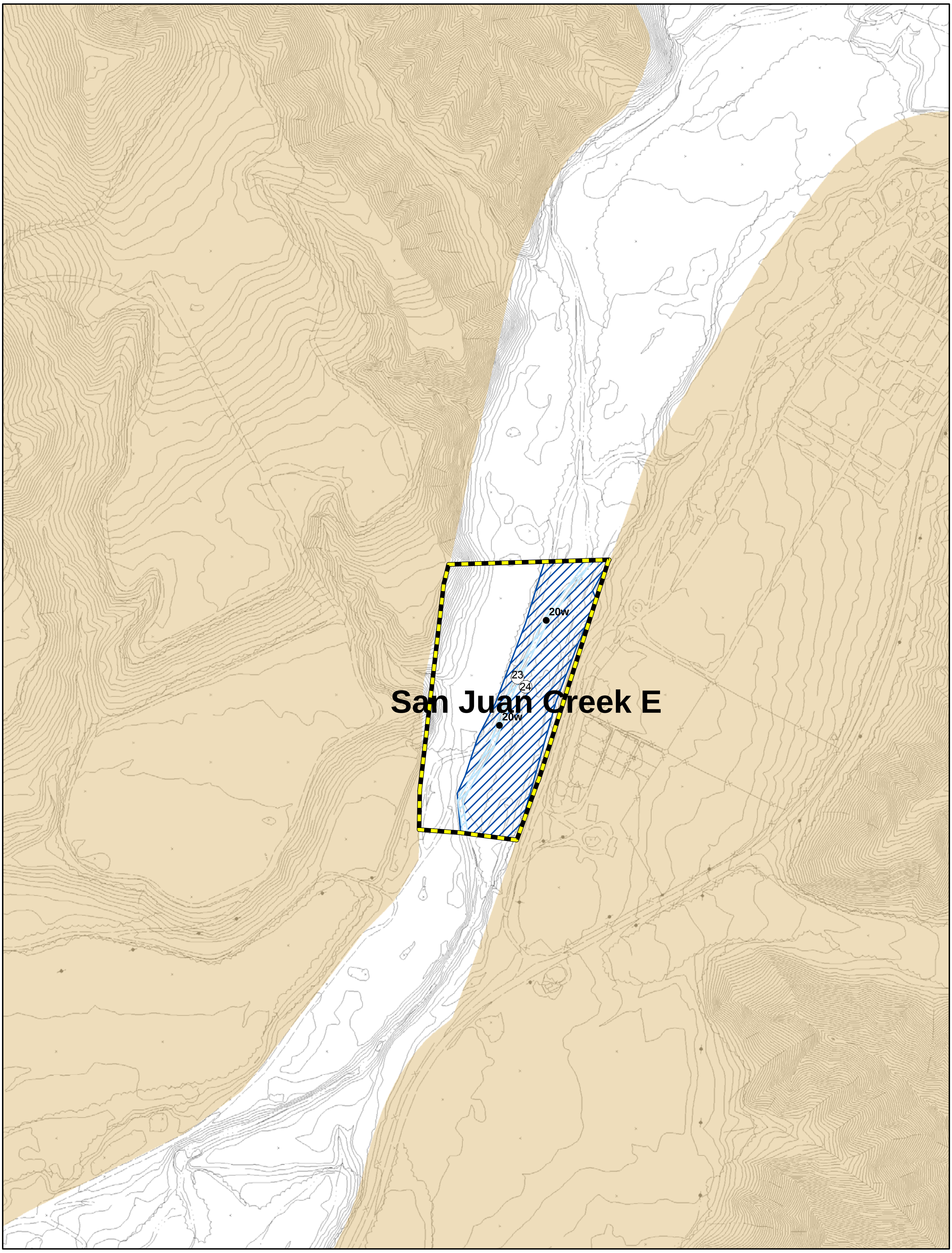
GLENN LUKOS ASSOCIATES

N

400 0 Feet

Study Area Boundaries
Soil Pit Location
Width of OHWM ("w" indicates the presence of wetland)
No OHWM, bed or bank
Jurisdictional Wetlands
Jurisdictional Waters
Isolated Wetlands
Isolated Waters
Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscorps.mxd November 9, 2003



RANCHO MISSION VIEJO ROAD GAP ANALYSIS

Jurisdictional Delineation Map (Corps) Sheet 8

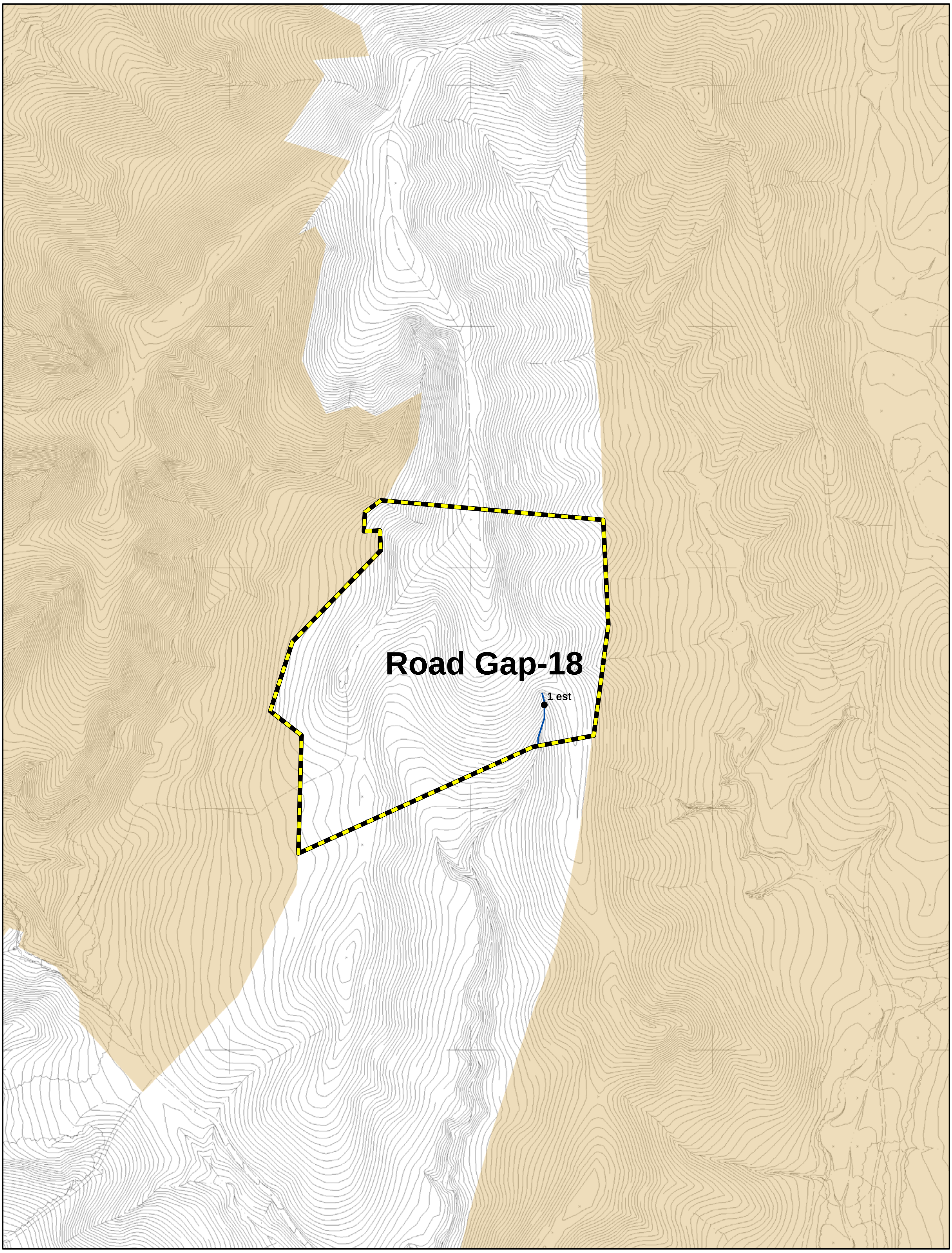
GLENN LUKOS ASSOCIATES

N

400 0 Feet

Study Area Boundaries
Soil Pit Location
Width of OHWM ("w" indicates the presence of wetland)
No OHWM, bed or bank
Jurisdictional Wetlands
Jurisdictional Waters
Isolated Wetlands
Isolated Waters
Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscorps.mxd November 9, 2003



Study Area Boundaries
Soil Pit Location
Width of OHWM ("w" indicates the presence of wetland)
No OHWM, bed or bank
Jurisdictional Wetlands
Jurisdictional Waters
Isolated Wetlands
Isolated Waters
Planning Area (see Study Area Maps)

RANCHO MISSION VIEJO
ROAD GAP ANALYSIS

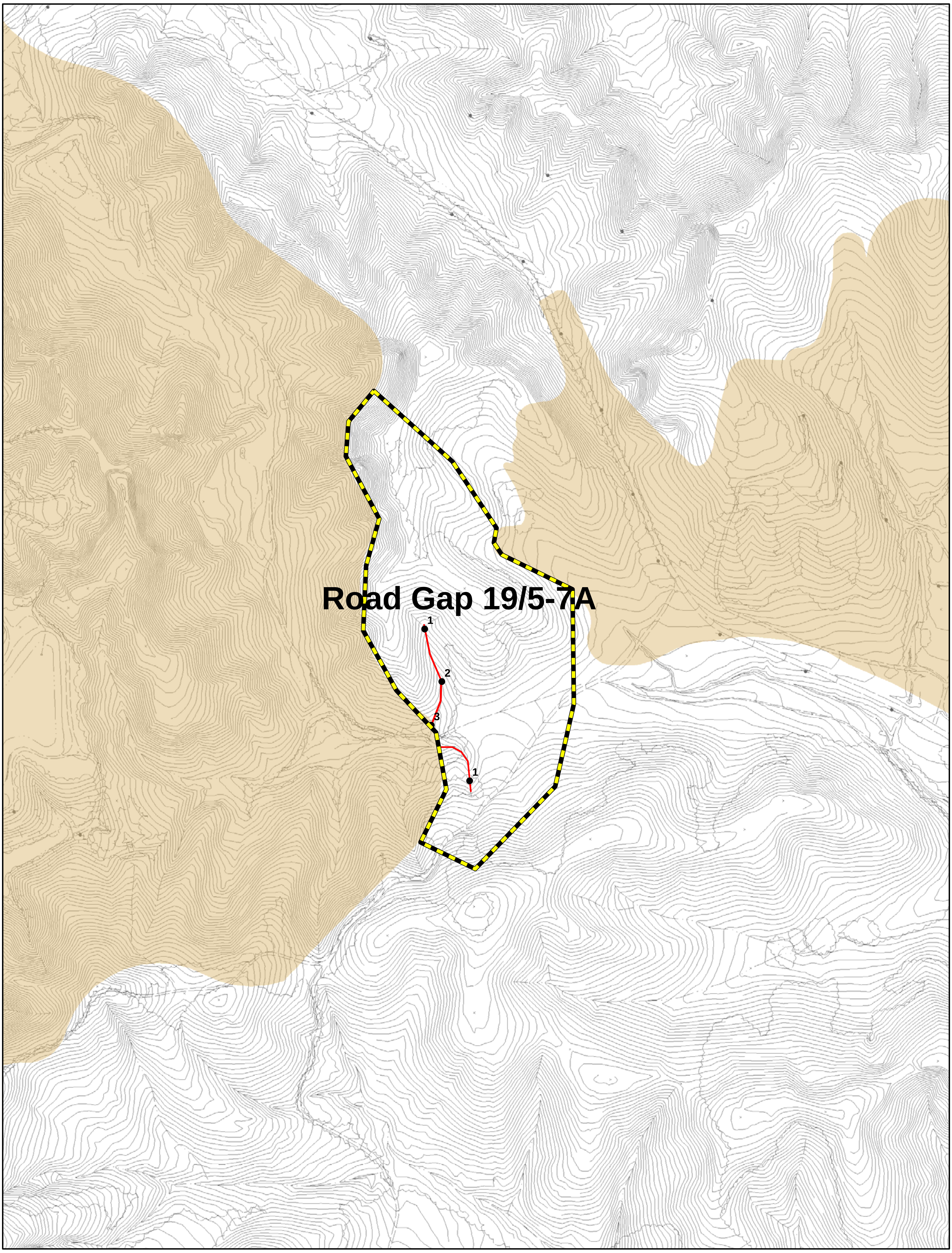
Jurisdictional Delineation Map (Corps) Sheet 9

N

400 0 Feet

GLENN LUKOS ASSOCIATES

c: GIS PROJECTS/239-15SAMP/roadgapscorps.mxd November 9, 2003



RANCHO MISSION VIEJO
ROAD GAP ANALYSIS

Jurisdictional Delineation Map (Corps) Sheet 10

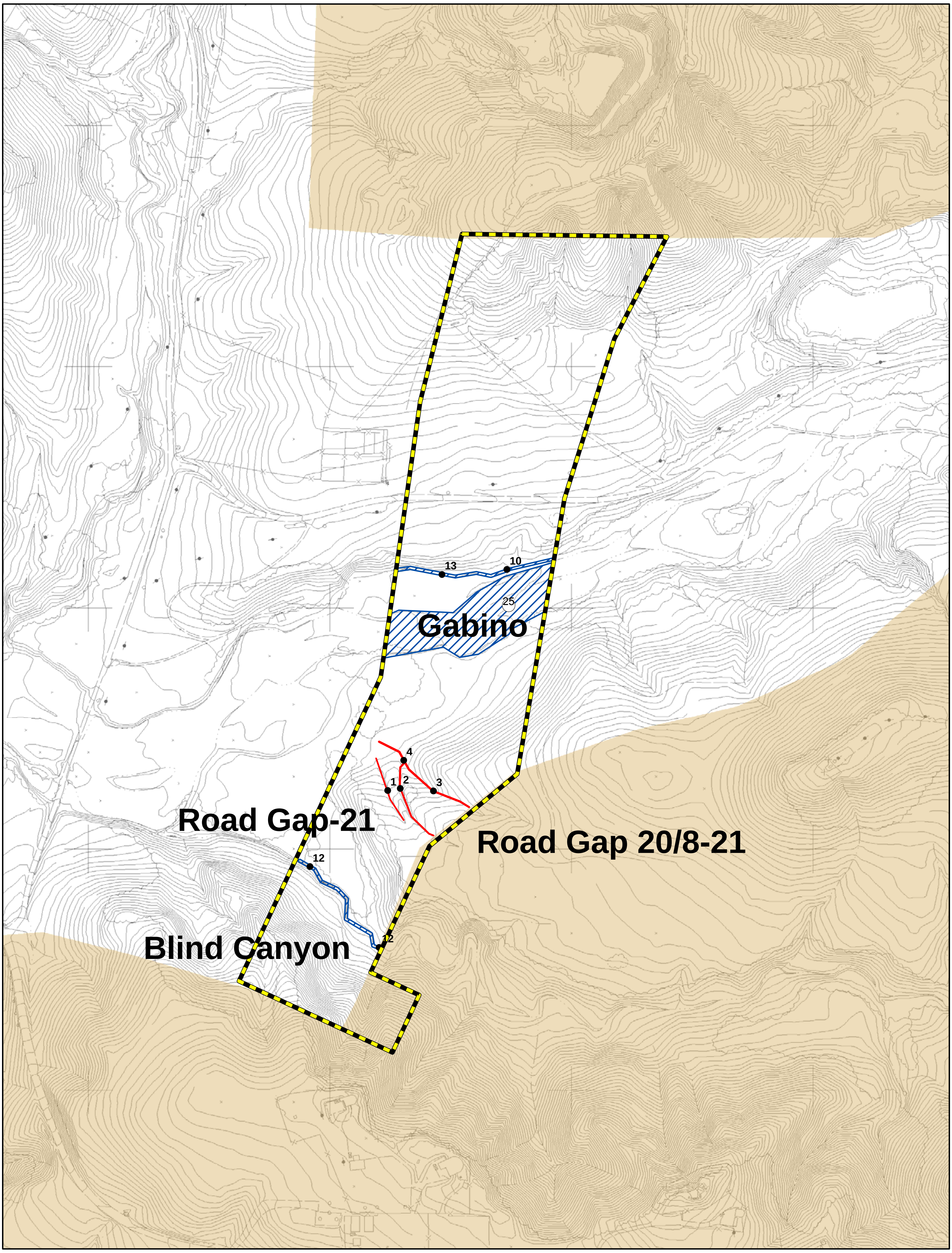
GLENN LUKOS ASSOCIATES

N

400 0 Feet

- Study Area Boundaries
- Soil Pit Location
- Width of OHWM ("w" indicates the presence of wetland)
- No OHWM, bed or bank
- Jurisdictional Wetlands
- Jurisdictional Waters
- Isolated Wetlands
- Isolated Waters
- Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscorps.mxd November 9, 2003



RANCHO MISSION VIEJO
ROAD GAP ANALYSIS

Jurisdictional Delineation Map (Corps) Sheet 11

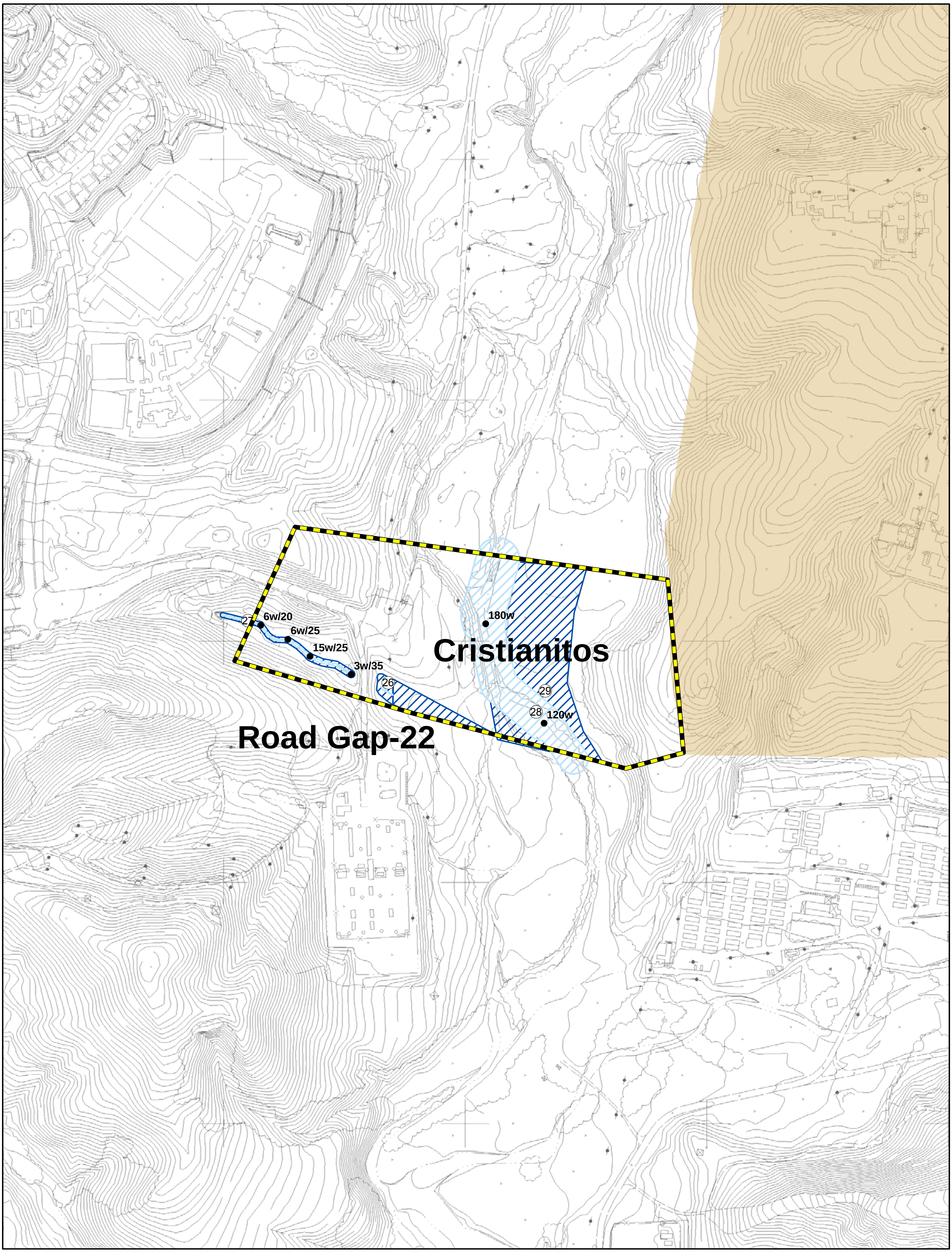
GLENN LUKOS ASSOCIATES

N

400 0 Feet

- Study Area Boundaries
- Soil Pit Location
- Width of OHWM ("w" indicates the presence of wetland)
- No OHWM, bed or bank
- Jurisdictional Wetlands
- Jurisdictional Waters
- Isolated Wetlands
- Isolated Waters
- Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscorps.mxd November 9, 2003



RANCHO MISSION VIEJO ROAD GAP ANALYSIS

Jurisdictional Delineation Map (Corps) Sheet 12

GLENN LUKOS ASSOCIATES

N

400 0 Feet

Study Area Boundaries
Soil Pit Location
Width of OHWM ("w" indicates the presence of wetland)
No OHWM, bed or bank
Jurisdictional Wetlands
Jurisdictional Waters
Isolated Wetlands
Isolated Waters
Planning Area (see Study Area Maps)

c: GIS PROJECTS/239-15SAMP/roadgapscorps.mxd November 9, 2003

APPENDIX A
Delineation and Verification Site Visit Dates

Type	Month and Year	Individual Dates
Delineation	October 2002	29, 30, 31
Delineation	November 2003	1, 4, 7, 11, 12, 14, 21, 25, 26
Delineation	December 2002	6, 16
Delineation	January 2003	15
Delineation	February 2003	19, 21, 24, 27
Delineation	March 2003	3, 5, 6, 8, 21, 24, 26
Delineation	April 2003	1, 8, 16, 22, 23, 24, 25, 28
Delineation	May 2003	1, 2, 13, 22, 23
Delineation	June 2003	2, 5, 9, 11, 12, 13, 26, 27
Delineation	July 2003	9, 10, 11, 14
Delineation	October 2003	6, 7, 17
Delineation	November 2003	5
Verification	March 2003	11, 14, 19
Verification	April 2003	1, 11, 29, 30
Verification	May 2003	21, 23
Verification	June 2003	18, 25
Verification	July 2003	2, 3, 8, 9, 14, 22, 23, 30, 31
Verification	August 2003	6, 15
Verification	October 2003	27

APPENDIX A

WETLAND DATA SHEETS ARE AVAILABLE FROM:

GLENN LUKOS ASSOCIATES
29 ORCHARD
LAKE FOREST, CA 92630
(949) 837-0404

November 14, 2003

Laura Coley Eisenberg
Rancho Mission Viejo
P.O. Box 9
San Juan Capistrano, CA 92693

SUBJECT: Graphical Peak Discharge Report, Trampas Dam Watershed, Rancho Mission Viejo, Orange County, California.

Dear Ms. Coley Eisenberg:

Glenn Lukos Associates (GLA) is currently assisting Rancho Mission Viejo (RMV) in preparing a jurisdictional delineation in support of the Special Area Management Plan/Master Streambed Alteration Agreement (SAMP/MSAA) that RMV is preparing in consultation with the U.S. Army Corps of Engineers (Corps) and California Department of Fish and Game (CDFG). The jurisdictional delineation covers all areas identified by the SAMP/MSAA alternatives as potentially developable. A development bubble (Planning Area 5) has been identified in the Trampas sub-basin. Currently Oglebay Norton Industrial Sands (ONIS) is located in this sub-basin, and conducts a sand mining operation on a portion of the sub-basin. Trampas Dam was constructed in 1975, prior to the July 1, 1977 phase-in-date for Section 404 permits for ephemeral tributaries, to support mining operations within this sub-basin. Water used in the sand processing operation, along with the tailings generated by the processing operation, are stored behind the dam. Since construction of the dam isolated all of the area above the dam from downstream jurisdictional waters prior to regulation under the Clean Water Act, the dam does not represent an impoundment of waters of the United States. It is therefore the position of RMV and GLA that the Tailings Pond/Recycle Area behind Trampas Canyon Dam is not subject to Corps jurisdiction as it is isolated pursuant to the recent Supreme Court decision in *Solid Waste Agency of Northernn Cook County v. United States Army Corps of Engineers et al* (SWANCC).

To date, the Corps has not concurred with this position and, during a review of the Tailings Pond/Recycle Area suggested that most effective way to evaluate the post-mining condition would be to “turn off the water”. The analysis summarized in this letter report was performed to respond to the Corps request and models the amount of U.S. Army Corps of Engineers (Corps) and California Department of Fish and Game (CDFG) jurisdiction for the Tailings Pond/Recycle Area in the post mining condition when all artificial water subsidies associated with current mining practices are withdrawn (It is not possible to literally “turn off the water” as the mining operator has a lease with RMV and is expected to continue mining until 2013).

Rather than turning off the water supply, a regulatory specialist/hydrologist GLA conducted an analysis of the amount of water that could potentially accumulate in the "Tailings Pond/Water Recycling Area" under natural hydrological conditions (i.e., with no artificial irrigation provided by the mining operation). As noted, in 1975, the Trampas Dam was constructed in such a manner that it isolated Trampas Canyon Creek and its ephemeral tributaries. It is important to note that prior to construction of the dam, GLA has determined (based on a Corps-verified delineation of upstream and downstream drainages) that the amount of ephemeral drainage channels isolated behind the dam was between 0.8 and 1.2 acres with no wetlands. In the post-mining condition, sufficient hydrology would exist, at the site under natural conditions (i.e., no irrigation subsidies) to support between 5 and 6 acres of hydrophytic vegetation, which would be isolated and not subject to Corps jurisdiction.

The watershed of the Trampas Canyon Dam (Dam) is located in Orange County [Exhibit 1] and covers approximately 362.6 acres of which 71.1 acres is open water or mine tailings [Exhibit 2].

I. METHODOLOGY

The most widely used rainfall-runoff model for routine design purposes in the United States is the SCS method, which was developed by the U.S. Soil Conservation Service (now the U.S. Natural Resources Conservation Service, NRCS). Technical Release 55 (TR-55) presents simplified procedures for estimating runoff and peak discharges in small watersheds. To save time, the procedures in TR-55 are simplified by assumptions, approximations and generalizations about certain parameters, which can provide results that are less refined than more detailed methods.[1] Runoff is determined primarily by the amount of precipitation and by infiltration characteristics related to soil type, soil moisture, antecedent rainfall, cover type, impervious surfaces and surface retention. Travel time is determined using slope, length of flow path, depth of flow, and roughness of flow surfaces. Peak discharges are based on the relationship of these parameters and on the total drainage area of the watershed, the effect of any natural or man-made storage, and the distribution of rainfall during a given storm event. A peak discharge was calculated for the watershed surrounding the Trampas Canyon Dam. The amount of water that would be impounded by the Tailings Pond and Recycle Area was calculated using the Rational Method, which will be discussed below.

[1] Wildermuth Environmental has, on a preliminary basis, conducted more detailed modeling of the Tailings Pond, that reduces the estimated watershed runoff (as set forth using the TR-55 methodology) from approximately 43.5 acre feet to between 25 and 30 acre feet. The more conservative number of 43.5 acre feet is incorporated into this analysis because the Wildermuth report has not yet been completed; however, upon its completion, it is expected to reduce the watershed runoff totals.

In order to determine the amount of wetland habitat that could be sustained in the post-mining condition, it was also necessary to calculate the amount of water that is required by native hydrophytes such as southern cattail (*Typha domingensis*) and California bulrush (*Scirpus californicus*). Water use data for vegetation was obtained from *Bulletin No. 50:Use of Water by Native Vegetation.*[2], Bulletin No. 50, State of California, Department of Public

A. Estimating Runoff

The Soil Conservation Service uses the Runoff Curve Number (CN) method to estimate runoff from storm rainfall. SCS runoff equation is:

$$Q = \frac{(P - I_a)^2}{(P - I_a) + S}$$

where Q = runoff (in)
P = rainfall (in)
S = potential maximum retention after runoff begins (in) and
I_a = initial abstraction

Initial Abstraction (I_a)

Initial abstraction is all losses before runoff begins. It includes water retained in surface depressions, water intercepted by vegetation, evaporation, and infiltration. I_a is highly variable and is correlated with soil and cover parameters. I_a is approximated in this method by the following empirical equation:

$$I_a = 0.2S$$

Substituting 0.2S for I_a in the runoff equation gives:

$$Q = \frac{(P - 0.2S)^2}{(P - 0.2S) + S}$$

S is related to the soil and cover conditions of the watershed through CN by:

[2] State of California, Department of public Works, Division of Water Resources. 1942. *Bulletin No. 50: Use of Water by Native Vegetation*, 160pp.

$$S = \frac{1000}{CN} - 10$$

Determination of CN depends on the soil and cover conditions of the watershed. Hydrologic soil group (HSG), cover type, treatment, hydrologic condition and antecedent runoff coefficient (ARC) are the five parameters analyzed to represent the soil and cover conditions.

Hydrologic Soil Groups (HSG)

Infiltration rates of soils vary widely and are affected by subsurface permeability as well as surface intake rates. Soils are classified into four HSG's (A, B, C, and D) according to their minimum infiltration rate, which is obtained for bare soil after prolonged wetting [Exhibit 3]. Soils in Group A have the lowest runoff potential and the highest infiltration rates, while Group D soils exhibit opposite characteristics.

The Soil Conservation Service (SCS) soil survey of the Orange County and Western Riverside Counties (1978) identified the soils in the area of interest. Table 1 lists each of the soil types located in the general vicinity of the study area along with their HSG classification and their watershed composition percentage.

Table 1. Soil Types and HSG Classifications for Watershed

Soil Type	*HSG Classification*	*Composition of Watershed*
Bosanko Clay (128)	Group D	25%
Cieneba Sandy Loam (142)	Group C	60%
Soper Gravelly Loam (202)	Group C	15%

Cover Type

Cover types address vegetation, bare soil and impervious surfaces of the study area. Field reconnaissance and aerial photographs were the methods used to determine the cover types. Arid and semiarid rangelands runoff curve numbers were used for this method [Exhibit 4].

Treatment

Treatment is a cover type modifier that is used to describe the management of cultivated agricultural lands. This is not applicable to the study area.

Hydrologic Condition

Hydrologic Condition indicates the effects of cover type on infiltration and runoff and is generally estimated from density of plant and residue cover on sample areas. Good hydrologic condition indicates that soil usually has a low runoff potential for that specific hydrologic soil group and cover type. Table 2 lists the cover type and hydrologic condition for each of the soils identified for the site.

Table 2. Cover Types and Hydrologic Conditions for Watershed

Soil Type	*Cover Type*	*Hydrologic Condition*
Bosanko Clay (128)	Oak-Aspen	Good
Cieneba Sandy Loam (142)	Oak-Aspen	Good
Soper Gravelly Loam (202)	Oak-Aspen	Good

Antecedent Runoff Condition (ARC)

The index of runoff potential before a storm event is the antecedent runoff condition. CN for the average ARC at a site is the median value as taken from sample rainfall and runoff data. Average runoff condition was assumed for this calculation.

Results

Table 3. Results from Runoff Calculations

Parameter	*Result*
Curve Number (CN)	43
Maximum Potential Retention After Runoff Begins (S)	13.26 in
Runoff (Q)	0.0024 in

Calculations for the runoff curve number and runoff for can be found on Worksheet 2 in Appendix A. The 2-year, 24-hour precipitation event was obtained from the NOAA Atlas 2.

Estimating Time of Concentration and Time of Travel

Travel time (T_t) is the time it takes water to travel from one location to another in a watershed. T_t is a component of time concentration (T_c), which is the time for runoff to travel from the hydraulically most distant point of the watershed to a point of interest within the watershed. T_c is computed by summing up all the travel times for consecutive components of the drainage conveyance system.

Time of travel and time of concentration is affected by surface roughness, channel shape, flow patterns, and slopes. Water moves through a watershed as sheet flow, shallow concentrated flow, open channel flow, or some combination of these. Sheet flow is flow over plane surfaces until it becomes shallow concentrated flow and then open channel flow. A detailed description of these types of flow along with the figure to determine average velocity for shallow concentrated flow is in Exhibit 5.

Table 4. Results from Time of Concentration and Travel Calculations

Flow Type	*Segment ID*	T_t
Sheet Flow	AB	0.21 hr
Shallow Concentrated Flow	BC	0.02 hr
Channel Flow	CD	0.02 hr
	T_c	**0.25 hr**

Calculations for the time of travel and time of concentration can be found on Worksheet 3 in Appendix A.

B. Graphical Peak Discharge Method

The graphical peak discharge method computes peak discharge from rural and urban areas. A detailed description of this method is in Exhibit 6, while the calculations can be found on Worksheet 4 in Appendix A.

Results

The peak discharge for the Trampas Dam watershed was determined to be 0.06 cubic feet per second (ft^3/s) or 43.5 af/yr.

C. Rational Method

To calculate the amount of water that will accumulate in the area behind the Dam through direct precipitation, a modified version of the Rational Method was applied.

$$Q = CIA$$

where: Q = peak discharge (ft^3/s)
C = runoff coefficient (dimensionless)
I = average available rainfall (ft/yr)
A = area (acres)

Average available rainfall (I) was calculated by subtracting the average monthly evaporation rates from the average monthly rainfall rates to determine the amount of rainfall that would remain in the Tailings Pond/Recycling Area (see Appendix B). Sulphur Creek Dam data was used because it is the closest recording station to Trampas Canyon Dam.

The peak discharge into the 71.1-acre area behind the dam, calculated from an average available rainfall of 3.58 inches with a runoff coefficient of 1.0 is 21.2 af/yr.

II. CONCLUSIONS/DISCUSSION

Under natural conditions, the area behind Trampas Dam will receive approximately 64.7 acre-feet of water in an average rainfall year including 43.5 acre-feet from the surrounding watershed and an additional 21.2 acres of "available" water from direct precipitation.

A. Overall Approach

In order to accurately determine the extent of hydrophytic vegetation in the post-mining condition, the following factors were considered/evaluated.

- Post-mining dry-out of the tailings;
- Hydrologic input from watershed runoff (provided in detail above);
- Hydrologic input from precipitation (provided in detail above);
- Water consumption by hydrophytic vegetation (amounts); and
- Water consumption by hydrophytic vegetation (seasonality)

B. Post-Mining Dryout of Tailings

Currently, water depths for areas occupied by cattails, which accounts for approximately 55 acres of the Tailings Pond, average less than two feet. Cattails and bulrush will use up to eight feet of water per year when it is available and require a minimum of about five feet of water seasonally to survive and persist on a site.[3] Cattails and bulrush exhibit winter dormancy with most of the water consumption occurring during the period from May to November. Cattails and bulrush are both shallow-rooted species with nearly all of root zone located in the upper two feet.

[3] California bulrush grown in tanks will use up to 184 inches (15.3 feet) of water per year. In the field, under optimal hydrological conditions the actual water use is substantially less, varying between five and eight feet

Without water subsidies from the mining operation, essentially all of the water within the root zone of the cattails and bulrush would be depleted by the end of one growing season.[4]

While the Tailings Pond is drying out during the first year without water subsidies, the exposed substrate will quickly be colonized by propagules from non-native grasses and forbs that are found throughout the watershed of the Tailings Pond including wild oats (*Avena farua*, UPL), slender oats (*Avena barbata*, UPL), ripgut (*Bromus diandrus*, UPL), soft chess (*Bromus hordeaceus*, UPL), red brome (*Bromus madritensis rubens*, UPL), rattail fescue (*Vulpia myuros*, UPL), Italian ryegrass (*Lolium multiflorum*, UPL), black mustard (*Brassica nigra*, UPL), field mustard (*Brassica rapa*, UPL), wild radish (*Raphanus sativus*, UPL), tocalote (*Centaurea melitensis*, UPL) and three species of filaree (*Erodium* spp., UPL). These species, as a group, germinate during winter and early spring, consuming most available soil moisture by late spring or early summer, meaning that they are most active during the winter dormancy of the cattails and bulrush, substantially limiting soil moisture that might be available to any surviving wetland plants. Direct evaporation and evapotranspiration will consume most direct precipitation falling on the tailings such that water would be available in very limited amounts to wetland plant species.[5]

C. Input from Watershed Runoff

The hydrological model determined that a maximum of 43.5 acre-feet of water would reach the tailings during an average rainfall year.[6] Essentially all of the hydrological input from watershed runoff would occur during the rainy season, which is between October 15 and April 15. This runoff would reach the outer edges of the Tailings Pond, at points where the ephemeral drainages intersect the Tailings. Tailings at these locations would be shallowest and much of the water would be stored in the upper few feet, meaning that it would be available to whatever plants are growing at the discharge point. As noted above, substantial amounts of this water would be consumed by opportunistic spring annuals, which germinate as early as November or December (coincident with the first one to two inches of rainfall) and reach their peak growth during February and March (some species such as Italian Ryegrass geminate a little later and reach peak growth in March and April). The approximately 43.5 acre feet of runoff would generally be

---

[4] This includes surface water up to three feet and subsurface water at depths to three feet. Evaporation and transpiration combined could account for up to 12 feet of water loss in the first year if sufficient water supplies were available.
[5] According to Water Bulletin 50, native grasses and weeds will use between 10.0 and 15.5 inches of water per year and in most years will use all available soil moisture except in above-average rainfall years when limited amounts of water penetrate to below the root zone before the water is transpired.
[6] As noted in footnote 1 above, a more detailed analysis is expected to reduce the total to between 25 and 30 acre feet.

sufficient to support up to 7.0 acres of cattails, bulrush and other native and non-native hydrophytes. However, direct evaporation coupled with water consumption by spring annuals, which would germinate and reach maximum growth during the winter dormancy period exhibited by the cattails and bulrush, would reduce to amount of wetland vegetation to between 5.0 and 6.0 acres.[7]

D. **D. Input from Direct Precipitation**

During average rainfall years, approximately 75 acre-feet would fall on the area occupied by the mine tailings. Essentially all of the hydrological input from direct precipitation would occur during the rainy season, which is between October 15 and April 15, which as noted above coincides with the winter dormancy period of native hydrophytes and the germination and maximum growth period of non-native spring annual grasses and forbs. Evaporation rates exceed rainfall rates in all months except for February and March, leaving about 21 acre feet of available water. Up to 15 inches of water could be used by the weedy annual vegetation with the rest lost to evaporation leaving essentially no additional water to support wetland vegetation.

E. E. Summary/Conclusions

In the post-mining condition, the available surface and subsurface water in the Tailings Pond would be consumed by the existing hydrophytic vegetation, which exhibits high water consumption rates, beginning in late spring and continuing until late fall. Natural hydrologic input from storm runoff and direct precipitation would coincide with the germination and maximum growth period of the (mostly) non-native annual grasses and forbs expected to rapidly colonize the drying tailings. Available water for native hydrophytes would be a maximum of 30 and 35 acre feet which would be sufficient to allow persistence of between 5.0 and 6.0 acres of hydrophytic vegetation.

---

[7] A reduction in the runoff from 43.5 to 25 to 30 acre feet would result in a reduction of potential wetland habitat to between approximately three and four acres.

If you have any questions about this letter report, please contact either Tony Bomkamp or Cherylee Sevilla at (949) 837-0404.

Sincerely,

GLENN LUKOS ASSOCIATES, INC.

Tony Bomkamp
Senior Biologist

s:0239-15TrampasDam2.rpt

Adapted from USGS Santa Ana Quadrangle

NORTH

SCALE IN MILES

TRAMPAS CANYON DAM

Regional Map

GLENN LUKOS ASSOCIATES

EXHIBIT 1

TRAMPAS CANYON DAM

Watershed Boundary

GLENN LUKOS ASSOCIATES

EXHIBIT 2

Hydrologic Soil Groups

Soils are classified into hydrologic soil groups (HSG's) to indicate the minimum rate of infiltration obtained for bare soil after prolonged wetting. The HSG's, which are A, B, C, and D, are one element used in determining runoff curve numbers (see chapter 2). For the convenience of TR-55 users, exhibit A-1 lists the HSG classification of United States soils.

The infiltration rate is the rate at which water enters the soil at the soil surface. It is controlled by surface conditions. HSG also indicates the transmission rate—the rate at which the water moves within the soil. This rate is controlled by the soil profile. Approximate numerical ranges for transmission rates shown in the HSG definitions were first published by Musgrave (USDA 1955). The four groups are defined by SCS soil scientists as follows:

Group A soils have low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sand or gravel and have a high rate of water transmission (greater than 0.30 in/hr).

Group B soils have moderate infiltration rates when thoroughly wetted and consist chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission (0.15-0.30 in/hr).

Group C soils have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine texture. These soils have a low rate of water transmission (0.05-0.15 in/hr).

Group D soils have high runoff potential. They have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very low rate of water transmission (0-0.05 in/hr).

In exhibit A-1, some of the listed soils have an added modifier; for example, "Abrazo, gravelly." This refers to a gravelly phase of the Abrazo series that is found in SCS soil map legends.

Disturbed soil profiles

As a result of urbanization, the soil profile may be considerably altered and the listed group classification may no longer apply. In these circumstances, use the following to determine HSG according to the texture of the new surface soil, provided that significant compaction has not occurred (Brakensiek and Rawls 1983).

HSG	*Soil textures*
A	Sand, loamy sand, or sandy loam
B	Silt loam or loam
C	Sandy clay loam
D	Clay loam, silty clay loam, sandy clay, silty clay, or clay

Drainage and group D soils

Some soils in the list are in group D because of a high water table that creates a drainage problem. Once these soils are effectively drained, they are placed in a different group. For example, Ackerman soil is classified as A/D. This indicates that the drained Ackerman soil is in group A and the undrained soil is in group D.

Chapter 4 Graphical Peak Discharge Method

This chapter presents the Graphical Peak Discharge method for computing peak discharge from rural and urban areas. The Graphical method was developed from hydrograph analyses using TR-20, "Computer Program for Project Formulation—Hydrology" (SCS 1983). The peak discharge equation used is:

$$q_p = q_u A_m Q F_p \qquad \text{[eq. 4-1]}$$

where:

q_p = peak discharge (cfs)
q_u = unit peak discharge (csm/in)
A_m = drainage area (mi^2)
Q = runoff (in)
F_p = pond and swamp adjustment factor

The input requirements for the Graphical method are as follows: (1) T_c (hr), (2) drainage area (mi^2), (3) appropriate rainfall distribution (I, IA, II, or III), (4) 24-hour rainfall (in), and (5) CN. If pond and swamp areas are spread throughout the watershed and are not considered in the T_c computation, an adjustment for pond and swamp areas is also needed.

Peak discharge computation

For a selected rainfall frequency, the 24-hour rainfall (P) is obtained from appendix B or more detailed local precipitation maps. CN and total runoff (Q) for the watershed are computed according to the methods outlined in chapter 2. The CN is used to determine the initial abstraction (I_a) from table 4-1. I_a / P is then computed.

If the computed I_a / P ratio is outside the range in exhibit 4 (4-I, 4-IA, 4-II, and 4-III) for the rainfall distribution of interest, then the limiting value should be used. If the ratio falls between the limiting values, use linear interpolation. Figure 4-1 illustrates the sensitivity of I_a / P to CN and P.

Peak discharge per square mile per inch of runoff (q_u) is obtained from exhibit 4-I, 4-IA, 4-II, or 4-III by using T_c (chapter 3), rainfall distribution type, and I_a / P ratio. The pond and swamp adjustment factor is obtained from table 4-2 (rounded to the nearest table value). Use worksheet 4 in appendix D to aid in computing the peak discharge using the Graphical method.

Figure 4-1 Variation of I_a / P for P and CN

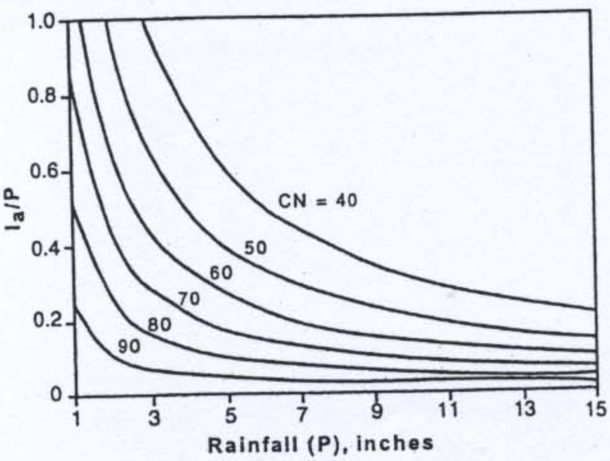


Table 4-1 I_a values for runoff curve numbers

Curve number	I_a (in)	Curve number	I_a (in)
40	3.000	70	0.857
41	2.878	71	0.817
42	2.762	72	0.778
43	2.651	73	0.740
44	2.545	74	0.703
45	2.444	75	0.667
46	2.348	76	0.632
47	2.255	77	0.597
48	2.167	78	0.564
49	2.082	79	0.532
50	2.000	80	0.500
51	1.922	81	0.469
52	1.846	82	0.439
53	1.774	83	0.410
54	1.704	84	0.381
55	1.636	85	0.353
56	1.571	86	0.326
57	1.509	87	0.299
58	1.448	88	0.273
59	1.390	89	0.247
60	1.333	90	0.222
61	1.279	91	0.198
62	1.226	92	0.174
63	1.175	93	0.151
64	1.125	94	0.128
65	1.077	95	0.105
66	1.030	96	0.083
67	0.985	97	0.062
68	0.941	98	0.041
69	0.899		

Table 2-2d Runoff curve numbers for arid and semiarid rangelands [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition [2]	A [3]	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

1 Average runoff condition, and I_a, = 0.2S. For range in humid regions, use table 2-2c.
2 Poor: <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: > 70% ground cover.
3 Curve numbers for group A have been developed only for desert shrub.

Sheet flow

Sheet flow is flow over plane surfaces. It usually occurs in the headwater of streams. With sheet flow, the friction value (Manning's n) is an effective roughness coefficient that includes the effect of raindrop impact; drag over the plane surface; obstacles such as litter, crop ridges, and rocks; and erosion and transportation of sediment. These n values are for very shallow flow depths of about 0.1 foot or so. Table 3-1 gives Manning's n values for sheet flow for various surface conditions.

Table 3-1 Roughness coefficients (Manning's n) for sheet flow

Surface description	n [1]
Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover ≤20%	0.06
Residue cover >20%	0.17
Grass:	
Short grass prairie	0.15
Dense grasses [2]	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods:[3]	
Light underbrush	0.40
Dense underbrush	0.80

1 The n values are a composite of information compiled by Engman (1986).

2 Includes species such as weeping lovegrass, bluegrass, buffalo grass, blue grama grass, and native grass mixtures.

3 When selecting n , consider cover to a height of about 0.1 ft. This is the only part of the plant cover that will obstruct sheet flow.

For sheet flow of less than 300 feet, use Manning's kinematic solution (Overtop and Meadows 1976) to compute T_t:

$$T_t = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5} s^{0.4}} \qquad \text{[eq. 3-3]}$$

where:

T_t = travel time (hr),
n = Manning's roughness coefficient (table 3-1)
L = flow length (ft)
P_2 = 2-year, 24-hour rainfall (in)
s = slope of hydraulic grade line (land slope, ft/ft)

This simplified form of the Manning's kinematic solution is based on the following: (1) shallow steady uniform flow, (2) constant intensity of rainfall excess (that part of a rain available for runoff), (3) rainfall duration of 24 hours, and (4) minor effect of infiltration on travel time. Rainfall depth can be obtained from appendix B.

Shallow concentrated flow

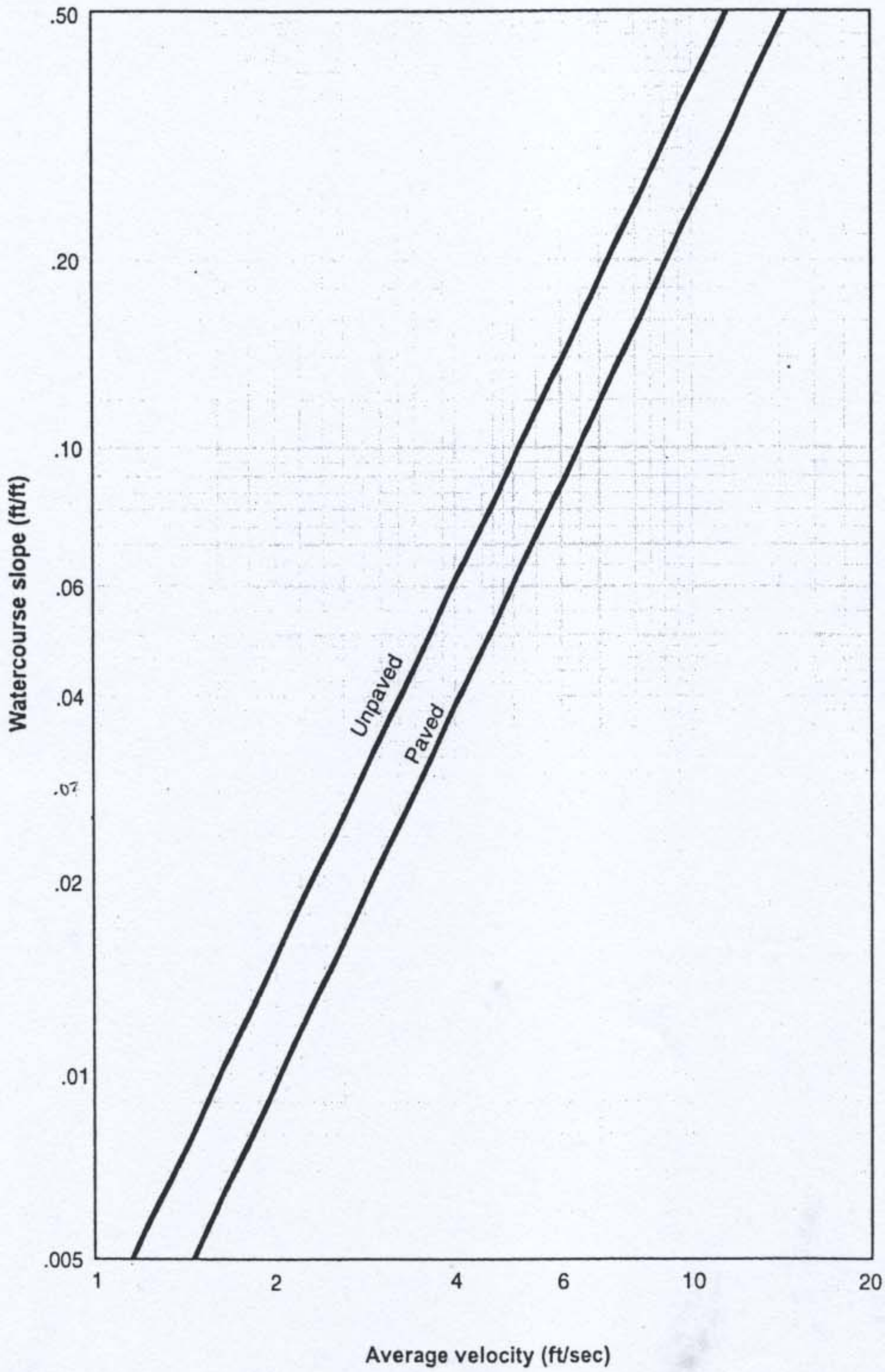
After a maximum of 300 feet, sheet flow usually becomes shallow concentrated flow. The average velocity for this flow can be determined from figure 3-1, in which average velocity is a function of watercourse slope and type of channel. For slopes less than 0.005 ft/ft, use equations given in appendix F for figure 3-1. Tillage can affect the direction of shallow concentrated flow. Flow may not always be directly down the watershed slope if tillage runs across the slope.

After determining average velocity in figure 3-1, use equation 3-1 to estimate travel time for the shallow concentrated flow segment.

Open channels

Open channels are assumed to begin where surveyed cross section information has been obtained, where channels are visible on aerial photographs, or where blue lines (indicating streams) appear on United States Geological Survey (USGS) quadrangle sheets. Manning's equation or water surface profile information can be used to estimate average flow velocity. Average flow velocity is usually determined for bank-full elevation.

Figure 3-1 Average velocities for estimating travel time for shallow concentrated flow



Chapter 4 Graphical Peak Discharge Method

This chapter presents the Graphical Peak Discharge method for computing peak discharge from rural and urban areas. The Graphical method was developed from hydrograph analyses using TR-20, "Computer Program for Project Formulation—Hydrology" (SCS 1983). The peak discharge equation used is:

$$q_p = q_u A_m Q F_p \qquad \text{[eq. 4-1]}$$

where:

q_p = peak discharge (cfs)
q_u = unit peak discharge (csm/in)
A_m = drainage area (mi^2)
Q = runoff (in)
F_p = pond and swamp adjustment factor

The input requirements for the Graphical method are as follows: (1) T_c (hr), (2) drainage area (mi^2), (3) appropriate rainfall distribution (I, IA, II, or III), (4) 24-hour rainfall (in), and (5) CN. If pond and swamp areas are spread throughout the watershed and are not considered in the T_c computation, an adjustment for pond and swamp areas is also needed.

Peak discharge computation

For a selected rainfall frequency, the 24-hour rainfall (P) is obtained from appendix B or more detailed local precipitation maps. CN and total runoff (Q) for the watershed are computed according to the methods outlined in chapter 2. The CN is used to determine the initial abstraction (I_a) from table 4-1. I_a / P is then computed.

If the computed I_a / P ratio is outside the range in exhibit 4 (4-I, 4-IA, 4-II, and 4-III) for the rainfall distribution of interest, then the limiting value should be used. If the ratio falls between the limiting values, use linear interpolation. Figure 4-1 illustrates the sensitivity of I_a / P to CN and P.

Peak discharge per square mile per inch of runoff (q_u) is obtained from exhibit 4-I, 4-IA, 4-II, or 4-III by using T_c (chapter 3), rainfall distribution type, and I_a / P ratio. The pond and swamp adjustment factor is obtained from table 4-2 (rounded to the nearest table value). Use worksheet 4 in appendix D to aid in computing the peak discharge using the Graphical method.

Figure 4-1 Variation of I_a / P for P and CN

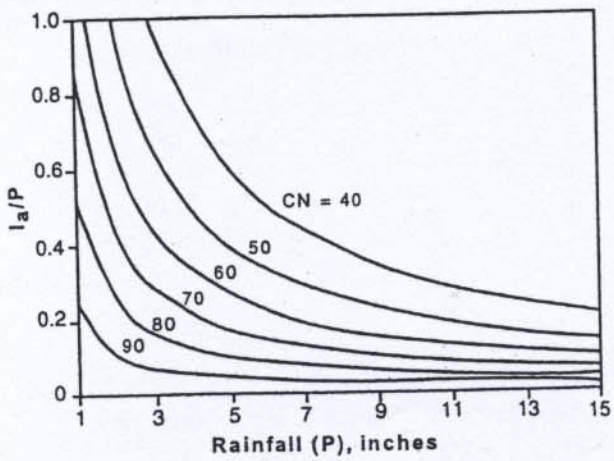
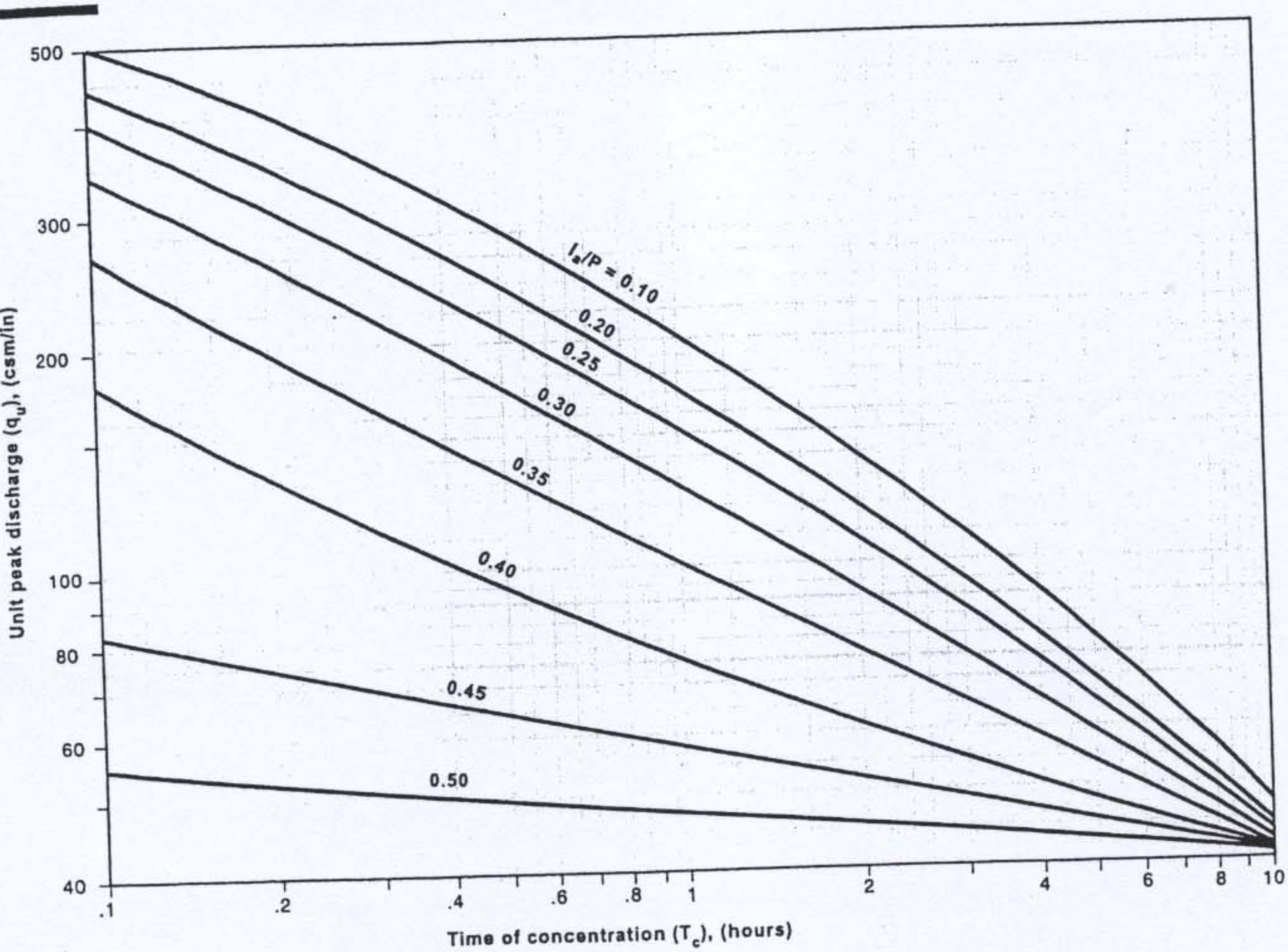


Table 4-1 I_a values for runoff curve numbers

Curve number	I_a (in)	Curve number	I_a (in)
40	3.000	70	0.857
41	2.878	71	0.817
42	2.762	72	0.778
43	2.651	73	0.740
44	2.545	74	0.703
45	2.444	75	0.667
46	2.348	76	0.632
47	2.255	77	0.597
48	2.167	78	0.564
49	2.082	79	0.532
50	2.000	80	0.500
51	1.922	81	0.469
52	1.846	82	0.439
53	1.774	83	0.410
54	1.704	84	0.381
55	1.636	85	0.353
56	1.571	86	0.326
57	1.509	87	0.299
58	1.448	88	0.273
59	1.390	89	0.247
60	1.333	90	0.222
61	1.279	91	0.198
62	1.226	92	0.174
63	1.175	93	0.151
64	1.125	94	0.128
65	1.077	95	0.105
66	1.030	96	0.083
67	0.985	97	0.062
68	0.941	98	0.041
69	0.899		

Exhibit 4-I Unit peak discharge (q_u) for NRCS (SCS) type I rainfall distribution



Worksheet 2: Runoff curve number and runoff

Project Trampas Canyon	By	Date
Location Rancho Mission Viejo	Checked	Date

Check one: ☒ Present ☐ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN [1/] Table 2-2	CN [1/] Figure 2-3	CN [1/] Figure 2-4	Area ☐ acres ☐ mi^2 ☒ %	Product of CN x area
cieneba, C	oak-aspen, good	41			60	2460
Soper, C	oak-aspen, good	41			15	615
Bosanko, D	oak-aspen, good	48			25	1200
						4275

[1/] Use only one CN source per line

Totals ➡ 100 | 4275

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{4275}{100} = 42.75$; Use CN ➡ 43

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	2		
Rainfall, P (24-hour)	in	2.48		
Runoff, Q (Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)	in	0.0024		

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project Trampas Canyon	By	Date
Location Rancho Mission Viejo	Checked	Date

Check one: ☒ Present ☐ Developed

Check one: ☒ T_c ☐ T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to Tc only)

	Segment 1	Segment 2	Total
Segment ID	AB		
1. Surface description (table 3-1)	Dense grass		
2. Manning's roughness coefficient, n (table 3-1)	0.24		
3. Flow length, L (total L † 300 ft) ... ft	300		
4. Two-year 24-hour rainfall, P_2 ... in	2.48		
5. Land slope, s ... ft/ft	0.33		
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{\ 0.5}\ s^{0.4}}$ Compute T_t ... hr	0.21	+	= 0.21

Shallow concentrated flow

	Segment 1	Segment 2	Total
Segment ID	BC		
7. Surface description (paved or unpaved)	unpaved		
8. Flow length, L ... ft	200		
9. Watercourse slope, s ... ft/ft	0.028		
10. Average velocity, V (figure 3-1) ... ft/s	2.8		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t ... hr	0.020	+	= 0.02

Channel flow

	Segment 1	Segment 2	Total
Segment ID	CD		
12. Cross sectional flow area, a ... ft^2	8		
13. Wetted perimeter, p_w ... ft	8		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ... ft	1		
15 Channel slope, s ... ft/ft	0.18		
16. Manning's roughness coefficient, n ...	0.025		
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ... ft/s	25.03		
18. Flow length, L ... ft	1880		
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ... hr	0.021	+	= 0.02
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ... Hr			0.25

Worksheet 4: Graphical Peak Discharge method

Project Trampas Canyon Dam	By	Date
Location Rancho Mission Viejo	Checked	Date

Check one: ☒ Present ☐ Developed

1. Data

Drainage area .... A_m = 0.45 mi^2 (acres/640)

Runoff curve number ....CN = 43 (From worksheet 2)

Time of concentration .... T_c = 0.25 hr (From worksheet 3)

Rainfall distribution .... = I (I, IA, II III)

Pond and swamp areas spread throughout watershed .... = Ø percent of A_m (Ø acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr	2		
3. Rainfall, P (24-hour)	in	2.48		
4. Initial abstraction, I_a (Use CN with table 4-1)	in	2.651		
5. Compute I_a/P		1.07		
6. Unit peak discharge, q_u (Use T_c and I_a/P with exhibit 4– 1)	csm/in	55		
7. Runoff, Q (From worksheet 2) Figure 2-6	in	0.0024		
8. Pond and swamp adjustment factor, F_p (Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond ans swamp area.)		1.0		
9. Peak discharge, q_p (Where $q_p = q_u A_m Q F_p$)	ft^3/s	0.06		

(ft3/s × 1.984 × 365)

43.45 af/yr + 21.21 af/yr =
64.66 af/yr

Sulphur Creek Dam Rainfall and Evaporation Data (1977-2002)

	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
Average Rainfall (in)	0.02	0.13	0.34	0.44	1.25	1.83	3.41	3.72	2.73	0.92	0.22	0.08
Average Evaporation (in)*	5.26	4.87	4.01	3.06	2.27	1.81	1.76	1.81	2.76	3.55	4.22	4.53
Difference (in)	-5.24	-4.74	-3.67	-2.62	-1.02	**0.01**	**1.66**	**1.90**	-0.03	-2.63	-3.99	-4.45

Average Available Rainfall (in) **3.58**

Source: County of Orange Public Facilities and Resources Department, 2002

*These evaporation numbers reflect the Class A land pan coefficient number of 0.70

Draft Southern NCCP/HCP Planning Guidelines

Southern Subregion
Orange County, California

Revised May 2004

DRAFT SOUTHERN NCCP/HCP PLANNING GUIDELINES

Southern Subregion
Orange County, California

Prepared by:
NCCP/SAMP Working Group
Contacts:
Ken Corey, USFWS Coordinator
Jae Chung, USACE Coordinator
William Tippets, CDFG Coordinator
Tim Neely, County of Orange Coordinator
Laura Coley Eisenberg, Rancho Mission Viejo Coordinator
Rod Meade, NCCP Consultant

Revised May 2004

TABLE OF CONTENTS

Section **Page**

TABLE OF CONTENTS

Section **Page**

TABLE OF CONTENTS

Section **Page**

APPENDICIES

LIST OF TABLES

Page

TABLE OF CONTENTS

LIST OF TABLES **Page**

LIST OF FIGURES **Page**

TABLE OF CONTENTS

LIST OF FIGURES **Page**

SECTION 1: DRAFT SOUTHERN NCCP/HCP GUIDELINES INTRODUCTION

1.1 Introduction

This document presents the second version of the Planning Guidelines for the Southern Subregion NCCP/HCP (Draft Southern NCCP/HCP Guidelines). The original Draft Southern NCCP/HCP Guidelines were made available to the public in April 2003. The primary differences between this version and the April 2003 version are: **(1)** the addition of species accounts for 14 additional unlisted planning species in Section 4 (written comments by the resource agencies on the additional accounts submitted to the agencies in June 2003 have not been received); and **(2)** revised accounts for the arroyo toad, thread-leaved brodiaea, and many-stemmed dudleya) based on recent information.

1.2 Purpose of the Guidelines

The Draft Southern NCCP/HCP Guidelines are intended to provide an objective and common set of planning considerations and recommendations for use by the resource and regulatory agencies and the program participants in selecting and evaluating reserve program, restoration and management alternatives for the Southern Subregion NCCP/HCP. The Draft Southern NCCP/HCP Guidelines are comprised of three primary components:

1. NCCP Tenets outlined in the 1993 NCCP Conservation Guidelines;

2. Reserve Design Principles prepared by the panel of NCCP Science Advisors convened by The Nature Conservancy (1997); and

3. A set of draft "work in progress" sub-basin specific planning recommendations prepared by the NCCP Consultant Team.

These guidelines are also complemented by the Watershed & Sub-basin Planning Principles (Watershed Planning Principles) prepared to address the protection and management of aquatic resources within the planning area. The consultant team has also prepared additional general planning area resource protection, management and restoration policies which should be considered for incorporation into reserve design planning.

The Draft Southern NCCP/HCP Guidelines are a "work in progress" prepared by the NCCP/SAMP working group. These guidelines represent a synthesis of the following source materials:

- The NCCP Conservation Guidelines, including the seven Tenets of Reserve Design, prepared by the Scientific Review Panel appointed by the CDFG (1993);

- The Principles of Reserve Design and Adaptive Management Principles for the Southern Subregion prepared by the Science Advisors convened by The Nature Conservancy to assist in the preparation of the Southern NCCP (1998); and

- Southern Subregion databases.

These guidelines do not: **(1)** commit to conserve or allow impacts to specific biological and hydrological resources; or **(2)** discount specific biological and hydrological resources that are not identified herein. As the public preparation and review process for the NCCP/HCP continues, it is anticipated that new planning information and analyses could modify the assessment of the significance of specific resources, including the initial protection, management, and restoration recommendations. Thus, the specific language in the Draft Southern NCCP/HCP Guidelines will continue to be reviewed and modified as appropriate.

Using the broader NCCP Tenets as a framework and starting point, the Draft Southern NCCP/HCP Guidelines provide guidance for decision-makers that is keyed to local biologic, hydrologic, and geomorphic conditions. These guidelines address resources at both the landscape and more detailed hydrologic/geomorphic sub-basin levels. For each sub-basin planning unit, the Guidelines identify the important biological resources and key hydrologic/geomorphic processes. Protection recommendations also are included, providing an objective and common set of planning considerations and recommendations for use in selecting and evaluating Habitat Reserve design, restoration and adaptive management alternatives.

The Draft Southern NCCP/HCP Guidelines also reflect other non-biological objectives in keeping with the purpose and need of the NCCP/HCP to provide a subregional approach to protecting identified species and their habitats while allowing for compatible economic uses. Accordingly, application of the planning recommendations is consistent with the Science Advisors recognition that the NCCP "reserve design principles are not absolutes and ". . . that it may be impractical or unrealistic to expect that every design principle will be completely fulfilled throughout the subregion" (Science Advisors 1998).

1.3 Relationship of Guidelines to Other Planning Program Criteria

The participants in the Special Area Management Plan/Master Streambed Alteration Agreement (SAMP/MSAA) process have also developed tenets and principles for the identification and evaluation of alternatives. The U.S. Army Corps of Engineers (ACOE) and California Department of Fish and Game (CDFG) set forth eight SAMP/MSAA Tenets characterized as overall program goals intended to facilitate the identification of alternatives that meet the project purpose and need. The participants have also jointly collaborated on a set of Watershed Planning Principles. The Watershed Planning Principles are intended to function in a similar manner as the NCCP Science Advisors reserve design principles. Reserve Design Principle 7 was added by the Science Advisors in recognition of the role that hydrologic and sediment processes play in shaping the landscapes of the planning area. This principle helps to integrate the NCCP/HCP and SAMP/MSAA processes and serves as a link between this set of guidelines and the tenets and principles of the SAMP/MSAA.

The Watershed Planning Principles and the Draft Southern NCCP/HCP Guidelines described in this document are applied at the sub-basin scale as a response to the distinct characteristics (geomorphic, hydrologic and biologic) of each of the sub-basins. Both the Watershed Planning Principles and the Draft Southern NCCP/HCP Guidelines use the same sub-basin units/boundaries as the basis for addressing site-specific resource protection and management. This facilitates and makes more effective a comparison of the effects of the proposed respective guidelines/principles for both the NCCP/HCP and SAMP/MSAA programs. It is important to understand that the Draft Southern NCCP/HCP Guidelines and Watershed Planning Principles will not always treat the same biologic and hydrologic resources in the same manner. Use of common sub-basin planning units enables program participants and the public to identify and address those instances where the different approaches and priorities inherent in the NCCP/HCP and SAMP/MSAA programs create the need for reconciliation of differing protection and management recommendations.

1.4 Format of Document

Section 1 provides an introduction to the Draft Southern NCCP/HCP Guidelines.

Section 2 of this document contains materials intended to provide basic planning principles that can be used throughout the planning area and species information for listed and other selected species in the planning area, as follows:

- Section 2.1 contains the NCCP Tenets outlined in the 1993 Conservation Guidelines.

- Section 2.2 sets forth the Science Advisors translation of the NCCP Tenets to Subregional Design Principles.

Section 3 sets forth general policies for resource protection, management and restoration that apply at the planning (landscape) area scale. These general policies also address:

- The protection and maintenance of wildlife movement corridors and habitat linkages;
- Creation and management of urban/wildland interface areas;
- Fuel management; and
- Grazing management.

Section 4 provides species accounts and key physical habitat components of listed and other selected planning species in the planning area.

Section 5 identifies and discusses resource planning considerations at the sub-basin scale. This section reflects the need to identify key planning principles that both reflect and address the distinctive characteristics of each of the sub-basins. Each sub-basin description and analysis includes:

- A summary of the Existing Conditions and Biological Resources that represent important planning consideration in the sub-basin.

- A summary of Planning Recommendations for the sub-basin. Planning Recommendations are broken down into three categories; protection, management and restoration.

Section 6 reviews in more detail the restoration and management recommendations for each sub-basin and explains how these recommendations could contribute to an overall Habitat Reserve design and future adaptive management program.

1.5 Relationship to Species Downstream and Outside the Planning Area

In addition to the listed and other selected planning species that occur within the Southern Subregion planning area and the hydrologic/sediment resources occurring within the Orange County portions of the San Mateo Creek watershed, other listed species and hydrologic resources of significance occur downstream of the planning area. Potential downstream impacts and mitigation measures will be addressed in the CEQA/NEPA documents for the NCCP/HCP and SAMP/MSAA. From an NCCP/HCP perspective, potential downstream impacts will be considered from a species needs, terrains, hydrology and water quality perspective. This consideration will include information regarding watershed processes and species needs gained in formulating the Draft Southern NCCP/HCP Guidelines.

SECTION 2: PLANNING AREA TENETS AND PRINCIPLES

2.1 NCCP Tenets

Seven basic Tenets of Reserve Design were outlined in the NCCP Conservation Guidelines (November 1993). These tenets were elaborated upon in the Coastal/Central NCCP (1996) and repeated here for planning purposes:

1. **Conserve target species throughout the planning area**: Species that are well distributed across their native ranges are less susceptible to extinction than are species confined to small portions of their ranges.

   Reserves should represent the full range of physiographic conditions which support the three target species (California gnatcatcher, cactus wren and orange-throated whiptail), such as the immediate coastal terrace/frontal slopes along with more inland areas, lower along with higher elevations, and different vegetational assemblages.

2. **Larger reserves are better**: Large blocks of habitat containing large populations of the target species are superior to small blocks of habitat containing small populations.

   Reserve units should include the largest practical numbers of target species, thereby minimizing the instabilities inherent in smaller populations. This objective must be balanced against the need to identify reserve boundaries which are manageable and viable in the long term.

3. **Keep reserve areas close**: Blocks of habitat that are close to one another are better than blocks of habitat far apart.

   The distance between blocks of habitat should be well within the distance that can be traveled by dispersing individuals of the target species, particularly the two birds. Because available data indicate that dispersal distances of less than a mile are usual and less than two miles are common, blocks of habitat which support target species should be no more than one or two miles apart wherever practical. The presence and type of linkages affect this objective.

   Linkages which require animals to cross "gaps" should ideally consist of narrow gaps with broad "landing zones" on either side. Organisms which "jump" from one are thus much more likely to successfully land on the other side of the linkage. Gaps at the ends of long narrow fingers of habitat pointing toward each other are less likely to be successfully transited, and are less desirable.

4. **Keep habitat contiguous**: Habitat that occurs in less fragmented, continuous blocks is preferable to habitat that is fragmented or isolated by urban lands.

To the degree possible, reserve blocks of core habitat should be on the order of a 1,000 or more acres. In this community and setting, reserve habitat blocks in the 100 or more acre range may require special management efforts to remain viable, and reserve habitats in the 10-acre range will often not be viable in the long run. (Note that these numerical targets should be interpreted according to the specifics of habitat blocks: for example, a well-connected and nearly round block in the high 100's of acres may function better in the reserve than a long and narrow "dead end" block in the low 1,000s of acres, and an archipelago of smaller blocks may remain viable under some circumstances). This objective applies to the blocks of habitat making up the core of the reserve, but it may sometimes be necessary and desirable to include small blocks of habitat at strategic locations for habitat linkages.

5. **Link reserves with corridors**: Interconnected blocks of habitat serve conservation purposes better than isolated blocks of habitat.

Linkages allow for genetic exchange, recolonization of habitat following perturbations, and operation of the "rescue effect" for small populations. Linkages within subareas are more important in terms of the latter two functions, while linkages between subregions are more important for genetic exchange. A linkage functions if enough animals transit the linkage often enough for these functions to occur; and a linkage does not have to allow completely unimpeded movement of individual organisms to function. The important individuals are those which are actively dispersing, most often juveniles.

Corridors which are large enough to include habitat sufficient for several home ranges (i.e., "live-in" habitat) may not require an organism to successfully transit the entire linkage when dispersing, and thus are more likely to allow flow of individuals between populations. For this reason, they are preferable to smaller corridors. Similarly, they may be somewhat longer than the distance most individual organisms disperse. These habitat linkages, which represent linear patches of native habitat connecting large blocks, may function as both corridor (for larger animals) and habitat (for smaller, less fragile species).

Corridors function best when they contain native habitat (e.g., coastal scrub, chaparral, riparian) or non-native habitats readily crossed by target species (e.g., annual grassland, ruderal habitats dominated by mustard). Non-habitat linkages function best when the land cover within them physically resembles the habitat preferred by target species. Culverts, agricultural fields, golf courses, and other non-native landscape features that lack barriers to dispersal may function as corridors, especially for important non-target species such as coyote.

Linkages are more likely to function if individual animals can see (or otherwise sense) suitable habitat within or beyond the corridor. Linkages which cross canyons or road cuts (where elevation allows animals to see across) are thus preferable to corridors obscured by topography, development, and/or ornamental vegetation.

Multiple, or redundant corridors are preferable where linkages are longer than normal dispersal distances, include gaps which much be "jumped," include visual barriers, and/or include significant non-habitat components (e.g., golf course, fuel modification zones).

6. **Reserves should be biologically diverse**: Blocks of habitat should contain a diverse representation of physical and environmental conditions.

   The reserves should include other habitat types that may occur in a mosaic pattern with coastal sage scrub and contribute to the long-term protection and management of the coastal sage scrub reserve system. Reserve boundaries should be drawn to include other habitat types which occur within a manageable physiographic unit (e.g., a canyon or ridge system) containing coastal sage scrub. Small exclusions of other habitat types which produce a highly interdigitated boundary or pockets of development should be avoided.

   Larger areas typically support a greater species richness owing to increased habitat heterogeneity in larger patches.

7. **Protect reserves from encroachment**: Blocks of habitat that are roadless or otherwise are inaccessible to human disturbance better serve target species than accessible habitat blocks.

   In the Southern Subregion, the greatest potential for encroachment is from urban edges surrounding reserve lands. Encroachment by non-native species (e.g., non-native grasses and exotic weeds) may reduce the habitat quality and value of reserve lands and thereby lower their carrying capacity. Edges are also the most likely ignition points for wildfire. For these reasons, the reserve boundary should minimize perimeter to area (P/A) ratio and avoid highly interdigitated configurations. (A circle has the smallest P/A ratio.)

   The above objective must be balanced against needs for firebreaks or other features to inhibit large-scale spread of ecological catastrophes and infrastructure/access for reserve management and passive recreation uses.

2.2 Science Advisors Translation of Tenets to Subregional Reserve Design Principles

The NCCP Science Advisors elaborated upon the general NCCP tenets set forth in Section 2.1 with a series of reserve design principles and recommendations developed specifically for the Southern Subregion. For ease of use, these principles and recommendations are summarized in this section, and are set forth in their entirety in APPENDIX A:

- Potential reserve sites should be prioritized based on the presence or potential presence of species or other ecological phenomena in the following five categories:

  1. Legally protected species
  2. Rare plant or habitat associations
  3. Upper trophic level or generalist species
  4. Locally rare species
  5. Species indicative of select habitat types

- Reserves should capture the environmental gradient, both within and among habitat types. This includes the elevation gradient, the coast/inland gradient, and variability among soils, vegetation and habitat types.

- Reserve design should seek, in order of priority:

  1. Continuity within habitat
  2. Connectedness
  3. Proximity

- Reserve design should strive to maintain the contiguity of large intact habitat blocks and not fragment them internally.

- Reserve design should attempt to minimize physical and visual barriers between reserves, particularly those reserves that are close together.

- Development around reserves should be directed to existing disturbed areas everywhere possible and away from native communities.

- Linkages should follow landscape features and respond to patterns of dispersal exhibited by species considered in reserve design. These linkages should be designed to serve the widest array of species by providing characteristics required for dispersal by the most wide-ranging organisms (mountain lion, bobcat, coyote, red-diamond rattlesnake).

The Science Advisors also specifically identified important habitats and specific uplands and riparian areas within the subregion.

- Several important grassland areas occur within the subregion. They are valuable for a variety of vertebrate species of concern, including badger, burrowing owl, spadefoot toad and horned lark. Also the ecotone between coastal sage scrub and grassland is important for California gnatcatchers. Important grassland areas are Gobernadora, Chiquita, upper Gabino, and Cristianitos.

- Reserve selection should favor increasing open space and *de facto* permanent natural areas, or reserves should be in close proximity to those areas. They include:

  - Donna O'Neill Land Conservancy at Rancho Mission Viejo
  - Caspers Wilderness Park
  - O'Neill Regional Park
  - Open Space in Upper Trabuco
  - Wagon Wheel Park (General Thomas F. Reilly Regional Park)
  - Camp Pendleton
  - Cleveland National Forest

- Ridgetop connectivity between Canada Gobernadora and Bell Canyon is important.

- Several key riparian systems occur within the subregion, including along San Juan Creek, Trabuco Creek, and the San Mateo Creek drainage (Gabino and Cristianitos creeks). Maintaining the integrity of these systems is important for a wide variety of species.

- Several canyons are important for nesting raptors, including Gabino, La Paz, Cristianitos and Talega canyons.

- Maintaining the integrity of riparian systems (including major stream courses and their tributaries) is very important for both vertebrates and invertebrates in:

  - San Mateo Drainage (Cristianitos and Gabino creeks)
  - San Juan Creek
  - Trabuco Creek
  - Gobernadora Creek

To address the importance of hydrologic and erosional process, the Science Advisors combined two previous tenets and added this seventh tenet to ensure that reserve design planning would account for the hydrologic and erosional processes that shape the landscapes of the planning area:

- The reserve system should protect intact hydrologic and erosional processes, including both normal function and extreme events (flooding, earthflow). Reserve design should protect to the maximum extent possible the hydrology and erosion regimes of riparian systems, especially in Cristianitos, San Juan and Trabuco drainages.

This tenet is more fully addressed in the SAMP/MSAA Watershed & Sub-basin Planning Principles, but is addressed in this document as appropriate for certain habitats and species.

SECTION 3: GENERAL POLICIES FOR PROTECTING, MANAGING AND RESTORING HABITAT SUPPORTING SELECTED SPECIES

The goal of the NCCP/HCP is to fashion a habitat conservation planning and implementation program that addresses coastal sage scrub and other natural habitats on an ecosystem basis at a subregional level, pursuant to the State of California NCCP coastal sage scrub program and within the framework of the 1993 NCCP Conservation Guidelines. According to the NCCP Conservation Guidelines:

> *. . .subregional NCCPs will designate a system of interconnected reserves designed to: 1) promote biodiversity, 2) provide for high likelihoods for persistence of target species in the subregion, and 3) provide for no net loss of habitat value from the present, taking into account management and enhancement. No net loss of habitat value means no net reduction in the ability of the subregion to maintain viable populations of target species over the long-term.*

To achieve the above goals, the NCCP Conservation Guidelines set forth seven tenets of reserve design previously discussed in Section 2.

In other NCCPs, four planning elements comprise the "Conservation Strategy" and have been formulated as programmatic vehicles for carrying out the NCCP Tenets of reserve design:

- *Creation of a Reserve*: the assemblage of large scale Habitat Reserves capable of protecting and maintaining populations of "target species" over the long term.

- *Assurance of Connectivity*: the provision of land areas necessary for the dispersal of target species and the ability to maintain genetic flow within and between areas.

- *Adaptive Management*: the creation of an institutional basis and program for undertaking management actions necessary to sustain populations over the long term, and in doing so, to adapt management actions to new information and changing habitat needs.

- *Implementation Agreement and Funding*: the formulation of a binding Implementation Agreement that identifies the rights and obligations of all signatory parties to the approved NCCP/HCP and provides for funding mechanisms adequate to assure the implementation of the NCCP/HCP consistent with FESA, CESA and the NCCP Act.

The combination of a properly formulated Habitat Reserve and a comprehensive Adaptive Management Program will allow the NCCP/HCP program to maintain *net habitat value* on a *long-term basis* for species ultimately receiving regulatory coverage under the program. As broadly defined in the 1993 NCCP Conservation Guidelines, "no net loss of habitat value means no net reduction in the ability of the subregion to maintain viable populations of target species over the long-term." (Conservation Guidelines 1993, p 9). Specifically defined, *net habitat value* takes into account habitat gains and losses due to a particular activity, such as reductions in habitat area (impact) and increases in habitat quality (mitigation through restoration and management). The Habitat Reserve and Adaptive Management Program will allow for the mitigation of impacts of proposed incidental take such that the *net habitat value* of the subregion for Identified Species will be maintained on a long-term basis.

The following general policies address the first two planning elements of the conservation strategy for the Southern Subregion NCCP /HCP– creation of a Habitat Reserve and assurances of connectivity. Included are policies concerning the urban/wildland interface, fuel management areas, and grazing management designed to be applied throughout the planning area such that the goals of the NCCP/HCP will be met. This planning area guidance is intended to be supplemented by the more specific sub-basin recommendations and policies set forth in Section 5 that are designed to guide protection, management and restoration of habitats and species at the sub-basin scale. With the exception of habitat linkage/corridor recommendations, policies within these topical areas are not generally addressed at the sub-basin scale.

The Adaptive Management Program component of the three key conservation principles will be provided in a separate document.

3.1 General Policy 1: To maintain *net habitat value* over the long term, site and design new development to conserve and manage *major habitat types* and *major* and *important populations* in *key locations* through the following policies

- Create a Habitat Reserve that includes all *major habitat types* currently existing within the planning area in a manner that conserves blocks of habitat that constitute a diverse representation of the existing range of physical and environmental conditions within the subregion. *Major habitat types* are the generalized natural vegetation communities and include coastal sage scrub, chaparral, grassland, riparian, streamcourses, woodland, forest, lakes and reservoirs, freshwater marsh, vernal pools, and rock & cliff.

- Create a Habitat Reserve that protects habitat supporting listed and selected planning species (see discussion in General Policy 2).

- Create a Habitat Reserve that can be adaptively managed, by a single management entity, as recommended by the State's NCCP Conservation Guidelines (1993) and the NCCP Science Advisors (1998). The Southern Subregion NCCP shall either designate or provide for the creation of a management entity capable of overseeing adaptive management of the entire Habitat Reserve.

3.2 General Policy 2: Identify habitat areas necessary for the conservation and management of NCCP/HCP "planning species." Species ultimately selected as Identified Species shall be designated based on the extent to which the Habitat

Reserve provides for the conservation and management of the species consistent with applicable regulatory requirements

- Because the NCCP/HCP addresses a broad range of habitats, the suite of "planning species" has been expanded from the original suite of three NCCP target species: California gnatcatcher, cactus wren and orange-throated whiptail. These planning species, which include both listed and unlisted species, serve as the conservation planning surrogates for identifying habitat areas that should be considered for inclusion in the Habitat Reserve. The planning species selected for the Southern Subregion NCCP/HCPz are the California gnatcatcher, least Bell's vireo, southwestern willow flycatcher, arroyo toad, Riverside fairy shrimp, San Diego fairy shrimp, thread-leaved brodiaea, cactus wren, tricolored blackbird, yellow-breasted chat, yellow warbler, grasshopper sparrow, white tailed kite, Cooper's hawk, merlin (foraging areas), western spadefoot toad, southwestern pond turtle, San Diego horned lizard, orange-throated whiptail, golden eagle, mountain lion, mule deer, and all California Native Plant Society (CNPS) List 1B and List 2 sensitive species known from the planning area, including many-stemmed dudleya, intermediate mariposa lily, southern tarplant, Coulter's saltbush, chaparral beargrass, Salt Spring checkerbloom, and mud nama**.** In addition, all historic raptor nest sites will be considered in the reserve design process.

In order to prepare and implement sub-basin guidelines for NCCP/HCP planning species, it is necessary to gain an understanding of each of the species' regional and subregional distribution, specific habitat affinities (including edaphic requirements) and the life history characteristic of each species. In this context, the following issues need to be addressed:

- The species' regional and subregional distribution;
- The relative importance of the Southern Subregion for the continued survival or recovery of the species;
- Key and important habitat characteristics of the species;
- Key and important life history characteristics (e.g., plant pollinators, dispersal, response to fire); and
- Response to management (including enhancement and restoration).

With the above information, *major populations* and *important populations* of the planning species will be identified. *Major populations* are those considered sufficiently large to be self-sustaining with a minimum of active or intensive management intervention or that at least support enough breeding individuals to contribute reliably to the overall metapopulation stability of the species. *Important populations* may not meet the relative size standards of *major populations*, but may nonetheless be important to the species' long-term survival. For example, a smaller population in a key habitat linkage may be important for breeding success and exchange of genetic material and thus would be considered to be an *important population,* even though it would not be considered a *major population*.

To facilitate reserve design, *key locations* will be defined for some planning species. For planning purposes, *key locations* are those locations that are deemed necessary for the conservation of the species in the subregion. For example, populations of a species that are concentrated in a single or few locations would be *key locations*. *Key locations* may not be identifiable for some species that are widely scattered and lack population concentrations. *Major populations*, or some portion thereof, may be *key locations*, but not all *major populations*, or portions thereof, are necessarily *key locations.*. With respect to *important populations*, most *important populations* would also be in *key locations*. An *important population* may not be a *key location* where, for example, more than one *important population* can fulfill a desired reserve design and species sustainability function (e.g., connectivity). The identification of a *key location* within a *major* or *important population* defines that portion of the population that is necessary for conservation of the species in the subregion. Portions of *major* or *important populations* that are not identified as *key locations* may be impacted consistent with the conservation of the species within the subregion. For listed species with critical habitat identified or proposed within the subregion, the designation or proposed designation for a particular listed species will be reviewed to determine whether the habitat designation should be proposed to be revised and whether special management considerations should be changed or amplified in light of the proposed Southern Subregion NCCP Conservation Strategy. For any listed species for which critical habitat has yet to be designated, habitat essential to the conservation of the species within the subregion and any special management considerations should be identified.

With regard to federally-listed species and other species ultimately designated as Identified Species in the final Southern NCCP/HCP, a main purpose of the final Conservation Strategy is to provide for the protection of those physical and biological features essential to the conservation of Identified Species in a manner consistent with the definitions set forth in FESA Section 3(5)(A)(i) and (ii). As indicated above, the Draft Southern NCCP/HCP Guidelines have been formulated to identify *key locations* for listed and other species that are deemed necessary for the conservation of the species in the Subregion. These *key location* determinations, as well as specific connectivity, management and restoration recommendations, are provided for each planning area sub-basin, as well as for the overall planning area. In relation to FESA critical habitat considerations, the Southern NCCP/HCP thus provides the opportunity for a more focused analysis of species protection needs, including a more detailed analysis of special management considerations and habitat protection, consistent with FESA Section 3(5)(A)(i), than that which can be undertaken on a species-wide critical habitat designation (see discussion in footnote one below).[1]

Accordingly, the EIR/EIS for the Southern NCCP/HCP will evaluate the extent to which the proposed Conservation Strategy (including Habitat Reserve Alternatives) will provide protection for occupied habitat of the gnatcatcher on which are found those physical or biological features essential to the conservation of the species and which may require special management considerations or protection; and unoccupied habitat that is essential for the conservation of the species, consistent with FESA Section 3(5)(A)(i) and (ii). To the extent the recommended final Conservation Strategy differs from the existing and proposed critical habitat designation for the gnatcatcher, USFWS will consider all available information, including information from the final EIR/EIS, in developing the final rule for designating critical habitat for coastal California gnatcatcher. For all other federally listed species found in the Subregion and other Identified Species for which Species Accounts have been finalized pursuant to Sections 3 and 4 of these Guidelines, the EIR/EIS for the Southern NCCP/HCP will evaluate the extent to which the proposed Conservation Strategy (including Habitat Reserve Alternatives) will provide protection for occupied habitat of the species on which are found those physical or biological features essential to the conservation of the species and which may require special management considerations or protection; and unoccupied habitat that is essential for the conservation of the species, consistent with FESA Section 3(5)(A)(i) and (ii).

The subregional guidelines set forth in the following sections should reflect an overall planning area assessment for each of the planning species using the above criteria. The geographic application of the subregional guidelines should result in a preliminary reserve design alternative. In turn, the preliminary reserve design should be reviewed from the perspective of the NCCP tenets of reserve design and overall program purposes. The planning area habitats required for the protection of planning species serve as the primary indicator of habitats to be considered for inclusion in the Habitat Reserve. The needs of other species considered to be "sensitive species" pursuant to CEQA that are not planning species will be reviewed in conjunction with the reserve design process.

Once a preliminary proposed Habitat Reserve design is identified and a proposed long-term adaptive management program has been formulated, species proposed for regulatory coverage will be designated as proposed "Identified Species." The basis for regulatory coverage for each Identified Species will be derived from applicable state and federal regulatory requirements.

[1] "The HCP development process provides an opportunity for more intensive data collection and analyses regarding the use of particular habitat areas by the gnatcatcher. The process also enables us to conduct detailed evaluations of the importance of such lands to the long-term survival of the species in the context of constructing a biologically configured system of interlinked habitat blocks. We will provide technical assistance and work closely with applicants throughout the development of future HCPs to identify lands essential for the long-term conservation of the gnatcatcher and appropriate management for those lands. By definition, if the gnatcatcher is a covered species under future HCPs, the plans should provide for the long-term conservation of the species." (Fed.Reg. Vol. 65, No. 206, 10/24/00, 63693)

3.3 General Policy 3: Assure wildlife and habitat connectivity within the subregion and to other subregions. Site and design new development to assure wildlife and habitat connectivity between *major* and *important populations* in *key locations*, within the subregion and between those populations and *major populations* in other contiguous subregions

The planning area is partially urbanized and partially open space. In urbanized areas, there are varying opportunities for wildlife movement, ranging from highly constrained settings such as Mission Viejo where wildlife movement may be restricted to a man-made culvert, to more expansive areas, such as the Arroyo Trabuco, that afford “live-in habitat” for some species while conveying movement between surrounding development for a broader suite of species. Areas presently in open space generally facilitate wildlife movement in multiple directions and provide “live-in habitat” for many species, but can show constrained movement (e.g., along narrow vectors) where the open space is contiguous with already urbanized areas. The identification of the most important movement wildlife corridors and habitat linkages, as defined below, which will continue to support effective movement in a future environment that supports development depends on animal behavior, habitat affinities and local geography.

For broad wildlife movement areas that presently allow for unconstrained movement, future development scenarios will restrict movement patterns to some extent. To weigh the merits of alternative development configurations/reserve designs, there is a need to preliminarily identify wildlife movement opportunities that are likely important to retain for ecosystem function. Identification of the areas most important for retaining effective wildlife movement in a future environment with development requires consideration of available wildlife movement data, existing species distributions, habitat affinities, animal behavior and local geography. To provide guidance for the planning process, these factors were considered to identify the areas discussed below that are considered important for maintaining wildlife movement functions under any reserve alternative.

To the extent feasible, important broad wildlife movement areas will be retained in the Habitat Reserve. Where conservation of an entire wildlife movement area within the Habitat Reserve is not feasible, a reduced or more constrained habitat linkage or wildlife corridor would still be conserved and managed. In addition, the function of habitat linkages will be conserved and managed to facilitate wildlife movement in multiple directions. The linkages will be managed to provide “live-in” habitat for a variety of species such that the overall function of the wildlife movement area is maintained.

In order to provide guidance for the planning process, important areas for maintaining wildlife movement functions under any reserve designs are described in this subsection. For purposes of General Policy 3, a distinction is drawn between habitat linkages and wildlife corridors:

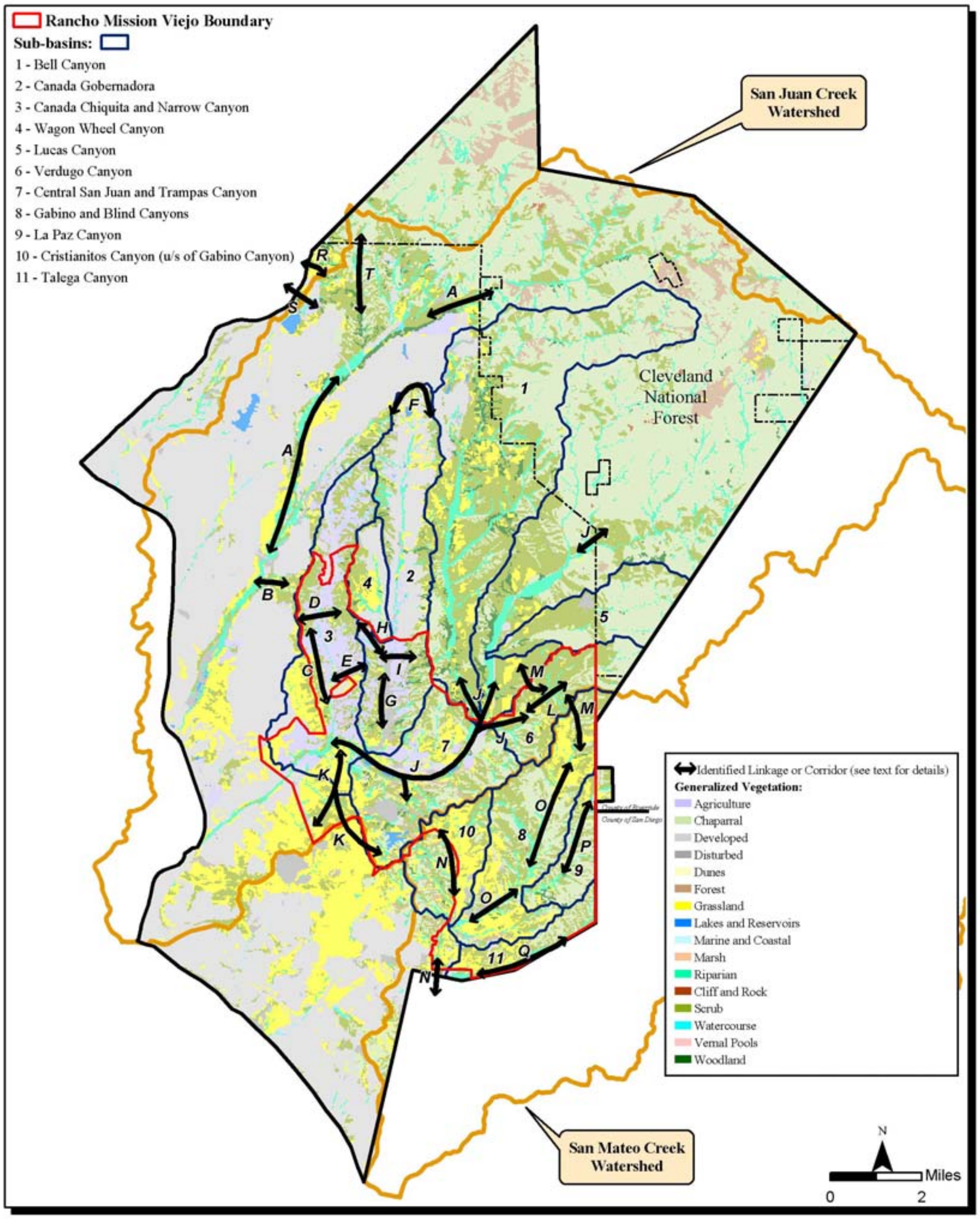
- *Habitat linkages*: Following Soule and Terborgh's (1999) use of the term "landscape linkage," habitat linkages are areas of natural habitat that function to join two larger blocks of habitat. They serve as connections between habitat blocks and help reduce the adverse effects of habitat fragmentation by providing a potential route for gene flow and long-term dispersal. Habitat linkages may serve both as "live-in" habitat and avenues of gene flow for small animals such as reptiles, amphibians, and rodents. Habitat linkages also provide for the transit of larger species, but as contrasted with wildlife corridors, as defined below, also may be "live-in" habitat for larger species (i.e., support breeding sites, frequent use areas, etc.). Habitat linkages also may be represented by continuous habitat or by closely spaced habitat "islands" that function as stepping stones for dispersal and movement (especially for birds and flying insects).

- *Wildlife corridors*: As defined here, wildlife corridors tend to be linear features that connect large blocks of habitat and provide avenues for frequent movement, dispersal or migration of larger animals. Because of their more narrow configuration wildlife corridors generally serve a more limited function than habitat linkages and primarily are used for transit of larger species rather than as live-in habitat for a broader suite of species. Wildlife corridors may also contain "choke-points" (e.g., hourglass or funnel shapes) or man-made structures such as culverts and flood control channels that wildlife quickly move through.

Habitat linkages and wildlife corridors facilitate the dispersal by smaller, less mobile species and frequent movement (e.g., daily, weekly, etc.) by large mammal species such as mountain lion, mule deer, coyote and bobcat. The species identified below only highlight a much broader suite of species served by the habitat linkages and corridors. Accordingly, the species identified should not be interpreted as the only species that benefit from the linkages and corridors. It can be reasonably assumed that habitat linkages and corridors that function for large mammals (except coyote) also function for many other species.

Except where only habitat linkages or corridors currently exist, the following discussion identifies habitat linkage and corridor functions within the general wildlife movement areas that appear to be important to be retained under any reserve alternative. Identification of these linkage and corridor functions are based on field studies of wildlife movement in the planning area (e.g., Beier and Barrett 1993, Dudek 1995; MBA 1996; Padley 1992), input from the Science Advisors and the wildlife agencies, and the consultant team's review and analysis of the species, vegetation, and physiographic information for the subregion. Habitat linkages and wildlife corridors in the planning area are shown in *Figure 3-1* and include:

- The Arroyo Trabuco (A) between about Avery Parkway and the Cleveland National Forest provides a habitat linkage for movement and dispersal of large species, as well as for numerous smaller, less mobile species (e.g., Beier and Barrett 1993; Dudek 1995; Padley 1992; Science Advisors 1998).



Draft NCCP/HCP Planning Guidelines

Habitat Linkages and Wildlife Corridors Map

FIGURE 3-1

•

The area (B) between the Las Flores and Ladera Ranch developments connecting Arroyo Trabuco and Chiquita Ridge provides an existing habitat linkage for species such as California gnatcatcher and a wildlife corridor for large mammals (e.g., Beier and Barrett 1993).

- The combined Chiquita Ridge and Creek area (C) provides a north-south wildlife habitat linkage from San Juan Creek to the "horseshoe" of habitat surrounding the northern end of Coto de Caza. This linkage is important for species such as California gnatcatcher and cactus wren and also for movement and dispersal of large mammals (e.g., Beier and Barrett 1993; Dudek 1995; MBA 1996; Padley 1992; Science Advisors 1998).

- The "Narrows" area (D) separating middle and lower Chiquita Canyon consists of oak/riparian and coastal sage scrub habitats, and relatively little dry land farming. This area provides an east-west habitat linkage between Chiquita Ridge and Chiquadora Ridge and Sulphur Canyon for both large mammals and small, mobile species such as the gnatcatcher (e.g., Beier and Barrett 1993; MBA 1996; Padley 1992).

- A mosaic of coastal sage scrub and grassland in lower Chiquita Canyon (E), such as the area adjacent to the wastewater treatment plant, provides an east-west movement corridor for California gnatcatcher dispersal, as well as for dispersal and movement of large mammals.

- The "horseshoe" connection (F) north of Coto de Caza provides a "stepping-stone" habitat linkage for the California gnatcatcher and cactus wren. It probably has limited existing function as a wildlife corridor for large species, although coyotes likely move through the area and bobcat and mule deer may occasionally use the corridor.

- Chiquadora Ridge and adjacent Gobernadora Creek (G) provide a north-south habitat linkage for California gnatcatcher and cactus wren to San Juan Creek, as well for movement and dispersal by large mammals (e.g., Beier and Barrett 1993; MBA 1996; Padley 1992; Science Advisors 1998).

- Sulphur Canyon (H) provides a north-south and east-west habitat linkage for large mammals between Chiquita Canyon and Wagon Wheel Canyon and Canada Gobernadora that allows wildlife to move east to Bell Canyon and Caspers Wilderness Park. It also provides a north-south connection for smaller species such as California gnatcatcher and cactus wren (e.g., Beier and Barrett 1993; MBA 1996; Padley 1992; Science Advisors 1998).

- Canada Gobernadora between Coto de Caza and the mouth of Sulphur Canyon (I) provides an east-west habitat linkage for large mammals between Chiquita Canyon and Wagon Wheel Canyon to the west and Bell Canyon and Caspers Wilderness Park to the east (e.g., Beier and Barrett 1993; MBA 1996).

- San Juan Creek (J) functions as a central nexus for north-south and east-west wildlife movement in the central part of the planning area. It connects Chiquita Ridge and Chiquita Canyon with the Central San Juan Creek and Trampas Canyon sub-basin to allow dispersal and movement to the south via Cristianitos Canyon. It also serves east-west wildlife movement and dispersal from Chiquita Canyon upstream to the Cleveland National Forest and major tributaries such as Canada Gobernadora, Bell Canyon, and Verdugo Canyon (e.g., Beier and Barrett 1993; Dudek 1995; Padley 1992; Science Advisors 1998). It should be noted that under existing conditions, large wildlife species (coyote, mule deer, bobcat and possibly mountain lion) moving between San Juan Creek and Trampas Canyon and the Radio Tower Road area either use existing corrugated steel and concrete box culverts under Ortega Highway (Dudek 1995) or must cross the highway directly.

- Habitat west of the silica mine in Trampas Canyon (K) currently provides dispersal opportunities for California gnatcatchers and other species between Chiquita Ridge and gnatcatcher populations in San Juan Capistrano and San Clemente, as well as eastward dispersal between Trampas Canyon and the Talega development to the RMV Conservancy, Cristianitos Canyon and MCB Camp Pendleton.

- Verdugo Canyon (L) provides an east-west habitat linkage for large mammals between San Juan Creek and the Cleveland National Forest (Beier and Barrett 1993; Padley 1992).

- Upland coastal sage scrub and chaparral habitats adjacent to Verdugo Canyon (M) may provide north-south movement opportunities for the cactus wren and other species, although it is likely that these species also disperse along San Juan Creek.

- Local gnatcatcher populations in the Southeast Quadrant are relatively small, compared with the remainder of the planning area, and are concentrated along the Cristianitos Creek corridor and overlooking lower Talega Creek. Although there is the potential for gnatcatcher dispersal through coastal sage scrub patches throughout the Southeast Quadrant, an important habitat linkage for gnatcatchers within the Southeast Quadrant appears to be Cristianitos Canyon (N), which links San Juan Creek with local populations in lower Gabino Creek and Camp Pendleton along lower Cristianitos/San Mateo Creek.

- Gabino Canyon (O) provides a north-south habitat linkage between the planning area and the Cleveland National Forest for large mammals (Beier and Barrett 1993; MBA 1996; Padley 1992; Science Advisors 1998) and may support dispersal by the cactus wren and other species.

- La Paz Canyon (P) provides a north-south habitat linkage between the planning area and the Cleveland National Forest for large mammals (Beier and Barrett 1993; Padley 1992) and possibly a habitat linkage for dispersal by the cactus wren and other species.

- Talega Canyon (Q) provides for east-west and north-south movement between the planning area and MCB Camp Pendleton for large mammals (Beier and Barrett 1993; Padley 1992), cactus wren and other species.

- The Saddleback Meadows (R) area provides a lower elevation habitat linkage between the Southern Subregion planning area and the Central Subarea component of the Central and Coastal Subregion NCCP/HCP Habitat Reserve. This area also provides a very limited wildlife corridor between the Central and Southern subregions via two 300-ft long corrugated steel pipes that cross under El Toro Road (Dudek 1995). This crossing may be used by smaller animals such as coyote, gray fox and raccoons, but likely is not used by bobcat, mule deer or mountain lion because the pipes are long and confining, and preclude visual contact between the two ends because they have a slight bend.

- The area north of Oso Reservoir (S), including O'Neill Regional Park and the nursery provides a lower elevation "stepping stone" habitat linkage between the Southern Subregion planning area and the Central Subarea component of the Central and Coastal Subregion NCCP/HCP Habitat Reserve. With habitat restoration, this linkage likely would be suitable for the California gnatcatcher.

- The Foothill-Trabuco Specific Plan (1985) identified the locations of several habitat linkages and wildlife corridors, generally shown as (T), within the upper Arroyo Trabuco area. The precise locations of extant linkages and corridors needs to be refined and based on information developed through the review of existing developments and recently submitted specific project plans.

3.4 General Policy 4: Roads and infrastructure should be located outside the Habitat Reserve to the maximum extent feasible. The siting and design of roads and infrastructure should provide for protection of habitat linkages and movement corridors.

- To the maximum extent feasible, roads and infrastructure should be located outside the Habitat Reserve.

- Roads that are necessary to serve approved land and water uses located inside or outside the Habitat Reserve shall be designed and sited to minimize impacts on designated Identified Species, to accommodate wildlife movement to the maximum extent feasible, and to minimize impacts to habitat and associated species. Where roads are necessary, under the approved NCCP/HCP, they will be designed consistent with safety, roadway design criteria that are appropriate for the setting and desired roadway function. Roadway design shall include bridges and/or culverts large enough to accommodate fish and wildlife movement and, where appropriate and feasible, wildlife over crossings. In addition, bridges and culverts should maintain appropriate sediment movement for existing streams. As appropriate, fencing, grading and plant cover will be provided to serve wildlife crossings consistent with conservation principles and the adaptive management program. Where feasible and safe, lighting along roadways within the Habitat Reserve should be avoided. Where roadway lighting within the Habitat Reserve is necessary for public safety reasons, it should be low-sodium or similar low intensity lighting that is directed away or shielded from the Habitat Reserve.

- Other infrastructure facilities (e.g., pipelines, transmission lines, etc.) that are necessary to serve approved uses or regional needs also shall be sited and designed to accommodate wildlife movement and, to the extent feasible, to minimize impacts to habitats and designated Identified Species located inside and outside the Habitat Reserve. To the extent feasible, infrastructure facilities within the Habitat Reserve should be located within or immediately adjacent to existing roadways or other developed landscapes.

3.5 General Policy 5: Long-term indirect impacts to the Habitat Reserve and other areas being preserved for species protection shall be managed through creation of an urban/wildlands interface zone separating the Habitat Reserve and the non-reserve/urban areas. Management within the interface zone would:

- Create fuel management zones combining irrigated and non-irrigated native plantings separating the Habitat Reserve from adjacent urban uses.

- To the extent that fuel management zones are composed of native habitats and can support Identified Species and other species, or be enhanced or managed to support Identified Species and other species, this should be encouraged. For example, using prickly-pear in the fuel management zone may provide habitat for the cactus wren, as well as enhance the buffering effect between the Habitat Reserve and developed areas.

- Fuel management zones and practices will be set forth in a “fuel management plan” as part of the NCCP/HCP and aquatic resources protection program.

- Prohibit plants identified by the California Exotic Pest Plant Council as an invasive risk in Southern California from development and fuel management zones adjoining the Habitat Reserve;

- Manage pesticide and herbicide use and fertilizer application techniques in landscaped areas, including golf courses, located adjacent to the Habitat Reserve or preserved wetlands and provide comprehensive water quality treatment, which may include, but not be limited to, the use of natural treatment systems, prior to discharge of urban runoff into the Habitat Reserve;

- Shield and/or direct lighting away from habitat areas through the use of low-sodium or similar intensity lights, light shields, native shrubs, berms, and other shielding methods; and

- Provide barriers, fencing, signs, walls, etc. to manage and direct access by the public and domestic animals (e.g., pets) to protect sensitive habitat and species.

3.6 General Policy 6: Cattle grazing shall be permitted within the Rancho Mission Viejo portion of the Habitat Reserve provided that grazing activities are consistent with a "grazing management plan" approved as part of the certified NCCP/HCP

- The grazing management plan (GMP) approved as part of the NCCP/HCP shall identify suitable grazing areas and allowable grazing practices that are consistent with certified NCCP/HCP policies and the aquatic resource management program. The GMP will address grazing practices following approval of the NCCP/HCP and prior to transfer of lands to the Habitat Reserve.

- The GMP will incorporate grazing management techniques designed to address the needs of species and habitat identified for protection, promote perennial grasses including native grasses, allow for continued cattle grazing sufficient to support cattle operations and, where appropriate, reduce fuel loads for fire.

SECTION 4: SPECIES ACCOUNTS FOR PLANNING SPECIES

This section provides species accounts and key habitat components for listed and unlisted "planning species" in the planning area, as identified in Section 3. The planning species are intended to serve as conservation planning surrogates for identifying habitat areas that should be considered for inclusion in the Habitat Reserve.

The following species accounts are a "work in progress" for the purpose of characterizing, analyzing and developing the conservation and management strategy for listed and other selected "planning species." As a "work in progress" this section provides species accounts for the seven listed species that occur in the Southern Subregion planning area:

- California gnatcatcher
- arroyo toad
- least Bell's vireo
- southwestern willow flycatcher
- San Diego fairy shrimp
- Riverside fairy shrimp
- thread-leaved brodiaea

The original species accounts for these seven species appeared in the April 2003 version of the Guidelines, but accounts for the arroyo toad and thread-leaved brodiaea have been revised based on new information collected since that time. For the arroyo toad, new natural history information regarding habitat use adjacent to breeding streams has been added. Also, the characterization of the *major population* in Talega Canyon in relation to the San Juan Creek *major population* has been refined. For the thread-leaved brodiaea, new plant survey data have been added, expanding a *major population* in lower Cristianitos/Gabino canyons, adding two new *important populations* in the southern Trampas Canyon and middle Gabino sub-basins, and refining population estimates for other previously documented locations. Because two new *important populations* of brodiaea have been identified, protection recommendations for these locations were added. As noted in Section 1, the agencies have not provided comments on these revised species accounts.

This section also provides accounts for unlisted wildlife and plant planning species. The new species accounts presented in this 2004 version are highlighted in boldface.

- **cactus wren**
- **Cooper's hawk**
- **grasshopper Sparrow**
- **merlin**

- **tricolored blackbird**
- **white-tailed kite**
- **yellow warbler**
- **yellow-breasted chat**
- **western spadefoot toad**
- **orange-throated whiptail**
- **San Diego horned lizard**
- **southwestern pond turtle**
- **chaparral beargrass**
- Coulter's saltbush
- intermediate mariposa lily
- many-stemmed dudleya
- mud nama
- **Salt Spring checkerbloom**
- southern tarplant

The unlisted species accounts for many-stemmed dudleya, mud nama and southern tarplant have been revised to include spring 2003 survey data and clarifications of population locations and sizes. As a result of new information for many-stemmed dudleya, a new *important population* in a *key location* in the upper portion of the Gobernadora sub-basin was identified and the lower Chiquita Canyon *important population* in a potential *key location* was upgraded to a *major population* in a *key location*. As noted above and in Section 1, these new and revised species accounts and protection recommendations have not been commented upon by the resource agencies.

Finally, the April 2003 version of the Guidelines included coarse conservation analyses for several of the planning species based on implementing the protection recommendations. These conservation analyses were omitted from the 2004 version because they are more appropriately, and more thoroughly, presented in the NCCP/HCP document rather than this planning document.

The accounts include both regional and subregional background information for the species as the basis for developing specific protection, management and restoration recommendations that can be applied at the watershed and sub-basin levels. Both the regional and subregional perspective are important because the relative importance of populations of planning species at the subregional, watershed and sub-basin level can only be understood within the broader context. Developing protection, management, and restoration recommendations for the planning species requires an understanding of each species' regional and subregional distribution, as well as the specific habitat affinities and key life history characteristic of each species. In this context, the following issues need to be addressed:

- The species' regional and subregional distribution;

- The relative importance of the Southern Subregion for the continued existence or recovery of listed species or sustainability of unlisted species;

- Existing regional or subregional protection of species, to the extent known;

- Key and important habitat characteristics of the species;

- Key and important life history characteristics (e.g., pollinators, dispersal mechanisms, response to fire); and

- Response of the species to management (e.g., directed or selective grazing, prescribed burns, exotics control/eradication, translocation, seed propagation).

Using the above information, *major populations* and *important populations* of the planning species are identified. *Major populations* are those considered sufficiently large to be self-sustaining with a minimum of active or intensive management intervention or that at least support enough breeding individuals to contribute reliably to the overall metapopulation stability of the species. *Important populations* may not meet the relative size standards of *major populations*, but may nonetheless be important to the species' long-term survival. For example, a smaller population in a key habitat linkage may be important for breeding success and exchange of genetic material and thus would be considered to be an *important population*, even though it would not be considered a *major population*.

To facilitate reserve design, *key locations* will be defined for some planning species. For planning purposes, *key locations* are those locations that are deemed necessary for the conservation of the species in the subregion. For example, populations of a species that are concentrated in a single or few locations would be *key locations*. *Key locations* may not be identifiable for some species that are widely scattered and lack population concentrations. *Major populations*, or some portion thereof, may be *key locations*, but not all *major populations*, or portions thereof, are necessarily *key locations*. With respect to *important populations*, most *important populations* would also be in *key locations*. An *important population* may not be a *key location* where, for example, more than one *important population* can fulfill a desired reserve design and species sustainability function (e.g., connectivity). The identification of a *key location* within a *major* or *important population* defines that portion of the population that is necessary for conservation of the species in the subregion. Portions of *major* or *important populations* that are not identified as *key locations* may be impacted consistent with the conservation of the species in the subregion. For listed species with critical habitat identified or proposed within the subregion the designation or proposed designation for a particular listed species will be reviewed to determine whether the habitat designation should be proposed to be revised and whether special management considerations should be changed or amplified in light of the proposed Southern Subregion NCCP Conservation Strategy. For any listed species for which critical habitat has yet to be designated, habitat essential to the conservation of the species within the subregion and any special management considerations should be identified.

With regard to federally-listed species and other species ultimately designated as Identified Species in the final Southern NCCP/HCP, a main purpose of the final Conservation Strategy is to provide for the protection of those physical and biological features essential to the conservation of Identified Species in a manner consistent with the definitions set forth in FESA Section 3(5)(A)(i) and (ii). As indicated above, the draft Southern NCCP/HCP Guidelines have been formulated to identify *key locations* for listed and other species that are deemed necessary for the conservation of the species in the Subregion. These *key location* determinations, as well as specific connectivity, management and restoration recommendations, are provided for each planning area sub-basin, as well as for the overall planning area. In relation to FESA critical habitat considerations, the Southern NCCP/HCP thus provides the opportunity for a more focused analysis of species protection needs, including a more detailed analysis of special management considerations and habitat protection, consistent with FESA Section 3(5)(A)(i), than that which can be undertaken on a species-wide critical habitat designation (see discussion in footnote one below).[1]

Accordingly, the EIR/EIS for the Southern NCCP/HCP will evaluate the extent to which the proposed Conservation Strategy (including Habitat Reserve Alternatives) will provide protection for occupied habitat of the gnatcatcher on which are found those physical or biological features essential to the conservation of the species and which may require special management considerations or protection; and unoccupied habitat that is essential for the conservation of the species, consistent with FESA Section 3(5)(A)(i) and (ii). To the extent the recommended final Conservation Strategy differs from the existing and proposed critical habitat designation for the gnatcatcher, USFWS will consider all available information, including information from the final EIR/EIS, in developing the final rule for designating critical habitat for coastal California gnatcatcher. For all other federally listed species found in the Subregion and other Identified Species for which Species Accounts have been finalized pursuant to Sections 3 and 4 of these Guidelines, the EIR/EIS for the Southern NCCP/HCP will evaluate the extent to which the proposed Conservation Strategy (including Habitat Reserve Alternatives) will provide protection

[1] "The HCP development process provides an opportunity for more intensive data collection and analyses regarding the use of particular habitat areas by the gnatcatcher. The process also enables us to conduct detailed evaluations of the importance of such lands to the long-term survival of the species in the context of constructing a biologically configured system of interlinked habitat blocks. We will provide technical assistance and work closely with applicants throughout the development of future HCPs to identify lands essential for the long-term conservation of the gnatcatcher and appropriate management for those lands. By definition, if the gnatcatcher is a covered species under future HCPs, the plans should provide for the long-term conservation of the species." (Fed.Reg. Vol. 65, No. 206, 10/24/00, 63693)

for occupied habitat of the species on which are found those physical or biological features essential to the conservation of the species and which may require special management considerations or protection; and unoccupied habitat that is essential for the conservation of the species, consistent with FESA Section 3(5)(A)(i) and (ii).

Specific buffer recommendations and requirements are not included in the species accounts. Requirements, guidelines or recommendations for buffers of specific widths for some species have been incorporated into Biological Opinions or appear in listings of threatened and endangered species, critical habitat designations and the scientific literature. However, these buffer widths are variable, because appropriate buffer widths depend on a variety of factors, including adjacent habitat, adjacent existing and future land uses, topography, and potential or existing threats. Such variable factors are better addressed on a site-specific rather than a generic basis (i.e., one size does not fit all). In the following species accounts, information about suitable adjacent habitats, where relevant, is provided in the accounts to help guide planning for appropriate buffers.

4.1 Listed Species

4.1.1 California Gnatcatcher

Polioptila californica – California Gnatcatcher
Federal: Threatened
State: California Special Concern Species

a. Regional Status

Historically, the California gnatcatcher ranged from southern Ventura County southward through Los Angeles, Orange, Riverside, San Bernardino, and San Diego counties, and into Baja California, Mexico, to approximately 30 degrees North latitude near El Rosario (Atwood 1990). The gnatcatcher was considered locally common in the mid-1940s; but by the 1960s, this subspecies had declined substantially in the United States owing to widespread destruction of its habitat (Atwood 1990). Currently, the subspecies occurs on coastal slopes of southern California, ranging from southern Ventura southward through Palos Verdes Peninsula in Los Angeles County through Orange, Riverside, San Bernardino and San Diego Counties into Baja California to El Rosario, Mexico, at about 30 degrees North latitude (Atwood 1991).

Gnatcatcher sites listed in *Table 4-1* include cumulative observed locations of gnatcatchers dating from about 1989 to 2001. The sites may include breeding pairs or some unpaired individuals. Because gnatcatcher breeding populations fluctuate from year to year, these data are not intended to provide an accurate population estimate, but include gnatcatcher observations recorded since about 1989 to provide a relative measure of gnatcatcher distribution and densities within southern California for the purpose of conservation planning.

TABLE 4-1. REGION-WIDE SUMMARY:
2001 STATUS OF COASTAL CALIFORNIA GNATCATCHER SITES
WITHIN KNOWN RANGE IN SOUTHERN CALIFORNIA

Regional Population Area(s)	Number of Counted Gnatcatcher Sites[1,2]
San Diego MSCP	1,819[3]
North San Diego County MHCP	378[4]
Central/Coastal NCCP Reserve	340[5]
Central/Coastal Special Linkage, NRPPA, Existing Use Area and Non-Reserve Open Spaces	140[6]
Protected Gnatcatcher Sites in Southern Orange County Subregion NCCP (Conservation Easements)	348[7]
Unprotected Sites in the Southern Subregion NCCP	389[7]
Palos Verde Peninsula, Los Angeles County	38[8]
APPROXIMATE TOTAL SITES IN NCCP/HCP PLANNING AREAS	*3,452 sites*
GNATCATCHER SITES LOCATED ON FEDERAL LANDS	
MCB, Camp Pendleton	620
Miramar MCAS	53
TOTAL GNATCATCHER SITES ON FEDERAL LANDS	*673 sites*
GNATCATCHERS WITHIN AREAS NOT COVERED BY 4(D) RULE PROTECTIONS BUT SUBJECT TO SECTION 9 ESA PROTECTIONS	
Riverside County	326[9]
Los Angeles County	97
San Bernardino County	27
Ventura County	12[10]
TOTAL GNATCATCHER SITES SUBJECT TO SECTION 9	*461 sites*
GNATCATCHER SITES IN NCCP/HCP PLANNING AREAS, FEDERAL LANDS OR SUBJECT TO SECTION 9 PROTECTIONS	
Gnatcatchers Sites in NCCP Planning Areas	3,445
Gnatcatchers Sites on Federal Lands	673
Gnatcatcher Sites Subject to Section 9 Protections	454
GNATCATCHER SITES NOT AUTHORIZED FOR TAKE	*4,579*
GNATCATCHER SITES AUTHORIZED FOR TAKE BY APPROVED NCCP'S	1,103
GRAND TOTAL	5,682

Notes:

1 Gnatcatcher sites include cumulative observed locations of gnatcatchers dating from 1989 to 2001. The sites may include breeding or unpaired individuals. These data are intended to provide information about observed occupied habitat.
2 Non-footnoted numbers are taken from the 1999 USFWS Biological Opinion for the Gnatcatcher 4(d) rule.
3 San Diego Multiple Species Conservation Plan, Table 3-5, page 3-45, August 1996.
4 Source is Dr. Wayne Spencer, Conservation Biology Institute, 2001.
5 Central and coastal Subregion NCCP/HCP, Table 1-ES, July 17, 1996.

TABLE 4-1. REGION-WIDE SUMMARY:
2001 STATUS OF COASTAL CALIFORNIA GNATCATCHER SITES (*Cont.*)
WITHIN KNOWN RANGE IN SOUTHERN CALIFORNIA

[6] Central and coastal Subregion NCCP/HCP with updated survey data by Harmsworth Associates for the North Ranch Policy Plan Area, 2001.
[7] Source is Dr. Philip Behrends, Dudek & Associates, Inc., 2001.
[8] Atwood et al., 1996
[9] Source is Western Riverside County Multi-Species Habitat Conservation Program sensitive species data base, 2001.
[10] Source is Susan Davison, EDAW, 2003.

The California gnatcatcher, is a small, long-tailed 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 coastal sagebrush (*Artemisia californica*), various species of sage (*Salvia* sp.), California buckwheat (*Eriogonum fasciculatum*), lemonadeberry (*Rhus integrifolia*), California encelia (*Encelia californica*), and *Opuntia* spp. Ninety-nine percent of all gnatcatcher locality records within coastal Orange and San Diego counties occur at or below an elevation of 300 meters (m) (984 feet [ft]) (Atwood 1990).

Gnatcatchers also use chaparral, grassland, and riparian habitats where they occur adjacent to sage scrub. 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 (see discussion below), but data on dispersal use are largely anecdotal (Bowler 1995; Campbell et al. 1998). Although existing quantitative data are poor regarding gnatcatcher use of these other habitats, these areas may be critical during certain times of year for dispersal or as foraging areas during drought conditions. Breeding territories have also been documented in non-sage scrub habitat. Campbell et al. (1998) discuss likely scenarios explaining why non-coastal sage scrub is used by gnatcatchers, including food source availability, dispersal areas for juveniles, temperature extremes, fire avoidance, and lowered predation rate for fledglings.

The California gnatcatcher is primarily insectivorous, non-migratory, and exhibits strong site tenacity (Atwood 1990). The diet of gnatcatchers, based on fecal analyses, includes leaf- and plant hoppers and spiders as dominant prey, with true bugs, wasps, bees, and ants as only minor components of their diet (Burger et al. 1999).

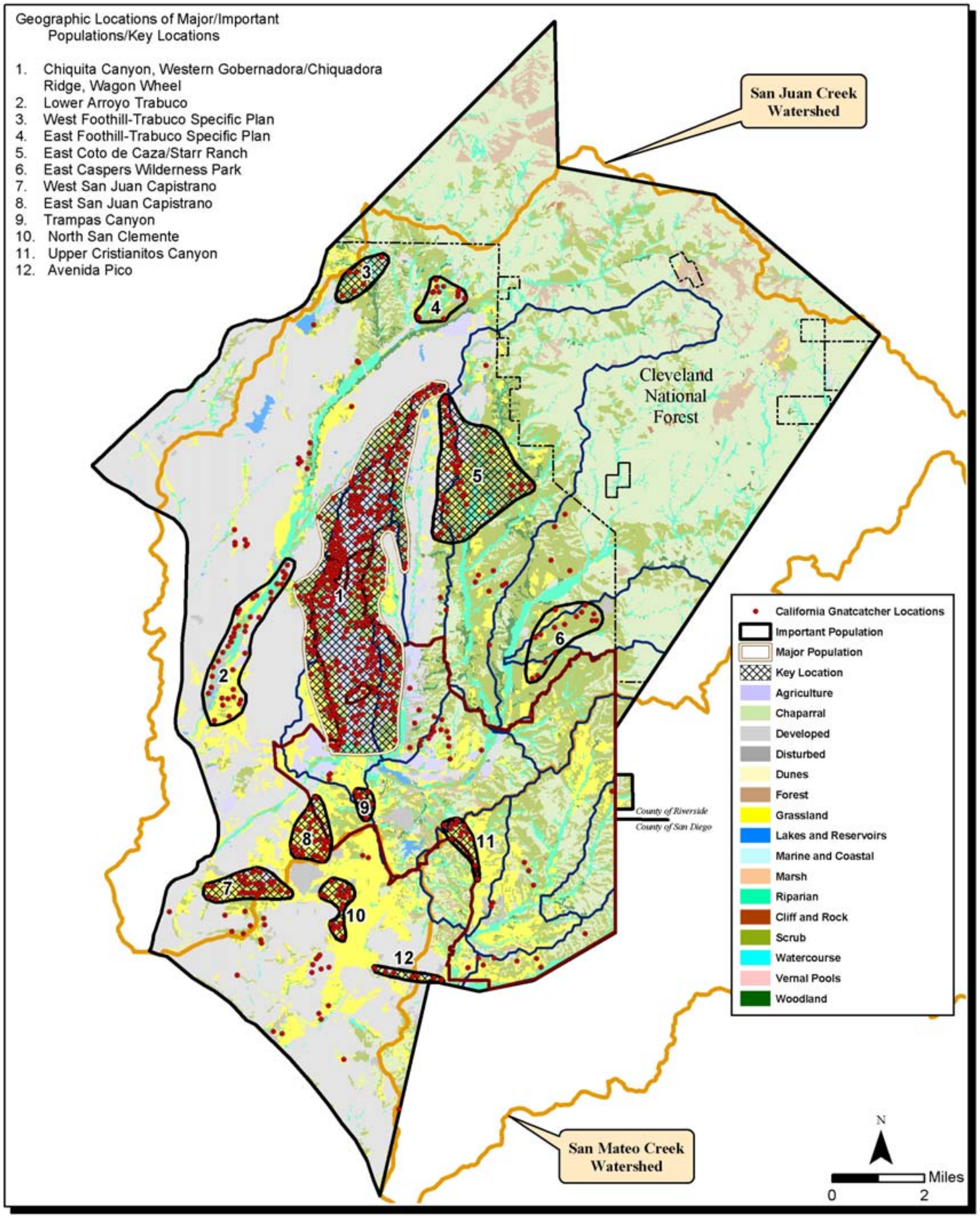
The breeding season of the gnatcatcher extends from mid February through middle August, with the peak of the nesting activity occurring from mid-March through mid-May. The gnatcatcher nest is a small, cup-shaped basket usually found one to three feet above the ground in a small shrub or cactus. Clutch sizes range between three and five eggs, with the average being four. Juvenile birds associate with parents for several weeks (sometimes months) after fledging (Atwood 1990). The coastal California gnatcatcher is a year-round resident. Post-breeding dispersal of fledglings occurs between late May and late November.

Two studies have documented dispersal by California gnatcatchers. Mean dispersal of juveniles in Orange County was found to be 1.05 kilometer (km) (0.65 mile [mi]) with one individual dispersing a total of 7.5 km (4.7 mi) (Galvin 1998). In an isolated population on the Palos Verdes Peninsula, the mean dispersal distance of gnatcatchers banded as nestlings for males was 2.8 km (1.7 mi) and for females was 3.3 km (2.0 mi) (Atwood et al. 1996). Although the mean dispersal distances that have been documented above are relatively low, dispersal of juveniles is difficult to observe and to document without extensive banding studies. It is likely that the few current studies underestimate the gnatcatcher's typical dispersal capacity because of the difficulty of detecting (Bailey and Mock 1998). Juvenile coastal California gnatcatchers are apparently able to traverse highly man-modified landscapes, including non-native landscaping vegetation, for at least short distances (Bailey and Mock 1998). Additionally, natural and restored coastal sage scrub habitat along highway corridors has been documented to be used for foraging and nesting by gnatcatchers and may serve important dispersal functions (Famolaro and Newman 1998).

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 coastal sagebrush-dominated stands on mesas, gently sloping areas, and along the lower slopes of the coast ranges (Atwood 1990). Territory size increases as vegetation density decreases and with distance from the coast, probably due to food resource availability. Therefore, gnatcatchers will use sparsely vegetated coastal sage scrub for shelter and to forage for insects as long as perennial shrubs are available.

b. Subregional Status

The 737 mapped locations for the California gnatcatcher in the Southern Subregion are distributed throughout the subregion, with population concentrations at the lower elevations. About 97 percent of the 737 mapped locations are at elevations below 366 m (1,200 ft) (*Figure 4-1*). The locations above 366 m are concentrated in the Foothill-Trabuco Specific Plan area and the eastern portion of Caspers Wilderness Park. *Table 4-2* provides a breakdown of mapped gnatcatcher locations by watershed and sub-basin. As illustrated in *Table 4-2*, the vast



Draft NCCP/HCP Planning Guidelines

California Gnatcatcher Distribution Map

FIGURE 4-1

majority of gnatcatcher locations are in the San Juan Creek Watershed. The San Clemente Hydrological Unit includes about 7 percent of the locations and the portion of the San Mateo Creek Watershed in the planning area supports only 4 percent of the locations.

TABLE 4-2
CALIFORNIA GNATCATCHER DISTRIBUTION
IN THE SOUTHERN SUBREGION

	No. Mapped Locations	Percent of Total
Sub-basins in San Juan Creek Watershed		
Chiquita Canyon	282	38%
Canada Gobernadora	109	15%
Central San Juan & Trampas Canyon	17	2%
Wagon Wheel Canyon	23	3%
Bell Canyon	29	4%
Lucas Canyon	10	1%
Verdugo Canyon	1	<1%
Other Sub-basins within Watershed	185	25%
SUBTOTAL	654	89%
Sub-basins in San Mateo Creek Watershed		
Cristianitos Canyon	12	2%
Gabino & Blind Canyons	4	<1%
La Paz Canyon	1	<1%
Talega Canyon	7	1%
Other Sub-basins within Watershed	5	<1%
SUBTOTAL	31	4%
San Clemente Hydrological Unit	52	7%
Total	*737*	*11%*

Gnatcatcher concentrations in the planning area also can be described in terms of relatively discrete local populations that lend themselves to an analysis of *major* and *important populations* and *key locations*. Generally these local populations are comprised of clusters of locations that probably encompass typical dispersal patterns within the local area. For example, the Chiquita population exhibits a clearly defined cluster of points, although the break between this population and the cluster on the ridge between Coto de Caza and Bell Canyon is somewhat arbitrary. On the other hand, the population east of Coto clearly is less concentrated even though there are substantial patches of coastal sage scrub available. Although empirical data for dispersal in the subregion are not available, based on dispersal studies conducted elsewhere (e.g., Galvin 1998; Baily and Mock 1998), it can be hypothesized where birds may move within the planning area. For example, Galvin's (1998) study of dispersal by gnatcatchers in southern Orange County found that most dispersal movements by juvenile gnatcatchers were less than 1 km (3,275 ft), although birds are capable of moving much farther (e.g., Baily and Mock 1998).

The Southern Subregion supports one *major population* centered in the Chiquita Canyon area, including Chiquadora Ridge and Wagon Wheel Canyon. This *major population* includes approximately 404 locations, or about 55 percent of the total locations in the subregion. This population also is a *key location* because it is central to several other *important populations* that are distributed throughout the subregion, as well as populations to the south on Camp Pendleton. Some of these *important populations* may only number a few mapped locations, but occur in areas important for geographic diversity and representation of the gnatcatcher in the subregion. *Important populations* that are also identified as *key locations* are integral to the overall function of the reserve for this species because they provide linkages to other populations, including populations on Camp Pendleton.

Table 4-3 summarizes the identified *major* and *important populations* and *key locations* for the California gnatcatcher in the Southern Subregion. These populations and locations are depicted in *Figure 4-1*. *Table 4-3* is followed by a narrative summary of these populations and locations.

TABLE 4-3
MAJOR AND IMPORTANT POPULATIONS OF THE
CALIFORNIA GNATCATCHER IN THE SOUTHERN SUBREGION

Population No.	Population Type/ Location	General Area	No. Locations
1	Major/Key Location	Chiquita Canyon, Western Gobernadora/ Chiquadora Ridge, Wagon Wheel	404
2	Important	Lower Arroyo Trabuco	41
3	Important/Key Location	West Foothill-Trabuco SP	6
4	Important	East Foothill-Trabuco SP	14
5	Important/Key Location	East Coto de Caza/Starr Ranch	52
6	Important	East Caspers Wilderness Park	15
7	Important/Key Location	West San Juan Capistrano	35
8	Important/Key Location	East San Juan Capistrano	28
9	Important/Key Location	Trampas Canyon	7
10	Important/Key Location	North San Clemente	21
11	Important/Key Location	Upper Cristianitos Canyon	13
12	Important/Key Location	Avenida Pico	8
Total Locations in Major and Important Population Areas			644 (87%)
Total Locations not included in Major or Important Population Areas			93 (13%)

The Chiquita Canyon area (No. 1 on *Figure 4-1*), including Chiquadora Ridge and Wagon Wheel Canyon supports a *major population*, both within the Southern Subregion, and within the range of the gnatcatcher in southern California. This area, which extends from the "horseshoe" in northern Coto de Caza south to San Juan Creek, includes 404 mapped locations of the gnatcatcher and accounts for 55 percent of the gnatcatchers in the subregion. As the *major population* in the subregion, this population also is in a *key location*.

- Lower Arroyo Trabuco (No. 2 on *Figure 4-1*) between about Avery Parkway and Oso Parkway supports an *important population* containing about 41 mapped locations. This population is linked to the Chiquita Canyon population through the open space habitat on Chiquita Ridge between the Las Flores and Ladera Ranch developments. This population is considered important because it contains a substantial number of gnatcatchers, provides dispersal areas and potentially a refugium for birds in Chiquita Canyon when wildfires occur. Although this area supports an *important population*, it is not considered a *key location* and a minor loss of locations would still be consistent with the species conservation goals.

- The portion of the Foothill-Trabuco Specific Plan area west of the Live Oak Canyon Road (No. 3 on *Figure 4-1*) supports an *important population* in a *key location*. Although there are only about six gnatcatcher locations here, the area is important as a low elevation habitat link to gnatcatcher populations in the Central Subregion.

- The portion of the Foothill-Trabuco Specific Plan in the Rose Canyon area (No. 4 on *Figure 4-1*) supports an *important population* of the gnatcatcher. Although the gnatcatcher is sparsely distributed and there are only 14 mapped locations for this area, it represents the upper elevation limit and edge of the geographic range for the species in the Southern Subregion. This population contributes to the physiographic diversity of the species in the subregion. Birds in this population probably also disperse to the *important population* west of Live Oak Canyon Road and possibly to the *major* and *important populations* to the south.

- The population of gnatcatchers along the ridgeline between the Gobernadora and Bell Canyon sub-basins, and the scattered locations east of the northern Bell Canyon (No. 5 on *Figure 4-1*) comprise an *important population* in a *key location.* This population is physically linked to the Chiquita Canyon *major population* via the "horseshoe" north of Coto de Caza, but does not exhibit quite as high a concentration of birds despite the predominance of coastal sage scrub in the area. This population is considered important because it contains 52 gnatcatcher locations, provides dispersal areas and potentially refugia for birds in Chiquita Canyon when wildfires occur. It is also considered to be in a *key location* because it provides a north-south linkage to other gnatcatcher locations in

Caspers Wilderness Park, including scattered locations west of San Juan Creek and *important population* No. 6 (*Figure 4-1*) located east of San Juan Creek.

- The population east of San Juan Creek in Caspers Wilderness Park (No. 6 of *Figure 4-1*) is an *important population.* This population comprising 15 locations represents the eastmost extension of the gnatcatcher in the subregion and thus provides physiographic diversity for the species in the subregion.

- The population located north of Camino Las Ramblas in San Juan Capistrano (No. 7 on *Figure 4-1*) is an *important population* in a *key location.* This area supports about 35 mapped locations and is the southwesternmost cluster of gnatcatchers in the subregion. This population contributes to the physiographic diversity of the species in the subregion and provides potential refugia in case of wildfire in locations to the east.

- The population generally located north of Camino Las Ramblas and west of La Pata Avenue in San Juan Capistrano (No. 8 on *Figure 4-1*) is an *important population* in a *key location.* This population numbers about 28 locations and is in a *key location* for the north-south linkage between the Chiquita Canyon *major population*, the *important population* to the west (No. 7) and the *important population* to the south (No. 10).

- The population generally located northwest of the silica sand mining operation in Trampas Canyon (No. 9 on *Figure 4-1*) is an *important population* in a *key location.* Although this area supports only about seven locations, it contributes to the north-south linkage between Chiquita Canyon and the San Juan Capistrano populations and also provides a potential east-west linkage between the San Juan Capistrano and Chiquita Canyon populations and the upper Cristianitos population.

- The population of about 21 locations located mostly in San Clemente west of the proposed extension of La Pata Avenue and on either side of the proposed extension of Camino Del Rio (No. 10 on *Figure 4-1*) is an *important population* in a *key location.* This population provides a low elevation east-west linkage between the San Juan Capistrano populations (Nos. 7 and 8) and the *important population* along Avenida Pico (No. 12), that then connects to the population along lower Cristianitos and San Mateo creeks and other populations on Camp Pendleton.

- The population in upper Cristianitos Canyon (No. 11 on *Figure 4-1*) is an *important population* in a *key location.* While this is a small populations with only 13 mapped locations, it is located in a *key location* for connecting the Chiquita Canyon *major population* with populations in lower Cristianitos and San Mateo creeks on Camp Pendleton. It is the eastmost of the low elevation population connections.

- The population located south of Avenida Pico in San Clemente (No. 12 on *Figure 4-1*) is an *important population* in a *key location.* Although this area supports only eight locations, it is in a *key location* for the east-west linkage between populations in San Juan Capistrano and San Clemente and the population in lower Cristianitos and San Mateo creeks on Camp Pendleton. It is the only remaining southerly link for these populations.

c. Protection Recommendations

- Based on the application of the protection recommendations for overall biological resources in the Chiquita sub-basin, the goal is to protect at least 80 percent of the existing coastal sage scrub and gnatcatcher locations within the *major population* (including those sites within the Chiquita sub-basin and the Chiquadora Ridge portion of the Gobernadora sub-basin). Additional conservation of gnatcatcher habitat will be achieved by implementation of the restoration recommendations described below.

- Avoid impacts to the *important population* of the California gnatcatcher and coastal sage scrub in the portion of the Chiquita sub-basin south of San Juan Creek, as well as the locations west of Narrow Creek within the *major population* to the maximum extent feasible to maintain resident and dispersal habitat for the gnatcatcher between Chiquita Ridge and San Juan Capistrano and San Clemente.

- Protect the major north-south habitat connection for the California gnatcatcher to Central San Juan Creek by providing a habitat linkage between Chiquita Creek and the eastern edge of the Ladera Open Space.

- Maintain east-west biological connectivity for habitat linkages for the gnatcatcher between Arroyo Trabuco, Chiquita Canyon and Canada Gobernadora. Biological connectivity should be maintained between Chiquita, Gobernadora and Arroyo Trabuco by providing for connectivity at a minimum of three locations within the sub-basin: (1) via rim to rim preservation of Sulphur Canyon (approximately 2,000 to 2,500 feet wide), (2) at the "Narrows" where the canyon is only 210-244 m (700-800 ft wide) (approximately 900 m [3,000 ft] south of Tesoro High School) and connects to Sulphur Canyon; and (3) in contiguous patches of coastal sage scrub through the major canyon north and east of the wastewater treatment plant.

- Maintain connectivity between protected coastal sage scrub patches throughout Chiquadora Ridge to allow for dispersal of gnatcatchers between patches.

- Maintain a continuous upland habitat linkage for gnatcatchers along the east-facing slopes of Chiquadora Ridge between San Juan Creek and Sulphur Canyon.

- Provide floodplain and upland habitat linkages adjacent to San Juan Creek for east-west and north-south dispersal by the California gnatcatcher between the Chiquita Canyon and Cristianitos sub-basins.

- Avoid impacts to the *important populations* of California gnatcatchers and coastal sage scrub to the maximum extent feasible to maintain resident and dispersal habitat for the gnatcatcher between San Juan Creek and Cristianitos Canyon and populations on Camp Pendleton.

- Maintain upland north-south habitat linkages through the central and western portions of the Trampas Canyon subunit to convey gnatcatchers between San Juan Creek and Cristianitos Canyon, the Donna O'Neill Conservancy at Rancho Mission Viejo and other areas of the San Mateo Watershed.

- Within the Trampas Canyon subunit of the Central San Juan Creek and Trampas Canyon sub-basin, maintain upland east-west habitat linkage for gnatcatchers south of the artificial lake to link Prima Deshecha, Talega Open Space and other habitat to the west with the Donna O'Neill Conservancy and the San Mateo Watershed. This habitat linkage should allow for dispersal of gnatcatchers and other avian species, as well as provide a movement corridor for large mammals such as bobcat, coyote and mule deer.

- Maintain a north-south habitat linkage between San Juan Creek and lower San Mateo Creek for dispersal and movement of gnatcatchers and other avian species, as well as large mammals such as bobcat, coyote and mule deer, and, in particular, avoid occupied coastal sage scrub habitat in upper Cristianitos Canyon.

d. Management Recommendations

- Implement a cowbird trapping program to mitigate for impacts to existing habitat within the sub-basin and for potential impacts associated with future development. The cowbird trapping program will be evaluated on an annual basis and trap locations and trapping effort will be adjusted as part of the overall Adaptive Management Program (e.g., if the number of trapped cowbirds drops to a prescribed threshold, the trapping program may be terminated or otherwise modified).

e. Restoration Recommendations

- Implement a coastal sage scrub (CSS)/valley needlegrass grassland (VGL) restoration program to enhance habitat connectivity and mitigate for impacts to existing habitat associated with future development. Identified restoration areas include Chiquita Ridge, Chiquadora Ridge and Sulphur Canyon.

4.1.2 Arroyo Toad

Bufo californicus - Arroyo Toad
Federal: Endangered
State: California Special Concern Species

a. Regional Status

The arroyo toad originally ranged from the upper Salinas River system in Monterey County, south through the Santa Ynez, Santa Clara and Los Angeles river basins and the coastal drainages of Orange, Riverside and San Diego counties in the U.S. and south to the Arroyo San Simeon system about 16 km (10 mi) southeast of San Quintin, Baja California, Mexico (USFWS 1999c). Although the arroyo toad primarily occurs in coastal drainages, it also is known from desert slopes of the Transverse and Peninsular ranges south of the Santa Clara River in Los Angeles County (USFWS 1999c). Population areas along the desert slope include the Mojave River in San Bernardino County and Little Rock Creek, Whitewater River, San Felipe Creek, Vallecito Creek, and Pinto Canyon in Riverside County (Jennings and Hayes 1994; Patten and Myers 1992; Stebbins 1985). As of 1994, only 22 discrete populations were thought to exist in California over an area representing about 25 percent of the historic range of the species. The final recovery plan for the arroyo toad divided the existing range into three units: the northern, southern and desert units (USFWS 1999c). The drainages within these units generally describe the existing distribution of the toad and are listed below.

Northern Unit

San Antonio River, Monterey County
Sisquoc River and tributaries, Santa Barbara County
Upper Santa Ynez River Basin (Indian, Mono, Agua Caliente), Santa Barbara County
Sespe Creek, Ventura County
Piru Creek (Upper and Lower), Ventura and Los Angeles counties
Upper Santa Clara River Basin, Los Angeles County
Upper Los Angeles Basin (Big Tujunga, tributaries, Arroyo Seco), Los Angeles County

Southern Unit

Santiago Creek, Orange County
San Jacinto River and Bautista Creek, Riverside County

San Juan basin and Trabuco Creeks, Orange and Riverside counties
San Mateo and San Onofre Creek basins, San Diego and Orange counties
Lower Santa Margarita basin (De Luz, Roblar, and Sandia creeks), San Diego County
Upper Santa Margarita basin (Temecula Creek, Arroyo Seco), Riverside and San Diego counties
Lower and Middle San Luis Rey basin (below Lake Henshaw), San Diego County
Upper San Luis Rey basin (above Lake Henshaw), San Diego County
Santa Ysabel Creek, San Diego County
San Diego Basin (including San Vicente Creek), San Diego County
Sweetwater River basin (including Viejas, Petersen creeks), San Diego County
Cottonwood Creek basin, San Diego County

Desert Unit

Little Rock Creek, Los Angeles County
Upper Mojave River basin (Mojave, Deep, Horsethief, Little Horsethief), San Bernardino County
Whitewater River basin, Riverside County

Arroyo toads are found in foothill canyons and inter-mountain valleys where rivers are bordered by low hills and the stream gradients are low (Miller and Miller 1936; Sweet 1992). The arroyo toad uses riparian environments for breeding and adjacent uplands for foraging and estivation. Arroyo toads are known to either breed, forage, and/or aestivate in aquatic habitats, riparian, coastal sage scrub, oak, and chaparral habitats. The species is restricted to medium- to large-sized, slow-moving streams. The majority of arroyo toad population studies occur within third and fourth order drainages that are characterized by decomposed granite bedrock. However, toad populations have been found in a wide range of stream orders, including lower, second order, and higher, fifth and sixth order coastal streams characterized by sedimentary rock (PCR et al. 2002). According to USFWS, streams supporting arroyo toads range from first to sixth order in the central part of the species' range (Orange, Riverside and San Diego counties) (USFWS 1999c).

Natural geomorphological processes are important for maintaining suitable breeding habitat for the arroyo toad. Periodic flooding is required to modify the stream channel, limit the proliferation of vegetation within the channel and the adjacent upland terrace, redistribute coarse sediments within the streamcourse, and redistribute breeding pools (USFWS 2001a). The flooding regime is directly responsible for the development of the appropriate number and size of breeding pools, friable soils for juvenile and adult toads to create burrows, and unvegetated lower stream terraces (Jennings and Hayes 1994; USFWS 1999c).

Breeding pools must be open and shallow with minimal current, and a sand or pea gravel substrate overlain with sand or flocculent silt (Sweet 1989). Breeding sites generally have flow rates less than 5 cm per second (cm/sec) (USFWS 1999c). Currents greater than 5 cm/sec are sufficient to displace eggs and embryos up to 82 hours post hatching (Sweet 1992). Stream bottoms composed of sand or well-sorted gravel are favored by adults for breeding (USFWS 2001a). Larval growth appears to be more rapid in pools with low silt loads (Jennings and Hayes 1994). Griffin et al. (1999) found that fine-, medium-, and coarse-grained sands are the preferred adult burrow substrate and that cobble is the least preferred, although burrow sites can be interspersed with heavier gravel and cobble.

Water persistence in natal pools is key to successful breeding by arroyo toads. Streams must have persistent water from March to mid-June in shallow, gravely pools less than 7.1 cm (18 in) deep and adjacent sandy terraces. The larval period of arroyo toads lasts about 65-85 days, so the persistence of water is crucial for successful breeding and high mortality of tadpoles can occur if breeding pools dry up too quickly.

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). Juveniles favor areas that remain damp, have midday surface temperatures of 34 to 37 degrees Celsius (C) (93.2-98.6 degrees Fahrenheit [F]) and contain less than 10 percent cover, because these sites possess the thermal and refuge characteristics required for juvenile survival and rapid growth (Sweet 1992).

Several studies have examined the instream activity of arroyo toads during the breeding season. Studies summarized by the USFWS (2001a) indicate that subadults and male adults can move anywhere from 0.8 km (0.5 mi) to more than 1 km (0.6 mi) along streamcourses during a single breeding season. In upper Piru Creek it was inferred that toads had moved as far as 8 km (5 mi) along a streambed, based on the consistent absence of toads from this area in previous surveys.

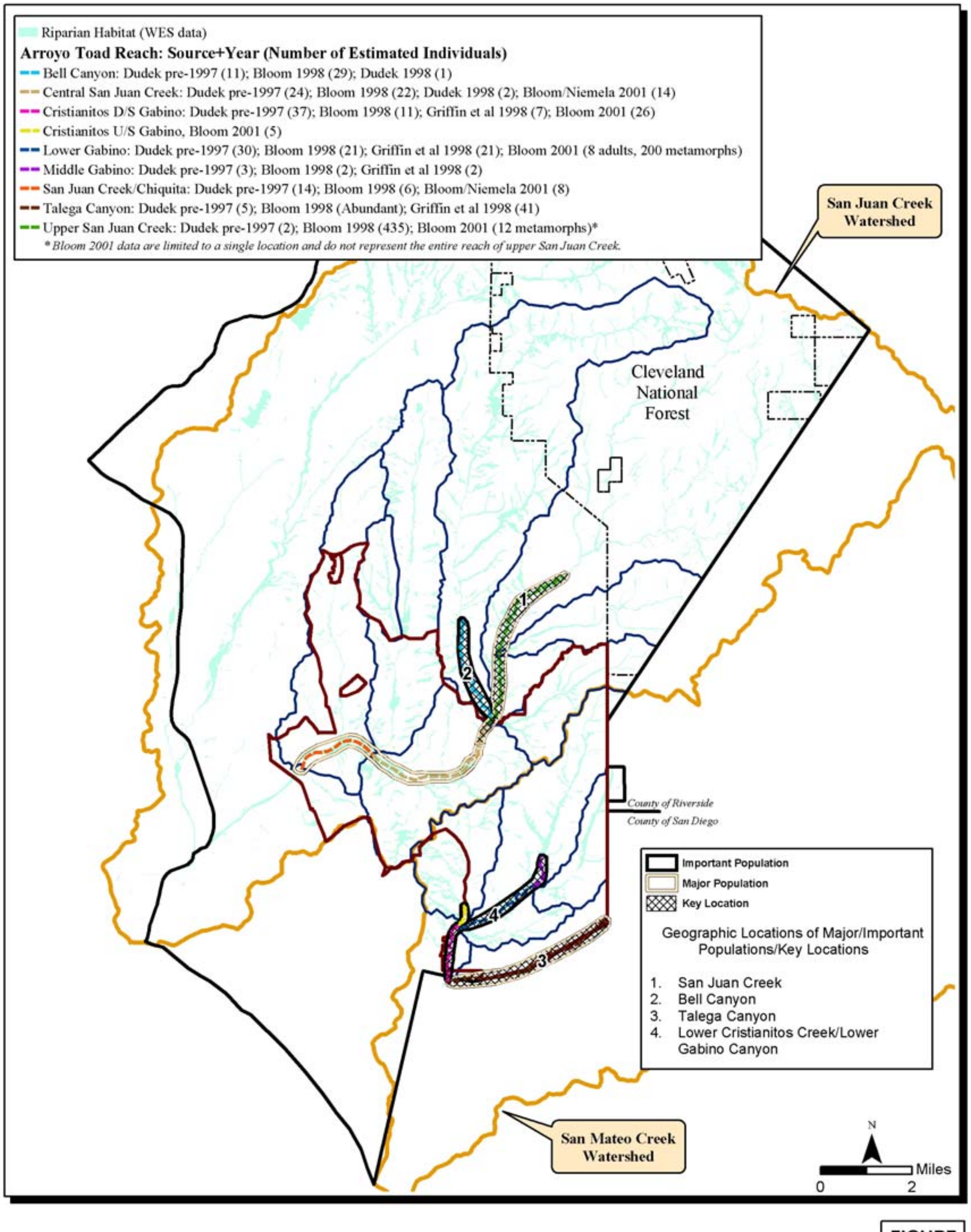
There also is some information of lateral movements from streams into uplands during the breeding season. The USFWS states that "Although the upland habitat use patterns of this species are poorly understood, activity probably is concentrated in the alluvial flats (areas created when sediments from the stream are deposited) and sandy terraces found in valley bottoms of currently active drainages." (Federal Register, 9415, 2/07/01). Upland habitat use appears to be related to rainfall amounts, availability of surface water, width of streamside terraces and floodplains, vegetative cover and topography (USFWS 2001a). For example, Griffin et al. (1999) found that lateral movements were related to topography adjacent to the stream. In coastal streams with broad floodplains, 33 males moved an average maximum of 92 m (302 ft) from the stream, while in a narrower canyon 13 males moved only 23 m (75 ft) from the streambed. Ramirez (2000) observed a similar pattern where 12 toads in a very narrow floodplain on a desert slope moved a maximum distance of 37 m (121 ft) and an undisclosed number of toads moved a maximum of 200 m (656 ft) in a broader floodplain. Griffin et al. (1999) noted that tall cliff faces may hinder toad movements into upland habitats, with a female struggling on a 60 degree sandstone slope along a cliff edge.

While there seems to be a general relationship between lateral movement and topography, the USFWS (2001a) concluded that there are not enough data "to characterize fully overwintering activities and habitat use in all of the systems that arroyo toads inhabit." However, they did conclude that, "Individual toads have been observed as far as 2 km (1.2 mi) from streams where they breed, but are found most commonly within 0.5 km (0.3 mi) of those streams (USFWS 1999; Griffin et al. 1999; Dan C. Holland, Camp Pendleton Amphibian and Reptile Survey, Fallbrook, California, unpublished data; Holland and Sisk 2000)." (Federal Register, 9415-9416, 2/7/01). A recent radio telemetry study of habitat use and toad movements by Ramirez on RMV property in San Juan Creek found that arroyo toads primarily utilized the broad floodplain of the creek during breeding season movements, with the most distance lateral movement about 274 m (810 ft) (Ramirez 2003). Four separate radio telemetry studies on inland populations in more mountainous areas by Ramirez showed that toads used narrower areas of 50 to 200 m (10 to 650 ft) from the stream compared to areas with broader floodplains (Federal Register, 23255, 4/28/04).

With regard to burrow use, the four Ramirez studies on inland populations in mountainous areas showed that arroyo toads utilized burrows up to 324 m (1,062 ft) from the edge of a stream, with an average of 16 m (52 ft) (Federal Register, 23255, 4/28/04). Based on a sample of 109 location, Ramirez (2003) found that burrow locations on RMV in San Juan Creek ranged from locations within the active stream channel to distances up to 274 m (810 ft) from the stream, with a mean distance of 23.9 m (78 ft); the distribution of burrow locations is heavily skewed toward locations within 50 m (164 ft) of the stream. This study supports the general finding that toad activity and estivation sites tend to be concentrated near the active stream channel.

b. Subregional Status

Within the Southern Subregion planning area the arroyo toad is associated with riparian, streamcourses with sandy benches along streams in both the San Juan Creek and San Mateo Creek watersheds (*Figure 4-2*). Different survey efforts over the past several years in association with the SOCTIIP project and other projects consistently have found toads in the San Juan Creek Watershed from about the mouth of Chiquita Canyon upstream to about Hot Springs Creek and in lower Bell Canyon. In the San Mateo Watershed in the planning area the toad occurs in Talega, lower Gabino and lower Cristianitos creeks. In addition, the USFWS (2001) cited a



Draft NCCP/HCP Planning Guidelines

Arroyo Toad Distribution Map

FIGURE 4-2

personal communication from D. Holland that a population of the arroyo toad also occurs in upper Arroyo Trabuco, but the population size and specific location has not been confirmed (e.g., it does not appear in the 2002 CNDDB).

In 1998 Bloom conducted a study area-wide survey to assess the status of the toad, although his survey in Arroyo Trabuco only extended as far north as Oso Parkway. Since 1998, additional studies have been conducted on the arroyo toad in relation to the SOCTIIP project (Bloom 2001a; Bloom and Niemela 2001) and an independent radio-telemetry study by Griffin et al. 1999). Because these studies were conducted in different years under different environmental conditions, the absolute number of toads detected within the same reaches of drainages are variable, but relatively consistent among different drainages; i.e., areas with a small number of detections had consistently fewer detections across survey years than areas where larger numbers of toads were detected.

The planning area supports two *major populations* and two *important populations.* The two *major populations* are located in San Juan Creek from near the confluence with Chiquita Canyon north to beyond the confluence with Hot Springs Creek and in Talega Creek from the confluence with Cristianitos Creek to at least the eastern boundary of the planning area. The two *important populations* are located in Bell Canyon from the confluence with San Juan Creek north to about 3.5 km (2.2 mi) north of the confluence; and lower Cristianitos/lower Gabino Canyon extending from the confluence of Cristianitos and Talega creeks to about 3,000 feet upstream of the confluence of Gabino and La Paz creeks (i.e., into middle Gabino) and in Cristianitos Creek extending about 2,500 feet upstream of Gabino Creek.

The San Juan Creek and Bell Canyon populations probably comprise distinct, but linked populations. The San Juan Creek and Bell Canyon populations are linked because the streamcourses are directly connected by suitable habitat, allowing toads to move freely between the two areas. However, the two sub-basins are physically distinct; the Bell Canyon sub-basin is a much smaller sub-watershed and characterized by a narrower canyon. It is likely that peak flows and timing for the two sub-basins are different, thus affecting the character of toad breeding habitat.

Likewise, the Talega, Cristianitos and Gabino canyons populations probably are distinct, but linked local populations. Like Bell Canyon and San Juan Creek, they are all connected by suitable habitat within the drainages. However, these sub-basins are characterized by different geological structures and processes that likely affect the quality of toad breeding habitat. For example, as summarized in the *Baseline Conditions and Hydrologic Conditions* report (PCR et al. 2002), Talega Canyon has the highest proportion of poorer infiltrating soils of any of the other sub-basins in the San Mateo Watershed, while Gabino Canyon has a higher infiltration capacity that other sub-basins in the watershed. Although Talega has a high runoff volume, it also has a relatively low magnitude of peak flows because of the elongated shape of the sub-basin and long routing distance of the streamcourse. In contrast, Gabino has the highest peak flows and runoff volume because of its high drainage density, position high in the watershed and steep terrain. Sediment from Gabino also contains a high proportion of cobbles and other larger particles that are less suitable for toad breeding habitat. Cristianitos is a relatively small sub-basin and has the lowest absolute runoff volume and peak flows of the sub-basins studied in the watershed. The clays in the sub-basin contribute to fine sediments discharged to the creek, which generally are an unsuitable substrate for toad breeding habitat.

An additional reason that the populations in these sub-basins should be considered linked, but distinct is that fires within the sub-basins would be expected to have different effects on the populations; e.g., a fire in the Talega sub-basin may result in temporary disruption or loss of the Talega population. In such a case the Cristianitos and Gabino populations would be important source populations for recolonization of the Talega sub-basin.

Whether the San Juan Creek and San Mateo Creek populations are linked is unknown. The minimum distance between occupied toad habitat in the San Juan and San Mateo watersheds populations is about 3.7 km (2.3 mi). Based on the observation of toads moving as far as 1.9 km (1.2 mi) from streams, it is conceivable that toads occasionally could move between the two watersheds.

Major and *important populations* were identified and are illustrated in *Figure 4-2*. Each of the population areas is described in detail below:

- The *major population* in San Juan Creek (No. 1 on *Figure 4-2*) extends from near the confluence with Chiquita Canyon north to about 0.8 km (0.5 mi) south of Hot Springs Creek in the Cleveland National Forest. (Note: Bloom [1998] mapped potential habitat to an area about 915 m (3,000 ft) downstream of Antonio Parkway bridge, but toads have not been observed this far west.) While this population can be considered continuous because toads have been observed throughout the area, the reach of San Juan Creek extending north from near the confluence with Bell Canyon supports the large majority of the toad population in San Juan Creek and provides the highest quality habitat for the species in the creek. This reach supported about 435 counted adult toads in 1998 (Bloom 1998) and is the second largest population area in the subregion. Habitat for the toad approximately 800 feet below the confluence with Bell Canyon becomes degraded by a proliferation of giant reed and the open stream channel becomes obscured by riparian vegetation by about 1,600 feet below Bell Canyon. This demarcation is consistent with Bloom's observation of 29 toads in this reach in 1998, compared to fewer toads downstream. Because it supports a large population and high quality habitat, the portion of the *major population* in "upper" San Juan Creek from about 1,600 feet south of Bell Canyon can be considered a *key location*.

Surveys in San Juan Creek downstream of Bell Canyon on RMV property have yielded persistent, but relatively small, population counts. In the segment from near the mouth of Gobernadora Creek to about 2,000 feet south of Bell Canyon, counts were 24 individuals before 1997, 22 individuals in 1998 by Bloom and 14 individuals in 2001 by Bloom and Niemela. In the more downstream portion of this segment between Gobernadora and Chiquita, pre-1997 counts were 14 individuals, 6 by Bloom in 1998 and 8 by Bloom and Niemela in 2001. The consistent small numbers of individuals in this reach of San Juan Creek distinguish it from the *key location* of this *major population* upstream from the point about 1,600 feet south of Bell Canyon. Recent breeding in this lower reach has been limited to the area just downstream of Trampas Canyon and is maintained by artificial runoff from Trampas. The reason for fewer toad detections and apparent decline in breeding south of the confluence with Bell Canyon in recent years is not completely known, but likely is the result of a combination of natural and anthropogenic factors, including an inferred natural groundwater barrier between Chiquita and Gobernadora canyons and San Juan Creek that limits inter-aquifer exchange, groundwater withdrawals, truck traffic, other human activity, and bullfrogs in the abandoned mining pit. In contrast, upper San Juan Creek probably is naturally wetter, allowing for longer persistence of breeding pools, and is subject to fewer human uses. In addition, giant reed is proliferating in the reach below Bell Canyon, resulting in degradation of toad habitat. For recovery purposes, active management to maintain breeding pools and control giant reed in the stream likely will be needed to sustain this segment of the population on a long-term basis.

- The *important population* in Bell Canyon (No. 2 on *Figure 4-2*) extends from the confluence with San Juan Creek north about 2.2 miles up Bell Creek into Caspers Wilderness Park. In 1998 Bloom counted 29 calling males in this area. This *important population* is considered a *key location* because it is situated in a relatively undisturbed area and is directly connected to the San Juan Creek *major population*.

- The *major population* in Talega Canyon (No. 3 on *Figure 4-2*) was categorized as "abundant" by Bloom in 1998 based on presence of metamorphs. In the same 1998 study year Griffin et al. (1999) counted 41 calling toads in the same reach. Bloom (pers. comm. 2004) considers the Talega population be one of the most significant in Orange County, although not as large or important as the San Juan Creek population in Caspers Wilderness Park. In addition, this population is connected to the downstream arroyo toad populations in lower Cristianitos and San Mateo creeks on Camp Pendleton, as well as the upstream populations in Cristianitos and lower Gabino creeks. In addition to suitable geomorphic conditions for the toad discussed above, the combination of higher precipitation in the upper watershed and presence of year-round springs provides a more reliable water source to support breeding pools.

- The *important population* in lower Cristianitos Creek and lower Gabino Creek (No. 4 on *Figure 4-2*) extends from the confluence of Cristianitos and Talega creeks upstream into Gabino Creek to about 3,000 feet north of the confluence with La Paz Creek and in Cristianitos Creek about 2,500 feet upstream of Gabino Creek.

  Over several surveys in the segment of Cristianitos Creek between its confluence with Gabino Creek in the north and Talega Creek in the south, calling males have numbered 37 before 1997, 11 by Bloom in 1998, 7 by Griffin et al. in 1998 and 26 by Bloom in 2001. The segment of lower Gabino from the confluence with Cristianitos to La Paz Creek numbered 30 before 1997, 21 by Bloom in 1998, 21 by Griffin et al. [1999] in 1998, and 8 by Bloom in 2001 (as well as 200 metamorphs observed during this survey). Bloom also observed a total of 38 adults in this reach during six survey nights in 2003, with the eight adults as maximum number of individuals observed on any single night (Bloom 2003). The portion of the *important population* within lower Gabino and lower Cristianitos creeks is considered a *key location* because it is linked along the streamcourse to the *major population* in Talega Canyon.

  The segment of Cristianitos Creek upstream of the confluence with Gabino Creek is included as part of the *important population* because it is directly connected to the populations in lower Gabino Creek and Cristianitos Creek downstream of Gabino. However, this portion of the *important population* is not considered a *key location*. This reach is considered marginal breeding habitat for arroyo toads because of the clayey sediments that are characteristic of this portion of the creek. Out of three survey years, only in 2001 were toads (5 adults) recorded along this stream segment and they were observed only adjacent to the creek. There was no evidence that toads were breeding in the creek.

c. Protection Recommendations

- Maintain and manage riparian and aquatic habitats along San Juan Creek for breeding populations of the arroyo toad.

- Provide upland foraging and estivation habitat within the upland terraces in the floodplain of San Juan Creek, with a particular focus on the south side of the creek, to maintain existing population levels of the arroyo toad.

- Maintain Verdugo Canyon hydrology to maintain sources of coarse sediment that are important for arroyo toad breeding habitat in downstream areas.

- Protect breeding and foraging habitat and movement opportunities within the lower Gabino Canyon, lower Cristianitos and Talega Canyon streamcourses and adjacent alluvial terraces for the arroyo toad. Address potential upland estivation habitat needs in the context of best scientific information regarding the influence of topography, soils and other factors that appear to influence arroyo toad lateral movement and frequency of use in upland areas away from streamcourse habitat areas.

- Protect the integrity of arroyo toad populations in Talega Canyon by maintaining current stormwater runoff patterns and hydrologic conditions.

- Protect the arroyo toad population within middle Gabino Creek upstream from the confluence with La Paz Creek by avoiding impacts to breeding, foraging and estivation habitat and protect canyons to avoid downstream impacts to the toad.

- Protect the integrity of arroyo toad populations in lower Gabino Creek, as well as downstream populations in Cristianitos and San Mateo creeks, by protecting the generation and transport of coarse sediments in La Paz Creek to downstream areas.

- Protect the *key location* of the arroyo toad upstream from the confluence of Cristianitos and Talega creeks by avoiding direct impacts to breeding, foraging and estivating habitat and avoiding indirect impacts to the Cristianitos and lower Gabino sub-basins.

d. Management Recommendations

- Within the Gobernadora, Verdugo, Cristianitos, Gabino, and La Paz sub-basins, protect the integrity of downstream habitat for the arroyo toad by maintaining hydrology, water quality and sediment delivery to San Juan and San Mateo creeks, including flow characteristics of episodic events, and minimizing additional loadings of nutrients or toxics.

- Maintain stormwater flow characteristics comparable to existing conditions from Trampas Canyon into San Juan Creek to preserve breeding habitat for the arroyo toad population in San Juan Creek.

- Attempt to identify groundwater sources that are important to breeding pools and address potential management measures.

- Implement a bullfrog eradication program within San Juan Creek to help protect arroyo toads, with a special focus on Cal-Mat Lake and other water bodies that provide source concentrations of bullfrogs.

e. Restoration Recommendations

- In coordination with upstream eradication efforts, implement a giant reed removal program for San Juan Creek within RMV boundaries to protect arroyo toad habitat.

- Implement an invasive plant species eradication effort in Cristianitos Creek between the confluences with Gabino and Talega creeks.

4.1.3 Least Bell's Vireo

Vireo bellii pusillus - Least Bell's vireo
USFWS: Endangered
CDFG: Endangered

a. Regional Status

The Bell's vireo, consisting of four subspecies, is widespread as a breeding species in the central and southwestern U.S. and northern Mexico. Its breeding range includes southern California, southern Nevada, southwestern Utah, northwestern and southern Arizona, southern New Mexico, central and southwestern Texas, eastern Colorado, central Nebraska, central South Dakota, south central North Dakota, southeastern Minnesota, southern Wisconsin, northeastern Illinois, and northwestern Indiana south to northern Baja, southern Sonora, southern Durango, Zacatecas, southern Nuevo Leon, southern Tamalpais, southern and eastern Texas, northwestern Louisiana, Arkansas, southwestern Tennessee, southwestern Kentucky, southern Indiana, and western Ohio (Brown 1993). Although the winter range of Bell's vireo is not well known, generally it appears to winter from southern Baja and southern Sonora south along the west coast of Mexico and Central America to Honduras and casually to northern Nicaragua. It is also reported from the eastern coast of Central America from Veracruz south to Honduras (Brown 1993).

Zeiner et al. (1990) summarized the distribution, abundance, and seasonality of the subspecies least Bell's vireo (*V. b. pusillus*) within California. Least Bell's vireo formerly was a common and widespread summer resident below about 600 m (2,000 ft) in the western Sierra Nevada, throughout the Sacramento and San Joaquin valleys, and in the coastal valleys and foothills from Santa Clara County south. Least Bell's vireo also was common in coastal southern California from Santa Barbara County south, east of the Sierra Nevada below about 1,200 m (4,000 ft), in the Owens and Benton valleys, along the Mojave River and other streams at the western edge of southeastern deserts, and along the entire length of the Colorado River (Grinnell and Miller 1944). Two subspecies occur in California: *V. b. pusillus* (the least Bell's vireo described below) and *V. b. arizonae,* which is now a rare summer resident along the Colorado River from Needles, San Bernardino County, south to Blythe, Riverside County. Bell's vireo (subspecies uncertain) also breeds in at least two sites along the Amargosa River near Tecopa, Inyo County (Garrett and Dunn 1981).

As summarized in *Table 4-4*, the year 2001 distribution of confirmed territories (not necessarily confirmed breeding pairs) of the least Bell's vireo in California includes the counties of San Diego, Orange, Riverside, San Bernardino, Los Angeles, Ventura, Santa Barbara, Inyo, and Santa Clara (USFWS, pers. comm. 2002).

TABLE 4-4. REGIONWIDE SUMMARY:
2001 STATUS OF LEAST BELL'S VIREO
WITHIN KNOWN BREEDING RANGE OF SOUTHERN CALIFORNIA

County	Confirmed Territories[1]
San Diego – excluding Camp Pendleton	883
San Diego – Camp Pendleton	783
Orange	111[2]
Riverside	500
San Bernardino	14
Los Angeles	24
Ventura	124
Santa Barbara	12
Inyo	3
TOTAL CONFIRMED TERRITORIES	2,443

Notes:

[1] The number of confirmed territories in 2001 is based on unpublished data provided by the USFWS in December 2002 (Terp, pers. comm. December 2002).

[2] The 2001 USFWS data base included about 100 confirmed territories in Orange County but does not include the 11 breeding pairs documented in lower Arroyo Trabuco in 2000. Also, Gobernadora Creek within GERA was estimated to support about 12-15 nesting locations based on 1998 and 2001 surveys, but the USFWS 2001 data base indicates 8 confirmed territories based on surveys in 2001 by P&D. The number cited in the table reflects the additional Arroyo Trabuco data and the 2001 P&D Gobernadora survey data.

Most of the current populations of least Bell's vireo have undergone tremendous growth over the last decade. Census data collected over the past 16 years indicate that the population in southern California has increased from an estimated 300 pairs in 1986, an estimated 1,346 pairs in 1996 (USFWS 1998a) and in 2001 an estimated 2,443 confirmed territories (USFWS, pers. comm., 2002).

The two largest concentrations of confirmed territories in the 2001 data base are in the Prado Basin in western Riverside County (444 territories) and on Camp Pendleton (785 territories). San Diego County, excluding Camp Pendleton, has the greatest total number of confirmed territories, with relatively large concentrations in the San Luis Rey River between College Avenue and Interstate 15 (132 territories), the Sweetwater River with 102 territories, the San Dieguito River with 45 territories, and various drainages in Anza Borrego with 105 territories. The Santa Clara River in Los Angeles and Ventura counties also supports a large concentration of territories, with 123 total territories in 2001.

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 one to two 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 that is limited to the immediate vicinity of watercourses below about 457 m (1,500 ft) 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 breeding season for least Bell's vireo is typically mid-March to September (USFWS 1986). Males arrive a few days before females to establish breeding territories. Nests are typically built within 1 m (3.3 ft) of the ground in the fork of willows, wild rose (*Rosa californica*), mule fat (*Baccharis salicifolia*), 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 two to ten feet above the ground (Goldwasser 1981; Franzreb 1989). The birds typically forage in riparian habitat, but also use adjoining chaparral or scrub habitat (Salata 1983). These adjacent upland foraging habitats become relatively more important late in the breeding season.

Clutch sizes of the least Bell's vireo are between two to five eggs (typically three or four) that are laid shortly after nest construction (Salata 1984; Kus 1994; USFWS 1998). Incubation is about 14 days and young fledge about 12-14 days after hatching (Zeiner et al. 1990). Fledglings may range from established breeding territories, but remain under parental care for several more weeks (USFWS 1998). Least Bell's vireo usually produce only one brood per season, but additional broods up to four or five have also been reported (Franzreb 1989; USFWS 1998a). Vireos typically depart by mid-September, but stragglers have been observed as late as November (Zeiner et al. 1990).

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).

Bell's vireos are known to feed primarily on insects and spiders (Chapin 1925; Bent 1950; Terres 1980). The least Bell's vireo primarily forages in willow (*Salix* spp.) stands or associated riparian vegetation, with forays into upland vegetation including chaparral, sage scrub and oak woodlands later in the breeding season (Gray and Greaves 1984; Salata 1983; Kus and Minor 1989). Least Bell's vireos forage in a variety of tree and shrub species, with a preference for black willow (*Salix gooddingii*), arroyo willow (*Salix lasiolepis*), and mule fat (*Baccharis salicifolia*). Individuals are known to travel between 3 and 61 m (9.8 and 200 ft) (mean of 15.5 m [50.8 ft]) while foraging, with the majority of these destinations occurring within 30 m (98 ft) of the edge of riparian vegetation (Kus and Miner 1989). Least Bell's vireo are known to forage in all vertical vegetation layers from ground level to 20 m (66 ft), but most feeding is concentrated above the ground surface in the lower vegetation layers from ground level to 6 m (20 ft) (Kus and Minor 1989; Salata 1983). The least Bell's vireo exhibits year-round diurnal activity; and is known to be a nocturnal migrant (Brown 1993).

The literature on the dispersal and status remains unclear. Early data suggested that least Bell's vireos are strongly site tenacious, returning to the same site in close proximity to previously occupied territories (Salata 1983; Greaves 1987, 1989). More recent data suggest that least Bell's vireo may change breeding sites, but that additional study is needed (data from Kus cited in USFWS 1998a).

Least Bell's vireo breeding territory sizes range from 0.2 to 3.0 hectares (ha) (0.5 acre [ac] to 7.4 ac) (Gray and Greaves 1984; Collins et al. 1989; Newman 1992) with most averaging between 0.3 to 1 ha (1 to 3 ac) (USFWS 1998a). Territories in Bell's vireo are maintained by threat and physical confrontation early in the breeding season, tapering to vocal warnings later in the season (Barlow 1964).

b. Subregional Status

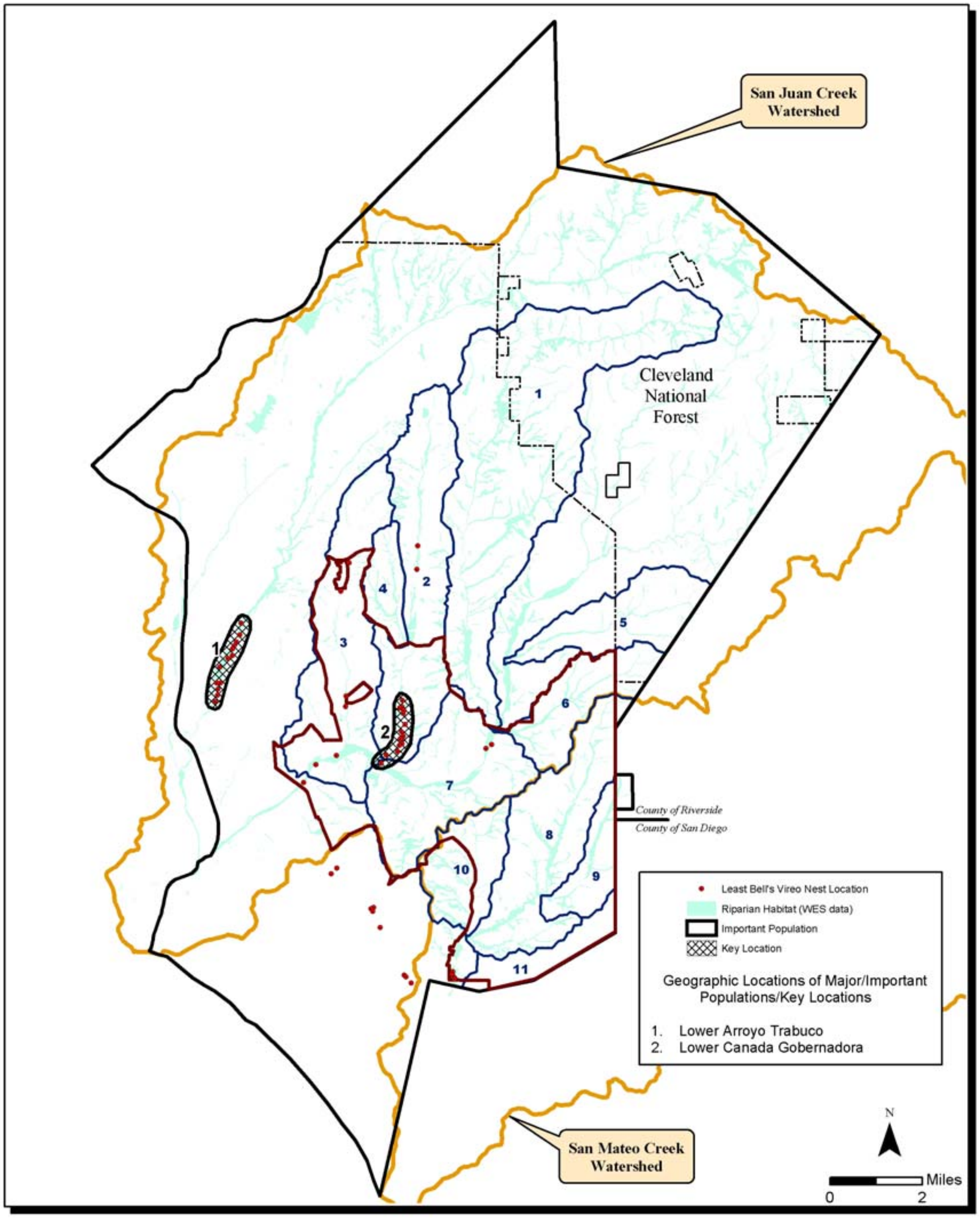
The NCCP data base includes 54 vireo nesting locations within the planning area (*Figure 4-3*). Surveys have documented nesting locations in Gobernadora Creek, middle San Juan Creek (between the Ortega Highway bridge and Casper Wilderness Park), lower Arroyo Trabuco, Chiquita Creek, lower Cristianitos Creek, and in isolated patches of willow scrub in Prima Deshecha and on the Talega development. Notably, planning area-wide surveys in 1998 failed to observe vireos in the remainder of riparian habitat in the planning area, including Gabino Canyon, La Paz Canyon, Blind Canyon, San Juan Creek above the Caspers Wilderness Park boundary, Bell Canyon, Verdugo Canyon, Lucas Canyon, Oso Creek, Tijeras Creek, upper Arroyo Trabuco, and Wagon Wheel Canyon. Much of the habitat in these areas consists of southern coast live oak riparian forest, which generally is unsuitable for the vireo. However, with the continued expansion of the breeding population of this species in southern California and changes in local habitat conditions, the future occurrence of the vireo in some of these areas is possible.

The planning area supports at least two *important populations* of the vireo in two *key locations*. These two areas combined include about 50 percent of the documented nesting locations in the planning area.

- Lower Arroyo Trabuco between Crown Valley Parkway and Avery Parkway supported 12 locations of the vireo in year 2000 surveys, of which 11 were documented breeding pairs (No. 1 on *Figure 4-3*). About the same number of nesting sites had been documented in the area in 1998 surveys (Dudek 1998). This area, which supports a well-developed stand of southern willow scrub, is included in the 90 ha (223 ac) added to O'Neill Regional Park as mitigation for the Arroyo Trabuco Golf Course.

- Lower Canada Gobernadora within GERA supports about 12-15 nesting locations based on 1998 and 2001 surveys (No. 2 on *Figure 4-3*).

It should be noted that recent observations include 10 confirmed territories and nine confirmed breeding pairs in the Prima Deshecha area (USFWS, pers. comm. 2002), but this area does not have a major, well-defined riparian system similar to Arroyo Trabuco or Canada Gobernadora. These observations suggest that vireos are opportunistic in selecting breeding sites, but whether this area should be considered an *important population* is uncertain because of the lack of a well-defined riparian system. It also should be noted that the three nesting locations in lower Cristianitos are contiguous with numerous nest sites in lower Cristianitos and San Mateo Creek on Camp Pendleton, which should be considered a *major population* outside the planning area.



Draft NCCP/HCP Planning Guidelines
Least Bell's Vireo Distribution Map

FIGURE 4-3

c. Protection Recommendations

- Protect breeding and foraging habitat for the least Bell's vireo along Chiquita Creek.
- Protect southern willow scrub in GERA that provides nesting and foraging habitat for least Bell's vireo.
- Maintain and manage riparian habitats along San Juan Creek that provides nesting and foraging habitat for the least Bell's vireo.
- Protect breeding and foraging habitat for least Bell's vireo in lower Cristianitos Creek between the RMV boundary and the confluence with Gabino Creek.

d. Management Recommendations

- Implement a cowbird trapping program to mitigate for impacts to existing habitat within the Chiquita, Gobernadora sub-basins, as well as the "other" planning area in lower Cristianitos, and for potential impacts associated with future development. The cowbird trapping program will be evaluated on an annual basis and trap locations and trapping effort will be adjusted as part of the overall Adaptive Management Program (e.g., if the number of trapped cowbirds drops to a prescribed threshold, the trapping program may be terminated or otherwise modified).
- Protect downstream habitat in GERA, San Juan Creek, lower Cristianitos and San Mateo creeks for the least Bell's vireo by maintaining hydrology, water quality and sediment delivery and minimizing additional loadings of nutrients or toxics.

e. Restoration Recommendations

- Implement restoration efforts to address localized headcuts within Chiquita Creek, as further described in the Watershed and Sub-basin Planning Principles – Chiquita Sub-basin.
- Implement a restoration program in Gobernadora Creek which addresses **(1)** the historic creek meander above the knickpoint; and **(2)** upstream land use induced channel incision and erosion, including potentially excessive surface and groundwater originating upstream.

- Identify likely causes of erosion and potential measures to rectify causes of headcutting in the lower portion of Gobernadora Creek.

4.1.4 Southwestern Willow Flycatcher

Empidonax traillii extimus - Southwestern Willow Flycatcher
USFWS: Endangered
CDFG: Endangered

a. Regional Status

The full species willow flycatcher (*Empidonax traillii*) breeds throughout much of North America, absent only from the Central Plains and southeastern U.S. The breeding range of the subspecies southwestern willow flycatcher (*E. t. extimus*) includes southern California, Arizona, New Mexico, extreme southern portions of Nevada and Utah, far western Texas, southwestern Colorado, and extreme northwestern Mexico (USFWS 1993a). Within California, the specific breeding range for this subspecies includes the Owens Valley; the south fork of the Kern River; the Los Angeles Basin (Unitt 1987; Zeiner et al. 1990); the Santa Ynez River near Buellton; the Prado Basin riparian forest in Riverside County; the Santa Margarita and San Luis Rey rivers in San Diego County; Middle Peak in the Cuyamaca Mountains; near Imperial Beach (Small 1974); and most recently lower Gobernadora Creek in southern Orange County. This subspecies overwinters in Mexico (USFWS 1995). Areas along the Rio Grande provide important refueling sites for flycatchers as they migrate between their breeding and wintering grounds (Yong and Finch 1997).

Based on survey data collected between 1993 and 1996, a total of 549 territories was estimated for the entire breeding range of the southwestern willow flycatcher. Since that time, at least 386 of these territories have been documented as confirmed probable breeding pairs (Finch and Stoleson 2000). Within California, there are an estimated 121 breeding territories (Finch and Stoleson 2000) which appear to be scattered around southern California. The population size in the Santa Margarita River from Camp Pendleton to Fallbrook is an estimated 15-16 territories (San Diego Museum of Natural History 1995). Within western Riverside County, there are an estimated 15-20 territories, including three to five territories in the Prado Basin, three to five territories in the Santa Ana River, two to four territories at Vail Lake, and three territories in Temecula Creek (Dudek 2002).

The southwestern willow flycatcher is restricted to riparian woodlands along streams and rivers with mature, dense stands of willows (*Salix* spp.), cottonwoods (*Populus* spp.) or smaller spring fed or boggy areas with willows or alders (*Alnus* spp.) (Sedgwick and Knopf 1992). It is an insectivore that forages within and above dense riparian vegetation, taking insects on the wing or gleaning them from foliage (USFWS 1993a). This species also forages in areas adjacent to nest sites which may be more open (USFWS 1995).

Southwestern willow flycatchers breed in relatively dense riparian habitats in all or parts of seven southwestern states from near sea level in California to over 2,600 m (8,500 ft) in Arizona and Colorado (USFWS 2001b).

The migration routes and winter destinations of the southwestern willow flycatcher are not well understood. They most likely winter in Mexico, Central America, and perhaps northern South America; however, the habitats used by willow flycatchers on the wintering grounds are unknown (USFWS 1993a). The species has been reported to sing and defend winter territories in Mexico and Central America.

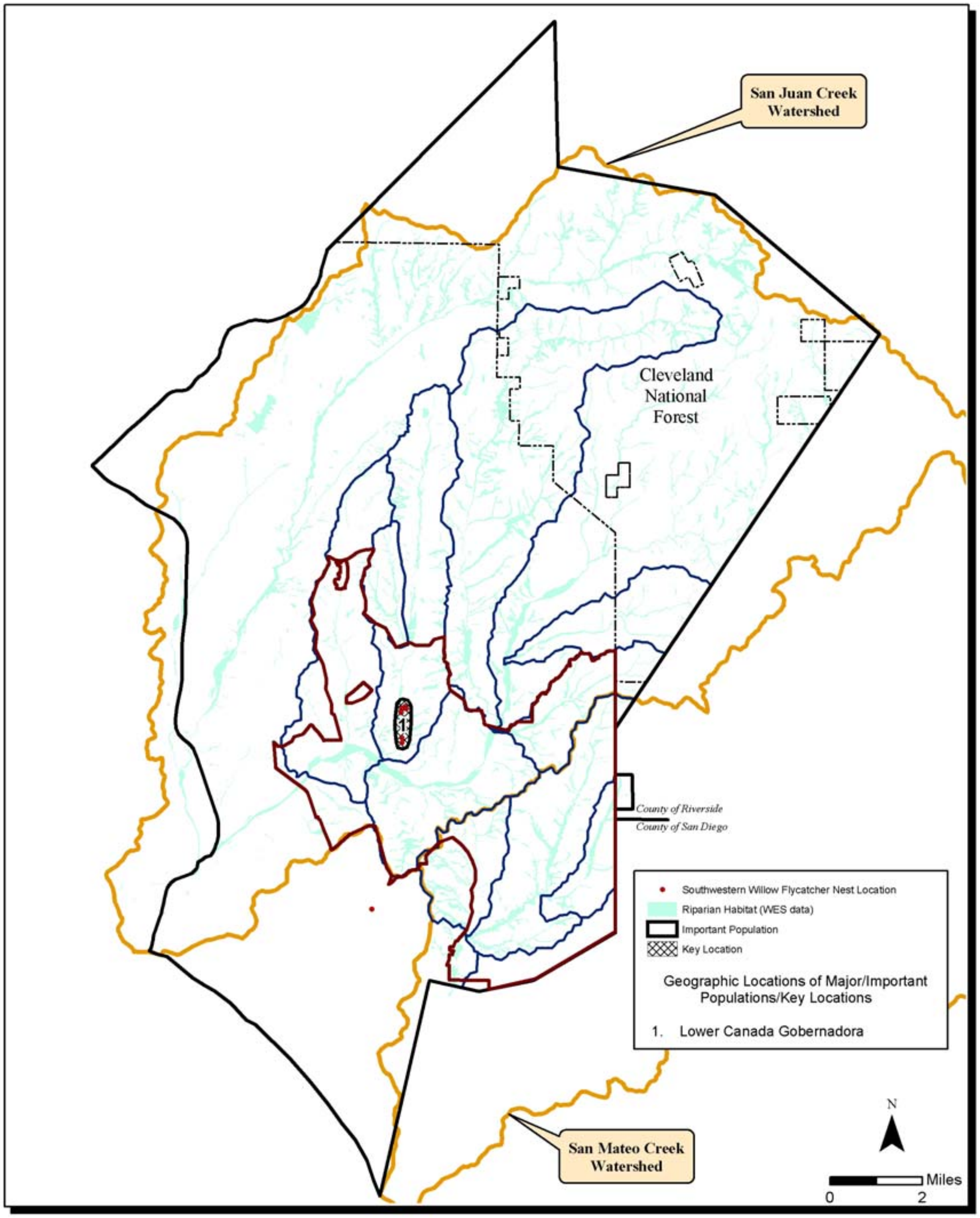
The southwestern willow flycatcher nests from ground level to 4 m (13 ft) above ground in thickets of trees and shrubs approximately 4-7 m (13-23 ft) with a high percentage of canopy cover and dense foliage. The nest site plant community typically is even-aged, structurally homogeneous and dense (Brown 1988; Whitfield 1990; Sedgwick and Knopf 1992). Historically, the willow flycatcher nested primarily in willows and mule fat with a scattered overstory of cottonwood (Grinnell and Miller 1944). Although the species still nests in willows where available, with recent non-native invasions of riparian plant communities in the region, the flycatcher also is known to nest in thickets dominated by tamarisk and Russian olive (Hubbard 1987; Brown 1988). Regardless of the plant species composition or height, occupied sites always have dense vegetation in the patch interior and in most cases this dense vegetation occurs within the first 3-4 m (9-13 ft) above ground (USFWS 2001b). This species usually nests in the upright fork of a shrub but occasionally nests on horizontal limbs within trees and shrubs (Terres 1980). Typically, sites selected as song perches by male willow flycatchers show higher variability in shrub size than do nest sites and often include large central shrubs. Nest sites are distinguished by high willow density and low variability in willow patch size and bush height. Habitats avoided for either nesting or singing typically are riparian zones with greater distances between willow patches and individual willow plants (Sedgwick and Knopf 1992). Nesting willow flycatchers invariably prefer areas with surface water nearby (Phillips et al. 1966). In almost all cases, slow-moving or still surface water and or saturated soils are present at or near the breeding sites during normal precipitation years (USFWS 2001b). Suitable flycatcher habitat is most likely to develop in more extensive patches along lower gradient streams with wider floodplains, although there are exceptions to this habitat characterization (e.g., San Luis Rey River) (USFWS 2001b). Suitable habitat is less likely to occur in steep, confined streams characteristic of narrow canyons (USFWS 2001b).

Males typically arrive in southern California at the end of April and females arrive approximately one week later. They have a home range larger than the defended territory and territorial defense begins in late May. Territory sizes range from 0.24 to 0.45 ha (0.6 to 1.1 ac) and territories can be dense in suitable habitat; the documented maximum is six females and five males in only 4.4 ha (10.9 ac) (San Diego Natural History Museum 1995). Sogge et al. (1997) found territorial flycatchers in habitat patches ranging from 0.5 to 1.2 ha (1.2 to 3.0 ac). Two habitat patches of 0.5 (1.2 ac) and 0.9 ha (2.2 ac) each supported two territories in this study (Sogge et al. 1997). Alternatively, southwestern willow flycatchers do not always pack their territories into all available space within a habitat (USFWS 2001b). Instead, some territories may be bordered by undefended riparian habitat that could be important in attracting flycatchers to the site or in providing post-nesting use and dispersal areas.

The southwestern willow flycatcher usually is monogamous within a nesting season, but not all territorial males are mated (San Diego Natural History Museum 1995). Pairs typically raise one brood per year (USFWS 1993a). Clutch sizes range from two to five, with an average of 3.4 eggs in coastal southern California. Southwestern willow flycatcher fledglings leave the nest at age 12-15 days post-hatching (usually in early July) and disperses from their natal territory at a minimum age of 26-30 days (USFWS 1993a). About 25 percent of adults return to their territory from the previous year. At least 20 percent of juveniles return to their "natal areas" which are usually within 2 to 4 km (1.6 to 2.5 mi) of their natal territory. Although nest reuse is not common by the southwestern willow flycatcher, recent studies have reported a low percentage of nest reuse by this species (Yard and Brown 1999). Adults usually depart from breeding territories between mid-August and early September (San Diego Natural History Museum 1995).

b. Subregional Status

The southwestern willow flycatcher is known to nest in two locations in the planning area; in GERA and in an isolated patch of riparian habitat in Talega development open space in the year 2000 (*Figure 4-4*). A calling male was detected in 1998 in lower Chiquita Canyon by Harmsworth Associates but there was no evidence of breeding activity (reported in Dudek 1998). The GERA location is the only *important population* of willow flycatcher in the planning area and also is considered a *key location* for the species (No. 1 on *Figure 4-4*). Planning area-wide surveys in 1998 failed to find the willow flycatcher elsewhere in the planning area and the habitat in these areas was judged to be generally unsuitable for the species (Dudek 1998). However, as with the vireo, there is a possibility that this species could occur in other riparian areas, and the observation of a breeding pair in the isolated riparian area on Talega in 2000 suggests that occasional or sporadic breeding at other sites in the planning area is possible.



Draft NCCP/HCP Planning Guidelines

Southwestern Willow Flycatcher Distribution Map

FIGURE 4-4

c. Protection Recommendations

- Protect southern willow scrub in GERA that provides nesting habitat for southwestern willow flycatcher.

d. Management Recommendations

- Implement a cowbird trapping program to mitigate for impacts to existing habitat within the Gobernadora sub-basin and for potential impacts associated with future development. The cowbird trapping program will be evaluated on an annual basis and trap locations and trapping effort will be adjusted as part of the overall Adaptive Management Program (e.g., if the number of trapped cowbirds drops to a prescribed threshold, the trapping program may be terminated or otherwise modified).

- Protect downstream habitat in GERA and lower Cristianitos and San Mateo creeks for the southwestern willow flycatcher by maintaining hydrology, water quality and sediment delivery and minimizing additional loadings of nutrients or toxics.

e. Restoration Recommendations

- Implement a restoration program in Gobernadora Creek which addresses (**1**) the historic creek meander above the knickpoint; and **(2)** upstream land use induced channel incision and erosion, including potentially excessive surface and groundwater originating upstream.

- Identify likely causes of erosion and potential measures to rectify causes of headcutting in the lower portion of Gobernadora Creek.

4.1.5 Riverside Fairy Shrimp

Streptocephalus woottoni - Riverside Fairy Shrimp
USFWS: Endangered
CDFG: None

a. Regional Status

Riverside fairy shrimp is restricted to southwestern California and northwestern Baja California. It occurs from southern Ventura County south and east through Orange and western Riverside counties to coastal San Diego County (primarily Camp Pendleton and Otay Mesa) and the vicinity of Baja Mar north of Ensenada in Baja California, Mexico. With the exception of the

Riverside populations, all populations are within 15 km (9.3 mi) of the coast (Eriksen and Belk 1999). All known populations lie between 30 m (98 ft) and 415 m (1,361 ft) in elevation.

The *Recovery Plan for Vernal Pools of Southern California* (USFWS 1998b) identified six Management Areas for the Riverside fairy shrimp:

1. **Los Angeles/Orange County:** This Management Area includes three areas in southern Orange County known to support the Riverside fairy shrimp – Saddleback Meadows/Foothill-Trabuco area, RMV property, and El Toro.

2. **Riverside County:** This Management Area includes three areas in western Riverside County – Temecula, Skunk Hollow, and the Santa Rosa Plateau. Recent data have revised and refined this distribution to include at least five extant populations in western Riverside County, including Skunk Hollow, Santa Rosa Plateau, Murrieta, Alberhill, and Lake Elsinore populations, plus an unnamed location that apparently includes a series of private stockponds (USFWS 2001c). Other undiscovered populations may occur in this area (Dudek 2002). The Skunk Hollow pool is protected as part of a mitigation bank and the Santa Rosa Plateau complex is on the Ecological Reserve owned and managed by The Nature Conservancy.

3. **San Diego North Coastal Mesas:** This Management Area includes MCB Camp Pendleton and Carlsbad. The Pendleton pool complexes are located in the Wire Mountain Housing Area, Cockleburr Mesa, Las Pulgas, Stuart Mesa, San Mateo and on lands leased to State Parks. The Pendleton complexes represent one of the largest populations of the Riverside fairy shrimp (USFWS 2001c). The Carlsbad pools are located at the Poinsettia Land Station and are mitigation lands.

4. **San Diego Central Coastal Mesas:** This Management Area includes the Marine Corps Air Station Miramar. Only one complex supporting the Riverside fairy shrimp is known from this Management Area. This complex is in the Miramar Marine Corps Air Station (MCAS) and is managed by the Department of Defense (DOD).

5. **San Diego South Coastal Mesas:** This Management Area includes Otay Mesa. Six complexes in the Otay area support Riverside fairy shrimp, of which five are on private property and one is on City of San Diego property. Two of the five private complexes and the City site are on mitigation land.

6. **Transverse:** This Management Area is located in inland valleys and mesas north of the Los Angeles Basin in association with the Transverse Mountain Ranges. The Riverside fairy shrimp is known from the Carlsberg Ranch vernal pool in Moorpark, on the

northern edge of the Santa Monica Mountains in Ventura County. This vernal pool represents a northern limit of the species, and is now in preserved open space under the management of the Santa Monica Mountains Conservancy.

Vernal pools that support the Riverside fairy shrimp primarily occur on mesas and other level terrain generally less than 10 percent. These areas often exhibit a characteristic microrelief called Gilgai or mima mound formation. The species may also occur in ditches and road ruts, but only in areas associated with degraded vernal pool habitat. Because of the distinctive topography supporting vernal pools, pools typically are clustered in "complexes," including dense clusters of small pools or scattered clusters of large pools that often share a common watershed (USFWS 2001c).

Vernal pools in general are associated with heavy soils that prevent the percolation of water. Southern California vernal pools are most often found in alluvial soils with clay or clay loam subsoils. Basaltic or granitic substrates or indurated hardpan layers may contribute to poor drainage and retention of water (USFWS 1998b). The size of vernal pools can vary dramatically, from just a few square meters to the size of small lakes (e.g., Skunk Hollow in western Riverside County). The size of the vernal pool is related to the watershed of the pool and the local micro-relief.

The Riverside fairy shrimp is restricted to deep seasonal vernal pools, vernal pool-like ephemeral ponds, and stock ponds and other human modified depressions (Eng et al. 1990; USFWS 1993b; USFWS 2001c). Riverside fairy shrimp prefer warm-water pools that have low to moderate dissolved solids, are less predictable, and remained filled for extended periods of time (Eriksen and Belk 1999). Basins that support Riverside fairy shrimp are typically dry a portion of the year, but usually are filled by late fall, winter or spring rains, and may persist through May (USFWS 2001c). All known vernal pool habitat lies within annual grasslands, which may be interspersed through chaparral or coastal sage scrub vegetation.

Females produce between 17 and 427 cysts over their lifetime (Simovich and Hathaway 1997). Presumably because of the ephemeral and unpredictable nature of the pool resource, few of the available cysts hatch at a time (Eriksen and Belk 1999). Cysts may hatch when water temperature is at 10 degrees C (50 degrees F) but develop slowly below 15 degrees C (59 degrees F) (Eriksen and Belk 1999). Hathaway and Simovich (1996) found that Riverside fairy shrimp hatched in seven to 12 days when water temperatures were between 10 and 20 degrees C (50 and 68 degrees F) and maturity was noted between 48 to 56 days.

Dispersal in fairy shrimp is likely mediated by vectors such as waterfowl, cattle, sheep, dogs and even off-road vehicles (e.g., rubber-tired or tracked vehicles) that move through or wallow in inhabited wet or dry pools. Wildlife and vehicles transport cysts or pregnant or mature adults between dry depressions or extant pools. Cysts may also disperse like some plant seeds by passing through an animal's gut after it ingests pregnant females or cysts in drinking water and then eliminates in other suitable depressions or pools.

b. Subregional Status

In the planning area, the Riverside fairy shrimp is known from vernal pools on Saddleback Meadows in the northwest portion, two pools near the intersection of Antonio Parkway and the FTC-North segment, a very large population in a large pool on Chiquita Ridge and in two pools located along Radio Tower Road (pools 2 and 7) (*Figure 4-5*). Because this species is rare in the subregion, all vernal pools supporting the Riverside fairy shrimp are considered *important populations* in *key locations*.

The geology of the vernal pools in the planning area is different from that underlying mima mounds found on the mesas of San Diego County. The Chiquita Ridge and Radio Tower Road pools originate from young bedrock slides associated with the Cristianitos fault zone. The formation of these vernal pools apparently derives from the differential settling of fine-grained materials (high clay content) from San Onofre Breccia, Monterey and Topanga formations. These pools are underlain by Soper gravelley loam on 15-30 percent slopes and Alo clay on 0-15 percent slopes.

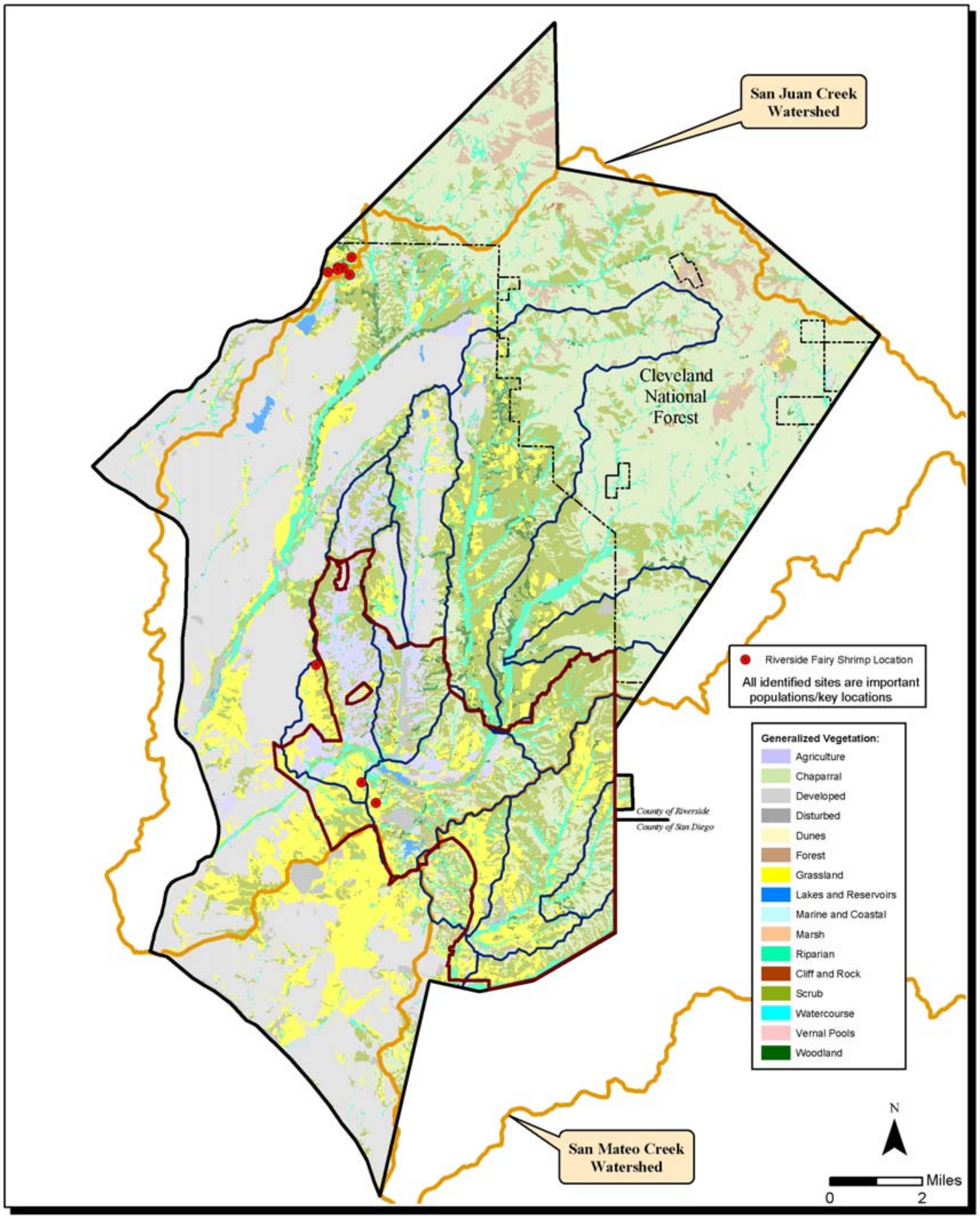
On RMV, the Riverside fairy shrimp was found in pools ranging in depth from 22 to 41.9 cm (8.7 to 16.5 in). Water temperatures of these pools ranged from 15 to 20 degrees C (59 to 84 degrees F). The percent dissolved oxygen was 0.02 to 6.0 and the total dissolved solids was 61-364 parts per million.

c. Protection Recommendations

- Protect the two vernal pools that support the Riverside fairy shrimp and their contributing hydrologic sources along Radio Tower Road. The Chiquita Ridge pools are already protected in Ladera Open Space.

d. Management Recommendations

- Implement a management program for vernal pools, including control of non-native invasive species, management of grazing and minimization of human access and disturbance as part of the Adaptive Management Program.



Draft NCCP/HCP Planning Guidelines

Riverside Fairy Shrimp Distribution Map

FIGURE 4-5

4.1.6 San Diego Fairy Shrimp

Branchinecta sandiegonensis - San Diego Fairy Shrimp
USFWS: Endangered
CDFG: None

a. Regional Status

The San Diego fairy shrimp is restricted to vernal pools in coastal southern California and Baja California, Mexico. Its current range in coastal southern California includes western San Diego County and southern and central Orange County. All known localities of the species are below 700 m (2,300 ft) and are within 64 km (40 mi) of the Pacific Ocean (USFWS 2000). The largest concentration of vernal pools supporting the San Diego fairy shrimp is in San Diego County, with an estimated 82 ha (202 ac) of occupied vernal pool basins in the County at the time of the species' listing in 1997. Of this occupied habitat, approximately 70 percent is on military lands, including the Miramar MCAS and Camp Pendleton (USFWS 2000b). The USFWS (2000b) concluded that vernal pool habitat in Los Angeles and Orange counties has been almost completely lost.

The *Recovery Plan for Vernal Pools of Southern California* (USFWS 1998b) identified five Management Areas for the San Diego fairy shrimp:

1. **Los Angeles/Orange County:** This Management Area includes Fairview Regional Park in Orange County that supports a vernal pool complex of about eight pools on 25 ha (62 ac) inhabited by the San Diego fairy shrimp (USFWS 2000b). This park is located east of the Santa Ana River and north of Victoria Street in Costa Mesa. The other Management Area is Rancho Mission Viejo, as described below under Subregional Status. Another Orange County population is known from Newport Banning Ranch (T. Bomkamp, pers. comm. 2002).

2. **San Diego North Coastal Mesas:** This Management Area includes complexes and pools on the coastal terraces on Camp Pendleton such as the State Park lease area, San Mateo, O'Neill, Stuart Mesa, Cockleburr Mesa, Las Pulgas, Basilone and Wire Mountain. This Management Area also includes two sites in the City of Carlsbad: a complex north of Poinsettia Lane between I-5 and Highway 1 (Carlsbad Boulevard) in the vicinity of the Poinsettia Lane train station and a complex between College Boulevard and Palomar Airport Road in the vicinity of Palomar Airport. The Poinsettia Lane location is on mitigation land.

3. **San Diego Central Coastal Mesas:** This Management Area includes pools and complexes on Del Mar Mesa, Kearney Mesa, Miramesa, MCAS Miramar, and Tierrasanta associated with coastal terraces and mesas in central San Diego County from the San Dieguito River to the Sweetwater River. As of 1998, the Central Coastal Mesas were known to support 41 complexes with San Diego fairy shrimp. Of these, 29 are on DOD land, five on private lands, three on City of San Diego land, one each on Grossmont College and City of San Diego School District lands, and two on Caltrans lands. Of the 29 on DOD land, 25 are managed for biological resources, three were proposed as refuge in 1998, and one was developed. Of the five complexes on private lands, two are mitigation land. One of the three City of San Diego complexes is mitigation and both of the Caltrans complexes are mitigation.

4. **San Diego Inland Valley:** This Management Area includes a large set of complexes in the Ramona area (Santa Maria Valley). These inland complexes are generally isolated from maritime influences and are representative of pools associated with alluvial or volcanic soil types. Although some of these pools are known to support the San Diego fairy shrimp, the occupancy status of all the pools is not known (USFWS 2000b). As of 1998, six complexes were known to support the San Diego fairy shrimp, of which five are on private land and one within San Diego County's Ramona Airport boundaries.

5. **San Diego South Coastal Mesas:** This Management Area includes pools and complexes from the Sweetwater River to the Mexican border. Vernal pools with San Diego fairy shrimp are located in the Tijuana Estuary Wildlife Refuge, western and eastern Otay Mesa, the Otay Lakes area, and Proctor Valley. As of 1998, seven complexes in this Management Area were known to support the San Diego fairy shrimp (USFWS 1998b). Of these seven, five are on private land, one is on City of San Diego land, and one is on Navy land. Three of the privately owned complexes and the City of San Diego complex are mitigation lands.

Vernal pools that support the San Diego fairy shrimp primarily occur on mesas and other level terrain generally less than 10 percent. These areas often exhibit a characteristic microrelief called Gilgai or mima mound formation. The species may also occur in ditches and road ruts, but only in areas associated with degraded vernal pool habitat. Because of the distinctive topography supporting vernal pools, pools typically are clustered in "complexes," including dense clusters of small pools or scattered clusters of large pools that often share a common watershed (USFWS 2000b).

Vernal pools in general are associated with heavy soils that prevent the percolation of water. Southern California vernal pools are most often found in alluvial soils with clay or clay loam subsoils. Basaltic or granitic substrates or indurated hardpan layers may contribute to poor drainage and retention of water (USFWS 1998b). The size of vernal pools can vary dramatically, from just a few square meters to the size of small lakes (e.g., Skunk Hollow in western Riverside County). The size of the vernal pool is related to the watershed of the pool and the local micro-relief.

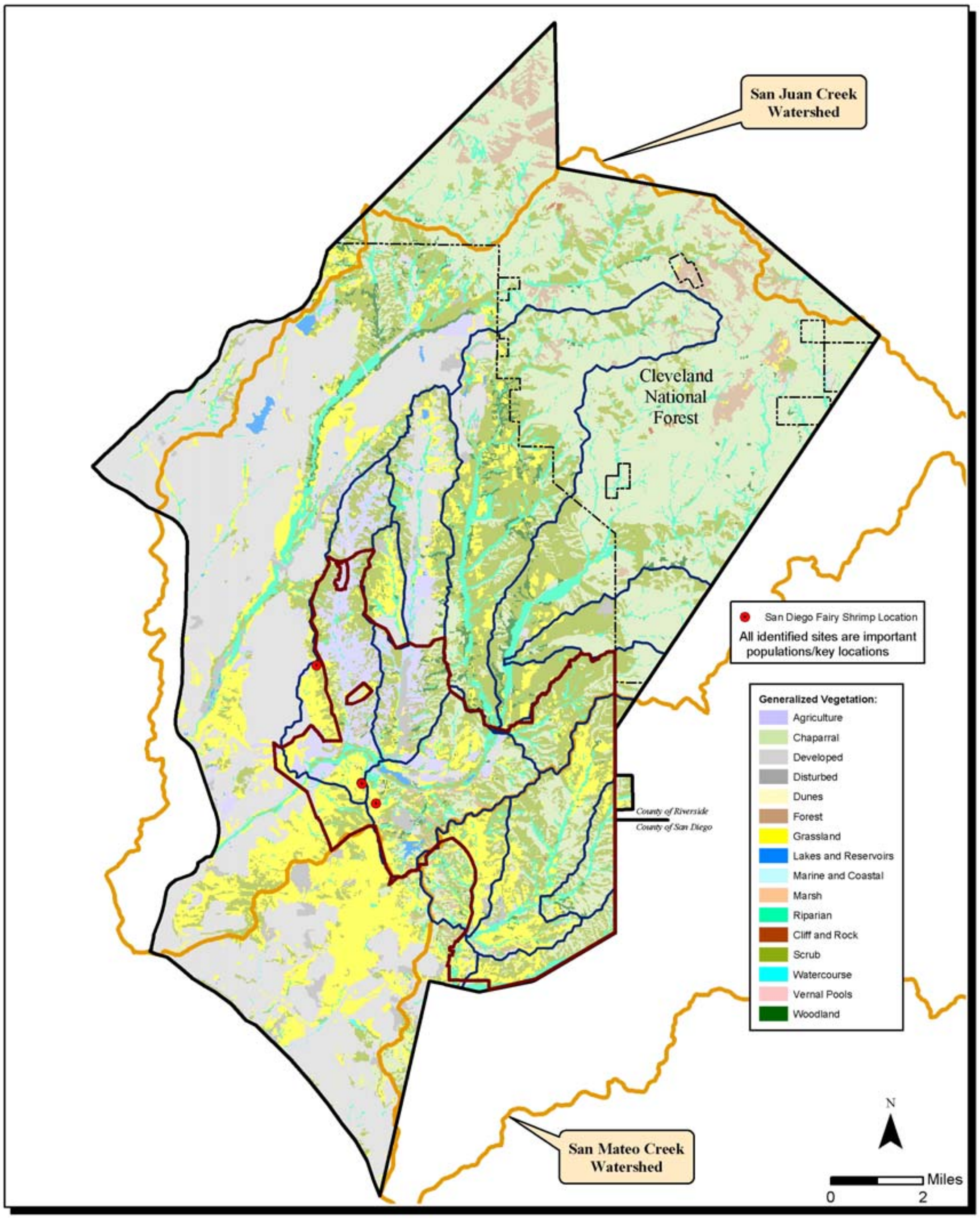
The San Diego fairy shrimp occurs in small, shallow vernal pools ranging in depth from 5.1 to 30.5 cm (2 to 12 in) and in water temperatures from 10 and 14.5 degrees C (50 to 58 degrees F). Water temperature and chemistry are important factors in the species' distribution. Adults are usually observed in January-March when pools hold water from winter rains, although the breeding season may be extended in association with early winter or mid-spring rains (USFWS 2000b). Eggs are either dropped to the pool bottom or remain in the brood sac until the adult female dies and sinks. The shrimp hatch and mature in seven days to two weeks, depending on water temperature. "Resting eggs" of cysts are capable of withstanding heat, cold and prolonged drying (USFWS 2000b). Because the high variability rainfall in southern California, and thus the success of any given breeding season, only a fraction of cysts may hatch in a given year and reproductive success can be spread out over several years (USFWS 2000b).

Dispersal in fairy shrimp is likely mediated by vectors such as waterfowl, cattle, sheep, dogs and even off-road vehicles (e.g., rubber-tired or tracked vehicles) that move through or wallowing in inhabited wet or dry pools. Wildlife and vehicles transport cysts or pregnant or mature adults between dry depressions or extant pools. Cysts may also disperse like some plant seeds by passing through an animal's gut after it ingests pregnant females or cysts in drinking water and then eliminates in other suitable depressions or pools.

b. Subregional Status

The San Diego fairy shrimp occurs in two locations in the planning area: in the large and small vernal pools on Chiquita Ridge (vernal pools 3 and 4) and in three pools located along Radio Tower Road south of Ortega Highway (vernal pools 1, 2 and 7) (*Figure 4-6*). Because this species is rare in the region, both locations are *important populations* in *key locations*.

The geology of the vernal pools in the planning area is different from that underlying mima mounds found on the mesas of San Diego County. The Chiquita Ridge and Radio Tower Road pools originate from young bedrock slides associated with the Cristianitos fault zone. The formation of these vernal pools apparently derives from the differential setting of fine-grained materials (high clay content) from San Onofre Breccia, Monterey and Topanga formations. These pools are underlain by Soper gravelley loam on 15-30 percent slopes and Alo clay on 0-15 percent slopes.



Draft NCCP/HCP Planning Guidelines

San Diego Fairy Shrimp Distribution Map

FIGURE 4-6

The San Diego fairy shrimp was found in pools ranging in depth from 17.0 to 41.9 cm (6.7 to 16.5 in). Water temperatures of these pools ranged from 11 to 23 degrees C (52 to 73 degrees F). The percent dissolved oxygen was 2.3 to 5.36 and the total dissolved solids was 51-166 parts per million.

c. Protection Recommendations

- Avoid impacts to the three vernal pools (1, 2 and 7) that support the San Diego fairy shrimp and their contributing hydrologic sources along Radio Tower Road. The Chiquita Ridge pools are already protected in Ladera Open Space.

d. Management Recommendations

- Implement a management program for vernal pools, including control of non-native invasive species, management of grazing and minimization of human access and disturbance as part of the Adaptive Management Program.

4.1.7 Thread-leaved Brodiaea

Brodiaea filifolia - Thread-leaved Brodiaea
Federal: Threatened
State: Endangered
CNPS: List 1B

a. Regional Status

Thread-leaved brodiaea is a perennial geophyte that has a corm with a dark brown, fibrous tunic. The flowering stalk is 20.3-40.6 cm (8-16 in) high and the narrow leaves are generally shorter than the flowering stem. The flowers are dark blue to violet and have six perianth segments. There are three stamens and three staminodia (sterile stamens), which are narrow and thread-like in each flower.

The thread-like staminodia are the feature which distinguishes this species from other related brodiaea occurring in southern California. This species reportedly hybridizes with *B. orcuttii* and *B. terrestris*, but these species have different chromosome numbers, so hybridization events should be rare (chromosome counts need to be confirmed, sources are inconsistent). In Riverside County a large reported hybrid swarm occurs on Miller Mountain and Elsinore Peak and reported hybrids are also found in populations on the Santa Rosa Plateau.

Counts of flowering stalks are often used to determine the size of brodiaea populations. Although a good index, it appears that there may be higher number of corms in the ground than is indicated by the number of flowering plants. In 1998, the USFWS cited an instance where in a recorded population of 20 flowering stalks, over 8,000 corms were recovered (USFWS 1998c). Other botanists have used a general range of indices of 5 to 100 corms for every flowering stalk observed (pers. comm., Bomkamp and Elvin 2002).

In the Transverse Ranges, the thread-leaved brodiaea is known to occur in the foothills of the San Gabriel Mountains, east to Arrowhead Hot Springs in the San Bernardino Mountains. Populations are also found in southern Orange, western Riverside, and northwestern San Diego counties. In 1998, the USFWS estimated that 50 extant populations occurred in southern California, with the majority consisting of sites supporting less than 2,000 plants (USFWS 1998c). Since 1998, some of these populations have been extirpated, while additional populations have been identified in Riverside, Los Angeles, San Diego and Orange counties. The exact number of extant populations is not known, but it is likely between 40 and 50. Most of these additional populations occur in northwest San Diego County. Similarly, in 1998 the USFWS estimated that 338 ha (835 ac) of occupied habitat occur within the range of this species; however, based upon extirpations and additional occurrences identified between 1998 and 2001, an estimate of somewhat less than 338 ha (835 ac) is more likely. As shown in *Table 4-5*, the largest locality is found in San Marcos in northern San Diego County with an estimated range of 201,200 to 342,000 flowering stalks, while the largest population in Riverside County is found on the Santa Rosa Plateau with over 30,000 flowering stalks estimated to occur on the ecological reserve. The largest extant populations in Orange County occur at Aliso-Woods Regional Park, consisting of several thousand plants and on Rancho Mission Viejo (see below). The largest population in Los Angeles County occurs in Glendora, containing an estimated 2,000 to 3,000 flowering stalks.

In western Riverside County this species is known to occur on the Santa Rosa Plateau; Upper Salt Creek, west of Hemet; the San Jacinto Wildlife Area (two localities); Perris, east of the Perris Valley Airport (approximately 5,000 flowering stalks); south of San Jacinto Road (<500 individuals); and in Railroad Canyon where approximately 3,000 plants are associated with *Sporobolus*-dominated alkali grassland.

In Orange County, populations are known from Aliso-Woods Canyon Regional Park (several thousand), Rancho Mission Viejo (4,500 to 5,500 flowering stalks), Forster Ranch (approximately 5,000 flowering stalks associated with a restoration/relocation program), Prima Deshecha Landfill, and the Talega Development where one small population will be preserved in open space and a second population is slated for translocation.

TABLE 4-5
REGIONWIDE SUMMARY:
2002 STATUS OF THREAD-LEAVED BRODIAEA
WITHIN KNOWN RANGE IN SOUTHERN CALIFORNIA

Regional Major Population Area(s)	Brodiaea Population: Number of Counted/Estimated Plants
San Marcos and Northern San Diego County Excluding Camp Pendleton	350,000 to 400,000 (estimated)[1] 201,200 (estimated)[2]
Camp Pendleton and San Onofre State Park	5,000 (estimated)
San Jacinto River and Hemet, Riverside County	10,000
Santa Rosa Plateau, Riverside County	30,000
Los Angeles County (Glendora and San Dimas)	2,000 to 3,000
Orange County	16,450-18,450
APPROXIMATE TOTAL PLANTS REGIONWIDE	264,450 to 466,450
Orange County Population Summary	
Rancho Mission Viejo	Approximately 9,300
Aliso-Woods Park	Approximately 2,000 to 3,000
Talega and Forster Ranch Developments	5,000 to 6,000
Arroyo Trabuco Golf Course	150
ORANGE COUNTY SUMMARY	16,450 to 18,450+

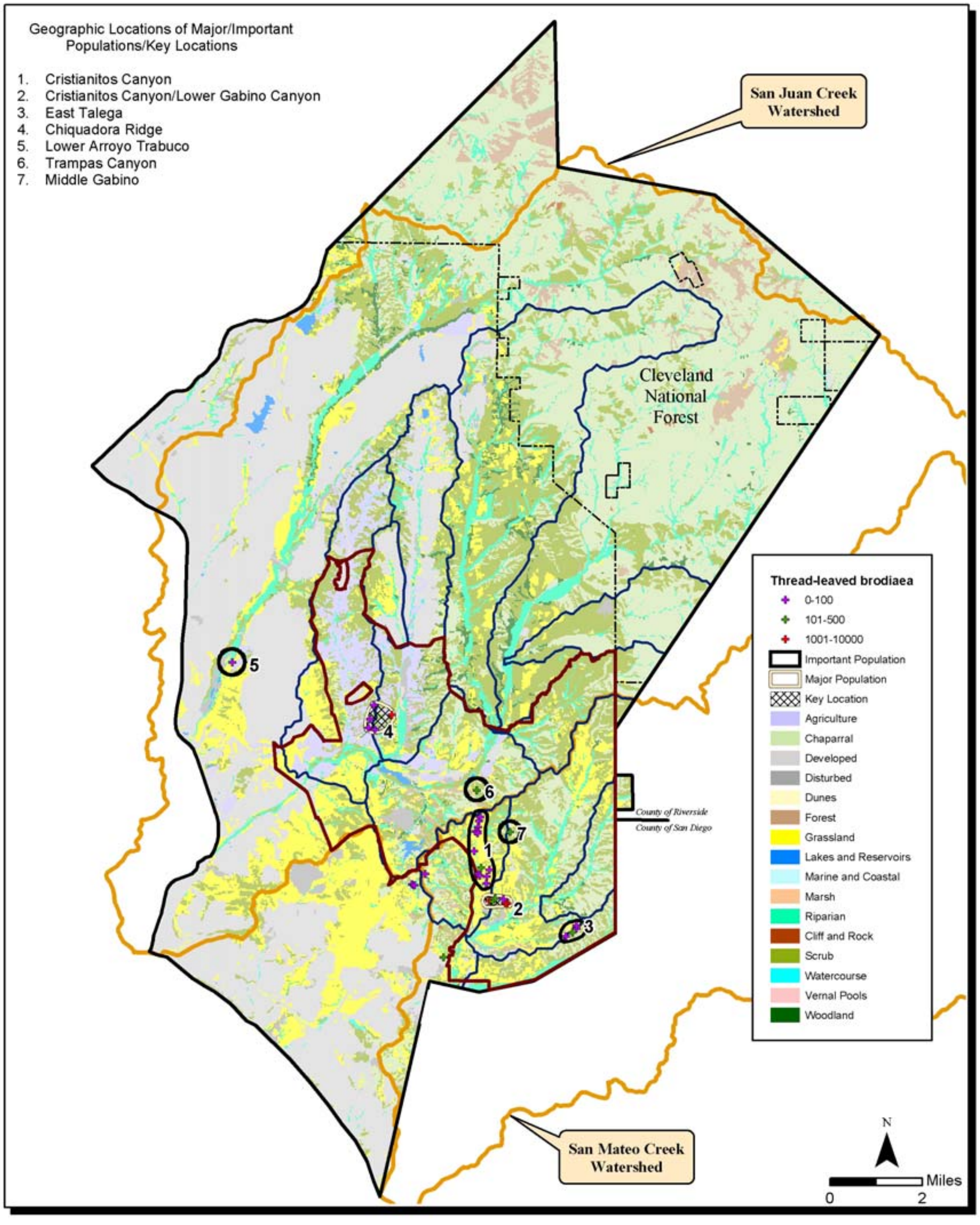
Notes:

1 USFWS 1998c

2 SANDAG GIS Database 2000. Locations of Sensitive Species Sitings (Sue Carnavale, pers. comm.)

b. Subregional Status

Thread-leaved brodiaea is found in eight general locations in the planning area (*Figure 4-7*), excluding the translocated population at Forster Ranch: Chiquadora Ridge; Trampas Canyon sub-unit; Cristianitos Canyon; lower Cristianitos Canyon/lower Gabino Canyon; middle Gabino Canyon; Talega ridgeline east of Northrop Grumman; and just east of Trabuco Creek in the Arroyo Trabuco Golf Course project area. The approximately 9,600 flowering stalks known from the planning area, (excluding Forster Ranch) are a small percentage (about 2-3 percent) of the thread-leaved brodiaea range-wide, but represent an important geographic segment of the species. However, conservation of this species is most dependent on protection of the two largest concentrations in north San Diego County and western Riverside County (see *Table 4-5*).



Draft NCCP/HCP Planning Guidelines

Thread-leaved Brodiaea Distribution Map

FIGURE 4-7

Within the planning area, this species is associated with purple needlegrass grasslands and grassland/sage scrub ecotone areas. In many instances, the needlegrass grasslands exhibit low densities of native bunch grasses and support non-native English ryegrass (*Lolium multiflorum*) and cardoon (*Cynara cardunculus*). In all cases, the brodiaea is associated with clay soils; often times that occur as lenses in cobbly loams, clay loams or sandy clay loams. In such instances, the brodiaea is restricted to the clay lenses.

The following summarizes the size and distribution of thread-leaved brodiaea within RMV and identifies *major* and *important populations* and *key locations*:

- About 13 separate scattered locations occur in the Cristianitos sub-basin, ranging from one to 120 flowering stalks (No. 1 on *Figure 4-7*). These are *important populations* for conservation of the brodiaea in the subregion because they potentially provide connectivity between offsite locations to the south in San Onofre State Park and Camp Pendleton with planning area locations to the north (e.g., Chiquadora Ridge). These locations could also potentially link planning area locations to occurrences to the west including the Donna O'Neill Conservancy lands, ultimately linking to the offsite Talega Development and Forester Ranch development occurrences to be preserved in open space. In addition, they occur in an area dominated by clay soils, and thus there is an opportunity to expand the population in this area through adaptive management. Some subset of these locations comprise *key locations*, but there is flexibility in which locations need to be protected to maintain population viability in the area.

- A large complex of six discrete locations totaling approximately 6,100 flowering stalks occurs on the hill outcrop adjacent to the mine pits in the southern portion of Cristianitos Canyon on the boundary between the Cristianitos and Gabino and Blind Canyons sub-basins (No. 2 on *Figure 4-7*). As one of the two largest populations on RMV, this is a *major population* in a *key location.*

- Four locations totaling 288 flowering stalks occur in the Talega sub-basin on the mesa east of Northrop Grumman near the boundary with the Gabino and Blind canyons sub-basins (No. 3 on *Figure 4-7*). Although not a large population, these locations may be considered an *important population* because they potentially contribute to connectivity and genetic exchange among the various nearby locations in the subregion.

- Five locations occur on Chiquadora Ridge southeast of the treatment plant, including the eastern portion of the Chiquita sub-basin and the western portion of the Gobernadora sub-basin (No. 4 on *Figure 4-7*). Four of the five locations are small (73, 2, 3 and 7 flowering stalks), but the easternmost location on the ridge has about 2,000 flowering stalks. These five locations together comprise a *major population* and one of the two largest on RMV.

The largest location of this population also is in a *key location* for conservation of this species in the subregion because this location is on Chiquadora Ridge, a major landscape feature that serves an important habitat connection function, and it is the only *major population* in the San Juan Creek Watershed.

- One location of about 150 flowering stalks occurs on a slope east of Trabuco Creek in open space associated with the golf course project (No. 5 on *Figure 4-7*). This disjunct location is an *important population* because as the westernmost occurrence it contributes to the geographic diversity of the species in the subregion.

- One location of about 250 flowering stalks in the southeastern portion of the Trampas Canyon subunit of the Central San Juan and Trampas Canyon sub-basin (No. 6 on *Figure 4-7*). This location is an *important population* because it contributes to the geographic diversity of the species in the subregion. **Note that this is new information since the April 2003 version of the Guidelines.**

- One location of about 183 flowering stalks occurs in the western portion of the middle Gabino subunit of the Gabino and Blind Canyons sub-basin (No. 7 on *Figure 4-7*). This location is an *important population* because it contributes to the geographic diversity of the species in the subregion. **Note that this is new information since the April 2003 version of the Guidelines.**

Other locations of thread-leaved brodiaea in the planning area include:

- The Forster Ranch population, which is a translocated/restored population. This population numbered about 5,000 flowering stalks in 2001. Only a few brodiaea flowered in 2002, attributed to the poor rainfall.

- One location (no size estimate) occurs on the Donna O'Neill Conservancy at Rancho Mission Viejo.

- Two locations where 100 and 150 plants were detected, respectively, occur within the planned Talega Development (USFWS 2001d). These locations will be lost in association with the Talega Development, but corms excavated from these locations will be translocated to help offset this loss (USFWS 2001d). Another location of about 300 flowering stalks occurs in designated Talega Open Space.

c. **Protection Recommen**dations

- Protect the large population of approximately 2,000 flowering stalks of brodiaea on Chiquadora Ridge and two of the four small populations in Chiquita Canyon south of the wastewater treatment plant. Protection of these locations would constitute protection of a *major population* in a *key location*.

- Protect the location supporting approximately 6,100 flowering stalks on the hill outcrop adjacent to the clay mine pits in the southern portion of Cristianitos Canyon. This location is the largest contiguous thread-leaved brodiaea population in the planning area and comprises a *major population* in a *key location*.

- Protect 10 of the 13 small, scattered locations in Cristianitos Canyon, totaling approximately 300 flowering stalks. Maintain a continuous habitat connection between these scattered populations to allow for interactions and genetic exchange between the populations. These locations meet the criteria of *important populations* in *key locations* because they provide a linkage between brodiaea locations in the area and because the area has good potential for enhancement and restoration.

- Protect the four locations totaling 288 individuals in the Talega sub-basin east of the Northrop Grumman facilities. The locations are considered *important populations* because they contribute to the geographic diversity and provide additional sources for genetic exchange and connectivity in this portion of the subregion.

- Protect the location of approximately 150 flowering stalks on the slope east of Trabuco Creek. This location is considered an *important population* because as the westmost occurrence in the subregion it contributes to the geographic diversity of the species in the subregion.

- Salvage and translocate individuals within development areas that cannot be avoided to areas with suitable soils. Where suitable soils are present, translocation sites should be located to the extent feasible and appropriate in key locations that maximize connectivity among locations within the subregion.

Two additional protection recommendations have been added to the May 2004 version of the Guidelines based on new information from the Spring 2003 surveys.

- **Protect the location of approximately 250 flowering stalks in the southeastern portion of the Trampas Canyon subunit of the Central San Juan and Trampas**

Canyon sub-basin. This location is considered an *important population* because it contributes to the geographic diversity of the species in the subregion.

- **Protect the location of approximately 183 flowering stalks in the western portion of the middle Gabino subunit of the Gabino and Blind Canyons sub-basin. This location is considered an *important population* because it contributes to the geographic diversity of the species in the subregion.**

d. Management Recommendations

As part of the Adaptive Management Program, the following management activities for thread-leaved brodiaea will be conducted:

- Control non-native invasive species such as cardoon, ryegrass, bromes and mustards.

- Manage grazing as part of the Adaptive Management Program in a manner that optimizes the control of non-native grasses (*Lolium*, *Bromus*, *Avena*) while allowing for proliferation of the native grasses and forbs.

- Protect thread-leaved brodiaea populations from human disturbance such as hiking, mountain bikes and equestrian activities.

- Collect data on pollinators to ensure that habitats (including soils) for native Halictid bees and other pollinators are preserved in the vicinity of preserved populations.

e. Restoration Recommendations

- Translocate salvaged thread-leaved brodiaea to CSS and VGL restoration and enhancement areas where feasible and appropriate. Potential restoration and enhancement areas include Chiquita Ridge, Chiquadora Ridge, upper Cristianitos Canyon, Ladera Ranch open space adjacent to the Arroyo Trabuco golf course, upper Gabino Canyon, and Blind Canyon. Receiver areas should support clay soils suitable for brodiaea and, as noted above, should be placed in locations that maximize connectivity and genetic exchange.

- Salvage clay topsoils from development areas where feasible and appropriate and transport to restoration areas. Salvaged topsoils may be used to create additional suitable brodiaea habitat.

4.2 Unlisted Planning Species

4.2.1 Cactus Wren

Campylorhynchus brunneicapillus couesi– Cactus Wren
USFWS: None
CDFG: California Special Concern Species[2]

a. Listing History and Taxonomic Status

The taxonomic status of the cactus wren and the significance of coastal southern California populations has been the subject of considerable debate in the recent past. Based on variations in plumage patterns and characters that are used to distinguish the subspecies of the cactus wren, Rea and Weaver (1990) proposed a distinct southern California/Baja California subspecies, the San Diego cactus wren (*C. b. sandiegensis*), that they argued was limited to southern Orange County, coastal San Diego County, and extreme northwestern Baja California, Mexico. This proposed subspecies was petitioned for federal listing as endangered on September 21, 1990. However, at that time this proposed subspecies was not accepted by the American Ornithologist Union (AOU) Committee on Nomenclature and Classification. Consequently the petition for listing of the "San Diego cactus wren" was no longer valid. Based on the AOU findings, the USFWS (Federal Register Vol. 59, 170, 9/2/94) made several determinations in their 1-year finding on the petition to list the Pacific coast population of the cactus wren that are particularly relevant for understanding the status of this species in southern California and establishing protection recommendations for this species for the Southern NCCP/HCP. The USFWS' findings regarding the cactus thus are cited here in detail.

pp. 45659-45660 – USFWS "announces a 1-year finding on a petition to add the Pacific coast population of the cactus wren (*C. couesi*) to the List of Endangered and Threatened Wildlife. . . . hereby transfers the petitioned entity from category 2 to category 3B of the Candidate Notice of Review. The Service concludes that the cactus wrens occupying coastal southern California do not constitute a distinct population segment."

p. 45660 – ". . . the Service concludes that the coastal population of cactus wren consists of Pacific coastal portions of *C. b couesi* and *C. b bryanti*."

---

[2] CDFG designated the *C.b. sandiegensis* (Orange & San Diego Counties only) as a California Special Concern species following the draft DFG Bird California Special Concern Species report. As discussed in this account, this subspecies is not accepted by the AOU as a valid taxon.

p. 45660 – ". . . it is currently evident that the cactus wrens residing in coastal sage scrub plant communities are not distinct from other wrens. Therefore, cactus wrens occupying coastal southern California do not constitute a distinct vertebrate population segment."

p. 45660 – ". . . it is apparent that the habitat preference of coastal birds (coastal sage scrub) does not readily separate them from other members of the subspecies."

p. 45660 – "The coastal sage scrub plant formation grades into coastal succulent scrub and eventually into Sonoran desert scrub. Although some gaps in the range of the species may exist, birds representing *C.b. bryanti* or *C.b. couesi*. . . likely occupy all of these 'scrub' plant communities or formations. Hence, because cactus wrens evidently occupy several plant communities and are not isolated in habitat, the Service concludes that providing protection pursuant to the Act for birds living in some (but not all) of these plant communities and habitats is inappropriate."

pp. 45660 – 45661 - "Furthermore, the cactus wrens occupying coastal southern California are not likely significant to the continued existence of a species that occurs in portions of southern California, southern Nevada, Arizona, New Mexico, Utah and Texas, in the United States, and mainland Mexico. The species is relatively common throughout much of its range. However, since the birds occupying coastal southern California are not distinct, the issue of significance need not be addressed."

p. 45661 – "This finding announced herein is not intended to discount the importance of the coastal sage scrub ecosystem in southern California, which is the subject of intense multi-species and ecosystem planning efforts. . . . Cactus wrens living in coastal southern California have declined in numbers and coastal sage scrub habitats are becoming increasingly depleted. Efforts to conserve these depleted habitats will be of benefit to cactus wrens residing in southern California."

b. Regional Status

The full species of cactus wren (*Campylorhynchus brunneicapillus*) is a resident species ranging from southern California to southern Baja California, southern Nevada, southwestern Utah, western and central Arizona, southern New Mexico, and central Texas south to Mexico (Terres 1980). Eight subspecies of cactus wren currently are recognized, with the subspecies falling into roughly two groups, the *affinis* group (peninsular forms) and *brunneicapillus* group (continental forms) (Proudfoot et al. 2000). Within the *brunneicapillus* group, there has been considerable debate, as discussed above, about that taxonomy of the coastal Southern California populations of the cactus wren, which currently is named the *C. b. couesi*.

Historically, the coastal populations of the cactus wren were found continuously along the coastal slopes and lowlands of southern California in arid and semiarid regions with abundant cacti and directly connected to desert populations through the San Gorgonio Pass in the Banning/Beaumont and Cabazon areas. As early as 1944, however, biologists noted that loss of habitat had greatly reduced the historic range of this species (Grinnell and Miller 1944).

Solek and Szijj (1999) provide a comprehensive review and summary of the distribution of the cactus wren. Breeding populations of the cactus wren occur in Ventura, Los Angeles, Orange, San Bernardino, Riverside and San Diego counties. *Table 4-6* provides a range-wide summary of localities by county for the cactus wren (Solek and Szijj 1999).

TABLE 4-6
RANGEWIDE DISTRIBUTION OF THE CACTUS WREN
IN SOUTHERN CALIFORNIA

County	General Localities
Ventura	Camarillo, Moorpark, Newbury Park, Santa Rosa Valley, Simi Valley, Thousand Oaks
Los Angeles	Baldwin Hills, Claremont, Duarte, Glendora, Irwindale, La Puente, Laverne, Malibu, Palos Verdes, Pomona/San Dimas, Puente Hills, San Dimas, San Fernando Valley, San Jose Hills, Walnut, West Covina
Orange	Anaheim, Caspers Wilderness Park, Chino Hills, Crystal Cove State Park, Dana Point, East Orange, Costa Mesa, Fullerton, Irvine, La Mirada, Laguna Beach, Laguna Hills, Laguna Niguel, Lake Forest, Loma Ridge, Mission Viejo, Newport Beach, Placentia, Portola Hills, Rancho Mission Viejo, Rancho Santa Margarita, San Clemente, San Joaquin Hills, San Juan Capistrano, Starr Ranch, Tustin, Yorba Linda
San Bernardino	Chino Hills, Fontana, Loma Linda, Mentone, Rancho Cucamonga, Redlands, Rialto
Riverside	Aguanga, Beaumont, Cajalco, Calimesa, Corona, Lake Mathews, Lake Perris State Recreation Area, Moreno Valley, Morongo Indian Reservation, Riverside City, Sage, San Jacinto, Murrieta, Temescal Wash
San Diego	Bonsall, Camp Pendleton, Carlsbad, Chula Vista, Dennery Canyon, El Cajon, Encinitas, Escondido, Johnson Canyon, Lake Jennings, Lakeside, Lilac, Mission Hills, Mother Miguel Mountain, Otay Mesa, Otay Ranch, Paradise Hills, Pauma Valley, Poway, Proctor Valley, Rancho Santa Fe, San Pasqual Valley, Santee, Spring Canyon, Sunnyside, Sweetwater Reservoir

Range-wide estimates of the total cactus wren population are not available by county, but location counts within NCCP or multi-species conservation planning areas and on military lands in southern California are summarized in *Table 4-7*.

TABLE 4-7
CACTUS WREN SITES IN NCCP/MULTI-SPECIES
CONSERVATION PLANNING AREAS AND MILITARY LANDS

Planning Area	Number of Sites
Southern Orange County Subregion	1,410[1]
Central & Coast Orange County Subregion	994[2]
Shell HCP	45-55[3]
North San Diego County MHCP	24[4]
San Diego County MSCP	397[5]
MCB Camp Pendleton	278[6]
Western Riverside County MSHCP	100-110[7]

1 2002 Southern Subregion Cumulative Database
2 Central and Coastal Subregion NCCP/HCP, Table 1-ES, July 17, 1996
3 Shell HCP. Estimated number of sites conserved with restoration (W. Boyd, pers. comm. 2003)
4 MHCP Public Review Draft, Vol. II, pg. 4-319 (SANDAG 2000). Number of locations in the Focused Planning Area (FPA) and estimated to be 97 percent of locations in MHCP planning area.
5 San Diego Multiple Species Conservation Plan, Table 3-5, page 3-45, August 1996. This value represents the number of locations within the MSCP planning area. An estimated 268 locations are in the proposed reserve.
6 Estimated locations from 1993-1994 census conducted by Griffith Wildlife Biology.
7 Estimated number of pairs by McKernan (pers. comm., 1998), Western Riverside County Draft MSCHP, Vol. II, The MSHCP Reference Document, 2002, pg. B-90.

Table 4-8 shows the existing and proposed conservation status of the cactus wren and its habitat in the San Diego MSCP and MHCP, Central and Coastal NCCP/HCP and Western Riverside County MSHCP.

TABLE 4-8
CONSERVATION STATUS OF THE CACTUS WREN IN SOUTHERN CALIFORNIA

Conservation Planning Area	Number of Cactus Wren Locations and Percent Conserved	Potential Habitat Conserved
San Diego MSCP	397 locations, of which 68% conserved	47% of maritime succulent scrub
North San Diego County MHCP	24 locations, of which 97% conserved	95-100% conservation of major population in "critical" habitat location in San Pasqual Valley
Central/Coastal NCCP Reserve, Special Linkage and Existing Use Areas, Non-Reserve Open Space, and the Policy Plan Area	994 locations, of which 78% conserved.	Not analyzed
Shell HCP	45-55 sites conserved	60+ acres conservation of cactus scrub, including CSS restoration areas
Western Riverside MHSCP	34 "precision locations," of which 41% in public/quasi-public land and Criteria Area	77,070 acres of suitable habitat (55%) and 11 of 12 identified core areas.

The cactus wren is an obligate, non-migratory resident of the coastal sage scrub and chaparral plant communities that include substantial cover of cacti (*Opuntia* spp.). Coastal populations inhabit cactus scrubs typically occurring in a mosaic of coastal sage scrub and chaparral on mesas and lower slopes of the coast ranges at elevations up to 450 m (1,475 ft). In addition to cacti, characteristic shrubs in suitable habitat include California buckwheat, coastal sagebrush, several sages (*Saliva* spp.) and scattered shrubs approaching tree-size, such as laurel sumac and lemonadeberry. Thickets of this xeric vegetation may provide cover and thermal relief for wrens. The nest is also used as a roost site (Anderson and Anderson 1957).

Although most of the biological information collected for cactus wrens has not focused on the coastal subspecies (e.g., Anderson and Anderson's studies cited below were in Arizona), it is assumed that general life history information is applicable to the cactus wren.

Cactus wrens tend to forage on the ground or in low vegetation for insects and other small invertebrates, cactus fruits and other fruits, seeds and nectars. Fruits comprise 15-20 percent of the species' annual diet. Foraging is often regulated by heat stress (Ricklefs and Hainsworth 1968), requiring retreat from exposed sites into the shade of shrubs and tree.

The breeding season of the cactus wren extends from March into June, with two broods per season being common. The nest is usually built in cholla or other large, branching cacti, which also is used as a roost site. The nest is an intricate, woven cylinder, usually placed horizontally 1.2 to 1.5 m (4-5 ft) above the ground (Anderson and Anderson 1957). Clutch sizes typically are 4-5 eggs, with a range of 3-7 eggs (Harrison 1978). Nestlings fledge at 17-23 days, with an average of 21 days (Hensley 1959; Anderson and Anderson 1960). Young may return to roost in the nest after fledging. The young become independent at about one month after leaving the nest (Harrison 1978). There are limited data for dispersal, but birds appear to be highly sedentary and tend to return to the same territories each year (Solek and Szijj 1999). On the Palos Verdes Peninsula in Los Angeles County, for example, Atwood (1998) observed a mean dispersal distance of 1.6 km (1 mi) by juvenile cactus wrens from their natal territories. It should be noted, however, that the Palos Verdes population is a highly fragmented, isolated population and dispersal opportunities may be limited (Solek and Szijj 1999). Arizona data indicate that females disperse farther from natal territories than males (Anderson and Anderson 1973).

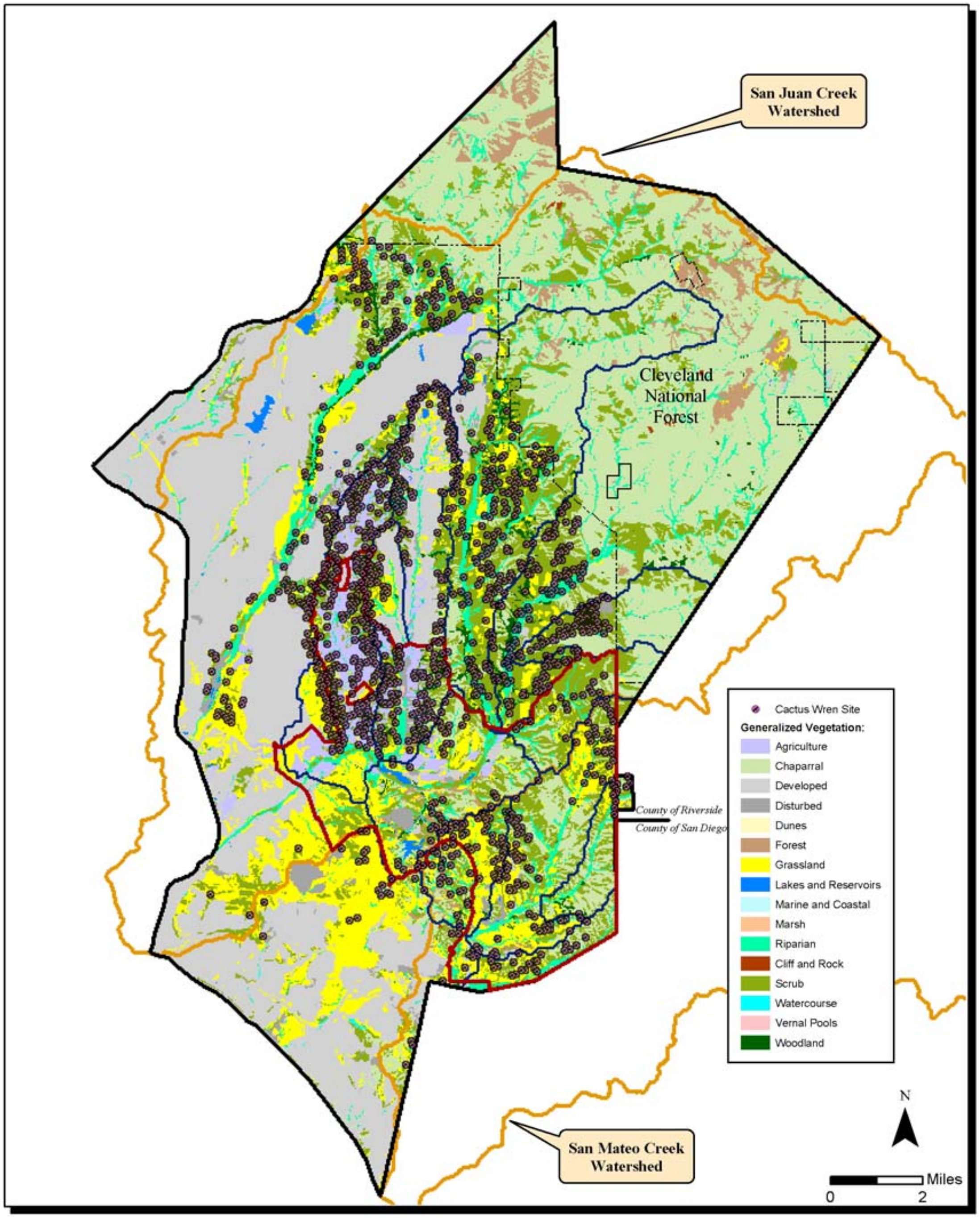
The home range of cactus wrens may be the same as the territory range. In Arizona, the average home range/territory is 1.9 ha (4.8 ac), varying from 1.2-2.8 ha (2.9-6.9 ac), and is maintained all year round (Anderson and Anderson 1963).

Threats to the cactus wren include habitat loss and fragmentation from urbanization and agricultural development. Domestic cats, roadrunners, snakes, and loggerhead shrikes prey on adults and nestlings (Anderson and Anderson 1973). Cactus wrens that are confined to isolated patches of habitat in urbanizing areas are subject to increased levels of predation pressures as larger predators are replaced by greater population levels of smaller predators and domestic animals. This species is especially vulnerable to stochastic events, especially wildland fires. Because of its narrow habitat requirements, sedentary behavior, and low dispersal characteristics, cactus wren are subject to loss by fires and, if they disperse, may not find suitable habitat to survive. Intense fires may actually kill cactus plants and eliminate nesting habitat for the cactus wren (e.g., Bontrager et al.1995). Nests typically are placed in cactus at least 1 m above ground level. However, cactus patches within less intense burns that do not kill the cactus may be utilized soon after the burn (e.g., Harmsworth Associates 1997, 1998a, 2001). As a result of competition from invasive plant competition, grazing, weather patterns and other natural and human-influenced disturbances, the reestablishment of severely burned cactus patches essential to this species may take several years. An increasing pattern of habitat fragmentation and isolated populations also diminishes the dispersal ability and inter-population connections of the cactus wren, potentially reducing the overall genetic viability of the species.

c. Subregional Status

The cactus wren is widely distributed throughout the Southern NCCP/HCP planning area (*Figure 4-8*). Although population numbers are not available for the northern portions of the cactus wren's range (i.e., Ventura, Los Angeles and western San Bernardino counties), the Southern NCCP/HCP planning area clearly supports a substantial portion of the remaining cactus wren population; about 44 percent of the locations within Orange, Riverside and San Diego counties are in the Southern Subregion (*Table 4-7*).

Within the planning area the cactus wren is widely distributed in the San Juan and San Mateo watersheds with essentially continuous connectivity among occupied areas (*Figure 4-8*). Within the context of the coastal populations of the cactus wren, the population in the planning area constitutes a *major population*. Because of its widespread distribution in the planning area, however, it was not appropriate to identify specific portions of the population as *key locations* in the subregion. The population in the planning area is strategically located as a linkage between the San Diego County populations on Camp Pendleton and protected populations in the Central and Coastal Subregion Habitat Reserve. Substantial protection of this species in the planning area and maintaining connections both within the planning area and between the planning area population and protected locations in the Central and Coastal Subregion Habitat Reserve and populations located on Camp Pendleton will contribute to conservation of the species in the subregion.



Draft NCCP/HCP Planning Guidelines
Cactus Wren Distribution Map

FIGURE 4-8

d. Protection Recommendations

- Protect at least 70 percent (about 987 mapped sites) of the cactus wren sites located throughout the planning area.

- Protect the major north-south connection to Central San Juan Creek for the cactus wren by providing a habitat linkage between Chiquita Creek and the eastern edge of the Ladera Open Space.

- Protect, to the extent feasible, patches of coastal sage scrub and southern cactus scrub in the San Mateo Watershed to maintain resident and dispersal habitat for the cactus wren between San Juan Creek and populations on Camp Pendleton.

- Maintain east-west biological connectivity for the cactus wren by protecting habitat linkages between Arroyo Trabuco, Chiquita Canyon, and Gobernadora Canyon. Biological connectivity should be maintained between Chiquita, Gobernadora and Arroyo Trabuco by protecting habitat linkages at a minimum of three locations within the sub-basin: **(1)** via rim-to-rim preservation of Sulphur Canyon (approximately 2,000 to 2,500 feet wide); **(2)** at the "Narrows" where the canyon is only 700-800 feet wide (approximately 3,000 feet south of Tesoro High School) and connects to Sulphur Canyon; and **(3)** in contiguous patches of coastal sage scrub through the major side canyon north and east of the wastewater treatment plant.

- Maintain a continuous upland habitat linkage along the east-facing slopes of Chiquadora Ridge Canyon between San Juan Creek and Sulphur Canyon for occupation and dispersal by the cactus wren.

- Provide floodplain and upland habitat linkages adjacent to San Juan Creek for east-west and north-south dispersal by the cactus wren between the San Juan Creek and San Mateo Creek watersheds.

- Maintain upland north-south habitat linkages through the central and western portions of the Trampas Canyon subunit to convey dispersal of the cactus wren between San Juan Creek, San Juan Capistrano, San Clemente, Cristianitos Canyon, the Donna O'Neill Land Conservancy at Rancho Mission Viejo and Camp Pendleton.

- Provide for cactus wren dispersal by maintaining a ridgeline east-west habitat linkage south of the artificial lake in the Trampas Canyon subunit to link Prima Deshecha, Talega Open Space and other habitat to the west in San Juan Capistrano and San Clemente with the Donna O'Neill Land Conservancy and Gabino, La Paz and Talega canyons to the east.

- Protect a habitat linkage, consisting of the Donna O'Neill Land Conservancy and an area along the east side of Cristianitos Creek, to provide connectivity for cactus wrens in the upper portion of the sub-basin with other populations in lower Gabino Creek and Camp Pendleton along lower Cristianitos/San Mateo Creek, and to maintain habitat integrity through connectivity within the Donna O'Neill Land Conservancy at Rancho Mission Viejo.

e. Management Recommendations

- Pursuant to the Fire Management Plan, implement fire management to help protect patches of southern cactus scrub occupied by the cactus wren while protecting the public, property, and other resources, and, where appropriate reducing fuel loads for fire.

- Pursuant to the Grazing Management Plan, implement grazing management techniques to help protect patches of southern cactus scrub occupied by the cactus wren while allowing for continued cattle grazing sufficient to support cattle ranching operations, and, where appropriate reducing fuel loads for fire.

- Protect southern cactus scrub patches occupied by cactus wrens to the extent feasible from nest predation by non-native mesopredators (e.g., cats).

f. Restoration Recommendations

- Implement a CSS/VGL restoration program to enhance habitat connectivity and mitigate for impacts to existing habitat associated with future development. Identified restoration areas include Chiquita Ridge, Sulphur Canyon, Chiquadora Ridge and upper Gabino Canyon.

- Plant cacti, where appropriate, along the urban-Habitat Reserve edge to provide additional habitat for the cactus wren and to inhibit unauthorized intrusions into the Habitat Reserve by the public and domestic animals (cats and dogs).

4.2.2 Cooper's Hawk

Accipiter cooperii - Cooper's hawk
USFWS: None
CDFG: California Special Concern Species

a. Regional Status

The Cooper's hawk is a wide-ranging species in North America that breeds from British Columbia eastward to Nova Scotia and southward to northern Mexico and Florida (AOU 1998). Its nesting range includes southern British Columbia, northwestern Montana, Wyoming, eastern North Dakota, southern Manitoba, western Ontario, northern Michigan, southern Ontario, Southern Quebec, Maine, and Nova Scotia, south to Baja California, south-central Texas, Louisiana, central Mississippi, central Alabama, and central Florida (Terres 1980; Reynolds 1975).

Cooper's hawks winter from British Columbia eastward to New England and southward, primarily to Honduras (AOU 1998). Their wintering range includes Washington, Colorado, Nebraska, Iowa, southern Wisconsin, southern Minnesota, southern Michigan, southern Ontario, New York, southern Maine and Massachusetts, and south through the rest of the U.S. to Costa Rica (Terres 1980). Cooper's hawks are a large part of the great fall flights of hawks that pass over the U.S. in September, flying high and seemingly preferring to fly when the wind is from the northwest (Bent 1937).

Table 4-9 shows the distribution of the Cooper's hawk in California. For central and northern California counties the data are from the 2003 CNDDB and the more detailed information for Orange, San Diego and Riverside counties is from the conservation planning programs in those regions. As illustrated in *Table 4-9*, Cooper's hawks are widely distributed in California. The information in *Table 4-9* is intended to show the distribution in California in general and should not be interpreted as reflecting *major* or *important populations* or *key locations*. Cooper's hawks apparently may be found almost anywhere in suitable woodland habitats and a lack of information in a given area with habitat may be due to low survey effort. Also, interpretation of the occurrence data is complicated by the fact that many of the records may be for spring and fall migrating transients or a wintering population, and not just for the breeding population. However, locations in the Southern Subregion planning area are documented historic nest sites and do not include casual observations of migrants or winter visitors.

TABLE 4-9
DISTRIBUTION OF THE COOPER'S HAWK IN CALIFORNIA

County	General Location
Alameda County	Indian Joe Creek
Colusa County	Rail Canyon east of Bear Valley Road
Contra Costa County	South of Franklin Canyon Road
Fresno County	West of Baker Cutoff
Humboldt County	Maple Creek Road near Bear Creek
Imperial County	Northeast of Yuma, Bard, Potholes, Colorado River
Inyo County	Between Big Pine Creek and Baker Creek
Kern County	Walker Pass, South Fork Kern River at end of Lake Isabella

TABLE 4-9
DISTRIBUTION OF THE COOPER'S HAWK IN CALIFORNIA

County	General Location
Monterey County	Fort Hunter Liggett Military Reservation at intersection of Ruby Canyon and Old Man Canyon and Mission Creek north of Headquarters
Los Angeles County	Palmdale
Orange County Southern Subregion	Talega Canyon, Cristianitos Canyon, Gabino Canyon, La Paz Canyon, Verdugo Canyon, Blind Canyon, Chiquita Canyon, San Juan Creek, Bell Canyon, Wagon Wheel Canyon, Lower Cañada Gobernadora, Arroyo Trabuco, and Prima Deshecha
Orange County – Other Locations	Silverado Canyon
Placer County	Cedar Creek upstream of The Cedars
Riverside County MSHCP	Harford Springs County Park, Santa Rosa Plateau (Mesa de Colorado, Rancho Santa Rosa), Prado Basin-Santa Ana River, San Timoteo Canyon, Temescal Wash, Wasson Canyon, Slater Canyon, Temecula Creek, Murrieta Creek, Tucalota Creek, Vail Lake, Wilson Valley, San Bernardino and Cleveland National Forests, Box Springs Mountains, Mockingbird Canyon, Lake Mathews-Estelle Mountain, Gavilan Hills, Lake Perris-San Jacinto Wildlife Area-Mystic Lake, Quail Valley, Wildomar, Sage, Lake Skinner, Badlands, Bautista Creek, and Potrero Creek
Riverside County – Other Locations	Palm Canyon
San Bernardino County	Northeast of Granite Well, southwest of Hesperia, Victorville, Big Morongo Wildlife Sanctuary, Crystal Creek
Sacramento County	Goethe Park, White Rock Road, Mississippi Bar, Natomas East main drainage channel, Carmencita Road and Laguna Creek
San Diego County MSCP	Silverwood Wildlife Sanctuary, Sycamore Canyon, west Sycamore Canyon, on mesa north of McGinty Mountain, Loveland Reservoir, Sweetwater River, Lake Hodges, San Diego Wild Animal Park, Balboa Park, Dulzura Creek, San Ysidro Mountains.
San Diego County – MHCP	San Luis Rey River, Pilgrim Creek, San Marcos, Escondido
San Diego County – Other Locations	Scattered locations throughout western San Diego County and Borrego area, including Jacumba, Boucher Hill, Indian Canyon, Camp Pendleton, Santa Margarita River, San Diego River, Tijuana River
San Luis Obispo County	Baywood
Santa Barbara County	Botanic Garden, Upper Santa Ynez River
Santa Cruz County	East of Henry Cowell Redwoods State Park
Siskiyou County	Northwest slope of Bear Mountain
Tulare County	Eshom Creek
Ventura County	Santa Clara River east of Piru

Cooper's hawks hunt in broken woodland and habitat edges; it catches prey in the air, on the ground, and in vegetation, and sometimes runs prey down in dense thickets. It uses cover to hide, attack, and approach prey; it also soars and makes low, gliding search flights (Zeiner et al. 1990). Cooper's hawks primarily take avian prey, especially passerines. Peterson and Murphy (1992) found that avian prey made up 70 percent of the food items and 58 percent of the dietary biomass delivered to broods at two nests surrounded by a mixed grass prairie, with mammal prey making up the remainder. Cooper's hawks also prey on amphibians, reptiles and fish.

Cooper's hawks primarily breed in riparian areas and oak woodlands, and apparently are most common in montane canyons (Garrett and Dunn 1981; Hamilton and Willick 1996). They usually nest in second-growth conifer stands, or in deciduous riparian areas, usually near streams or open water (Zeiner et al. 1990). Throughout much of the west, the Cooper's hawk nests in stands of cottonwoods along stream courses, especially where the tree stands are fairly large (Call 1978). Denser stands of trees with moderate crown-depth are used for nesting. It appears that the vertical structure of the nest site tree is more important to the nest site selection than the horizontal structure (Wiggers and Kritz 1991). Nest trees tend to be taller and of greater diameter and have more canopy cover than the average tree in a given area; nest trees are often the largest tree in the nest site area (Bosakowski et al. 1992). Nests may be located on the horizontal limbs of a pine or hardwood, near the trunk or in the crotch of a hardwood tree species, usually 3-18 m (10-60 ft) above the ground (Harrison 1978). They also often nest just below the lowest live limbs (Zeiner et al. 1990). The nest is typically a platform of sticks and twigs lined with bark (Call 1978).

Cooper's hawks lay eggs from February through June, with clutch sizes of three to six eggs, but usually four or five eggs (Brown and Amadon 1968). The female primarily incubates the eggs for approximately 24 days (Terres 1980). Incubation usually begins after the third egg is laid, resulting in asynchronous hatching for later eggs. Young birds usually leave the nest at 30 to 34 days but continue to be brought food for up to seven weeks afterwards. Young may remain together near the nest for another five to six weeks (Rosenfield and Bielefeldt 1993).

Seasonal home ranges of Cooper's hawks have been estimated at about 784 ha (1,930 ac) with the daily home range averaging about 231 ha (570 ac) (Murphy et al. 1988). Cooper's hawks may require a minimum of 6 ha (15 ac) of relatively undisturbed woodland or riparian habitat for nesting (Call 1978). Nest sites of the Cooper's hawk within stands of oaks are located approximately 2.7 km (1.6 mi) apart and thus are distributed widely but sparsely within woodland habitat (Zeiner et al. 1990). Rosenfield et al. (1995) found a nesting density of 331 ha/pair (817 ac/pair) in a long-term study in rural Wisconsin. Studies of urban areas have reported a maximum density of 272 ha/pair (672 ac/pair) (Rosenfield et al. 1995). Cooper's hawks defend nesting territories of about 100 m (330 ft) around the nest.

The migratory patterns of the Cooper's hawk are complex. Although it is mostly a yearlong resident in California, some individuals from more northern areas migrate into California. Furthermore, within California, hawks may move downslope and south from areas of heavy snow and return to the general nesting area in the spring (Zeiner et al. 1990). As a result, fall and winter observations of Cooper's hawks may include local breeding residents, resident California hawks from higher elevations and migrant hawks from outside of California.

Some data are available on dispersal behavior. The mean distance from the natal site to the breeding site is 12 km (7.4 mi) for males and 14.4 km (8.9 mi) for females. Adult birds frequently reoccupy nesting areas and breeding site fidelity is assumed (Rosenfield and Bielefeldt 1993). The Cooper's hawk may reuse the same nest site for multiple years (Call 1978).

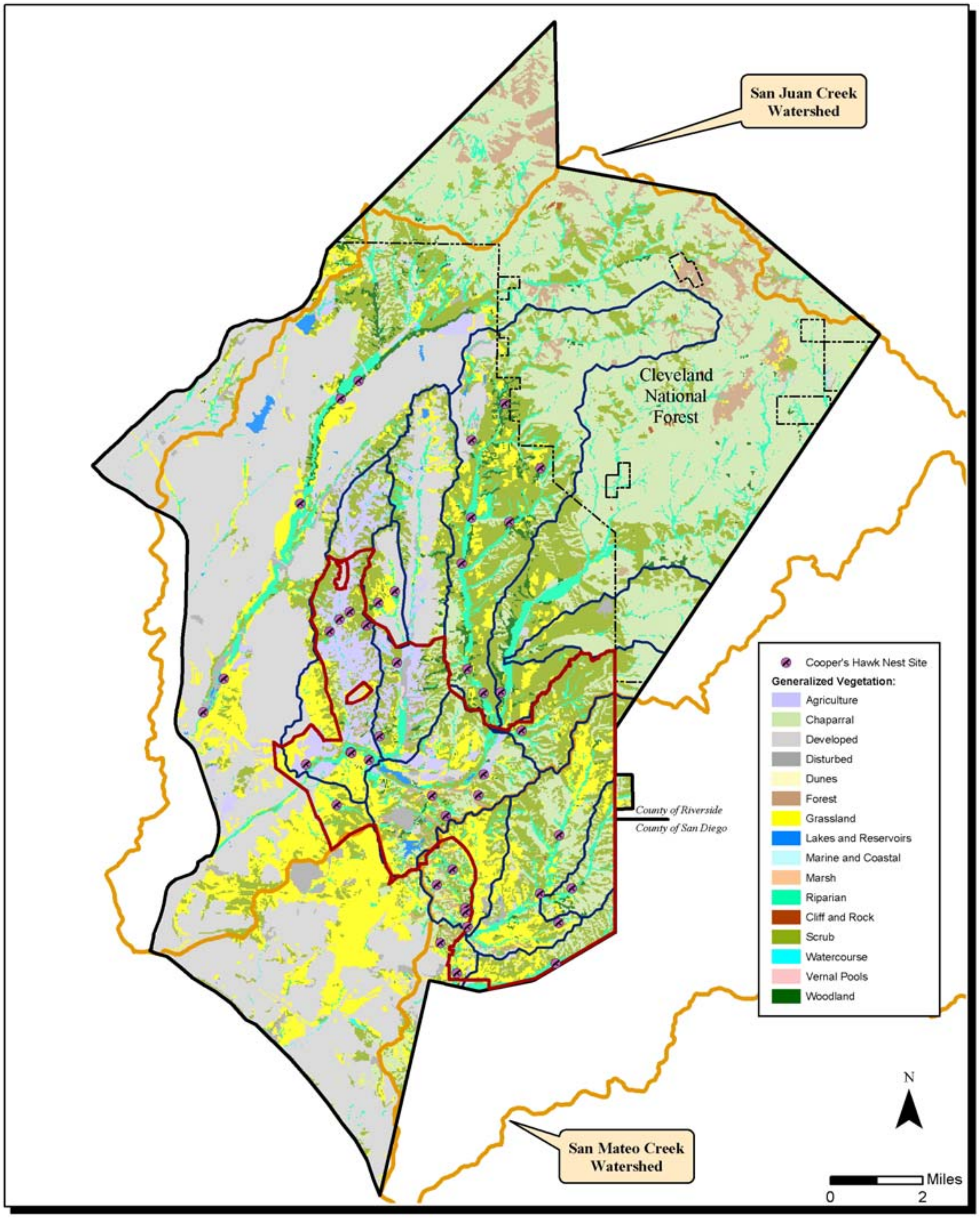
Although Cooper's hawks are relatively common in California, a decline in the population was noted by Remsen (1978). For example, approximately only 40 pairs were detected in Orange County during a breeding bird atlas survey effort (Gallagher 1996). A major decline that occurred in the 1970s during the nesting season probably was due to eggshell thinning resulting from pesticide exposure (Terres 1980; Henny and Wight 1972). However, habitat destruction, mainly in lowland riparian areas, due to urbanization and development is probably the main current threat, although direct or indirect human disturbance at nest sites may also be a factor (Remsen 1978; Boal and Mannan 1998).

Cooper's hawk appear to be somewhat tolerant of human activity in fairly urbanized areas and nest in suitable habitat within 30 m (100 ft) of residences, but their reproductive success in natural settings is substantially higher than in urban settings. Boal and Mannan (1999) recorded 50 percent nestling mortality in urban settings in southeastern Arizona compared to less than five percent in natural settings. Nestlings in urban settings primarily died from trichomoniasis (a parasitic protozoan that occurs in the digestive and urogenital tracts in many animals and humans) and adult hawks died from collisions, most often with windows.

Indirect effects on breeding success in urban settings also may have a behavioral component. The type of response and intensity of the Cooper's hawk aggressive response to human intrusion near a nest site varies among individuals and probably also varies with the stage of nesting. Many breeding birds respond to human activity by remaining inconspicuous, neither vocalizing nor behaving aggressively in the presence of humans, but some individuals may leave the immediate vicinity of the nest, possibly leading to failure of the nest (Rosenfield et al. 1995). However, distance thresholds at which hawks abandon nest sites has not been determined.

b. Subregional Status

The Cooper's hawk is still a relatively common breeding resident in riparian and woodland habitats in the Southern Subregion and occurs in most major drainages (*Figure 4-9* and *Table 4-9*). There are 44 historic nesting sites scattered throughout the planning area. While there are no apparent clusters of nesting sites, and no *major* or *important populations* or *key locations* are identified in the subregion, six drainages in the subregion account for 30 of the 44 (68 percent) of the historic nest sites: Chiquita Canyon (eight sites), Bell Canyon (eight sites), Central San Juan and Trampas Canyon (four sites), Cristianitos Canyon (five sites), and Arroyo Trabuco (five



Draft NCCP/HCP Planning Guidelines

Cooper's Hawk Distribution Map

FIGURE 4-9

sites). These drainages support high quality riparian and woodland habitats that serve the Cooper's hawk as well as many other species, including several other raptors such as white-tailed kite, long-eared owl, red-shouldered hawk, red-tailed hawk, barn owl and great horned owl. Mapped locations of Cooper's hawk nests in the planning area occur most frequently in southern coast live oak riparian woodland, and also in coast live oak woodland and savanna, southern arroyo willow forest, southern sycamore riparian woodland, and mule fat scrub.

c. Protection Recommendations

Recognizing that no single or a few *key location(s)* can be identified for the Cooper's hawk, the Protection Recommendations listed below reflect the broad distribution of the species in the planning area.

- Protect breeding habitat and, to the extent feasible, foraging habitat for the Cooper's hawk along Chiquita Creek and substantial riparian and woodland habitat in tributaries to the creek.
- Protect the riparian habitat in GERA that provides nesting habitat for Cooper's hawk.
- Protect breeding habitat, and to the extent feasible, foraging habitat for the Cooper's hawk along San Juan Creek, Cristianitos Creek, and lower Gabino Creek.
- Protect Cooper's hawk nest sites in the middle Gabino Canyon subunit and the Verdugo, Talega and La Paz canyons sub-basins.

d. Management Recommendations

- Protect downstream habitat in GERA for Cooper's hawk.
- Implement a management program for protected Cooper's hawk nesting habitat, including the minimization of human disturbance within 30 m (100 ft) of nest sites during the breeding season.

4.2.3 Grasshopper Sparrow

Ammodramus savannarum - Grasshopper Sparrow
USFWS: None
CDFG: None

a. Regional Status

The grasshopper sparrow breeds from eastern Washington south to southern California and northernmost Mexico, and eastward to Virginia. The species has a disjunct distribution through the western portion of the United States and is not present within the mountainous and desert regions. It occurs in the areas east of the Rocky Mountains from Canada to the southern states as a breeding resident. It is a year round resident in the western states and in the southern portions of the southeastern states (Vickery 1996). Grasshopper sparrows winter from California to North Carolina, south through Middle America to Costa Rica (AOU 1998). In southern California, the species occurs locally in appropriate habitats west of the deserts and has nested at elevations up to 1,500 m (4,920 ft) in the San Jacinto Mountains in western Riverside County (Garrett and Dunn 1981). It is an uncommon and local summer resident and breeder in foothills and lowlands west of the Cascade-Sierra Nevada crest from Mendocino and Trinity counties south to San Diego County, as well as Lassen County and Siskiyou County (Zeiner et al. 1990).

Information for the distribution and breeding status of the grasshopper sparrow in southern California is poor. The grasshopper sparrow has been characterized as secretive in the winter and may occur more regularly than indicated by infrequent records (Grinnell and Miller 1944; McCaskie et al. 1979; Garrett and Dunn 1981). However, documented observations of this species in most areas primarily are anecdotal, and because the species has no state status, records generally are not available in the CNDDB – only two records from Mendocino County are in the 2003 CNDDB. General locations for the species in San Diego, western Riverside and Orange counties, based on conservation program databases and regional accounts (Hamilton and Willick 1996; Unitt 1984), are summarized in *Table 4-10*. The Southern Subregion database is relatively complete because of the extensive surveys conducted for the SOCTIIP. While there are 730 locations in the Southern Subregion database, there are only 13 locations for the San Diego MHCP, 91 locations for the San Diego MSCP, and 20 “precision” records (i.e., records with a specific x- and y-coordinate) for the Western Riverside County MSHCP. Because of the lack of comparable survey efforts, the disparity in the number of locations in the different conservation planning areas cannot be interpreted as southern Orange County supporting the vast majority of the grasshopper sparrow population in southern California.

Migration information for the grasshopper sparrow is scarce because the species is very secretive in the winter. It is thought to winter rarely, but regularly, in California, chiefly along the southern coast. It migrates from breeding grounds to weedy fields with scattered trees or abandoned crop fields dominated by grassy plant species. Summer residents arrive in March to May, and most migrate south in August or September.

TABLE 4-10
DISTRIBUTION OF GRASSHOPPER SPARROW IN SELECTED
CONSERVATION PLANNING AREAS IN SOUTHERN CALIFORNIA

Area	Specific Locations
San Diego MSCP	Otay River Valley, Sweetwater Reservoir, Rancho San Miguel to Proctor Valley, Penasquitos Canyon-Carmel Mountain, Santa Fe Valley, north of Black Mountain
San Diego MHCP	Buena Vista Lagoon, north Carlsbad, north and south San Marcos, south and east Encinitas, south Escondido
San Diego – Other Locations (Unitt 1984)	Lake Henshaw, Warner Springs, Dyche Valley-Palomar Mountain
Western Riverside County MSHCP	Prado Basin, Santa Rosa Plateau, Kabian Park, Lake Mathews-Estelle Mountain, Wasson Canyon-Lake Elsinore, Murrieta, Temecula Mystic Lake-San Jacinto Wildlife Area-Lake Perris
Orange County Southern Subregion	Chiquita Canyon, Chiquadora Ridge, Gobernadora, Radio Tower Road area, Cristianitos Canyon, lower Gabino and Blind Canyons
Orange County – Other Locations	San Joaquin Hills, Mile Square Regional Park, Upper Newport Bay, Huntington Central Park

During the breeding season in California, grasshopper sparrows occur on mesas and slopes in dense, dry or well-drained grasslands, especially native grassland with a mix of grasses and forbs for foraging and nesting (Grinnell and Miller 1944; Garrett and Dunn 1981. Apparently, thick cover of grasses and forbs is essential for concealment. They require fairly continuous native grassland areas with occasional taller stems for breeding areas (Garrett and Dunn 1981). They especially occur in grasslands composed of a variety of grasses and tall forbs with scattered shrubs for singing perches (Zeiner et al. 1990). Grasshopper sparrows use a variety of forb species for perches and choose them predominantly on the basis of their height rather than the specific plant species (Payne et al. 1998). Although shrub and forb species are used for perching, they tend to avoid grassland areas with extensive shrub cover and the presence of native grasses is less important than the absence of trees (Smith 1963; Vickery 1996). Grasshopper sparrows typically forage on the ground and in low foliage for insects (especially Orthoptera), other invertebrates, and grass and forbs seeds, with grass seeds a large percentage of winter diet. Because the species is a visual predator, bare ground is important for foraging.

Grasshopper sparrows build distinctive ground nests that are well concealed. They are constructed of grasses and forbs in a slight depression in the ground or hidden at the base of an overhanging clump of grasses or forbs. Nests usually are domed or concealed with overhanging grasses and accessed from a side entrance (Bent 1968; Zeiner et al. 1990; Vickery 1996).

Territory sizes outside of California vary from 0.3 to 1.7 ha (0.8 to 4.3 ac), but no data are available for California nesting populations.

Grasshopper sparrows breed from early April to mid-July, with a peak in May and June. Clutch sizes usually are four or five eggs, but sometimes three or six. They may raise two or three broods per year, but additional clutches usually are smaller (Vickery 1996). The female incubates the eggs for approximately 11-12 days and then tends the young, which leave the nest at about nine days, although they are still unable to fly at this point (Harrison 1978). The male's role includes responding to predators near the nest and providing food for the young. Adult and juvenile non-parental attendants also are known to feed the young, and may make up to half the provisioning visits to the nests (Vickery 1996). The young of the first brood have usually dispersed from the natal territories when the adults are feeding the nestlings of the second brood (Vickery 1996). One study showed that predation was a major cause of nest failure (Perkins et al. 1998). Predation rates also appear to be highest for nests placed in grassland areas less than about 15 ha (37 ac) and for areas adjacent to wooded areas (Burger et al. 1994).

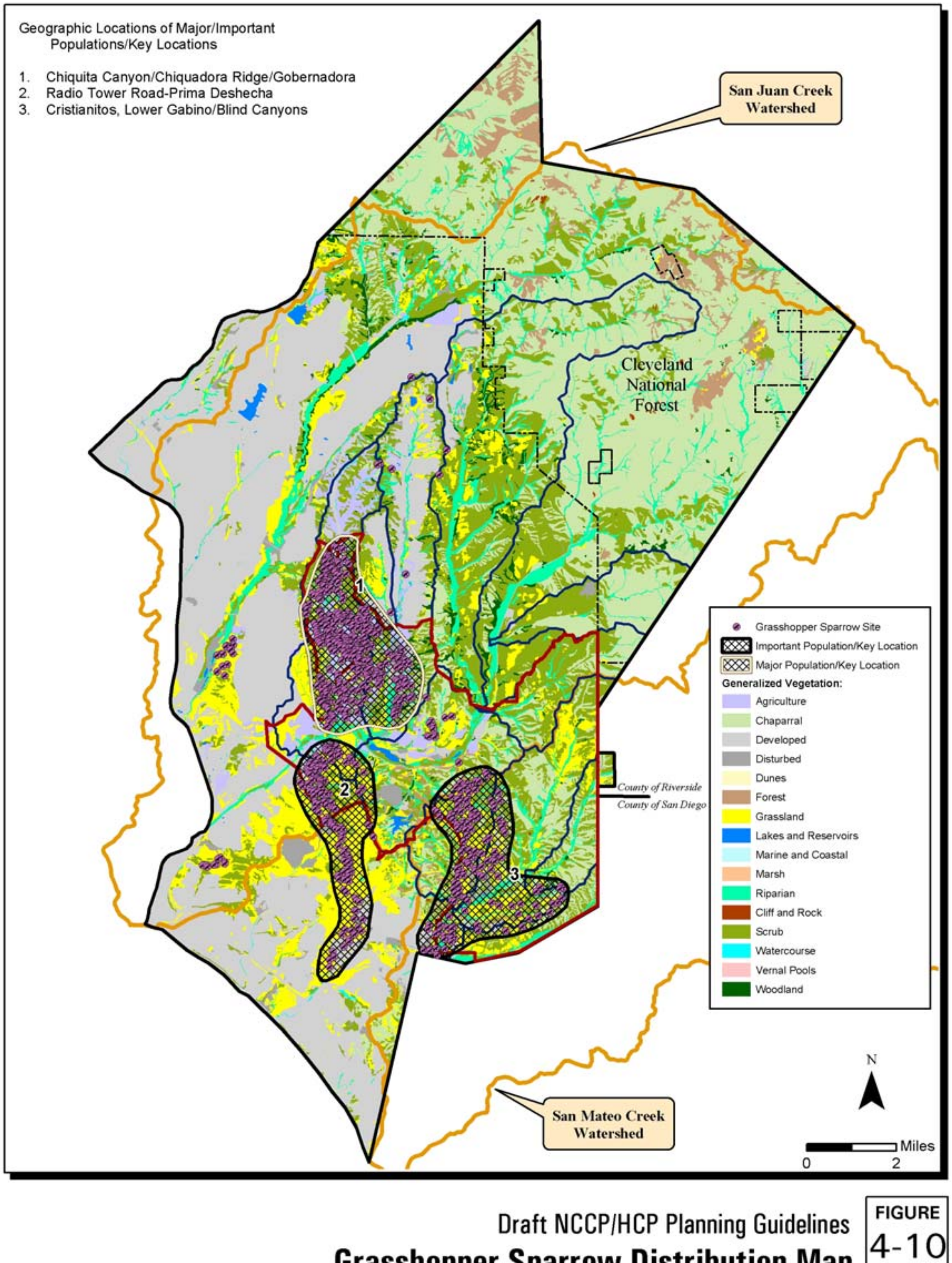
Human-related threats to the species apparently include habitat loss, degradation, and fragmentation. Extensive and intensive grazing in western North America has had a negative impact on this species (Vickery 1996). Garrett and Dunn (1981) concluded that the grasshopper sparrow has declined as a breeder in recent decades due to the development of open hilly areas that make up the grasshopper sparrow's preferred habitat. Brown-headed cowbird parasitism does occur but is generally considered low (Vickery 1996).

b. Subregional Status

The Southern Subregion planning area includes about 730 documented occurrences for the grasshopper sparrow. It should be noted that these observations are not documented nest sites and do not distinguish breeding pairs and single individuals, but they do reflect concentrations of habitat use in the planning area by the species. The planning area appears to support one *major population* and two *important populations* of the grasshopper sparrow that account for more than 90 percent of the locations in the subregion. Because these three populations account for more than 90 percent of the locations, all three are considered *key locations*.

- Middle and lower Chiquita Canyon (i.e., south of Oso Parkway), Chiquadora Ridge and Gobernadora support approximately 380 locations (No. 1 on *Figure 4-10*). These areas comprise a single *major population* because the farthest distance between any two locations is about 1,000 feet. This *major population* is also considered a *key location* because it supports approximately 52 percent of the total grasshopper sparrow locations in the planning area.

•



Draft NCCP/HCP Planning Guidelines
Grasshopper Sparrow Distribution Map
FIGURE 4-10

Grasslands in the Radio Tower Road area and extending south through the grasslands of Prima Deshecha to Avenida Pico support approximately 150 locations (No. 2 on *Figure 4-10*). These locations comprise an *important population* in a *key location*.

- The grasslands within Cristianitos Canyon and lower Gabino and Blind canyons support approximately 148 locations (No. 3 on *Figure 4-10*). These locations comprise an *important population* in a *key location*.

c. Protection Recommendations

- Protect at least 60 percent of the mapped grasshopper sparrow locations of the *major population* in a *key location* in the Chiquita and Gobernadora sub-basins.

- Protect at least 60 percent of the mapped grasshopper sparrow locations of the *important population* in a *key location* in the Cristianitos and Gabino and Blind Canyons sub-basins, and extending into the unnamed sub-basin south of the Cristianitos sub-basin.

- Protect at least 90 percent of the mapped grasshopper sparrow locations of the *important population* in a *key location* along Radio Tower Road on RMV property.

- Protect the majority of native grasslands and annual grasslands to the extent feasible supporting the *important population* in a *key location* in the southern Trampas Canyon and Cristianitos sub-basins. Minimize impacts to native grasslands elsewhere in the planning area.

d. Management Recommendations

- Implement a cowbird trapping program to mitigate for impacts to existing habitat within the Chiquita and Gobernadora sub-basins and for potential impacts associated with future development. The cowbird trapping program will be evaluated on an annual basis and trap locations and trapping effort will be adjusted as part of the overall Adaptive Management Program (e.g., if the number of trapped cowbirds drops to a prescribed threshold, the trapping program may be terminated or otherwise modified).

- Pursuant to the Grazing Management Plan, implement grazing management techniques to help protect the grasshopper sparrow and its habitat, promote perennial grasses including native grasses, allow for continued cattle grazing sufficient to support cattle ranching operations, and, where appropriate reduce fuel loads for fire. Note, under the Grazing Management Plan, it is likely that grasslands in upper Gabino Canyon will provide additional suitable habitat for the grasshopper sparrow.

- Pursuant to the Fire Management Plan, implement prescribed burning techniques to promote native perennial grasses.

e. Restoration Recommendations

- Implement a CSS/VGL restoration program to enhance habitat carrying capacity and connectivity. Restoration areas that would benefit the grasshopper sparrow include Chiquita Ridge, Sulphur Canyon, Chiquadora Ridge, upper Cristianitos and upper Gabino Canyon.

4.2.4 Merlin

Falco columbarius - Merlin
USFWS: None
CDFG: California Special Concern Species

a. Regional Status

The merlin's summer breeding range includes the interior or western North America from Alaska, through most of Canada, eastward to Newfoundland southward to Washington and Maine. It winters in southern California, northern Mexico and southern Texas. Within California merlins are an uncommon winter migrant from September to May. They occur in most of the western half of the state below about 1,500 m (3,900 ft) (Zeiner et al. 1990). It is a rare winter migrant in the Mojave Desert and a few records are from the Channel Islands (Zeiner et al. 1990). Merlin numbers have declined markedly in California in recent decades.

The CNDDB does not contain any occurrence records for the merlin. In San Diego County, Unitt (1984) characterizes the merlin as a rare winter visitor that is usually seen around agricultural areas, grasslands or mudflats, where they prey on shorebirds. In San Diego they are mostly seen along the coastal slope and only once, for example, in the Anza Borrego Desert at Agua Caliente Springs.

In western Riverside County, merlins also occur locally as very rare winter visitors in suitable habitat. It is more frequently observed within western Riverside County as a spring and fall migrant/transient, but even then it is infrequently observed and there are few records for the area. The merlin has been observed in western Riverside County in and around the Mystic Lake-San Jacinto Wildlife Area, the Jurupa Hills, Prado Basin-Santa Ana River, the Lakeview Mountains, Diamond Valley Reservoir, Wilson Valley, and Skunk Hollow (Dudek 2002).

In Orange County records for the species also are sparse, with observations at Dana Point, Bolsa Chica, San Juan Capistrano, Irvine, Peter's Canyon, Silverado Canyon and Yorba Regional Park (Hamilton and Willick 1996). Bloom and Bontrager have observed the merlin on RMV land on several occasions, as described below.

Merlins use a wide variety of habitats for breeding and foraging. Range-wide, merlins breed in open country (e.g., open coniferous woodland, prairie) and winter in open woodlands, grasslands, cultivated fields, marshes, estuaries and sea coasts (AOU 1998). Within southern California, birds are often found in these same habitats and are rarely found in heavily wooded areas or over open deserts (Garrett and Dunn 1981). Merlins frequent coastlines, open grasslands, savannas, woodlands, lakes, wetlands, edges, and early successional stages where they forage while flying at low levels primarily for avian prey species (Zeiner et al. 1990). Most studies report a specialization on one or two locally abundant species of small birds. A given principal prey species in an area usually is one of the most abundant species in the area; often forages away from cover making it more vulnerable to predation; and weighs in the range of 20 to 40 g (Sodhi and Oliphant 1993). Dense tree stands may be used for cover and frequently are close to bodies of water. They may nest in small groves of deciduous trees adjacent to open areas for foraging. They frequently occur in areas with undulating topography (Sodhi et al. 1993).

The merlin breeds in Alaska and Canada and is not a breeding resident in California. It may use abandoned stick nests of crows or magpies, usually in conifers but also in deciduous trees. Occasionally it nests in cavities, on cliffs, in deserted buildings, on the ground, or in old nests of other birds (Craighead and Craighead 1956; Brown and Amadon 1968). The clutch of four to five eggs is laid from late May into June. It incubates 28-32 days, and chicks fledge at about 24 days (Trimble 1972).

The decline of merlins in California may partially be the result of the conversion of suitable open foraging habitats, and also possibly due to environmental contaminants that have affected their prey base (Remsen 1978). Most nesting merlin populations are no longer affected by pesticide contamination and appear to be reproducing well. However, the loss of suitable habitat within important nesting site areas also may be the major factor affecting merlin numbers (Cade 1982).

b. Subregional Status

Although mapped merlin locations are not in the NCCP database, they are known to occur in Chiquita Canyon and Cañada Gobernadora. Bontrager reported three sightings on RMV in February-March 1990 (Bontrager 1990). Two merlins were observed during SOCTIIP surveys in 1995 north of Ortega Highway (MBA 1996); one in Chiquita Canyon south of Oso Parkway and the other on the ridge between Chiquita Canyon and Cañada Gobernadora. Bloom indicated that merlins are particularly apt to occur in lower Chiquita Canyon within approximately 275 m (900 ft) of the creek (*Figure 4-11*). Merlins also may be expected to forage in grasslands in Cristianitos Canyon, along Radio Tower Road, and in upper Gabino Canyon. Because this species is rare and not a resident breeding species, *major* and *important populations* are not identified. However, based on Bloom's assessment (Bloom, pers. comm.. 1998), Chiquita Canyon is considered a *key foraging location* for the merlin in the subregion (*Figure 4-11*).

c. Protection Recommendations

- Protect grassland foraging habitat to the extent feasible in the Chiquita Canyon, Cristianitos Canyon and upper Gabino Canyon sub-basins.

- Protect the major north-south connection to Central San Juan Creek by providing a habitat linkage between Chiquita Creek and the eastern edge of Ladera Open Space in order to maintain habitat integrity between the creek and the ridge.

- Protect grasslands south of San Juan Creek and Ortega Highway along Radio Tower Road to the RMV boundary with Prima Deshecha Landfill.

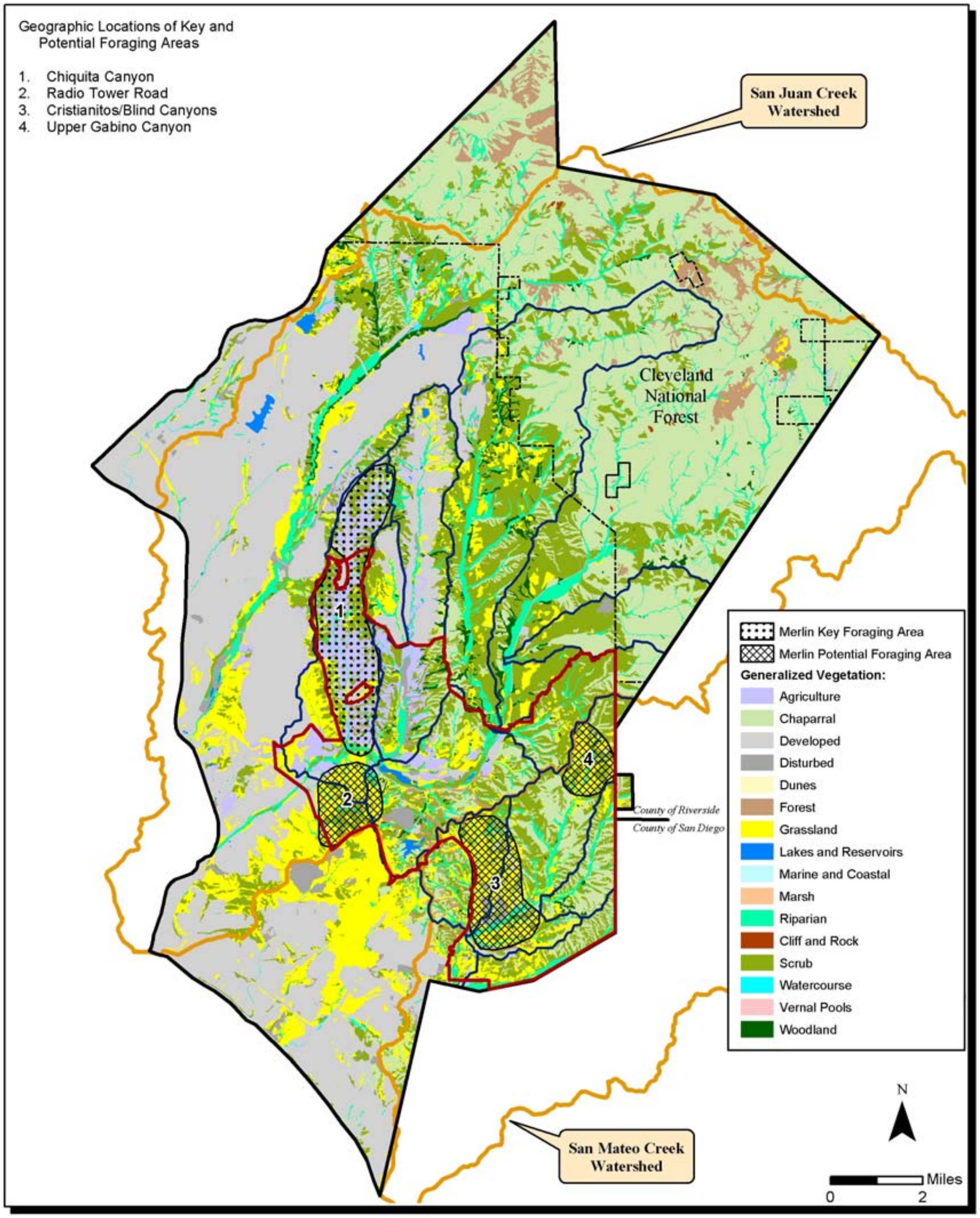
d. Management Recommendations

- Pursuant to the Grazing Management Plan, implement grazing management techniques to help protect foraging habitat for the merlin, promote perennial grasses including native grasses, allow for continued cattle grazing sufficient to support cattle ranching operations, and, where appropriate reduce fuel loads for fire.

- Pursuant to the Fire Management Plan, implement prescribed burning techniques to promote native perennial grasses.

e. Restoration Recommendations

- Implement a CSS/VGL restoration program to enhance foraging habitat value. Restoration areas that would benefit the merlin include Chiquita Ridge, Sulphur Canyon, Chiquadora Ridge, upper Cristianitos and upper Gabino Canyon.



Draft NCCP/HCP Planning Guidelines

Merlin Key and Potential Foraging Habitat Map

FIGURE 4-11

4.2.5 Tricolored Blackbird

Agelaius tricolor - Tricolored Blackbird
USFWS: Birds of Conservation Concern
CDFG: California Special Concern Species

a. Regional Status

The tricolored blackbird has a relatively restricted breeding range that extends from southern Oregon and the Modoc Plateau of northeastern California, south through the lowlands of California west of the Sierra Nevada to northwestern Baja California (Grinnell and Miller 1944). It is estimated that 95 percent of the tricolored blackbird population is in California. The species is not migratory, but is nomadic and highly colonial, although the pattern of nomadism is poorly known (Orians 1961). Exhibiting a behavior called "itinerant breeding" (Collier 1968; Orians 1961), large flocks may appear suddenly in areas from which they have been absent for months, breed, and then quickly leave.

The tricolored blackbird is mostly a resident in California and locally common throughout the Central Valley and in coastal areas from Sonoma County south (Zeiner et al. 1990). Since 1980, active breeding colonies have been observed in 26 California counties and most of the largest colonies are in the Central Valley (Beedy and Hamilton 1999). It breeds locally west of the Cascade Range, Sierra Nevada, and southeastern deserts from Humboldt and Shasta counties south to extreme southwest San Bernardino County, western Riverside County and western and southern San Diego County. In Central California, its breeding range extends east into the foothills of the Sierra Nevada (Beedy and Hamilton 1999). It is a summer resident in northeastern California, occurring regularly only at Tule Lake, but has bred some years as far south as Honey Lake and in the marshes of the Klamath Basin in Siskiyou and Modoc counties (Zeiner et al. 1990). In the southern deserts, it is found regularly only in Antelope Valley, Los Angeles County. In winter, it becomes more widespread along the central coast and San Francisco Bay area (Grinnell and Miller 1944; McCaskie et al. 1979; Garrett and Dunn 1981).

The 2003 CNDDB contains 347 records for the tricolored blackbird, of which 211 are recent and 136 are historical. Of these records, 275 of the sites are considered extant, 58 possibly extirpated and 14 extirpated. The CNDDB suppresses the specific locations for the species because of its sensitivity.

The Point Reyes Bird Observatory coordinated a statewide survey for the tricolored blackbird in 2001 (Humple and Churchwell 2002). A total of 142,000 birds was observed at colony sites. This compared to 162,000 in 2000, 240,000 in 1997 and 370,000 in 1994, indicating a continued decline in the species. The ten largest colonies are located in the Central Valley in Merced, Tulare, Fresno, Colusa, and Kern counties and range in size from 5,000 to 30,000 birds and account for 118,000 (83 percent) of the birds observed in 2001 (Humple and Churchwell 2002). Of the 10 largest colonies, seven are on private lands and three are on public lands (Humple and Churchwell 2002). It is important to note that prior to 1992 at least two breeding colonies numbered 120,000 (Laguna Seca) and 150,000 (Grey Hill Duck Club).

Some general locational information for the tricolored blackbird in coastal southern California is available through the various conservation planning programs and is summarized in *Table 4-11*.

TABLE 4-11
DISTRIBUTION OF THE TRICOLORED BLACKBIRD IN SELECTED CONSERVATION PLANNING AREAS IN SOUTHERN CALIFORNIA

Area	Specific Locations
San Diego MSCP	Mother Miguel Mountain, Otay River Valley, Lindo Lakes, Sweetwater Reservoir, Tijuana River Valley, San Diego River, miscellaneous small populations in other drainages
San Diego MHCP	San Luis Rey River, Pilgrim Creek, Buena Vista Lagoon, Batiquitos Lagoon, San Elijo Lagoon, Kit Carson Park
Western Riverside MSHCP	Santa Ana River, Lake Mathews, Lake Elsinore, Alberhill, Lake Murrieta, Vail Lake, Wilson Creek, Lake Riverside, Hemet Lake, San Jacinto Sewage Ponds, San Jacinto, Lakeview, Mystic Lake, San Jacinto Wildlife Area, March Air Reserve Base, Sycamore Canyon Regional Park, the Badlands, San Timoteo Creek
Orange County Southern Subregion	Chiquita Canyon north and south of the "Narrows," lower Canada Gobernadora, grassland south of Ortega Highway, CalMat in San Juan Creek, Trampas Canyon, Riverside Cement north of Gabino Canyon, mouth of Verdugo Canyon
Orange County – Other Locations	San Diego Creek, Peters Canyon Regional Park; localized nesting colonies in Carr Park, Huntington Beach and Tewinkle Park, Costa Mesa

Although the tricolored blackbird is not migratory over most of its range, it leaves Oregon, northeastern California, Santa Barbara County and eastern San Diego County in fall and winter, presumably migrating south (Zeiner et al. 1990; Beedy and Hamilton 1999). Flocks of the species become nomadic in fall, seeking food (Zeiner et al. 1990). In winter, flocks become more widespread from Marin to Santa Cruz counties and in the Sacramento River Delta (Zeiner et al. 1990).

The tricolored blackbird forms the largest breeding colonies of any North American passerine bird that relies on specific habitat requirements (e.g., up to 150,000 as noted above). Large breeding colonies require nearby water, suitable nesting substrates, and open-range foraging habitat composed of grassland, woodland, or agricultural cropland. In winter, they often form single-species, and sometimes single-sex, flocks, but they also flock with other blackbird species. As a nomadic or "itinerant" breeding species, they often change their nesting locations from year to year. These changes may be an adaptation to exploit rapidly changing environments in ephemeral habitats, provide secure nesting sites, and provide plentiful insect food supplies (Beedy and Hamilton 1999).

While the tricolored blackbird is frequently an itinerant and opportunistic breeder, it generally is associated with wetland habitat and prefers emergent vegetation and protected habitats near wetlands for nesting. Its preferred, or primary, habitat includes freshwater marsh and cismontane alkali marsh. It may use a wide variety of habitats, including flooded agriculture lands, pastures, and grasslands in a very nomadic and unpredictable manner for foraging (Garrett and Dunn 1981). The tricolored blackbird also has been documented to use riparian forest habitats occasionally for nesting.

Primary breeding habitats of the tricolored blackbird include freshwater marsh and cismontane alkali marsh, preferably in emergent wetland with tall, dense cattails or tules, but also in thickets of willow, blackberry, wild rose, tall herbs and forages in grassland and cropland habitats (Ziener et al. 1990). The species seeks cover for roosting in emergent wetland vegetation, especially cattails and tules, and also in trees and shrubs (Zeiner et al. 1990). Although true marsh habitat with its growth of cattails and tules is favored, marshes are not necessary for the nesting of the species and it may nest in other protective vegetation, including shrubs (Neff 1937). Within the Central Valley, colonies generally are found in the rice lands of the Sacramento Valley and pasture lands of the lower Sacramento Valley and San Joaquin Valley. Colonies outside the Central Valley may occur in several different habitat types, including areas surrounded by chaparral-covered hills extending for miles, orchards, or sagebrush-grasslands adjacent to salt marsh (DeHaven et al. 1975).

An important finding for the management of this species is that it appears to respond very well to habitat manipulation. Humple and Churchwell (2002) report that a man-made bulrush wetland at the San Jacinto sewage treatment ponds in Riverside County immediately attracted a breeding colony of tricolored blackbirds in 1993 and was the largest colony (35,000 birds) in southern California in 1994. It also is important to note that these ponds are bordered by large alfalfa fields and pasture that provide substantial foraging habitat.

Nest sites usually are located a few feet over, or near, fresh water, but also may be hidden on the ground among low vegetation. The tricolored blackbird builds its nest of mud and plant materials (Zeiner et al. 1990). Because it is a highly colonial species, the nesting area must be large enough to support a minimum colony of about 50 pairs (Grinnell and Miller 1944). The breeding territory, which includes only the vicinity of nest, is usually about 3.3 sq m (11 sq ft), or less, in dense vegetation, but may be larger in less suitable cover (Orians 1961). The usual breeding season is mid-April into late July (Payne 1969). Orians (1960) also reported active breeding in October and November in Sacramento Valley, although nesting success was low. Individual pairs in breeding colonies may initiate nesting synchronously. Even in colonies of up to 50,000 to 100,000 nests, all first eggs may be laid within one week (Orians 1961). The species is polygynous; each male may have several mates nesting in his small territory (Orians 1961). As described above, the tricolored blackbird is an "itinerant breeder." An example of this breeding strategy is a study in which in April all observed tricolored blackbirds were in the vicinity of one breeding colony, but in May and June populations declined in this area and increased in another as breeding birds moved to the new breeding area (Hamilton 1998).

Clutch size is typically three or four eggs, with clutches of two or five eggs observed occasionally (Emlen 1941). The first egg is usually laid the day after the nest is completed and even occasionally before completion. One egg is then laid per day for one to five days (Emlen 1941). The species may raise two broods per year (Terres 1980), which is consistent with the "itinerant breeding" behavior described above. Incubation lasts about 11 days and the young are tended by the female or by both parents (Lack and Emlen 1939). The young leave the nest at about 13 days (Zeiner et al. 1990). The species probably first breeds at one year (Harrison 1978).

Although percent nesting success and survival of young has not been determined in detail, the tricolored blackbird has been documented to suffer widespread nest failure. Frequently the entire colony abandons nests with eggs or nestlings (Orians 1961), often with no obvious destruction or predation of eggs (Lack and Emlen 1939). The abandonment leads to a departure of the entire colony, sometimes to an unknown area of unknown distance (Lack and Emlen 1939). Abandonment may occur for several reasons: a change in the food supply in the area due to drought; poor timing of nesting; or disturbance from harvest activities within the nesting area (Orians 1961).

Dispersal behavior of blackbirds is complex. While colonies have relatively high site fidelity (i.e., breeding colonies regularly return to the same breeding site), individual birds show relatively low fidelity to their natal areas. For example, a study of banded fledglings showed that only 39 percent returned to areas with 16 km (10 mi) of their natal colony (DeHaven et al. 1975).

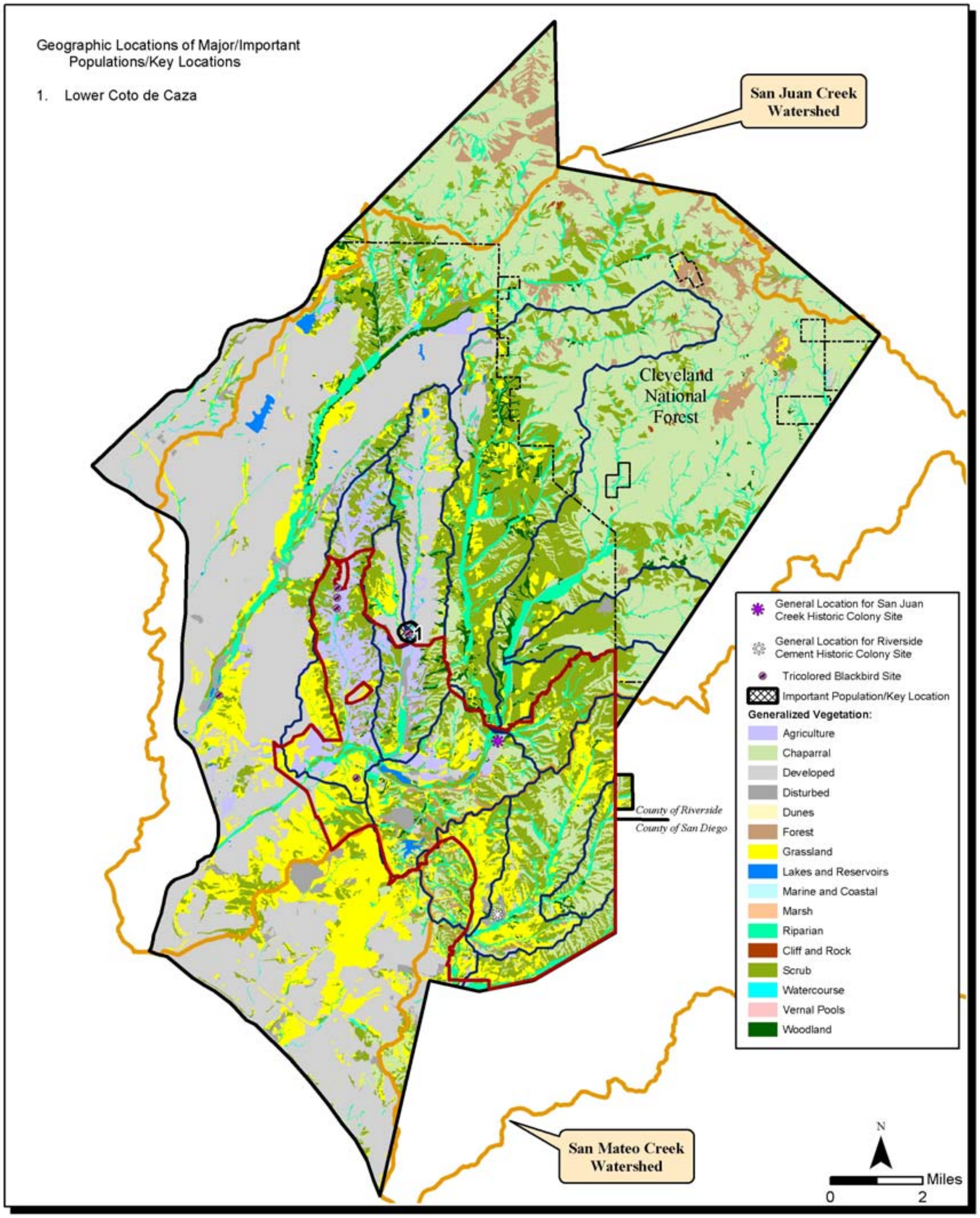
Available foraging habitat within a few kilometers of the nesting area is a basic requirement of the species. Nests may be located up to 6.4 km (4 mi) from foraging areas (Orians 1961). The tricolored blackbird forages on the ground in crop lands, grassy fields, flooded land, irrigated pastures, lightly grazed rangelands, dry seasonal pools, mowed alfalfa fields, feedlots, dairies, and along edges of ponds (Zeiner et al. 1990; Beedy and Hamilton 1999). The diet of the tricolored blackbird in California is predominantly animal matter. Insects and spiders make up about 86-91 percent of the nestling and fledgling diet and 28-96 percent of the adult diet in spring and summer (Skorupa et al. 1980). Seeds and cultivated grains, such as rice and oats, are other major foods, and compose most of the fall and winter diet (Martin et al. 1961).

The decline of the tricolored blackbird has been attributed to several factors. Loss of breeding and foraging habitat are a key factor, but pollutants and predation by mesopredators (e.g., opossum, feral cats) and native birds (e.g., black-crowned night heron) appear also to have contributed to the decline of this species. Poisoning, either deliberate (to control crop depredation) or indirect, and increased disturbance by humans from agriculture operations such as harvesting, have been cited as contributing to the continued population decreases (Beedy et al. 1991). Contamination by trace elements (selenium) and pesticides are a potential cause of nesting failures (Beedy and Hayworth 1987). Contaminants can have direct effects on individuals, but perhaps more importantly, may indirectly affect the food supply.

b. Subregional Status

Although the Southern Subregion does not support the large colonies reported elsewhere in western Riverside County and the Central Valley, breeding colonies of tricolored blackbirds consistently have been observed in various locations in the planning area since about 1989: upper Chiquita Canyon above the "Narrows" and in lower Chiquita just below the "Narrows;" lower Canada Gobernadora in both south Coto de Caza and in grasslands on RMV; and grasslands south of Ortega Highway south of a Ranch residence. Other locations for the tricolored blackbird observed in the past include the "CalMat" colony along San Juan Creek east of the intersection of Cristianitos Road and Ortega Highway, the "Silica Products" colony in Trampas Canyon, the "Riverside Cement" colony just north of Gabino Canyon, and east of lower Arroyo Trabuco Creek between Avery and Crown Valley parkways. (Note: mapping of the sites in the database has been inconsistent, and most of the site locations are based on narrative descriptions.) The CNDDB includes a 1992 record of a small breeding colony at the mouth of Verdugo Canyon under the Ortega Highway bridge.

Because of the nomadic behavior of this species, it is difficult to define *important populations* or *key locations*. However, at least one area seems to fit this definition. Breeding colonies of several thousand birds consistently were observed in lower Gobernadora in ponds in south Coto de Caza from 1993 to 1996 (Ortega, pers. comm. 1996) (No. 1 on *Figure 4-12*). During cowbird trapping in 1996, 1,400 tricolored blackbirds were non-target captures in lower Coto de Caza. Wintering flocks have been observed as recently as 2002 on RMV property just south of the breeding area (Behrends, pers. obs.). This area should be considered to support an *important population* in a *key location*. Other locations listed above have shown sporadic occupation by the blackbird. For example, during SOCTIIP surveys in 1994 a small colony was presumed to



Draft NCCP/HCP Planning Guidelines

Tricolored Blackbird Distribution Map

FIGURE 4-12

have nested in Chiquita Canyon above the "Narrows" (*Figure 4-12*). This nesting colony was not observed in 1995, although a small flock was observed foraging near the nest site in 1995 (MBA 1996).

The limiting factor for the tricolored blackbird in the Southern Subregion likely is suitable nesting sites rather than foraging habitat. RMV supports 18,000+ acres of grassland and agriculture which should be adequate to support nesting populations in the 10s of thousands, compared to the largest observe population of "several" thousand birds nesting in the lower Gobernadora ponds on Coto de Caza.

c. Protection Recommendations

- Protect grassland habitat in the valley bottom in the northern portion of lower Gobernadora on RMV property to support a breeding colony of the tricolored blackbird. This colony is an *important population* in a *key location*. (The existing nesting ponds are located within Coto de Caza. Also note that tricolored blackbird nests may be up to 6.4 km [4 mi] from foraging areas [Orians 1961] so having grassland foraging habitat in immediately adjacent to breeding areas is not essential for maintaining a successful breeding population. (For the Irvine Ranch Water District Water Supply project analysis, suitable foraging habitat within a 5 km [3.1 mi] buffer area of nesting sites was determined. This buffer area was based on a species account for the tricolored blackbird prepared by K. Campbell [no date]).

- Maintain and manage aquatic habitats (bulrush and cattails) along San Juan Creek to support a breeding colony of the tricolored blackbird. The minimum size nesting area to support at least 50 pairs of the tricolored blackbird is 500-600 sq ft.

- Protect grasslands and wetland/riparian habitat at the mouth of Verdugo Canyon to provide potential breeding habitat for the tricolored blackbird colony observed in the past under the Ortega Highway bridge at this location.

- Protect additional areas where tricolored blackbirds have been observed in the past to the extent feasible, including freshwater and alkali marsh habitats and adjacent grasslands in the "Narrows" area of Chiquita Canyon, the area south of the Ranch residence south of Ortega Highway, and the "Riverside Cement" area north of Gabino Canyon.

d. Management Recommendations

- Protect potential breeding areas for the tricolored blackbird by maintaining hydrology and water quality and minimizing additional loadings of nutrients or toxics.

Protect grassland foraging habitats adjacent to breeding areas by implementing Integrated Pest Management Practices (e.g., minimizing the use of any pesticides on golf courses that could be toxic to tricolored blackbirds either directly or indirectly through prey).

- Implement a management program for breeding areas, including control of non-native predators (e.g., feral cats and opossums), management of grazing and minimization of human access and disturbance as part of the Adaptive Management Program.

e. Restoration Recommendations

- Consider establishment of suitable breeding habitat for the tricolored blackbird in association with the creation of new natural treatment systems water quality wetlands.

4.2.6 White-tailed Kite

Elanus leucurus - White-tailed Kite
USFWS: Migratory Nongame Bird of Management Concern
CDFG: Fully Protected

a. Regional Status

The current range of the white-tailed kite in North America includes California, Oregon, southern Washington, southern Texas and Florida. This species was threatened with extinction in North America during the early twentieth century, but since 1960 the population and range of this raptor in North America have improved markedly. It also has rapidly colonized habitats throughout much of Central America in regions previously uninhabited (Eisenmann 1971). The main breeding area of the kite in North America remains in California, with nearly all areas up to the western Sierra Nevada foothills and southeast deserts occupied by the species (Small 1994; Dunk 1995). It is common in the Central Valley of California and along the entire length of the coast. Breeding also has been documented regularly in the western counties of Oregon, as well as recently in southern Washington. It is a common breeder in southern Texas and a small breeding population has established in southern Florida since at least 1986, with scattered reports elsewhere in the peninsula and in the eastern panhandle (Dunk 1995). Its breeding range continues south along the coast in Mexico, into Central America and in South America from Colombia south to Buenos Aires, Argentina (Dunk 1995).

In California, the white-tailed kite is a common to uncommon year-long resident in coastal and valley lowlands. It is rarely found away from agricultural areas (Grinnell and Miller 1944). It inhabits herbaceous and open stages of most habitats in cismontane California. It has extended its range and increased numbers in California in recent decades (Eisenmann 1971). *Table 4-12* provides a summary by county of white-tailed kite observations from the 2003 CNDDB (62 records) and other local sources, including Hamilton and Willick (1996) for Orange County, Unitt (1984) for San Diego County and Dudek (2002) for western Riverside County. It should be noted that the observations include both breeding and non-breeding records. Also, the information in *Table 4-12* should be considered only as representative of the kite's broad distribution in California and is not intended to reflect *major* or *important populations* or *key locations*. As explained below, kites appear to track prey populations and may be found almost anywhere adequate prey occur.

TABLE 4-12
DISTRIBUTION OF THE WHITE-TAILED KITE IN CALIFORNIA

County/Area	General Locations
Alameda County	Coyote Hills Regional Park, South San Francisco Bay, east of Bethany Reservoir, Berkeley Yacht Harbor area
Colusa County	Lurline Creek
Contra Costa County	Brooks Island, Wildcat Creek Marsh, Antioch
Del Norte County	Mouth of Jordan Creek
Marin County	Novato
Napa County	Napa River Ecological Reserve, Haystack Mountain
Orange County Southern Subregion	Arroyo Trabuco, Chiquita Canyon, Gobernadora, Wagon Wheel Canyon, San Juan Creek, Bell Canyon, Trampas Canyon, Cristianitos Canyon, Gabino Canyon, La Paz Canyon, and Talega Canyon
Orange County – Other Locations	San Joaquin Marsh, Bolsa Chica
Placer County	South Branch of Pleasant Grove Creek
Riverside County MSHCP	Prado Basin-Santa Ana River, Lake Mathews-Estelle Mountain, Temescal Wash, Wasson Canyon, Murrieta Creek, Temecula Creek, Santa Rosa Plateau (Mesa de Burrro, De Luz Creek, Mesa de Colorado, Rancho Santa Rosa), Vail Lake, Wilson Valley, Lake Skinner, Mystic Lake-San Jacinto Wildlife Area-Lake Perris, San Timoteo Creek, and Gavilan Peak
Sacramento County	Dillard Road/Hwy 99, Courtland, Cosumnes River, Hedge Ave., Mather Lake, Blodgett Reservoir, Coyote Creek south of Folsom, American River behind Rio Americano High School, Goethe Park, Elder Creek Road, McCoy Avenue, Snipes/Pershing Ravine, Sailor Bar, Woodbridge Park, Sacramento Bar, Folsom Blvd. in Rancho Cordova, Don Julio Creek
San Diego County	Tule Canyon, French Canyon, Cockleburr Canyon and Las Flores Creek on Camp Pendleton; northwest Carlsbad, Batiquitos Lagoon, Sycamore Canyon, Tijuana River Valley, San Felipe Valley, Sentenac Canyon, Anza Borrego, San Luis Rey River, San Dieguito River
San Luis Obispo	Camp San Luis Obispo
San Mateo County	Bair Island
Santa Clara County	South San Francisco Bay
Solano County	Batavia Road, Midway and Buckley Roads, Road 104 south Tremont Road, north of Walnut Road east of Willow Road, Lewis Road Farmstead
Sonoma County	Russian River-Healdsburg
Tehama County	North and west of Gerber
Ventura County	Santa Clara River
Yolo County	County Road 96 west of Davis, County Road 113 northwest of Davis, El Macero Road, County Road 30B east of Davis, Putah Creek

Although the white-tailed kite is a resident bird throughout most of its breeding range, non-breeding season dispersal occurs, resulting in some range expansion during the winter. For example, Hamilton and Willick (1996) comment that although uncommon during the breeding season, kites are fairly common during fall and winter in Orange County and may occur in flocks of 30 or more birds at locations such as Bolsa Chica, San Joaquin Marsh and Gen. Thomas F. Riley Regional Park.

White-tailed kite foraging habitat includes grasslands, open shrub, agricultural areas, wetlands dominated by grasses, fence rows and irrigation ditches (with residual vegetation) adjacent to grazed lands, riparian, oak woodlands, coastal sage scrub, and saltmarsh. They forage in almost any habitat with a dense population of voles (*Microtus* spp.); its main prey in coastal Southern California is the California vole (*M. californicus*). It also preys on other small, diurnal mammals, and occasionally on birds, insects, reptiles, and amphibians. It takes small mammal prey approximately 95 percent of the time and can be considered a small mammal specialist (Dunk 1995). Tall grasslands have the highest suitability because they provide good vole habitat (Faanes and Howard 1987). Kites forage from a central perch to an area as large as 486 ha (1,200 ac). However, they seldom forage farther than 0.8 km (0.5 mi) from the nest during the breeding season (Hawbecker 1942).

Kites may become nomadic during low vole abundance, and the population fluctuations appear to track vole numbers. However, in northern California it is unclear whether fluctuations are normal migration movements or nomadic responses to changes in the prey densities (Dunk and Cooper 1994).

The breeding density of the white-tailed kite varies greatly, ranging from one pair per 26-472 ha (64-1,166 ac). Vole density at the onset of breeding appears to influence the kite density and it is likely that breeding densities vary even more dramatically than reported above (Dunk 1995). Where prey density is not the limiting factor, the availability of nesting and roosting sites becomes important (Dunk and Cooper 1994). Generally kites are not territorial, but nest sites may be defended against crows, other hawks, and eagles (Pickwell 1930; Dixon et al. 1957). They also have been observed to defend foraging territories of about 0.1 sq km. (0.04 sq mi) in winter against red-tailed hawks and northern harriers (Bammann 1975). The success of nesting appears to be related to surrounding land uses. Erichsen et al. (1996) documented that successful nests were surrounded by more natural vegetation and non-urban human development (e.g., agriculture) within a 0.8-km (0.5 mi) radius circle centered on the nest site compared to failed nests.

The white-tailed kite breeding season is February to October, with the peak from May to August. Kites are monogamous through the breeding season, although some pairs remain together year-round (Dunk 1995). Nests of loosely piled sticks and twigs lined with grass, straw, or rootlets are placed near the tops of oaks, willows, or other tree stands (more than 20 species have been documented as nest sites) from 6-20 m (20-100 ft) above ground (Dixon et al. 1957). Nests are located near open foraging areas. Nest trees may be isolated or part of a contiguous forested area and tree structure apparently is the most important determinant of use for the nest site (Dunk 1995). Communal roosts are used in the non-breeding seasons (Waian and Stendell 1970).

The average kite clutch is four or five eggs, with a range of three to six eggs. The female is responsible for incubation, which lasts about 28 days. The young fledge in 35-40 days. During the incubation and nestling period, the male feeds the female, and supplies her with food to feed the young. Kites usually produce a single brood per breeding season, but may occasionally have two broods.

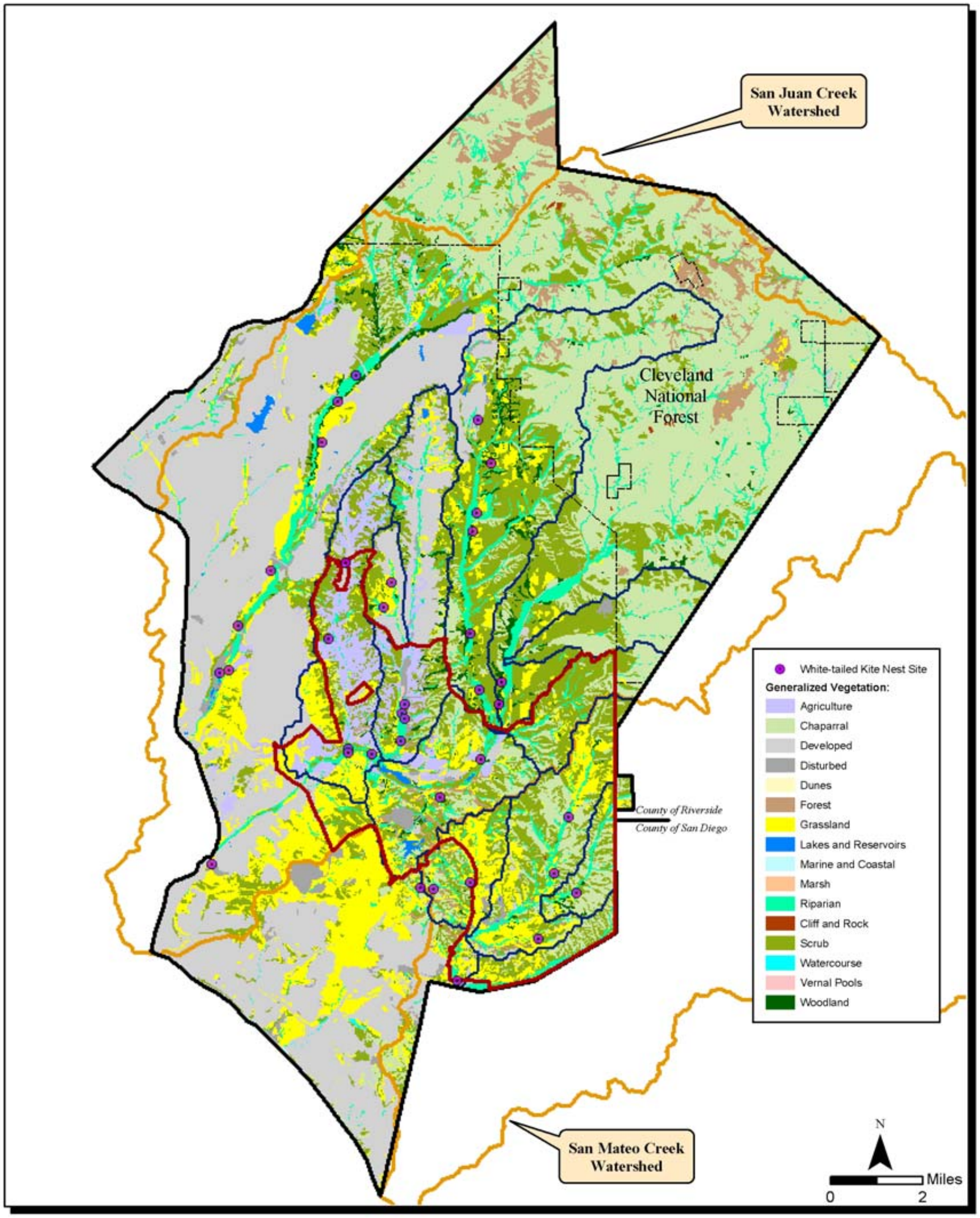
Dispersal information includes two white-tailed kites banded as nestlings that were recovered 19 km (11.8 mi) and 160 km (99 mi) from their nests (Dixon et al. 1957). Other anecdotal information indicates that kites are capable of dispersing long distances over inhospitable habitat. For example, a total of 26 kites dispersed from the California mainland over 80 km (50 mi) to San Clemente Island in 1984 over a two month period, formed a communal roost through December, and then departed the island by spring without nesting (Scott 1994).

The California population of the white-tailed kite originally was reduced by habitat loss, shooting and possibly egg collecting (Pickwell 1930). Although the population rebounded, current breeding bird surveys indicate that the population numbers are again declining in some areas (Dunk 1995). This apparent decline may be due to the conversion of natural or agricultural lands to urban or commercial property; clean farming techniques that leave few residual vegetation areas for the prey; increased competition for nest-sites with other raptors and corvids; a relatively long-term drought throughout California during much of the time from 1982 to 1991; and increased disturbances at the nest (Dunk 1995). A significant threat to the species is the degradation of habitat, especially the loss of nest trees and foraging habitat (Dunk 1995).

White-tailed kites appear to respond to habitat management. In northern California, CDFG purchased previously grazed grasslands and largely removed them from grazing. As of 1995 these areas supported large populations of voles and high densities of wintering white-tailed kites, approximately 10 times the raptor density they supported prior to the purchase (Dunk 1995).

b. Subregional Status

There is a total of 37 historic nest sites for the white-tailed kite scattered throughout the planning area (*Figure 4-13*). These nest sites are located in southern coast live oak riparian forest and woodlands, southern arroyo willow forest, southern sycamore riparian woodland, southern



Draft NCCP/HCP Planning Guidelines

White-tailed Kite Distribution Map

FIGURE 4-13

willow scrub, and along intermittent rivers and streams. Because the nest sites are widely distributed, no single area appears to support an *important population*. However, several drainages appear to be important for this species in the planning area:

- GERA in lower Gobernadora Creek and central San Juan Creek supports nine historic nest sites.
- Arroyo Trabuco between Live Oak Canyon Road in the north and Avery Parkway in the south supports seven historic nest sites.
- Bell Canyon supports seven historic nest sites.
- Middle Gabino and lower La Paz canyons support three historic nest sites.
- Talega and lower Cristianitos canyons support five historic nest sites. All four nest sites in Talega Canyon are south of the RMV property boundary.

It is important to note that at any given time the number of breeding pairs in the planning area probably is only a small percentage of the historic nesting sites. For example, Bloom estimated that only three pairs of kites nested on RMV in 2001 (P. Bloom, pers. comm. 2002).

e. Protection Recommendations

- Protect the southern willow scrub in GERA in lower Gobernadora Creek and in central San Juan Creek that provides nesting habitat, and adjacent foraging habitat to the extent feasible, for the white-tailed kite.
- Protect breeding habitat and, to the extent feasible, foraging habitat for the white-tailed kite in the Cristianitos Canyon sub-basin, along lower Cristianitos Creek and in the lower Gabino Canyon subunit.
- Protect breeding and foraging habitat for the white-tailed kite in Middle Gabino, La Paz , and Talega canyons.

d. Management Recommendations

- Protect existing riparian habitat downstream of the knickpoint in GERA for the white-tailed kite.

- Implement a management program for protected white-tailed kite nesting habitat, including the minimization of human disturbance during the breeding season.

- Pursuant to the Grazing Management Plan, implement grazing management techniques to help protect the white-tailed kite and its nesting and foraging habitat, promote perennial grasses including native grasses (to provide vole habitat), allow for continued cattle grazing sufficient to support cattle ranching operations, and, where appropriate reduce fuel loads for fire.

- Pursuant to the Fire Management Plan, implement prescribed burning techniques to promote native perennial grasses.

e. Restoration Recommendations

- Implement a CSS/VGL restoration program to enhance habitat carrying capacity for prey. Restoration areas that would benefit the white-tailed kite include Chiquita Ridge, Sulphur Canyon, Chiquadora Ridge, upper Cristianitos and upper Gabino Canyon.

4.2.7 Yellow Warbler

Dendroica petechia - Yellow Warbler
USFWS: None
CDFG: California Special Concern Species

a. Regional Status

Yellow warblers nest from northern Alaska eastward to Newfoundland, Canada and southward to northern Baja California and Georgia. The species migrates throughout much of North America and winters from southern California, Arizona and the Gulf Coast southward to central South America (AOU 1998). In California, the yellow warbler is an uncommon to common, summer resident in the north and locally common in the south (Zeiner et al. 1990). It breeds in riparian woodlands from northern and central California generally west of the Sierra Nevada to the coastal slopes of southern California. It breeds in coastal and desert lowlands up to 2,500 m (8,000 ft) in the Sierra Nevada and other montane chaparral and forest habitats (Grinnell and Miller 1944). The yellow warbler also occurs as a migrant throughout the state and it is a common migrant on the Channel and Farallon Islands in spring and fall (DeSante and Ainley 1980; Garrett and Dunn 1981).

The patterns of yellow warbler population densities probably have changed since Europeans settled North America and altered the character of riparian systems. Although no large-scale, range-wide changes are documented for the yellow warbler, populations in the southwestern United States have declined dramatically in recent decades in many lowland areas, including the southern coast, Colorado River, and San Joaquin and Sacramento valleys (Lowther et al. 1999). It is now rare to uncommon in many lowland areas where formerly it was common (McCaskie et al. 1979; Garrett and Dunn 1981).

Available information on the state-wide distribution of the species is variable. For example, the 2003 CNDDB contains only 36 records for the species distributed among the counties and general locations shown in *Table 4-13*.

TABLE 4-13
2003 CNDDB RANGEWIDE DISTRIBUTION OF THE
YELLOW WARBLER IN CALIFORNIA

County	General Location
Alameda	Cull Creek Recreation Area
Imperial	Niland, Calexico
Fresno	Lake Thomas A. Edison/Mono Creek
Inyo	Furnace Creek, Shosone, Wild Rose Mine
Kern	S. Fork Kern River
Marin	Olema Marsh
Mendocino	Little Lake Valley
Mono	Lee Vining
Monterey	Salinas River
Placer	Soda Springs-Baker Ranch Road, Antone Meadows
Riverside	Snow Creek, Cottonwood Springs, Prado County Park, Wilson Creek
San Bernardino	Hesperia, Morongo Valley, Big Morongo Wildlife Sanctuary, Black Rock Spring
San Diego	San Diego River, Vallecito Creek, Sweetwater River
Sierra	Lower Sardine Lake
Santa Barbara	Sisquoc River
Tehama	Todd Island, Sacramento River, Bisquit Flat, Sunflower Gulch, Ventura (Santa Clara River), Nevada (Donner Lake, Dry Creek

For southern California, the Southern Subregion database includes 33 locations (described below) and the western Riverside MSHCP database includes approximately 47 recent records that were considered precise enough to be used for the conservation analysis for that program. Within western Riverside County, significant breeding populations occur in the Prado Basin (Hays 1999, pers. obs.), and other breeding areas include Temescal Canyon and its tributaries, Wasson Canyon, Temecula Creek, Murrieta Creek, Vail Lake area, Wilson Creek, San Timoteo Creek, Santa Rosa Plateau, and drainages and woodland areas within the San Bernardino National Forest. The yellow warbler was not evaluated for regulatory coverage in either the San Diego MSCP or MHCP. However, based on Unitt (1984), the known and probable breeding distribution of the species in San Diego County includes all the major coastal drainages, including the Tijuana, Sweetwater, San Diego, San Dieguito, and San Luis Rey rivers.

Throughout its range the yellow warbler most commonly breeds in wet, deciduous thickets (especially those dominated by willows) and in disturbed and early successional habitats (Lowther et al. 1999). Yellow warblers in southern California breed in lowland and foothill riparian woodlands dominated by cottonwoods, alders, or willows and other small trees and shrubs typical of low, open-canopy riparian woodland (Garrett and Dunn 1981). The yellow warbler is found at elevations from 100-2,700 m (328-8,858 ft) within riparian habitat and at higher elevations along watercourses with riparian growth (Lowther et al. 1999). The yellow warbler also breeds in montane chaparral, open ponderosa pine and mixed conifer habitats with substantial amounts of brush (Zeiner et al. 1990). Breeding in montane shrubs and conifers is perhaps a recent phenomenon (Gaines 1977).

Yellow warblers usually arrive in California in April, and generally have migrated out of the area by October. There appears to be a post-breeding, upslope movement, mostly to middle elevations (Beedy 1975); it is scarce at elevations above 2,500 m (8,000 ft) (Gaines 1977). Small numbers regularly overwinter in southern California lowlands (Garrett and Dunn 1981). During migration, they occur in lowland and foothill woodland habitats such as desert oases, riparian woodlands, oak woodlands, mixed deciduous-coniferous woodlands, suburban and urban gardens and parks, groves of exotic trees, farmyard windbreaks, and orchards (Small 1994).

Preferred nest trees of yellow warbles are willows, alders, and cottonwoods, but birds have been observed using tamarisk *(Tamarix* sp.) (Brown and Trosset 1989). The nest is an open cup placed 0.6 to 5 m (2-16 ft) above ground in a deciduous sapling or shrub. Breeding is from mid-April into early August with peak activity in June. Three to six eggs (usually four or five) are laid and incubated by the female for 11 days. Nestlings are tended by both parents until fledging at 9-12 days (Harrison 1978). The young breed the following year.

The annual adult survival rate of yellow warblers, based on returns of banded birds to the same breeding location, is estimated to be about 0.53. Nest predation has been found to be the major cause of nest failure of yellow warblers in Alaskan wetlands (Rodgers 1995). However, causes of nest failure for other geographical locations of breeding populations of yellow warbler are unknown, but it is likely that local conditions dictate level of predation risk (e.g., abundance of predators in an area). The maximum reported longevity is almost nine years by a male yellow warbler (Klimkiewicz et al. 1983).

Territories are established as soon as males arrive (Lowther et al. 1999). Yellow warblers defend multipurpose territories, which often include tall trees for singing and foraging and a heavy brush understory for nesting (Ficken and Ficken 1966). Territorial interactions are dynamic and continue throughout the breeding season. Territories and home ranges are relatively small, varying from 0.03-0.2 ha (0.08-0.5 ac) (Ficken and Ficken 1966; Beer et al. 1956). Peak densities measured in southeast Arizona have reached 48 birds/ha (~19 birds/ac) (Skagen et al. 1998).

The yellow warbler forages for insects and spiders in the upper canopy of deciduous trees and shrubs. Occasionally it hawks insects from air, or eats berries. It gleans and hovers in the upper canopy of deciduous trees and shrubs (Bent 1953; Ehrlich et al. 1988). Summer observations of foraging showed that small limbs are preferred to large limbs, tips, and dead limbs for both deciduous and coniferous trees (Morse 1973). Foraging is typically observed between 0.3 to 16.8 m (1 to 55 ft), at the top of the vegetation, never on the ground and mostly between 6 to 8 m (20 to 26 ft).

Threats to the species include habitat destruction and fragmentation and brood-parasitism by brown-headed cowbirds (Garrett and Dunn 1981). The populations in the western United States are affected by intense grazing especially where willow growth along riparian habitats is reduced or removed. For example, an Oregon study on the effects of cattle grazing on riparian habitat found a negative correlation between shrub volume and the frequency of cattle use and a positive correlation between the time since a transect was last grazed by cattle and shrub volume (Taylor and Littlefield 1986). Photographs substantiated improvements in riparian vegetation when protected from cattle. Yellow warblers were more numerous on transects with abundant willow and few or no cattle than on transects with heavy cattle use and low shrub volume. The yellow warbler population increases coincided with a decrease in cattle and the elimination of willow cutting and spraying.

b. Subregional Status

There are 33 locations for the yellow warbler in the planning area database. The warbler distribution in the planning area generally overlaps with the least Bell’s vireo distribution, but is somewhat broader because it also occurs in more open canopy riparian woodlands. In addition to areas supporting vireos such as lower Arroyo Trabuco and GERA, yellow warblers also occur in upper San Juan Creek, Lucas Canyon, lower Bell Canyon and Arroyo Trabuco north of Crown Valley Parkway. The most common riparian habitat supporting the yellow warbler in the planning area is southern arroyo willow forest, followed by mule fat scrub, southern willow scrub, southern sycamore riparian woodland, and freshwater marsh. Other habitats supporting yellow warbler locations in the planning area are giant reed, floodplain sage scrub, intermittent rivers and streams, and southern coast live oak riparian woodland.

Four *important population* areas for the yellow warbler occur in the planning area:

- Lower Arroyo Trabuco south of Crown Valley Parkway supports at least four locations (No. 1 on *Figure 4-14*). This area also supports an *important population* of the least Bell's vireo, and thus has very high riparian habitat quality and importance in the subregion.

- GERA supports at least five locations, with a sixth just south of the dirt road below GERA in lower Gobernadora Creek (No. 2 on *Figure 4-14*). This area also supports *important populations* of the least Bell's vireo and southwestern willow flycatcher.

- Central San Juan Creek near the confluence with Chiquita Creek supports two locations, as well as about eight yellow-breasted chat locations, indicating high quality riparian habitat in this reach of the creek (No. 3 on *Figure 4-14*).

- Central San Juan Creek downstream of the confluence with Bell Creek supports four locations in association with about 10 yellow-breasted chat locations, indicating riparian habitat of sufficient quality for the yellow warbler in this reach of the creek (No. 4 on *Figure 4-14*). However, this reach of the creek currently supports extensive stands of giant reed that will need to be controlled to sustain the warbler in this area.

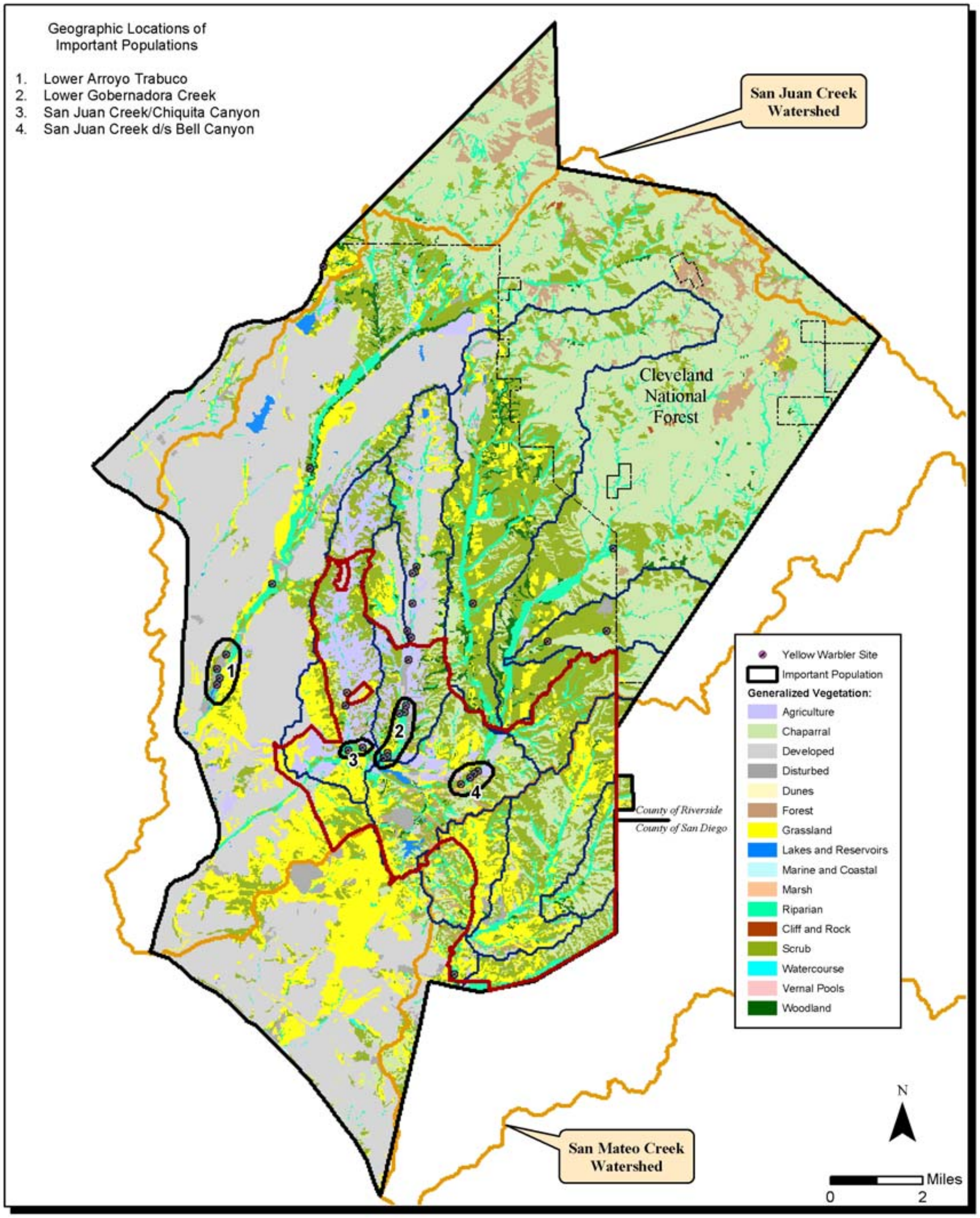
It is interesting to note the six locations for the yellow warbler occur in upper Gobernadora Creek within Coto de Caza. These data date back to 1997 and the current status of the habitat suitability for the warber in this area is unknown.

No *key locations* in the subregion were identified for the yellow warbler. There are no obvious locations with a high concentration of the species that would appear to be necessary for conserving this species in the subregion.

c. Protection Recommendations

- Protect the southern willow scrub in GERA in lower Gobernadora Creek that provides nesting habitat for the *important population* of the yellow warbler.

•



Draft NCCP/HCP Planning Guidelines

Yellow Warbler Distribution Map

FIGURE 4-14

Maintain and manage riparian and aquatic habitats along San Juan Creek for the *important populations* of the yellow warbler.

d. Management Recommendations

- Implement a cowbird trapping program to mitigate for impacts to existing habitat within the Chiquita and Gobernadora sub-basins and for potential impacts associated with future development. The cowbird trapping program will be evaluated on an annual basis and trap locations and trapping effort will be adjusted as part of the overall Adaptive Management Program (e.g., if the number of trapped cowbirds drops to a prescribed threshold, the trapping program may be terminated or otherwise modified).

- Pursuant to the Grazing Management Plan, implement grazing management techniques to help protect riparian habitats and associated species while allowing for continued cattle grazing sufficient to support cattle ranching operations, and, where appropriate reducing fuel loads for fire.

- Protect downstream habitats (e.g., lower San Juan Creek and lower Cristianitos Creek within the planning area) for the yellow warbler by maintaining hydrology, water quality and sediment delivery and minimizing additional loadings of nutrients or toxics.

- Control Argentine ants in proximity to yellow warbler nesting habitat.

e. Restoration Recommendations

- Implement restoration efforts to address localized headcuts within the Chiquita sub-basin as further described in the Watershed and Sub-basin Planning Principles.

- Implement a restoration program in Gobernadora Creek which addresses: **(1)** the historic creek meander above the knickpoint; and **(2)** upstream land use induced channel incision and erosion, including potentially excessive surface and groundwater originating upstream.

- Identify likely causes of erosion and potential measures to rectify causes of headcutting in the lower portion of Gobernadora Creek.

- Implement an invasive species eradication program for San Juan Creek between San Juan Capistrano and Bell Canyon to control giant reed and pampas grass in conjunction with upstream eradication efforts.

- Implement an invasive species eradication program for lower Cristianitos Creek from the confluence with Gabino Creek and the RMV boundary to control tamarisk, giant reed and pampas grass.

4.2.8 Yellow-breasted Chat

Icteria virens - Yellow-breasted Chat
USFWS: None
CDFG: California Special Concern Species

a. Regional Status

Yellow-breasted chats summer and nest from British Columbia eastward to New Hampshire, and southward to Baja California and northern, mainland Mexico. The species presumably migrates throughout much of North America and winters primarily from northern Mexico to Panama (AOU 1998). Within California the chat is an uncommon summer resident and migrant in coastal California and in the foothills of the Sierra Nevada (Zeiner et al. 1990), and is found up to about 1,450 m (4,800 ft) in valley foothill riparian habitats, and up to 2,050 m (6,500 ft) east of the Sierra Nevada in desert riparian habitats (Gaines 1977; DeSante and Ainley 1980; Garrett and Dunn 1981). The yellow-breasted chat is uncommon along the coast of northern California and occurs only locally south of Mendocino County (McCaskie et al. 1979). In southern California, the species breeds locally on the coast and very locally inland at lower elevations throughout most of the region (Garrett and Dunn 1981). Once considered fairly common to common in California (Grinnell and Miller 1944), the yellow-breasted chat has been more recently considered to be uncommon and local in southern California (Garrett and Dunn 1981).

There are 63 records for the yellow-breasted chat in the 2003 CNDDB in the counties and general locations shown in *Table 4-14*.

Of note in the CNDDB database is that 26 of the 63 records for the yellow-breasted chat are from the Colorado River area.

For coastal southern California, the Southern Subregion database includes 130 locations (described below). The western Riverside MSCHP database includes approximately 23 recent records that were considered precise enough to be used for the conservation analysis for that program. Areas of western Riverside County supporting the yellow-breasted chat include a large concentration in the Prado Basin and contiguous reaches of the Santa Ana River, as well as San Timoteo Creek, Temescal Canyon (including the Alberhill Creek tributary), Canyon Lake, Temecula Creek, and Vail Lake. The San Diego MHCP database includes 47 locations for the chat, with locations in the San Luis Rey River, lower Escondido Creek in Encinitas, Pilgrim

Creek in Oceanside, and Kit Carson Park in Escondido; the San Luis Rey River and Pilgrim Creek are identified in the MHCP as supporting major populations. Although the yellow-breasted chat was not evaluated for regulatory coverage in the San Diego MSCP, Unitt's (1984) summary of the known and probable breeding distribution of the species in this region includes the Sweetwater and San Diego rivers. The species also breeds in the Santa Margarita River on Camp Pendleton.

TABLE 4-14
2003 CNDDB RANGEWIDE DISTRIBUTION OF THE
YELLOW-BREASTED CHAT IN CALIFORNIA

County	General Locations
Imperial	Potholes, Bard, Niland, Salton Sea, Picacho State Recreation Area, Colorado River
Inyo	Shoshone, Independence, Baker Meadows, Lone Pine, Olancha, Ash Creek, Hogback Creek, Wyman Creek
Kern	S. Fork Kern River, Lake Isabella
Mendocino	Little Lake Valley
Orange	San Diego Creek
Riverside	Mecca, Colorado River, Santa Ana River, Prado Basin, Temescal Wash
San Benito	San Benito River
San Bernardino	Yermo, Old Fort Piute, Baker, Colorado River, Lower Big Morongo Canyon, Soto Ranch, Cushenbury Springs, Mojave River
San Diego	4-S Ranch, Vallecito Creek, Sweetwater River, Otay Valley
Solano	SR-128 and Pleasants Valley Road
Stanislaus	Littlejohn Creek
Tehama	Todd Island, Sacramento River
Ventura	Santa Clara River

Yellow-breasted chats usually arrive in southern California in April and depart by late September for wintering grounds in Mexico and Guatemala, although there are a few late fall and winter records of the chat. Migrants are observed only rarely to uncommonly away from breeding areas.

The species has been characterized as a relative generalist in regard to nesting habitat selection within a riparian area (Brown and Trossett 1989). They nest in dense plant cover within streams, swampy ground, and the borders of small ponds. Burhans and Thompson (1999) observed that chats preferred nesting in large habitat patches, which, despite increased risk of brood-parasitism, decreased the risk of nest predation and resulted in a higher nesting success.

The chat breeding season runs from early May into early August, with a peak of nesting activity in June. Nests are usually 0.6-2.4 m (2-8 ft) above the ground in dense shrubs along a stream or river. The species appears to be monogamous, although pairs may nest near one another (Ehrlich et al. 1988). Females may lay three to six eggs, but usually three or four eggs. Incubation is 11-15 days and chicks fledge in 8-11 days. The young are tended by both parents until fledged (Harrison 1978).

Home range sizes of yellow-breasted chats vary substantially, from 0.04 ha (0.1 ac) to 1.3 ha (3.2 acres) (Brewer 1955; Dennis 1958; Thompson and Nolan 1973).

The yellow-breasted chat eats insects and spiders and also may take berries and other fruits. Mostly the yellow-breasted chat gleans prey from foliage of shrubs and low trees (Zeiner et al. 1990).

Loss and fragmentation of riparian woodlands in the coastal lowland as a result of development, agriculture, and channeling rivers has led to the decline of the yellow-breasted chat. Garrett and Dunn (1981) concluded that the clearing of dense riparian thickets and brush tangles has caused a noticeable decline in the number of breeding pairs of the chat. Cowbird parasitism may have played an additional role in the decline of the yellow-breasted chat affecting its distribution in addition to its density (Gaines 1974; Remsen 1978).

b. Subregional Status

There are 130 documented nesting locations for the yellow-breasted chat in the planning area database. As with the yellow warbler, the yellow-breasted chat co-occurs with the least Bell's vireo, but is more widespread because it has broader habitat affinities. It occurs in both willow thickets and riparian woodlands. Most of the nesting locations are located in lower Arroyo Trabuco, central San Juan Creek, lower Gobernadora Creek and lower Cristianitos Creek, but it also occurs in upper San Juan Creek, Lucas Canyon, lower Bell Canyon, and Arroyo Trabuco north of Crown Valley Parkway. There are several locations in small drainages and relatively isolated patches of riparian habitat. There are many locations along San Mateo Creek south of the planning area on Camp Pendleton.

Mule fat scrub is most common riparian habitat type associated with mapped locations of the yellow-breasted, followed closely by southern arroyo willow forest. Other habitats supporting yellow-breasted chats in the planning area include southern willow scrub, southern coast live oak riparian woodland, southern sycamore riparian woodland, freshwater marsh, intermittent and perennial rivers and streams.

Five *important population* areas for the yellow-breasted chat occur in the planning area.

- Lower Arroyo Trabuco below Crown Valley Parkway supports about 29 documented nesting sites (No. 1 on *Figure 4-15*). This area has high quality southern willow scrub habitat and also supports *important populations* of the least Bell's vireo and yellow warbler.

- GERA supports about 20 documented nesting sites (No. 2 on *Figure 4-15*). GERA also supports *important populations* of the least Bell's vireo, southwestern willow flycatcher and yellow warbler.

- Central San Juan Creek from the confluence with Chiquita Creek downstream to the Ortega Highway bridge supports about nine documented nesting sites and also an *important population* of the yellow warbler (No. 3 on *Figure 4-15*).

- Central San Juan Creek south of the confluence of Bell Creek supports about 17 documented nesting sites and also an *important population* of the yellow warbler (No. 4 on *Figure 4-15*).

- Lower Cristianitos between the confluences of Gabino and Talega creeks supports about 11 documented nesting sites and is associated with numerous nesting locations in lower Cristianitos and San Mateo creeks on Camp Pendleton (No. 5 on *Figure 4-15*).

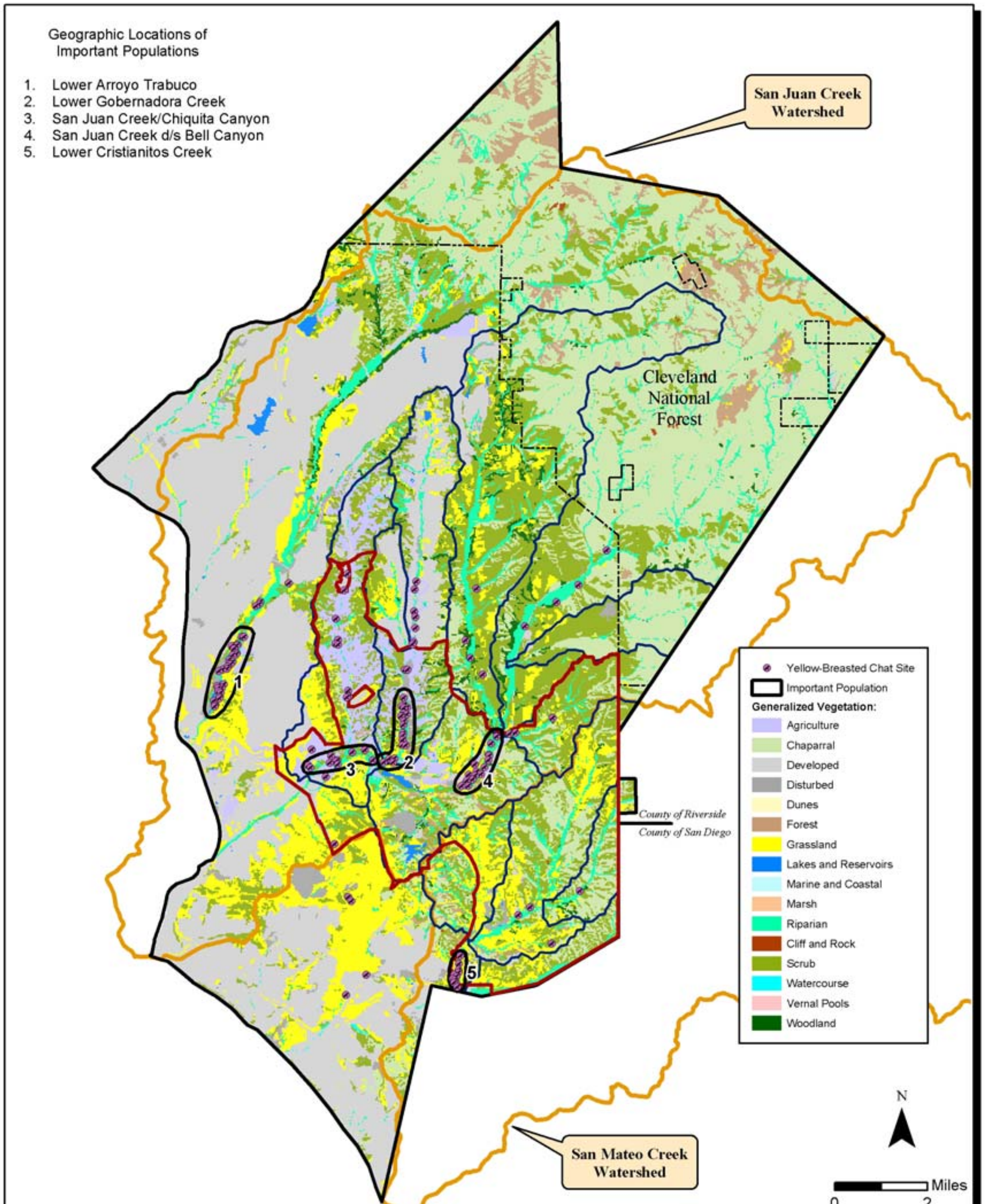
No *key locations* in the subregion were identified for the yellow-breasted chat. There are no obvious locations with a high concentration of the species that would appear to be essential for conserving this species in the subregion. Also, as with the yellow warbler, there are several records for the chat along Gobernadora Creek within Coto de Caza, but the current status of habitat suitability at these locations is unknown.

c. Protection Recommendations

- Protect the southern willow scrub in GERA in lower Gobernadora Creek that provides nesting habitat for an *important population* of the yellow-breasted chat.

- Maintain and manage riparian and aquatic habitats along San Juan Creek for the *important populations* of the yellow-breasted chat.

- Protect breeding habitat for the *important population* of the yellow-breasted chat along lower Cristianitos Creek.



Draft NCCP/HCP Planning Guidelines

Yellow-Breasted Chat Distribution Map

FIGURE 4-15

d. Management Recommendations

- Implement a cowbird trapping program to mitigate for impacts to existing habitat within the Chiquita and Gobernadora sub-basins and for potential impacts associated with future development. The cowbird trapping program will be evaluated on an annual basis and trap locations and trapping effort will be adjusted as part of the overall Adaptive Management Program (e.g., if the number of trapped cowbirds drops to a prescribed threshold, the trapping program may be terminated or otherwise modified).

- Pursuant to the Grazing Management Plan, implement grazing management techniques to help protect riparian habitats and associated species while allowing for continued cattle grazing sufficient to support cattle ranching operations, and, where appropriate reducing fuel loads for fire.

- Protect downstream habitats (e.g., San Juan Creek and lower Cristianitos Creek in the planning area) for the yellow-breasted chat by maintaining hydrology, water quality and sediment delivery and minimizing additional loadings of nutrients or toxics.

- Control Argentine ants in proximity to yellow-breasted chat nesting habitat.

e. Restoration Recommendations

- Implement restoration efforts to address localized headcuts within the Chiquita sub-basin as further described in the Watershed and Sub-basin Planning Principles.

- Implement a restoration program in Gobernadora Creek which addresses: **(1)** the historic creek meander above the knickpoint; and **(2)** upstream land use induced channel incision and erosion, including potentially excessive surface and groundwater originating upstream.

- Identify likely causes of erosion and potential measures to rectify causes of headcutting in the lower portion of Gobernadora Creek.

- Implement an invasive species eradication program for San Juan Creek between San Juan Capistrano and Bell Canyon to control giant reed and pampas grass.

- Implement an invasive species eradication program for lower Cristianitos Creek from the confluence with Gabino Creek and the RMV boundary to control tamarisk, giant reed and pampas grass.

4.2.9 Western Spadefoot Toad

Scaphiopus (=Spea) hammondii– Western Spadefoot Toad
Federal: None
State: California Special Concern Species

a. Regional Status

The western spadefoot toad is a California near endemic ranging from Shasta County southward into Baja California (Stebbins 1985). Its known elevation range extends from near sea level to 1,500 m (4,921 ft) (Zeiner et al.1990; Ervin et al. 2001). The known range of western spadefoot toad is restricted to west of the Sierran-desert range axis (Myers 1944).

Table 4-15 summarizes the 243 records in the 2003 CNDDB database for the western spadefoot toad in California. Because there are numerous records, the table only tabulates the number of locations by county and does not include general location information. The toad is widespread in the central and southern coastal portions of the state. However, the table does not reflect the location of *major* or *important populations* or *key locations*.

TABLE 4-15
2003 CNDDB RANGEWIDE DISTRIBUTION OF THE WESTERN SPADEFOOT TOAD IN CALIFORNIA

County	No. of CNDDB Records
Alameda	1
Butte	1
Calaveras	2
Colusa	1
Fresno	11
Kern	4
Kings	7
Los Angeles	7
Madera	14
Merced	13
Monterey	22
Orange	7
Placer	4
Riverside	19

TABLE 4-15
2003 CNDDB RANGEWIDE DISTRIBUTION OF THE WESTERN SPADEFOOT TOAD IN CALIFORNIA

County	No. of CNDDB Records
Sacramento	5
San Benito	15
San Diego	7
San Joaquin	11
San Luis Obispo	25
Santa Barbara	28
Stanislaus	11
Tehama	1
Tulare	10
Ventura	1
Yolo	2

Table 4-16 provides more detailed information for western spadefoot locations in southern California based on data from the various conservation planning programs. This information also should be considered as distributional and does not identify *major* or *important populations* or *key locations*. However, it is evident from *Table 4-16* that the spadefoot toad is still relatively widespread in its distribution in Orange, Riverside and San Diego counties.

TABLE 4-16
WESTERN SPADEFOOT TOAD LOCATIONS IN SOUTHERN CALIFORNIA

Conservation Planning Area/County	General Locations
San Diego County MHCP	Buena Vista Lagoon, Page Creek in north Escondido, San Marcos Creek in southeast Carlsbad, Daley Ranch in Escondido
San Diego County – Other Locations	San Dieguito River near Rancho Santa Fe, Sycamore Canyon on Camp Elliot Naval Reservation, west-southwest of Starvation Mountain, vernal pools near Carroll Canyon, off Highland Valley Road, South Fork of Moosa Creek, Carmel Mountain, 1.3 mi south of Horno Hill on Camp Pendleton, considered relatively widespread and abundant on Camp Pendleton (Camp Pendleton AARS 1998), substantial roadkills observed (1) along Cristianitos Road between junction with San Mateo Road and Camp Talega, (2) Basilone Road east of San Onofre housing area to the 52 area, (3) Old

TABLE 4-16
WESTERN SPADEFOOT TOAD LOCATIONS IN SOUTHERN CALIFORNIA

Conservation Planning Area/County	General Locations
	Highway 101 between Las Pulgas Road and the SDGE yard.
Riverside County MSHCP	South of Temecula near Interstate 15, south and east of the Lake Mathews Reserve, north of Lake Elsinore, Diamond Valley Reservoir, Canyon Lake, Murrieta, Lee Lake, City of Corona, Banning-Beaumont, Moreno Valley, Santa Ana River; Temescal Wash, Lake Perris, San Jacinto River near Nuevo, south of Lake Skinner, Rawson Canyon, Motte-Rimrock Reserve, Santa Margarita Ecological Reserve
Orange County Southern Subregion	Vernal Pools on Chiquita Ridge and Radio Tower Road, upper Chiquita Canyon, San Juan Creek south of Chiquita Ridge and at confluence with Verdugo Canyon, upper Cristianitos Canyon, lower Gabino Canyon, upper Aliso Watershed north of El Toro Road
Orange County - Other Locations	Bee Canyon, Dana Point, near junction of Santiago Canyon Road and landfill, lower Cristianitos Creek northeast of San Clemente.

Western spadefoot toads inhabit coastal sage scrub, chaparral, and grasslands habitats, but are most common in grasslands with vernal pools or mixed grassland/coastal sage scrub areas (Holland and Goodman 1998). For reproduction and successful metamorphosis, western spadefoot toads require rain-filled pools ranging between 9 and 30 degrees C (48-86 degrees F) (Brown 1966, 1967) that hold standing water for more than three weeks (Feaver 1971). Riparian habitats with suitable water resources also may be used for reproduction (Holland and Goodman 1998). Breeding pools must lack fish, bullfrogs, and crayfish in order for western spadefoot toad to successfully reproduce and metamorphose (Jennings and Hayes 1994).

Breeding efforts probably are tied to the amount of rainfall (Holland and Goodman 1998), but artificial irrigation may elicit advertisement (reproductive) vocalizations during any month (Zeiner et al. 1990). After periods of warm rains, spadefoot toads emerge from burrows and form explosive, and sometimes large (>1,000 individuals) aggregations (Jennings and Hayes 1994). This typically occurs in late winter and early spring, but also may occur during the fall (Storer 1925; Feaver 1971; Jennings and Hayes 1994).

Because the critical thermal minimum is 9 degrees C (48 degrees F) (Brown 1966), spadefoot toads wait until water temperature is at least 10 degrees C (50 degrees F) before egg deposition (Jennings and Hayes 1994). Eggs are deposited in irregular small clusters about 25-30 cm (9.8-11.8 in) in diameter (Holland and Goodman 1998). They are attached to vegetation or debris (Storer 1925) in shallow temporary pools or ephemeral streamcourses (Stebbins 1985; Jennings and Hayes 1994). Egg clusters rarely number more than 42 eggs (Jennings and Hayes 1994). The rate of egg hatching is water temperature-dependent (Brown 1967); however, eggs usually hatch within six days. Complete development can rapidly occur within three weeks (Holland and Goodman 1998), but may last up to 11 weeks (Burgess 1950; Feaver 1971; Jennings and Hayes 1994).

Water temperature, water evaporation, water chemistry, and food resources regulate the rate of development of western spadefoot toad (Holland and Goodman 1998; Denver 1998; Denver et al. 1998; Newman 1998; Morey and Reznick 2003). Tadpoles experimentally subjected to water volume reduction showed significant acceleration of metamorphosis (Denver et al. 1998), but the rate of accelerated development was determined by rate of water reduction and was reversible (decelerated development) by replacement of water. An accelerated metamorphosis appears to be a response to reduced swimming volume and proximity to water surface (Denver et al. 1998). Morey and Reznick (2003) found that western spadefoots breed synchronously in relation to heavy spring rains. Also, they found that spadefoots vary both in age and size at metamorphosis in relation to food resources, with larger sizes and reduced age at metamorphosis under good resource conditions. Spadefoot tadpoles exhibit several other adaptations for breeding in temporary pools, including cannibalism, production of growth inhibitors (to affect other tadpoles), and high heat tolerance (Low 1976).

After metamorphizing in the late spring, juvenile toads disperse after a short period of time (Zeiner et al. 1990). Western spadefoot toads apparently do not move far from their breeding pool during the year, with movements within a few hundred meters of breeding pools (Zeiner et al. 1990), and it is likely that their entire post-metamorphic home range is situated around a few pools. Toads estivate in upland habitats adjacent to potential breeding sites in burrows approximately 1 m (3.3 ft) in depth (Stebbins 1972). Although not observed specifically for this species, soil characteristics of burrow refuge sites likely become fairly hard and compact during the period of summer estivation (Jennings and Hayes 1994; Ruibal et al. 1969).

About 80 percent of the habitat once occupied by western spadefoot toad in southern California has been developed or converted to uses incompatible with successful reproduction or recruitment (Jennings and Hayes 1994). In addition, planting of mosquito fish for mosquito abatement programs in rain pools threatens some populations (Jennings and Hayes 1994) and bullfrogs emigrating into rain pool breeding sites also may pose a threat to this species as a predator (Hayes and Warner 1985; Morey and Guinn 1992). Finally, cattle grazing may have an impact on this species if cattle trample eggs masses and tadpoles and lower water levels when they drink at pools

b. Subregional Status

There are 22 records for spadefoot toads from about 10 distinct areas in the Southern Subregion database (*Figure 4-16*). Bloom's pre-1998 data include four spadefoot locations: near the RMV headquarters above San Juan Creek; along San Juan Creek approximately 0.5 mile east of the headquarters; near the confluence of Bell Canyon and San Juan Creek; and in grassland along Avenida Pico approximately 1 mile west of Cristianitos Canyon. Subsequent SOCTIIP surveys found spadefoot toads in San Juan Creek and upper Cristianitos Canyon. Other surveys by Bloom in 1998 documented several new locations. Several individuals and their larvae were found on RMV land within 0.75 mile of a Ranch residence south of the Ortega Highway. Four individuals were found near the confluence of Gabino Creek and Cristianitos Creek in the "Roundup/BBQ" area. Larvae also were found in vernal pools within Ladera Open Space on Chiquita Ridge. In addition, one spadefoot individual was found within Caspers Wilderness Park near the entrance. Pete DiSimone, in a personal communication to Pete Bloom, reported several larvae in a small pool on Starr Ranch. A spadefoot toad location from upper Chiquita Canyon was reported by Harmsworth Associates. The CNDDB includes records from Aliso Creek (not shown on map) and Bell Canyon at San Juan Creek. None of these locations numbered more than four adult individuals, suggesting relatively small populations in the subregion. Based on the existing database, no *major populations* occur in the Southern Subregion. However, five *important populations* are identified:

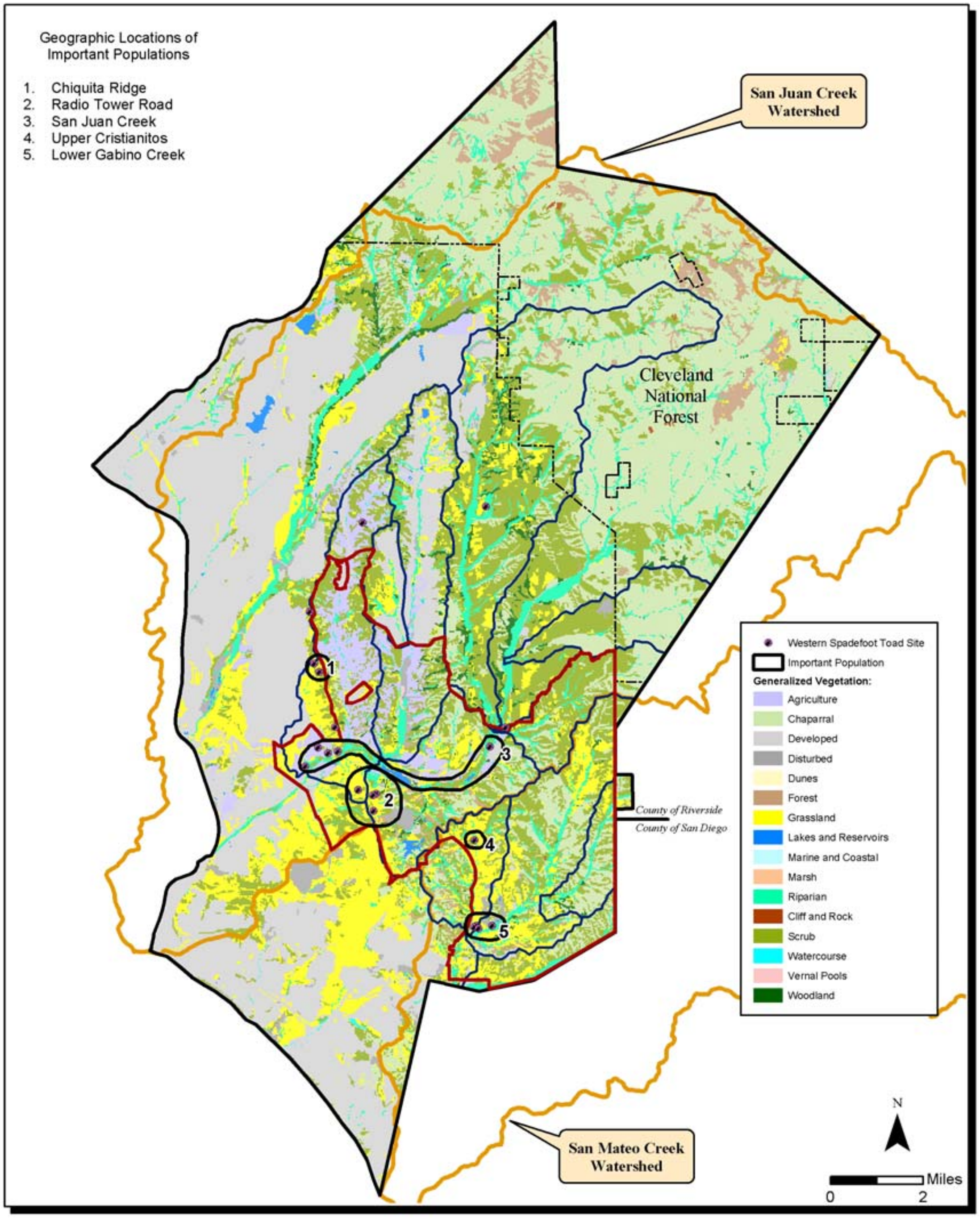
- Vernal pools on Chiquita Ridge in Ladera Open Space support an *important population* (No. 1 on *Figure 4-16*). These pools also support the Riverside and San Diego fairy shrimp and the special status plant mud nama.

- Vernal pools on Radio Tower Road support an *important population* (No. 2 on *Figure 4-16*). These pools also support the Riverside and San Diego fairy shrimp and mud nama.

- San Juan Creek from the RMV Headquarters to the confluence with Verdugo Canyon support an *important population* (No. 3 on *Figure 4-16*). These sites overlap with occupied and potential arroyo toad habitat.

- A stock pond in upper Cristianitos Canyon supports an *important population* (No. 4 on *Figure 4-16*). This site overlaps with an *important population* of the southwestern pond turtle.

- Lower Gabino Canyon supports an *important population* (No. 5 on *Figure 4-16*). This site overlaps with an *important population* of the arroyo toad.



Draft NCCP/HCP Planning Guidelines

Western Spadefoot Toad Distribution Map

FIGURE 4-16

Because all of these scattered locations appear to support small populations and none appear to be crucial for maintaining the species in the planning area, no *key locations* were identified.

The 1998 surveys began somewhat late in the spadefoot toad breeding season and some breeding sites may have been missed. Bloom believes that the toad is more widespread in the planning area than indicated in the database. However, it seems unlikely that any new locations would constitute a *major population* or a *key location*. Even though the survey probably was too late in the season to find all the locations, it seems unlikely that a *major population* would have been missed.

c. Protection Recommendations

- Avoid impacts to vernal pools and their contributing hydrological sources along Radio Tower to support all life stages of the western spadefoot toad. The Chiquita Ridge pools are already protected in Ladera Open Space.

- Maintain and manage riparian and aquatic habitats along San Juan Creek to support all life stages the western spadefoot toad.

- Protect wetlands and adjoining upland habitat within 200 m (650 ft) of breeding sites in upper Cristianitos Canyon to support all life stages of western spadefoot toad.

- Protect the western spadefoot toad breeding population near the confluence of Gabino and Cristianitos creeks by avoiding direct impacts to breeding, foraging and estivating habitat (within 200 m [650 ft] of breeding sites), and avoiding indirect impacts to the watershed.

d. Management Recommendations

- Protect downstream habitat for the western spadefoot toad by maintaining hydrology, water quality and sediment delivery in San Juan Creek and minimizing additional loadings of nutrients or toxics.

- Implement a bullfrog eradication program for the Cal-Mat Lake within San Juan Creek and in the ponds north of lower Gabino Creek to help protect western spadefoot toads. Identify other bullfrog breeding areas that may pose a risk to western spadefoot and implement a bullfrog eradication program where necessary.

- Maintain stormwater flow characteristics comparable to existing conditions from Trampas Canyon into San Juan Creek to preserve breeding habitat for the western spadefoot toad.

- Implement a management program for vernal pools and other ephemeral breeding sites for the western spadefoot toad, including control of non-native species, management of grazing, and minimization of human access and disturbance as part of the Adaptive Management Program.

- Protect the integrity of the western spadefoot toad population in lower Gabino and Cristianitos creeks by implementing the Watershed and Sub-basin Planning Principles.

e. Restoration Recommendations

- In coordination with upstream eradication efforts, implement an invasive species eradication program for San Juan Creek between San Juan Capistrano and Bell Canyon to control giant reed and pampas grass.

- Implement an invasive species eradication program for lower Cristianitos Creek from the confluence with Gabino Creek and the RMV boundary to control tamarisk, giant reed and pampas grass.

- Implement a native grasslands restoration program in conjunction with the grazing techniques described above for the upper portion of the Cristianitos sub-basin that would benefit the western spadefoot toad.

4.2.10 Belding's Orange-throated Whiptail

Cnemidophorus hyperythrus (Aspidoscelis hyperythra) beldingi - Belding's Orange-throated Whiptail
USFWS: None
CDFG: California Special Concern Species

a. Regional Status

The Belding's orange-throated whiptail (*Cnemidophorus hyperythrus [Aspidoscelis hyperythra] beldingi*) is one two subspecies of orange-throated whiptail, the other being the cape orange-throated whiptail (*C. h. hyperythrus*) which is limited to the extreme southern portion of Baja California, Mexico. The Belding's orange-throated whiptail is simply called the orange-throated whiptail in this account since it is the only member of the taxon in the U.S. The current range of the orange-throated whiptail includes southwestern California and Baja California. In California, this species is described as ranging from the southern edges of Orange (Corona del Mar) and San Bernardino (near Colton) counties southward to the Mexican border (Jennings and Hayes 1994). However, the CNDDB includes a single record from Tujunga Wash in Los Angeles County south of Interstate 210 near Sunland. This disjunct record suggests that the species is more common than described in the literature. They are located on the coastal slope of the Peninsular Ranges and extend from near sea level to 1,040 m (3,412 ft) northeast of Aguanga in Riverside County (Jennings and Hayes 1994).

The geographic distribution the orange-throated whiptail coincides with that of the subterranean termite (*Reticulitermes hesperus)*, the whiptail's primary prey item. For example, the Peninsular Mountain Range in Riverside and San Diego counties, where the termite is limited to its slopes, possibly restricts eastward and altitudinal expansion of orange-throated whiptail populations. Similarly, in San Bernardino County, the restriction of subterranean termites to the lower slopes of the Transverse and Peninsular ranges, and their local scarcity, possibly prevents eastward expansion of whiptails in that county. On the other hand, termites are abundant in Los Angeles and northern Orange counties, but orange-throated whiptails are considered to be absent from these areas (see description of range above) despite the availability of ostensibly suitable whiptail habitat. It is possible that urban, suburban and agricultural development activities may be effective dispersal barriers, but reason(s) for the absence of this species from habitat islands (e.g., the Palos Verdes Peninsula) is(are) unknown.

Table 4-17 shows the distribution of the orange-throated whiptail lizard in California based 233 records in the 2003 CNDDB. The records are too numerous to include the general locations. Almost 88 percent of the occurrences are from San Diego and Riverside counties, with less than 10 percent from Orange County.

TABLE 4-17
DISTRIBUTION OF THE ORANGE-THROATED
WHIPTAIL IN CALIFORNIA

County	No. of CNDDB Records
Los Angeles	1
Orange	23
Riverside	82
San Bernardino	4
San Diego	123

The orange-throated whiptail has been a focus of conservation planning programs in southern California. *Table 4-18* provides more detailed information on the conservation status of this species and its habitat in these programs.

TABLE 4-18
CONSERVATION STATUS OF THE ORANGE-THROATED WHIPTAIL

Conservation Planning Area	Number of Orange-throated Whiptail Locations and Percent Conserved	Potential Habitat Conserved
San Diego MSCP	514 locations, of which 62% conserved	56% of CSS and chaparral habitats and riparian scrub
Central/Coastal NCCP Reserve, Special Linkage and Existing Use Areas, Non-Reserve Open Space, and the Policy Plan Area	Number of locations not analyzed for conservation purposes	NA
North San Diego County MHCP	33 locations 55% proposed conservation	Proposed conservation of 11,691 acres (64%) of suitable habitat, including coastal sage scrub, maritime succulent scrub, chaparral, southern maritime chaparral, coastal sage scrub/chaparral mix.
Western Riverside MHSCP	140 locations 45% proposed conservation	Proposed conservation of 226,313 acres (59 %) of suitable habitat in the Plan Area, including chaparral, coastal sage scrub, desert scrub, Riversidean alluvial fan sage scrub, riparian scrub, woodland and forest.

The orange-throated whiptail inhabits coastal sage scrub, chaparral, non-native grassland, oak woodland, alluvial fan scrub and riparian areas. This species is presumably tied to perennial vegetation because its major food source, termites, requires perennial plants as a food base (Bostic 1966a). California buckwheat appears to be an important indicator of suitable habitat for the orange-throated whiptail because it generally is associated with habitats with 10-40 percent bare ground (McGurty 1981). Substantial bare ground apparently is required for foraging and thermoregulatory behavior by this species (McGurty 1981). California buckwheat commonly occurs in coastal sage scrub and chaparral and often is associated with other perennial species such as coastal sagebrush and sages (*Salvia* spp.) that may be food sources for termites. Friable soils also appear to be necessary for excavating burrows and hiding eggs (Bostic 1965).

Analyses of soil grain size preferences indicate that orange-throated whiptail select only the two finest grain sizes for bury (Brattstrom 1989). However, these findings are complicated by the fact that lizards sometimes bury in larger grains in loose soil aprons brought up from the sub-surface by rodents (Brattstrom 1989).

Unlike several species in the whiptail genus *Cnemidophorus*, the orange-throated whiptail does not reproduce through parthenogenesis (development of an individual from a female gamete without fertilization by a male gamete). Based on examining reproductive structures throughout the year, Bostic (1966b) inferred from the presence of enlarged testes that males are reproductively active from the first week of April through the first week of July. The male cycle begins with regressed testes as they emerge from hibernation. By late April, maximum testicular volume is achieved, followed by a decrease throughout the rest of the summer and complete regression by August. Orange-throated whiptails generally were found to reach maturity in the spring following hatching in the previous summer based on examination of the gonads and accessory reproductive structures of male and female dissected lizards.

The average clutch size for the orange-throated whiptail is approximately 2.3 eggs (Bostic 1966b). Reproductive potential is lower in yearlings than in adults of two years of age or older, with a recorded a maximum clutch size of two eggs for yearlings and three for older lizards (Bostic 1966b). The number of egg clutches deposited each season by orange-throated whiptails in not known; however, multiple clutches may be laid, one in June and again in mid-July (Milstead 1957a; Bostic 1966b; Parker 1972; Crews et al. 1986). Rainfall may influence clutch size (Mitchell 1979; Crews et al. 1986; Pianka 1986). Incubation of hatchlings appears to be approximately 50-55 days based on the time interval between the last record of females with oviducal eggs (mid-July) to dates hatchlings were last observed in the field.

Bostic (1965) recorded an average home range of 0.04 ha (0.10 ac) for adult orange-throated whiptails. Female ranges were slightly larger than male ranges at 0.06 ha (0.15 ac) versus 0.03 ha (0.07 ac), respectively. Female home ranges overlap extensively with other females' ranges as well as male ranges. Bostic (1965) also noted some overlap among male home ranges, but not as extensive as for females.

Termites comprise 72-92 percent of the orange-throated whiptail's diet (Bostic 1966a). In late summer, however, when termites migrate deep into the soil to avoid high surface temperatures, alternate prey items dominate the whiptail's diet. Orange-throated whiptails feed primarily on prey of a secretive nature and low activity, and depend primarily on chemoreception when hunting such prey (Bostic 1966a). When hunting prey of intermediate or high activity (e.g., lepidopterans), vision is most often employed.

The daily activity cycle of whiptails is dominated and controlled by thermoregulatory needs (e.g., Cowles 1940; Carpenter 1961; Bogert 1949; Fitch 1958). Through thermoregulatory behaviors, whiptails are able to maintain their body temperatures within a narrow range. Most of the year whiptails are active throughout the day when near-surface temperatures are between 36-41 degrees C (96-106 degrees F). They become bimodally diurnal on hot summer days, meaning that their surface activity peaks twice a day when temperatures are appropriate; otherwise they spend the warmest part of the day in shade or an underground retreat (Milstead 1957b; Mitchell 1979; Pianka 1986). Whiptails usually only emerge when near-surface temperatures reach about 28 degrees C (82 degrees F). During low early morning temperatures, they move slowly while foraging and frequently stop to bask in open or sparsely covered grass areas between bushes. As mid-morning temperatures increase, basking becomes infrequent and of shorter duration and foraging largely occurs in shaded or semi-shaded areas around bushes. Movements between bushes are very rapid. Few whiptails are observed foraging as midday temperatures increase and as they retreat to cooler areas (e.g., rodent burrows, shade beneath bushes, or they excavate shallow retreats in the substrate). Additional thermoregulatory behavioral patterns may include arboreal behavior to aid in the dispersal of heat to the cooler upper air strata, although Bostic (1966c) found that substrate temperatures appear to be more important role in regulating body temperature than do air temperatures. Adult orange-throated whiptails usually enter into hibernation in late July through most of September, and immatures in December (Bostic 1966c). Favored hibernation, and likely oviposition sites, appear to be on well-isolated, south-facing slopes (Jennings and Hayes 1994).

The main threat to the orange-throated whiptail has been habitat loss and fragmentation to development in recent decades. The CDFG estimated in 1990 that the orange-throated whiptail had been extirpated from 75 percent of its historic range (Jennings and Hayes 1994). The lower coastal floodplains have been developed, leaving the smaller, higher elevation and relatively isolated drainages and terraces as habitat for the whiptail. Because these areas are smaller and isolated, thus limiting dispersal opportunities, local populations have a greater risk of local extinction. The CDFG (2003) also suggests that the drought of 1986-1990 may have depleted the orange-throated whiptail's prey base, which poses a particular problem to a dietary specialist than cannot easily shift to another prey. As with the horned lizard, Argentine ants, that displace many native insects, also may influence the prey base of orange-throated whiptail (Jennings and Hayes 1994). Finally, McGurty (1981) suggested the frequent fires resulting in type conversion from scrub to grassland habitat reduces woody shrubs and food sources for termites. Lack of cover cause by fires may also affect thermoregulation by the whiptail.

b. Subregional Status

The NCCP database includes 174 locations for the orange-throated whiptail broadly distributed throughout the planning area, ranging from the Saddleback Meadows area in the northwest to the Talega sub-basin in the southeast (*Figure 4-17*). Areas with clusters of locations include Saddleback Meadows; lower Arroyo Trabuco; Starr Ranch in upper Bell Canyon (from pitfall trapping data of 23 captures in six of 17 pitfall traps); Chiquita Ridge below Oso Parkway; lower Chiquita Ridge just north of San Juan Creek; the ridge between Chiquita Canyon and Wagon Wheel Canyon; Chiquadora Ridge; the Gobernadora/Central San Juan Creek sub-basins north and east of the Colorspot Nursery; the lower Trampas Canyon subunit/upper Cristianitos sub-basin; and the lower Cristianitos sub-basin. Scattered locations also occur in the eastern portion of the Talega sub-basin, middle Gabino Canyon and west of Radio Tower Road.

The orange-throated whiptail occurrences are widely scattered, but there appear to be three clusters of occurrences that may be considered *important populations* in *key locations*.

- A cluster of 58 occurrences in coastal sage scrub along the ridge between Chiquita Canyon and Wagon Wheel Canyon south of Oso Parkway (No.1 on *Figure 4-17*).

- A cluster of 22 occurrences along Chiquadora Ridge (No. 2 on *Figure 4-17*).

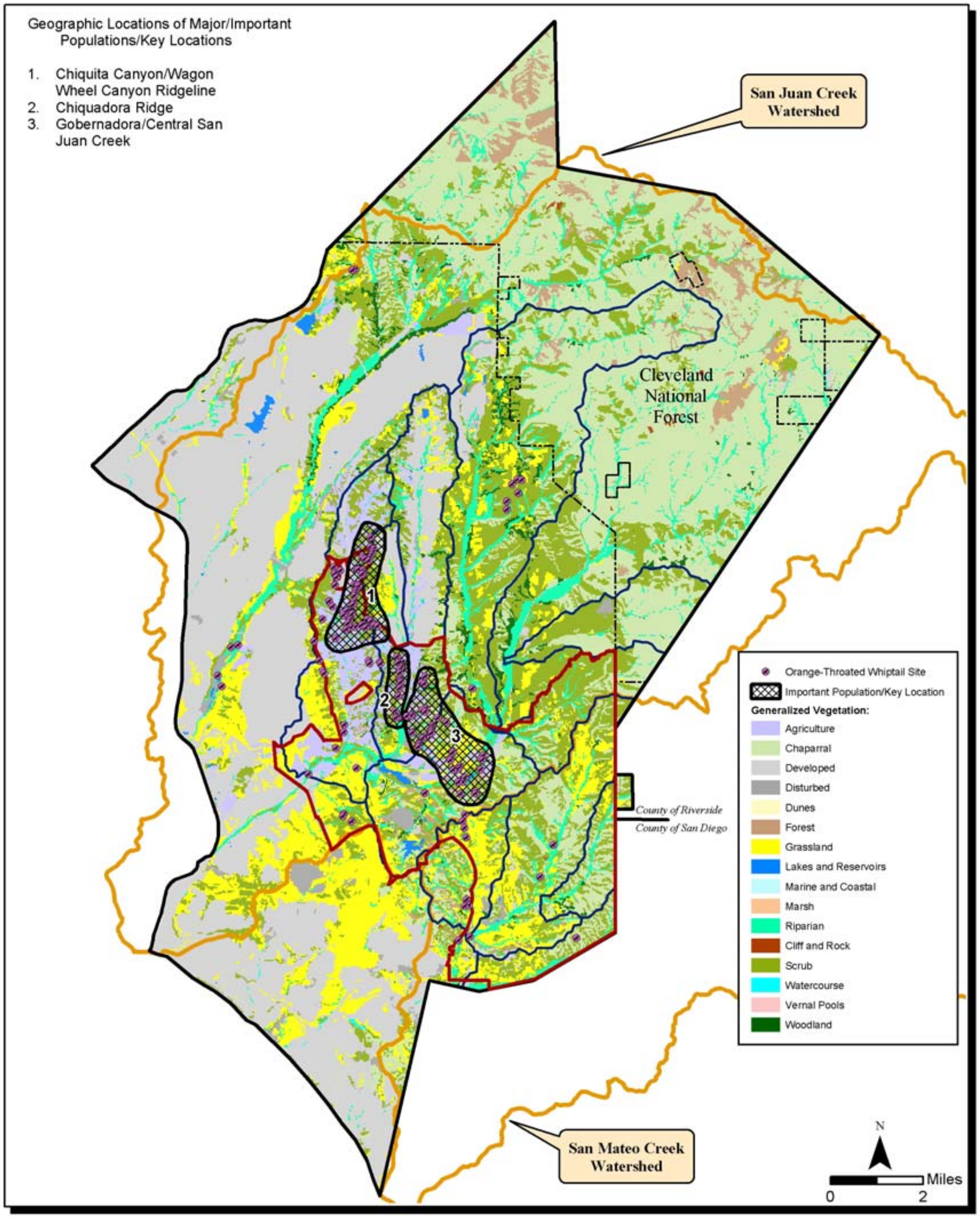
- A cluster of 35 occurrences in the Gobernadora/Central San Juan Creek sub-basins north and east of the Colorspot Nursery (No. 2 on *Figure 4-17*).

As with the San Diego horned lizard, identifying these three areas as *important populations* in *key locations* must be qualified. These clusters occur within survey areas for the SOCTIIP project and thus probably reflect the greater survey effort in this portion of the planning area. Given the wide distribution of this species in the planning area, and its fairly general habitat requirements, it is likely to occur in many other locations within the planning area. The Science Advisors considered the orange-throated whiptail a Group 2 species that can be conserved at a habitat or landscape level. For that reason, the protection recommendations below reflect conservation of these *important populations* as well as broader habitat and landscape protection.

c. Protection Recommendations

- Protect the orange-throated whiptail locations on the ridgeline between Chiquita Canyon and Wagon Wheel Canyon that comprise an *important population* in a *key location*.

- Protect the orange-throated whiptail locations on Chiquadora Ridge that comprise an *important population* in a *key location*.



Draft NCCP/HCP Planning Guidelines

Orange-throated Whiptail Distribution Map

FIGURE 4-17

Protect the major north-south connection to Central San Juan Creek by providing a habitat linkage between Chiquita Creek and the eastern edge of the Ladera Open Space and by restricting new impervious surfaces west of Chiquita Creek in order to maintain habitat integrity between the creek and Chiquita Ridge.

- Maintain east-west biological connectivity by protecting habitat linkages and wildlife corridors between Arroyo Trabuco, Chiquita Canyon, and Gobernadora Canyon. Biological connectivity should be maintained between Chiquita, Gobernadora and Arroyo Trabuco by protecting habitat linkages at minimum of three locations within the sub-basin: **(1)** via rim-to-rim preservation of Sulphur Canyon (approximately 2,000 to 2,500 feet wide); **(2)** at the "Narrows" where the canyon is only 700-800 feet wide (approximately 3,000 feet south of Tesoro High School) and connects to Sulphur Canyon; and **(3)** in contiguous patches of coastal sage scrub through the major canyon north and east of the wastewater treatment plant.

- Maintain a continuous upland habitat linkage along the east-facing slopes of Chiquadora Ridge between San Juan Creek and Sulphur Canyon.

- Provide floodplain and upland linkage habitat adjacent to San Juan Creek for "live-in" and dispersal habitat for the orange-throated whiptail.

- Maintain upland north-south habitat linkages through the central and western portions of the Trampas Canyon subunit to provide "live-in" and dispersal habitat for the orange-throated whiptail.

- Protect a habitat linkage, consisting of the Donna O'Neill Land Conservancy and an area along the east side of Cristianitos Creek, to provide dispersal opportunities for the orange-throated whiptail in the upper portion of the sub-basin with other populations in lower Gabino Creek and Camp Pendleton along lower Cristianitos/San Mateo Creek, and to maintain habitat integrity through connectivity within the Donna O'Neill Land Conservancy at Rancho Mission Viejo.

- Maintain an east-west habitat linkage from Gabino Creek to the confluence with Cristianitos Creek as "live-in" habitat and dispersal opportunities for the orange-throated whiptail between Gabino Canyon and the Donna O'Neill Conservancy at Rancho Mission Viejo.

- Protect, to the extent feasible, patches of coastal sage scrub in the Verdugo Canyon sub-basin with a focus on maintaining contiguous habitat patches that provide "live-habitat" and north-south dispersal opportunities for the orange-throated whiptail between the

Lucas Canyon sub-basin to the north, and the Gabino Canyon/Blind Canyon and La Paz sub-basins to the south.

- Maintain contiguity and connectivity of coastal sage scrub in the upper Gabino Canyon subunit to provide “live-in” and dispersal habitat for the orange-throated whiptail.

- Protect a north-south habitat linkage through Middle Gabino to provide “live-in” habitat and dispersal opportunities for the orange-throated whiptail.

- Maintain contiguity and connectivity of coastal sage scrub in the Talega Canyon sub-basin to provide “live-in” habitat and dispersal opportunities for the orange-throated whiptail.

d. Management Recommendations

- Implement a management program for protected habitat suitable for the orange-throated whiptail, including control of non-native species such as the Argentine ant, management of fire and grazing and minimization of human access and disturbance (e.g., collecting), as part of the Adaptive Management Program.

e. Restoration Recommendations

- Implement a CSS/VGL restoration program to enhance habitat value and connectivity. Potential restoration areas that would benefit the orange-throated whiptail include Chiquita Ridge, Sulphur Canyon, Chiquadora Ridge, upper Cristianitos Canyon and upper Gabino Canyon.

4.2.11 San Diego Horned Lizard

Phrynosoma coronatum blainvillei - San Diego Horned Lizard[3]
USFWS: None
CDFG: California Special Concern Species

a. Regional Status

The full species coast horned lizard (*Phrynosoma coronatum*) occurs throughout much of California west of the Sierra Nevada and Cascade ranges (Stebbins 1985). It is absent from the

[3] The CDFG January 2004 Special Animals list specifies coast horned lizard (*Phrynosoma coronatum*) blainvillei, population as a California Special Concern species. However, for the purpose of continuity with all previous documents prepared for the NCCP, this species account will continue to use the common name San Diego horned lizard.

humid rainforests of northwest coastal California. The range of the subspecies San Diego horned lizard (*P. c. blainvillei*) includes 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). The known elevation range of this species is from 10 m (33 ft) at the El Segundo dunes in Los Angeles County to approximately 2,130 m (6,988 ft) at Tahquitz Meadow in the San Jacinto Mountains in Riverside County. The San Diego horned lizard was once common on coastal plains and in riparian and coastal sage scrub habitats on the old alluvial fans in southern California (Hayes and Guyer 1981; Bryant 1911; Van Denburgh 1922), but appears to have been extirpated from about 45 percent of its former range in southern California (Jennings 1988). The San Diego horned lizard is thought to intergrade with the subspecies *P. c. frontale* in extreme southern Kern County and northern Santa Barbara, Ventura, and Los Angeles counties (Reeve 1952; Montanucci 1968; Jennings 1988). It should be noted that recent taxonomic studies find no evidence based on scale characteristics to separate the two subspecies of *P. coronatum* (Grismer and Mellink 1994; Brattstrom 1997). The CDFG January 2004 Special Animals list currently specifies the coast horned lizard (*Phrynosoma coronatum*) blainvillei, population as the California Special Concern species that replaces the old designation San Diego horned lizard. However, for the purpose of continuity with all previous documents prepared for the NCCP, this species account will continue to use the common name San Diego horned lizard.

Table 4-19 provides distributional information for the San Diego Horned lizard by county based on 350 records in the 2003 CNDDB. Records are too numerous to include general locations within the counties. These data do not identify *major* or *important populations* or *key locations*. *Table 4-19* shows that the vast majority of the San Diego horned lizard observations are in the five Southern California counties, with San Diego having the greater number of occurrences, followed by Riverside, Los Angeles, San Bernardino and Orange.

TABLE 4-19
2003 CNDDB RANGEWIDE DISTRIBUTION OF THE
SAN DIEGO HORNED LIZARD IN CALIFORNIA

County	No. of CNDDB Records
Kern	1
Los Angeles	70
Orange	26
Riverside	82
San Bernardino	45
San Diego	124
Ventura	2

The San Diego horned lizard has been the focus of conservation planning programs in southern California. *Table 4-20* provides detailed information on the conservation status of this subspecies in these programs.

TABLE 4-20
CONSERVATION STATUS OF THE SAN DIEGO HORNED LIZARD

Conservation Planning Area	Number of Horned Lizard Locations and Percent Conserved	Potential Habitat Conserved
San Diego MSCP	291 locations 63% conserved	56% of coastal sage scrub and chaparral habitats and riparian scrub
Central/Coastal NCCP Reserve, Special Linkage and Existing Use Areas, Non-Reserve Open Space, and the Policy Plan Area	Number of locations not analyzed for conservation purposes	NA
North San Diego County MHCP	30 locations 38% proposed conservation	Proposed conservation of 13,992 acres (57%) of potential habitat, including chaparral, southern maritime chaparral, coastal sage scrub, coastal sage scrub/chaparral mix, grassland, oak woodlands
Western Riverside MSHCP	135 locations 42% proposed conservation	Proposed conservation of 407,036 acres (56%) of suitable habitat in the Plan Area including coastal sage scrub, desert scrub, Riversidean alluvial fan sage scrub, grassland, and chaparral

The San Diego horned lizard 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 1985). In inland areas, this species is restricted to areas with open microhabitats, often created by natural or anthropogenic disturbances (e.g., floods, fire, roads, grazed areas, fire breaks) (Jennings and Hayes 1994).

In southern California, the male reproductive cycle begins during mid- to late-March and ends in June (Goldberg 1983). Female horned lizards lay a clutch of 6 to 17 eggs between May and July each year (Stebbins 1954; Howard 1974; Goldberg 1983). Goldberg (1983) found that *P. coronatum* has the potential to produce multiple clutches during the spring. Hatchlings appear in late July to early August, and require two to three years to reach reproductive age (Howard 1974;

Pianka and Parker 1975; Goldberg 1983). San Diego horned lizards emerge from hibernation in March, and become surface active in April through July, after which most adults estivate (summer hibernation) (Hagar 1992). The adults reappear again briefly in late summer and return to overwintering sites between August and early October depending upon elevation (Klauber 1939; Howard 1974; Hagar 1992).

Horned lizards in general (i.e., the genus *Phrynosoma*) primarily are ant-eating reptiles with relatively well-known dietary habits (Montanucci 1981; Pianka and Parker 1975; Powell and Russell 1984; Rissing 1981; Turner and Medica 1982). Up to 90 percent of the diet of San Diego horned lizard consists of native harvester ants (*Pogonomyrmex* spp.) (Pianka and Parker 1975). However, the San Diego horned lizard does not appear to eat non-native Argentine ants (*Linepithema humile*) (Jennings and Hayes 1994), which displace native ants wherever they are introduced (Suarez et al. 2001), and as described in more detail below. In addition, other slow moving insects, such as beetles, flies, and caterpillars are consumed opportunistically by horned lizards when encountered (Presch 1969; Pianka and Parker 1975).

The daily diurnal activity of San Diego horned lizards is tied closely to surface temperatures. As surface temperatures reach at least 19 degrees C (66 degrees F) just prior to sunrise lizards emerge from burial sites in the substrate into a position that allows them to bask in the first rays of the sun (Heath 1965; Hagar 1992). Although horned lizards emerge at relatively low temperatures, the optimum temperature range for horned lizard activity is 29-39 degrees C (84-102 degrees F). Midday temperatures over 40 degrees C (104 degrees F) are avoided as San Diego horned lizards bury themselves in the substrate, reemerging in the later afternoon when its cooler to resume activities of foraging and reproduction. High site fidelity appears to be related to effective thermoregulation, because maintaining optimum temperatures requires familiarity with their surroundings (Heath 1965).

There are no specific data for the home range of San Diego horned lizards. However, Whitford and Bryant (1979) study of the closely related *P. cornutum* and found that individuals moved an average of only 46.8 m (53.5 ft) per day (range = 9-91 m [29.5-298.5 ft]). They also found that an individual horned lizard moved over a zigzag course during a day but rarely crossed its own trail. Tollestrup (1981) suggested that olfactory cues are important in the horned lizard’s daily activities, including courtship, feeding, sex recognition, and conspecific interactions. In addition, they apparently mark sites by partially extruding their cloaca and rub it back and forth on the substrate.

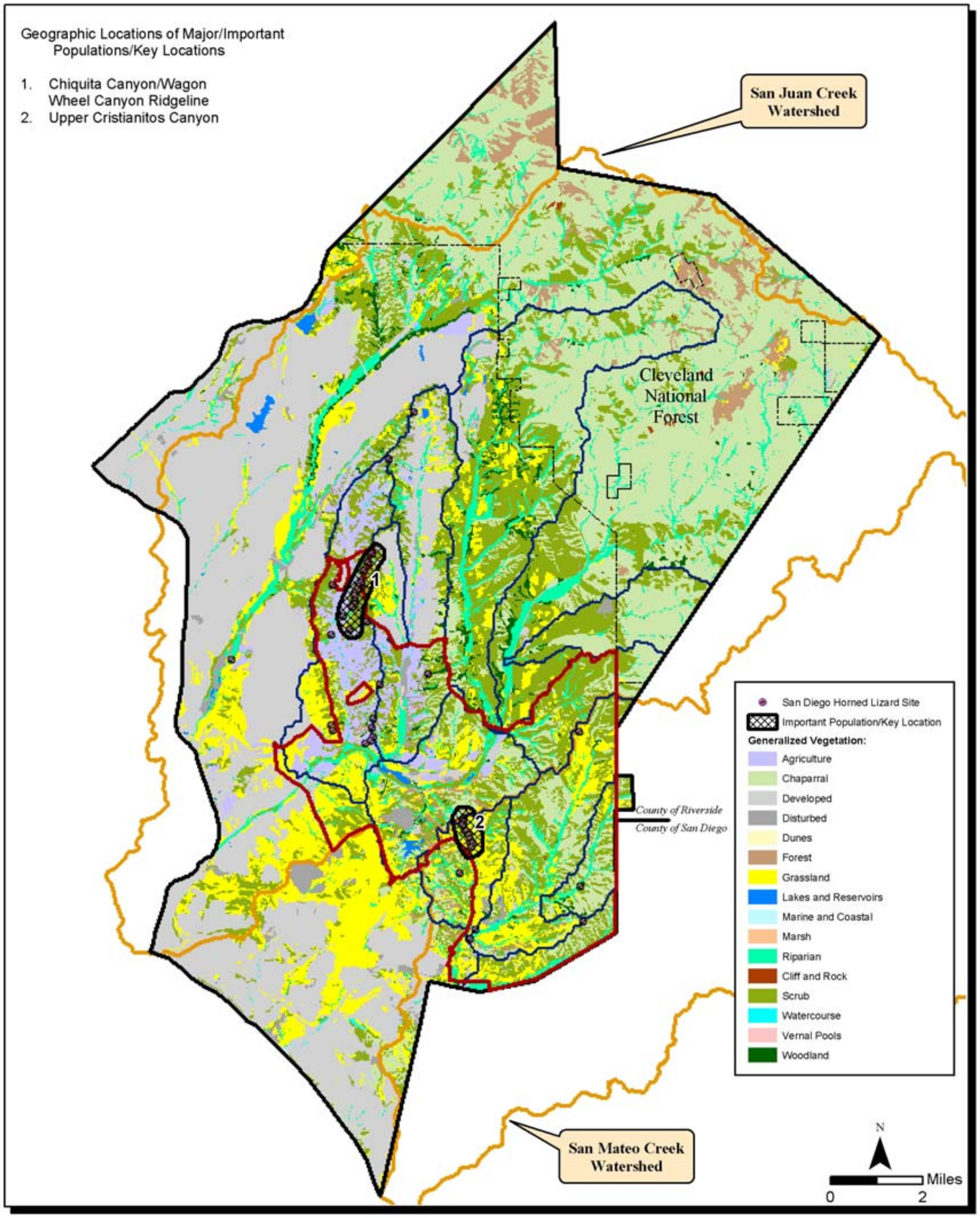
Horned lizards are prey for a variety of natural predators, such as coyotes, badgers, foxes, small raptors (kestrels, falcons, shrikes, burrowing owls), roadrunners, and several other lizards and snakes (Zeiner et al. 1990). Their main defenses against predators are their cryptic appearance and freezing behavior (Jennings and Hayes 1994). Klauber (1939) observed changes in body coloration to match the soil or sand on which they were found. If discovered or disturbed horned lizards defenses include hissing, inflating their lungs to increase apparent size (Pianka and Parker 1975; Munger 1984; Sherbrooke 1981), raising their horns by lowering their snout (Pianka and Parker 1975; Sherbrooke 1981), squirting blood from the corner of the eye (which seems to repel dogs and cats) (Presch 1969; Pianka and Parker 1975), tilting the body when irritated (Milne and Milne 1950; Smith 1946; Tollestrup 1981), presenting a bristling of scales of the back while standing well up on the legs (Bryant 1911), and running a short distance before flattening out or burrowing several centimeters under the ground (Presch 1969). When a horned lizard flattens its body, it usually tucks its head down, exposing its horns, and often charges the enemy (Winton 1916).

Habitat loss is one of the main threats to the San Diego horned lizard, with approximately 45 percent of habitat extirpated as of 1988 (Jennings 1988). In addition to habitat loss, Jenning and Hayes (1994) identified several other threats to the San Diego horned lizard, including collection by humans, off-road vehicles, livestock grazing, conversion of habitat to agriculture, invasion by Argentine ants, firebreaks and prescribed burning (although the latter two may actually create open microhabitats used by horned lizards).

The invasion of habitat by Argentine ants in California recently has become a high profile threat, not only to the horned lizard, but also to other native species. Although Argentine ants have been in California for at least 93 years (Holway 1995), studies of the species date back only to the 1970s. It is now clear that Argentine ants disrupt natural communities by displacing native ants and other arthropods and disrupting ant-plant and ant-aphid mutualisms (evolved interdependent associations) (Holway 1995). Argentine ants spread by two mechanisms: diffusion and jump-dispersal. Diffusion involves typically slow, continuous spreading often along riparian corridors. Jump-dispersal can transport ants quickly and across long distances and can be human-mediated (e.g., potted plants, foodstuffs) or natural (e.g., floating wood rafts along streams).

a. Subregional Status

The NCCP database for the San Diego horned lizard includes 50 occurrence records, with virtually all in coastal sage scrub. The San Diego horned lizard is found in the following locations within the planning area: lower Arroyo Trabuco; the northern portion of the Upper Chiquita Canyon Conservation Area; in the "Narrows" area of Chiquita Canyon and along ridgeline separating the Chiquita Canyon and Wagon Wheel Canyon sub-basins; the southern portion of Chiquita Ridge; Chiquadora Ridge south and southeast of the wastewater treatment plant; upper Cristianitos Canyon; the confluence of Cristianitos and Gabino creeks; La Paz Creek; upper Blind Canyon; and upper Gabino Canyon (*Figure 4-18*). Although there is wide



Draft NCCP/HCP Planning Guidelines

San Diego Horned Lizard Distribution Map

FIGURE 4-18

scattering of horned lizard occurrences, there appear to be two clusters of occurrences that may be considered *important populations* in *key locations*:

- A cluster of 16 occurrences in coastal sage scrub along the ridge between Chiquita Canyon and Wagon Wheel Canyon south of Oso Parkway (No.1 on *Figure 4-18*).

- A cluster of 14 occurrences in the upper Cristianitos and southern Trampas Canyon sub-basin located between Cristianitos Road and Cristianitos Creek (No. 2 on *Figure 4-18*).

Identifying these two areas as *important populations* in *key locations* must be qualified. These clusters occur within the survey area for the SOCTIIP project and thus probably reflect the greater survey effort in this portion of the planning area. On the other hand, even within the SOCTIIP survey area, these two locations stand out as having exceptionally high numbers of horned lizards. Given the wide distribution of this species in the planning area, and its fairly general habitat requirements, it is likely to occur in many other locations within the planning area, but perhaps not in the concentrations found in these two areas. The Science Advisors considered the San Diego horned lizard a Group 2 species that can be conserved at a habitat or landscape level. For that reason, the protection recommendations below reflect conservation of these *important populations* in *key locations* as well as broader habitat and landscape protection.

b. Protection Recommendations

- Protect the San Diego horned lizard locations on the ridgeline between Chiquita Canyon and Wagon Wheel Canyon that comprise an *important population* in a *key location*.

- Protect the San Diego horned lizard locations in the upper Cristianitos Canyon and southern Trampas Canyon sub-basins between Cristianitos Creek and Cristianitos Road that comprise an *important population* in a *key location*.

- Protect the major north-south connection to Central San Juan Creek by providing a habitat linkage between Chiquita Creek and the eastern edge of the Ladera Open Space and by restricting new impervious surfaces west of Chiquita Creek in order to maintain habitat integrity between the creek and Chiquita Ridge.

- Maintain east-west biological connectivity by protecting habitat linkages and wildlife corridors between Arroyo Trabuco, Chiquita Canyon, and Gobernadora Canyon. Biological connectivity should be maintained between Chiquita, Gobernadora and Arroyo Trabuco by protecting habitat linkages at minimum of three locations within the sub-basin: **(1)** via rim-to-rim preservation of Sulphur Canyon (approximately 2,000 to 2,500 feet wide); **(2)** at the "Narrows" where the canyon is only 700-800 feet wide (approximately 3,000 feet south of

Tesoro High School) and connects to Sulphur Canyon; and **(3)** in contiguous patches of coastal sage scrub through the major canyon north and east of the wastewater treatment plant.

- Maintain a continuous upland habitat linkage along the east-facing slopes of Chiquadora Ridge between San Juan Creek and Sulphur Canyon.

- Protect Sulphur Canyon rim-to-rim to maintain a functional biological connection from Gobernadora to Gen. Thomas F. Riley Regional Park in Wagon Wheel Canyon and upper Chiquita Canyon.

- Provide floodplain and upland linkage habitat adjacent to San Juan Creek for "live-in" and dispersal habitat for the San Diego horned lizard.

- Maintain upland north-south habitat linkages through the central and western portions of the Trampas Canyon subunit to provide "live-in" and dispersal habitat for the San Diego horned.

- Protect a habitat linkage, consisting of the Donna O'Neill Land Conservancy and an area along the east side of Cristianitos Creek, to provide dispersal opportunities for the San Diego horned lizard in the upper portion of the sub-basin with other populations in lower Gabino Creek and Camp Pendleton along lower Cristianitos/San Mateo Creek, and to maintain habitat integrity through connectivity within the Donna O'Neill Land Conservancy at Rancho Mission Viejo.

- Maintain an east-west habitat linkage from Gabino Creek to the confluence with Cristianitos Creek as "live-in" habitat and dispersal opportunities for the San Diego horned lizard between Gabino Canyon and the Donna O'Neill Land Conservancy.

- Protect, to the extent feasible, patches of coastal sage scrub in the Verdugo Canyon sub-basin with a focus on maintaining contiguous habitat patches that provide "live-habitat" and north-south dispersal opportunities for the San Diego horned lizard between the Lucas Canyon sub-basin to the north, and the Gabino Canyon/Blind Canyon and La Paz sub-basins to the south.

- Maintain contiguity and connectivity of coastal sage scrub in the upper Gabino Canyon subunit to provide "live-in" and dispersal habitat for the San Diego horned lizard.

- Protect a north-south habitat linkage through Middle Gabino to provide "live-in" habitat and dispersal opportunities for the San Diego horned lizard.

- Maintain contiguity and connectivity of coastal sage scrub in the Talega Canyon sub-basin to provide “live-in” habitat and dispersal opportunities for the San Diego horned lizard.

c. Management Recommendations

- Implement a management program for protected habitat suitable for the San Diego horned lizard, including control of non-native species such as the Argentine ant, non-native mesopredators (cats and dogs), management of fire and grazing and minimization of human access and disturbance (e.g., collecting), as part of the Adaptive Management Program.

d. Restoration Recommendations

- Implement a CSS/VGL restoration program to enhance habitat value and connectivity. Potential restoration areas that would benefit the San Diego horned lizard include Chiquita Ridge, Sulphur Canyon, Chiquadora Ridge, upper Cristianitos Canyon and upper Gabino Canyon.

4.2.12 Southwestern Pond Turtle

Clemmys (Emys) marmorata pallida - Southwestern Pond Turtle
USFWS: None
CDFG: California Special Concern Species

a. Regional Status

The historic range of the full species of the pond turtle (*Clemmys [Emys] marmorata*) extended along most of the west coast of North America, primarily west of the Cascade-Sierra crest, from western British Columbia to northern Baja California (Ernst et al. 1994). The subspecies southwestern pond turtle (*C. m. pallida*) ranges south of San Francisco Bay to northern Baja California, Mexico, and intergrades with the northwestern pond turtle (*C. m. marmorata*) over a large area in central California (Bury 1970; Stebbins 1985). Isolated populations of the southwestern pond turtle are known to exist as far into the Mojave Desert in Afton Canyon and in the Amargosa River (Lovich 1999). The elevational range for the species is from brackish estuarine waters at sea level to over 2,000 m (6,562 ft), but it is uncommon over 1,530 meters (5,020 ft) (Stebbins 1954; Bury 1963; Holland 1994).

Table 4-21 illustrates the distribution of the southwestern pond turtle by county in California based on 277 records in the 2003 CNDDB. Specific locations for pond turtles are suppressed in the CNDDB to prevent collection from the sites. These data illustrate the general distribution of the southwestern pond turtle and do not identify *major* or *important populations* or *key locations*.

TABLE 4-21
2003 RANGEWIDE DISTRIBUTION OF THE
SOUTHWESTERN POND TURTLE IN CALIFORNIA

County	No. of CNDDB Records
Alameda	1
Kern	19
Los Angeles	30
Monterey	19
Orange	26
Riverside	10
San Bernardino	7
San Diego	30
San Luis Obispo	75
Santa Barbara	35
Santa Clara	2
Santa Cruz	3
Ventura	22

Harmsworth Associates (1998b) conducted visual, seine netting and funnel trapping surveys for the pond turtle in all natural and semi-natural watercourses, artificial lakes and reservoirs, and channelized culverts and flood control channels in the Central and Coastal NCCP Subregion in 1997 (excluding MAS Tustin, the North Ranch Policy Plan Area and Cleveland National Forest). Of about 123 separate study sites the pond turtle was observed at 17 locations (locations are not described in detail here), with most occurring in the Central Subarea. The Southern Subregion NCCP planning area supports approximately seven discrete locations, as described in more detail below.

Southwestern pond turtles inhabit 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 within streams are the preferred habitat (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 m (6.6 ft) (Brattstrom and Messer 1988; Holland 1994). Additionally, emergent basking sites, emergent vegetation and the availability of suitable terrestrial shelter and nesting sites are characteristic of occupied habitat. Adjacent upland areas provide overwintering and estivation sites that are used for 1-2 months in southern California (Holland 1994).

Reproductive activity by southwestern pond turtles has been observed from February through November (Holland1988; Buskirk 1991; Goodman 1997a). Depending on latitude, peak nesting season is from late May through early July, but extends from late April through August (Holland 1994). Goodman (1997a) found that females begin laying eggs at a carapace length greater than 11 cm (4.3 in) and Holland (1994) suggests that females first reproduce at age 6 to 7 years.

Availability and selection of suitable nesting sites is a key factor in pond turtle distribution. If suitable nesting sites are not available, females have been observed to travel up to 1.9 km (1.2 mi) along a waterway to lay their eggs (Rathbun et al. 1992). Nests typically are located along stream or pond margins, but may be located over 100 m (328 ft) from water on adjacent hillsides, apparently with a southern exposure. Six terrestrial nest locations inspected by Rathbun et al. (1992) were all found in open, grassy areas with a southern exposure. Goodman (1997a) observed a similar pattern at two study sites in southern California: Aliso Creek in Chino Hills State Park and along the West Fork of the San Gabriel River. Nest sites were generally on south-facing slopes ranging from 2-60 degrees and an average of 16.2 m (53.1 ft) from the watercourse (range: 1.5-48.2 m [4.9-158.1 ft]) at Aliso Creek and an average of 28.7 m (94.1 ft) from the watercourse (range: 18.3-47.3 m [60.0-155.2 ft]) at the San Gabriel River. A southern exposure likely is important for thermal regimes related to egg development. Goodman also noted dominant vegetation at nest sites. At the Aliso Creek site the dominant vegetation was non-native grasses, usually in association with black mustard. The average percent cover at the Aliso Creek nest sites was a 17 percent (range: 5-33 percent). At the San Gabriel River site, there was more variability in the dominant vegetation communities at nest sites, and included moss, buckwheat, scrub oak, chamise, yucca and non-native grasses. The average percent cover at the San Gabriel River nests sites was 28 percent (range: 0-80 percent). Goodman (1997a) did not analyze whether there was specific nest site selection based on vegetation or soils. Holland (1991) noted that most nests sites discovered up to that time were on dry, well-drained soils with significant clay/silt content and low (<15 degrees) slope.

Nesting forays onto land may require several days (Holland 1994), and Rathbun et al. (1992) reported an overnight trip. In the Rathbun et al. (1992) study, nest cavities were pear-shaped and measured 6.5-8.0 cm (2.6-3.1 in) deep with a 2.6-2.8 cm (6.5-7.0 in) wide egg chamber and a 1.4-1.6 cm (3.5-4.0 in) mouth. Usually nest excavation occurs in the morning or evening (Storer 1930).

Average clutch sizes are about 6 eggs, with a range of 1 to 13. Clutch size, and possibly egg width, appear to be correlated with body size (Holland 1994; Goodman 1997a). Doubleclutching was observed in 3 of 7 females in San Bernardino County (Goodman 1997b). First clutches were laid between May 4 and 14 and second clutches between June 10 and 20.

Incubation is typically 80 to 126 days and varies with latitude and temperature (Goodman1997a; Holland 1994; Lardie 1975; Feldman 1982). As is common in turtles, incubation temperature is a factor in sex determination in pond turtles. Ewert et al. (1994) found that males are produced below 30 degrees C (86 degrees F) and females above this temperature.

Complete failure of pond turtle nests is not uncommon in some years or locations (Holland 1994). Goodman (1997a) observed an 80 percent hatchling success rate for 15 eggs in three nests; however, Holland (1994) reports an overall average of 70 percent. In the northern portions of their range, hatchlings remain in the nest through the winter, although in southern California, most emerge in the early fall (Holland 1994). Also, many females do not lay eggs every year (Goodman 1997a).

The southwestern pond turtle is an omnivore with a broad feeding niche (Bury 1986). It is an opportunistic forager, both scavenging and taking live prey. Pond turtles prefer live or dead animal food, but ingest plants as part of their diet to provide nutrients when live prey are unavailable. Food items eaten by pond turtles include aquatic plants such as the pond lily (*Nuphar polysepalum*), water beetles, mallard duck carrion, adult larval insects, coyote scat, and snails (Pope 1939; Evenden 1948; Carr 1952; Holland 1988; Bury 1986; Goodman and Stewart 1998).

Pond turtles aggressively compete for spatially limited habitat resources (e.g., basking sites) that result in aggregated distributions of turtles around pools (Bury 1972). For example, an aggregation of 19 southwestern pond turtles located in a single crevice of granitic rock near a stream was reported by Holland and Goodman (1996). Agonistic behaviors to secure preferred basking sites include biting, ramming and pushing.

In a radiotelemetry study by Rathbun et al. (1992), daily movements of four females during one month from May 20 to June 21, 1989, averaged 28 m (91 ft), 55 m (108 ft), 61 m (200 ft), and 87 m (285 ft), respectively.

Longer-term home range sizes vary between age and sex classes. Bury (1972) studied a population in a northern California stream and found that adult males had the largest home range, averaging a mean linear length (i.e., point to point) of 976 m (3,202 ft). Adult female home ranges averaged 248 m (814 ft), while juveniles had home ranges with a mean length of 363 m (1,190 ft). While moving between pools within the stream system, average distances were 354 m (1,161 ft) for males, 169 m (554 ft) for females, and 142 m (466 ft) for juveniles. Goodman (1997a) conducted radiotelemetry studies of pond turtles in Aliso Creek in Chino Hills State Park and the West Fork of the San Gabriel River from 1992 to 1994. In the Aliso Creek population, the minimum linear range for nine females averaged 1,273 m (4,176 ft) (range: 708-4,263 m [2,323-13,986 ft]) and two males had ranges of 319 m and 709 m (1,046 and 2,326 ft), respectively. In contrast, the minimum linear ranges for turtles on the San Gabriel River were significantly shorter for females, with an average of 335 m (1,099 ft) (range: 48-966 m [157-3,169]) for 11 females and a range of 1,610 m for a single male. Goodman suggested that the relative lack of water in the Aliso Creek study area compared to the San Gabriel River may account for the longer movements of the Aliso population because individuals may have had to move farther to obtain the resources necessary for survival.

For the most part, overwintering sites in the Goodman (1997a) study were relatively close to water. At the Aliso Creek site, the mean distance of overwintering sites from water for seven turtles was 7.3 m (23.9 ft) (range: 1.5-10.7 m [4.9-35.1 ft]). At the San Gabriel River site the mean distance of overwintering sites for 20 turtles was 32.7 m (107.3 ft) (range: 12.8-60.2 m [42.0-197.5 ft]). However, Holland (1994) reports overwintering sites up to 500 m (1,640 ft) from the watercourse. In addition Holland (1994) reports that pond turtles have been found up to 1 km (3,280 ft) from watercourses and are capable of moving up to 5 km (3.1 mi) between drainages. Although pond turtles are capable of moving long distances, they generally are characterized as relatively sedentary animals. Holland and Goodman (1996) state that “most animals appear to remain within a given watercourse for extended periods of up to several years.”

Overwintering sites appear to have more cover than nesting sites. Dominant vegetation at seven overwintering sites at the Aliso Creek studied by Goodman (1997a) included mule fat, willows, black mustard and tree tobacco, with cover ranging averaging 65 percent (range: 25-90 percent). At 20 overwintering sites the San Gabriel River study area dominant vegetation consisted of scrub oak, yucca, chamise, ceanothus, laural sumac, bay tree, canyon oak, white sage, black sage, poison-oak, Douglas-fir, monkeyflower, giant rye grass, ash (dead), and non-native grasses. Percent cover at the 20 sites averaged 64 percent (range: 20-100 percent).

A number of threats have been identified for the southwestern pond turtle. Loss and alteration of aquatic habitat is the greatest threat to the southwestern pond turtle. Over 90 percent of wetland habitat within its historic California range has been eliminated by agricultural development, flood control, water diversion projects, and urbanization (USFWS 1992, 1993c). Additionally, predation on young by introduced aquatic species (*e.g.*, bullfrogs, bass, and catfish), collection for pets, urban-related predation pressures (e.g., dogs raccoons, skunks), competition with non-native turtles (Holland 1991), contaminant spills, grazing, off-road vehicle use and vehicle strikes on roads (Holland 1994) have all contributed to the sharp decline this species has experienced in recent decades. Dams and channelization have greatly reduced the availability of suitable habitat (Brattstrom and Messer 1988). Reese and Welsh (1988) determined that the quality of western pond turtle habitat has been reduced by alteration of channel morphology and flow rates associated with dam construction. Invasion of exotic vegetation species such as tamarisk (*Tamarix* sp.) is another threat to the pond turtle. Establishment of tamarisk results in changes to hydrology and channel morphology which degrades pond turtle habitat.

b. Subregional Status

There are currently 21 individual pond turtle occurrences from seven discrete locations in the NCCP database (*Figure 4-19*). The largest population is in the stock pond and adjacent grassland habitat in upper Cristianitos Canyon. A total of 14 pond turtles have been observed in this area since the early 1990s, with the most recent observation during SOCTIIP surveys of two individuals basking in the stockpond in 2001. There are five observations of single pond turtles associated with San Juan Creek; two just east of Antonio Parkway: one in Cal-Mat Lake; one in uplands between the creek and Ortega Highway; one in uplands north of the creek in a tributary drainage surrounded by disturbance and development. One individual was observed in a small pond within the Colorspot Nursery north of the creek. There also is an observation of a single individual in grassland just west of Jerome's Lake in upper Gabino Canyon The CNDDB also includes a 1993 record in the planning area at an urbanized site disjunct from the main reserve study area; Oso Creek between La Paz and Jeronimo Road in Mission Viejo.

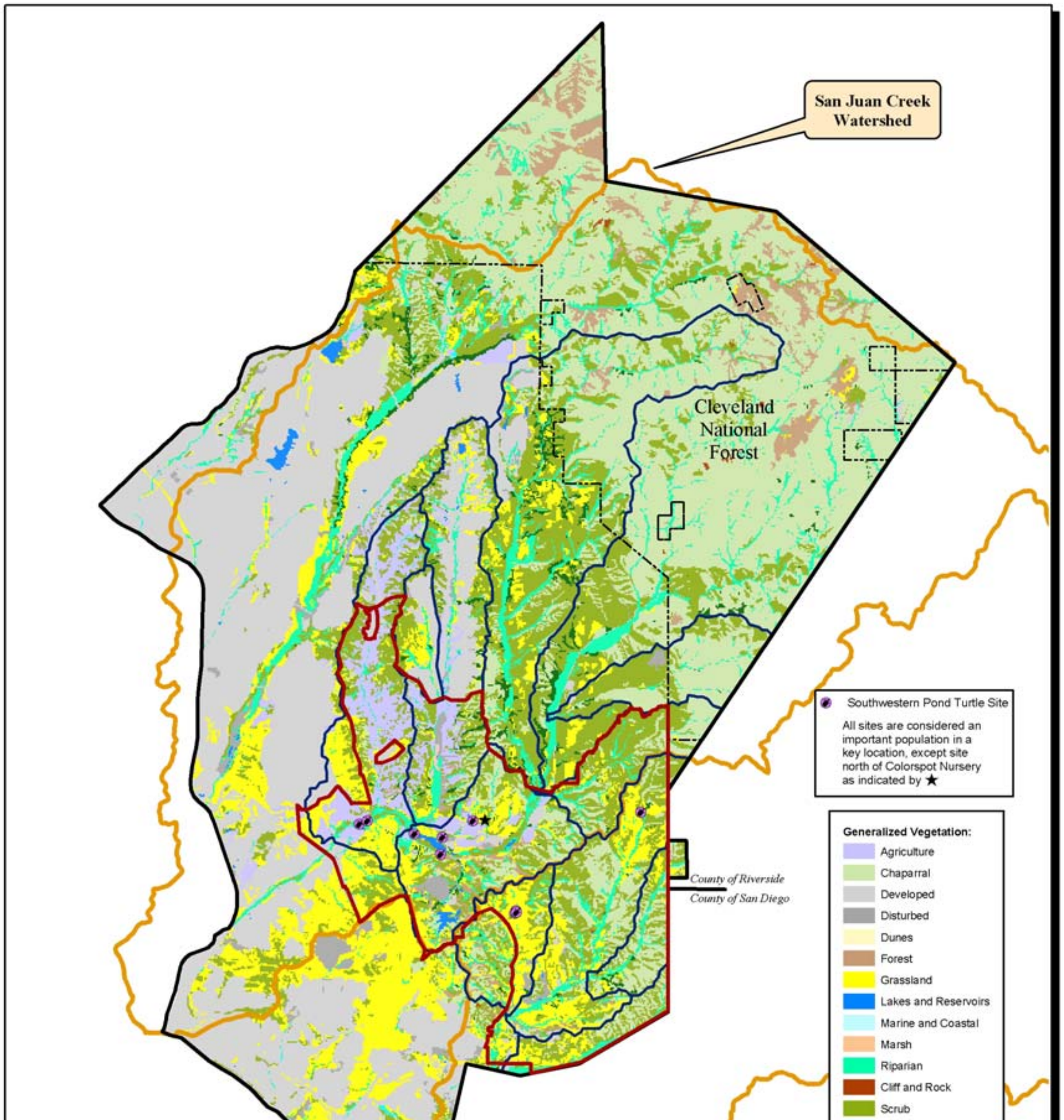
The size of the pond turtle populations at these localities is uncertain since the observations were visual and detected only turtles basking or above ground in uplands (as opposed to focused trapping surveys). Although there is a significant positive correlation between trapping studies and visual surveys, visual surveys may miss turtles and cannot be relied upon as presence/absence surveys (Germano and Bury 2001). Because the pond turtle is relatively rare in the planning area, all occupied sites except the location next to Colorspot Nursery are considered *important populations* in *key locations*.

c. Protection Recommendations

- Maintain and manage riparian and aquatic habitats along San Juan Creek for breeding populations of the southwestern pond turtle.

- Protect the stockpond and other wetlands in the upper Cristianitos Watershed to support the nesting population of the southwestern pond turtle.

- Protect Jerome's Lake in upper Gabino Canyon to support the nesting population of the southwestern pond turtle.



Draft NCCP/HCP Planning Guidelines

Southwestern Pond Turtle Distribution Map

FIGURE 4-19

- Protect upland habitat within 100 m (328 ft) adjoining occupied aquatic and riparian habitats and on southern exposures along San Juan Creek, upper Cristianitos and Jerome's Lake to support nesting and overwintering sites for the southwestern pond turtle.

d. Management Recommendations

- Within Gobernadora Creek, protect downstream habitat for the southwestern pond turtle by maintaining hydrology, water quality and sediment delivery in San Juan Creek and minimizing additional loadings of nutrients or toxics.

- Implement a bullfrog eradication program in southwestern pond turtle breeding areas where necessary, including Cal-Mat Lake, the stock pond in upper Cristianitos, and Jerome's Lake.

- Maintain flow characteristics comparable to existing conditions from Trampas Canyon into San Juan Creek to preserve breeding habitat for the arroyo toad population and other aquatic species in San Juan Creek.

- Protect occupied nesting locations of the southwestern pond turtle from human disturbance and collection.

- Manage, to the extent feasible, the impact of potential mesopredators on southwestern pond turtle nesting areas, including raccoons, skunks, and feral dogs.

- Pursuant to the Grazing Management Plan, implement grazing management techniques to help protect the southwestern pond turtle and its habitat, promote perennial grasses including native grasses, allow for continued cattle grazing sufficient to support cattle ranching operations, and, where appropriate reduce fuel loads for fire.

e. Restoration Recommendations

- In coordination with upstream eradication efforts, implement a giant reed removal program for San Juan Creek within RMV boundaries to protect southwestern pond turtle habitat and other riparian areas.

- Implement a restoration program in Gobernadora Creek which addresses **(1)** the historic creek meander above the knickpoint; and **(2)** upstream land use induced channel incision and erosion, including potentially excessive surface and groundwater originating upstream.

- Identify likely causes of erosion in Gobernadora Creek and potential measures to rectify causes of headcutting in the lower portion of the creek.

4.2.13 Chaparral Beargrass

Nolina cismontana – Chaparral Beargrass
Federal: None
State: None
CNPS: List 1B

a. Regional Status

Chaparral beargrass (aka chaparral nolina and cismontane nolina) is a shrub species of the Liliaceae family that is endemic to cismontane southern California. It occurs in the coastal foothills in xeric coastal sage scrub and chaparral on sandstone and gabbro soils in San Diego, Orange, Riverside and Ventura counties. Some locations in San Diego and Orange counties lie on the boundary with Riverside County, and locations in Ventura County are close to the borders with Los Angeles and Santa Barbara counties, so it would not be surprising for this species to occur in additional areas in those counties as well. The known elevation range of chaparral beargrass is 140 to 1,275 m (460 to 4,180 ft).

The Jepson Manual (Hickman 1993) does not recognize *Nolina cismontana* as a distinct species and mentions it as "undescribed" in the description of *Nolina parryi*. However, based on an examination of "*N. parryi*" specimens from desert and coastal areas Hess and Dice (1995) determined that the desert and coastal specimens differed in certain morphological traits such as leaf number and width, stem length, panicle length and diameter and bracht size. Hess and Dice (1995) proposed the name *Nolina cismontana* for this "undescribed" species to reflect its occurrence west of the mountain ranges. The CNPS and CNDDB have adopted this taxon and designated the species as sensitive. The CNPS considers the species to be "fairly endangered in California."

Table 4-22 summarizes the known occurrences of chaparral beargrass.

The chaparral beargrass is a yucca-like perennial succulent with a 1-1.5 m (3.3-4.9 ft) flower stalk that blooms from April to June. No published literature on the life history of this species is available.

TABLE 4-22
DISTRIBUTION OF CHAPARRAL BEARGRASS IN SOUTHERN CALIFORNIA

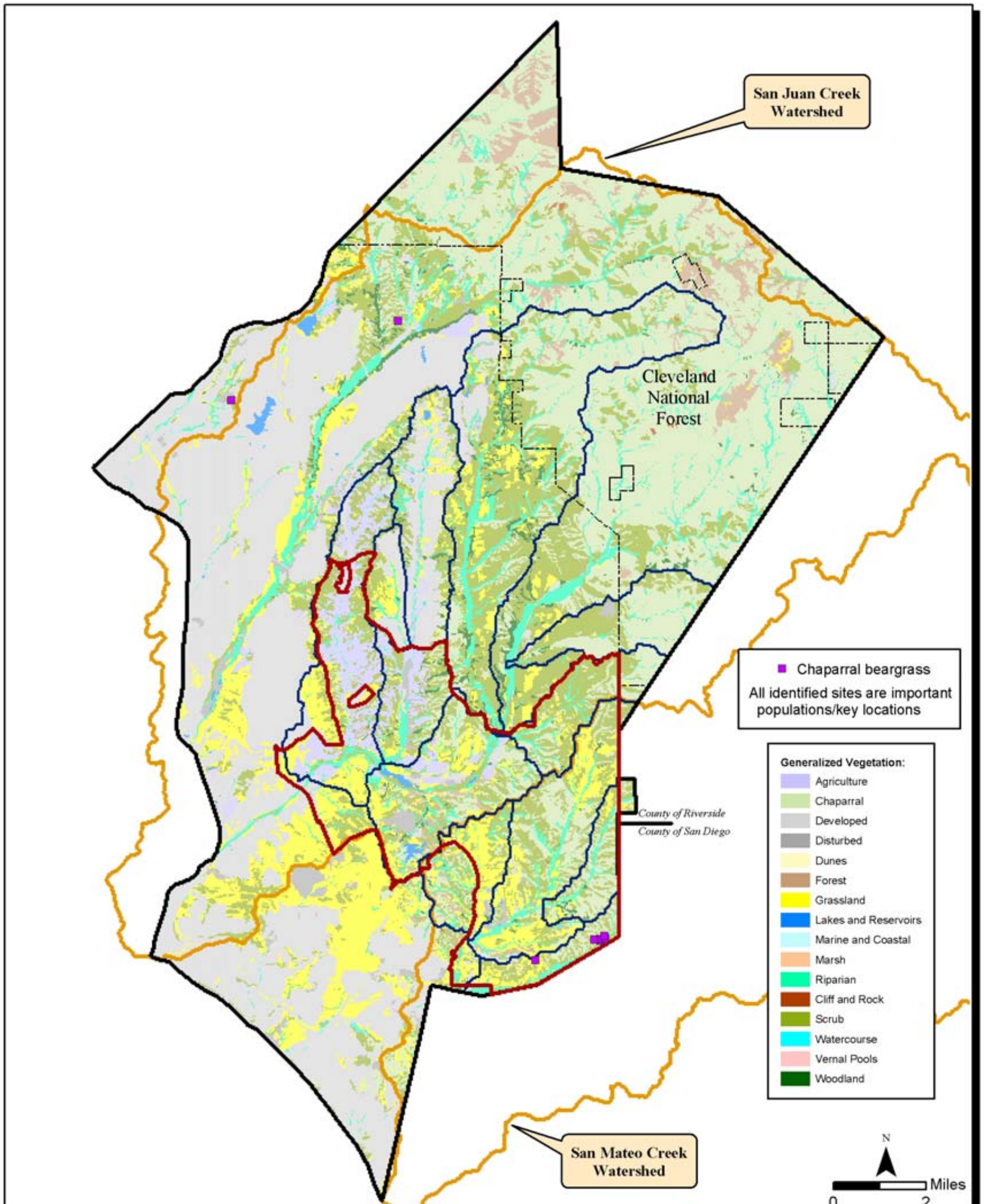
County	General Locations
Orange	East of Live Oak Canyon Road; south of Hamilton Truck Trail; several locations along western flank of the Santa Ana Mountains; Hot Springs Canyon/western San Juan Trail; Claymine Canyon; south-facing slopes in Talega Canyon east of Northrop Grumman
Riverside	Cleveland National Forest in Corona area
San Diego	Northeast of Gregory Canyon on south-facing slopes above San Luis Rey River; Hwy S-16 north of Pala; upper Borrego Canyon; Magee Truck Trail northeast of Mt. Olympus; west of Trujillo southwest of Magee Truck Trail; east of Ranchita; western slope of Viejas Mountain
Ventura	Medea Creek south-southeast of Simi Peak; foothills of Santa Ynez Mountains near head of Santa Ana Valley

According to Rieser (1994) chaparral beargrass often occurs on eroded Cieneba soils in Orange County, on Los Posas soils at the San Luis Rey River site, and on the Lodo, Calleguas-Arnold complex, and Anaheim soils at other sites.

Reiser (1994) states that chaparral beargrass is declining in the Pala region from conversion of habitat to agriculture and residences, and in the Santa Ana Mountains from residential development. The USFS identified protection of the species from too-frequent fire as a management issue.

b. Subregional Status

The NCCP database for chaparral beargrass includes two general areas for the planning area. A single location is located in the Foothill-Trabuco Specific Plan area between Live Oak Canyon Road and Trabuco Oaks Drive. Two locations are in the Talega sub-basin, one individual just east the Northrop Grumman facility and a cluster of five individuals in the eastern portion of the sub-basin (*Figure 4-20*). These five individuals in the Talega sub-basin are an *important population* in a *key location* because of the rarity of this species. Survey data for the Foothill-Trabuco Specific Plan Area are incomplete and, based on general habitat conditions in the area, it is likely that chaparral beargrass is present in other areas. If the species occurs in this area in an substantial populations, they may be considered *major* or *important populations* in *key* l*ocations*.



Draft NCCP/HCP Planning Guidelines

Chaparral Beargrass Distribution Map

FIGURE 4-20

c. Protection Recommendations

- Protect the location with five individuals of chaparral beargrass in the eastern portion of the Talega sub-basin.

d. Management Recommendations

- As part of the fire management program, protect chaparral beargrass from too-frequent fire.

4.2.14 Coulter's Saltbush

Atriplex coulteri – Coulter's Saltbush
Federal: None
State: None
CNPS: List 1B

a. Regional Status

Coulter's saltbush is a decumbent to ascending perennial growing to 0.5 m in length. This species occurs on coastal bluffs and on alkali or saline flats in interior areas such as western Riverside County. The leaves are subsessile, elliptic to lanceolate, somewhat greenish, sparsely fine-scaly and detate. The blades are 7-20 mm in length. The plants are monecious (male and female flowers on the same plant) with the inconspicuous female flowers subtended by bracts and the male flowers in panicles. The seeds are found within a fruiting bract, which in this species is sharply dentate, 2-3 mm long, and with small tubercles (sometimes smooth) covering the surface of the bract.

This species occurs from Baja California, extending northward to Ventura County and also on the Channel Islands. Extant locations on the mainland include: Rancho Mission Viejo (approximately 3,000 plants); San Clemente State Park; San Onofre State Park; Whispering Hills in San Juan Capistrano; Dana Point Headlands; Bommer Canyon (two small populations of about 20 plants each); San Joaquin Freshwater Marsh (less than 25 plants observed); Laguna Beach; MacArthur Boulevard and Pacific Coast Highway; behind Newport Beach Public Library (observed by Dave Bramlet in 1998); Pelican Hill; and the east slope above Los Trancos Canyon, where it is common along the dirt road passing through coastal sage scrub on hill top in sandy clay soil.

b. Subregional Status

Coulter's saltbush is known from three general locations in the planning area (*Figure 4-21*): Chiquita Canyon, upper Cristianitos Canyon and upper Gabino Canyon. Coulter's saltbush occurs in alkaline soils and is associated with southern tarplant in Chiquita Canyon. Because this species is relatively rare within its range, all populations on Rancho Mission Viejo constitute *major* or *important populations*. Specific occurrences are described below.

- In upper Gabino Canyon a small population of about 100 individuals occurs west of and adjacent to the creek (No. 1 on *Figure 4-21*). This is an *important population* because of the rarity of this species in the region.

- Upper Cristianitos Creek supports two small locations numbering three and 12 individuals, respectively (No. 2 on *Figure 4-21*). This is an *important population* because of the rarity of this species in the region.

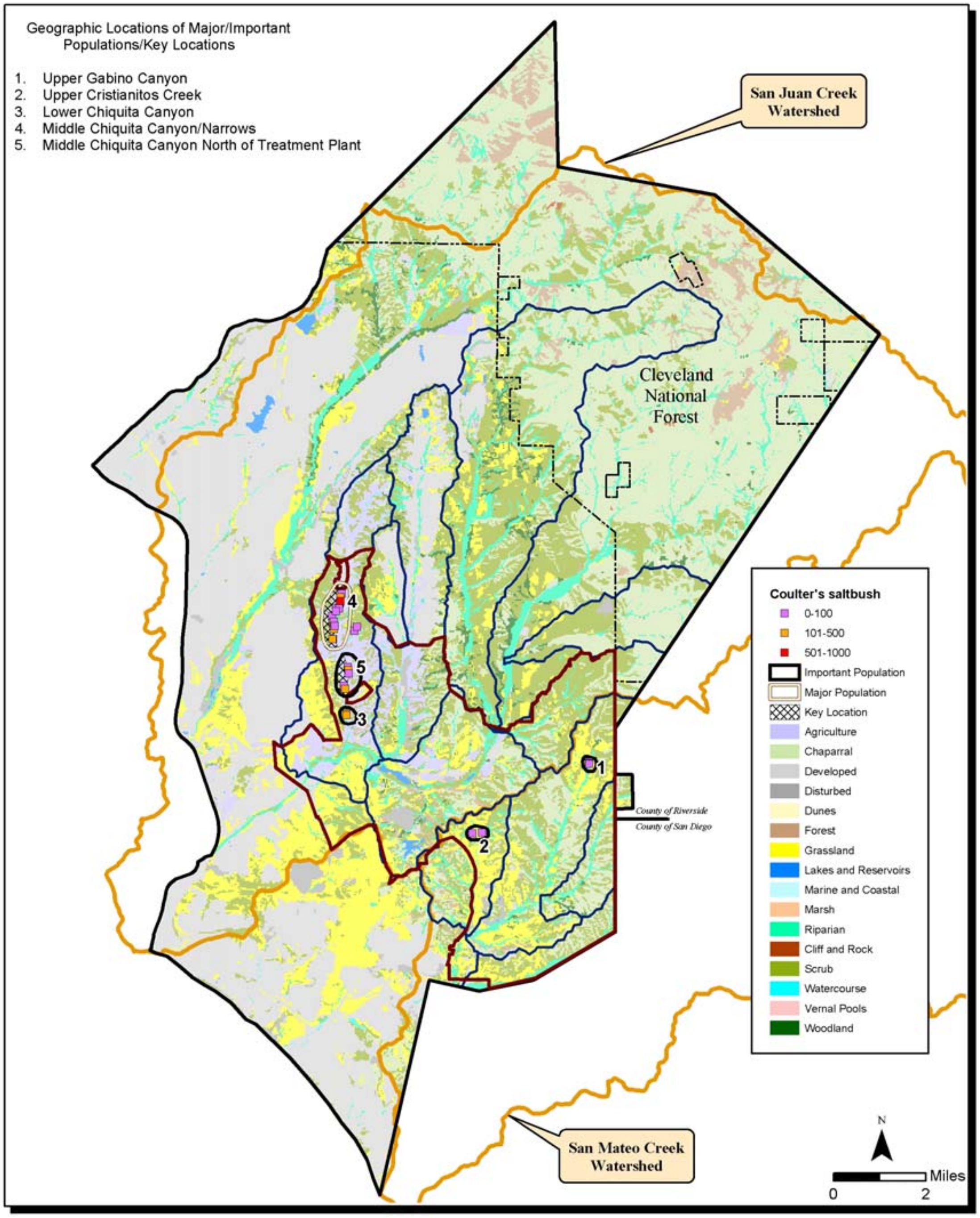
- Lower Chiquita Canyon west of the creek supports two locations numbering 200 and 400 individuals, respectively (No. 3 on *Figure 4-21*). This is an *important population* because of the rarity of this species in the region.

- Middle Chiquita just above and below the Narrows supports numerous locations ranging from the 10s to 600 individuals (No. 4 on *Figure 4-21*). The location with 600 individuals is east and adjacent to the creek about midway between the Narrows and Tesoro High School. Locations with 150, 150 and 200 individuals are west of the creek. This location overlaps substantially with the largest southern tarplant population. This group of locations east and west of the creek is a *major population* in a *key location*.

- Middle Chiquita just to the northwest of the treatment plant supports five locations, of which four are west of the creek (No. 5 on *Figure 4-21*). The locations west of the creek number 25, 50, 150 and 360 individuals, and the location east of the creek has 100 individuals. These five locations constitute an *important population*. The locations west of the creek constitute a *key location*.

- Two small locations are located in a major side canyon southeast of the Narrows. These locations number six and 10 individuals, respectively.

- One small population of less than 20 individuals occurs with southern tarplant (noted above) at a wetland seep between Gobernadora and Chiquita.



Draft NCCP/HCP Planning Guidelines

Coulter's Saltbush Distribution Map

FIGURE 4-21

c. Protection Recommendations

- Protect the *key locations* of Coulter's saltbush in Middle and Lower Chiquita Canyon. Minimize impacts to *important populations* within the sub-basin and mitigate unavoidable impacts in the sub-basin.

- Protect the two known *important populations* of Coulter's saltbush in the Cristianitos sub-basin.

- Protect the *important population* of Coulter's saltbush in the Upper Gabino Canyon subunit.

d. Management Recommendations

- Implement a management program for Coulter's saltbush, including control of non-native invasive species, management of grazing and minimization of human access and disturbance as part of the Adaptive Management Program**.**

e. Restoration Recommendations

Translocate salvaged Coulter's saltbush to suitable restoration and enhancement areas in the same sub-basin as where impacts occur to the extent feasible. Receiver areas should support alkali soils suitable for the species and should be placed in locations that maximize connectivity and genetic exchange.

4.2.15 Intermediate Mariposa Lily

Calochortus weedii var. *intermedius* – Intermediate Mariposa Lily
Federal: None
State: None
CNPS: 1B

Note: This species account has not been revised for the May 2004 version of the Guidelines due to unresolved issues regarding the taxonomic status of populations in the planning area.

a. Regional Status

The intermediate mariposa lily is a perennial geophyte in the lily family (Liliaceae) that occurs in coastal sage scrub, chaparral and grassland/scrub ecotones. Stems heights are variable, reaching to 0.8 to 2.0 m (M. Elvin, pers. obs.). The plant typically produces from 3 to 4 campanulate flowers ranging from 2.5 to 3 cm long. The petals are broadly cuneate-obovate and light yellow tinged (sometimes with purple) and usually fringed with yellow hairs. The intermediate mariposa lily is distinguished from *C. w. weedii* by petal shape and color with bright yellow petals on *C. w. weedii,* and from C. *w. vestus* by the abruptly pointed anthers on C. *w. vestus*.

The intermediate mariposa lily is known from Orange, Riverside and Los Angeles counties and at least one putative occurrence in Ventura County.

In Riverside County, occurrences are known from the Winchester quadrangle, in the hills west of Crown Valley and northwest of Rawson Canyon; the Vail Lake Quadrangle approximately one-half mile southwest of Vail Lake dam; the Corona South near the mouth of Hagadoor Canyon.

Orange County supports the majority of the extant populations with significant populations found in the Central/Coastal Subregion. Up to 83,000 individuals are reported from the Central/Coastal Subregion, including approximately 46,535 from within the NCCP Reserve and 6,209 in the North Ranch Policy Plan Area that is also dedicated open space. The Southern Subregion supports about 12,800 individuals, or about 12 percent of the known individuals in the County.

b. Subregional Status

Intermediate mariposa lily generally occurs in four main areas on RMV (*Figure 4-22*): Chiquita Canyon/Chiquadora Ridge, Gobernadora east of the creek/northern Central San Juan Creek sub-basin, Cristianitos Canyon/southern Trampas Canyon sub-basin, and La Paz Canyon. A few scattered locations also occur in the Foothill-Trabuco Specific Plan area on the Saddleback Meadows site. Except for the La Paz Canyon and Saddleback Meadows locations, this species tends to occur in association with many-stemmed dudleya in the planning area. A total of about 130 locations are known from the planning area with about 12,800 counted individuals. Of the 130 locations, approximately 111 (85 percent) are on RMV land.

Within the subregion this species is most often found growing under or through shrubs in open coastal sage scrub associated with Cieneba sandstone outcrops or Cieneba sandy loams within the Santiago geologic formations. In other limited areas, this species is associated with cobbly loams or clay loams that support coastal sage scrub or chamise chaparral.

The following describes the *major* and *important populations* and *key locations* of the intermediate mariposa lily in the planning area:

- La Paz Canyon supports two locations of about 322 and 485 individuals, respectively (No. 1 on *Figure 4-22*). These locations may be considered *important populations* because they contribute to the geographic diversity of the species in the subregion.

- Lower Gabino/Blind canyons support two locations of about 12 and 305 individuals, respectively (No. 2 on *Figure 4-22*). These locations are on the southern boundary with Cristianitos Canyon. These locations may be considered *important populations* because they contribute to the geographic diversity of the species in the subregion.

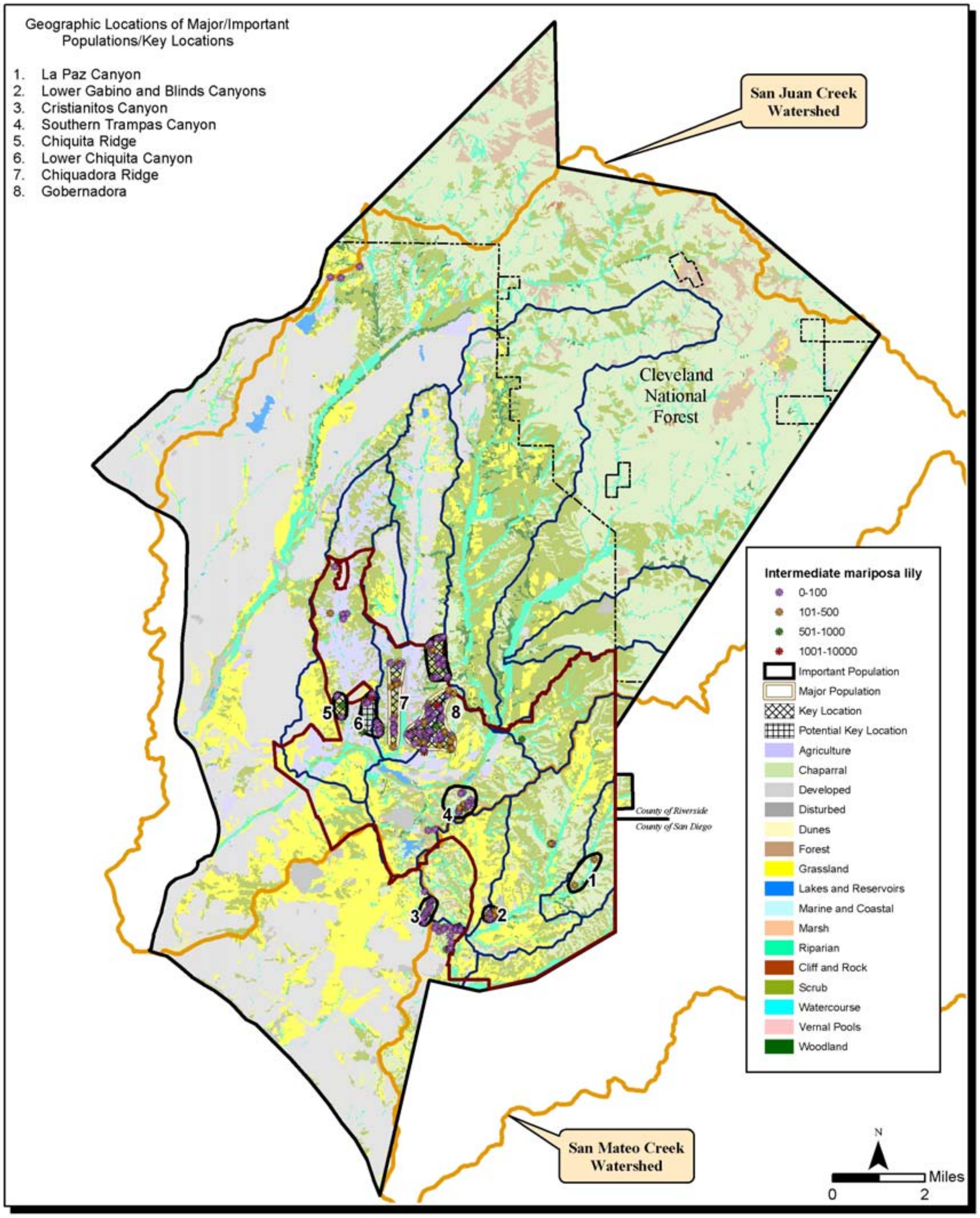
- Cristianitos Canyon within the Donna O'Neill Land Conservancy supports five locations of unknown size (data base has population size of 1) (No. 3 on *Figure 4-22*). In addition, about 15 locations occur west and south of the Cristianitos sub-basin contiguous with these five locations in Talega Development Open Space, with the largest population at 17 individuals. These combined locations may be considered an *important population* because they contribute to the geographic diversity of the species in the subregion.

- The southern edge of the Trampas Canyon sub-basin supports eight locations, with one population numbering 640 individuals, but the others numbering less than 50 individuals (No. 4 on *Figure 4-22*). These locations may be considered an *important population* because they contribute to the geographic diversity of the species in the subregion.

- Lower Chiquita Ridge west of the creek supports three locations numbering about 21, 47, and 625 individuals (No. 5 on *Figure 4-22*). Although these locations do not support large populations, together they may be considered to an *important population* in a *key location* because Chiquita Ridge is a key landscape feature and habitat linkage in the subregion.

- Lower Chiquita Canyon east of the creek and south of the treatment plant supports about 18 locations, with most uncounted, but one relatively large population of 660 individuals (No. 6 on *Figure 4-22*). These scattered locations, along with the location numbering 660 individuals, may be considered an *important population.* Whether this population is also in a *key location* depends of the protection status of the Chiquita Ridge and Chiquadora Ridge populations, as described in the next section.

- Middle Chiquita Canyon supports five scattered locations north of the Narrows and both east and west of the creek. The largest of the five locations is about 260 individuals. Two locations north of Oso Parkway occur in the Upper Chiquita Conservation Easement, with one location supporting only one individual and the other supporting ten individuals. Because of the few number of locations and the small number of individuals at each, these locations probably are not *important populations* or in *key locations*.



Draft NCCP/HCP Planning Guidelines

Intermediate Mariposa Lily Distribution Map

FIGURE 4-22

Chiquadora Ridge supports about 14 locations totaling about 2,000 individuals (No. 7 on *Figure 4-22*). These locations constitute a *major population* in a *key location* because Chiquadora Ridge is a key landscape feature in the subregion and serves an important habitat connection function.

- Gobernadora sub-basin east of the creek and the northern portion of the Central San Juan Creek sub-basin supports more than 50 locations, with eight locations numbering more than 200 individuals and the two largest locations 775 and 1,300 individuals each (No. 8 on *Figure 4-22*). This area supports a total of about 6,600 individuals, or about 51 percent of the individuals in the subregion and about 6 percent of the population in Orange County. The location supporting 1,300 individuals is the single largest population in the subregion. These locations comprise a *major population* in a *key location*.

c. Protection Recommendations

- Protect approximately six locations along Chiquita Ridge, along with the location south of the treatment plant that supports 660 individuals, totally protection for about 1,600 individuals. Although these locations are scattered, together they comprise an *important population* in a *key location*.

- Protect the 14 locations comprising the *major population* on Chiquadora Ridge, for total protection of about 2,000 individuals.

- Protect two locations in the eastern portion of the Gobernadora sub-basin of 315 and 135 individuals each.

- Protect all known locations of intermediate mariposa lily in the San Mateo Watershed, totaling about 18 locations and more than 2,300 individuals.

- Salvage and translocate intermediate mariposa lily to the extent feasible and appropriate, as described below under Restoration Recommendations.

d. Management Recommendations

As part of the Adaptive Management Program, the following management activities for intermediate mariposa lily will be conducted:

- Control non-native invasive species such as cardoon, ryegrass, and mustards.

- Manage grazing in a manner that optimizes the control of non-native grasses (*Lolium*, *Bromus*, *Avena*) while allowing for proliferation of the native grasses and forbs. The optimum grazing pattern has not been established and will be part of the Adaptive Management Program.

- Conduct prescribed burning where appropriate and as described in the Fire Management Program.

- Protect intermediate mariposa lily populations from human disturbance such as hiking, mountain bikes and equestrian activities.

e. Restoration Recommendations

- Translocate salvaged intermediate mariposa lily to areas where suitable soil conditions occur. Specific translocation areas have not been identified, but based on the existing distribution, potential general translocation areas include Chiquita Ridge, Chiquadora Ridge, upper Cristianitos Canyon, La Paz Canyon.

- Initiate a seed collection program in 2003 if sufficient rain falls to warrant the collection program. Receiver sites should be identified in the winter of 2003 and a pilot program should be implemented to determine the effectiveness of propagation from seed.

4.2.16 Many-stemmed Dudleya

Dudleya multicaulis – Many-Stemmed Dudleya
Federal: None
State: None
CNPS: 1B

a. Regional Status

Many-stemmed dudleya is a small geophyte that grows in open-habitat soils associated with coastal sage scrub and grassland plant communities in southern California. It usually grows in shallow weathered cobbly loam or clay soils, and open barrens associated with rock outcrops and ridgelines.

The many-stemmed dudleya is endemic to southwestern California, and is known only from southeast Los Angeles County, Orange County, western Riverside County, extreme southwestern San Bernardino County, and the northernmost portion of San Diego County. Modern records have not substantiated old collections from near Tehachapi in Kern County, and in Dehesa Valley in southern San Diego County.

Orange County supports the majority of the known populations of this species and was estimated by Roberts to support much as 80 percent of the total dudleya in the species' range (Roberts 1999). Roberts identified five areas of dudleya concentration in Orange County: 1) the San Joaquin Hills; 2) the northern Lomas de Santiago including the Santiago Hills north to Gypsum and Blind Canyons (1 and 2 combined generally comprise the Orange County Central/Coastal Subregion); 3) the Rancho Mission Viejo (Southern Subregion); and 4) the northern portion of San Diego County that comprises Camp Pendleton (Roberts 1999). A fifth concentration has been identified in the Gavilan Hills (Estelle Mountain) of western Riverside County (Roberts 1999). *Table 4-23* provides a region-wide summary of large and (potentially) important populations. Based on *Table 4-23*, it appears that Orange County (excluding the relatively small occurrences in the Cleveland National Forest) supports closer to 70 percent of the total dudleya.

TABLE 4-23
REGIONWIDE SUMMARY:
2002 STATUS OF MANY-STEMMED DUDLEYA
WITHIN KNOWN RANGE IN SOUTHERN CALIFORNIA

Regional Large Population Areas	Dudleya Population: Number of Counted/Estimated Plants
Rancho Mission Viejo and San Clemente	65,250
Central/Coastal NCCP Reserve Lands	52,000
Camp Pendleton, San Diego County	32,000
Estelle Mountain, Riverside County	10,000
Subtotal:	*159,250*
Other Significant Smaller Population Areas	
Corona, Alberhill, Cleveland National Forest Riverside County	4,486
Cleveland National Forest Orange and San Diego counties	1,938
San Dimas/San Jose Hills (mostly Bonelli Regional Park) Los Angeles County	2,459
Chino Hills, Orange County	150
Subtotal:	*9,033*
APPROXIMATE TOTAL PLANTS	168,300

The smaller populations listed in *Table 4-23* do not necessarily include all potential *important populations* or *key locations* of the many-stemmed dudleya, because yet undiscovered plants may persist in small habitat fragments located outside of these areas. The preservation of these potential smaller *important populations* may also facilitate the survival and recovery of this rare species. Delineation and identification of other smaller populations is beyond the scope of this analysis.

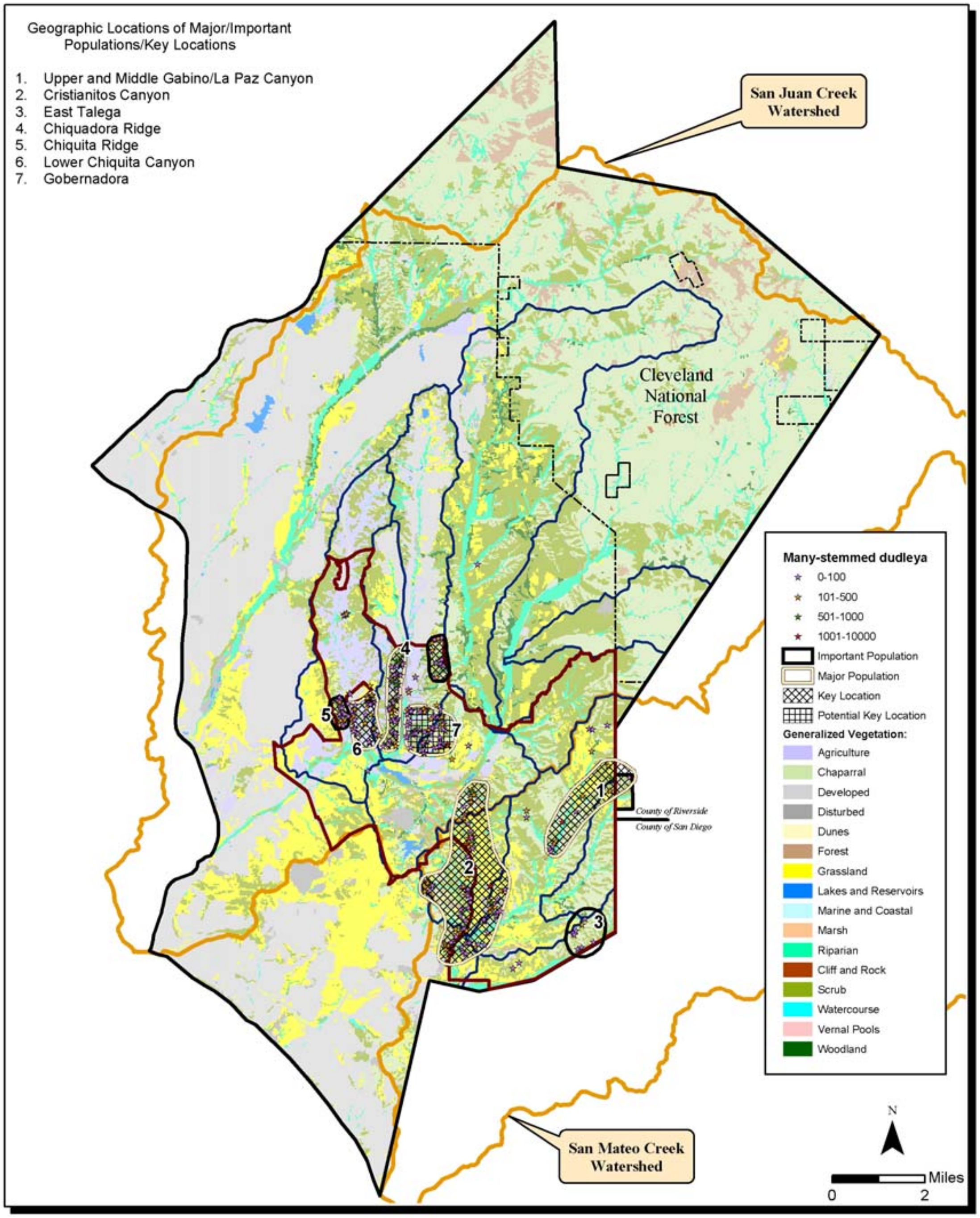
b. Subregional Status

Note to reader: This species account has been substantially revised since the April 2003 version of the Guidelines based on Spring/Summer 2003 surveys. One new *important population* in a *key location* has been identified in the Gobernadora sub-basin and the former lower Chiquita *important population* and potential *key location* has been upgraded to a designation as a *major population* in a *key location* based on a four-fold increase in the estimated population size. Based on this new information, two new protection recommendations have been added.

Many-stemmed dudleya is known from five main areas in the planning area (*Figure 4-23*): Chiquita Ridge; Chiquadora Ridge; Gobernadora/Central San Juan east of Gobernadora Creek and north of ColorSpot Nursery; Trampas Canyon/Cristianitos Canyon extending south to the Talega development in the San Clemente Watershed; and upper Gabino and La Paz canyons. A smaller cluster occurs east of the Northrop Grumman facilities on the mesa. There also is a single record for the Bell Canyon area on Starr Ranch (F. Roberts 1997) and locations in Caspers Wilderness Park not in the data base, but these populations are considered to be small. The total counted individuals of many-stemmed dudleya in the planning area numbers about 65,250.

Within the planning area, this species occurs in open coastal sage scrub or sage scrub/grassland ecotones dominated by *Salvia apiana*, *Galium angustifolium, Bothriochloa barbinodis*, *Castilleja foliolosa*, *Aristida hamulosa*, and *Artemisia californica*. In some areas, such as ridges east of Gobernadora and north of ColorSpot Nursery, this species is associated with Cieneba sandstone outcrops that support low densities of *Galium angustifolium*, *Bothriochloa barbinodis*, and *Castilleja foliolosa*. At other locations, such as portions of Chiquadora Ridge and Cristianitos, many-stemmed dudleya is often associated with purple needlegrass grassland and clay outcrops within the grassland complexes. In most of these areas, the dudleya typically grows in the shade of larger grasses or shrubs that appear to provide at least limited "nursery" effects.

The following describes the *major* and *important populations* and *key locations* of many-stemmed dudleya in the planning area:



Draft NCCP/HCP Planning Guidelines
Many-stemmed Dudleya Distribution Map

FIGURE 4-23

Upper Gabino/Middle Gabino and upper La Paz Canyon support 12 locations ranging from about five individuals to about 1,500 individuals, cumulatively totaling more than 4,100 individuals (No. 1 on *Figure 4-23*). Eight of the 12 locations range from about 100-700 individuals, with one location at the boundary between middle and upper Gabino supporting about 1,500 individuals. Two locations near the county boundary with Riverside number about 500 and 700 individuals each, the latter of which overlaps the boundary with the La Paz Canyon sub-basin. These locations comprise a *major population* in a *key location*.

- A *major population* totaling approximately 34,137 individuals in 164 locations is located in the Cristianitos sub-basin and the southern portion of the Trampas Canyon sub-basin extending, south to the Talega development in the San Clemente Watershed and eastward into the western portion of the Lower Gabino and Blind canyon sub-basins (No. 2 on *Figure 4-23*). This population, which accounts for 52 percent of the documented many-stemmed dudleya in the planning area, occurs on both RMV land and the Donna O'Neill Conservancy at Rancho Mission Viejo and extends into Talega Open Space, as described below.

  - The portion of the Cristianitos Canyon *major population* on RMV outside the Donna O'Neill Conservancy supports about 72 locations ranging up to 1,800 individuals. Five of these locations number 1,100, 1,160, 1,500, 1,700 and 1,800 individuals each, respectively. These locations comprise five of the 11 largest counts known from the planning area. An additional 11 locations range from about 400 to 976 individuals and 17 other locations support 100 to 355 individuals. The cumulative total of these locations is 18,796, individuals, or about 29 percent of the documented dudleya in the subregion. These locations comprise 55 percent of the individuals and 44 percent of the locations in the Cristianitos Canyon *major population* and *key location.*

  - The Donna O'Neill Land Conservancy supports about 85 locations, with two of the locations supporting about 2,000 individuals each, and a third location of 1,175 individuals. The cumulative total of dudleya on the Conservancy is 14,250 individuals, accounting for 42 percent of the individuals in the Cristianitos *major population*.

  - The Talega Open Space supports about seven locations totaling about 1,091 individuals, or 3 percent of the total in the Cristianitos *major population*.

Fourteen locations totaling 292 individuals occur east of Northrop Grumman, but population estimates were not made (No. 3 on *Figure 4-23*). The 14 locations are considered an *important population* because they contribute to geographic diversity in the subregion and potentially provide a connection with nearby populations on Camp Pendleton.

- Chiquadora Ridge, including the area within the Gobernadora sub-basin, supports about 47 discrete locations totaling about 8,623 individuals (No. 4 on *Figure 4-23*). The locations range from 1 to 750 individuals, with eight locations numbering 540 to 750 individuals each. These locations comprise a *major population* and *key location* because the ridge is a major landscape feature in the planning area that provides important habitat connectivity functions.

- Chiquita Ridge west of the creek supports about 18 discrete locations ranging up to about 420 individuals, with four locations supporting more than 100 individuals (No. 5 on *Figure 4-23*). The cumulative total of these locations is about 1,349 individuals. These locations comprise an *important population* and *key location* because of their clustering on Chiquita Ridge, a major landscape feature in the planning area that provides important habitat connectivity function.

- Lower Chiquita Canyon east of the creek and south of the treatment plant supports about 41 locations totaling approximately 6,686 individuals (No. 6 on *Figure 4-23*). (Note to reader: this is a four-fold increase in the population estimate compared to the pre-2003 survey data.) The locations range from 1 to 1,330 individuals, with four locations supporting at least 500 individuals. These locations comprise a *major population* in a *key location*. (This population was identified as an *important population* in a *potential key location* in the April 2003 version of the Guidelines.)

- Central Gobernadora sub-basin east of the creek and the Central San Juan subunit north of the creek comprises a single population supporting about 61 scattered locations ranging from 1 to 2,000 individuals (No. 7 on *Figure 4-23*). Although there is one location with 2,000 individuals, the remaining 60 locations number 225 or fewer individuals each. Combined, however, these locations total about 5,678 individuals and comprise a *major population.* Whether this population is in a *key location* should be considered in the context of the conservation status of the other *major* and *important populations* in the San Juan Creek Watershed, as discussed in the next section.

- Middle Chiquita Canyon (between the treatment plant and Oso Parkway) supports a few scattered locations in association with intermediate mariposa lily in the area between the Narrows and Tesoro High School. Because these locations are small and apparently do not serve a linkage function between other larger populations, they do not comprise an *important population.*

An additional *important population* in a *key location* was identified in the Gobernadora sub-basin based on Spring 2003 surveys.

- Upper Gobernadora sub-basin supports 13 locations ranging from 5 to 513 individuals, and totaling 1,622 individuals (No. 8 on *Figure 4-23*). This population is considered an *important population* in a *key location* because it contributes to the geographic diversity and potentially is connected to any populations in Caspers Wilderness Park

b. Protection Recommendations

- Protect the Chiquita Ridge *important population* and *key location* totaling about 1,349 individuals in approximately 18 discrete locations. This population includes four locations totaling 100 to 420 individuals each.

- Protect the Chiquadora Ridge *major population* and *key location* totaling about 8,620 individuals in approximately 47 discrete locations. This population includes 24 locations totaling 100 to 750 individuals each, with eight of these locations numbering more than 500 individuals.

- Protect the Cristianitos Canyon *major population* and *key location* extending from the southern portion of the Trampas Canyon sub-basin in the north, through the Cristianitos Canyon sub-basin south to the Talega development open space located in the San Clemente Watershed. This area supports the largest *major population* and *key location* in the subregion with approximately 34,137 individuals in about 164 discrete locations, or about 52 percent of the documented dudleya in the planning area. Ninety-two of the 164 locations totaling 14,341 individuals are already conserved within the Donna O'Neill Conservancy at Rancho Mission Viejo and Talega open space (including two locations of 2,000 individuals and a third of 1,175 individuals). Five of the 72 RMV locations number 1,100, 1,160, 1,500, 1,700 and 1,800 individuals each. An additional 11 locations range from about 400 to 976 individuals and 17 other locations support 100 to 355 individuals.

- Protect the Gabino and Blind Canyon/La Paz Canyon *major population* totaling about 4,100 individuals in approximately 12 locations. This population includes eight locations of 100 to 1,500 individuals.

- Maintain direct habitat connectivity between the remaining major populations to convey pollinators and allow for dispersal.

- Salvage and translocate all individuals from development areas, as feasible and appropriate, where impacts cannot be avoided.

Based on new information from the Spring 2003 surveys, two protection recommendations have been added since the April 2003 version of the Guidelines.

- **Protect the lower Chiquita *major population* and *key location*, totaling about 6,686 individuals in 41 locations. The locations in this population range from 1 individual to 1,330 individuals, with four locations supporting at least 500 individuals.**

- **Protect the upper Gobernadora *important population* and *key location*, totaling 1,622 individuals in 13 locations.**

d. Management Recommendations

As part of the Adaptive Management Program, the following management activities for many-stemmed dudleya will be conducted:

- Control non-native invasive species such as cardoon, ryegrass, bromes, smooth cat's-ear (*Hypocharis glabra*), Crete hedypnois (*Hedypnois cretica*), and mustards.

- Manage grazing as part of the Adaptive Management Program in a manner that optimizes the control of non-native grasses (*Lolium*, *Bromus*, *Avena*) while allowing for proliferation of the native grasses and forbs.

- Protect many-stemmed dudleya populations from human disturbance such as hiking, mountain bikes and equestrian activities.

e. Restoration Recommendations

Translocation of many-stemmed dudleya has been demonstrated to be successful (e.g., the San Joaquin Hills Tollroad [SR-73]) and thus is recommended for as measure for mitigating impacts to dudleya, as described below:

- Translocate salvaged many-stemmed dudleya to CSS and VGL restoration and enhancement areas where feasible and appropriate. Potential restoration and enhancement areas include Chiquita Ridge, Chiquadora Ridge, upper Cristianitos

Canyon, upper Gabino Canyon, Blind Canyon, and the Radio Tower Road area (although there are no documented locations along Radio Tower Road, the area supports clay soils that might be suitable for the dudleya). Receiver areas should support clay, cobbly loam, or sandy clay loam soils suitable for many-stemmed dudleya.

- Salvage suitable topsoils from development areas where feasible and appropriate and transport to restoration areas. Salvaged topsoils may be used to create suitable many-stemmed dudleya habitat and may contain seed bank.

4.2.17 Mud Nama

Nama stenocarpum – Mud Nama
Federal: None
State: None
CNPS: List 2

a. Regional Status

Mud nama is a prostrate to ascending annual with short soft silky hairs, short glandular hairs, and some stiff hairs that are swollen at the base. The leaves vary from 5-30 mm and are typically oblanceolate or spoon shaped with wavy margins and rolled edges. The flowers are white to cream and the corolla is funnel shaped and 4-6 mm long.

This species occurs in vernally wet areas including vernal pools, the drying margins of lakes and ponds, and other intermittently wet areas. Historically in California, this species was known from Los Angeles, Orange, San Diego, Riverside and Imperial counties, across the desert through the southwestern U.S. to Texas and into Mexico. This species is also known from San Clemente Island. This species is believed to be extirpated from Los Angeles and Imperial counties and there were no recent records from Riverside County and Orange County. However, this species was identified in a vernal pool at Fairview Park in Costa Mesa in 1996, and at the Chiquita Ridge vernal pool in 1997. Three other populations have been identified on RMV since that time, one along the edge of a stockpond near the O'Neill residence and the other two along the edge of stock ponds between Cristianitos and Trampas canyons. A large population consisting of thousands of plants was also recently discovered at Mystic Lake along the San Jacinto River and another Orange County population was identified at the Lambert Reservoir in Central Orange County.

b. Subregional Status

As noted above, there are four occurrences known from the planning area (*Figure 4-24*), including the 1.2-acre vernal pool on Chiquita Ridge (500 individuals), along the margins of a stock pond immediately west of a Ranch residence south of Ortega Highway (350 individuals), and from the margins of two stock ponds located between Cristianitos and Trampas canyons south of Ortega Highway (7,500 and 2,000 individuals, respectively). The Rancho Mission Viejo populations vary considerably in size from year to year based upon rainfall. In dry years they may not appear at all and in wet years they number in the tens or hundreds.[4] Because the mud nama is so rare, all populations on RMV are *important populations* in *key locations*.

c. Protection Recommendations

- Protect the three known populations of mud nama on RMV property and their hydrologic sources. The fourth population is located in Ladera Open Space on Chiquita Ridge.

d. Management Recommendations

Implement a management program for mud nama, including control of non-native invasive species, management of grazing as part of the Adaptive Management Program, and prevention of human disturbance.

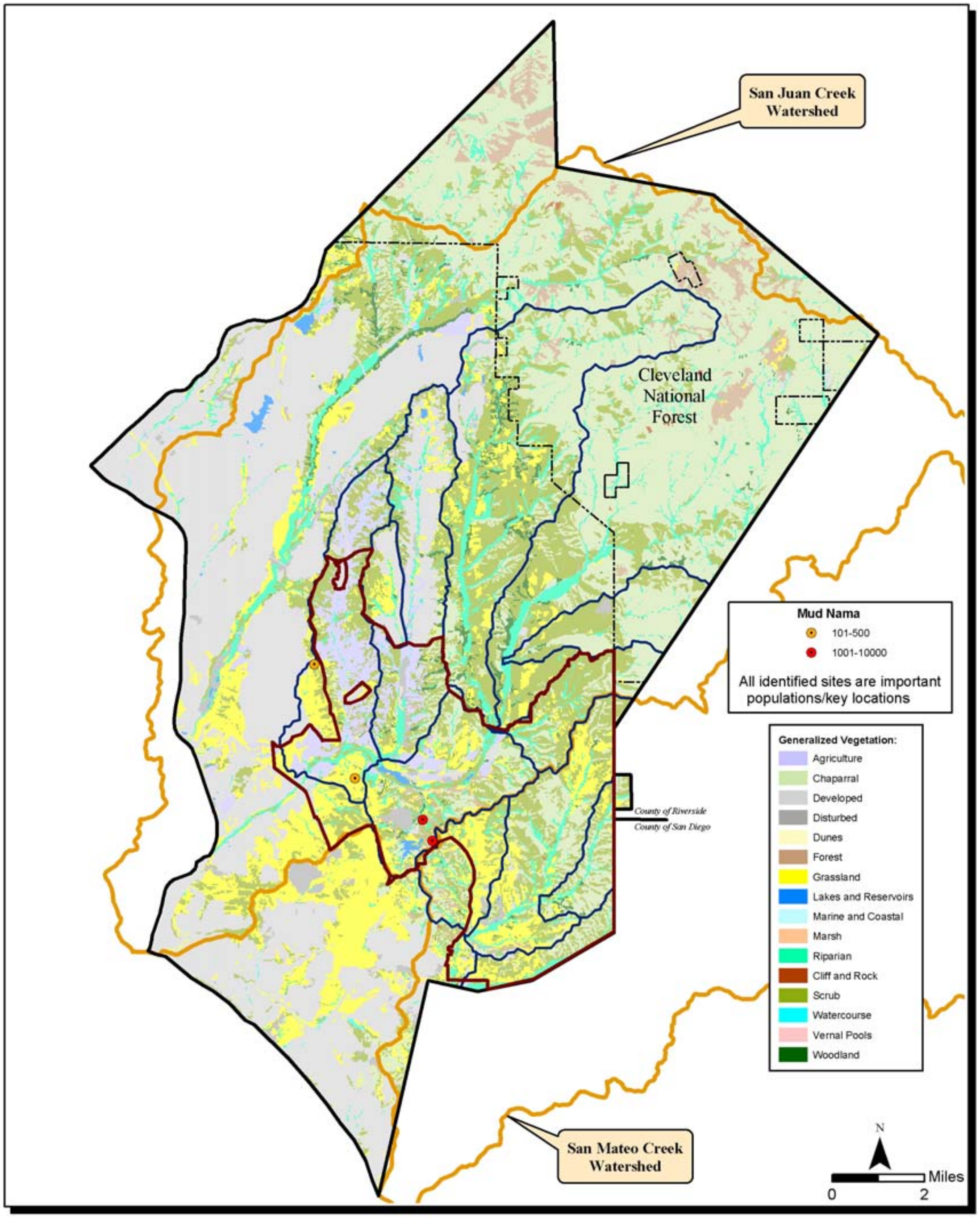
e. Restoration Recommendations

Mud nama responds very favorably to restoration efforts, as exemplified in the Fairview Park vernal restoration project. Five years of monitoring indicate that it has become well established in restored portions of the vernal pool (Bomkamp, pers. comm. 2002).

Through implementation of the Adaptive Management Program significant management opportunities that could substantially increase both the number of occupied sites of mud nama along with the total number of individuals within the subregion are available. As noted above, mud nama occupies drying ponds, including vernal pools and like many such annuals is likely dispersed by water fowl which carry seeds over long distances. Such species typically respond well to translocation or introduction efforts.

Potential introduction sites include: **(1)** the vernal pools located along Radio Tower Road; **(2)** the two unoccupied vernal pools on Chiquita Ridge; **(3)** the margins of seasonal ponds in the GERA; and **(4)** the margins of seasonal ponds in the Tesoro High School Mitigation site in Chiquita Canyon. All of these sites exhibit high potential for success and, as noted above, would

[4] Bomkamp, Tony. 2002. Personal Observations of the three populations between 1997 and 2001.



Draft NCCP/HCP Planning Guidelines
Mud Nama Distribution Map

FIGURE 4-24

result in an increase in the number of occupied site and an increase in total number of individuals.

4.2.18 Salt Spring Checkerbloom

Sidalcea neomexicana – Salt Spring Checkerbloom
Federal: None
State: None
CNPS: List 2

a. Regional Status

Salt Spring checkerbloom is known to occur within California, Arizona, Baja California, Nevada, New Mexico, Utah, Idaho, Wyoming, Sonora (Mexico), and "elsewhere" (the CNPS Inventory [2001] is not specific in this regard). Within California this species is known from Los Angeles, Orange, Riverside, San Bernardino, San Diego and Ventura counties (CNDDB 2003). Within these areas, Salt Spring checkerbloom is found at elevations below 1,500 m (4,921 ft) (Hickman 1993).

The CNDDB has 15 occurrences for the Salt Spring checkerbloom, as summarized in *Table 4-24*.

TABLE 4-24
DISTRIBUTION OF SALT SPRING CHECKERBLOOM IN CALIFORNIA

County	General Locations
Los Angeles	Bryant Ranch, Claremont, Santa Monica
Orange	Lower Chiquita and Gobernadora canyons in slope wetlands
Riverside	San Jacinto Valley
San Bernardino	Twentynine Palms; Rabbit Springs in Lucerne Valley, San Bernardino; Chino Creek south of Ontario
San Diego	North end of Lake Cuyamaca
Ventura	Southern Pacific Railroad between Santa Ana Blvd. and San Antonio Creek Bridge; upper Cuyama Valley; east end of Lockwood Valley; northeast slope of Mt. Pinos

According to CNPS (2001), Salt Spring checkerbloom is known to occur within chaparral, coastal scrub, lower montane coniferous forest, Mojavean desert scrub, playas, alkaline habitat and mesic habitats. The ecological data provided with the CNDDB records confirms these habitat associations. Some of the species Salt Spring checkerbloom has been associated with include yerba mansa (*Anemopsis californica*), large-flowered sand-spurrey (*Spergularia macrotheca*), (*Juncus* sp.), heliotrope (*Heliotropium* sp.), Great Basin sagebrush (*Artemisia tridentata*), and rubber rabbitbrush (*Chrysothamnus nauseosus*), the latter two species being common in Mojavean desert scrub. Salt spring checkerbloom is a perennial herb that blooms from March through June (CNPS 2001).

No literature was found on the life-history traits of Salt Spring checkerbloom.

b. Subregional Status

Salt spring checkerbloom is found in two slope wetlands in lower Chiquita Canyon and one slope wetland in Gobernadora Canyon (*Figure 4-25*). The Chiquita locations numbered 1,200 individuals for the northern location and 300 individuals for the southern location, respectively, during SOCTIIP surveys in 1995. The Gobernadora occurrence numbered only three individuals when it was first discovered in 2003. As described in the "Baseline Geomorphic and Hydrologic Conditions Report," these slope wetlands are perennially moist wetlands located along the toe of the slopes in lower Chiquita Canyon and are maintained by subsurface water movement in the sub-basin.

c. Protection Recommendations

- Protect the two locations of Salt Spring checkerbloom in the two slope wetlands in lower Chiquita Canyon.

d. Management Recommendations

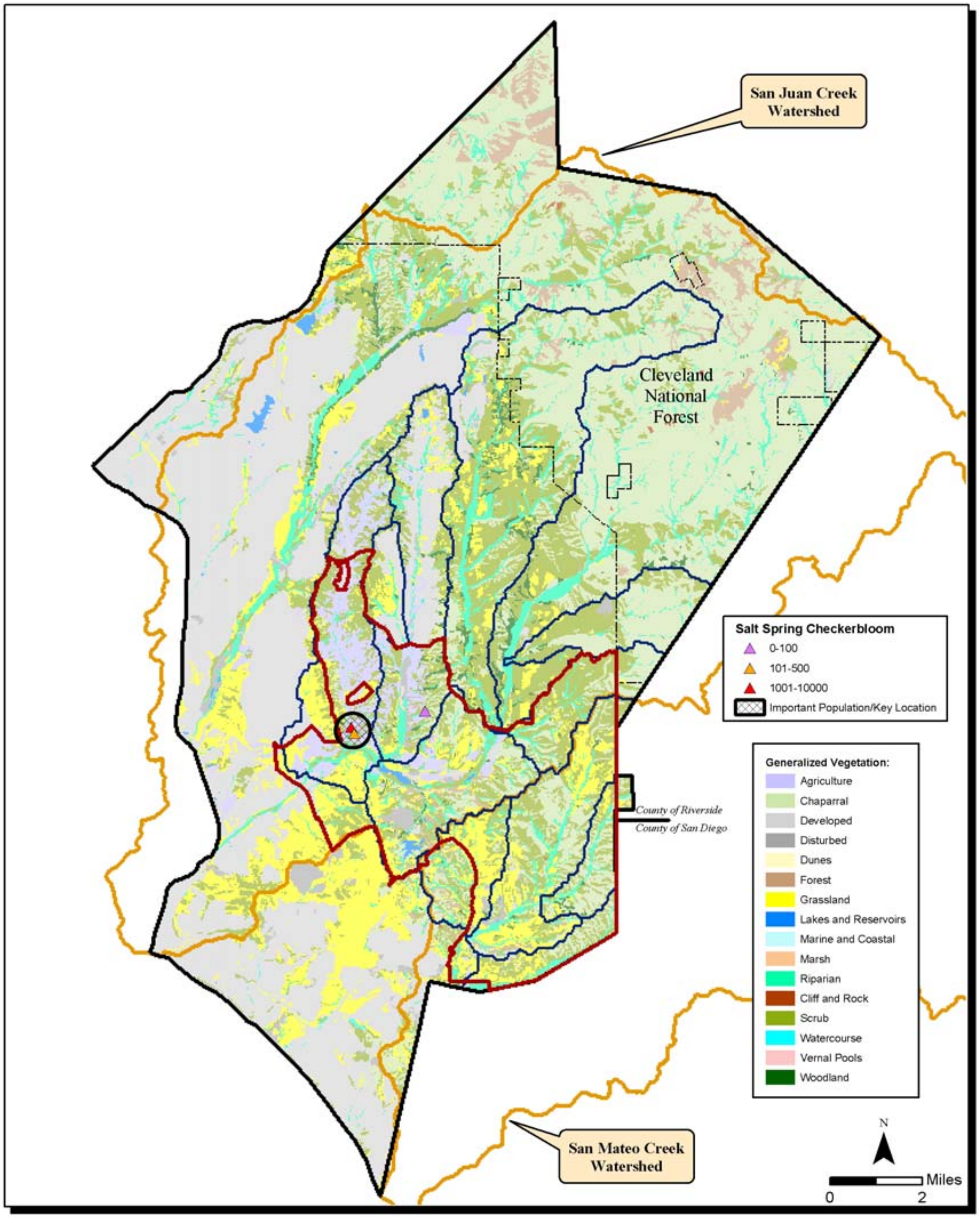
- Maintain existing slope wetland hydrology supporting the two locations of Salt Spring checkerbloom.

4.2.19 Southern Tarplant

Centromadia parryi var. *australis* – Southern Tarplant
Federal: None
State: None
CNPS: 1B

a. Regional Status

Southern tarplant is an annual member of the sunflower family (Asteraceae) that occurs in vernal pools, alkali playas, alkali grasslands, and disturbed areas. The stiff bristly stems are simple or



Draft NCCP/HCP Planning Guidelines

Salt Spring Checkerbloom Distribution Map

FIGURE 4-25

branched and can reach heights of up to 0.7 m. The lower leaves vary from 5 to 20 cm, and are linear-lanceolate and deeply divided. The upper leaves are linear and are spine-tipped. The infloresence can vary from open to dense. The ray flowers number from 9 to more than 30 and the ligule is 2 to 6 mm, 2 lobed, and yellow (sometimes becoming red). The species is characterized by many disk flowers with yellow corollas and brown or black anthers.

Historically this species was known from 47 locations in San Diego, Orange, Los Angeles, Ventura and Santa Barbara counties, with four populations reported from Mexico.[5] Of the approximately 47 populations in the U.S., between 35 and 40 percent have been extirpated. Currently, Orange County contains the majority of the remaining populations (*Table 4-25*). In his status report, Roberts divided the populations into: "major" – over 8,000; "moderate" – between 1,000 and 5,000; and "small" – fewer than 1,000. Nine populations are reported by Roberts as moderate (over 1,000) and two populations, Talbert Marsh and Canada Chiquita are reported as major.

TABLE 4-25. REGIONWIDE SUMMARY:
2002 STATUS OF SOUTHERN TARPLANT WITHIN
THE KNOWN RANGE IN SOUTHERN CALIFORNIA

Regional Major Population Area(s) in Orange County	Southern Tarplant Population: Number of Counted/Estimated Plants
Rancho Mission Viejo	145,600
Newport Backbay	Estimated 160,000*
Talbert Park	8,000
Banning Ranch	2,000+
Hellman Ranch	3,300
Bolsa Chica	2,000+
Subtotal:	*~320,900*
Other Important Populations	
Madrona Marsh, Los Angeles County	Estimated 1,000 to 5,000
APPROXIMATE TOTAL PLANTS	325,900

Note:* The Newport Backbay population is a preliminary rough estimate and is subject to field verification by T. Bomkamp.

[5] Much of the information regarding status of the southern tarplant has been obtained from a report prepared by Fred Roberts for the Bolsa Chica Land Trust in 2000, entitled *Southern Tarplant (Hemizonia parryi ssp. australis) on the Bolsa Chica Mesa, Orange County, California.* This report was submitted to the Coastal Commission and is part of the public record for the Bolsa Chica project.

Of the extant populations, many are on protected lands, including the populations at Newport Ecological Reserve (estimated at 160,000 individuals by DuBois in 2002, pers. comm. 2002; this estimate is subject to field conformation to be completed by T. Bomkamp), Hellman Ranch (now in permanent conservation) (3,307 individuals recorded in 1996), Bolsa Chica Mesa (estimated 2,000 individuals in conservation/preservation areas based on surveys by LSA in 2001), Talbert Park (8,000+), Madrona Marsh, Banning Ranch (2,000+ individuals in 1999 recorded by GLA). Also, not included by Roberts are 11,000+ individuals in the Chiquita Tesoro Mitigation Site and an estimated 10,000+ individuals in the Ladera portion of the GERA mitigation area, both of which would be considered as "major" populations based upon the Roberts' convention.

b. Subregional Status

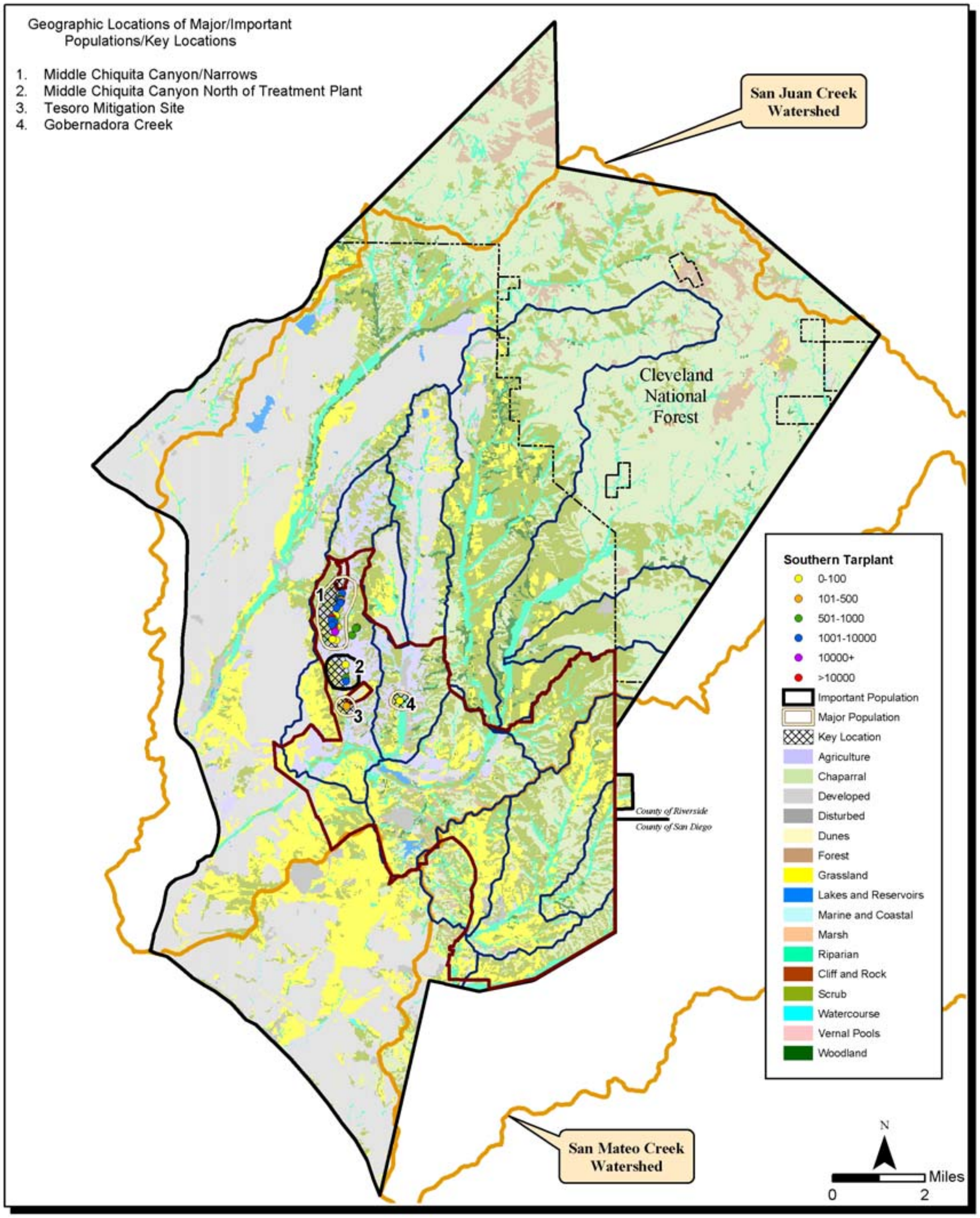
Southern tarplant is limited to two sub-basins in the planning area (*Figure 4-26*). The largest population is in Chiquita Canyon and, including the Tesoro mitigation site, numbers more than 135,600 individuals. A large population numbering 10,000+ individuals occurs on the GERA site in Gobernadora. It should be noted that southern tarplant populations are quite variable in size and location from year to year.

Within the subregion, this species is typically associated with wet meadow areas that exhibit mildly alkaline/saline soils dominated by saltgrass (*Distichlis spicata*), Mexican rush (*Juncus mexicanus*), yerba mansa (*Anemopsis californica*), shining peppergrass (*Lepidium nitidum*), dwarf peppergrass (*Lepidium latipes*), and alkali plantain (*Plantago elongata*). In Chiquita Canyon this species is sometimes associated with or in close proximity to Coulter's saltbush. More than any of the other special-status plant species under consideration, this species is well adapted to disturbance associated with flood events and appears to benefit from occasional disking or other soil-disturbing activities.

The following provides a more detailed description of the southern tarplant in the planning area and identifies *major* and *important populations*:

- Middle Chiquita north and south of the "Narrows" supports about 35 mapped locations ranging up to about 30,000 individuals in the largest (No. 1 on *Figure 4-26*). Estimated discrete locations numbering 7,000, 7,500, 10,000, 20,000, and 30,000 individuals, respectively, are located west of the creek. Locations east of the creek are more disparate and smaller, with the largest numbering about 750 individuals. This is a *major population* and the portion of the population west of the creek is a *key location*.

- Middle Chiquita northwest of the wastewater treatment facility supports three locations west of the creek numbering 3,000, 700 and 40 individuals, respectively (No. 2 on *Figure 4-26*). These locations comprise an *important population* in a *key location*.



Draft NCCP/HCP Planning Guidelines

Southern Tarplant Distribution Map

FIGURE 4-26

The Tesoro High School mitigation site in Lower Chiquita supported approximately 1,100 individual in 2000, 6,000 individuals in 2001 and 11,000 individuals in 2002 as determined during monitoring of the population (No. 3 on *Figure 4-26*). This population was introduced to the site in Fall of 1999 as mitigation for impacts to the tarplant at the High School site. This population appears to be self-sustaining and has increased for three consecutive years and should now be considered a *major population* in a *key location*.

- Further south in lower Chiquita Canyon there is one population numbering about 400 individuals. This population is relatively small for this species, but should be considered part of the Tesoro mitigation site *major population*.

- Portions of the Ladera Ranch Mitigation site in GERA, on the west side of the Gobernadora Creek "spur" that enters the mitigation area, supports an estimated 10,000+ individuals that have colonized the mitigation areas (No. 4 on *Figure 4-26*). This population should now be considered a *major population* in a *key location*.

- Finally, a wetland seep between Gobernadora and Chiquita supports a few hundred individuals during optimal years. While not large enough to be considered a major population, this population may potentially be an *important population* in a *key location.*

c. Protection Recommendations

- Minimize impacts to the *key location* of southern tarplant west of Chiquita Creek in Middle Chiquita Canyon to the maximum extent feasible. Minimize impacts to the remainder of the *major population* in Middle Chiquita Canyon. Mitigate impacts to southern tarplant in a manner similar to the Tesoro mitigation project (ongoing mitigation projects in Chiquita Canyon have demonstrated over three successive years that this plant can be readily propagated from seed).

- Protect the *major population* of southern tarplant in a *key location* in Lower Chiquita Canyon.

- Protect the *major population* of southern tarplant totaling 10,000+ individuals located in GERA.

d. Management Recommendations

- Implement a management program for southern tarplant, including control of non-native invasive species, management of grazing and minimization of human access and disturbance as part of the Adaptive Management Program**.**

e. Restoration Recommendations

- Translocate salvaged southern tarplant to suitable restoration and enhancement areas in the Chiquita sub-basin. Receiver areas should support alkali soils suitable for the species and should be placed in locations that maximize connectivity and genetic exchange.

SECTION 5: SUB-BASIN SCALE PLANNING CONSIDERATIONS

The Planning Considerations identified in this section are intended to be used at the sub-basin scale. The Planning Considerations are separated into two sub-groups: **(1)** those that apply to sub-basins within the San Juan Creek Watershed; and **(2)** those that apply to sub-basins in the San Mateo Creek Watershed. Each sub-basin description includes:

- A summary of the Planning Considerations – Existing Conditions and Biological Resources for each sub-basin. Planning considerations relating to soils and hydrology should be related to the more extensive review set forth in the Watershed Planning Principles.

- A summary of Planning Recommendations for each sub-basin. The Planning Recommendations are broken down into three general categories: protection, management and restoration. Appropriate goals, performance standards and reporting requirements associated with management and restoration recommendations will be developed in the context of specific management and restoration plans that will be prepared in the future. Not all sub-basins have management and/or restoration recommendations.

- Maps illustrating important biological resources, including listed species and other selected planning species.

- Maps identifying areas recommended for both upland and creek restoration, revegetation, and/or enhancement.

With regard to Sub-Basin Scale Planning Considerations and Planning Recommendations for individual "planning species," it is extremely important to review the "Species Accounts" in Section 4 prior to reviewing the sub-basin planning considerations and recommendations. The Species Accounts in Section 4 provide an overview of each planning species and provide a full set of recommendations for each species on an area wide basis. These recommendations are carried forward into the planning considerations and planning recommendations for each sub-basin set forth in this Section 5. Accordingly, the sub-basin planning considerations and planning recommendations for each species derive from the overall Species Accounts and are presented, along with other sub-basin planning considerations and recommendations, to provide a complete picture of all of the planning species considerations and recommendations for a particular sub-basin. Since the April 2003 version of the Guidelines was released new plant species information has been incorporated into the May 2004 version, most importantly for the thread-leaved brodiaea and the many-stemmed dudleya. The reader is referred to the Species Accounts in Section 4 for more detail on these important updates. Additions and revisions are incorporated into this Section 5 based on the new information. As noted in Sections 1 and 4, the revisions to the Species Accounts in this document have not been commented upon by the resource agencies.

Species recommendations are presented for planning purposes to assist in selecting and evaluating Habitat Reserve design alternatives and the preliminary and draft Conservation Strategy. Specific mitigation requirements for individual species, including performance standards, will be prepared in conjunction with subsequent determinations regarding those species that will be proposed for regulatory coverage upon final approval of the Southern Subregion NCCP/HCP.

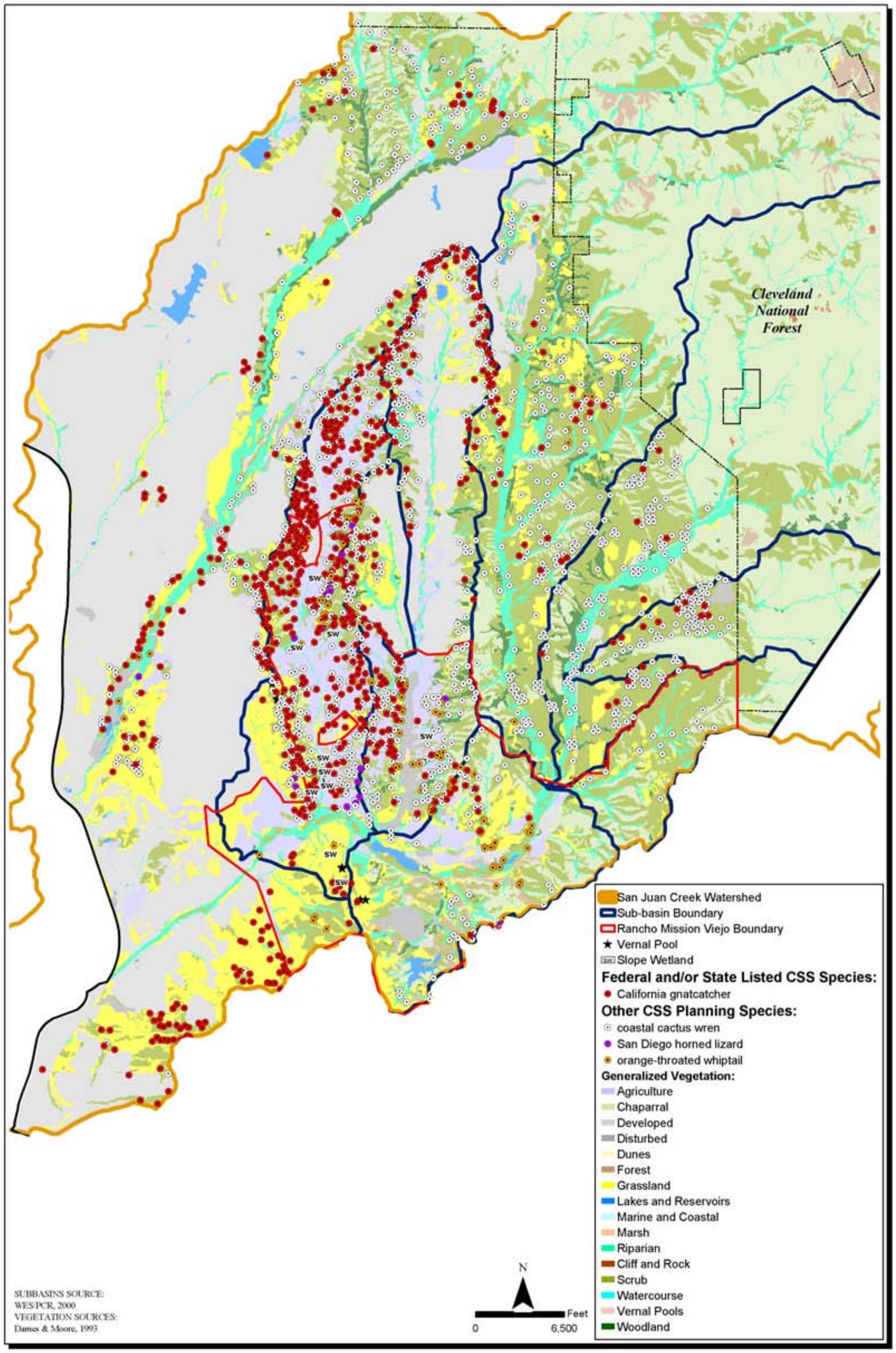
Finally, it should be noted that management and restoration recommendations will continue to be amplified as further information is obtained (e.g., a recent report on invasive plants species and other draft reports are under review) and as draft management plans are completed (e.g., a Grazing Management Plan will identify both transitional and long-term grazing areas and practices and a Fire Management Plan will address fuel modification standards, fire suppression practices and strategies and prescribed burns for habitat restoration and long-term management).

5.1 San Juan Creek Watershed

Figures 5-1 through *5-5* provide planning species maps for coastal sage scrub, riparian/aquatic habitat, historic raptor nest sites, grassland, and plants, respectively, for the San Juan Creek Watershed.

5.1.1 Chiquita Canyon Sub-basin

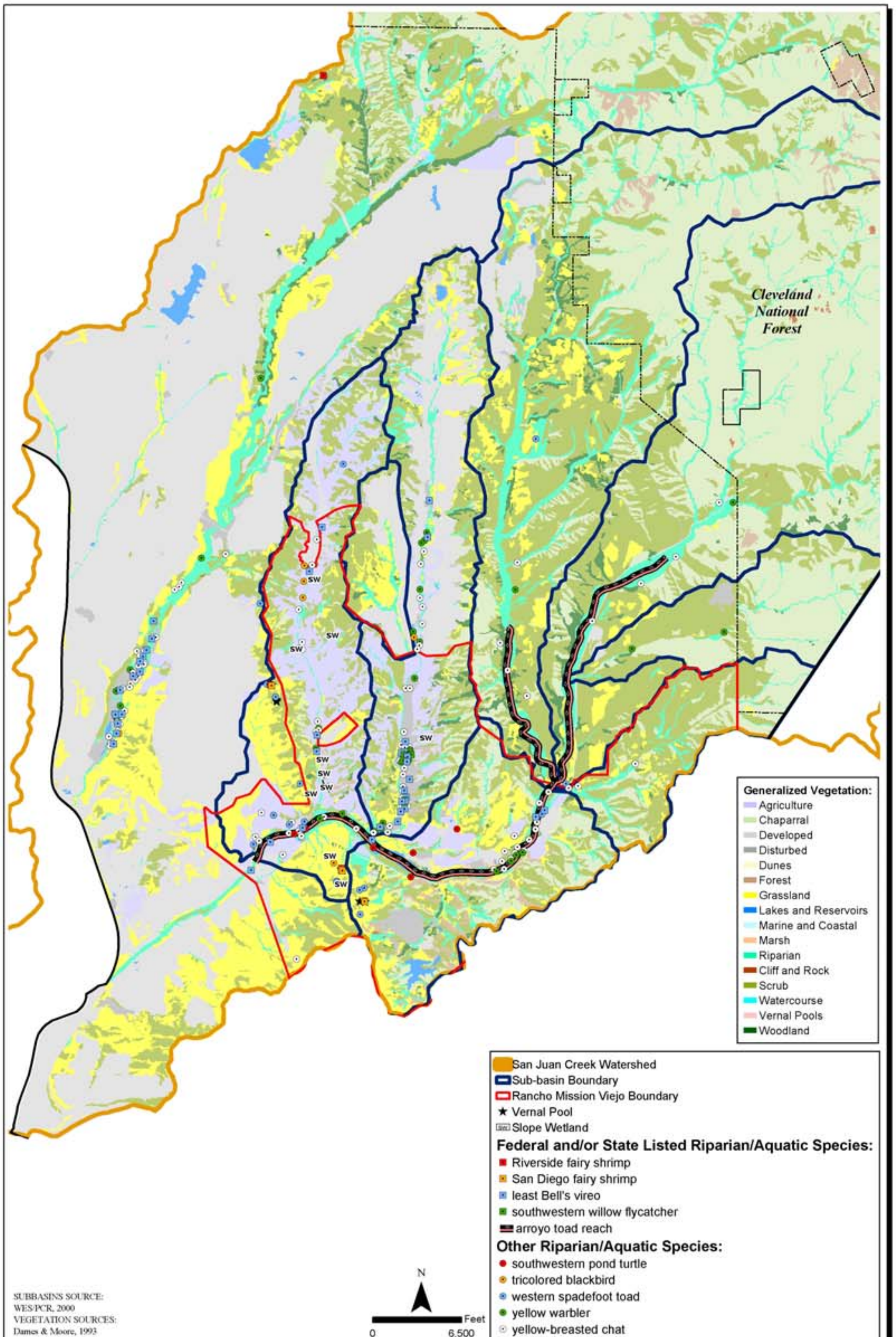
The Chiquita Canyon sub-basin is divided into three geographic areas: upper Chiquita Canyon, defined as the portion of the sub-basin north of Oso Parkway, middle Chiquita, defined as the portion of the sub-basin south of Oso Parkway to the “Narrows” and lower Chiquita Canyon defined as the portion of the sub-basin from the “Narrows” to the sub-basin boundary south of San Juan Creek and Ortega Highway. Upper Chiquita Canyon is protected by a conservation easement. Middle and lower Chiquita Canyon would be subject to the sub-basin planning considerations and recommendations described below. To distinguish the two ridges bordering Chiquita Canyon, this document refers to the east ridge as Chiquadora Ridge and the west ridge as Chiquita Ridge. The eastern portion of Chiquadora Ridge is in the Gobernadora sub-basin.



Draft NCCP/HCP Planning Guidelines

San Juan Creek Watershed - Coastal Sage Scrub Wildlife Species

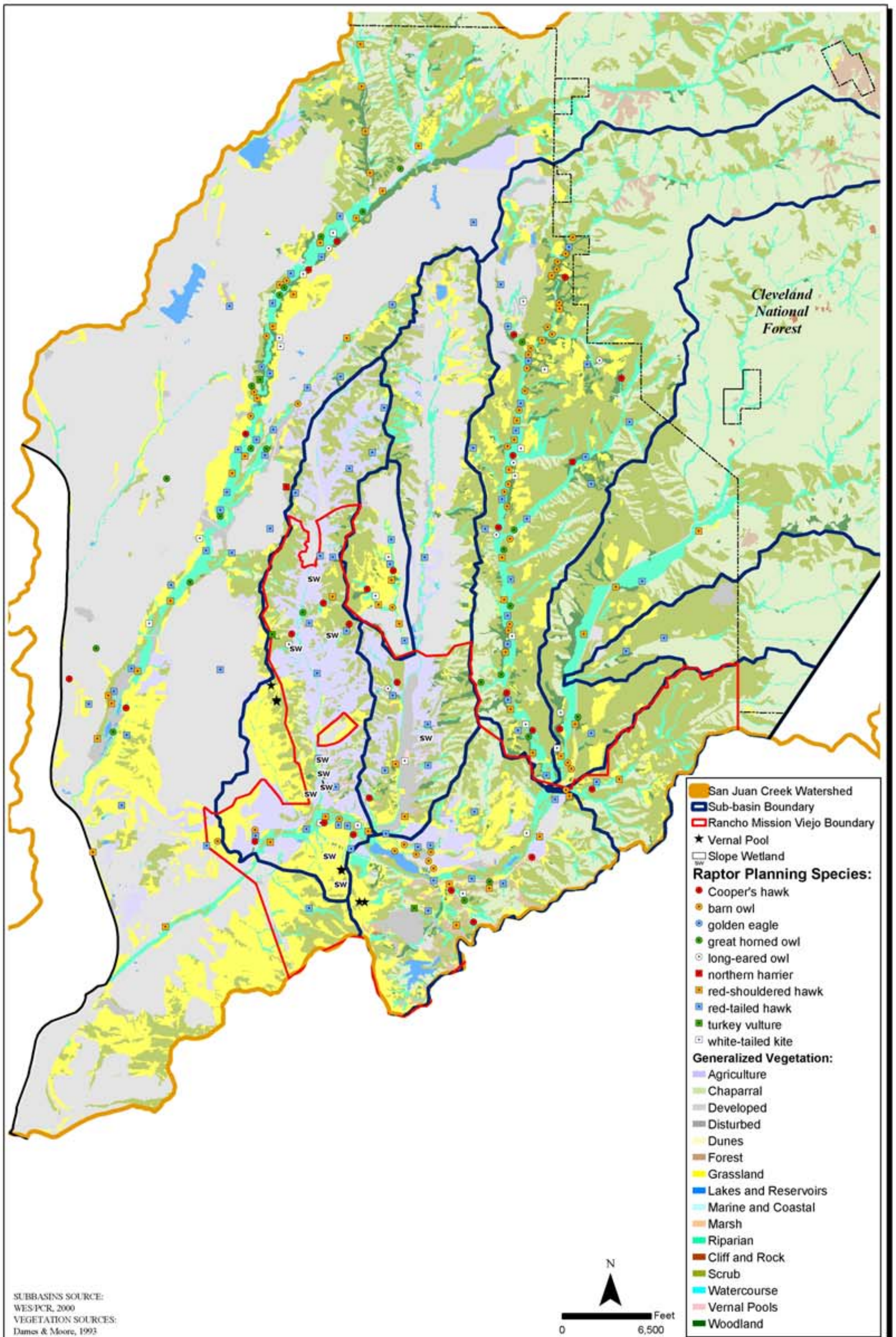
FIGURE 5-1



Draft NCCP/HCP Planning Guidelines

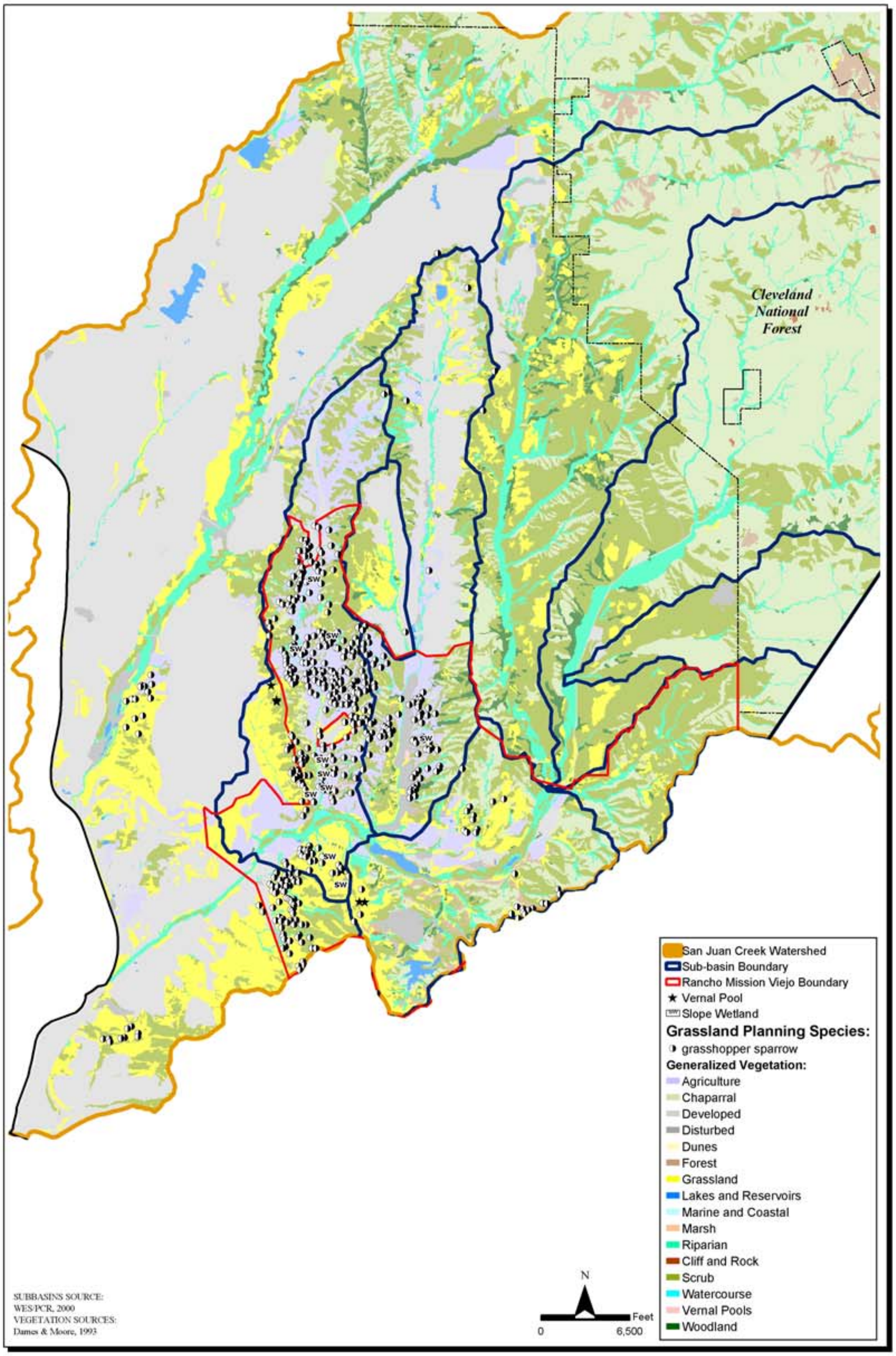
San Juan Creek Watershed - Riparian/Aquatic Wildlife Species

FIGURE 5-2



Draft NCCP/HCP Planning Guidelines
San Juan Creek Watershed - Historic Raptor Nest Sites

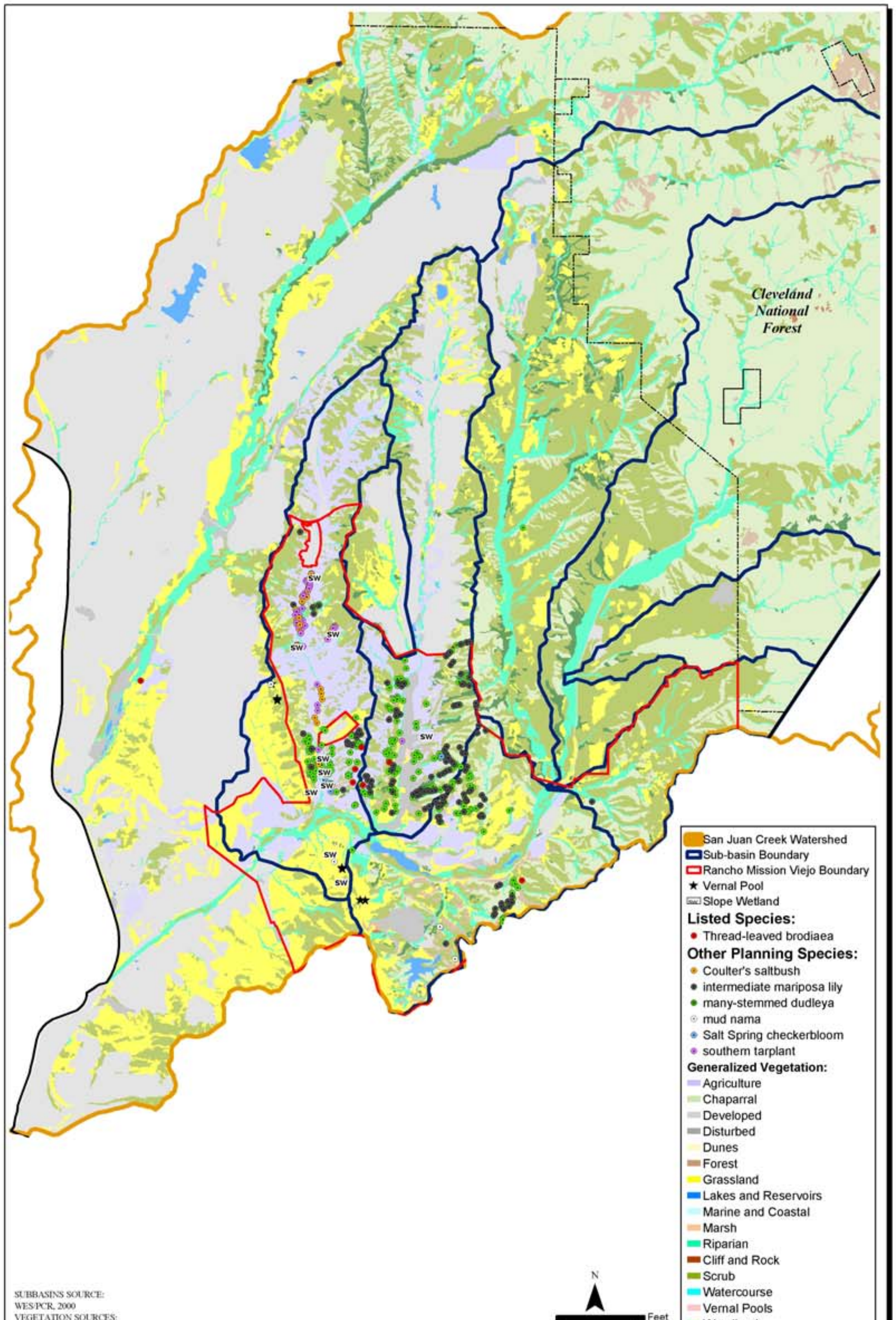
FIGURE
5-3



Draft NCCP/HCP Planning Guidelines

San Juan Creek Watershed - Grassland Wildlife Species

FIGURE 5-4



Draft NCCP/HCP Planning Guidelines

San Juan Creek Watershed - Plant Planning Species

FIGURE 5-5

a. Planning Considerations - Existing Conditions and Biological Resources

Note that substantially revised Planning Considerations from the 2003 Version of the Guidelines are shown in boldface.

- Soils in the main canyon and eastern side canyons primarily are sandy. Soils on the western side are primarily silty sand. Ridges on the east side of the valley are characterized by rock outcroppings and areas of clay hardpans that are eroded remnants of claypans.

- Elevations in the sub-basin range from approximately 200 feet above mean sea level at the confluence with San Juan Creek to 1,200 feet in the north end of the sub-basin.

- The sub-basin is approximately 5.7 miles from the Pacific Coast.

Upland habitats mostly are comprised of coastal sage scrub, agriculture, patches of native and annual grassland and patches of chaparral.

- The Chiquita Canyon area north of San Juan Creek, including Chiquadora Ridge and Wagon Wheel Canyon adjacent to the Chiquita sub-basin, supports a *major population* of the California gnatcatcher, both within the Southern Subregion, and within the range of the gnatcatcher in southern California. This area, which extends from the "horseshoe" in northern Coto de Caza south to San Juan Creek, includes 404 mapped locations of the gnatcatcher and accounts for 55 percent of the mapped gnatcatcher locations in the subregion. This is the *major population* in the subregion. A substantial portion of this population is a *key location*.

- The portion of the sub-basin south of San Juan Creek supports 5-6 California gnatcatcher locations in habitat linkage K. This small concentration of gnatcatcher locations, which overlaps with the Trampas Canyon subunit, as described below, is an *important population* in a *key location* because it provides north-south connection for the species.

- The mainstem creek supports herbaceous riparian, southern willow scrub, arroyo willow riparian forest, and coast live oak riparian forest habitats that support the least Bell's vireo and several other sensitive riparian and aquatic species, including yellow-breasted chat, yellow warbler, southwestern pond turtle (near the confluence with San Juan Creek), western spadefoot toad, and two-striped garter snake.

- The portion of San Juan Creek within the Chiquita sub-basin supports the western most extent of the San Juan Creek *major population* of arroyo toad (Bloom [1998] mapped potential habitat to an area about 3,000 feet downstream of Antonio Parkway bridge, but toads have not been observed farther west than about the confluence with Chiquita Creek.) This extension of the San Juan Creek *major population* is not considered a *key location* for at least three reasons: **(1)** the viability of the upstream *key locations* in Upper San Juan Creek and Bell Canyon are not reliant on this small downstream population; **(2)** recent breeding has been limited to an area just downstream of Trampas Canyon supported by an artificial runoff source; and **(3)** the proliferation of arundo in this reach of San Juan Creek is contributing to ongoing degradation of toad habitat.

- In addition to the perennial Chiquita Creek, several slope wetlands are present in lower Chiquita Canyon and the portion of the sub-basin south of San Juan Creek. These wetland features have varying conditions and support saltspring checkerbloom in the two southern most slope wetland locations.

- The riparian and woodland habitats in the mainstem creek and side canyons provide nest sites for several raptor species, including Cooper's hawk, white-tailed kite, red-shouldered hawk, great horned owl and barn owl.

- The sub-basin provides breeding and/or foraging habitat for a variety of the other sensitive wildlife species, including coastal cactus wren, ferruginous hawk, prairie falcon, merlin, northern harrier, wintering burrowing owls, loggerhead shrike, grasshopper sparrow, rufous-crowned sparrow, California horned lark, tricolored blackbird (nomadic colonies), orange-throated whiptail, coastal western whiptail, San Diego horned lizard, northern red-diamond rattlesnake, mule deer and mountain lion.

- A tricolored blackbird breeding colony has been observed on slopes south of San Juan Creek behind an RMV residence in the recent past (300+ pairs in 2001; P. Bloom, pers. comm. 2002).

- Vernal pools along Radio Tower Road south of Ortega Highway appear to be associated with localized bedrock landslides from the San Onofre and Monterey formations and support both the federally-listed Riverside fairy shrimp (vernal pool 2) and San Diego fairy shrimp (vernal pools 1 and 2), and the western spadefoot toad.

- Vernal pools (4 and 6) on Chiquita Ridge support San Diego fairy shrimp. The largest pool (4) also supports Riverside fairy shrimp and mud nama. A third vernal pool (5) was created as mitigation for Antonio Parkway and currently does not support either species of fairy shrimp.

- The state/federally-listed thread-leaved brodiaea is found in five locations on Chiquadora Ridge southeast of the wastewater treatment plant, including the eastern portion of the Chiquita sub-basin and the western portion of the Gobernadora sub-basin. The easternmost population on Chiquadora Ridge has about 2,000 flowering stalks. Together these five locations comprise a *major population*, substantial portions of which are a *key location*.

- The sub-basin, including Chiquadora Ridge, supports four general areas of many-stemmed dudleya (CNPS List 1B):

  - Chiquadora Ridge supports 47 locations numbering about 8,623 individuals and comprises a *major population* in a *key location*.

  - Approximately 18 locations on Chiquita Ridge comprise a total of about 1,349 individuals and are an *important population* in a *key location*. This *important population* includes four locations totaling 100 to 420 individuals each.

  - **Lower Chiquita Canyon east of the creek and south of treatment plant supports 41 locations totaling about 6,686 individuals. This is a *major population* in a *key location*. This population was originally considered an *important population* and potential *key location*, but 2003 survey data showed a four-fold increase in the population size and this location is now considered a *major population* and *key location*.**

  - The ridgeline east of the "Narrows" in middle Chiquita supports four locations of dudleya, with one numbering about 370 individuals and the other three numbering from 46 to 75 individuals. Because these locations are small and isolated from other locations, these individuals are not considered an *important population*.

- The sub-basin, including Chiquadora Ridge, supports four general areas of intermediate mariposa lily (CNPS List 1B) **Note: this section has not been revised to reflect 2003 survey data because of unresolved taxonomic issues with this species in the planning area**:

  - Lower Chiquita Ridge west of the creek supports three locations of intermediate mariposa lily numbering about 21, 47, and 625 individuals. Although these locations do not support large populations, together they may be considered to be an *important population* in a *key location* because Chiquita Ridge is a key landscape feature and habitat linkage in the subregion.

- Lower Chiquita Canyon east of the creek and south of the treatment plant supports about 18 locations, with most uncounted, but one relatively large population of 660 individuals. These scattered locations, along with the location numbering 660 individuals, may be considered an *important population.* Whether this population is also in a *key location* depends of the long-term status of the Chiquita Ridge and Chiquadora Ridge populations.

- Middle Chiquita Canyon supports five scattered locations north of the "Narrows" and both east and west of the creek. The largest of the five locations is west of the creek and has about 260 individuals. Another location west of the creek only supports two individuals and the three locations east of the creek support four, 12, and 70 individuals. Two locations also occur north of Oso Parkway in the Upper Chiquita Conservation Easement, with one location supporting only one individual and the other supporting ten individuals. Because of the few number of locations and the small number of individuals at each site, these locations probably are not *important populations* or in *key locations*.

- Chiquadora Ridge supports about 12 locations totaling about 1,580 individuals. These locations overlap the Chiquita and Gobernadora sub-basins and constitute a *major population* in a *key location.* The Chiquadora Ridge population is important for maintaining the landscape connection between the intermediate mariposa lily population on Chiquita Ridge and the populations in the San Mateo Watershed.

• The sub-basin supports four general locations for southern tarplant (CNPS List 1B):

  - Middle Chiquita supports about 35 mapped locations ranging up to about 30,000 individuals in the largest. Estimated discrete locations numbering 7,000, 7,500, 10,000, 20,000, and 30,000 individuals, respectively, are located west of the creek. Locations east of the creek are more disparate and smaller, with the largest numbering about 750 individuals. These 35 locations comprise a *major population* and the portion of the population west of the creek is a *key location*.

  - The Tesoro High School Mitigation site in Lower Chiquita supported approximately 1,100 individual in 2000, 6,000 individuals in 2001 and 11,000 individuals in 2002 as determined during monitoring of the population. This population was introduced to the site in Fall of 1999 as mitigation for impacts to the tarplant at the High School site. This population appears to be self-sustaining and has increased for three consecutive years and should now be considered a *major population* in a *key location*

- Further south in Lower Chiquita Canyon there is one population numbering about 400 individuals. This population is relatively small for this species, but should be considered functionally part of the Tesoro *major population*.

- A wetland seep between the Gobernadora and Chiquita sub-basins supports a few hundred individuals during optimal years. While not large enough to be considered a major population, this population may potentially be an *important population* in a *key location.*

• The sub-basin supports five general locations of Coulter's saltbush (CNPS List 1B):

- Lower Chiquita Canyon west of the creek supports two locations numbering 200 and 400 individuals, respectively. These two locations are an *important population* and comprise a *key location* because of the rarity of the species in the region.

- Middle Chiquita just above and below the "Narrows" supports numerous locations ranging from the 10s to 600 individuals. The location with 600 individuals is east and adjacent to the creek about midway between the "Narrows" and Tesoro High School. Locations with 150, 150 and 200 individuals are west of the creek. These locations overlap substantially with the largest southern tarplant population. This group of locations east and west of the creek is a *major population* in a *key location*.

- Middle Chiquita just to the northwest of the treatment plant supports five locations, of which four are west of the creek. The locations west of the creek number 25, 50, 150 and 360 individuals and the location east of the creek has 100 individuals. These five locations constitute an *important population.* The locations west of the creek constitute a *key location*.

- Two small locations are located in a major side canyon southeast of the Narrows. These locations number six and 10 individuals, respectively.

- One small population of less than 20 individuals occurs with southern tarplant (noted above) at a wetland seep between the Gobernadora and Chiquita sub-basins.

• Salt Spring checkerbloom (CNPS List 1B) occurs in the two slope wetlands in lower Chiquita Canyon. These are *important populations* in *key locations* because at 1,200 and 300 individuals, respectively, they are by far the two largest of three locations known from the subregion. The third location in the Gobernadora sub-basin supported only three individuals in 2003.

- The sub-basin also supports populations of Palmer's grapplinghook (CNPS List 4) and Catalina mariposa lily (CNPS List 4). The grapplinghook occurs in approximately 35 scattered locations (no population estimates) on Chiquadora Ridge southeast of the wastewater treatment plant and at a location supporting about 300 individuals east of the "Narrows." The Catalina mariposa lily is more widely distributed in the sub-basin, with clusters of individuals on Chiquadora Ridge southeast of the wastewater treatment plant, on Chiquita Ridge west of the "Narrows" and on a ridgeline east of the "Narrows."

- The sub-basin provides both north-south and east-west movement opportunities for mountain lion, mule deer, bobcat, coyote and gray fox. Coastal sage scrub habitat along Chiquita Ridge provides north-south movement opportunities for California gnatcatchers, cactus wrens, and other sensitive sage scrub species. A known important east-west movement route includes a wildlife corridor from Arroyo Trabuco situated between the Ladera Ranch and Las Flores developments. Based on existing landscape features, potential habitat linkages from Chiquita Ridge to Sulphur Canyon are located just north of the wastewater treatment plant and through the "Narrows" area south of Tesoro High School.

b. Planning Recommendations

1. Protection Recommendations

Note that one new Protection Recommendation is shown in boldface.

- Protect the major north-south connection to Central San Juan Creek by providing a habitat linkage between Chiquita Creek and the eastern edge of the Ladera Open Space and by restricting new impervious surfaces west of Chiquita Creek in order to maintain habitat integrity between the creek and Chiquita Ridge.

- Maintain east-west biological connectivity by protecting habitat linkages and wildlife corridors between Arroyo Trabuco, Chiquita Canyon, and Gobernadora Canyon. Biological connectivity should be maintained between Chiquita, Gobernadora and Arroyo Trabuco by protecting habitat linkages at minimum of three locations within the sub-basin: 1) via rim-to-rim preservation of Sulphur Canyon (approximately 2,000 to 2,500 feet wide); 2) at the "Narrows" where the canyon is only 700-800 feet wide (approximately 3,000 feet south of Tesoro High School) and connects to Sulphur Canyon; and 3) in contiguous patches of coastal sage scrub through the major canyon north and east of the wastewater treatment plant.

- Protect breeding and foraging habitat for the least Bell's vireo within Chiquita Canyon by focusing on protection of riparian habitat in Chiquita Creek.

- Protect breeding habitat and, to the extent feasible, protect foraging habitat for raptors and other species along Chiquita Creek.

- Protect riparian habitat in Chiquita Canyon by recognizing the influences of terrains and hydrology on the Chiquita Creek riparian system (see Watershed and Sub-basin Planning Principles).

- Protect the two vernal pools and their contributing hydrologic sources along Radio Tower Road that support the Riverside fairy shrimp, San Diego fairy shrimp and western spadefoot toad. The vernal pools located on Chiquita Ridge are within the existing protected Ladera Open Space.

- Protect slope wetlands and maintain their primary sub-surface water supply recharge characteristics and, where avoidance is infeasible, minimize and mitigate impacts.

- In conjunction with the large population of 2,000 thread-leaved brodiaea flowering stalks on Chiquadora Ridge in the Gobernadora sub-basin, protect two of the four small locations of thread-leaved brodiaea in Chiquita Canyon. Combined with the large population on Chiquadora Ridge, protection of these *key locations* would contribute to protection of a *major population.*

- **Protect the lower Chiquita Canyon *major population* and *key location,* totaling more than 6,686 individuals in 41 locations. The locations in this population range from 1 to 1,330 individuals, with four locations supporting at least 500 individuals.**

- Protect the Chiquita Ridge *important population* and *key location* of many-stemmed dudleya totaling about 1,349 individuals in approximately 18 discrete locations. This population includes four locations totaling 100 to 420 individuals each.

- Protect approximately six locations of intermediate mariposa lily along Chiquita Ridge together with the location south of the treatment plant that supports 660 individuals, totaling protection of about 1,600 individuals. Although these locations are scattered, together they comprise an *important population* in a *key location*

- Protect the 14 locations of intermediate mariposa lily comprising the major population on Chiquadora Ridge that overlaps the Chiquita and Gobernadora sub-basins, for a total protection of 2,000 individuals.

- Minimize impacts to the *key location* of southern tarplant west of Chiquita Creek in Middle Chiquita Canyon to the maximum extent feasible. Minimize impacts to the remainder of the *major population* in Middle Chiquita Canyon. Mitigate impacts to southern tarplant in a manner similar to the successful Tesoro mitigation project (ongoing mitigation projects in Chiquita Canyon have demonstrated over three successive years that this plant can be readily propagated from seed).

- Protect *major population* of southern tarplant in a *key location* in Lower Chiquita Canyon.

- Protect the *key locations* of Coulter's saltbush in Middle and Lower Chiquita Canyon. Minimize impacts to *important populations* within the sub-basin and mitigate unavoidable impacts in Chiquita Canyon**.**

- Protect the two *key locations* of Salt Spring checkerbloom in the slope wetlands in lower Chiquita Canyon.

- Protect the *important population* of the California gnatcatcher and coastal sage scrub in the portion of the sub-basin south of San Juan Creek to maintain resident and dispersal habitat for the gnatcatcher between Chiquita Ridge and San Juan Capistrano and San Clemente.

- Based on the application of the above connectivity protection recommendations and the Species Accounts recommendations, the goal is to protect at least 80 percent of the existing coastal sage scrub and gnatcatcher locations within the *major population* (including those sites within the Chiquita sub-basin and the Chiquadora Ridge portion of the Gobernadora sub-basin). Additional conservation of gnatcatcher habitat will be achieved by implementation of the restoration recommendations described below and in Section 4.

2. Management Recommendations

- Implement a cowbird trapping program to mitigate for impacts to existing habitat within the sub-basin and for potential impacts associated with future development. The cowbird trapping program will be evaluated on an annual basis and trap locations and trapping effort will be adjusted as part of the overall adaptive management program (*e.g.*, if the number of trapped cowbirds drops to a prescribed threshold, the trapping program may be terminated or otherwise modified).

- Implement a management program for protected sensitive plant locations in the sub-basin, including control of non-native invasive species, management of grazing and minimization of human access and disturbance as part of the adaptive management program,. The adaptive management recommendations for plants are described more fully in Section 4.

3. Restoration Recommendations

- Implement a coastal sage scrub (CSS)/valley needlegrass grassland (VGL) restoration program to enhance habitat connectivity and mitigate for impacts to existing habitat associated with future development (*Figure 5-6*). The CSS/VGL restoration program is discussed more fully in Section 6.

- Translocate salvaged thread-leaved brodiaea and many-stemmed dudleya to CSS/VGL restoration and enhancement areas where feasible and appropriate. Potential restoration and enhancement areas in the sub-basin include Chiquita Ridge and Chiquadora Ridge. Receiver areas should support clay soils suitable for brodiaea and many-stemmed dudleya, and should be placed in locations that maximize connectivity and genetic exchange.

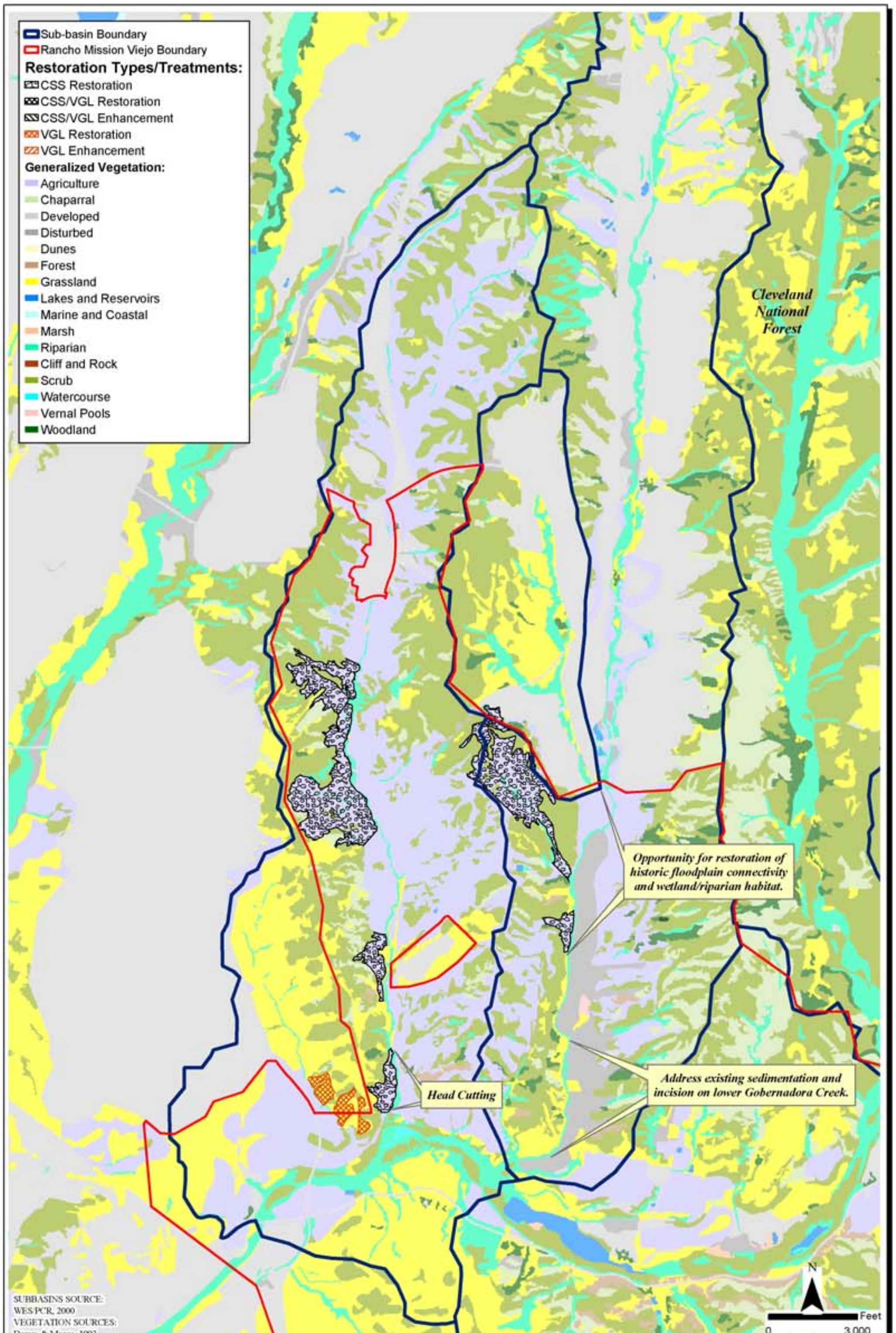
- Salvage clay topsoils from development areas where feasible and appropriate and transport to restoration areas. Salvaged topsoils may be used to create additional suitable brodiaea and dudleya habitat and may contain seedbank.

- Initiate an intermediate mariposa lily seed collection program in 2003 if sufficient rain falls to warrant the collection program. Receiver sites should be identified in the winter of 2003 and a pilot planting program should be implemented to determine the effectiveness of propagation from seed.

- Translocate salvaged intermediate mariposa lily bulbs to areas where suitable soil conditions occur. Specific translocation areas have not been identified, but based on the existing distribution potential general translocation areas in the sub-basin area include Chiquita Ridge and Chiquadora Ridge.

- Translocate salvaged southern tarplant and Coulter's saltbush to suitable restoration and enhancement areas in the sub-basin. Receiver areas should support alkali soils suitable for both species and should be placed in locations that maximize connectivity and genetic exchange.

- Implement restoration efforts to address localized headcuts within the sub-basin as further described in the Watershed and Sub-basin Planning Principles – Chiquita Sub-basin (*Figure 5-6*).



Draft NCCP/HCP Planning Guidelines

FIGURE 5-6

CSS/VGL and Creek Restoration for Canada Chiquita/Narrow Canyon & Canada Gobernadora Sub-basins

5.1.2 Gobernadora Canyon Sub-basin

The Gobernadora Canyon sub-basin is divided into two main geographic areas: upper Gobernadora Canyon, which includes the Coto de Caza residential development; and lower Gobernadora Canyon, which is under RMV ownership. The discussion herein is limited to lower Gobernadora Canyon within RMV ownership.

a. Planning Considerations - Existing Conditions and Biological Resources

Note that one new Planning Consideration based on recent information is shown in boldface.

- Soils in the valley floor of the sub-basin are characterized by deep alluvial sandy deposits with interbedded clay lenses. The hill slopes and ridges exhibit areas of exhumed hardpan overlying sandy and silty substrates (the remnants of claypans formed in the geologic past) and also include exposed rock outcrops or other areas of steep slopes.

- Elevations in the sub-basin range from approximately 260 feet above sea level at the confluence with San Juan Creek to 780 feet at the head of Sulphur Canyon west of the main valley.

- The sub-basin is approximately 6.5 miles from the Pacific Coast.

- Uplands are comprised of coastal sage scrub, chaparral, grassland, agriculture, and patches of oak woodlands. The more rugged uplands on the western side of the creek are dominated by coastal sage scrub, grassland and agriculture. The flat to rolling terrain on the east side of the creek supports a mixture of agriculture, coastal sage scrub, chaparral and oak woodlands. Sulphur Canyon, located west of the mainstem creek and below Chiquadora Ridge, is bordered by agriculture (grazing pasture and barley fields) and coastal sage scrub.

- Chiquadora Ridge west of the creek includes a part of the *major population* of the California gnatcatcher in the Chiquita Canyon area described above. The slopes east of the creek support a smaller population of the California gnatcatcher, probably due to the higher percentage of chaparral.

- Southern willow scrub in the revegetated wetland mitigation area (GERA) provides nesting habitat for least Bell's vireo, southwestern willow flycatcher, yellow-breasted chat, Cooper's hawk, red-shouldered hawk, and barn owl.

- A large colony of tricolored blackbirds periodically occurs in lower Gobernadora Canyon at the boundary on RMV property just south of the boundary with Coto de Caza. The birds nest in wetland areas within Coto de Caza just north of the RMV boundary and likely forage in the grassland and agricultural areas on RMV land.

- Other wildlife species in lower Gobernadora Canyon include white-tailed kite, long-eared owl, rufous-crowned sparrow, coast patch-nosed snake, northern red-diamond rattlesnake, western whiptail, San Diego horned lizard, Coronado skink and mule deer.

- Raptors using the grasslands and agriculture areas in the sub-basin for foraging include ferruginous hawk and merlin.

- Chiquadora Ridge within the Gobernadora sub-basin supports *major populations* of thread-leaved brodiaea (the location with 2,000 flowering stalks), many-stemmed dudleya (8,623 individuals), and intermediate mariposa lily (1,580 individuals in about 12 locations) described above for the Chiquita sub-basin.

- Central Gobernadora sub-basin east of the creek and the Central San Juan subunit north of the creek comprises a single, large population of many-stemmed dudleya supporting about 61 scattered locations ranging from 1 to 2,000 individuals. Although there is one location with 2,000 individuals, the remaining 60 locations number 225 or fewer individuals each. Combined, however, these locations total about 5,678 individuals and comprise a *major population.*

- **Upper Gobernadora sub-basin supports 13 locations of many-stemmed dudleya ranging from 5 to 513 individuals, and totaling 1,622 individuals. This population is considered an *important population* in a *key location* because it contributes to the geographic diversity and potentially is connected to any populations in Caspers Wilderness Park**

- Intermediate mariposa lily occurs in the Gobernadora sub-basin east of the creek and the northern portion of the Central San Juan Creek sub-basin in more than 50 locations, with eight locations numbering more than 200 individuals and the two largest locations 775 and 1,300 individuals each. This area supports a total of about 6,600 individuals. The location supporting 1,300 individuals is the single largest population in the subregion. These locations comprise a *major population* in a *key location*.

- Portions of the Ladera Ranch Mitigation site in GERA, on the west side of the Gobernadora Creek “spur” that enters the mitigation area, supports an estimated 10,000+

individuals of southern tarplant that have colonized the mitigation area. This population is a *major population* in a *key location*.

- Other sensitive plants known from the sub-basin include Catalina mariposa lily and Palmer's grapplinghook in the uplands and paniculate tarplant (CNPS List 4) in the valley bottom. A cluster of about 27 Catalina mariposa lily locations are on Chiquadora ridge associated with the cluster in the Chiquita sub-basin southeast of the wastewater treatment plant. Only three locations of Catalina mariposa lily are located east of Gobernadora Creek. There are about 23 locations of Palmer's grapplinghook in the sub-basin, with almost all east of the creek in association with the large population of many-stemmed dudleya. The paniculate tarplant is known from the along the creek near the boundary with Coto de Caza.

- The sensitive arroyo chub is known from the mouth of Gobernadora Creek at the confluence with San Juan Creek.

- Lower Gobernadora Canyon, including Sulphur Canyon, provides an important east-west connection between Chiquita and Wagon Wheel canyons to Bell Canyon and Caspers Wilderness Park. The riparian spine along the mainstem Gobernadora Creek, combined with the adjacent uplands along Chiquadora Ridge, provide a north-south habitat connection for mountain lions and other large mammals. The uplands along Chiquadora Ridge also provide habitat and a north-south connection for California gnatcatcher, cactus wren and a variety of other birds, reptiles and small mammals.

- Historic photographs indicate that Gobernadora Creek meandered freely across the valley floor over most of the length of the valley downstream from the mouth of Wagon Wheel Canyon.

- Potentially excessive surface and groundwater originates in the upstream portion of the sub-basin. These sources of water have contributed to erosion and incision of the mainstem and downstream deposition of sediments.

b. Planning Recommendations

1. Protection Recommendations

Note that the new protection recommendation is show in boldface.

- Maintain a continuous upland habitat linkage along the east-facing slopes of Chiquadora Ridge between San Juan Creek and Sulphur Canyon.

- Protect Sulphur Canyon rim-to-rim to maintain a functional biological connection from Gobernadora to Gen. Thomas F. Riley Regional Park in Wagon Wheel Canyon and upper Chiquita Canyon.

- Protect a 2,000- to 2,500-foot area along the southern boundary of Coto de Caza to provide for functional east-west wildlife movement from Sulphur Canyon to Bell Canyon.

- Minimize impacts to native grasslands. Any impacts resulting from future land uses will be addressed through an overall native grasslands restoration program, described in Section 6.

- Protect the southern willow scrub in GERA that provides nesting habitat for least Bell's vireo, southwestern willow flycatcher, yellow-breasted chat, Cooper's hawk, red-shouldered hawk, and barn owl.

- Avoid and minimize impacts to oak woodlands in northern Gobernadora along the ridgelines between the Gobernadora and Bell Canyon sub-basins.

- Keep open sufficient valley bottom south of Coto de Caza and above the knickpoint to allow creek meander for floodplain connection**.** Refer also to the Watershed and Sub-basin Planning Principles – Chiquita Gobernadora Sub-basin.

- Protect sufficient grassland habitat in the valley bottom in the northern portion of lower Gobernadora on RMV property to support a nesting population of the tricolored blackbird. (The existing nesting ponds are located within Coto de Caza.)

- Protect the thread-leaved brodiaea *major population* in a *key location* supporting approximately 2,000 flowering stalks on Chiquadora Ridge.

- Protect the 12 locations of intermediate mariposa lily comprising the *major population* on Chiquadora Ridge that overlaps the Chiquita and Gobernadora sub-basins, for total protection of about 1,580 individuals.

- Protect the Chiquadora Ridge *major population* of many-stemmed dudleya totaling about 8,623 individuals in approximately 47 discrete locations. This population includes 21 locations totaling 100 to 750 individuals each, with eight of these locations numbering more than 500 individuals.

- **Protect the upper Gobernadora *important population* and a *key location* of many-stemmed dudleya, totaling 1,622 individuals in 13 locations.**

- Protect the *major population* of southern tarplant totaling 10,000+ individuals located in GERA.

- Consistent with the Species Accounts recommendations and the Planning Recommendations for the Chiquita Sub-Basin, protect at least 80 percent of the coastal sage scrub and gnatcatcher sites along the eastern slopes of Chiquadora Ridge to contribute to achieving the overall goal of protecting at least 80 percent of the major population of gnatcatchers extending from Chiquita Canyon across to Gobernadora Creek. A further goal is the maintenance of connectivity between the protected coastal sage scrub patches to allow for dispersal of gnatcatchers between patches.

2. Management Recommendations

- Implement a cowbird trapping program to mitigate for potential impacts to native bird species associated with any proposed residential development in the sub-basin. The cowbird trapping program will be evaluated on an annual basis and trap locations and trapping effort will be adjusted as part of the overall adaptive management program (e.g., if the number of trapped cowbirds drops to a prescribed threshold, the trapping program may be terminated or otherwise modified).

- Protect existing riparian habitat downstream of the knickpoint in GERA for the least Bell's vireo, southwestern willow flycatcher and other riparian nesting bird species.

- Protect downstream habitat for the arroyo toad, least Bell's vireo, arroyo chub, and other sensitive riparian and aquatic species by maintaining hydrology, water quality and sediment delivery in San Juan Creek and minimizing additional loadings of nutrients or toxics.

- Implement a management program for protected sensitive plant locations in the sub-basin, including control of non-native invasive species, management of grazing as part of the adaptive management program, and prevention of human disturbance. The management recommendations for plants are described more fully in Section 4.

3. Restoration Recommendations

- Implement a coastal sage scrub restoration program in Sulphur Canyon to enhance habitat connectivity and mitigate for impacts to existing habitat associated with future development (*Figure 5-6*).

- Translocate salvaged many-stemmed dudleya to CSS/VGL restoration and enhancement areas where feasible and appropriate. Potential restoration and enhancement areas in the sub-basin include Chiquadora Ridge. Receiver areas should support clay soils suitable for dudleya and should be placed in locations that maximize connectivity and genetic exchange.

- Salvage clay topsoils from development areas where feasible and appropriate and transport to restoration areas. Salvaged topsoils may be used to create additional suitable dudleya habitat and may contain seedbank.

- Translocate salvaged intermediate mariposa lily bulbs to areas where suitable soil conditions occur. Specific translocation areas have not been identified, but based on the existing distribution, potential general translocation areas in the sub-basin area include Chiquadora Ridge.

- Initiate an intermediate mariposa lily seed collection program in 2003 if sufficient rain falls to warrant the collection program. Receiver sites should be identified in the winter of 2003 and a pilot planting program should be implemented to determine the effectiveness of propagation from seed.

- Implement a restoration program in Gobernadora Creek which addresses 1) the historic creek meander above the knickpoint; 2) upstream land use induced channel incision and erosion, including potentially excessive surface and groundwater originating upstream (*Figure 5-6*).

- Identify likely causes of erosion and potential measures to rectify causes of headcutting in the lower portion of the creek.

5.1.3 Central San Juan & Trampas Canyon Sub-basin

The Central San Juan & Trampas Canyon sub-basin is divided into two main geographic areas: the Central San Juan subunit and the Trampas Canyon subunit. The Central San Juan subunit includes the reach of San Juan Creek from just south of the confluence with Bell Creek to the east and the confluence with Gobernadora Creek to the west. The Central San Juan subunit extends north from San Juan Creek approximately 1.6 miles and encompasses a large north-south trending canyon through the center of the subunit. The Trampas Canyon subunit is characterized by the silica sand mining operation that dominates the canyon and the rugged terrain between Cristianitos Canyon and San Juan Creek.

5.1.4 Central San Juan Subunit

a. Planning Considerations - Existing Conditions and Biological Resources

- Soils in the subunit generally include erodable silts and erodable clays on the uplands north of San Juan Creek and alluvial deposits in San Juan Creek.

- Elevations in the subunit range from approximately 200 feet above sea level in San Juan Creek to about 870 feet at the boundary with Caspers Wilderness Park.

- The subunit is approximately 5.5 miles from the Pacific Coast.

- Upland habitats include coastal sage scrub, chaparral, oak woodlands, grassland, agriculture and disturbed areas (Colorspot Nursery).

- Approximately 13-14 California gnatcatcher locations occur in the coastal sage scrub habitat north of the nursery.

- Gnatcatchers may use coastal sage scrub adjacent to San Juan Creek, and this habitat probably is important for dispersal.

- Upland terraces immediately adjacent to the creek provide foraging and estivation habitat for the arroyo toad.

- Other sensitive species in uplands include cactus wren, rufous-crowned sparrow, grasshopper sparrow, San Diego desert woodrat, orange-throated whiptail, coastal western whiptail, northern red-diamond rattlesnake, San Diego ringneck snake, California glossy snake, and western skink. Sandy soils in and adjacent to San Juan Creek provide suitable habitat for the silvery legless lizard.

- A breeding colony of tricolored blackbirds has been observed in the past in San Juan Creek east of the intersection of Ortega Highway and Cristianitos Road.

- Uplands support locations of many-stemmed dudleya, intermediate mariposa lily, Catalina mariposa lily and Palmer's grapplinghook. As described above, the many-stemmed dudleya and intermediate mariposa lily locations, in combination with the Gobernadora sub-basin locations, comprise *major populations* of these species.

- A small portion of the San Juan Creek *major population* of the arroyo toad occurs in central San Juan Creek extending from about 1,600 feet south of the confluence of Bell, Verdugo and San Juan creeks to about 1,000 feet east of the Antonio Parkway bridge (in the Chiquita Canyon sub-basin). Surveys in this reach have yielded persistent, but relatively small, population counts for the toad. (Note: Bloom [1998] mapped potential habitat to an area about 3,000 feet downstream of Antonio Parkway bridge, but toads have not been observed farther west than about the confluence with Chiquita Creek.) This portion of the San Juan Creek *major population* is not considered a *key location* for at least three reasons: (1) the viability of the upstream *key locations* in Upper San Juan Creek and Bell Canyon are not reliant on this small downstream population, (2) recent breeding has been limited to an area just downstream of Trampas Canyon supported by an artificial runoff source; and (3) the proliferation of arundo in this reach of San Juan Creek has contributed to the ongoing degradation of toad habitat.

- Riparian and aquatic habitats within the creek provide breeding habitat for least Bell's vireo as well as yellow-breasted chat, yellow warbler, white-tailed kite, Cooper's hawk, red-shouldered hawk, great-horned owl, barn owl, red-tailed hawk, great blue heron, southwestern pond turtle, two-striped garter snake, western spadefoot toad, arroyo chub and threespine stickleback.

- The subunit is a key connection, especially for movement between the northern and southern portions of the subregion. It provides continuous upland habitat linkage connections, particularly along the southern side of the creek, for species such as the California gnatcatcher, cactus wren, rufous-crowned sparrow, and a variety of reptiles and small mammals. Large- and medium-sized mammals known or expected to use the riparian habitat as "live-in" habitat and for movement include mountain lion, mule deer, bobcat, coyote, and gray fox.

- North-south movement of large wildlife between San Juan Creek and Trampas Canyon and Cristianitos Canyon currently is constrained by Ortega Highway. High traffic volumes on Ortega Highway contribute to wildlife mortality. Wildlife have been documented to use two wildlife corridors that cross under the highway; a corrugated steel pipe culvert near Radio Tower Road and a concrete box culvert west of Cristianitos Road connecting to Trampas Canyon.

b. Planning Recommendations

1. Protection Recommendations

- Maintain and manage riparian and aquatic habitats along San Juan Creek for breeding populations of the arroyo toad, least Bell's vireo, and other sensitive species such as yellow warbler, yellow-breasted chat, raptors, southwestern pond turtle, two-striped garter snake, western spadefoot toad, silvery legless lizard, arroyo chub and threespine stickleback.

- Provide upland foraging and estivation habitat within the upland terraces in the floodplain of San Juan Creek, with a particular focus on the south side of the creek, to maintain existing population levels of the arroyo toad.

- Protect upland habitat adjoining riparian and aquatic habitats to support nesting sites of southwestern pond turtle.

- Protect upland habitat adjoining riparian and aquatic habitats to support all life stages of western spadefoot toad.

- Protect breeding habitat and, to the extent feasible, protect foraging habitat for raptors adjacent to San Juan Creek.

- Provide floodplain and upland habitat linkages adjacent to San Juan Creek for east-west and north-south dispersal by the California gnatcatcher between the Chiquita Canyon and Cristianitos sub-basins.

- Provide a habitat linkage at the confluences of Verdugo Canyon and Bell Canyon with San Juan Creek. Maintain an adequate habitat linkage along central San Juan Creek for "live-in" dispersal and movement habitat for terrestrial species, including mountain lion, bobcat, coyote and mule deer between sub-basins and especially between Chiquita Ridge, Canada Gobernadora, Bell Canyon, upper San Juan Creek, Verdugo Canyon, Trampas Canyon and Cristianitos Canyon.

- Address the potential to improve north-south movement of large wildlife between San Juan Creek and Trampas Canyon and Cristianitos Canyon by assessing the benefits and feasibility of relocating Ortega Highway to the north side of San Juan Creek.

2. Management Recommendations

- Implement a bullfrog eradication program for the Cal-Mat Lake within San Juan Creek to help protect arroyo toads.

- Implement a management program for protected sensitive plant locations in the sub-basin, including control of non-native invasive species, management of grazing as part of the adaptive management program, and prevention of human disturbance. The management recommendations for plants are described more fully in Section 4.

3. Restoration Recommendations

- In coordination with upstream eradication efforts, implement an arundo removal program for San Juan Creek within Rancho Mission Viejo boundaries to protect arroyo toad habitat and other riparian areas.

- Translocate salvaged many-stemmed dudleya to CSS/VGL restoration and enhancement areas where feasible and appropriate. Potential restoration and enhancement areas in the sub-basin include Chiquadora Ridge. Receiver areas should support clay soils suitable for many-stemmed dudleya and should be placed in locations that maximize connectivity and genetic exchange.

- Salvage clay topsoils from development areas where feasible and appropriate and transport to restoration areas. Salvaged topsoils may be used to create additional suitable dudleya habitat and may contain seedbank.

- Translocate salvaged intermediate mariposa lily bulbs to areas where suitable soil conditions occur. Specific translocation areas have not been identified, but based on the existing distribution, potential general translocation areas in the sub-basin area include Chiquadora Ridge.

- Initiate an intermediate mariposa lily seed collection program in 2003 if sufficient rain falls to warrant the collection program. Receiver sites should be identified in the winter of 2003 and a pilot planting program should be implemented to determine the effectiveness of propagation by seed.

5.1.5 Trampas Canyon Subunit

a. Planning Considerations - Existing Conditions and Resources

Note that one new Planning Consideration based on recent information is shown in boldface.

- Sand, hard rock and minerals have been mined from Trampas Canyon over the past 50 years. An artificial lake dominates this sub-basin. The lake is steep-sided, relatively deep and the uplands surrounding it are dominated by ruderal vegetation.

- The Trampas Canyon silica mining activities have resulted in the creation of an 88-acre temporary storage facility/artificial wetland. Cessation of mining activity will result in the elimination of the hydrologic conditions that created this feature.

- Soils in the subunit are comprised of mainly silty-sandy soils similar to those found in the Chiquita Canyon and Gobernadora sub-basins. Smaller areas in the eastern portion of the subunit are underlain by clayey silts and sands.

- Elevations in the subunit range from approximately 300 feet above sea level at Ortega Highway to more than 1,000 feet along Radio Tower Road at the western boundary of the subunit.

- The western boundary of the subunit is approximately 5.5 miles from the Pacific Coast.

- The subunit supports a mosaic of upland habitats, including coastal sage scrub, chaparral, grassland, and patches of oak woodland.

- The subunit supports approximately four California gnatcatcher locations and approximately 20 cactus wren locations. Two of the four gnatcatcher locations are in the western portion of the subunit adjacent to the Chiquita Canyon sub-basin and the other two are in the southeastern portion of the subunit adjacent to the Cristianitos sub-basin. Both sets of gnatcatcher locations are a part of *important populations* in *key locations* and provide important connectivity function.

- The subunit is used by mule deer and mountain lions.

- Raptors nesting in oak woodlands in the subunit include turkey vulture, white-tailed kite, Cooper's hawk, red-shouldered hawk, red-tailed hawk, and great horned owl.

- Vernal pools along Radio Tower Road south of Ortega Highway (pools 7 and 8) appear to be associated with localized bedrock landslides from the San Onofre and Monterey formations. Vernal pool 7 supports both the Riverside fairy shrimp and San Diego fairy shrimp. The spadefoot toad also breeds in these vernal pools.

- The subunit also supports slope wetlands along Radio Tower Road that also appear to be associated with localized bedrock landslides from the San Onofre and Monterey formations.

- Other sensitive wildlife species known from the subunit include orange-throated whiptail, red-diamond rattlesnake, and San Diego desert woodrat near the mouth of the canyon.

- **One location of about 250 flowering stalks of the thread-leaved brodiaea occurs in the southeastern portion of the subunit. This location is an *important population* because it contributes to the geographic diversity of the species in the subregion.**

- The southern portion of the subunit, in conjunction with the Cristianitos sub-basin, supports a *major population* of the many-stemmed dudleya in a *key location*. The Trampas Canyon subunit itself supports about eight locations of 20-700 individuals each.

- The southern portion of the Trampas Canyon subunit supports eight locations of intermediate mariposa lily, with one population numbering 640 individuals, and the others numbering less than 50 individuals. These locations may be considered an *important population* because they contribute to the geographic diversity of the species in the subregion.

- Although the riparian vegetation in the subunit does not provide high value breeding habitat for species such as the least Bell's vireo and other sensitive, non-raptor riparian birds, the reservoir provides resting and foraging habitat for common water fowl and other birds associated with open water and wetland vegetation such as pied-billed grebe, western grebe, mallard, ruddy duck, ring-necked duck, double-crested cormorant, herons, and American coot.

- Coastal sage scrub in the central portion of the subunit provides a nearly continuous north-south connection between San Juan Creek and the upper portion of the Cristianitos sub-basin for bird species such as the California gnatcatcher and cactus wren. This portion of the subunit east of Trampas Creek, along with the Cristianitos Canyon sub-basin, connects populations to the north in Chiquita Canyon with the Camp Pendleton population south of the subregion.

- The central portion of the subunit east of the mine and Cristianitos Road is also a habitat linkage between San Juan Creek and Cristianitos, Blind, La Paz, and Gabino canyons used by mountain lion, mule deer, coyote, and bobcat. A concrete box culvert crossing of Ortega Highway just west of Cristianitos Road is a key crossing point for wildlife between San Juan Creek and Trampas Canyon.

- North-south movement of large wildlife between San Juan Creek and Trampas Canyon and Cristianitos Canyon currently is constrained by Ortega Highway. High traffic volumes on Ortega Highway contribute to wildlife mortality. Wildlife have been documented to use two wildlife corridors that cross under the highway; a corrugated steel pipe culvert near Radio Tower Road and a concrete box culvert west of Cristianitos Road connecting to Trampas Canyon.

b. Planning Recommendations

1. Protection Recommendations

Note that one new Protection Recommendation based on recent information is shown in boldface.

- Protect the vernal pools and their contributing hydrologic sources, Riverside fairy shrimp and San Diego fairy shrimp, as well as the slope wetlands and their primary sub-surface water supply recharge characteristics along Radio Tower Road.

- Avoid impacts to the *important populations* of California gnatcatchers and coastal sage scrub to the maximum extent feasible to maintain resident and dispersal habitat for the gnatcatcher between San Juan Creek and Cristianitos Canyon and populations on Camp Pendleton.

- Maintain upland north-south habitat linkages through the central and western portions of the Trampas Canyon subunit to convey wildlife movement and dispersal (especially gnatcatchers) between San Juan Creek, San Juan Capistrano, San Clemente, Cristianitos Canyon, the Donna O'Neill Conservancy at Rancho Mission Viejo and Camp Pendleton.

- Maintain upland east-west habitat linkage/wildlife corridor south of the artificial lake to link Prima Deshecha, Talega Open Space and other habitat to the west in San Juan Capistrano and San Clemente with the Donna O'Neill Conservancy and the Gabino, La Paz and Talega movement corridors. This habitat linkage should allow for dispersal of gnatcatchers and other avian species, as well as provide a movement corridor for large mammals such as bobcat, coyote, and mule deer.

- Address the potential to improve north-south movement of large wildlife between San Juan Creek and Trampas Canyon and Cristianitos Canyon by assessing the benefits and feasibility of relocating Ortega Highway to the north side of San Juan Creek.

- Maintain and manage riparian and aquatic habitats along San Juan Creek for arroyo toad, least Bell's vireo, and other sensitive species such as yellow warbler, yellow-breasted chat, raptors, southwestern pond turtle, two-striped garter snake, western spadefoot toad, silvery legless lizard, arroyo chub and threespine stickleback.

- Protect upland terraces and habitat adjoining San Juan Creek to support arroyo toad foraging and estivation.

- **Protect the location of approximately 250 thread-leaved brodiaea flowering stalks in the southeastern portion of the subunit. This location is considered an *important population* because it contributes to the geographic diversity of the species in the subregion**

- Protect the Trampas Canyon subunit component (approximately eight discrete locations) of the *major population* of many-stemmed dudleya that extends from the southern portion of the Trampas Canyon in the north, through the Cristianitos Canyon sub-basin south to the Talega development open space located in the San Clemente Watershed.

- Protect the eight known locations of intermediate mariposa lily comprising an *important population* in the subunit.

2. Management Recommendations

- Maintain stormwater flow characteristics comparable to existing conditions from Trampas Canyon into San Juan Creek to preserve breeding habitat for the arroyo toad population and other aquatic species in San Juan Creek.

- Implement a management program for protected sensitive plant locations in the sub-basin, including control of non-native invasive species, management of grazing as part of the adaptive management program, and prevention of human disturbance. The management recommendations for plants are described more fully in Section 6.

5.1.6 Verdugo Canyon Sub-basin

a. Planning Considerations - Existing Conditions and Resources

- Soils in the sub-basin are characterized by highly erodable silts and clays, with a coarse substrate in the streambed.

- Elevations range from approximately 400 feet above sea level at the confluence with San Juan Creek to approximately 1,800 feet at the Riverside County boundary.

- The sub-basin is approximately 8.5 miles from the Pacific Coast.

- The sub-basin is bordered by grasslands, coastal sage scrub, and small patches of oak woodland. Coastal sage scrub and chaparral are the predominant habitats, with the grasslands more prominent toward the canyon's confluence with San Juan Creek.

- The sub-basin supports sycamore riparian woodland and southern coast live oak riparian forest, with small patches of mule fat scrub. Southern willow scrub is present in tributaries to Verdugo Canyon.

- One California gnatcatcher and approximately 16 cactus wren locations occur in the coastal sage scrub along the canyon.

- The yellow-breasted chat occurs in riparian habitat in the sub-basin.

- Riparian habitat in the sub-basin supports nest sites for Cooper's hawk, red-shouldered hawk, red-tailed hawk, and barn owl.

- There is an historic record of a small breeding colony of the tricolored blackbird at the mouth of the canyon under the Ortega Highway bridge.

- The sub-basin provides a habitat connection for large- and medium-sized mammals. Mule deer are common in the canyon, and it provides habitat for mountain lion, coyote, bobcat, and gray fox.

- The sub-basin is central to the large block of relatively undisturbed habitat in the eastern part of the subregion.

b. Planning Recommendations

1. Protection Recommendations

- Protect, to the extent feasible, patches of coastal sage scrub and patches of southern cactus scrub that support cactus wren with a focus on maintaining contiguous habitat patches that provide north-south dispersal opportunities for the cactus wren and other species between the Lucas Canyon sub-basin to the north, and the Gabino Canyon/Blind Canyon and La Paz sub-basins to the south.
- Maintain habitat connectivity for movement of large mammals such as mountain lion, bobcat, coyote and mule deer between San Juan Creek and Cleveland National Forest; and between upper Verdugo Canyon and the headwaters of Gabino Creek.
- Protect riparian habitat that provides nest sites for Cooper's hawk, red-tailed hawk, red-shouldered hawk and barn owl.
- Protect grassland and wetland/riparian habitat at the mouth of Verdugo Canyon near Ortega Highway to retain tricolored blackbird habitat and to provide for wildlife movement to San Juan Creek.
- Protect Verdugo Canyon hydrology to maintain sources of coarse sediment that are important for arroyo toad breeding habitat in downstream areas.

5.2 San Mateo Creek Watershed

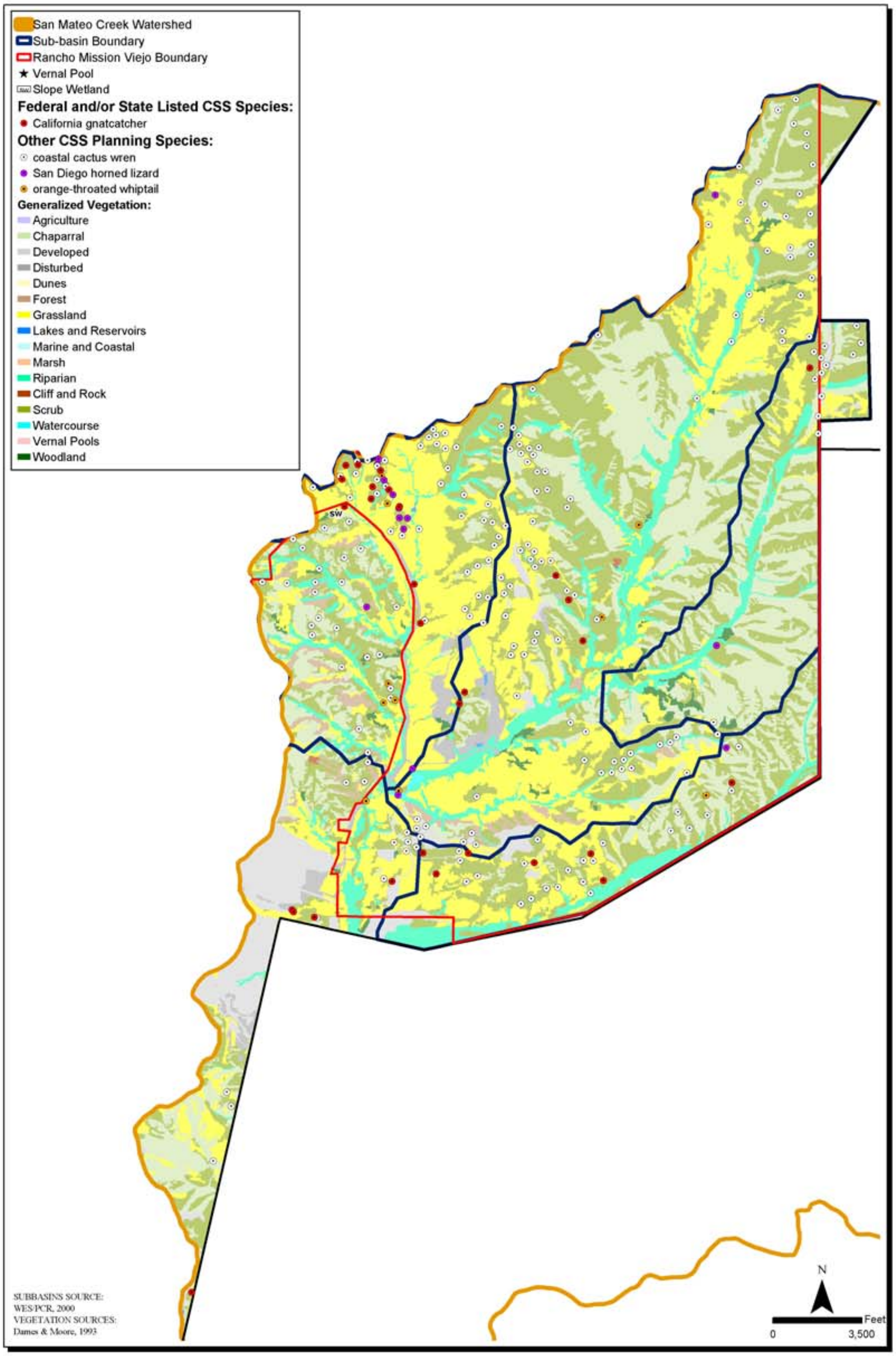
Figures 5-7 through *5-11* provide planning species maps for coastal sage scrub, riparian/aquatic habitat, historic raptor nest sites, grassland, and plants, respectively, for the San Mateo Creek Watershed.

5.2.1 Cristianitos Canyon Sub-basin

a. Planning Considerations - Existing Conditions and Resources

Substantial revisions to Planning Considerations based on recent information are shown in boldface.

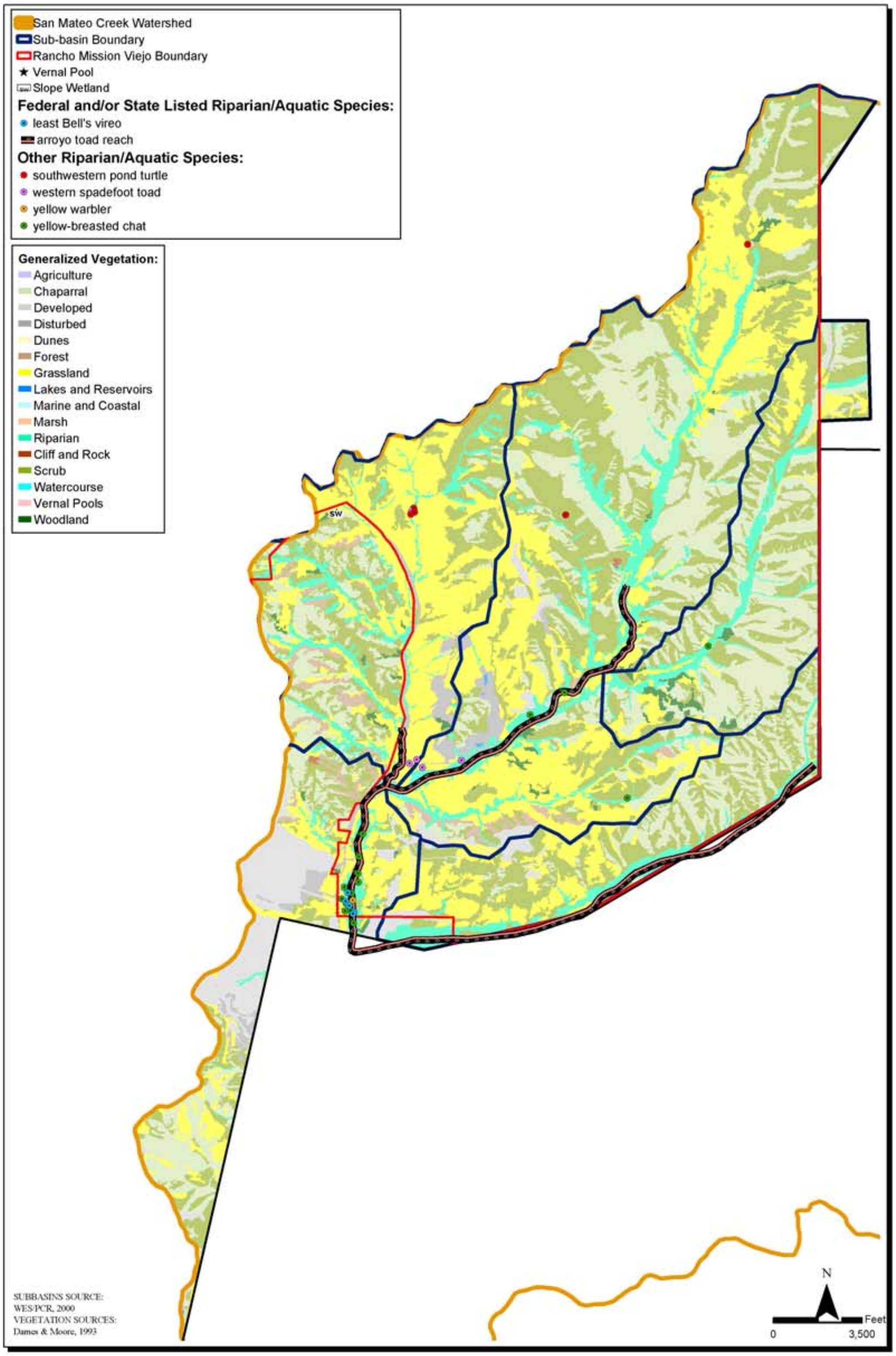
- Soils west of the creek are characterized by erodable silty sands while soils east of the creek generally are clays.



Draft NCCP/HCP Planning Guidelines

San Mateo Creek Watershed - Coastal Sage Scrub Wildlife Species

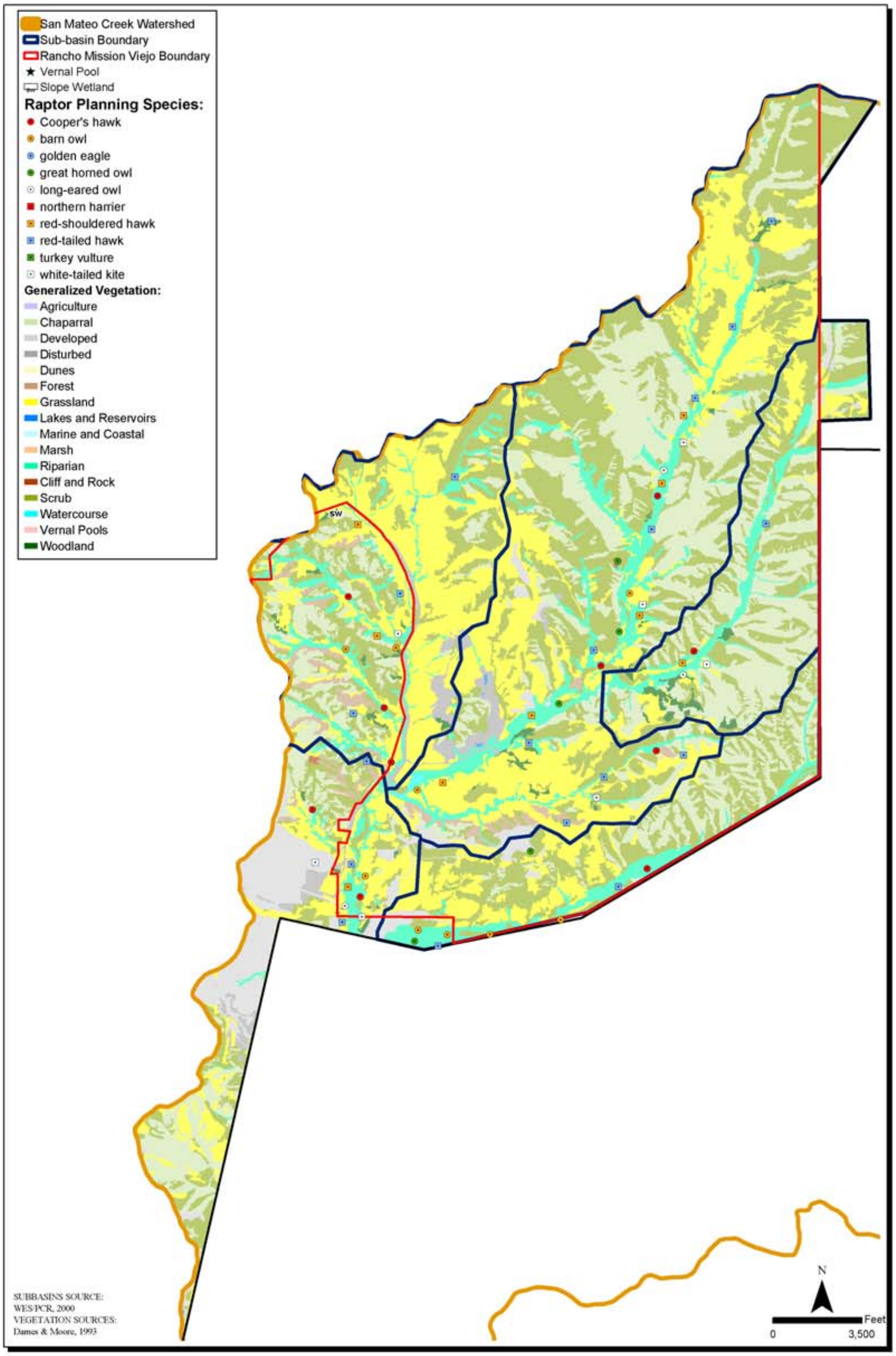
FIGURE 5-7



Draft NCCP/HCP Planning Guidelines

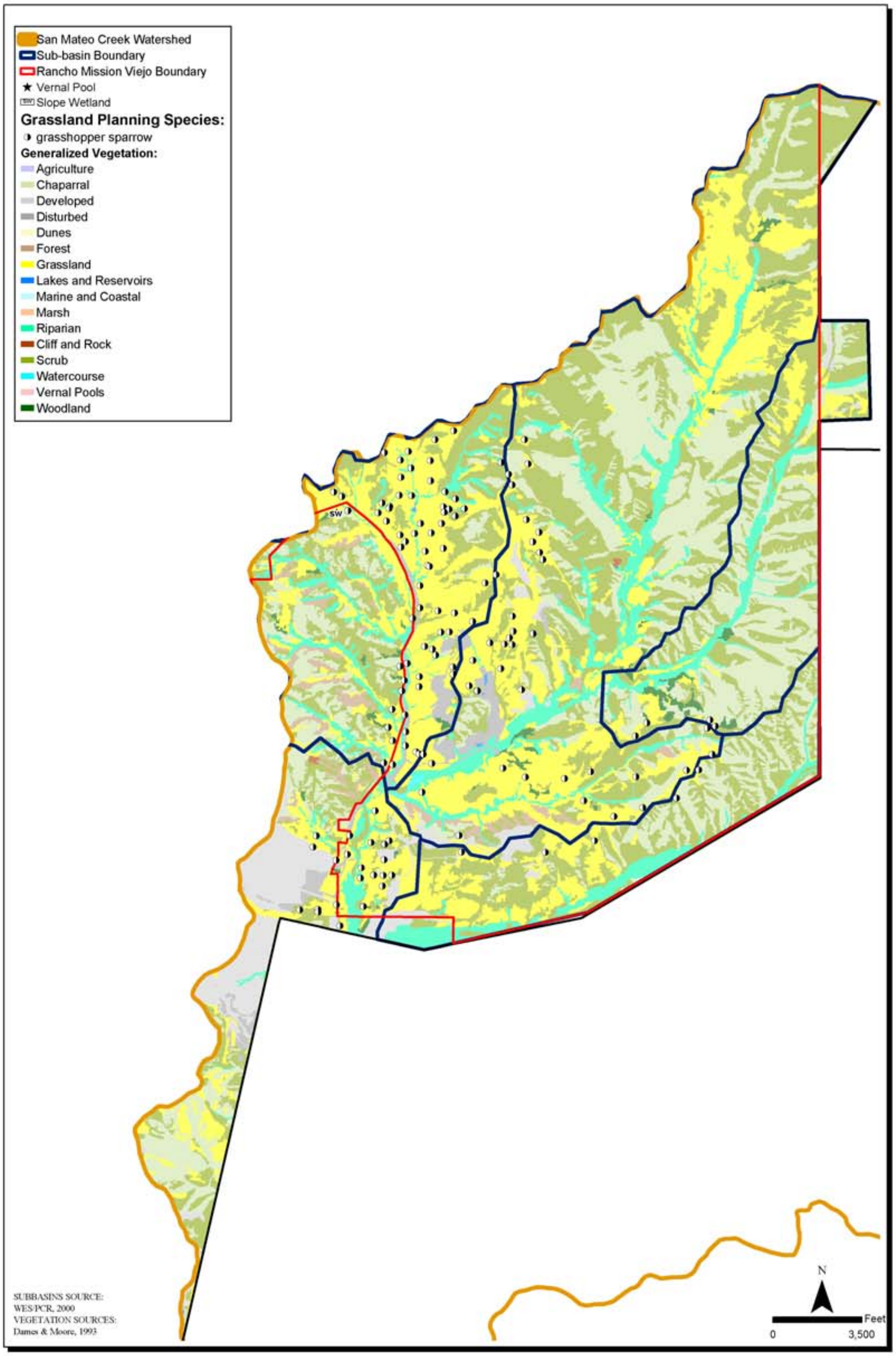
San Mateo Creek Watershed - Riparian/Aquatic Wildlife Species

FIGURE 5-8



Draft NCCP/HCP Planning Guidelines
San Mateo Creek Watershed - Historic Raptor Nest Sites

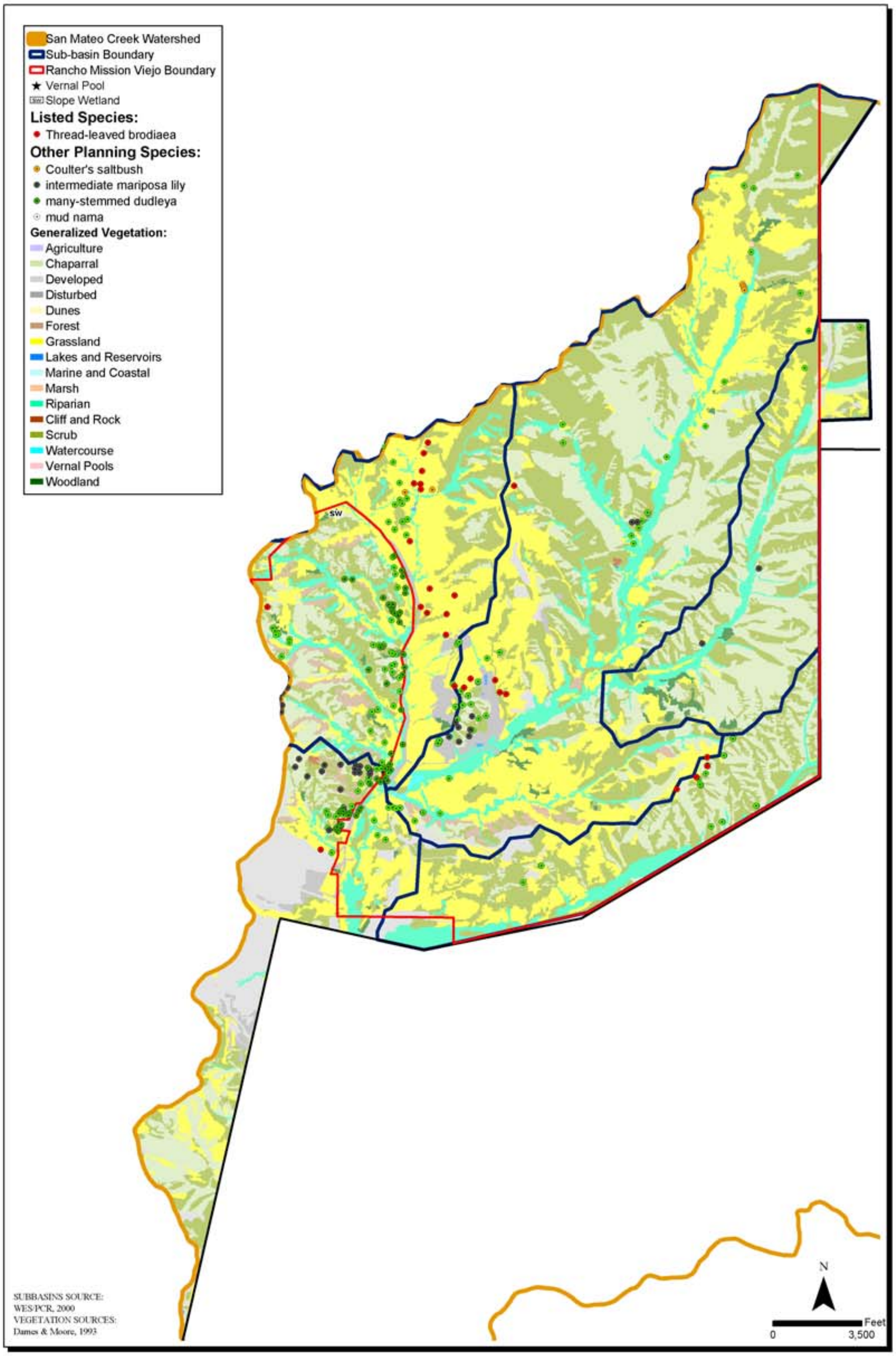
FIGURE 5-9



Draft NCCP/HCP Planning Guidelines

San Mateo Creek Watershed - Grassland Wildlife Species

FIGURE 5-10



Draft NCCP/HCP Planning Guidelines
San Mateo Creek Watershed - Plant Planning Species

FIGURE 5-11

- Elevations in the sub-basin range from approximately 280 feet above sea level at the confluence of Cristianitos and Gabino creeks to 1,000 feet at the head of Cristianitos Canyon.

- The sub-basin is approximately 5 miles from the Pacific Coast.

- The sub-basin is dominated by grasslands, a large component of which is native grassland (330 acres), and coastal sage scrub. The grassland is predominant in upper Cristianitos and along the eastern side of the canyon, while coastal sage scrub and chaparral dominate the east-facing slopes on the western side of the canyon within the Donna O'Neill Land Conservancy.

- Riparian habitats in the sub-basin include coast live oak riparian woodland, southern willow scrub and mule fat. Mule fat is a predominant component in the upper portion of the sub-basin. Tributaries to Cristianitos Creek from the Donna O'Neill Land Conservancy support coast live oak woodland and riparian woodland.

- The sub-basin supports approximately 12 California gnatcatcher locations and approximately 67 cactus wren locations. The 12 gnatcatcher locations, in combination with the two adjacent locations in the Trampas Canyon subunit, comprise an *important population* in a *key location*.

- Other upland sensitive species in the sub-basin include grasshopper sparrow, rufous-crowned sparrow, California horned lark, San Diego horned lizard, coastal western whiptail, orange-throated whiptail, western patch-nosed snake, northern red-diamond rattlesnake, and San Diego desert woodrat.

- The segment of Cristianitos Creek upstream of the confluence with Gabino Creek is part of the Lower Cristianitos Creek/Lower Gabino Creek arroyo toad *important population.* The segment of Cristianitos Creek north of the confluence with Gabino Creek is the transition zone between clay terrains that typify the substrate of the streamcourse in Upper Cristianitos Creek and sandy terrains that typify the substrate of the streamcourse below its confluence with Gabino Creek *(i.e*. Lower Cristianitos Creek). The creek habitat in this reach is considered marginal for breeding because of the fine sediments in the streamcourse and is peripheral to considerably more suitable breeding habitat downstream of the confluence with Gabino Canyon and within lower Gabino Canyon. Several surveys have only documented toads (5) in 2001 in this segment of Cristianitos Creek and they were only observed adjacent to the creek. There was no evidence that the toads were breeding in this segment of the creek. For these reasons, the segment of Cristianitos Creek upstream of the confluence with Gabino Creek is not considered part of the *key location* within the Lower Cristianitos Creek/Lower Gabino Creek *important population*.

- Riparian and aquatic sensitive species in the sub-basin include white-tailed kite, Cooper's hawk, red-shouldered hawk, red-tailed hawk, great horned owl, barn owl, southwestern pond turtle, and western spadefoot toad. The pond turtle and spadefoot toad both occur in the stockpond along Cristianitos Creek in the upper portion of the sub-basin. The spadefoot toad also occurs in the southern part of the sub-basin just north of the confluence of Cristianitos and Gabino creeks.

- The grasslands provide foraging habitat for sensitive wintering raptors such as the ferruginous hawk and Swainson's hawk. Wintering burrowing owls also have been recorded in Cristianitos Canyon.

- **A large complex of six discrete locations of thread-leaved totaling approximately 6,100 flowering stalks occurs on the hill outcrop adjacent to the mine pits in the southern portion of Cristianitos Canyon on the boundary between the Cristianitos and Gabino and Blind Canyons sub-basins. As one of the two largest populations on RMV, this is a *major population* in a *key location.***

- About 13 other separate, scattered locations of thread-leaved brodiaea occur in the Cristianitos sub-basin, ranging from one to 120 flowering stalks. These locations comprise an *important population* because they potentially provide connectivity between offsite locations to the south in San Onofre State Park and Camp Pendleton to the south with planning area locations to the north (e.g., Chiquadora Ridge).

- **A *major population* and *key location* of many-stemmed dudleya with 164 locations and 34,137 individuals is located in the Cristianitos sub-basin and the southern portion of the Trampas Canyon subunit, extending south to the Talega development in the San Clemente Watershed and eastward into the western portion of the Lower Gabino and Blind Canyons sub-basin. This population, which is by far the largest contiguous population in the planning area, occurs on both RMV land and the Donna O'Neill Conservancy and extends into Talega Open Space.**

- Cristianitos Canyon within the Donna O'Neill Conservancy supports five locations of intermediate mariposa lily of unknown size (data base has population size of 1). These locations may be considered *important populations* because they contribute to the geographic diversity of the species in the subregion.

- Upper Cristianitos Creek supports two small locations of Coulter's saltbush numbering three and 12 individuals, respectively. This is an *important population* because of the rarity of this species in the region.

- The sub-basin contains clay soils that support other sensitive plants including the Palmer's grapplinghook and western dichondra.

- The sub-basin supports Catalina mariposa lily within clay and non-clay soils.

- The sub-basin probably serves as a primary north-south dispersal area for the California gnatcatcher between the large populations in Chiquita Canyon and Camp Pendleton.

- In combination with Talega, Gabino and La Paz canyons, the Cristianitos Canyon sub-basin provides a habitat connection for the mountain lion, mule deer, bobcat, coyote and gray fox to adjoining sub-basins.

b. Planning Recommendations

2. Protection Recommendations

Note that substantial revisions to Protection Recommendations based on recent information are shown in boldface.

- Protect a habitat linkage, consisting of the Donna O'Neill Land Conservancy and an area along the east side of Cristianitos Creek, to provide connectivity for gnatcatchers in the upper portion of the sub-basin with other populations in lower Gabino Creek and Camp Pendleton along lower Cristianitos/San Mateo Creek, and to maintain habitat integrity through connectivity within the Donna O'Neill Land Conservancy at Rancho Mission Viejo.

- Protect appropriate wetland and upland habitats to support a nesting population of the southwestern pond turtle, which occurs in the upper portion of the watershed in a small stockpond along Cristianitos Creek.

- Protect wetlands and adjoining upland habitat to support all life stages of western spadefoot toad.

- Avoid riparian/wetland habitat, including alkali wetlands, to the maximum extent feasible.

- Protect the majority of native grasslands in the sub-basin.

- Protect breeding habitat and, to the extent feasible, foraging habitat for resident and wintering raptor species.

- Protect the majority of the cactus wren locations within the sub-basin.

- Maintain a north-south habitat linkage along Cristianitos Creek between San Juan Creek and lower San Mateo Creek for dispersal and movement of gnatcatchers and other avian species, as well as large mammals such as mountain lion, bobcat, coyote, and mule deer, and, in particular, avoid occupied coastal sage scrub habitat in upper Cristianitos Canyon.

- Maintain an east-west habitat linkage from Gabino Creek to the confluence with Cristianitos Creek for wildlife movement between Gabino Canyon and the Donna O'Neill Conservancy at Rancho Mission Viejo.

- **Protect the location supporting approximately 6,100 thread-leaved brodiaea flowering stalks on the hill outcrop adjacent to the clay mine pits in the southern portion of Cristianitos Canyon. This location is the largest contiguous thread-leaved brodiaea population in the planning area and comprises a *major population* in a *key location*.**

- Protect 10 of the 13 small, scattered locations of thread-leaved brodiaea in Cristianitos Canyon, totaling approximately 300 flowering stalks. Maintain a continuous habitat connection between these scattered populations to allow for interactions and genetic exchange between the populations. These locations meet the criteria of *important populations* in *key locations* because they provide a linkage between brodiaea locations in the area and because the area has good potential for enhancement and restoration.

- **Protect the *major population* of many-stemmed dudleya extending from the southern portion of the Trampas Canyon subunit in the north, through the Cristianitos Canyon sub-basin south to the Talega development open space located in the San Clemente Watershed. This area supports the largest *major population* in the subregion with approximately 34,137 individuals in about 164 discrete locations.**

- Protect the two known *important populations* of Coulter's saltbush in the sub-basin.

2. Management Recommendations

- Pursuant to the Grazing Management Plan, implement grazing management techniques to help protect listed and other selected species and habitat, promote perennial grasses including native grasses, allow for continued cattle grazing sufficient to support cattle ranching operations, and, where appropriate reduce fuel loads for fire.

- Implement a management program for protected sensitive plant locations in the sub-basin, including control of non-native invasive species, management of grazing as part of the adaptive management program, and prevention of human disturbance. The management recommendations for plants are described more fully in Section 4.

3. Restoration Recommendations

- Implement a native grasslands restoration program, which will likely include grazing grassland restoration techniques set forth in the Grazing Management Plan, for the upper portion of the sub-basin (*Figure 5-12*).

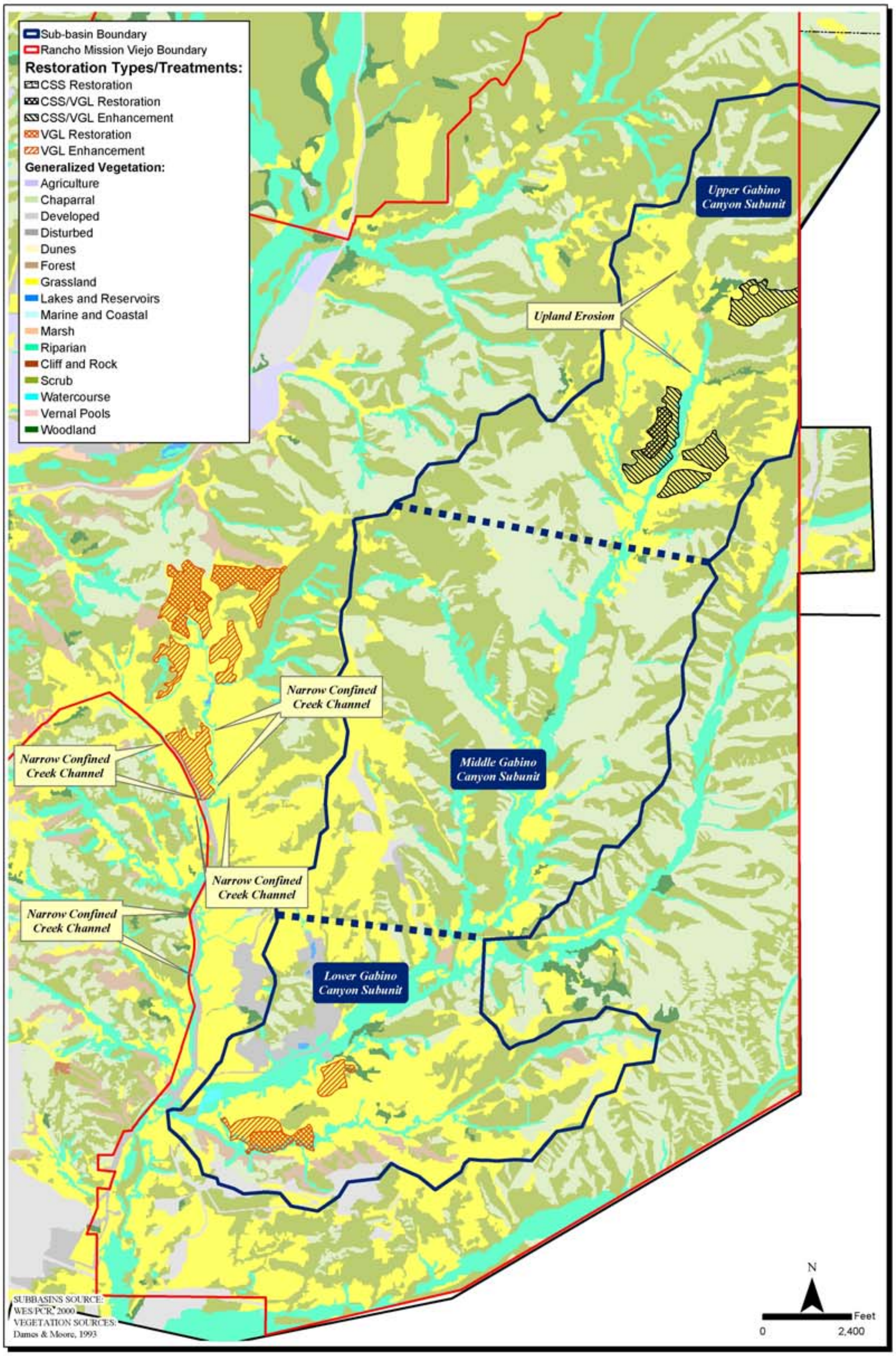
- Translocate salvaged thread-leaved brodiaea and many-stemmed dudleya to CSS/VGL restoration and enhancement areas where feasible and appropriate. Potential restoration and enhancement areas in the sub-basin include upper Cristianitos Canyon and the southern portion of the Trampas Canyon subunit. Receiver areas should support clay soils suitable for brodiaea and dudleya, and should be placed in locations that maximize connectivity and genetic exchange.

- Salvage clay topsoils from development areas where feasible and appropriate and transport to restoration areas. Salvaged topsoils may be used to create additional suitable brodiaea and dudleya habitat and may contain seedbank.

- Translocate salvaged intermediate mariposa lily bulbs to areas where suitable soil conditions occur. Specific translocation areas have not been identified, but based on the existing distribution, potential general translocation areas in the sub-basin area include upper Cristianitos Canyon and the southern portion of the Trampas Canyon subunit.

- Initiate an intermediate mariposa lily seed collection program in 2003 if sufficient rain falls to warrant the collection program. Receiver sites should be identified in the winter of 2003 and a pilot planting program should be implemented to determine the effectiveness of propagation from seed.

•



Draft NCCP/HCP Planning Guidelines

FIGURE 5-12

CSS/VGL and Creek Restoration Areas for Cristianitos and Gabino & Blind Canyons Sub-basin

- Protect the upper watershed headwaters, address erosion from the clay pits and implement creek stabilization actions to address localized erosion presently causing increases in fine sediment yields in Upper Cristianitos Creek per the "Watershed and Sub-Basin Planning Principles" (*Figure 5-12*).

5.2.2 Gabino and Blind Canyons Sub-basin

The Gabino and Blind Canyons sub-basin is divided into three main planning subunits: the upper Gabino Canyon subunit, the middle Gabino Canyon subunit and the lower Gabino Canyon subunit including Blind Canyon. The upper Gabino Canyon subunit encompasses the open grasslands at the headwaters of Gabino Creek. The middle Gabino Canyon subunit is defined by the narrow, steep-sided canyon between upper Gabino Canyon and the confluence of Gabino and La Paz creeks. The lower Gabino Canyon subunit includes the portion of Gabino Canyon below its confluence with La Paz Creek and its confluence with Cristianitos Creek.

5.2.3 Upper Gabino Subunit

a. Planning Considerations - Existing Conditions and Resources

- Soils in the subunit are dominated by erodable clays, with smaller areas of erodable silts.

- Elevations in the subunit range from approximately 600 feet in the valley floor to 1,500 at the Riverside County boundary.

- The subunit is approximately 10 miles from the Pacific Coast.

- The open "bowl-shaped" portion of the subunit adjacent to upper Gabino Creek is characterized by predominantly native grasslands on the gentle slopes leading away from the creek, with coastal sage scrub and chaparral dominating the surrounding rugged canyons and hills.

- The riparian habitat in the subunit includes relatively open coast live oak riparian woodland, sycamore riparian woodland, and mule fat.

- While the population is not as dense as other areas within the planning area, numerous cactus wren locations are present in the subunit.

- The grassland in the subunit is high quality raptor foraging habitat and also provides habitat for the badger, burrowing owl, spadefoot toad and horned lark.

- The riparian habitat in the subunit supports a few raptor nest sites for white-tailed kite, red-shouldered hawk and red-tailed hawk, but not at the density of the downstream riparian habitats in middle Gabino Canyon where the canyon is narrow and closely bounded by rugged terrain.

- Aquatic habitat (Jerome's Lake) in the subunit supports the southwestern pond turtle and two-striped garter snake.

- Upper Gabino, in association with middle Gabino and upper La Paz canyons, supports 12 locations of many-stemmed dudleya ranging from about five individuals to about 1,500 individuals, and cumulatively totaling more than 4,100 individuals. These locations comprise a *major population* in a *key location*.

- A small population of about 100 individuals of Coulter's saltbush occurs west of and adjacent to the creek. This is an *important population* because of the rarity of this species in the region.

- The subunit supports a large population of western dichondra.

b. Planning Recommendations

1. Protection Recommendations

- Protect a habitat linkage along Upper Gabino to allow dispersal of large mammals.

- Maintain contiguity and connectivity of coastal sage scrub to provide dispersal habitat for the cactus wren and other sensitive coastal sage scrub species.

- Minimize, to the extent feasible, impacts to grassland foraging habitat for resident and wintering raptors, as well as "live-in" habitat for several other wildlife species that potentially occur in the subunit, including grasshopper sparrow, wintering burrowing owls, badger, spadefoot toad and horned lark.

- Protect Jerome Lake and surrounding uplands to maintain nesting habitat for the southwestern pond turtle.

- Protect the majority of native grasslands within the subunit. Manage and restore protected native grasslands in accordance with the management and restoration recommendations described below, including grazing management techniques .

- Protect the approximately six known discrete locations of many-stemmed dudleya in the subunit that are part of the *major population* in a *key location*.

- Protect the *important population* of Coulter's saltbush in the subunit.

2. Management Recommendations

- Implement a management program for protected sensitive plant locations in the sub-basin, including control of non-native invasive species, management of grazing as part of the adaptive management program, and prevention of human disturbance. The management recommendations for plants are described more fully in Section 4.

- Pursuant to the Grazing Management Plan, implement grazing management techniques to help protect listed and other selected species and habitat, promote perennial grasses including native grasses, allow for continued cattle grazing sufficient to support cattle ranching operations, and, where appropriate reduce fuel loads for fire.

3. Restoration Recommendations

- Implement a CSS/VGL restoration and enhancement program, which will likely include grazing grassland restoration techniques set forth in the Grazing Management Plan (*Figure 5-12*).

- Translocate any impacted many-stemmed dudleya to CSS/VGL restoration and enhancement areas in upper Gabino where feasible and appropriate. Receiver areas should support clay soils suitable for dudleya.

- Salvage clay topsoils from development areas where feasible and transport to restoration areas. Salvaged topsoils may be used to create additional suitable dudleya habitat and may contain seedbank.

- Implement a creek restoration program in the subunit to address erosion that is generating increases in fine sediment yields in Upper Gabino (*Figure 5-12*).

5.2.4 Middle Gabino Canyon Subunit

a. Planning Considerations- Existing Conditions and Resources

Note that a new Planning Consideration based on recent information is shown in boldface.

- Soils in the middle Gabino segment of the subunit include erodable silts on very steep slopes, with sand and cobble in the creek.

- Elevations in the subunit range from approximately 400 feet at the confluence with La Paz Creek and 1,000 feet on the ridges above the canyon.

- The western portion of the subunit is approximately 7 miles from the Pacific Coast.

- The northern two-thirds of the subunit is a narrow canyon bounded by steep, rugged slopes dominated by chaparral and smaller patches of coastal sage scrub. The lower one-third of the subunit broadens somewhat with flat benches supporting small patches of grassland.

- The riparian habitat in the subunit includes coast live oak riparian woodland, sycamore riparian woodlands, and smaller areas of coast live oak woodland and mule fat scrub. Some portions of the canyon also support floodplain (alluvial) scrub.

- Breeding sites for a small population of the arroyo toad (2 toads in 1998) extend approximately 3,000 above the confluence with La Paz Creek. This toad population is considered to be part of the *important population* in lower Gabino Creek.

- The riparian habitat supports several nest sites for raptors, including white-tailed kite, Cooper's hawk, long-eared owl, great horned owl, barn owl, and red-tailed hawk.

- The western portion of the subunit includes numerous cactus wren locations, although the population is not as dense as other areas of the planning area

- Other sensitive wildlife species in the subunit include rufous-crowned sparrow and orange-throated whiptail.

- **One location of about 183 thread-leaved brodiaea flowering stalks occurs in the western portion of the subunit. This location is an *important population* because it contributes to the geographic diversity of the species in the subregion.**

- Many-stemmed dudleya occurs in several small populations in the subunit, but in conjunction with the upper Gabino subunit and upper La Paz Canyon locations, comprise a *major population* in a *key location*.

b. Planning Recommendations

1. Protection Recommendations

Note that a new Protection Recommendation based on recent information is shown in boldface.

- Limit impacts to ridgelines to the extent feasible in order to protect coarse sediments.

- Protect a north-south habitat linkage through Middle Gabino, with particular focus on maintaining uninterrupted riparian woodland through Middle Gabino and along the western tributary into Middle Gabino.

- Protect the arroyo toad population upstream from the confluence with La Paz Creek by avoiding impacts to breeding, foraging and estivation habitat and protect canyons to avoid downstream impacts to the toad.

- Protect the diversity of raptor nesting habitat with particular focus on retaining documented nesting habitat for white-tailed kites and long-eared owls within the subunit.

- **Protect the location of approximately 183 thread-leaved brodiaea flowering stalks in the western portion of the subunit. This location is considered an *important population* because it contributes to the geographic diversity of the species in the subregion.**

- Protect the four known discrete locations of many-stemmed dudleya in the subunit that are part of the Cristianitos Canyon *major population* in a *key location*.

2. Management Recommendations

- Implement a management program for protected sensitive plant locations in the sub-basin, including control of non-native invasive species, management of grazing as part of the adaptive management program, and prevention of human disturbance. The management recommendations for plants are described more fully in Section 6.

- Pursuant to the Grazing Management Plan, implement grazing management techniques that provide for long-term protection of selected species and habitat within designated reserve areas.

- Implement a management program for protected raptor nesting habitat in the sub-basin, including the minimization of human disturbance during the breeding season.

5.2.5 Lower Gabino Subunit including Blind Subunit

a. Planning Considerations - Existing Conditions and Resources

- Soils along the lower reaches of Gabino Creek and in Blind Canyon primarily are clays which generate fine sediments**.**

- Elevations in the subunit range from approximately 280 feet at the confluence of Gabino and Cristianitos creeks and 400 feet at the confluence with La Paz Creek.
- The subunit is approximately 5 miles from the Pacific Coast.

- The subunit is dominated by native and annual grasslands, with smaller patches of coastal sage scrub and oak woodlands.

- The riparian habitat in the subunit consists of southern sycamore riparian woodland, coast live oak riparian forest and woodlands, mule fat scrub and smaller areas of southern arroyo willow forest, coast live oak forest and coast live oak woodland.

- Lower Gabino Canyon supports a moderate size arroyo toad breeding population (~40 adults in 1998) between Cristianitos and La Paz creeks. This population is considered to be an *important population* in a *key location* because of its link via Cristianitos Creek with the Talega *major population*.

- The grasslands adjacent to lower Gabino Canyon provide potential upland foraging and estivation habitat for the arroyo toad.

- The subunit supports approximately five California gnatcatcher locations and numerous cactus wren locations, although the cactus wren population is not as dense as other areas of the planning area.

- Riparian habitat provides nesting sites for several raptors, including white-tailed kite, Cooper's hawk, red-tailed hawk, and great horned owl, as well as the yellow-breasted chat.

- Other sensitive wildlife species occurring in upland habitats in the subunit include grasshopper sparrow, rufous-crowned sparrow, San Diego horned lizard, orange-throated whiptail, and red-diamond rattlesnake.

- As described above for the Cristianitos sub-basin, a large complex of thread-leaved brodiaea comprised of six discrete locations totaling approximately 6,100 flowering stalks occurs on the hill outcrop adjacent to the mine pits in the southern portion of Cristianitos Canyon on the boundary between the Cristianitos and Gabino and Blind Canyons sub-basins. As one of the two largest populations on RMV, this is a *major population* in a *key location.*

- The western portion of lower Gabino and Blind Canyons supports several small locations of many-stemmed dudleya, with one location numbering about 400 individuals. These locations are physically associated with the Cristianitos sub-basin population and together with these locations form a *major population* and *key location*.

- Lower Gabino and Blind Canyons support two locations of intermediate mariposa lily of about 12 and 305 individuals, respectively. These locations are on the southern boundary with Cristianitos Canyon. These locations may be considered *important populations* because they contribute to the geographic diversity of the species in the subregion.

b. Planning Recommendations

1. Protection Recommendations

- Protect breeding and foraging habitat and movement opportunities within the streamcourse and adjacent alluvial terraces for the arroyo toad. Address potential upland estivation habitat needs in the context of best scientific information regarding the influence of topography, soils and other factors that appear to influence arroyo toad lateral movement and frequency of use in upland areas away from streamcourse habitat areas.

- Protect riparian habitat for nesting yellow-breasted chat within the subunit.

- Minimize impacts to California gnatcatcher locations.

- Minimize impacts to cactus wren locations.

- Minimize impacts to native grasslands within the subunit

- Protect breeding habitat, and to the extent feasible, protect raptor foraging habitat for resident and wintering species.

- Maintain an east-west habitat linkage from Gabino Creek to the confluence with Cristianitos Creek for wildlife movement between Gabino Canyon and the Donna O'Neill Conservancy at Rancho Mission Viejo.

- Protect approximately 80 percent of the discrete many-stemmed dudleya locations in lower Gabino and Blind Canyons such that the integrity of the *major population* in this area (i.e., the combined Cristianitos and Gabino and Blind Canyons) is preserved.

- Protect the two known locations of intermediate mariposa lily in lower Gabino Canyon.

- Protect the *major population* of brodiaea in a *key location* bordering the lower Gabino Canyon sub-unit and Cristianitos Canyon sub-basin supporting approximately 6,100 flowering stalks of thread-leaved brodiaea on the hill outcrop adjacent to the clay mine pits in the southern portion of Cristianitos Canyon.

2. Management Recommendations

- Implement a management program for protected sensitive plant locations in the sub-basin, including control of non-native invasive species, management of grazing and minimization of human access and disturbance as part of the adaptive management program. The adaptive management recommendations for plants are described more fully in Section 4.

- Protect the integrity of the arroyo toad population in lower Gabino and Cristianitos creeks, as well as San Mateo Creek, by maintaining hydrologic and sediment delivery processes, including maintaining the flow characteristics of episodic events in the sub-basin.

- Implement an invasive plant species eradication effort in Cristianitos Creek between Gabino Creek and Talega Creek.

3. Restoration Recommendations

- Implement a VGL restoration and enhancement program, which will likely include grazing grassland restoration techniques set forth in the Grazing Management Plan (*Figure 5-12*).

5.2.6 La Paz Canyon Sub-basin

a. Planning Considerations - Existing Conditions and Resources

- Soils in the sub-basin primarily are erodable silts on steep slopes, with cobbles and boulders in the creek.

- Elevations in the sub-basin range from approximately 400 feet above sea level at the confluence with Gabino Creek to 1,000 feet at the Riverside County boundary.

- The sub-basin is approximately 7.4 miles from the Pacific Coast.

- The predominant vegetation communities in the sub-basin are coastal sage scrub and chaparral.

- Riparian habitats in the canyon include southern sycamore riparian woodland, coast live oak woodland, and mule fat scrub. The canyon bottom also supports alluvial fan (floodplain) scrub.

- Sensitive wildlife species in the sub-basin include one location for the California gnatcatcher, 13 locations for the cactus wren, and records for the San Diego horned lizard, grasshopper sparrow, rufous-crowned sparrow and yellow-breasted chat.

- Riparian habitat in the sub-basin supports nest sites for the long-eared owl, white-tailed kite, Cooper's hawk, red-tailed hawk, and red-shouldered hawk.

- Sensitive plants in uplands adjacent to the creek include many-stemmed dudleya (forms part of the *major population* in upper Gabino Canyon) and two locations of intermediate mariposa lily, which comprise an *important population* because of their geographic separation from other locations.

- La Paz Canyon provides movement opportunities for wildlife including mountain lion, bob cat, coyote and mule deer among the Talega and Gabino and Blind Canyon subunits and Camp Pendleton.

b. Planning Recommendations

1. Protection Recommendations

- Maintain a habitat linkage along La Paz Canyon to convey movement and dispersal by mountain lion, bobcat, coyote and mule deer.

- Maintain contiguity and connectivity of coastal sage scrub to provide dispersal habitat for the cactus wren and other sensitive coastal sage scrub species.

- Maintain riparian habitat supporting nesting raptors.

- Protect alluvial fan scrub and hydrological conditions that support this plant community.

- Protect the locations of many-stemmed dudleya in the upper portion of the sub-basin.

- Protect the two discrete locations of intermediate mariposa lily in the middle portion of the sub-basin.

- Protect the integrity of arroyo toad populations in lower Gabino Creek, as well as downstream populations in Cristianitos and San Mateo creeks, by protecting the generation and transport of coarse sediments to downstream areas.

5.2.7 Talega Canyon Sub-basin

a. Planning Considerations - Existing Conditions and Resources

- Soils in the Talega sub-basin include erodable silts in steep slopes in the eastern portion and erodable clays in the western portion.

- Elevations in the sub-basin range from approximately 180 feet above sea level at the confluence of Talega and Cristianitos creeks to 800 feet in the eastern portion.

- The sub-basin is approximately 5 miles from the Pacific Coast.

- Upland habitats in the Talega Canyon sub-basin include coastal sage scrub, chaparral and grassland, with a mixture of sage scrub and chaparral in the upper portion of the canyon, and grassland and sage scrub in the lower part of the canyon south of the Northrop Grumman facility.

- Riparian habitat in Talega Creek includes sycamore riparian woodland and coast live oak riparian woodland. Substrate in Talega Creek is rock/cobble dominated with sandbars forming in depositional areas. The riparian habitat consists of dense stands of structurally diverse, mature coast live oak and southern sycamore riparian woodlands. Center portions of the creek support mule fat scrub and open sand bar habitat. The riparian zones are confined by the geology of the valley, but contain high topographic complexity, an abundance of coarse and fine woody debris, leaf litter, and a mosaic of understory plant communities. The creek contains shallow pools that retain water into the late spring and summer.

- Approximately seven California gnatcatchers locations and 22 cactus wren locations are scattered in the sage scrub on the south-facing slopes of the canyon.

- A *major population* of arroyo toad is present in Talega Canyon and was categorized as "abundant" by Bloom in 1998 based on the abundance of metamorphs. Although not as large as the *major population* in San Juan Creek, this population is one of the most significant in Orange County (Bloom, pers. comm.. 2004). In addition, this population is connected to the downstream arroyo toad populations in lower Cristianitos and San Mateo creeks on Camp Pendleton, as well as the upstream *key location* in lower Cristianitos and lower Gabino creeks.

- The two-striped garter snake has been observed in Talega Canyon.

- Raptors nesting in Talega Canyon include white-tailed kite, long-eared owl, Cooper's hawk, red-shouldered hawk, red-tailed hawk, great horned owl, and barn owl.

- The uplands adjacent to Talega Creek provide foraging and estivation habitat for the arroyo toad.

- Other sensitive upland wildlife species in the sub-basin include rufous-crowned sparrow, grasshopper sparrow, coastal western whiptail, orange-throated whiptail, San Diego horned lizard, northern red-diamond rattlesnake, and San Diego ringneck snake.

- Four locations of thread-leaved brodiaea totaling 288 flowering stalks occur in the Talega sub-basin on the mesa east of Northrop Grumman near the boundary with the Gabino and Blind Canyons subunit. Although not a large population, these locations may be considered an *important population* because they potentially contribute to connectivity and genetic exchange among the various nearby locations in the subregion.

- Fourteen locations of many-stemmed dudleya totaling 292 individuals are known from Talega Canyon east of Northrop Grumman. Although not a large population, these locations may be considered to comprise an *important population* because they contribute to geographic diversity in the subregion and potentially provide a connection with nearby populations on Camp Pendleton.

- Chaparral beargrass (CNPS List 1B) occurs at five locations on the steep, south-facing slopes in the eastern portion of the sub-basin and one in coastal sage scrub in the north-central part of the sub-basin.

- Talega Canyon is a habitat connection for large- and medium-sized mammals such as mountain lion, mule deer, bobcat, coyote, and gray fox in the San Mateo Watershed.

b. Planning Recommendations

1. Protection Recommendations

- Protect the integrity of arroyo toad populations in Talega Canyon by maintaining current stormwater runoff patterns and hydrologic conditions.

- Provide for comprehensive water quality treatment consistent with protection of arroyo toads in Talega Creek.

- Protect breeding and foraging habitat and movement opportunities within the streamcourse and adjacent alluvial terraces for the arroyo toad. Address potential upland estivation habitat needs in the context of best scientific information regarding the influence of topography, soils and other factors that appear to influence arroyo toad lateral movement and frequency of use in upland areas away from streamcourse habitat areas.

- Protect raptor nesting locations in the sub-basin, with particular attention to nesting of white-tailed kite and long-eared owl within the sub-basin.

- Maintain an east-west habitat linkage for gnatcatcher and cactus wren to protected habitat in the Talega and Forster Ranch Planned Communities.

- Maintain an east-west habitat linkage for large mammals along Talega Creek with sufficient width at confluence with Cristianitos Creek and along south-facing slope.

- Protect the four locations totaling 288 individuals of thread-leaved brodiaea in the Talega sub-basin east of the Northrop Grumman facilities. The locations are considered *important populations* because they contribute to the geographic diversity and provide additional sources for genetic exchange and connectivity in this portion of the subregion.

- Protect 12 locations of many-stemmed dudleya east of the Northrop Grumman facilities that may constitute an *important population*.

5.2.8 Other Planning Area

A small area comprising approximately 290 acres is located in the San Mateo Creek Watershed on RMV land south of the Cristianitos sub-basin, southeast of the Donna O'Neill Conservancy at Rancho Mission Viejo and west of the Lower Gabino and Blind Canyons sub-basin and the Talega sub-basin. This area warrants a discussion because although it is outside the identified sub-basins it has important biological resources and reserve design considerations. The dominant landscape feature of the area is lower Cristianitos Creek south of the confluence with Gabino Creek where it exits RMV property.

.

a. Planning Considerations – Existing Conditions and Resources

- Soils in the main canyon primarily sandy and soils on the uplands adjacent to Northrop Grumman are erodable clays.

- Elevations in the area range from approximately 200 feet above mean sea level in the creek bottom to approximately 300 feet on the mesa east of the creek.

- The area is approximately 4 miles from the Pacific Coast.

- Upland habitats in the area are dominated by annual grassland and small patches of coastal sage scrub and southern cactus scrub. A small patch of native grassland is present on the northeast corner of the area that overlaps with native grasslands in the Gabino and Blind Canyons sub-basin.

- Riparian habitats in lower Cristianitos Creek include southern coast live oak forest and woodland, southern sycamore riparian woodland, southern willow scrub, arroyo willow riparian forest, and mule fat scrub.
- Recent studies have identified substantial invasive plant species in this area.

- The small, scattered patches of coastal sage scrub support only one gnatcatcher location and the site is not part of an *important population*.

- Scattered cactus scrub supports about six cactus wren locations.

- The grasslands include about 16 locations of the grasshopper sparrow.

- Other sensitive upland wildlife species in the area include rufous-crowned sparrow, San Diego desert woodrat, orange-throated whiptail and western whiptail.

- The reach of Cristianitos Creek between the confluence with Gabino Creek and the planning boundary supports an *important population* of the arroyo toad in a *key location*. Toad counts for this reach have ranged from 11 individuals in 1998 to 37 in pre-1997 surveys, and toads have been found in the area in all surveys conducted.

- The uplands adjacent to Cristianitos Creek provide foraging and estivation habitat for the arroyo toad.

- The riparian habitat supports breeding habitat for the least Bell's vireo (5 locations), yellow-breasted chat (11 locations) and yellow warbler (1 location).

- A variety of raptors historically have nested in the riparian habitat, including long-eared owl (1 location), Cooper's hawk (1 location), red-tailed hawk (3 locations), red-shouldered hawk (2 locations), great horned owl (1 locations) and barn owl (1 location).

- The grasslands adjacent to Cristianitos Creek provide foraging habitat for both breeding resident and wintering raptors such as ferruginous hawk and Swainson's hawk.

- The only known sensitive plant from the area is many-stemmed dudleya, with approximately four discrete locations. Two of the locations have population counts of 20 and 33 individuals. These locations are part of the *major population* of dudleya in the Cristianitos and lower Gabino and Blind Canyons sub-basins.

- This area, in conjunction with the Cristianitos sub-basin, probably serves as a primary north-south dispersal area for the California gnatcatcher between large populations in Chiquita Canyon and Camp Pendleton.

- In combination with Talega, Gabino, La Paz, and Cristianitos canyons above the confluence with Gabino Creek, this area provides a habitat connection for the mountain, mule deer, bobcat, coyote and gray fox to adjoining sub-basins and Camp Pendleton.

b. Planning Recommendations

1. Protection Recommendations

- Protect a habitat linkage, consisting of the Donna O'Neill Land Conservancy and an area along the east side of Cristianitos Creek, to provide connectivity for gnatcatchers in the upper portion of the sub-basin with other populations in lower Gabino Creek and Camp Pendleton along lower Cristianitos/San Mateo Creek, and to maintain habitat integrity through connectivity within the Donna O'Neill Land Conservancy at Rancho Mission Viejo.

- Protect the majority of native grasslands in the area.

- Protect the integrity of arroyo toad populations in lower Cristianitos Creek by maintaining current hydrologic conditions.

- Protect breeding and foraging habitat and movement opportunities within the streamcourse and adjacent alluvial terraces for the arroyo toad. Address potential upland estivation habitat needs in the context of best scientific information regarding the influence of topography, soils and other factors that appear to influence arroyo toad lateral movement and frequency of use in upland areas away from streamcourse habitat areas.

- Protect breeding and foraging habitat for the least Bell's vireo, yellow-breasted chat and yellow warbler along lower Cristianitos Creek.

- Protect breeding habitat and to the extent feasible foraging habitat for resident and wintering raptor species.

- Maintain a north-south habitat linkage along Cristianitos Creek between San Juan Creek and lower San Mateo Creek for gnatcatchers and other avian species, as well as large mammals such as mountain lion, bobcat, coyote, and mule deer.

- Maintain an east-west habitat linkage from Gabino Creek to the confluence with Cristianitos Creek for wildlife movement between Gabino Canyon and the Donna O'Neill Conservancy at Rancho Mission Viejo.

2. Management Recommendations

- In conjunction with upstream and adjacent eradication efforts, implement an invasive plant species control program.

5.3 Other Planning Area-Wide Species Considerations

Several other planning species have broad geographic distributions and habitat requirements, and thus are best addressed at the subregional landscape level rather than the sub-basin level. These species include golden eagle, mountain lion and mule deer.

5.3.1 Golden Eagle

a. Planning Considerations – Existing Conditions and Resources

Golden eagles are an uncommon resident in the subregion. They are known to nest in the Cleveland National Forest, and although they are not known to nest on RMV, they occasionally forage in grasslands and agricultural areas throughout much of RMV, but especially in grasslands and agricultural areas in the Chiquita, Gobernadora, upper Gabino, Cristianitos and Talega sub-basins.

b. Planning Recommendations

1. Protection Recommendations

- Protect foraging habitat for the golden eagle to the extent feasible in the Chiquita, Gobernadora, upper Gabino, Cristianitos and Talega sub-basins.

5.3.2 Mountain Lion

a. Planning Considerations – Existing Conditions and Resources

Mountain lions range throughout much of the undeveloped portions of the planning area. The most extensive work on mountain lions in the study area has been conducted by Beier and Barrett (1993) using radiotelemetry to track lion movements. They included virtually the entire planning area as mountain lion habitat for the Santa Ana Mountains population. They also identified important lion use areas in the planning area, including Arroyo Trabuco, General Thomas F. Riley Regional Park and the Donna O'Neill Land Conservancy at Rancho Mission Viejo. The FTC surveys also recorded mountain lions at three camera stations: Northrop Grumman/Cristianitos, Blind and Gabino canyons, and Sulphur Canyon. While much of the planning area provides habitat for the mountain lion, Gabino, La Paz, and Blind canyons in the San Mateo Watershed and Verdugo Canyon in the San Juan Creek Watershed provide particularly important "live-in" and movement habitat connecting the southern portions of the planning area with the Cleveland National Forest. The western portion of the planning area, including Arroyo Trabuco, Sulphur Canyon, and Chiquita Ridge, provide important movement habitat, but are less suitable as "live-in" habitat because habitat blocks are not as large and adjacent urban development increases the risk of mountain lion mortality from vehicle collisions and depredation.

b. Planning Recommendations

1. Protection Recommendations

- Protect "live-in" habitat within the portion of the San Mateo Watershed in the planning area and Verdugo Canyon in the San Juan Creek Watershed adequate to meet the life history requirements of the mountain lion, comprising a large, unfragmented block of chaparral and coastal sage scrub directly connected to more than 100,000 acres in Caspers Wilderness Park, the Cleveland National Forest, and Camp Pendleton. (Beier and Barrett [1993] describe the Santa Ana Mountain Range as encompassing 800 mi^2 [512,000 acres) of "contiguous wildlands used by cougars." This habitat includes the Santa Margarita Mountains, the Santa Rosa Plateau, the Chino Hills and the San Joaquin Hills.) "Live-in" habitat provides adequate prey (primarily mule deer) and vertical and horizontal cover suitable as resting and bedding sites (e.g., woodlands and riparian areas, rocky areas). The reader should note that the "live-in" habitat within in the San Mateo Watershed portion of the planning area and Verdugo Canyon would only provide about 25-30 percent of an average mountain lion home range in the Santa Ana Mountains (Padley 1989, 1996), and that the home range of any lions using the planning area likely will include Caspers Wilderness Park, Audubon Starr Ranch Sanctuary, Cleveland National Forest, and Camp Pendleton.

- Maintain habitat connections throughout the planning area to provide movement opportunities for the mountain lion. As described above for individual sub-basins, as well as other areas in the planning area, important movement areas for mountain lion include Arroyo Trabuco, the Foothill-Trabuco Specific Plan Area, Chiquita Ridge, Sulphur Canyon, San Juan Creek, Trampas Canyon, Cristianitos Canyon, Verdugo Canyon, Gabino Canyon, La Paz Canyon and Talega Canyon.

2. Management Recommendations

In areas identified as "live-in" habitat or habitat connections, roads that are necessary to serve approved land and water uses located inside or outside the Habitat Reserve shall be designed and sited to accommodate mountain lion movement to the maximum extent feasible. Where roads are necessary, under the approved NCCP/HCP, they will be designed consistent with safety, roadway design criteria that are appropriate for the setting and desired roadway function. Roadway design shall include bridges and/or culverts large enough to accommodate mountain lion movement at key areas and, where appropriate and feasible, may include wildlife over crossings. As appropriate, fencing, grading and plant cover will be provided to serve wildlife crossings consistent with conservation principles and the adaptive management program. Where feasible and safe, lighting along roadways within the Habitat Reserve should be avoided. Where roadway lighting within the Habitat Reserve is necessary for public safety reasons, it should be low-sodium or similar low intensity lighting that is directed away or shielded from the Habitat Reserve.

5.3.3 Mule Deer

a. Planning Considerations – Existing Conditions and Resources

Mule deer are common in the planning area in coastal sage scrub, chaparral, and woodland habitats. A radiotelemetry study of mule deer was conducted by Padley (1992) in what he termed the "Gabino" and "Chiquita" general areas. This study characterized habitats use and movement patterns and concluded that mule deer in the planning area are year-round residents (i.e., they do not migrate) and their home ranges are relatively small. Also, there are no critical resource areas (e.g., meadows or mineral licks). Areas frequently used by deer include most of the major drainages and canyons, including Chiquita Canyon, Blind Canyon, Verdugo Canyon, Gabino Canyon, La Paz Canyon, and Trampas Canyon. Deer also frequent Arroyo Trabuco, Gobernadora Canyon, Bell Canyon, and many other smaller drainages. In addition, mule deer are the main prey of mountain lions and their presence in the planning area is important for maintaining the mountain lion population.

b. Planning Recommendations

1. Protection Recommendations

- Protect "live-in" habitat within the portion of the San Mateo Watershed in the planning area adequate to meet the life history requirements of the mule deer, comprising a large, unfragmented block of chaparral and coastal sage scrub directly connected to Caspers Wilderness Park, the Cleveland National Forest, and Camp Pendleton.

- Protect "live-in" habitat within the San Juan Creek Watershed in the planning area adequate to meet the life history requirements of the mule deer, including Chiquita Ridge, Chiquadora Ridge, the ridgeline separating the Chiquita and Wagon Wheel sub-basins, and the ridgeline separating the Gobernadora and Bell Canyon sub-basins that directly connects to Caspers Wilderness Park and Audubon Starr Ranch Sanctuary.

- Maintain habitat connections throughout the planning area to provide movement opportunities for the mule deer. As described above for individual sub-basins, as well as other areas in the planning area, important movement areas for mule deer include Arroyo Trabuco, the Foothill-Trabuco Specific Plan Area, Chiquita Ridge, Sulphur

Canyon, San Juan Creek, Trampas Canyon, Cristianitos Canyon, Verdugo Canyon, Gabino Canyon, La Paz Canyon and Talega Canyon.

2. Management Recommendations

In areas identified as "live-in" habitat or habitat connections, roads that are necessary to serve approved land and water uses located inside or outside the Habitat Reserve shall be designed and sited to accommodate mule deer movement to the maximum extent feasible. Where roads are necessary, under the approved NCCP/HCP, they will be designed consistent with safety, roadway design criteria that are appropriate for the setting and desired roadway function. Roadway design shall include bridges and/or culverts large enough to accommodate mule deer movement at key areas and, where appropriate and feasible, may include wildlife over crossings. (note: of the large mammal species, mule deer are the most sensitive to bridge and culvert design. Designs that accommodate mule deer are generally suitable for mountain lion, bobcat and coyote.) As appropriate, fencing, grading and plant cover will be provided to serve wildlife crossings consistent with conservation principles and the adaptive management program. Where feasible and safe, lighting along roadways within the Habitat Reserve should be avoided. Where roadway lighting within the Habitat Reserve is necessary for public safety reasons, it should be low-sodium or similar low intensity lighting that is directed away or shielded from the Habitat Reserve.

SECTION 6: PLANNING AREA RESTORATION OVERVIEW

The term "restoration" is used very broadly in this document. It is intended to cover the spectrum of possible restoration activities, from creation of new habitats to enhancement of existing degraded habitats. It is anticipated that restoration actions will be undertaken in accordance with certified/approved restoration plans under the NCCP/HCP and SAMP/MSAA within the NCCP/HCP Habitat Reserve and in areas subject to the aquatic resource management program. As a planning area-wide comprehensive program, this section summarizes restoration recommendations for several sub-basins and explains how these recommendations could contribute to a more effective Habitat Reserve and adaptive management program. Restoration recommendations are considered preliminary and will be subject to refinement and modification during the NCCP/HCP approval and environmental documentation processes. Preliminary restoration areas are illustrated in *Figure 6-1*.

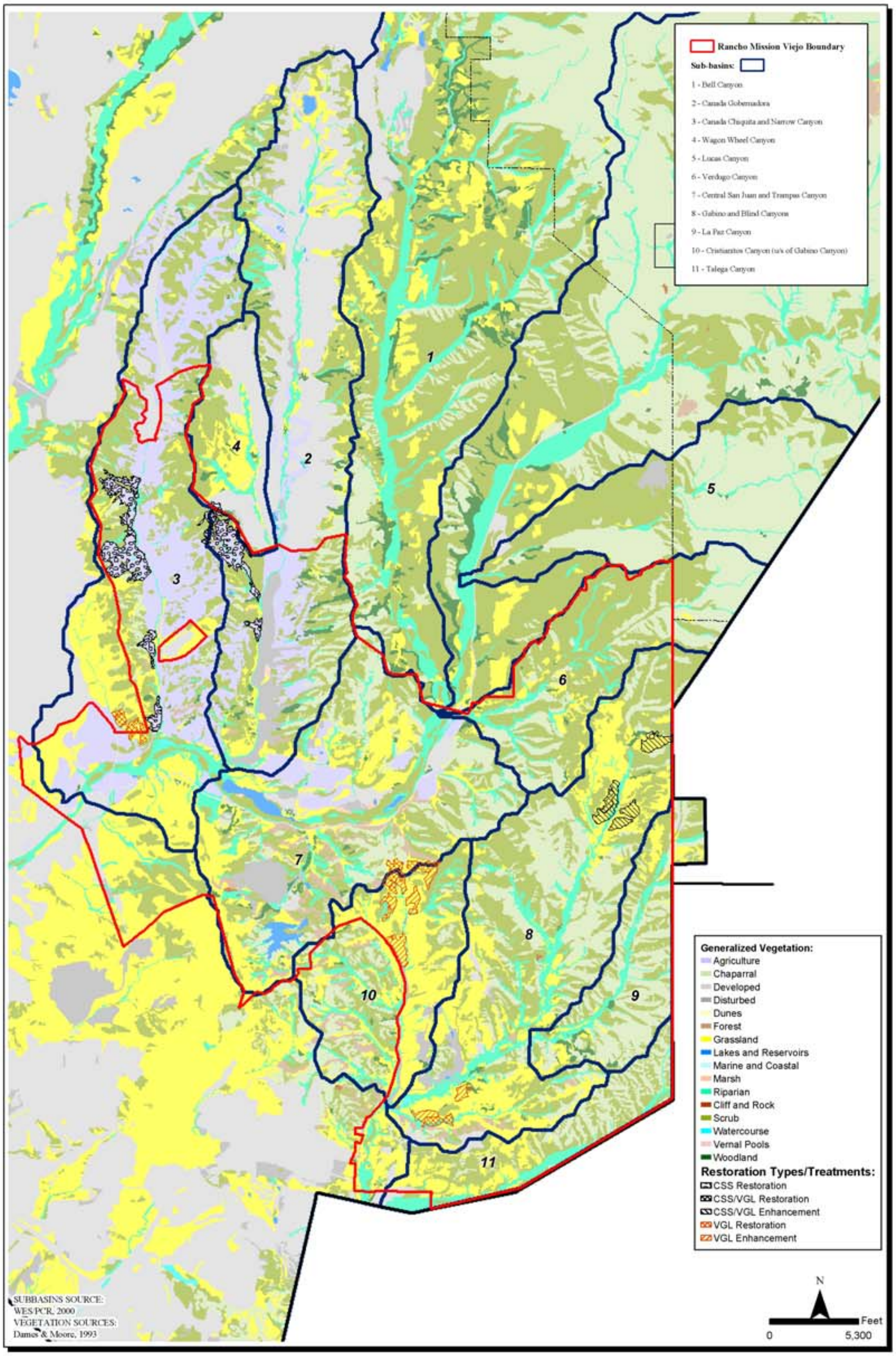
6.1 Restoration of Upland Habitats

6.1.1 Preliminary Designation of Coastal Sage Scrub Restoration Areas

The main goal of the coastal sage scrub (CSS) restoration program is to establish CSS in areas that: 1) probably supported CSS prior to ranching operations; and/or 2) would contribute to the Habitat Reserve by increasing the carrying capacity for the California gnatcatcher and other sage scrub species. With these goals in mind, the following areas have been tentatively identified for CSS restoration. Selection of these areas for restoration/enhancement will require additional field study to determine the likelihood of a successful restoration program, including factors such as soil conditions and presence of exotic species both within the restoration area and surrounding habitat.

- Sulphur Canyon in the Gobernadora sub-basin was identified for restoration/enhancement to provide additional habitat and enhance connectivity between Chiquita Canyon and Wagon Wheel Canyon to the west and Gobernadora and Bell canyons to the east. Sulphur Canyon is currently characterized by CSS on the slopes of the canyon and grazed annual grasses on the valley floor. Opportunities to improve "live-in" habitat and connectivity for California gnatcatchers through enhancement of existing CSS via the removal of grazing will be identified.

- Several side canyons between Chiquita Ridge and Chiquita Creek were identified for restoration/enhancement. Restoration of the two large canyons just northwest and southwest of the "Narrows" would greatly improve the habitat integrity of Chiquita Ridge, which narrows to less than 2,000 feet in width at the top of these side canyons,



Draft NCCP/HCP Planning Guidelines
Preliminary Restoration Areas
FIGURE
6-1

and provide substantial “live-in” habitat for California gnatcatchers and other species, and improve the integrity of the reserve system.

6.1.2 Preliminary Designation of Valley Needlegrass Grassland Restoration Areas

Areas identified for potential valley needlegrass grassland (VGL) restoration/enhancement includes areas that 1) currently support annual grasses, but have suitable soils and are adjacent to existing VGL; 2) currently support low quality VGL (i.e., areas with less than 10 percent cover of native grasses); and 3) would contribute to an overall native grasslands ecosystem (i.e., small, isolated patches of native grasslands would not be considered valuable to the overall system). Because establishing a functioning native grassland system is a goal of the restoration program, impacts to native grasslands in a particular sub-basin may be mitigated in another sub-basin to achieve greater value for the overall reserve system. Upper Cristianitos and portions of Blind Canyon mesa are recommended for VGL restoration.

- Upper Cristianitos is recommended for VGL restoration and enhancement to reduce the generation of fine sediments from clayey terrains, promote stormwater infiltration and to enhance the value of upland habitats adjacent to Cristianitos Creek. This area includes areas of annual grassland underlain by clay soils suitable for restoration and low quality VGL suitable for enhancement. These areas also are contiguous with existing medium quality grassland, suggesting a high likelihood of successful restoration/enhancement.

- Portions of Blind Canyon mesa are recommended for grassland restoration. This area has at least one patch of annual grassland suitable for restoration and possibly two patches of low quality VGL suitable for enhancement. These areas are adjacent to existing medium quality VGL, suggesting a high likelihood of successful restoration/enhancement. Additional fieldwork in the area may reveal additional restoration/enhancement opportunities.

6.1.3 Preliminary Designation of Coastal Sage Scrub/Valley Needlegrass Grassland Restoration Areas

The following areas are recommended for CSS/grassland restoration: Upper Gabino and in the Chiquita sub-basin in the area east of the Santa Margarita Water District wastewater treatment plant, the citrus groves west of Chiquita Creek and the disced areas west of the creek to the Chiquita ridgeline.

- Upper Gabino currently generates fine sediment due to extensive gully formation in the headwaters area. A combination of slope stabilization, grazing management and CSS/VGL restoration will reduce sediment generation and promote infiltration of stormwater which will reduce downstream impacts. This area has been identified for a mix of CSS and VGL restoration because some areas mapped as grassland in 1990 have naturally revegetated with sparse CSS. Allowing a mixed community to regenerate may represent a more natural climax situation. This area has at least one area of annual grassland adjacent to the creek suitable for restoration and several patches of low quality VGL suitable for enhancement.

- As discussed above for CSS, restoration of disturbed areas of Chiquita Canyon west of Chiquita Creek will provide additional habitat for upland species occupying Chiquita Ridge, and particularly the gnatcatcher. Restoration of areas previously used for agricultural purposes, including grazing and citrus, will also benefit riparian species by removing uses that may contribute to downstream impacts. Additional field work will be needed to identify the areas best revegetated with CSS alone and CSS/VGL.

6.2 Restoration of Riparian/Wetland Habitats

6.2.1 Preliminary Designation of Riparian/Wetland Restoration Areas

The following areas are recommended for riparian/wetland restoration: Gobernadora Creek and upper Gabino Creek.

- Gobernadora Creek is recommended for riparian/wetland restoration to address the historic meander conditions and excessive sediment input resulting from upstream land uses. Restoration may include the construction of a detention/water quality basin below Coto de Caza.

- Creation of wetland breeding habitat for the tricolored blackbird should be considered a priority in the Gobernadora area because breeding populations have regularly occurred in the ponds in southern Coto de Caza. Northward extension of riparian habitats from GERA also would provide additional breeding habitats for least Bell’s vireo, southwestern willow flycatcher, yellow-breasted chat, yellow warbler, raptors and other wetland species such as two-striped garter snake.

- Upper Gabino Creek currently generates fine sediment due to extensive gully formation in the headwaters area. To address this excessive sediment generation and reduce downstream impacts, both upland habitat restoration (described above) and wetland/riparian restoration is recommended. Depending on the type of wetland restoration in upper Gabino Canyon, several wildlife species could benefit, including two-striped garter snake, southwestern pond turtle, tricolored blackbird, and the riparian birds listed above.

6.2.2 Preliminary Designation of Small-scale Creek Stabilization Areas

Several smaller scale creek stabilizations are recommended to address locally induced headcuts in Chiquita Creek and upper Cristianitos.

- Locally induced headcuts (as contrasted with valley deepening reflecting longer-term geologic processes) are present in Chiquita Creek and Upper Cristianitos. Headcuts in Chiquita Creek are caused by the placement of road crossings or other anthropogenic causes. Headcuts in Cristianitos may have a similar origin but may also be influenced by long-term geologic processes. Further investigations of the causes of the Cristianitos headcuts will be necessary before identifying a specific restoration approach.

APPENDIX A

Principles of Reserve Design, Species Conservation and Adaptive Management

For the Proposed Southern Orange County NCCP

The Southern Orange County NCCP Science Advisors:
Jonathan Atwood, Ph.D.
Peter Bloom, M.S.
Dennis Murphy, Ph.D.
Robert Fisher, Ph.D.
Tom Scott, Ph.D.
Trish Smith, M.S.
Robin Wills, M.S.
Paul Zedler, Ph.D.

Botanical contributions by Fred Roberts and Jim Dice
Invertebrate contributions by John Brown

Contact:

Michael O'Connell
The Nature Conservancy
Telephone: 949-363-0933
Fax: 949-263-0936

1997

Introduction

The Orange County Southern NCCP Subregion Science Advisors (science advisors) were proposed as a means to assist the county in bringing scientific information and experience to bear on the conservation planning process for the southern subregion. The science advisors are independent from the county. The consulting team and county are not bound by the input of the advisors, but it is a generally held consensus among participating interests that sound scientific advice is an important part of creating a strong plan for the subregion.

The science advisors were tasked with developing three products: 1) principles for reserve design; 2) principles for conservation of species and habitats; and 3) principles and goals for an adaptive management program. This document presents the results of theses tasks.

The ultimate reserve design and likelihood of conserving certain species can be improved, and the probability of success over time increased, by the application of additional information from a research agenda targeted to provide key data to planning. These data include species/habitat relationships, autecological studies, presence/absence of rare species and narrow endemic species, natural disturbance patterns, life history characteristics, and other information. Much of this need is detailed in the original NCCP research agenda proposed by the Statewide Scientific Review Panel in 1993.

The Southern Orange County science advisors believe that existing data can lead to a supportable reserve design in the subregion for the species considered. This initial design could be further refined and improved through application of additional data, but the science advisors believe that the time and expense of such surveys relative to their likely effect or improvement on ultimate reserve design makes this exercise impractical. Some research needs to further increase the effectiveness of the conservation plan during the implementation phase, however, are identified in the Adaptive Management section of this report.

The language and terms used by the science advisors to describe the principles for species conservation, reserve design and adaptive management are not intended to correspond to legal definitions (e.g. “conserve,” or “critical”). The use of such words or phrases, unless specifically stated otherwise, is descriptive in nature and not intended to be legally explicit.

The Science Advisors

The goal of assembling a group of science advisors specific to the Southern Orange NCCP subregion was to bring individuals with relevant expertise and local experience to address issues unique to the subregion and provide advice useful to the consulting team and the county in developing alternative conservation plans. Some overlap exists with the state-authorized Science Advisors, but subregional advisors have a broader range of skills, including land management and ecological restoration. The science advisor process for the subregion was facilitated by The Nature Conservancy. The Conservancy recommended the individual advisors after broad and extensive consultation with the NCCP working group. Several of the advisors were compensated for their consultation by the State of California Department of Fish and Game using funds previously identified and intended for procuring scientific advice for the NCCP program.

There are other scientists, both locally-based and elsewhere, who are qualified to provide the advice and input needed to the subregional planning process. These individuals were not overlooked in creating the science advisors, rather the intent was to assemble a group with broad expertise and local experience that could perform needed tasks within the schedule necessary for the overall plan. The makeup of the science advisors did not preclude other individuals being called upon as necessary to address the tasks or provide review. This was done on several occasions, particularly with regard to expertise on plant and invertebrate species.

Assumptions

Descriptions of the specific tasks of the science advisors are summarized below at the beginning of the presentation of results for each task. It is important, however, to briefly discuss the general assumptions that the science advisors have operated under while addressing their work. These assumptions arose out of the direction the advisors received from the working group and are reviewed here.

1. *Role of advisors in reserve design decisions*: The final reserve design and boundaries will be recommended to the county by the consulting team based on an analysis of alternatives. The role of the science advisors and the principles they develop is to provide the best available information to the consulting team and the county. The science advisors will not be called upon to approve the final reserve design.

2. *Information used in science advisors work*: The principles for reserve design and conservation of species detailed in this report were derived by applying available information from local research, peer reviewed literature, and the experience of the science advisors and other available experts. This product represents a synthesis of scientific information about the targeted landscape, habitats and species in the Southern subregion. Except where noted, the advisors applied all the information they were provided. The advisors believe that the resulting principles will result in a reserve design and covered species list that is supported by current knowledge.

3. *Planning constraints*: Existing development, past disturbance, and current development agreements place limits on overall reserve design options within the subregion. These constraints may not be adjustable to any significant degree.

4. *Species and habitat assumptions*: The overall goal of the NCCP planning process is to protect the maximum number of species and range of habitats on the lists provided, modified by a roughly hierarchical analysis of importance. Legally protected species and rare habitats are highest priority, followed by subregional endemic species and eco-regional endemic species. Species with broader distributions follow these in importance.

5. *Ecosystem and process assumptions*: Preserves will be managed for long-term persistence of sensitive biological resources and habitat integrity, however they may be open to the public for certain types of recreation and selectively grazed. Fire and flood management practices will be necessary within the preserves along the urban interface. Also, the advisors note their strong preference for conservation through maintenance of extant habitats and linkages where possible, instead of using restoration and re-

vegetation. While in some cases this may be necessary to achieve overall habitat value goals, these are not considered biologically functional equivalents.

Results of Assigned Tasks

The working group and the County of Orange assigned the science advisors three tasks: 1) principles for reserve design; 2) principles for conservation of species and habitats; and 3) principles and goals for an adaptive management program. The following sections detail the result of those tasks, and together they form the advice of the science advisors for developing the NCCP for the subregion with respect to these issues.

Task I. Translation of NCCP Conservation Guidelines to Subregional Reserve Design Principles

Conservation guidelines developed by the state Scientific Review Panel (SRP) for NCCP in November, 1993, identified the biological foundation for planning for the entire 6,000 square mile NCCP region in Southern California. These guidelines established the scientific foundation for planning and articulated an interim conservation strategy, a research agenda, and premises on management and restoration of reserves.

The part of the SRP guidelines most relevant to the task of designing reserves was identification of seven basic tenets of reserve design applicable to NCCP. These general rules (listed below) are truisms of reserve design that form the basic scientific understanding of creating protected areas. It was determined, however, that additional specificity was useful regarding principles of reserve design for the southern subregion beyond that provided in the guidelines. The intent of the original SRP was that the tenets would be interpreted during subregional planning into geographically specific principles appropriate for that subregion, and this task is a fulfillment of that objective.

This report constitutes partial fulfillment of the SRP objective of translating the general NCCP reserve design tenets into explicit reserve design principles for the southern Orange County subregion. The intent of the science advisors is that the following subregional principles be general enough to allow flexibility in creating plan alternatives (in other words not parcel-specific), but precise enough that they capture the unique needs of the subregion. The principles constitute a set of "parameters of engagement" against which reserve design alternatives can be evaluated. The original seven tenets serve as categories under which the subregional principles can be grouped. It is important to note that the subregional science advisors modified the original seven tenets for the purposes of planning for the southern subregion. The subregional advisors combined *"keep reserve areas close"* and *"link reserves with corridors"* into one category, and added a new tenet: *"maintain ecosystem processes."*

In addition, to the above considerations, the science advisors recognize that it may be impractical or unrealistic to expect that every design principle will be completely fulfilled throughout the subregion. They also recognize that fulfillment of some principles may conflict with others. It is for this reason that the principles have been stated as "should" in most cases, rather than as absolutes. The principles of reserve design are specifically intended to form the scientific foundation for planning, but it is clear that the final reserve design will reflect a balance of a number of important interests of which biological conservation is but one. By the same token, the advisors do not believe that science should be treated as a competitive interest in planning negotiations, but instead should be a source of objectivity to inform the reserve design process.

Tenet 1. Conserve target species throughout the planning area

Species that are well distributed across their native ranges are less susceptible to extinction than are species confined to small portions of their ranges.

Reserve Design Principles:

- The three "official" target species (*Polioptila californica californica, Campylorhynchus brunneicapillus and Cnemidophorus hyperthyrus beldingi*) have not proven broad enough in their habitat requirements to serve as surrogate species for a multiple-habitat reserve of the type desired by planners in southern Orange County. Additional species may be necessary as indicators of other habitats (see #5 below).

- Reserve design alternatives should conserve species throughout the planning area.

- Reserves should carefully consider life history characteristics of species (breeding habitat, dispersal, foraging habitat, genetics, source/sink dynamics, the role of unoccupied habitat), particularly for those that are legally protected, endemic, or known to be declining.

- Reserves should maintain the potential for re-establishment and/or enhancement of sensitive species (such as tricolored blackbird, least Bell's vireo, willow flycatcher, red-legged frog, yellow-billed cuckoo, southern steelhead, quino checkerspot, common garter snake, black rail, etc.)

- Potential reserve sites should be prioritized based on the presence or potential presence of species or other ecological phenomena in the following five categories:

    1. *Legally protected species*: California gnatcatcher, least Bell's vireo, southwestern willow flycatcher, red-legged frog, arroyo southwestern toad, pacific pocket mouse, southern steelhead

    2. *Rare plant or habitat associations*: native grasslands, vernal pools, cliffs

    3. *Upper trophic level or generalist species*: golden eagle, red-tailed hawk, great horned owl, barn owl, mountain lion, bobcat, coyote, badger

    4. *Locally rare species*: long-eared owl, glossy snake, patch-nosed snake, long-nosed snake, lyre snake, blind snake, legless lizard, banded gecko, Gilbert's skink,
    5. *Species indicative of the quality of select habitat-types (NOTE: These are not "umbrella" species, nor necessarily sensitive species, but rather a collection of species with an affinity for each habitat-type. These species are highly indicative*

of the habitats which they occupy, and can be good indicators of both the quality of habitat and the presence of other species dependent upon that habitat-type):

a) Riparian - red-shouldered hawk, Cooper's hawk, sora, common yellowthroat, two-striped garter snake, red racer, arroyo toad, California tree frog, pacific pond turtle, arroyo chub, threespine stickleback, several bats

b) Coastal sage scrub - California gnatcatcher, cactus wren, wrentit, greater roadrunner, pacific kangaroo rat, California pocket mouse, red diamond rattlesnake, orange throated whiptail, spotted night snake, San Diego horned lizard

c) Oak woodland - Cooper's hawk, long-eared owl, western screech owl, acorn woodpecker, Nuttall's woodpecker, ash-throated flycatcher, bobcat, brush mouse, California slender salamander, bats

d) Grassland - white-tailed kite, northern harrier, burrowing owl, grasshopper sparrow, horned lark, savannah sparrow, lark sparrow, western meadowlark, loggerhead shrike, badger, western skink, ring-necked snake, western spadefoot toad, bats

e) Chaparral - wrentit, bushtit, spotted towhee, California thrasher, black-chinned sparrow, pacific kangaroo rat, California pocket mouse, rosy boa, western whiptail, red diamond rattlesnake, lyre snake

f) Pond **-** great blue heron, black crowned night heron, snowy egret, pied-billed grebe, tricolored blackbird, red-winged blackbird, sora, common yellowthroat, pacific pond turtle, pacific chorus frog, western toad, bats

Tenet 2. Larger Reserves are Better

Large blocks of habitat containing large populations of species indicative of habitat quality are superior to small blocks of habitat containing small populations.

Reserve Design Principles:

The science advisors believe this design principle needs no elaboration for the southern Orange County subregional planning area beyond that provided in the original SRP conservation guidelines. The tenet mandates that, **all else being equal,** reserve design options that include greater areal extent are superior. When comparative circumstances are not otherwise equal, habitat diversity, the presence of special landscape features, and concentrations of species of concern will often offset a solely area-driven reserve design selection process. It is in the alternative analysis where these variables are weighed, with appropriate weight given to habitat block size.

Tenet 3. Reserves Should be Diverse

Blocks of habitat for reserves should contain a diverse representation of physical and environmental conditions.

Reserve Design Principles:

- Reserves should capture the environmental gradient, both within and among habitat-types. This includes the elevation gradient, the coast/inland gradient, and variability among soils, vegetation and habitat-types. This should, among other things, increase the probability of including unsurveyed or unknown species in the reserves.

- Several important grassland areas occur within the subregion. They are valuable for a variety of vertebrate species of concern, including the badger, burrowing owl, spadefoot toad, and horned lark. Also, the ecotone between coastal sage scrub and grassland is important for California gnatcatchers. Important grassland areas are: Gobernadora, Chiquita, Upper Gabino, Cristianitos, and areas Northeast of San Clemente and San Juan Capistrano.

- Several key riparian systems occur within the subregion, including along San Juan Creek, Trabuco Creek, and the San Mateo Creek drainage (Gabino and Cristianitos Creeks). Maintaining the integrity of these systems is important for a wide variety of species, including least Bell's vireo, yellow warbler, yellow breasted chat, willow flycatcher, arroyo toad, California glossy snake, silvery legless lizard, southwestern pond turtle, arroyo chub, and threespine stickleback.

- Habitat mosaics on the side of the subregion nearest the coast are important for a number of reptile and amphibian species of concern in the subregion and have historically incurred more losses to conversion than inland portions. They can contain rarer natural subcommunities and higher densities of some species (red diamond rattlesnake, spadefoot toad, San Diego ringneck snake, orange-throated whiptail, coronado skink).

- The reservoir on the north side of Ortega highway along San Juan Creek is an important foraging, nesting and habitat area for several bird species (such as black skimmer, California gull, great blue heron, double-crested cormorant, elegant tern, white pelican, arroyo toad and pond turtle). Maintenance of this reservoir--including periodic silt, sand and gravel removal--is an important part of maintaining these species in the subregion.

- Several canyons are important for nesting raptors, including Gabino, La Paz, Cristianitos and Talega Canyons.

Tenet 4. Keep Reserves Contiguous

Habitat that occurs in less fragmented, contiguous blocks is preferable to habitat that is fragmented or isolated by urban lands.

Reserve Design Principles:

- Reserve design alternatives should seek, in order of priority:

  1. Continuity within habitat (minimize additional fragmentation).
  2. Connectedness (increase existing habitat blocks).
  3. Proximity (minimize distance between habitat blocks).

- The reserve design should strive to maintain the contiguity of large intact habitat blocks and not fragment them internally (e.g. the southeast section of the planning area).

- Reserve design should attempt to minimize physical barriers and visual barriers between reserves, particularly those reserves that are close together. Different groups of species (rodents, birds, large mammals, reptiles) are affected by different barriers and distances. For example, gnatcatcher populations in fragmented habitat blocks rely on visual observation to identify other potential habitat blocks for dispersal. If nearby habitat (less than 0.5 mile) is barred from sight by obstructions, those blocks are effectively separated permanently from one another. Similarly, roads, even two lane asphalt, represent permanent barriers to small mammals and many herpetofauna. These issues should be considered when assessing potential connectivity of reserve alternatives.

- Development around reserves should be directed to existing disturbed areas everywhere possible and away from native communities.

- Reserve selection should favor increasing permanent open space and de facto permanent natural areas, or reserves should be in close proximity to those areas. They include:

  - Rancho Mission Viejo Conservancy
  - Caspers Park
  - O'Neill Park
  - Open Space in Upper Trabuco Creek
  - Wagon Wheel Park
  - Camp Pendleton
  - Cleveland National Forest

Tenet 5. Maintain and Create Landscape Linkages Between Reserves

Blocks of habitat that are close to one another serve species of concern better than blocks of habitat that are situated far apart. Interconnected blocks are better than isolated blocks. Landscape linkages function better when habitat blocks and vegetation within them are natural and resemble habitat and vegetation preferred by key species of concern.

Reserve Design Principles:

- Maintaining the integrity of riparian systems (including major stream courses and their tributaries) is very important for both vertebrates and invertebrates, in:

- San Mateo Drainage (Cristianitos and Gabino creeks)
- San Juan Creek
- Trabuco Creek (downstream of existing open space)
- Gobernadora Creek

- Linkages should follow landscape features and respond to patterns of dispersal exhibited by species considered in reserve design.

- Only open space corridors that are native vegetation serve as truly effective landscape linkages.

- Reserve design should not impose artificial linkages on the landscape at the expense of natural linkages.

- Ridgetop connectivity between Gobernadora and Bell Canyons is an important landscape linkage.

- Landscape linkages should be designed to serve the widest array of species by providing characteristics required for dispersal by the most wide-ranging organisms (mountain lion, bobcat, coyote, red diamond rattlesnake).

Tenet 6. Protect Reserves from Encroachment and Invasion of Non-native Species

Blocks of habitat that are roadless or otherwise serve to minimize human disturbance conserve species better than do accessible habitat blocks

Reserve Design Principles:

- Reserve design should designate a fuel management zone outside the reserve.

- Where possible, areas of reduced human activity and development (recreational parks, parking lots, etc.) are preferable adjacent to reserves.

- Landscape linkages are also vulnerable to edge effects and disturbances. Wide linkages are preferable, so they may contain “interior” habitat.

- Both reserve design configuration and the engineering of impacts in the adjacent areas should minimize the effect of detrimental habitat interfaces (high-speed roads, high density housing) on species most sensitive, particularly species with large home ranges (such as mountain lion or bobcat), or lesser vagility (such as red diamond rattlesnake or rosy boa).

- Reserve design, as well as activities authorized immediately adjacent to reserves, should strive to minimize artificial drainage and downslope movement of materials into conservation areas.

- Reserve design should control and manage human entry into conservation areas.

- Activities within the reserves should be limited to those with least impact on ecological communities and species as well as be restrictive initially and relaxed as appropriate based on impacts. Controls may include limiting visitor numbers, allowing only certain types of activities, and other seasonal constraints. They also may include control of illegal dumping and high-impact recreation, and limiting unauthorized collection of specimens and vermin control.

Tenet 7. Maintain Ecosystem Processes and Structures

Reserves that are designed to maintain ecosystem processes and structures are easier to manage and have a much higher likelihood of sustaining biotic diversity over time than reserves that fragment and disrupt ecosystem processes.

Reserve Design Principles:

- The size, boundaries and shape of reserves should be selected to allow maximum scope for fire management, whether passive ("let it burn") or active in the form of controlled management or experimental fires.

- The reserve system should protect intact hydrologic and erosional processes, including both normal function and extreme events (flooding, earthflow). Reserve design should protect to the maximum extent possible the hydrology and erosion regimes of riparian systems, especially in Cristianitos, San Juan and Trabuco drainages.

- Reserves should minimize the possibility of arson or accidental fires starting or entering the reserves, by including among other things, consideration of potential ignition sources.

Task II. Principles for Conservation of Species and Habitats

The second task of the science advisors in the Southern NCCP subregion is to identify principles for conserving species and habitats under the plan. One end result of the NCCP planning process is generally a permit approving incidental take for an explicit list of species. The process of assembling this species list involves, in part, an evaluation of the extent to which an individual species is effectively conserved by the plan. The wildlife agencies are exclusively responsible for this coverage determination. The science advisors will not be involved in the legal and regulatory process of determining which species receive permit coverage and which do not. The product of this task, instead, is to provide information and objective criteria that may assist the working group and agencies in their analysis. It takes the form of an objective, scientifically-sound set of principles that may serve as a planning hierarchy for conservation decisions (see below).

The consulting team, the Department of Fish and Game and the U.S. Fish and Wildlife Service provided the science advisors with a list of species to be considered for conservation in the Southern subregion. The advisors worked from the list of species that was provided, recognizing that there are other species, such as wide-ranging animals and some rare plants, that are not included on the list. To develop the planning hierarchy and conservation analysis, three groups of species have been identified from that list. The groups were created based on criteria for each species that should be satisfied to assure their conservation. Species have been grouped based on their life history characteristics, degree of rarity or endemism, regional and global context, response to management, extant population size and trend, genetics, and other variables as necessary. The science advisors have used the criteria within each grouping to substantiate inclusion of a specific species in that group. For the species in the third planning group, the advisors have included a list of the known actions beyond reserve design necessary to achieve conservation of those species in the subregion. The planning groups, their associated criteria for conservation, and the species that fit them (from the species lists provided) are listed below.

Local survey data are incomplete for many taxa, and for plants in particular. Rare plants can present problems for conservation because they are often in patchy and highly localized distributions. Contributing botanists recommend surveying for nearly all the plant species during implementation, particularly in the southeast portion of the subregion, since it is the least studied. Current data and knowledge of rare plant distributions indicates that the Canada Chiquita-Canada Gobernadora-Christianitos axis is likely the most important rare plant area within the southern subregion.

It is fundamental to note that the species have been grouped for conservation based on the assumption that the overall reserve design will adhere as closely as possible to the principles recommended in Task I. The criteria for conservation and the assignment of species to groups will change if the reserve design principles in Task I are not observed. Similarly, some species can be best conserved by a combination of the reserve design principles and by management activities to be developed in Task III. The three sets of principles work together to enable a strong conservation program for the subregion.

Group 1: Minimal Conservation Action Needed

Species whose conservation is affected minimally by the outcome of the planning process.

***Criteria*:** Very limited impact of any alternative plan on species; or
Not found or insignificant in planning area; or
Very high population numbers in subregion

***Species*:**

Birds

Allen's hummingbird	*Selasphorus sasin*
American bittern	*Botaurus lentiginosus*
bald eagle	*Haliaeetus leucocephalus*
bank swallow	*Riparia riparia*
Belding’s savannah sparrow	*Passerculus s. beldingi*
black rail	*Laterallus jamaicensis*
black swift	*Cypseloides niger*
black tern	*Chlidonias niger*
Brewer's sparrow	*Spizella breweri*
brown pelican	*Pelecanus occidentalis*

canvasback	*Aythya valisineria*
clapper rail	*Rallus longirostris*
common loon	*Gavia immer*
Costa's hummingbird	*Calypte costae*
gull-billed tern	*Sterna nilotica*
hairy woodpecker	*Picoides villosus*
harlequin duck	*Histrionicus histrionicus*
hepatic tanager	*Piranga flava*
hermit warbler	*Dendroica occidentalis*
horned grebe	*Podiceps auritus*
least bittern	*Ixobrychus exilis*
least tern	*Sterna antillarum*
Lewis' woodpecker	*Melanerpes lewis*
long-billed curlew	*Numenius americanus*
mountain plover	*Charadrius montanus*
olive-sided flycatcher	*Contopus borealis*
osprey	*Pandion haliaetus*
peregrine falcon	*Falco peregrinus*
prairie falcon	*Falco mexicanus*
purple martin	*Progne subis*
reddish egret	*Egretta rufescens*
rufous hummingbird	*Selasphorus rufus*
savannah sparrow	*Passerculus s. rostratus*
snowy plover	*Charadrius alexandrinus*
spotted owl	*Strix occidentalis*
summer tanager	*Piranga rubra*
Vaux's swift	*Chaetura vauxi*
Virginia's warbler	*Vermivora virginiae*
western grebe	*Aechmophorus occidentalis*
white-faced ibis	*Plegadis chihi*
yellow rail	*Coturnicops noveboracensis*

Reptiles

southern sagebrush lizard	*Sceloporus graciosus vandenburgianus*

Mammals

San Diego desert woodrat	*Neotoma lepida intermedia*
Stephens' kangaroo rat	*Dipodomys stephensi*

Group 2: Best Conserved at Habitat/Landscape Level

Species conserved most effectively by protection activities at the habitat or landscape scale. These species are best conserved by following the reserve design principles identified in Task I and the management goals and principles to be identified in Task 3. Their conservation can be relatively accurately inferred from a well-planned and managed network of reserves in a functioning landscape.

***Criteria*:** Widespread within subregion; or
Relatively robust overall species population; or
May or may not be common outside subregion; or
Life history characteristics respond to habitat scale conservation; or
Detailed surveys or inventories not crucial in order to conserve; or
Known or suspected to respond well to habitat management; or
Locally genetically indistinct; or
No individual action needed other than habitat protection and mgmt

***Species*:**

<u>Birds</u>

Bell’s sage sparrow	*Amphispiza belli belli*
barn owl	*Tyto alba*
Bewick's wren	*Thryomanes bewickii*
black skimmer	*Rynchops niger*
cactus wren	*Campylorhynchus brunneicapillus*
California gnatcatcher	*Polioptila californica*
California gull	*Larus californicus*
California thrasher	*Toxostoma redivivum*
Cooper's hawk	*Accipiter cooperii*
double-crested cormorant	*Phalacrocorax auritus*
elegant tern	*Sterna elegans*
golden eagle	*Aquila chrysaetos*
grasshopper sparrow	*Ammodramus savannarum*
horned lark	*Eremophila alpestris actia*
lark sparrow	*Chondestes grammacus*
Lawrence's goldfinch	*Carduelis lawrencei*
loggerhead shrike	*Lanius ludovicianus*
merlin	*Falco columbarius*
northern harrier	*Circus cyaneus*
Pacific-slope flycatcher	*Empidonax difficilis*
red-breasted sapsucker	*Sphyrapicus ruber*
red-shouldered hawk	*Buteo lineatus*
rufous-crowned sparrow	*Aimophila ruficeps canescens*
sharp-shinned hawk	*Accipiter striatus*
short-eared owl	*Asio flammeus*
Swainson’s hawk	*Buteo swainsoni*
white pelican	*Pelicanus erythrorhynchos*

<u>Amphibians</u>

coast range newt	*Taricha torosa*

Reptiles

coast patch-nosed snake	*Salvadora hexalepis virgultea*
coastal rosy boa	*Lichanura trivirgata roseofusca*
coastal western whiptail	*Cnemidophorus tigris multisc*.
Coronado skink	*Eumeces skiltonianus interpar*.
orange-throated whiptail	*Cnemidophorus hyperthyrus*
San Diego horned lizard	*Phrynosoma coronatum blain*.
San Diego mountain kingsnake	*Lampropeltis zonata pulchra*
San Diego ringneck snake	*Diadophis punctatus similis*

Mammals

California leaf-nosed bat	*Macrotus californicus*
dulzura California pocket mouse	*Chaetodipus californicus femoralis.*
long-legged myotis	*Myotis volans*
mule deer	*Odocoileus hemionus*
pallid bat	*Antrozous pallidus*
San Diego pocket mouse	*Chaetodipus fallax fallax*
spotted bat	*Euderma maculatum*
Townsend's big eared bat	*Plecotus townsendii*
western mastiff bat	*Eumops perotis*

Fish

tidewater goby[1]	*Eucyclogobius newberryi*

Plants

Catalina mariposa lily	*Calochortus catalinae*
Coulter's matilija poppy	*Romneya coulteri*
intermediate mariposa lily	*Calochortus weedii var. Intermedius*
Palmer's grapplinghook	*Harpagonella palmeri*
summer holly	*Comarostaphylos diversifolia diversifolia*
western dichondra	*Dichondra occidentalis*
curving tarweed	*Holocarpha virgata ssp. Elongata*
rayless ragweed	*Senecio aphanactis*

Group 3: Best conserved at species-specific level

Organisms requiring species-level conservation action (including protection of individuals) in order to ensure their conservation, either within the subregion or as a species, are included in Group 3. The species in this group require one or more of three types of conservation action: 1) fine-tuning of reserve design or specific management activities; 2) reintroduction and/or

[1] This species is not known to occur in the planning area, but it is found in the lower San Mateo drainage immediately adjacent to the Southern subregion. The reserve design and activities conducted in the planning area may affect the species downstream.

significant enhancement; or 3) additional data and research are necessary to determine basic needs. Species are identified below with a superscript [1,2 or 3] corresponding to the appropriate type of action needed above. Where possible, species-specific conservation principles have been developed and are provided. In addition, surveys are recommended for all the species in this group during implementation to monitor and fine tune conservation requirements.

***Criteria*:** Known or predicted extremely low population; or
Narrowly endemic within subregion; or
Highly specialized life history requirements; or
Subregion crucial to survival of entire species; or
Known or suspected poor response to management; or
Highly sensitive to small changes in landscape or habitat; or
Dependent on intensive conservation activities; or
Widespread but extremely uncommon

***Species*:**

<u>Birds</u>

least Bell's vireo[1]	*Vireo bellii*
yellow warbler[1]	*Dendroica petechia*
yellow-billed cuckoo[1,2]	*Coccyzus americanus*
yellow-breasted chat[1]	*Icteria virens*
willow flycatcher[1]	*Empidonax traillii*

- Reserve design should conserve riparian habitat along key drainages and tributaries

- Management and enhancement of riparian systems will improve opportunities for these species during implementation

burrowing owl[1]	*Speotyto cunicularia*
ferruginous hawk[1]	*Buteo regalis*

- Reserve design should conserve key grasslands to the extent possible

- Documenting winter distribution and habitat needs is important

long-eared owl[1]	*Asio otus*
white-tailed kite[1]	*Elanus leucurus*

- For conserved nesting sites, undisturbed habitat within 0.5 miles is important (this may be fine-tuned based on local habitat context and topography)

- Basic life history research and monitoring should be included in plan implementation protocol

tricolored Blackbird[1]	*Agelatus tricolor*

- Reserve design should establish a minimum of 100yd buffer around colonies to be conserved

- Permanent ponds with cattails are key breeding and foraging areas

Amphibians

arroyo southwestern toad[1] *Bufo microscaphus calif.*

- Reserve should protect the integrity of important riparian systems and watercourses

- Exotic fish, frogs and Argentine ants should be strongly controlled

- For conserved breeding sites, uplands up to 0.5 miles from associated streams are important

- Light pollution from highways and developments should be minimized

- Surveys should be conducted during implementation to fine tune management

California red-legged frog[2] *Rana aurora draytoni*

- Surveys should be conducted to establish presence/absence in subregion before attempting reintroduction

- Potential habitat should be restored or enhanced

- Exotic predators (bullfrog, sunfish) should be controlled or eliminated

- Water quality and riparian zones should be protected in key drainages

western spadefoot toad[1] *Scaphiopus hammondii*

- Important grassland areas should be conserved or alternatives identified
- Possibly limited by lack of breeding pools in uplands

Reptiles

California glossy snake[1] *Arizona elegans occidentalis*

- Riparian sandy deposits along key drainages should be conserved and sand mining minimized; this is one of 3 places in Southern California where this subspecies has been recorded

- Argentine ants and light pollution from highways should be controlled and minimized northern red diamond rattlesnake[1] *Crotalus ruber ruber*

- Road kill is suspected to be highest mortality factor; all sources of road kill should be minimized
- Western sections of planning area have highest population density and should be conserved if possible
- Fragmentation of intact habitat blocks should be limited

San Diego banded gecko[3] *Coleonyx variegatus abbotti*

- Expected to occur in very low densities; surveys and monitoring (especially across elevational gradient) needed to establish preferred habitats and conservation needs

silvery legless lizard[1] *Anniella pulchra pulchra*

- One of only two species in Southern California representing an endemic family
- Sandy deposits in San Juan Creek, including downstream reaches, may be important
- Argentine ants should be controlled

southwestern pond turtle[1] *Clemmys marmorata pallida*

- San Juan Creek is an important drainage for this species
- Migrate overland to nest; uplands associated with ponds important
- Road kill and collection by humans should be minimized

two-striped garter snake[1] *Thamnophis hammondii*

- Riparian areas and adjacent uplands to distance of 0.5 miles should be conserved where possible
- Collection of specimens should be minimized

<u>Mammals</u>

Pacific pocket mouse[1,3] *Perognathus longimembris pacificus*

- Encroachment from adjacent development should be minimized, especially housecats
- Suggest additional surveys in suitable habitat
- Closest known population near San Mateo estuary (outside subregion)

San Diego black-tailed jackrabbit[2] *Lepus californicus bennettii*

- Suitable habitat remains in subregion and should be restored/enhanced
- Surveys should be conducted to establish presence/absence before attempting reintroduction
- Human encroachment on reserves should be minimized

southern grasshopper mouse[3] *Onychomys torridus ramona*

- No confirmed presence in subregion, although within historic range
- Surveys necessary to establish presence/absence and management needs

Fish

arroyo chub[1] *Gila orcutti*

- Trabuco and San Juan creek drainages are important to the species
- Exotic fish (e.g. *Gambusia*) should be controlled
- Hydrologic processes and water quality in key areas should be protected and restored

southern steelhead[2] *Oncorhynchus mykiss*

- Conservation plan should coordinate with recovery plan for the species
- Natural hydrology and erosional processes in San Mateo watershed should be maintained to provide restoration opportunities
- San Juan Creek drainage and tributaries are important for restoration

threespine stickleback[1] *Gasterosteus aculeatus ssp.*

- This subspecies is endemic to the San Juan/Trabuco drainage; water quality and quantity in the drainage should be maintained
- Exotic and invasive fishes and frogs should be controlled

Plants

Blochmann's dudleya[1] *Dudleya blochmaniae*

- Coastal bluffs are primary habitat

- Management to prevent human encroachment from nearby urbanized areas

- Highly limited distribution; 2 small populations known in subregion, additional surveys needed
- Annual/biennial monitoring of population numbers recommended

- Identification of potential restoration sites with suitable habitat within subregion and implementation of efforts to restore additional populations within subregion

chaparral beargrass[1] *Nolina cismontana*

- Relies on specific soil types (typically supporting chamise chaparral or coastal sage scrub)

- Over 90 % of known species distribution located in Central Coastal and Southern subregion

- Reserve design should protect specific soils where possible (mostly associated with Cieneba sandy loam, and Cieneba-Rock outcrop complex)

- Reserve design should attempt to protect major populations (i.e, Foothill Trabuco, Hot Springs Canyon, the latter is on already on land managed by the U.S. Forest Service)

- Soil specific surveys for additional populations

- Fire management likely necessary to promote reproduction

cliff spurge[1,3] *Euphorbia misera*

- Not confirmed from subregion, but populations known to be low in U.S.

- Reserve design should protect coastal bluff scrub, coastal bluffs, and steep coastal cliffs.

- Surveys necessary to establish presence/absence in subregion

- For confirmed populations, management consists of monitoring and control of invasive exotic plants

coastal golden bush[1,3] *Isocoma menzesii var. sedoides*

- Not confirmed from subregion; only one Orange County record, from Crystal Cove State Park

- Found on coastal bluffs and coastal bluff scrub; need surveys to establish presence/absence; easily detected in surveys

- Management consists of monitoring and control of invasive exotic plants

Coulter's saltbush[1,3] *Atriplex coulteri*

- One definitive record in Cristianitos Canyon along proposed transportation corridor alignment

- Additional surveys needed to establish presence/absence and habitat preference

heart-leaved pitcher sage[1] *Lepichinia cardiophylla*

- Known distribution in subregion: 2 populations reported near Trabuco Peak, others populations in Central/Coastal

- Associated with chaparral above 1,000 feet-- all appropriate habitat probably in the National Forest

many-stemmed dudelya[1] *Dudleya multicaulis*

- Requires xeric barrens, cobbly clay soils

- Species currently occupies half of historic range; concentrated in 5 core populations; western and southern areas important
- Reserve design should attempt to protect 80 percent of populations with minimum of 200-foot buffer from developed areas

- Transportation corridor may impact over 7,000 known individuals

- Management consists of species monitoring, exotics control in areas adjacent to development.

- Rare in Casper's Regional Park and Starr Ranch

ocellated Humboldt lily[1] *Lilium humboldtii ssp. Ocellatus*

- Key habitat for protection is oak woodland and stream courses in the foothill-mountain transition zone

- Most habitat is in Starr Ranch, Casper's Park and the National Forest; Foothill Trabuco unprotected

- Population monitoring needed to inform adaptive management

Parish's saltbush[1,3] *Atriplex parishii*

- Known from only two localities (both in Riverside County), however southern subregion has moderate chance of supporting the species

- Reserve design should attempt to include alkali habitats, swales, sinks, depressions, and grasslands with heavy alkali-clay such as in Canada Chiquita

- Habitat specific surveys needed during implementation

- Manage through population monitoring and invasive exotic plant control

Pacific saltbush[1,3] *Atriplex pacifica*

- Found rarely on coastal bluffs; may also be dependent on alkali habitats, swales, sinks, depressions and grasslands with heavy alkali-clay componants like *A. parishii*

- Suitable habitat known from coastal bluffs in subregion and in western lowland areas

Parry's tetracoccus[1] *Tetracoccus parryi*

- Specific to heavy gabbro-clay soils in chaparral
- Only known locality and most habitat within National Forest

prostrate spineflower[3] *Chorizanthe procumbens*

- Distribution very poorly understood in subregion

- Narrowly endemic to sandy areas

- Management needs include population monitoring and fire management

San Miguel Savory[1] *Satureja chandleri*

- Most of known habitat within National Forest

- Key habitats for potection are oak woodland, oak gallery forest, and shaded stream courses above 500 feet elevation

- Largest known populations of this species are within subregion in the vicinity of Upper Hot Springs Canyon and Chiquito Basin

- Management needs include monitoring and prevention of invasive exotic plants

southern tarplant[1] *Hemizonia parryi ssp. Australis*

- Populations known to be very reduced and restricted species-wide

- Found in moist alkali soils, alkali swales, sinks, depressions and grasslands with heavy alkali-clay componants such as in Canada Chiquita. Populations in Canada Chiquita some of the largest known and should be protected

- Management includes population monitoring and control of invasive exotic plants

sticky dudleya[1] *Dudleya viscida*

- Key habitats needing protection are shaded, steep rocky cliffs and canyon walls

- Most habitat appears to be within National Forest, Casper's Park and Starr Ranch, although appropriate habitat exists in Rancho Mission Viejo in southeast portion of subregion

- Unlikely to occur in western lowlands and foothillls of subregion

thread-leaved brodiaea[1] *Brodiaea filifolia*

- Declining rapidly over entire range
- Reserve should protect southern needlegrass grasslands and mixed native-non-native grasslands in clay soils

- Most populations known from western portion of southern subregion and should be protected if possible

<u>Invertebrates</u>

quino checkerspot[1,2] *Euphydryas editha quino*

- Locally extinct in Orange County

- Reintroduction should be enabled through reserve design and management by protecting open coastal sage scrub and host plants at a minimum of five locations

- Populations in northern Baja are likely source for translocations

Harbison's dun skipper[3] *Euphyes vestris harbisoni*

- Distribution very poorly known; surveys needed to establish presence/absence in subregion

- Key habitats are oak riparian drainages and adjacent seeps supporting *Carex spissa*, the larval host plant

Riverside fairy shrimp[1] *Streptocephalus woottoni*

- Only known subregional record from vernal pools in Saddleback Meadows

- Surveys desirable to determine presence absence of habitat

- Management requires maintenance of vernal pools and associated watersheds

San Diego fairy shrimp[1] *Branchinecta sandiegoensis*

- No confirmed records from subregion
- Requires vernal pool habitat; surveys suggested along with Riverside fairy shrimp
- Management includes maintenance of vernal pools and associated watersheds

A Further Note on "Umbrella Species":

Several vertebrate species in the subarea from this lists provided have broad requirements in both habitat and home range. They might serve as effective umbrella species for planning purposes; by providing for their requirements many other species will benefit. For example, landscape linkages designed for bobcats and mountain lions would work well for a number of other species. Or, conserving the nesting and foraging territories of some of the raptors will provide habitat for many other organisms. The species below have been identified in the reserve design principles under Tenet 1, but are worth describing here as well. In particular, the bobcat and the mountain lion are known empirically to serve well as umbrellas and there is extensive information on the breeding and foraging distribution of the three raptor species in the subregion. The following species can be important in identifying the potential reserve network:

American badger	*Taxidea taxus*
bobcat	*Lynx rufus*
coyote	*Canis latrans*
mountain lion	*Felis concolor*
red-tailed hawk	*Buteo jamaicensis*
great horned owl	*Bubo virginianus*
golden eagle	*Aquila chrysaetos*
barn owl	*Tyto alba*

Task III: Principles for Adaptive Management

This section develops an outline and principles for an adaptive management program for the subregional NCCP. It begins with a discussion of general land management principles and relates them to the key conservation goals of the NCCP. It discusses adaptive management and its fundamental elements to provide context for the specific suggested management program goals for the southern subregion. The report then outlines potential steps to implement an adaptive management approach for the subregion, based on the target landscape, species and natural communities of particular concern. Through a case example, the report shows how a community-specific model can be used to develop a set of testable management hypotheses. A discussion contrasting research, monitoring and management follows, leading to a suggested structure for the subregional program, tasks, responsibilities, products, and potential schedules. The section concludes with a discussion of funding strategies for management and research in the subregion. While the science advisors did not consider the allocation of responsibilities of funding adaptive management, the importance of funding was recognized and the program is believed to be financially feasible.

Overall Land Management Goals

There is a recent growing trend toward managing natural lands at the ecosystem level. The science advisors acknowledge and support this focus for adaptive management as the scale most likely to produce success for the conservation program. To do this, it is important to set some broad overall goals for land management. The advisors recommend that the management program of the subregional NCCP seek to achieve the following overall goals. The management activities outlined in this framework are intended to assist in meeting these goals:

1. Ensure the persistence of a native-dominated vegetation mosaic in the planning area.

2. Restore or enhance the quality of degraded vegetation communities and other habitat-types consistent with overall conservation goals for species and natural communities.

3. Maintain and restore biotic and abiotic natural processes, at all identified scales, for the planning area.

Although overall goals are extremely important to point the program in the right direction, they provide little guidance in defining target conditions for specific habitats and management activities on individual parcels. The following sections discuss development of a program aimed at the above goals while addressing species and community specific objectives and conditions.

Keys to Adaptive Management

This section briefly describes the emerging science of adaptive, ecosystem-level management as it relates to the reserve design and species conservation principles in the previous two sections. The science advisors identify the key elements of an adaptive management program and discuss in detail the process of setting objectives for management and development of natural community models that help initiate the adaptive process. This section also points out the crucial nature of biological monitoring as part of an overall management program.

Ecosystem management presumes a working knowledge of system function and structure. Yet we know comparatively little about how coastal scrub and associated habitats function and the roles of many species in this process. Coastal sage scrub received very little attention from researchers until the late 1970’s (see O’Leary et al 1994). As a result, it is difficult to initiate a precise long-term management program from the beginning of a conservation plan. The management program by necessity should be iterative -- continually refining initial management strategies according to information learned during the process of management and monitoring. This is particularly true for the effects of habitat fragmentation on the persistence of coastal sage scrub and associated species -- an important, but relatively unstudied issue.

A formally structured protocol for this learning process, termed “Adaptive Management,” directs management and monitoring actions to optimize information acquisition and improve management in feedback steps (Lee 1993:9). Adaptive management assumes that managers will take actions (including leaving habiats undisturbed) that modify present ecosystem structure and function with the aim of moving the system towards a more desirable state or keeping it within some acceptable limits. This process takes advantage of the information generating opportunities that management activities create (Fig 1). The process is based on a feedback loop in which individual management objectives are flexible and can be changed as new information becomes available or as conditions or priorities change (Schroeder and Keller 1990, Walter and Holling 1990). Adaptive management is iterative, meaning that managers constantly monitor and evaluating the consequences of their activities and refine them. This approach to conservation allows land management to proceed in the absence of complete initial information.

The fundamental elements of an adaptive management program are:

1. Setting Management Objectives

Before specific management activities can be identified for a parcel, habitat or landscape, planners and managers should identify desired future conditions. These are the initial objectives on which management activities are undertaken. Objectives should be measurable. They should incorporate the diverse views of stakeholders and specific legal requirements for conservation as well as recognize the limits of such factors as available funds and land ownership. It is important that objectives are set with full recognition of the economic, social and political context in which the conservation program takes place. Stakeholders and land managers should define site specific objectives with review and input from scientists with expertise.

The advisors propose the following issues as a good starting point in objective setting (after Schroeder and Keller 1990):

- The rarity of a species or community
- Importance of endemic species/communities
- The variability in abundance of species/communities
- Keystone species
- Species or communities that are good indicators of change in the ecosystem of concern
- Defining and managing for “natural conditions”
- Cumulative effects of isolated impacts
- Major landscape-level changes

It is also important that objective setting consider the multiple scales affected by the conservation program (global, regional and local). For example, an objective to manage for the maximum absolute number of species (species richness) might not be desirable if it results in loss of a rare species not found elsewhere (Samson and Knopf, 1982; Noss and Harris, 1986). Setting objectives with an eye to regional context allows greater contribution of local projects to overall biodiversity conservation. This point emphasizes the need to have an overall assessment of the NCCP Region and various tradeoffs at the subregional level such as provided by the NCCP Regional Science Advisors.

2. Preparing Management Plans and Conceptual Models

Using the objectives identified in Step 1 and based on the best initial information available, management plans for reserve parcels and habitats should be prepared. A concept of how the natural system functions and responds to various management treatments is also important to creating management plans. Managers should develop these conceptual models of each focal habitat-type before developing management plans. In Figure 2, we illustrate a conceptual model of upland habitats under three management scenarios. This simple conceptual model describes the changes in the system (based on current knowledge) resulting from different management treatments, and it aids in identifying which treatments to use to bring about the objectives described in Step 1. This qualitative, relational model represents mostly assumptions or hypotheses that can then be tested through management. Monitoring the effects of that management can provide information allowing both the conceptual model and management activities to be refined over time to better meet the overall goals of the conservation program.

3. Identifying Uncertainties and Knowledge Gaps in Management Plans

To continue creating an adaptive management program, it is important to identify early gaps in knowledge about the natural system that lead to uncertainties about the effectiveness of the management plan in achieving desired objectives. These gaps point out specific areas for scrutiny during monitoring or weaknesses in the model. For example, we may not know how what happens to a natural community if fire is applied too frequently (a weakness in the model) or we may simply not know what role fire plays in the community at all (a weakness in basic research).

The purpose of identifying gaps in models and knowledge is to translate them into a set of questions that can be addressed through monitoring and/or research. This experimental approach to management recognizes the limitations of current knowledge about natural communities and informs constant improvement of management efforts. As knowledge gaps are identified and hypotheses are tested, conceptual models and management plans get better at achieving the objectives of the conservation program.

4. Monitoring the Management Program

Assumptions about the effect of management actions in initial management plans and their ability to achieve desired objectives should be evaluated through ongoing monitoring. The results of monitoring, when compared to the hypotheses in the conceptual natural community models, are what allow refinement of management activities. The key to monitoring, then, is what is monitored and why. *The biological monitoring program should be developed specifically to measure and evaluate the effects of management activities. It should identify and measure variables that permit iterative refinement of the management program.*

The monitoring program should be structured so that the information collected allows both the determination of factors crucial to permit compliance and identification of trends that allow the management program and plans to be adapted. For example, one could monitor California gnatcatchers (*Polioptila californica*) by either counting absolute numbers of birds or by measuring key habitat variables. After a decade of monitoring, the first method would result in simply 10 years of population numbers with no sense of the cause of trends. The second method would give as accurate a picture of population health, but would also pick out trends that could be addressed through adapting management. Either method might suffice for permit compliance regarding coverage of gnatcatchers.

The biological and management monitoring program should include both routine long-term observations and management experiments since some crucial assumptions about cause and effect of management may not be easily tested by simple observation. These are important activities, and should be integrated into the management program in the context of ongoing management. Done creatively, this can occur without increasing or complicating management activities. Furthermore, some questions are better explored in more traditional scientific studies and the answers to these questions may be critical for success of the conservation management program. A successful adaptive management program should therefore include both routine observational monitoring and experimental management actions and monitoring designed to test assumptions beyond simply passive observation, supplemented by research to answer fundamental questions of ecosystem function or processes. The fundamental questions for biological monitoring to inform adaptive management should be: which attributes of the system should be measured, and when should the alarm bells go off that unacceptable change is occurring?

5. Incorporating Monitoring and Research Results Into Revised Management Plans

As discussed above, designing management plans as assumptions or hypotheses to be tested allows immediate biological and permit compliance needs to be met while utilizing management as an experimental treatment. Analysis of the ecological information gathered in the monitoring process should be fed back into revised management plans, and new hypotheses posed as new information becomes available. Over time, both knowledge (as reflected in conceptual natural community models) and management activities are refined and are better able to achieve the overall goals of the conservation program.

Adaptive Management for the Southern Orange County Subregion

The previous section described the fundamental steps in creating any adaptive management program. Program success depends on development of objectives and initial natural community conceptual models based on current information, and feeding these into management plans that can be tested and refined over time as knowledge gaps are filled through monitoring. The science advisors recommend that the management program for the Southern Orange NCCP follow this approach. This section identifies suggested target communities for management planning in the subregion as well as the natural processes that should be part of the conceptual models. The following sections identify additional pieces of the adaptive management program.

Two levels of planning should be conducted for the subregion. Conceptual models and initial management plans should be completed for each target natural community-type, and an overall qualitative model developed for the entire subregion to identify and coordinate interactions and management activities among natural community-types. These planning exercises will define current knowledge, identify gaps and direct initial management and monitoring activities.

Because of the biological complexity of the subregion, the science advisors believe that the number and scope of the conceptual models should be limited for practical purposes. In addition to the overall subregional model, conceptual models should be developed for the following generalized vegetation categories. These models should also include where appropriate the habitat relationships and management conditions identified for species from Group 3 of the Species Conservation Principles:

- Riparian
- Shrublands

- Woodlands
- Grasslands
- Wetlands
- Selected transitional habitats

The conceptual models developed for the subregion and generalized vegetation categories should also carefully consider the effects on preserved areas created by the wildland/urban interface that currently exists and that will be created by the development permitted under the NCCP. In particular, the following two factors should be considered:

1. Edge Effects

Encroachment from inhospitable adjacent land uses and other disturbances (e.g. feral cats, species collectors, etc.) may cause otherwise suitable habitat to be unoccupied by species of concern. Wildlife species often are extirpated from a proportion of high quality habitats near urban areas. The extent of this extirpation is highly variable and usually cannot be detected by vegetation or habitat element measurements (see Bolger et al 1997, Scott 1993).

2. Habitat Fragmentation

Converting parts of a natural landscape to developed areas disrupts patterns of dispersal or movement (e.g. many small mammals will not cross roads). Regional habitat patterns may be changed to the point that dispersal to some parcels of suitable habitat is insufficient to keep it occupied by a species of concern, even if those parcels are protected and remain relatively free from disturbance. For example, bird occurrence at Foothill Ranch (Scott unpublished data 1989 through 1996) adjacent to the Southern Orange County NCCP area indicates a high rate of species turnover in some patches of coastal oak woodland and sage scrub habitats. Dispersal between patches compensates for high mortality (perhaps due to Factor 1 above) and/or random extirpation. Habitat loss to land development further reduces availability and pattern of habitat patches in the landscape, reducing the likelihood that individual patches will be recolonized. The concept that there may be a critical threshold for the density and distribution of source populations is poorly understood.

Because of the importance of natural processes in maintaining species and habitats, and also due to the introduced factors illustrated above, it is critical that the adaptive management program address landscape issues and processes. When creating conceptual models for vegetation categories or habitat types it is recommended that the following processes be considered:

- Fire
- Hydrology/flooding
- Invasion of exotic species
- Erosion/sediment transport
- Recreation/Visitor use
- Encroachment/edge effect

Example Conceptual Natural Community Model - Coastal Sage Scrub

To assist subregional planners with modeling the vegetation categories identified above, the science advisors have developed and provided this preliminary model of the coastal sage scrub community based on current knowledge. The model depicts changes in species richness, successional stage and habitat-type over time in response to the varying effects of fire, invasions of exotic species, and other impacts such as grazing. This community-level information can be combined with other upland communities to define interactions and management activities across a broader portion of the landscape. The coastal sage scrub model is depicted in Figure 3.

The vegetative composition of coastal sage scrub has been shown to consist of relatively few dominant shrub species, with the majority of species occurring in the herbaceous understory (Westman 1981). Species richness in coastal sage scrub is typically highest in the first few years following a fire. This is attributed to the establishment of specialized fire-following annual grasses and plants. After a peak in local species diversity during a 5-10 year period, there is a general decline in understory herb species (and overall species diversity) over time. This may be attributed to dominant shrub species increasing in cover, thereby shading out the understory herbs (Keeley and Keeley 1984). Once the dominant shrub species are established, they will continue to re-seed and re-sprout in the absence of fire. The ability of coastal sage scrub to continually re-seed or re-sprout in the absence of fire suggests that a stand of sage scrub is typically of mixed age and leads to the hypothesis that the natural fire interval for sage scrub may be longer than is commonly assumed.

Post-fire shrub and herb diversity can vary depending on natural and anthropogenic or non-natural disturbance regimes. Westman and O'Leary (1988) found that sites adjacent to grazing tend to become dominated by annual grasses with poor recovery of dominant shrubs. In addition, short fire intervals (i.e. less than 20 years) may greatly reduce or eliminate some important or rare species, while longer fire intervals allow for the maintenance of species diversity (Malanson 1985). The example model demonstrates these effects by showing that species diversity declines over time in early and mid-successional sage scrub subject to either a repeat fire event or grazing. Increased dominance by non-native grasses as a result of grazing or a repeat fire event may in turn increase the fire frequency in that stand of sage scrub. As shown in the model, increased fire frequency may result in loss of species diversity and eventual type conversion of that stand to non-native grassland.

The example model shows that a late successional stand of sage scrub that has not been altered by grazing has the best chances for maintaining species diversity after a fire. The condition in a good portion of the subregion is the opposite, however, since much of the area is subject to grazing, and suggesting that fire management programs for sage scrub in the southern subregion should consider and plan for the potential effects of exotic species invasions.

Management Hypotheses for Coastal Sage Scrub

Based on the model developed above and illustrated in Figure 3, the following are examples of initial hypotheses that might be included in an initial management plan and then tested through the management and monitoring process. Some of these assumptions might be better addressed through research outside the scope of the NCCP, but the management and monitoring program should creatively maximize the number that can be tested through the adaptive management and monitoring program.

Hypotheses:

1. Fire intervals of less than 10 years will result in a decrease in diversity of native species and an increase in the frequency of non-native grasses and forbs.

2. Winter and spring fire events will result in a decrease in the density and diversity of native shrub species.

3. Grazing in post-fire, early and mid-successional coastal sage scrub will result in decreased species diversity over time.

4. An established (late successional) stand of coastal sage scrub that has not been subject to grazing will have a higher overall post-burn native species diversity than a same-aged stand that has been grazed.

5. Structural and compositional components of required habitat, for selected species, will decline in quality with fires occurring at least every 10 years.

6. Habitat quality, for certain associated species, will declined with grazing or grazing/fire events during early seral stages of succession.

The Role of Research in Adaptive Management

To date, ecologists and land managers have rarely attempted to synthesize the effects of management actions on landscape level projects. There is also relatively little basic information about how the system reacts to both natural and anthropogenic events or management techniques. This does not mean that sound biological management is impossible, only that it must be iterative. By the same token, research efforts have not been coordinated well to inform management, and the quality of conceptual ecological models and management activities have not progressed linearly. A recent conference on management and research in NCCP attempted to address this issue, and the science advisors recommend consideration of the report produced by the "Core Group" of the conference as a means to integrate these two issues.

In addition to the management/monitoring feedback described earlier, ecological research can be an effective way to fill the gaps in knowledge needed to refine management activities. For example, a management objective might be to preserve a particular natural community without significant change in its function. Because of variable climate and normal patterns of successional change, it is reasonable to state the objective as "no more change than would be expected given natural succession and the effect of variables like rainfall and temperature. But if we don't know how rainfall and temperature effect the system at a basic level, it is hard to identify changes in the system and how to compensate for them by adapting management. For example, complete loss of plant cover from a fire may be of no long term importance or it may be disastrous, depending on the system and the circumstances. This basic knowledge is gained through research. The advisors believe that the principles for adaptive management outlined here will make the most effective use of the benefits of both biological monitoring and research.

The following list focuses research on unanswered questions most affecting long-term conservation outcomes in Southern Orange County. *The NCCP management and biological monitoring program should be creatively designed to answer as many of these questions as possible*. The rest should be the subject of research early in implementation. The science advisors do not suggest a responsible entity for this research, only that the information is fundamental to development of a robust adaptive management program.

- Inventory and landscape pattern of CSS, grasslands, oak woodlands, riparian, chaparral.
- Trends in species composition and distribution in the above 5 communities
- Dispersal characteristics and landscape corridor use by focal species
- Demography, population viability and genetic or taxonomic analysis for selected target species
- Surveys and autecological studies of sensitive species (Category 3 list from Task 2)

Steps and Products for the Southern Orange County NCCP Adaptive Management Program

This section identifies a series of products and steps to creating an adaptive management program for the subregion. It also provides suggestions on priority and hierarchy. All these elements should be completed for the adaptive management program to operate effectively.

Elements of the Adaptive Management Program

As we have illustrated in this document, an adaptive management plan for the Southern Orange County subregional NCCP should contain the following elements (in hierarchichal order):

- Overall Land Management Goals
- Community or Species-Specific Management Objectives
- A Subregional Conceptual Model[1]
- Conceptual Ecological Models For Identified Natural Communities[1]
- Clearly Articulated Management Hypotheses
- Identification Of Knowledge Gaps in Models and Techniques
- Management Plans for Specific Natural Communities[2]
- A Landscape Plan Coordinating Overall Reserve System Management [2]
- Biological Monitoring Plan With Suggested Priorities To Address Management Hypotheses (what to measure, what to test)

The biological monitoring section of the NCCP plan should coordinate monitoring of management effects on sensitive species identified in Task 2 (the Species Conservation Principles). The vegetation specific plans and the landscape-level plan should address the following management issues:

- Fire
- Grazing
- Exotics Control

- Restoration
- Recreation

Ongoing or Continuing Management Activities

Even in the current absence of a well defined adaptive management plan some management activities should be initiated or continued. These activities should focus on maintaining the quality of existing habitats and restoring areas that have been highly degraded. All these activities should occur in an adaptive context upon completion of the adaptive management program.

For some management issues there is sufficient information to identify extreme threats and effective actions. For example, aggressive weed species are an existing extreme threat. Uncontrolled spread of invasive weeds such as artichoke thistle have the potential to quickly degrade (and have degraded) protected habitats and may reduce future conservation options. With proven control technologies in place for these threats, the science advisors recommend that active weed eradication commence or continue for some species immediately and not wait for the development of an adaptive management plan. Particular emphasis should be placed on both artichoke thistle (*Cynara cardunculus)* and arundo (*Arundo donax*) with the option for control of other species as appropriate. Technologies for control of these species may include, but should not be limited to herbicide treatments, prescribed fire and prescribed grazing. Weed control efforts should be subject to approval by existing management committees, or by a technical advisory committee if one is formed when the NCCP is approved.

The use of managed fire should be continued for grasslands and chaparral communities in the subregion. The science advisors believe that sufficient documentation of fire effects in these communities currently exists to plan ecologically sound management actions. Management burns should be coordinated with technical expertise and advice. Additional burning may be considered for scenarios where it may provided significant fire protection for sensitive resources, aid in the control of invasive weeds or provide an effective pre-treatment for restoration.

It is assumed that current levels of cattle grazing will continue on the site during the development stages of the adaptive management plan (and potentially beyond, depending on desired future habitat conditions) and grazing will be an important process managed through both the landscape-level plan and the specific natural community plans (see above). In the interim, the conservation outcomes of the NCCP would best be served by managing grazing allotments with strategies similar to those outlined in the grazing plan developed for the Irvine Open Space Reserve. Additional grazing of cattle, sheep or goats could be considered for weed control or fire protection objectives.

Restoration of highly degraded sites should also continue prior to completion of an adaptive management plan. Experimental or management treatments aimed at restoring non-native annual grasslands to coastal sage scrub should be highlighted in this process.

Implementing Adaptive Management in the Southern Subregion

This section offers recommendations about the issues and principles encountered in operating an adaptive management program and advice on the progression of tasks from immediate to long-term. For such an ambitious program to work effectively, there must be a blend of cooperation, objectivity, expertise, and critical evaluation. The science advisors note that the program administrative structure within which adaptive management takes place is fundamental to long-term success.

Without making conclusions about the administrative structure for implementing the Southern Orange County NCCP, the science advisors strongly recommend that a number of important issues for the adaptive management program be considered when the structure is created. The advisors also recommend that the advice and input of experienced, objective experts be sought frequently in the continuing administration of the adaptive management program.

Program Issues:

There are several issues at the program level that should be addressed through administration of the adaptive management program. These are:

- Coordination of resource agencies and technicians/scientists in conducting reviews and updates of adaptive management program goals and objectives
- Preparation of periodic reports on the management program
- Review of management plans
- Allocations of funds for management

Technical Issues:

These technical issues are essential to ensure ongoing effectiveness of the adaptive management program:

- Reviewing and updating program goals, objectives and techniques based on monitoring results
- Identification of long-term (10 year or more) and short term management priorities
- Development of long-term management and monitoring plans
- Review and establishment of research needs/coordination with researchers
- Development of plans and budget requests for management activities and biological monitoring programs
- Solicitation and evaluation of proposals received for management work
- Review of reports prepared by contractors/researchers
- Evaluation of effect of proposed modifications to reserve design

The NCCP Regional Science Advisors

The NCCP Regional Science Advisors were established by the state of California to provide objective expert input and examine programmatic science issues to provide advice and a regional perspective for the entire NCCP regional program. For this reason, the Southern Orange County science advisors believe that this group (or a similar one) should be integrated as closely as possible with the ongoing management program for the subregion to provide a regional biological context and perspective for management activities and progress under the plan and to use the information gained from the Southern Orange NCCP management program to identify regional research and management issues and priorities. The regional science advisors would also be effective in bringing the experiences and knowledge developed in implementation of other subregional plans to bear on the Southern Orange adaptive management process. The significant bioregional questions addressed by this group are crucial to success both at a subregional level and for the NCCP Region as a whole.

Funding Adaptive Management for the Southern Orange Subregion

The science advisors have avoided constraining their recommendations based on assumptions about funding. However, they acknowledge that funding the adaptive management program will be an important consideration. Most important, funding needs are not consistent through time. As knowledge is gained about the function and condition of a particular natural community, the cost to manage it becomes more efficient. One factor that may reduce the overall cost of the program is how closely the principles in Tasks 1 and 2 are followed (see below). The advisors offer the following suggestions on funding needs for an adaptive management program.

The advisors recommend that the adaptive management program be acted on and funded in a two phase process; 1) a relatively intense, shorter term program to create and refine models, identify gaps in knowledge about the systems, change management techniques as necessary and address specific immediate threats such as exotic and invasive plants; and 2) a longer term, less intense program with a lower level of permanent funding to monitor management activities, processes and trends once the techniques and models have been refined. Most of the experience gained and refinement necessary for the management program and much of will be gained in the early years of implementation. Underfunding the initial years of implementation will ensure that the management program will be continually “behind the curve” on many crucial issues such as restoration and exotic species control, with potentially negative consequences for the long term success of the program. On the other hand, intensive management and restoration early on is likely to be rewarded with a less costly “maintenance” level of management over the long term.

It is assumed that the funding for adaptive management in the subregion will be derived from an endowment or similar source. The science advisors recommend that planners consider structuring the endowment to provide whatever funds are necessary to carry out the crucial short term needs identified above and then stabilize the endowment at a level sufficient to fund ongoing, long-term monitoring of processes and trends, rather than making the entire endowment a non-wasting, perpetual source that may prove to be inadequate to establish the adaptive management program in the short term.

Conclusion

The science advisors intend that the principles for reserve design, species conservation and adaptive management described here be part of the foundation of a comprehensive program of conservation for the southern Orange County NCCP subregion. The first layer of this overall program is a reserve system based on strong design principles. For species not adequately protected by well-designed reserves, a layer of species conservation principles provide additional security. Adaptive management and targeted monitoring designed to examine and respond to changing conditions or unexpected consequences and develop crucial conservation information over time is the third layer in the hierarchy.

The principles described in this report are intended to coincide closely and be taken collectively, not in part. Many of the reptiles and amphibians, for example, do not need individual species-level action to conserve them, but they depend on a good reserve design, management, and careful monitoring over time to ensure that management activities are successful. The three sets of principles thus work together to enable a strong conservation program for the subregion.

By the same token, a reasonable final reserve design may not address each principle in its entirety. The science advisors have described all the important objectives for creating reserves in the subregion, but recognize implicitly that there will be tradeoffs in arriving at a final overall design. It is the expectation of the advisors that the principles for reserves and species outlined here will be followed as closely as possible given planning constraints and will be the foundation for discussions and tradeoffs among the program stakeholders and the county prior to any action by the county.

In some cases, the reserve design alternative analysis may encounter conflicts between principles, such as between a riparian connector versus a ridgetop connector, or a large, fragmented habitat block versus a smaller, intact habitat block. The science advisors have tried to provide as much guidance as possible in anticipation of these issues. The advisors hope remaining inconsistencies can be illustrated in various reserve design configurations so that the consulting team can recommend which alternative is preferred. Within the scope of work conducted by the science advisors, it is not possible to unequivocally weigh each of the principles against the others.

The science advisors have attempted to describe all the important objectives for an adaptive management program for the subregion, but also acknowledge that other factors will influence the scope and objectives of the program, especially the specific management actions taken on individual habitat parcels. Given these realities, the advisors have attempted to identify rough priorities for management that will guide these activities. Since adaptive management is so vital to the biological success of the NCCP, however, it is the hope of the science advisors that the outline and framework presented here will be followed as closely as possible.

The advisors note strongly that the need for and cost of management is closely tied to the reserve design and species conservation actions taken in the NCCP plan. For example, the more systematic disturbance created by the reserve design (e.g. fragmentation that will lead to encroachment) the more difficult and costly the adaptive management program must be in order to compensate for it. By the same token, a reserve design that adheres closely to the principles developed in Task 1 can be more cheaply and efficiently managed.

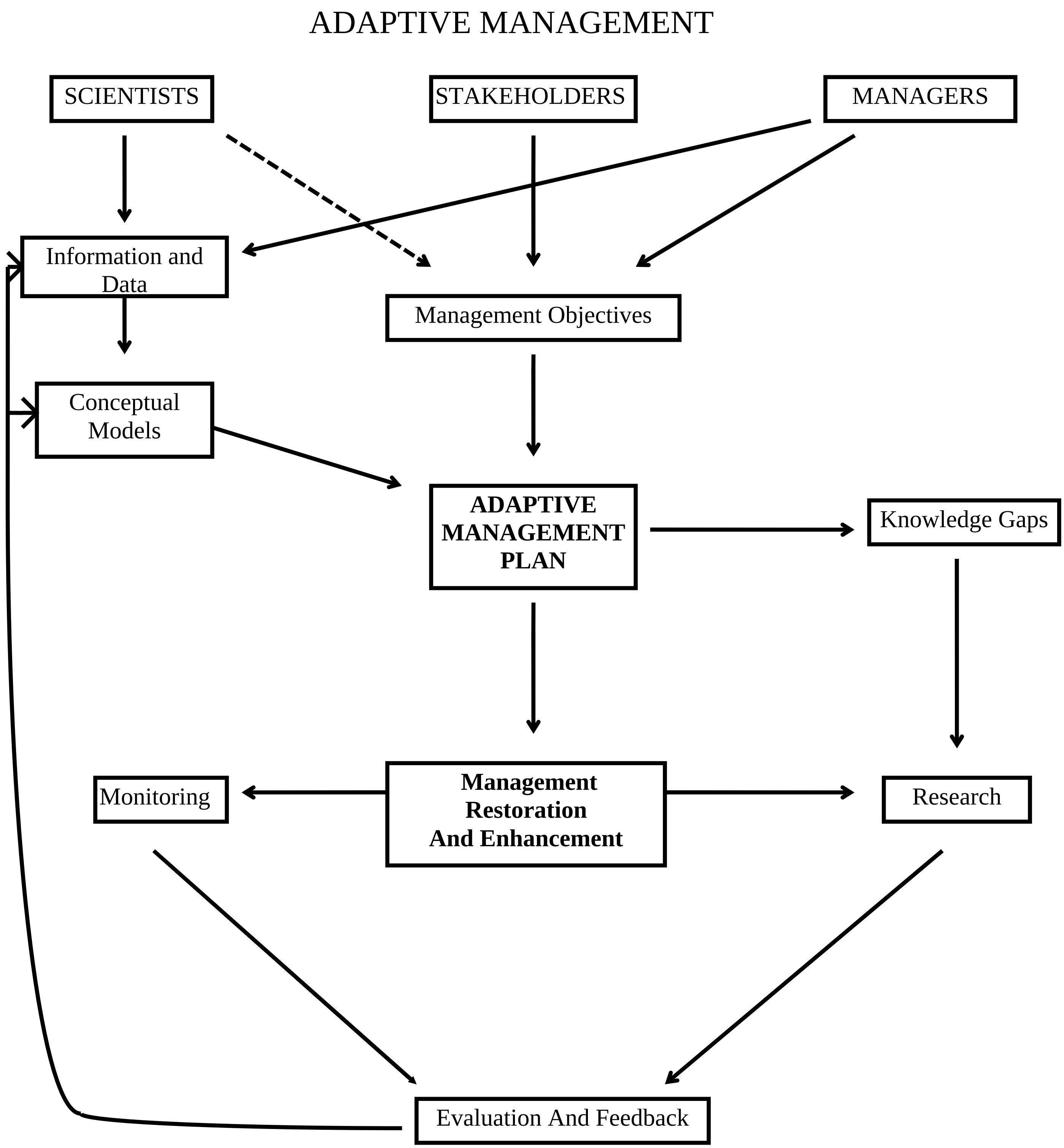


Figure 1. Adaptive management flow chart.

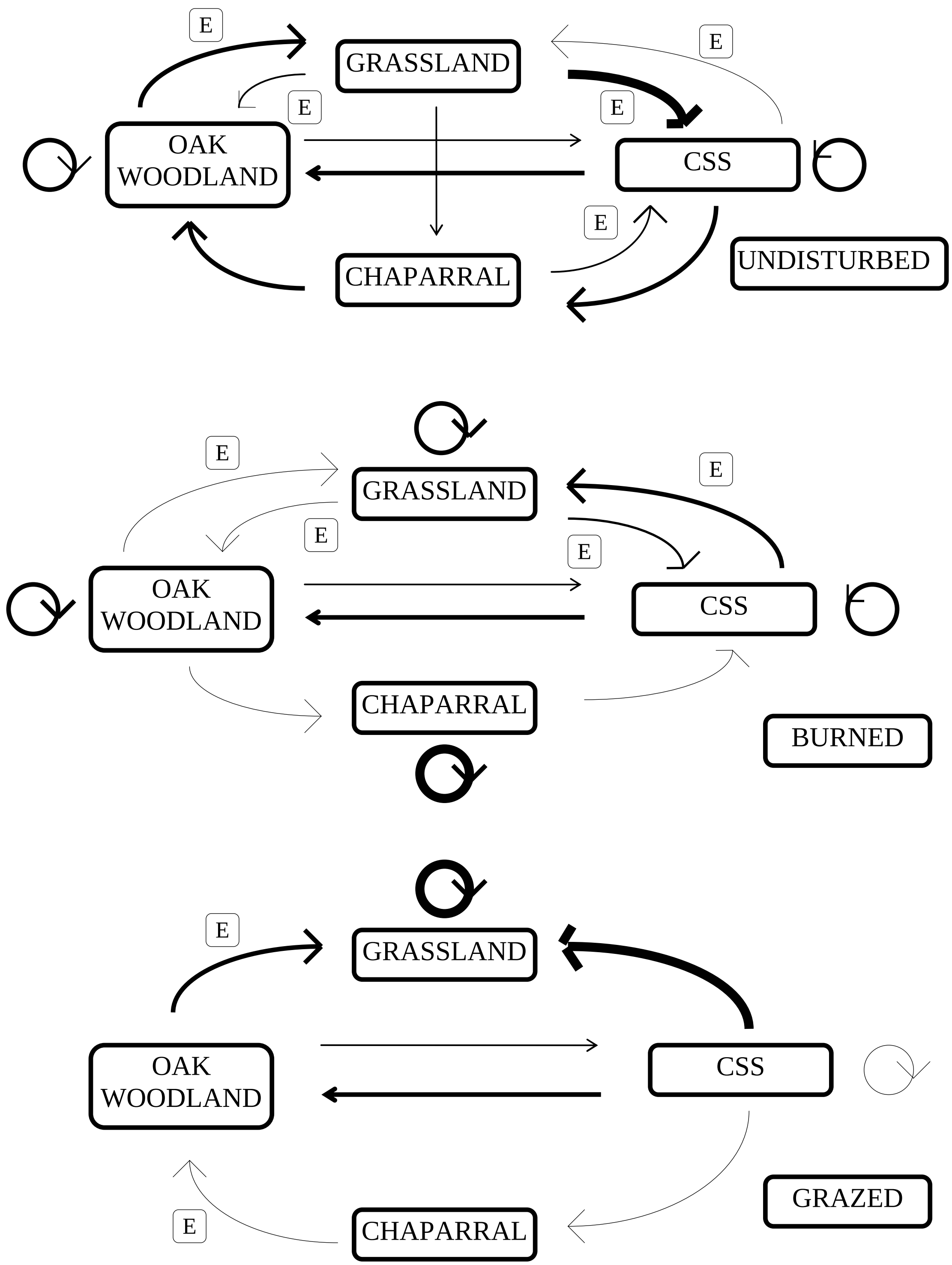
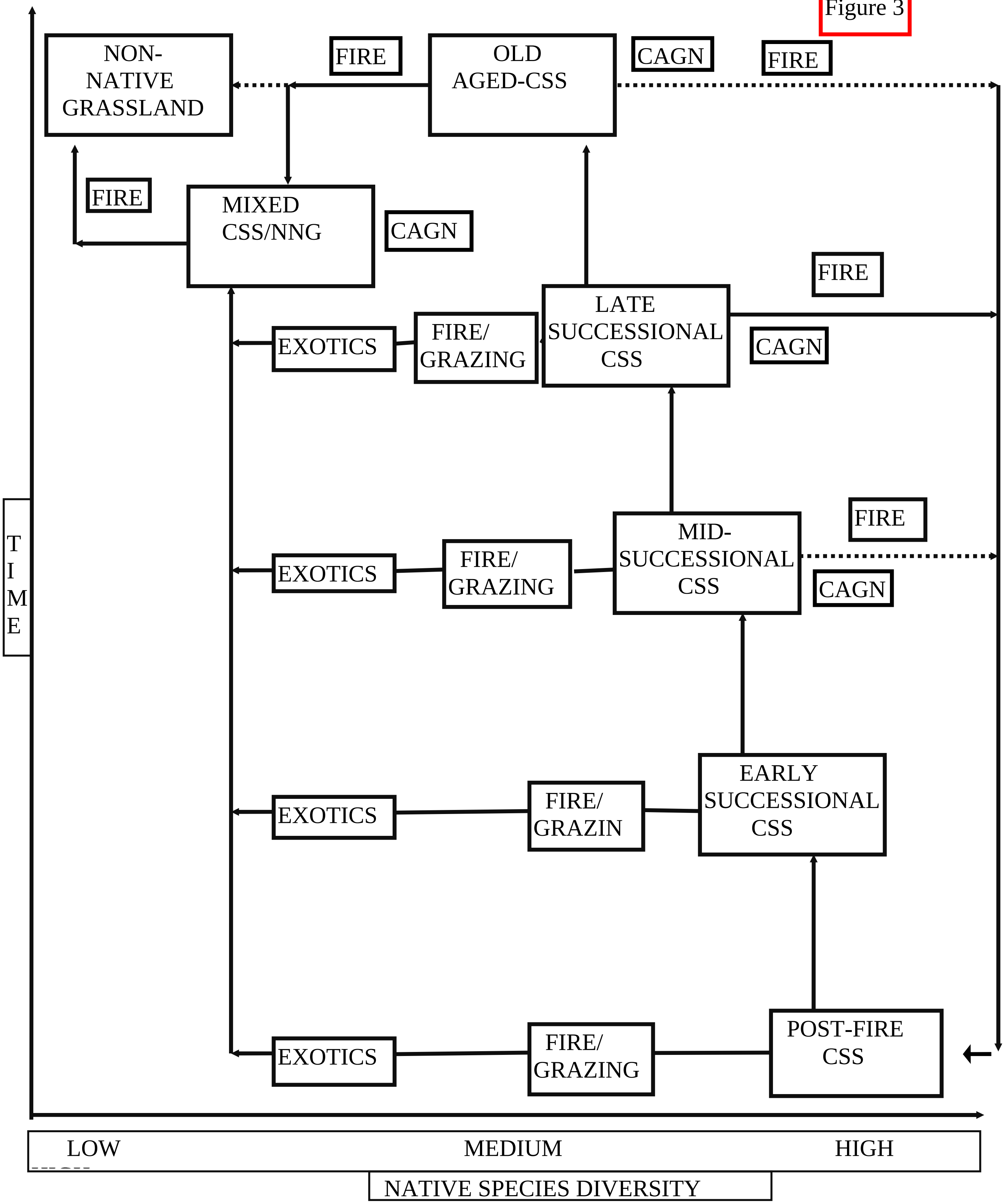


Figure 2. State-transition models for upland habitats under three management scenarios. Line thickness is proportional to the probability of that change. E refers to significant invasions of exotic species.

Figure 3



LEGEND

PRIMARY PATH

SECONDARY PATH

CONCEPTUAL COASTAL SAGE SCRUB HABITAT MODEL

LITERATURE CITED

Bolger, D.T., Scott, T.A., and Rotenberry, J.T. 1997. Breeding bird abundance in an urbanizing landscape in coastal southern California. *Conservation Biology* 11:1-16

Keeley, J.E., and S.C. Keeley. 1984. Postfire Recovery of California Coastal Sage Scrub. *American Midland Naturalist*. 111: pp. 105-117.

Lee, K. 1993. The compass and the gyroscope. *Island Press*

Malanson, G.P. 1985. Fire management in coastal sage scrub, Southern California, USA. *Environmental Conservation* 12:141-146.

NCCP Scientific Review Panel. 1993. Conservation Guidelines for Coastal Sage Scrub. California Department of Fish & Game.

Noss, R.F. & L.D. Harris. 1986. Nodes, networks, and MUMS: Preserving diversity at all scales. *Environ. manaage.* 10(3): 299-309.

O'Leary, J.F. 1988. Habitat differentiation among herbs in post-burn California chaparral and coastal sage scrub. *American Midland Naturalist.* 120: pp. 41-49.

O'Leary, J., DeSimone, S., Murphy, D., Brussard, P., Gilpin, M., and R. Noss. 1994. Bibliographies of on coastal sage shrub and other malacophorus shrublands and other Mediterranean type climates. *California Wildlife Conservation Bulletin* 10:1-51.

Samson, F.B. & F.L. Knopf. 1982. In search of a diversity ethic for wildlife management. *Trans. N.Am. Wildl. Nat. Res. Conf.* 47: 421-431.

Schroeder, R.L. & M.E. Keller. 1990. Setting Objective - A prerequisite of ecosystem management. *In*: R.S. Mitchell, C.J. Sheviak, D.J. Leopold EDS. *Ecosystem Management: Rare species and significant habitats*. pp 1-4. *Proceedings of the 15th Annual Natural Areas Conference.*

Scott, T. 1995. Prefire management of California shrublands. P. 3-11, in Keely, J. And Scott, T., (eds) Brushfires in California: Ecology and Management. International Association of Wildland Fire.

Short, H.L., and Hestbeck, J.B. 1995. National biotic resource inventories and GAP analysis. *Bioscience* 45:535-539

Walters, C.J. & C.S. Holling. 1990. Large-scale managment experiments and lerning by doing. *Ecology*. 71(6): 2060-2068.

Westman, W.E. 1981. Diversity relations and succession in California coastal sage scrub. *Ecology*. 62:439-455.

Zeiner, D.C., Laudenslayer, W.F., Mayer, K.E., and White, M. 1990. California's Wildlife: Volume II, Birds. *California Statewide Wildlife Habitat Relationships Model System*, California Department of Fish and Game, The Resources Agency, State of California.