Draft Watershed and Sub-basin Planning Principles

San Juan/Western San Mateo Watersheds

Orange County, California

February 2003

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Orange County, California

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TABLE OF CONTENTS

APPENDIX A ACOE INTEGRITY INDICES FOR SAN JUAN AND SAN MATEO CREEK WATERSHEDS

LIST OF FIGURES

Page

LIST OF FIGURES (Continued)

Page

LIST OF FIGURES (Continued)

Page

INTRODUCTION

The U.S. Army Corps of Engineers, Los Angeles District ("ACOE") and the California Department of Fish and Game ("CDFG") have previously prepared a set of general watershed tenets (planning framework) that was presented at the Southern Orange County Coordinated Planning Process public workshops on December 13, 2001 and May 15, 2002. As in the case of the Natural Community Conservation Planning Act (NCCP) Guidelines, the Natural Community Conservation Planning Act/Special Area Management Plan (NCCP/SAMP) working group has concluded that the preparation of a set of more geographically-specific planning principles will help provide focus for the Special Area Management Plan/Master Streambed Alteration Agreement (SAMP/MSAA) planning effort.

The draft SAMP/MSAA Watershed and Sub-basin Planning Principles for the San Juan/Western San Mateo Watersheds ("Planning Principles") provide a link between the broader SAMP/MSAA Tenets for protecting and conserving aquatic and riparian resources and the known, key physical and biological resources and processes that will be addressed in formulating the reserve program for the Southern Subregion SAMP/MSAA. The principles refine the planning framework tenets and identify the key physical and biological processes and resources at both the watershed and sub-basin level. These tenets and principles are to be the focus of the aquatic resources reserve and management program.

The Planning Principles are intended to provide an objective and common set of planning considerations and recommendations for use by the resource and regulatory agencies (in coordination with the program participants) in selecting and evaluating aquatic resource protection, restoration and management alternatives ("aquatic reserve program alternatives"). Other tools to be used by the regulatory agencies in selecting and evaluating reserve program, restoration and management alternatives include the use of the Assessment of Riparian Ecosystem Integrity Model, as developed for the San Juan and San Mateo Creek Watersheds of Orange County, California, by R. Daniel Smith, Engineering, Research and Development Center, Waterways Experiment Station (2001). It is also recognized that alternatives will reflect other non-biological objectives, in keeping with the purpose and need of the SAMP/MSAA to provide "a comprehensive approach to protect and enhance aquatic and riparian resources while providing for reasonable economic development and public infrastructure in accordance with applicable local, state and federal laws." 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, May 1997).

The Planning Principles represent a synthesis of the following sources:

- The Southern Subregion SAMP/MSAA tenets.
- The ACOE' Watershed Delineation and Functional Assessment reports.
- The Baseline Geomorphic and Hydrologic Conditions Report, and associated technical reports, prepared by Balance Hydrologics (BH), PCR Services Corporation (PCR) and Phillips Williams & Associates (PWA) for Rancho Mission Viejo (RMV).
- Reserve Design Principles (1997) prepared by the Science Advisors for the Southern Subregion NCCP.
- Southern Subregion data bases.

The principles do not: 1) commit to conserve or allow impacts to specific biological and hydrological resources; or 2) discount resources that are not identified specifically. As the public preparation and review process for the SAMP/MSAA continues, it is anticipated that new planning information and analyses could modify the assessment of the significance of specific resources, including the initial planning recommendations. Thus the specific language in the Planning Principles will continue to be reviewed and modified as appropriate.

Relationship of Principles to Other Planning Program Criteria

Importantly, the Planning Principles provide a key link between the SAMP/MSAA and the Natural Community Conservation Planning Act/Habitat Conservation Plan (NCCP/HCP). Recognizing the significance of watershed physical processes, the Science Advisors combined two of the 7 reserve design tenets originally formulated by the NCCP Scientific Review Panel and added a new Tenet 7. This new tenet of reserve design ("Maintain Ecosystem Processes and Structures") was directed in significant part toward protecting to the maximum extent possible the hydrology regimes of riparian systems. The fundamental hydrologic and geomorphic processes of the overall watersheds and of the sub-basins not only shape and alter the creek systems in the planning area over time but also play a significant role in influencing upland habitat systems. The ACOE and consultant reports both address biologic, hydrologic and geomorphic processes and resources. The ACOE report focuses its assessment at the riparian reach (segment)-level of the watershed, although it also integrates adjacent landscape conditions. The consultant reports address both broader watershed level processes and terrains and the distinct biologic, geomorphic and hydrologic characteristics of each sub-basin. Together, these reports provide important information that is necessary to identify and understand the key processes and resources of the watersheds and sub-basin and their relationship to upland processes and resources consistent with the SAMP/MSAA Tenets and Tenet 7 of the Science Advisors' reserve design principles.

The hydrologic "sub-basin" has been selected as the geographic planning unit because it is important to focus on the distinct biologic, geomorphic and hydrologic characteristics of each sub-basin while formulating an overall reserve program. For each sub-basin, the important hydrologic and geomorphic processes and aquatic/riparian resources are identified and reviewed under the heading of "planning considerations" which are then followed by protection and enhancement/restoration recommendations under the heading of "planning recommendations." It is important to understand that the NCCP Guidelines and 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 and SAMP programs create the need for reconciliation of differing protection and management recommendations.

Format of Document

Section 1 of this document contains materials intended to provide basic planning principles that can be used throughout the planning area, and is divided the SAMP/MSAA Tenets and those principles derived from the Baseline Conditions Report as follows:

- Section 1A contains the SAMP Tenets prepared by the ACOE.
- Section 1B contains a set of Baseline Conditions Watershed Planning Principles intended to summarize key considerations and principles identified in the Baseline Report and supporting field observations.
- Section 1C contains a series of maps designed to spatially represent the watershed-scale terrains and hydrology considerations from the Baseline Conditions Report.
- Section 1D describes the relationship between the SAMP Tenets and the Planning Principles in formulating and evaluating alternatives.

Section 2 of this document presents a number of considerations and recommendations at the Sub-Basin scale in order to identify key planning principles that both reflect and address the distinctive characteristics of the sub-basins. Each sub-basin description includes:

- A summary of the ACOE's Waterways Experiment Station (WES) studies observations (as interpreted by RMV consultants and not reflective of official ACOE guidance and policy).
- Maps of the hydrology, water quality and habitat integrity for each sub-basin as mapped by the ACOE.

- A summary of the Significant Terrains and Hydrology Features for planning consideration in the sub-basin.

- A summary of Planning Recommendations for the sub-basin.

- A set of maps and aerial photos highlighting both Significant Terrains and Hydrology Features and Planning Considerations from the Baseline Report.

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 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 California Environmental Quality Act/National Environmental Policy Act documents for the NCCP/HCP and SAMP/MSAA. From a SAMP/MSAA perspective, potential downstream impacts will be considered from a terrains, hydrology and water quality perspective. This consideration will include information regarding watershed processes gained in formulating the Planning Principles.

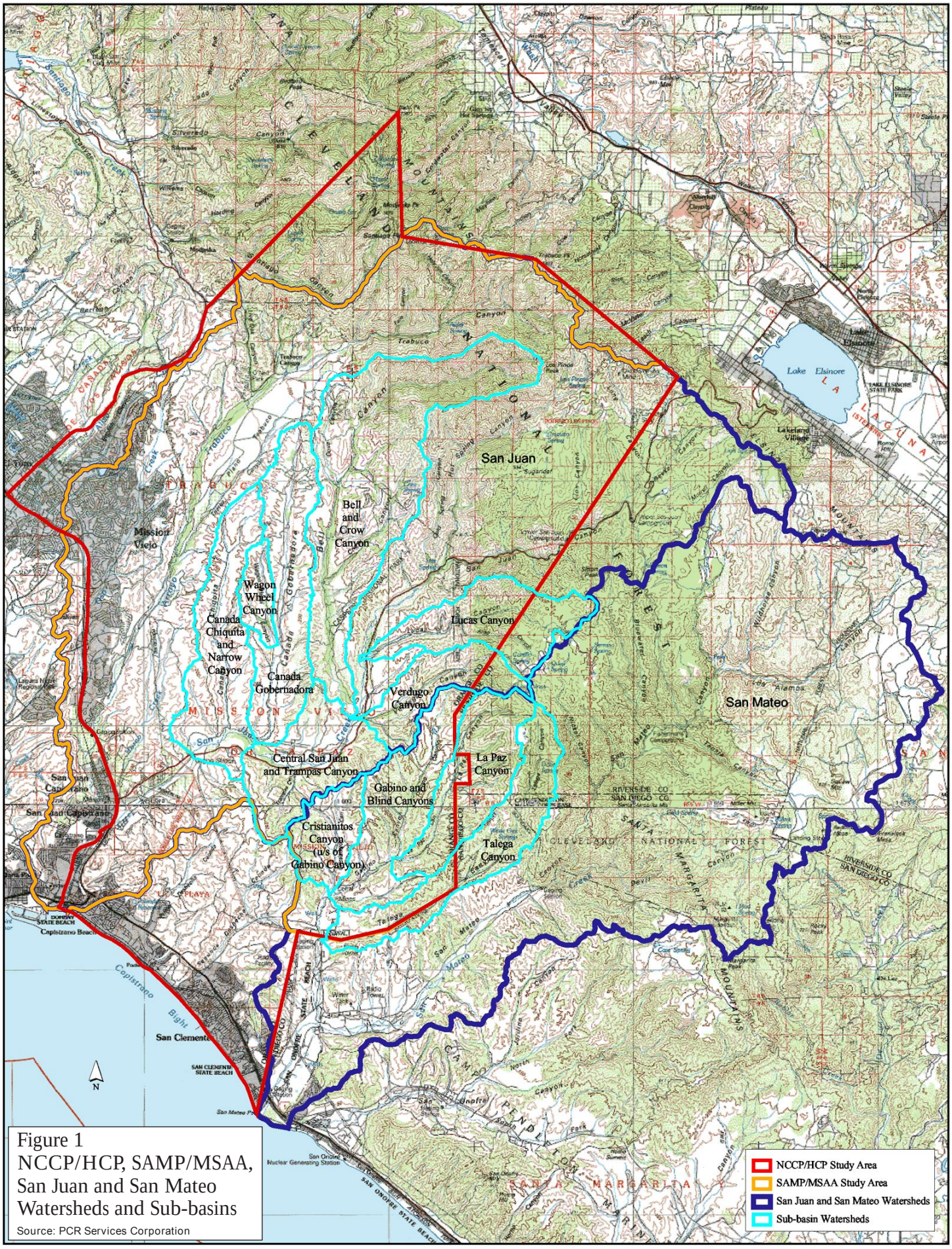


Figure 1
NCCP/HCP, SAMP/MSAA, San Juan and San Mateo Watersheds and Sub-basins

Source: PCR Services Corporation

Figure 2
Sub-basin Watersheds

SECTION 1: WATERSHED LEVEL PLANNING TENETS AND PRINCIPLES

The following Tenets and Principles are intended to be applied at the watershed scale. For reference the boundaries of the San Juan Creek and San Mateo Creek watersheds within the study area and the boundaries of each sub-basin are provided.

1A. SAMP TENETS

The following tenets were presented by the ACOE at the December 13, 2001 Alternatives Workshop and further expanded upon at the May 15, 2002 workshop.

i. No net loss of acreage and functions of waters of the U.S./State

ii. Maintain/restore riparian ecosystem integrity

iii. Protect headwaters

iv. Maintain/protect/restore riparian corridors

v. Maintain and/or restore floodplain connection

vi. Maintain and/or restore sediment sources and transport equilibrium

vii. Maintain adequate buffer for the protection of riparian corridors

viii. Protect riparian areas and associated habitats of listed and sensitive species

3

1B. BASELINE CONDITIONS WATERSHED PLANNING PRINCIPLES

The parenthetical references provided refer to the sections of the Baseline Conditions Report, or other technical reports, from which each principle or sub-part thereof was derived. The source documents contain the supporting data, analyses, and technical discussions.

i) Geomorphology/Terrains

Principle 1 – Recognize and account for the hydrologic response of different terrains at the sub-basin and watershed scale.

- Land use/resource planning (hereafter Planning) should recognize the following terrains characteristics: (1) "sandy" terrains favor the infiltration of stormwater and other surface flows and such terrains are particularly sensitive to significant changes in surface flow conditions; (2) "silty/sandy" terrains have higher runoff rates than sandy terrains and often contribute fine sediments during extreme runoff, with the potential for increases in downstream turbidity, but otherwise resemble sandy terrains more than clayey ones; (3) "clayey" terrains are characterized by very high surface runoff rates, with little contribution to groundwater infiltration; although typically resistant to erosion, where incision occurs, clay soils can be a significant source of fine sediments resulting in downstream turbidity impacts; and (4) "crystalline" terrains have high runoff rates during larger storms and produce much of the coarse sediments that move down the creek systems, thereby playing an important role in habitat systems affected by course sediment regimes *(Section 3.2.2, 4.1)*.

- Planning in sandy terrains should provide for setbacks from the mainstem channel in order to retain the infiltration capacity of the valley floor and protect the integrity of the mainstem channels and corridors. Planning should avoid the addition of significant impervious surfaces to major tributary side canyons and swales to the extent feasible. Planning should direct significant new impervious surfaces to areas characterized by relatively high runoff rates/low infiltration under existing conditions. Drainage from new impervious surfaces should, where feasible, be directed to major tributary side canyons for infiltration/detention. Drainage into major side canyons and swales must be accompanied by adequate detention/infiltration addressing the particular characteristics of sandy terrains *(Section 3.2.2.1 and 3.2.2.2)*.

- Planning in clayey terrains should attempt, to the maximum extent feasible, to emulate the runoff/infiltration characteristics of clayey terrains and to correct any existing erosion in clayey terrains contributing to downstream turbidity impacts. Channels in clayey and crystalline terrains are generally more resistant to erosion, incision and head cutting than those in sandy terrains. Restoration of native

grasslands may be a strategy for existing grazing lands in headwaters and other appropriate areas to reduce surface erosion, increase stormwater infiltration and reduce downstream turbidity *(Section 3.2.2.1 and 3.2.2.2)*.

- Planning in crystalline terrains should provide for the protection of sources of coarse sediments (e.g., Verdugo Canyon).

- Although generalized terrains patterns can guide planning at a watershed scale, the specific characteristics of a given sub-basin should direct planning at the site-specific scale.

ii) Hydrology

Principle 2 – Emulate, to the extent feasible, the existing runoff and infiltration patterns in consideration of specific terrains, soil types and ground cover.

- Planning should consider existing rainfall infiltration and runoff processes in the context of terrains, land use, ground cover, soil types (e.g., sandy soils with high infiltration vs. clay soils with high runoff), basin size and shape, natural zones of high runoff (e.g., hard-pan caps), and natural infiltration areas (e.g., sandy swales) *(Section 3.2.2.)*.

- Planning should recognize and account for the inherent characteristics of each sub-basin's channel network as it relates to the particular terrains and infiltration/runoff characteristics of the sub-basin *(Sections 3.4.1.1-3.4.1.3, 3.4.2.1-3.4.2.3)*.

Principle 3 – Address potential effects of future land use changes on hydrology.

- Planning should address the following hydrologic considerations under future land use scenarios: (1) potential increases in dry season streamflow and wet season baseflow between storms; (2) changes in the magnitude, frequency, and duration of annually expected flow events (1~2 yr events); (3) changes in hydrologic response to major episodic storm events; (4) potential changes in sediment supply, with short term increases related to construction and longer term reductions related to impervious/landscaped ground cover; and (5) potential changes in the infiltration of surface/soil water to groundwater *(Sections 3.4.1.2, 3.4.1.3, 3.4.2.2, 3.4.2.3, 3.4.3, 4.2, PWA Appendix A, Hamilton, 2000 study on Muddy Canyon)*.

Principle 4 – Minimize alterations of the timing of peak flows of each sub-basin relative to the mainstem creeks.

- Planning should address the relationship between the timing of peak flows of each sub-basin in relation to peak flows through and along the mainstem creeks.[1] Instances where the relative timing of peak flows from tributary sub-basins coincides with those of the mainstem channel may result in amplification of flow rates, volumes, and associated sediment transport. Therefore, management of the timing of peak flows is important to safeguard downstream areas from the effects of increased frequency of high flows and sediment yields. The goal should be to not adversely alter the runoff interactions between the sub-basins and mainstem creeks in relation to peak flow characteristics identified in the Baseline Conditions Report *(Section 4.2, PWA Appendix A)*.

Principle 5 – Maintain and/or restore the inherent geomorphic structure of major tributaries and their floodplains.

- Land use and restoration should be planned in the context of the nature of the mainstem channel and its associated floodplains, flow characteristics, terraces and important surface and sub-surface drainage systems. Land planning should consider channel form (e.g., well-defined single channel, meandering channel, braided channel system) in relation to governing physical processes in the sub-basin, including terrains and groundwater. To the extent possible, the role of long-term geologic processes needs to be differentiated from localized processes influenced by specific land uses *(Section 3.2, BH Appendix C, fundamental geomorphology)*.

- Planning should consider the role of longer-term wet/dry cycles and how such cycles influence hydrologic conditions. The role of major episodic storm events in transporting sediment, re-organizing channel/floodplain structure, and re-generating riparian plant communities should also be considered *(Section 3.3.1, 3.3.2, 3.5.2)*.

iii) Sediment Sources, Storage and Transport

Principle 6 – Maintain coarse sediment yields, storage and transport processes.

- Planning should take into account the volume and grain size of sediment generation occurring within the terrains specific to each sub-basin. In general, sandy and crystalline terrains will produce coarse sediments that may be important for

[1] *Timing of peak flows from tributary sub-basins is governed by the size, shape, geology, and soils of the sub-basin, the sub-basin's position in the watershed, as well as land use/cover in the sub-basin.*

downstream channel structure and habitat. Clayey terrains will produce fine sediments that may be associated with increased turbidity in downstream areas *(Sections 3.5.1, 3.5.3.1, 3.5.3.2, Table 10, Table 11).*

- Planning should maintain sediment transport and storage processes between hillslope, tributaries, sub-basin channels and mainstem creeks.

- Planning should maintain the geomorphic characteristics of streambeds, including maintaining the supply and transport of sediment types that are important to aquatic habitat systems (e.g., sand, gravel, cobbles).

- Planning should maintain significant sediment transport and storage processes in: (a) central San Juan Creek which transports coarse sediments from the upper San Juan watershed, Bell Canyon and Verdugo Canyon to downstream areas; and (b) middle and lower Gabino Creek and Cristianitos Creek downstream of the Gabino/Upper Cristianitos confluence containing areas with coarse textured channel beds and over-bank terraces supporting important aquatic habitats *(Sections 3.5.3.1, 3.5.3.2, 6.1.4, 6.2.3)*.

- Planning should assure that major new detrimental sources (or sinks) of sediment are not created. New sources can result from either causing new locations for sediment generation or mobilizing sediment through accelerating existing erosional areas or initiating sedimentation from recently inactive areas such as landslides. Particular attention must be paid to avoiding creating new sources of in-channel sediment generation resulting from channel incision *(Section 3.5, 4.4, Trimble 1998 San Diego Creek Study)*.

- Planning should attempt, to the extent feasible, to address existing sources of sediment, or deficits of sediments, that may be detrimental to the streams systems. Such sources may include increased fine sediment yields from upper Cristianitos Creek and upper Gabino Creek *(Sections 3.5, 4.4, 6.2.1, 6.2.3)*.

iv) Groundwater Hydrology

Principle 7 – Utilize infiltration properties of sandy terrains for groundwater recharge and to offset potential increases in surface runoff and adverse effects to water quality.

- Planning should take advantage of the infiltration opportunities associated with sandy terrains to offset potential effects of changes in surface runoff and water quality associated with existing and future land uses and groundwater extractions. In particular, unlike many of the other areas in southern Orange County, the sandy portions of the central San Juan watershed are moderately permeable and provide significant groundwater recharge and infiltration opportunities *(Sections 3.2.2, 3.7)*.

Principle 8 – Protect existing groundwater recharge areas supporting slope wetlands and riparian zones; and maximize groundwater recharge of alluvial aquifers to the extent consistent with aquifer capacity and habitat management goals.

- Planning should take into account and provide for the differences in character and function of groundwater recharge areas in specific sub-basins. Groundwater recharge characteristics are influenced by surface and sub-surface geology and hydrology, with significant differences in duration and areal extent of groundwater flows. Some canyons support perennial or near-perennial flow because: (a) their sandy watersheds support higher rates of recharge; (b) shallow aquifers perched on restrictive clay beds occur widely beneath their valley floors; and/or (c) discharge occurs from existing residential communities (Gobernadora) or industrial activities (Trampas). Other canyons sustain flows for only weeks or a month or two following the end of spring rains, because the properties of the bedrock do not enable movement of substantial volumes of water from beneath the slopes into the creek. Plans should recognize the distinctive aquifer properties, and enable the hydrogeologic system to function such that it helps support protected and future wetland or riparian habitat *(Sections 3.7, 4.3)*.

- Planning should explore opportunities to utilize urban-generated runoff that has been treated in natural water quality systems for aquifer recharge. For example, future increases in urban-generated runoff could provide aquifer re-charge opportunities to offset the effects of ongoing groundwater extraction from the San Juan Creek aquifer on riparian habitat during low rainfall years *(Section 5.1)*.

- Planning should anticipate the need to maintain infiltration and groundwater recharge in the main valleys of Chiquita and Gobernadora Sub-basins and in their wide and sandy, tributaries in order to maintain groundwater levels important for sustaining creek flows and associated wetlands and riparian habitats. Groundwater derived from beneath the hill slopes and ridges is a significant element of the sub-basin and creek system hydrology of the Chiquita and Gobernadora Sub-basins. Based on current understanding, historic lakebed deposits that formed during the recession of sea level provide a barrier to subsurface water movement out of the Chiquita and Gobernadora Sub-basins into the San Juan Creek aquifer. It is likely that water levels in the alluvium of these two streams are, at least in large part, isolated from groundwater in the sands and gravels beneath San Juan Creek, and that the water tables in both valleys can be maintained during normal years at levels sustaining their riparian zones *(Sections 3.7, 6.1.1, 6.1.2)*.

- Planning should protect the relationship between subsurface water and the slope wetlands. Slope wetlands are supported by shallow subsurface water originating within landslides and other slope deposits, or (more commonly) by deeper bedrock aquifers *(Sections 3.7, 6.1.1, 6.1.2)*.

v) Water Quality

Principle 9 – Protect water quality by using a variety of strategies, with particular emphasis on natural treatment systems such as water quality wetlands, swales and infiltration areas and application of Best Management Practices within development areas to assure comprehensive water quality treatment prior to the discharge of urban runoff into the Habitat Reserve.

- Planning should account for the range of pollutant loadings and filtration functions associated with the specific terrains of each sub-basin. Sub-basins dominated by grasslands and/or used for grazing contribute nitrogen loading (e.g., Chiquita, Gobernadora, Gabino, Cristianitos); sub-basins with large quantities of erodible material provide sources of phosphorus loading (e.g., Lucas, Verdugo, Narrow); sub-basins with silty or clayey terrains can be sources of turbidity (e.g., Cristianitos, Upper Gabino); and sandy terrains encourage assimilation of pollutants to groundwater *(Section 3.6)*.

- Planning should provide for water quality treatment prior to the discharge of stormwater runoff into native or restored habitat areas or shallow groundwater systems. To the maximum extent feasible, water quality management for future land-use scenarios should rely on the use of "natural treatment systems" such as water quality wetlands, swales and infiltration areas described in Management Measures 6B and 6C of the State Nonpoint Source Plan (Plan for California's Nonpoint Source Pollution Control Program, July 2000). These systems should address both dissolved and particulate-bound pollutants. Where feasible, such natural treatment systems should maintain existing hydrologic patterns, including infiltration of treated waters into groundwater systems, and should not displace existing significant habitat. Natural treatment systems should be capable of treating dry season nuisance flows, non-storm wet season flows and 1-2 year storms *(Sections 3.6, 4.5)*.

  - Planning should consider restoration of upland vegetation and riparian habitat as a strategy, where appropriate, to reduce loadings from uplands, and increase assimilation of pollutants *(Sections 3.6, 4.5)*.

  - Planning should consider infiltration in conjunction with created wetlands and recharge ponds as another strategy to assimilate and transform pollutants as near to the source as possible. Such systems should protect existing shallow groundwater aquifers *(Sections 3.6, 4.5)*.

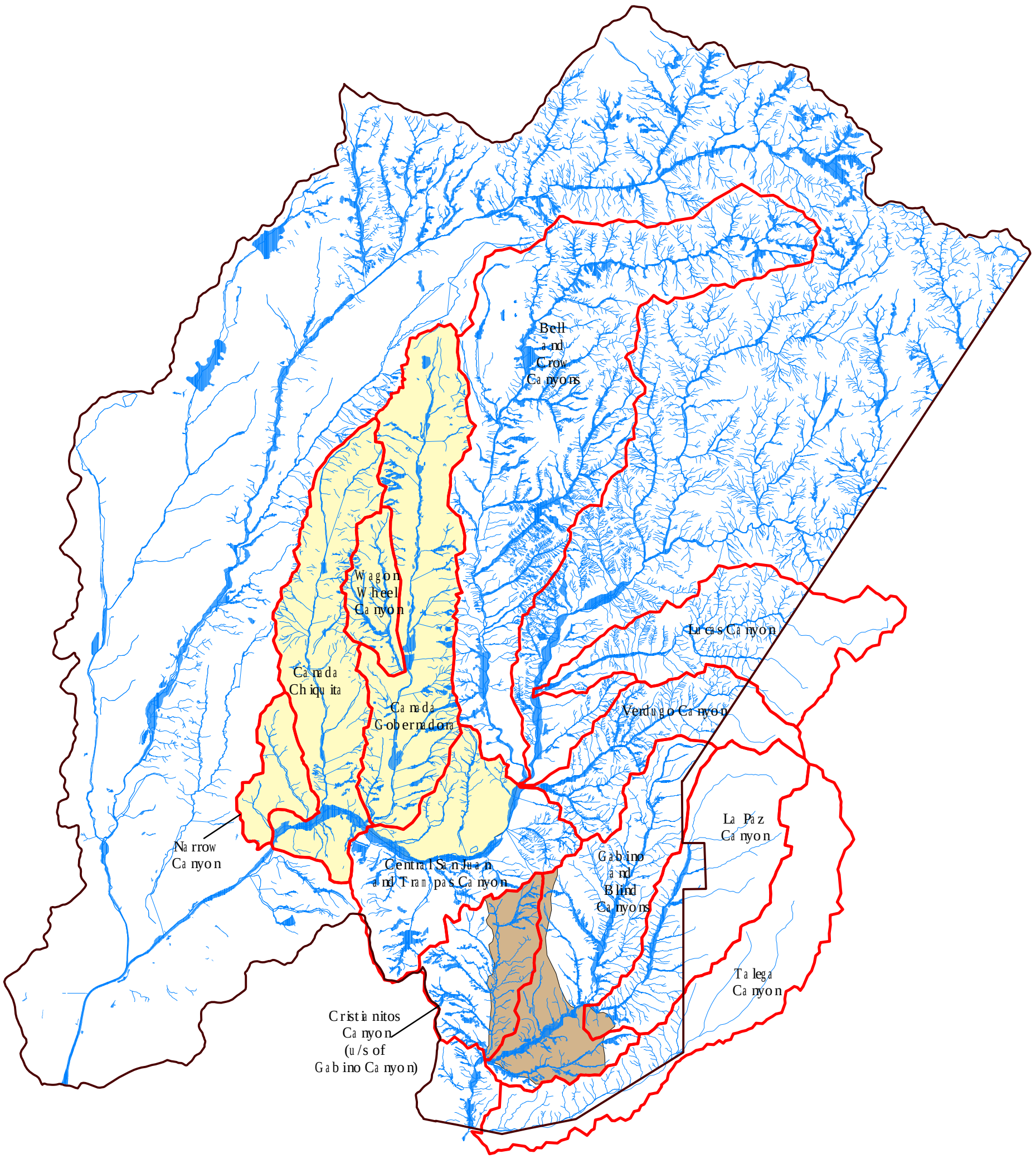
  - Planning should assess the need for changing agricultural practices to reduce nutrient loading consistent with applicable water quality requirements.

- Dry season and stormwater discharges under future land use scenarios should achieve appropriate levels of treatment for nutrients, metals, pathogens and other potential pollutants. Stormwater discharges should address the policies established by the San Diego Regional Water Quality Control Board and the County of Orange for purposes of preparing a Jurisdictional Urban Runoff Management Program pursuant to the Regional Board's Stormwater Program. Areas that contain aquatic habitats supporting sensitive aquatic species should receive particular attention and meet appropriate water quality requirements *(Sections 3.6, 4.5)*.

1C. SPATIAL REPRESENTATION OF WATERSHED SCALE TERRAINS AND HYDROLOGY PLANNING CONSIDERATIONS

The following series of maps were prepared by RMV consultants to spatially represent the indicated watershed considerations to facilitate discussions regarding watershed scale criteria:

- Areas with Low Density of Channels (Geomorphology & Terrains).
- Infiltration and Runoff (Geomorphology & Terrains).
- Timing of Peak Flows (Hydrology).
- Sediment Sources and Transport (Sediment).
- Groundwater Dependent Riparian Areas (Groundwater Hydrology).
- Geomorphic Terrains (Geomorphology and Terrains).
- Primary Geologic Formations Map/Bedrock Derived Baseflow (Groundwater Hydrology).
- Potential Sources of Nutrients and Turbidity (Water Quality).



*Note: Channels equal areas with defined bed and bank features.

N

0.9 0 0.9 1.8 Miles

Source: ACOE 2000 and PCR 2002.

Figure 3

Baseline Conditions Report
Watershed Scale Considerations
Areas with Low Density of Channels*

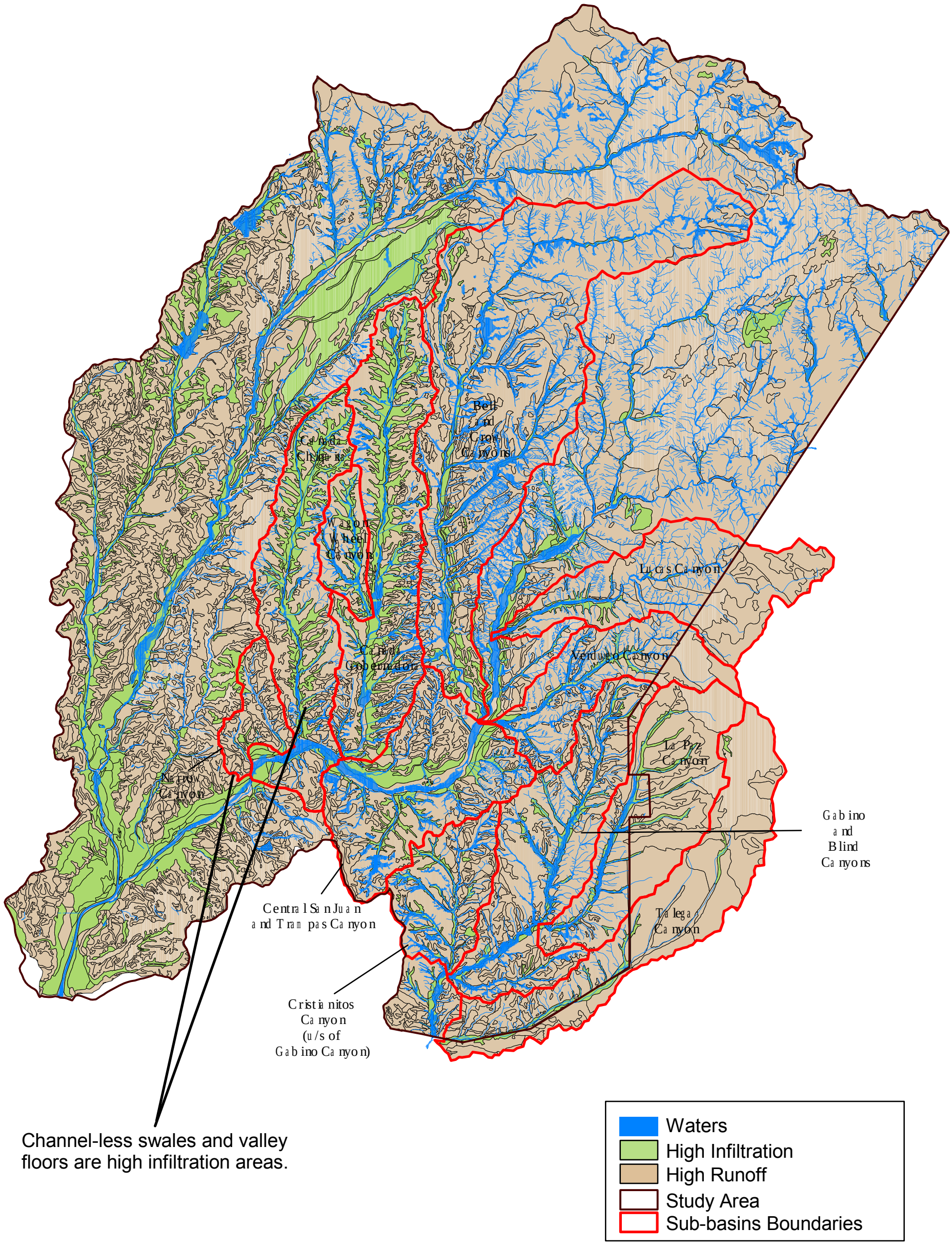


Figure 4
Baseline Conditions Report
Watershed Scale Considerations
Infiltration and Runoff

Bell and Crow Canyons

Wagon Wheel Canyon

Lucas Canyon

Canada Chiquita

Canada Gobernadora

Verdugo Canyon

La Paz Canyon

Narrow Canyon

Central San Juan and Trampas Canyon

Gabino and Blind Canyons

Talega Canyon

Cristianitos Canyon (u/s of Gabino Canyon)

Waters

Sub-basins where decrease in time of concentration poses risk of amplification of downstream peak flows

Sub-basins where timing of peak flows coincide with each other

Unlike other sub-basins, discharge from Central San Juan is diffuse; therefore, timing of peak flows are not as relevant

Study Area

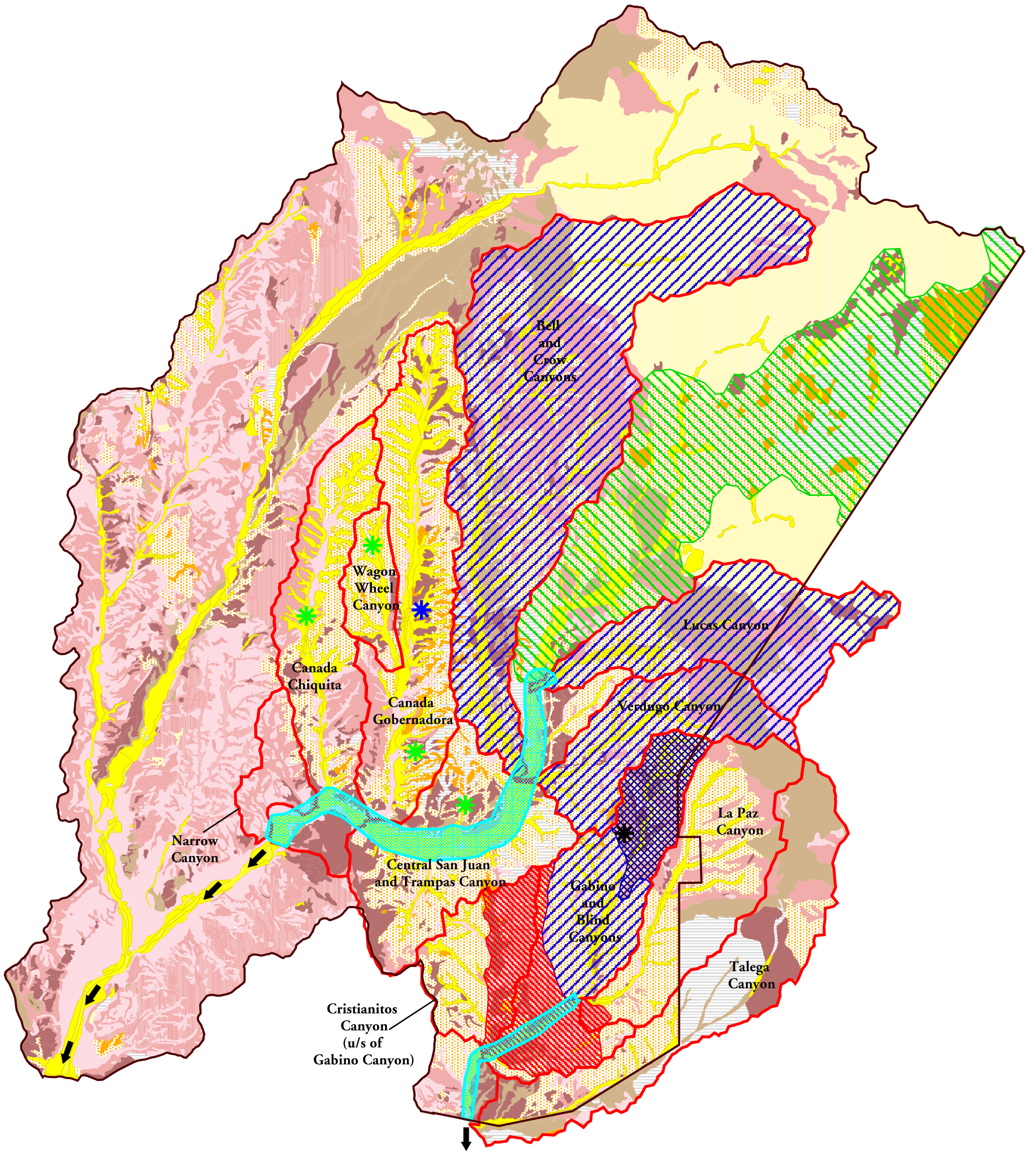
Sub-basins Boundaries

N

0.9 0 0.9 1.8 Miles

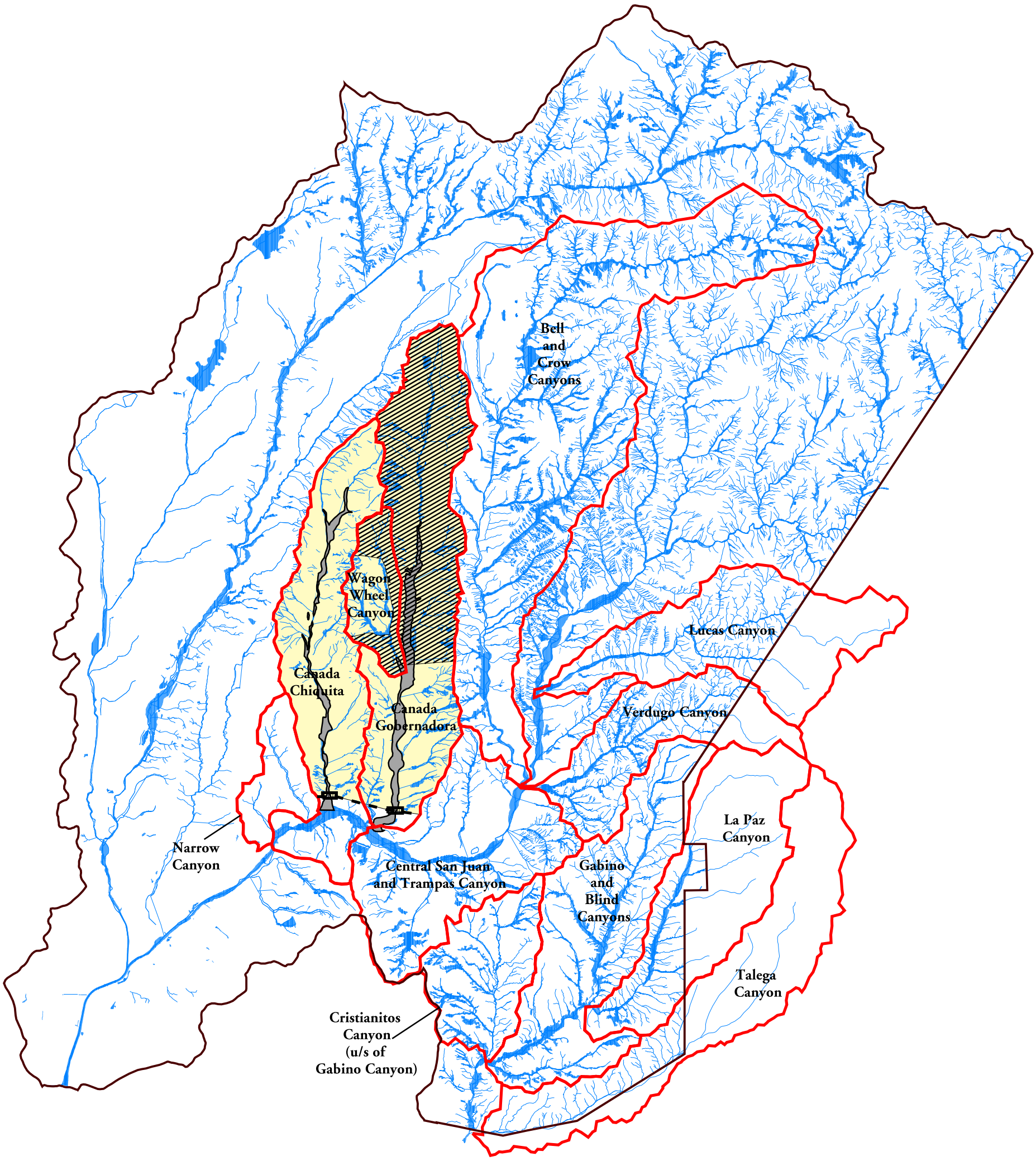
Source: ACOE, PWA 2000 and PCR 2002.

Figure 5
Baseline Conditions Report
Watershed Scale Considerations
Timing of Peak Flows



Source: ACOE, BH, PWA 2000 and PCR 2002.

Figure 6
Baseline Conditions Report
Watershed Scale Considerations
Sediment Sources and Transport



N

0.9 0 0.9 1.8 Miles

Source: ACOE, PWA, BH 2000 and PCR 2002.

Figure 7
Baseline Conditions Report
Watershed Scale Considerations
Groundwater Dependent Riparian Areas

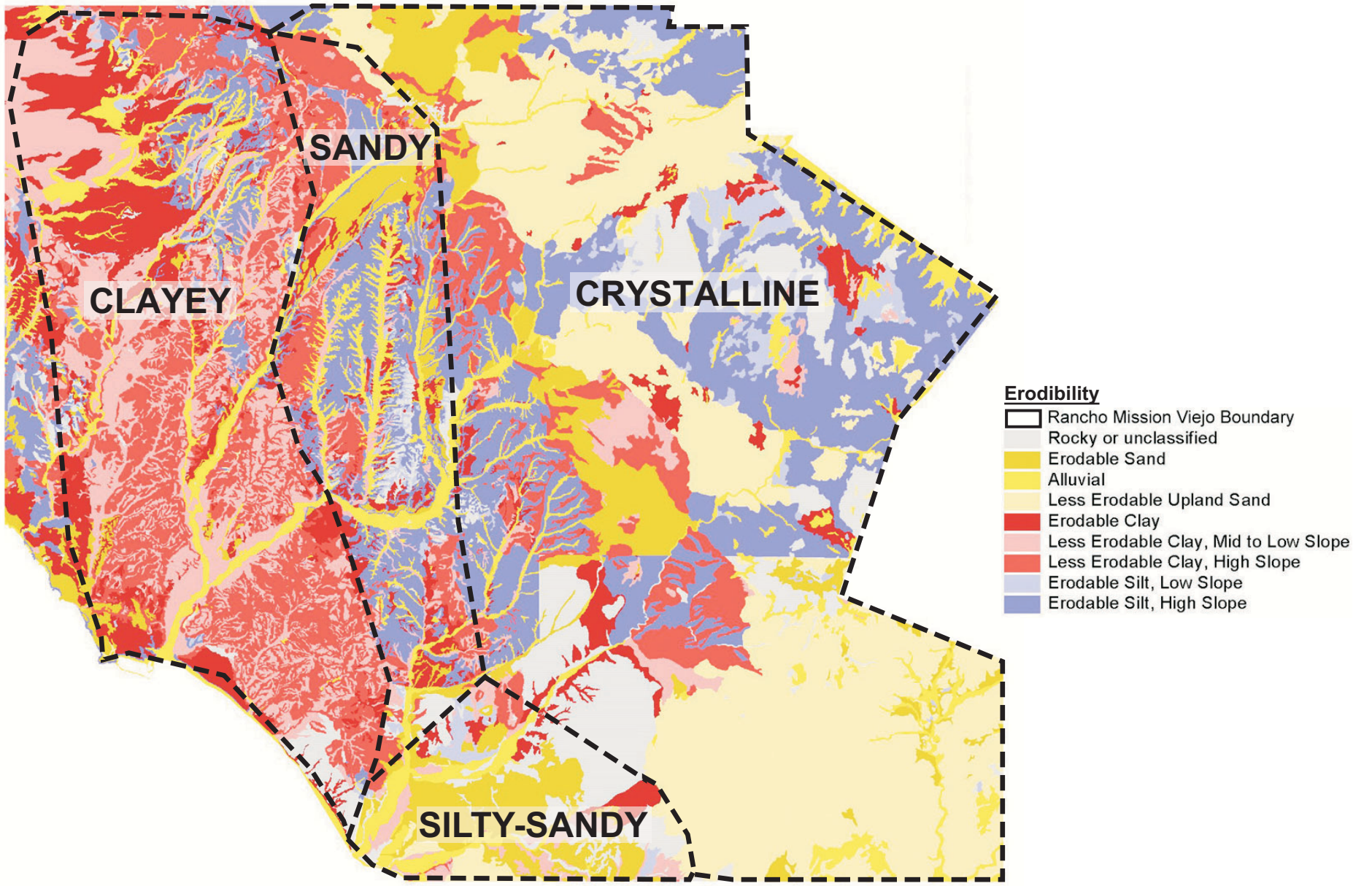
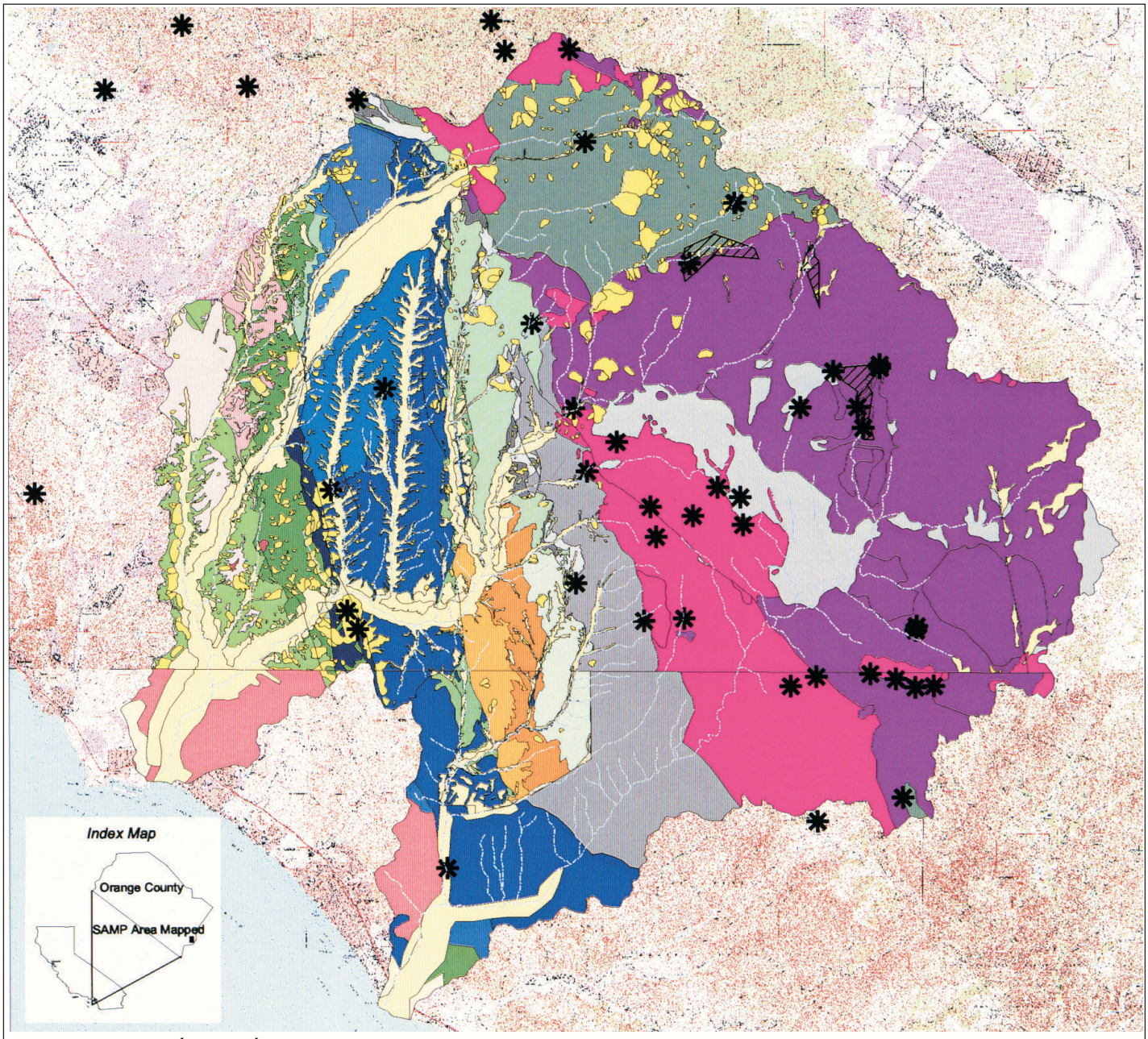


Figure 8
Baseline Conditions Report
Watershed Scale Considerations
Geomorphic Terrains



Legend

Sem-consolidated sandstones yielding substantial baseflow
- San Onofre Breccia
- Santiago Formation
- Sespe Formation
- Vaqueros Formation
- Undifferentiated San Onofre Breccia, Topanga, and Monterey Formations
- Undifferentiated Sespe and Vaqueros Formations

Granitic Rocks
- Mixed granitic rocks generating substantial baseflow

Volcanic and metavolcanic rocks generating substantial baseflow
- Santiago Peak volcanics
- Elsinore Peak basalt and Santa Rosa basalt

Consolidated sandstones and other coarse-grained sediments yielding discernible baseflows
- Pleasant sandstone member of Williams Formation
- Schulz Ranch "sandstone" member of Williams Formation

Broadly-fractured sandstones and shales locally yielding baseflow
- Monterey Formation
- Siltstone facies of Capistrano Formation
- Topanga Formation

Fine grained consolidated sediments yielding little baseflow
- Bedford Canyon Formation
- Lower Schulz Ranch "siltstone" member of Williams Formation
- Silverado Formation
- Starr member of Williams Formation

Major unconsolidated deposits not likely to generate baseflows
- Niguel Formation
- Oso Sandstone member of Capistrano Formation
- Undifferentiated Capistrano Formation
- Undifferentiated Puente and Capistrano Formations

Metasediments of Trabuco and Ladd Formations
- Holtz Shale member of Ladd Formation
- Trabuco Formation
- Undifferentiated Williams, Ladd, and Trabuco Formations
- Undifferentiated metasedimentary
- Baker Canyon member of Ladd Formation

Other unconsolidated deposits locally yielding limited baseflows
- Marine Terrace Deposits
- Alluvium, colluvium, and non-marine terrace deposits
- La Vida member of Puente Formation
- Landslides

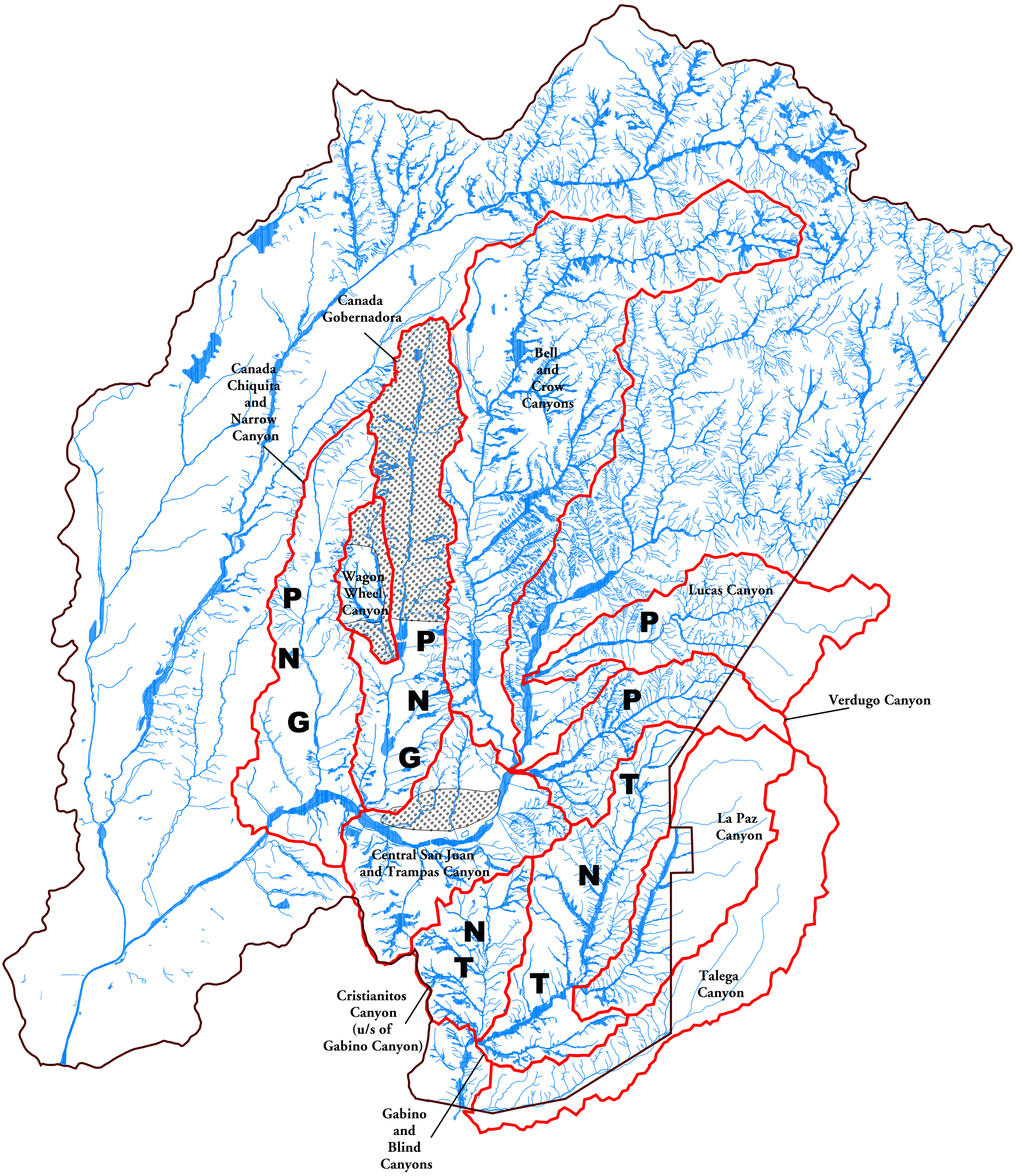
- Potreros (historic summer pasture)
- Major Watershed Creeks
- Springs

N

0 2 4 Miles

Source: Balance Hydrologics, Inc., 2002

Figure 9
Baseline Conditions Report
Watershed Scale Considerations
Bedrock Derived Baseflow



Source: ACOE, BH, PWA 2000 and PCR 2002.

Figure 10
Baseline Conditions Report
Watershed Scale Considerations
Potential Sources of Nutrients and Turbidity

1D. RELATIONSHIP OF PLANNING PRINCIPLES TO SAMP TENETS

Section 1A of this document sets forth the tenets established by the ACOE and CDFG for the SAMP/MSAA program. These tenets and the amplification thereof are overall program goals that support the stated purpose of the SAMP to develop and implement a watershed-wide aquatic resource management plan and implementation program. The Planning Principles set forth in Section 1B are derived from the Baseline Report and focus on the geomorphological and hydrologic processes that shape and alter the creek systems in the planning area over time. Application of both the SAMP tenets and planning principles to the San Juan and San Mateo watershed landscapes will facilitate the identification and subsequent evaluation of a range of aquatic resources reserve program alternatives which recognize the unique attributes of the planning area, achieve the overall program goals, and purpose of the SAMP. The relationship of specific tenets and principles (in abbreviated form) to each other is noted below.

i) No Net Loss of Acreage and Functions of Waters of the U.S./State

- Principle 2: emulate existing runoff/infiltrations patterns
- Principle 3: address potential effects of future land uses on hydrology
- Principle 5: maintain geomorphic structure of major tribs/floodplains
- Principle 8: protect existing groundwater recharge areas

ii) Maintain/Restore Riparian Ecosystem Integrity

- Principle 1: account for hydrologic response of different terrains
- Principle 2: emulate existing runoff/infiltrations patterns
- Principle 3: address potential effects of future land uses on hydrology
- Principle 4: minimize alteration of timing of peak flows
- Principle 7: use infiltration of sandy terrains for groundwater recharge
- Principle 8: protect existing groundwater recharge areas
- Principle 9: protect water quality

iii) Protect Headwaters

- Principle 1: account for hydrologic response of different terrains
- Principle 2: emulate existing runoff/infiltrations patterns
- Principle 3: address potential effects of future land uses on hydrology

iv) Maintain/Protect/Restore Riparian Corridors

- Principle 4: minimize alteration of timing of peak flows
- Principle 5: maintain geomorphic structure of major tribs/floodplains
- Principle 7: use infiltration of sandy terrains for groundwater recharge
- Principle 8: protect existing groundwater recharge areas

v) Maintain or Restore Floodplain Connection

- Principle 1: account for hydrologic response of different terrains
- Principle 2: emulate existing runoff/infiltrations patterns
- Principle 5: maintain geomorphic structure of major tribs/floodplains

vi) Maintain and/or Restore Sediment Sources and Transport Equilibrium

- Principle 5: maintain geomorphic structure of major tribs/floodplains
- Principle 6: maintain coarse sediment yields, storage and transport processes

vii) Maintain Adequate Buffer for the Protection of Riparian Corridors

- Principle 1: account for hydrologic response of different terrains
- Principle 5: maintain geomorphic structure of major tribs/floodplains
- Principle 8: protect existing groundwater recharge areas

viii) Protect Riparian Areas and Associated Habitats of Listed and Sensitive Species

- Principle 2: emulate existing runoff/infiltrations patterns
- Principle 4: minimize alteration of timing of peak flows
- Principle 5: maintain geomorphic structure of major tribs/floodplains
- Principle 6: maintain coarse sediment yields, storage and transport processes
- Principle 7: use infiltration of sandy terrains for groundwater recharge
- Principle 8: protect existing groundwater recharge areas
- Principle 9: protect water quality using a variety of strategies

SECTION 2: SUB-BASIN SCALE PLANNING CONSIDERATIONS

The Planning Considerations identified in this section are intended to be used at the sub-basin or sub-watershed scale. The Planning Considerations are divided 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 WES observations (as interpreted by RMV consultants and not necessarily reflective of ACOE official guidance or policy).

- A depiction of the hydrology, water quality and habitat integrity for each sub-basin as mapped by the ACOE. The ACOE maps displaying the average of relevant indicator scores for each reach within the study area ranging from 1 (lowest integrity) to 5 (highest integrity) for hydrologic, water quality, and habitat integrity indices are provided in Appendix A. The average for the indicators that contribute to hydrologic, water quality, and habitat integrity scores for each sub-basin are displayed accordingly: Chiquita (Figures 12, 13, and 14), Gobernadora (21, 22, and 23), Wagon Wheel (30, 31, and 32), Verdugo (Figures 42, 43, and 44), Gabino (Figures 58, 59, and 60), and La Paz (Figures 65, 66, and 67).

- A summary of the Planning Considerations – Significant Terrains and Hydrology Features of the sub-basin.

- A summary of Planning Recommendations for the sub-basin.

- A set of maps and aerial photos highlighting both Planning Considerations for Significant Terrains and Hydrology Features and Planning Recommendations from the Baseline Report and supplementary field studies and observations.

No direct source citations are provided for the text and data derived from the Baseline Report as each sub-basin corresponds to the analogous section in the baseline report (i.e., *Sections 6.1.1* through *6.1.4* for sub-basins in the San Juan Creek Watershed and Sections *6.2.1* through *6.2.4* for those within the San Mateo Watershed).

4

2A. SAN JUAN CREEK WATERSHED

i) Chiquita Sub-basin

WES General Assessment and Conclusions

- Overall Hydrologic function is high.
- Overall Water Quality and Habitat Integrity is moderate.
- Hydrologic regime is intact. No significant diversions, retention facilities, etc.
- High indicator scores of extent of riparian vegetation and floodplain interaction.
- Riparian corridor breaks at the drainage basin scale, especially in the area at and immediately below Oso Parkway.
- Moderately altered sediment regime, as indicated by entrenched stream reaches.
- Agricultural land use results in risk of nutrient, pesticide, and sediment loading to the stream.
- Lack of native plant buffer and agricultural land use in the sub-basin poses risks to water quality and habitat integrity.
- Habitat integrity could be increased by establishment of native plant buffers.

Chiquita and Narrow

Legend

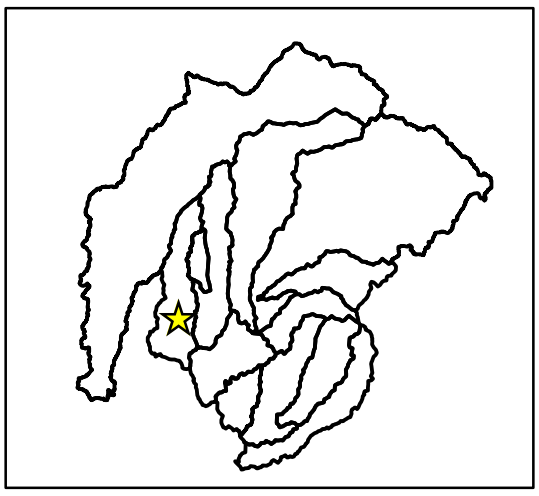
Sub-basin Watershed Boundary

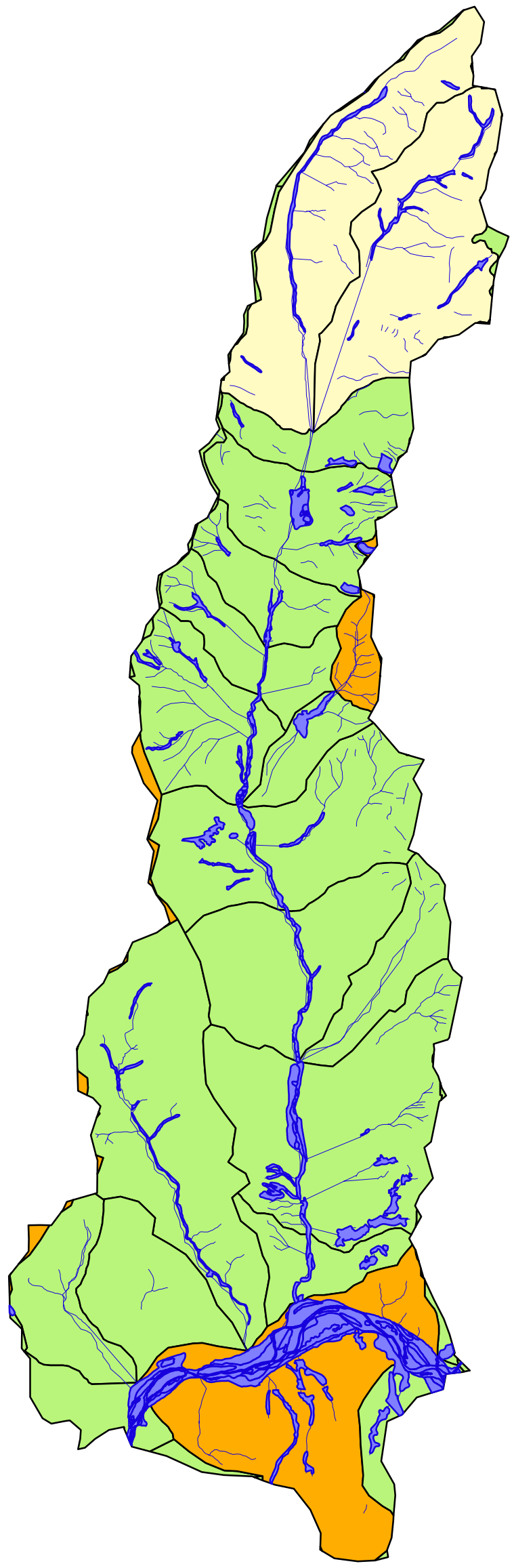
Riparian and Wetland Vegetated Areas per WES

N

3000 0 3000 Feet

Figure 11
Chiquita and Narrow Sub-basins





Waters

Water Quality Ranking

5 Highest Integrity

4

3

2

1 Lowest Integrity

Note: Data from WES Functional Evalution.

N

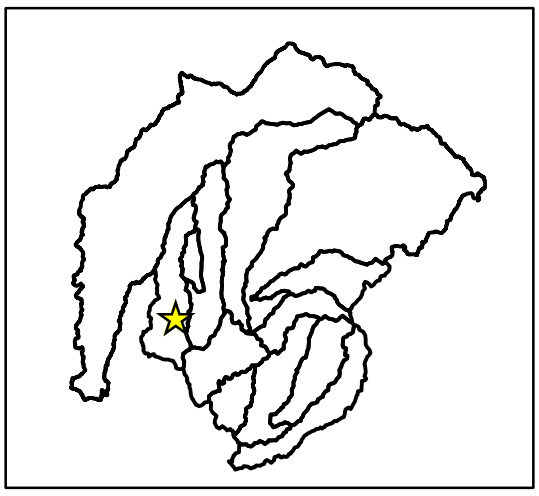
0.4 0 0.4 0.8 Miles

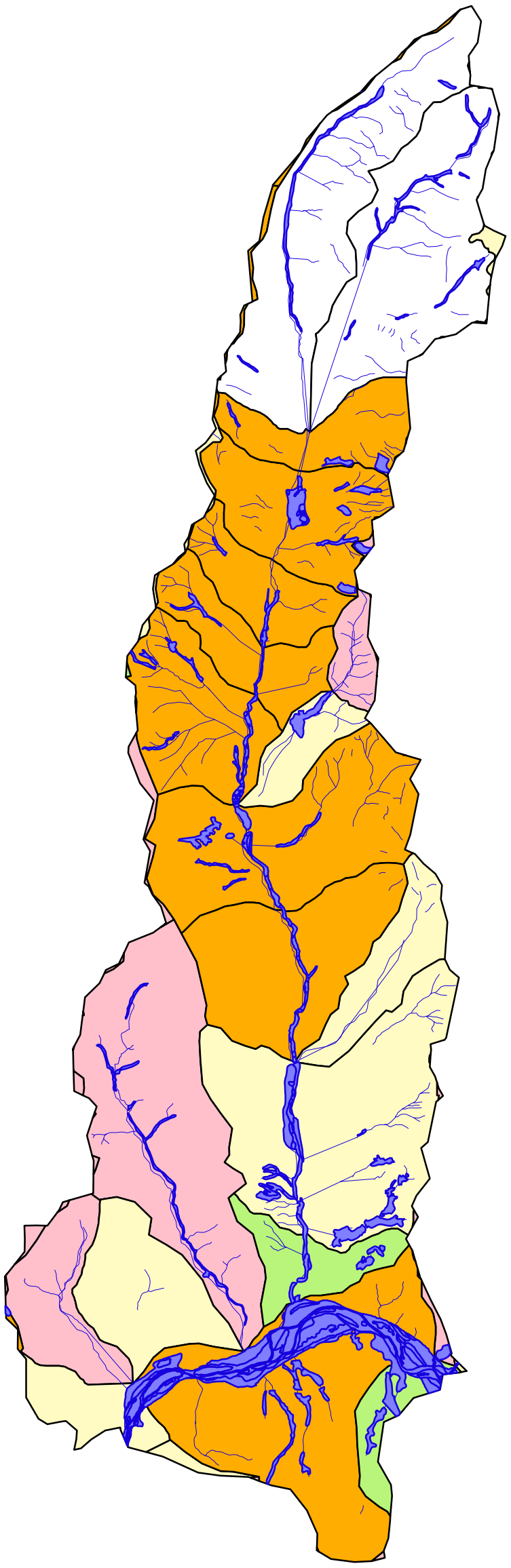
Source: ACOE 2000 and PCR 2002.

Figure 12

Water Quality Integrity Ranking

Canada Chiquita and Narrow Sub-basins





Waters

Hydrology Ranking

5 Highest Integrity

4

3

2

1 Lowest Integrity

Note: Data from WES Functional Evalution.

N

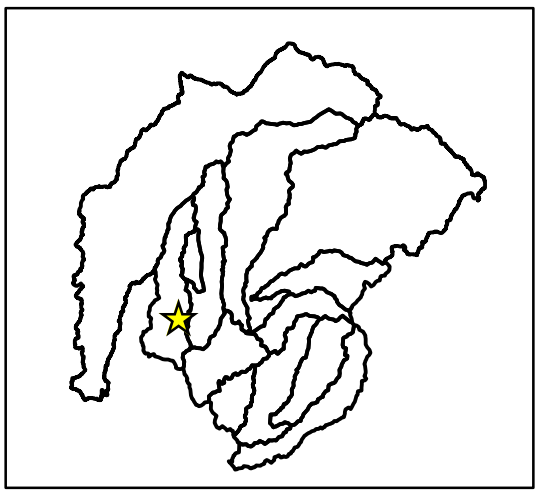
0.4 0 0.4 0.8 Miles

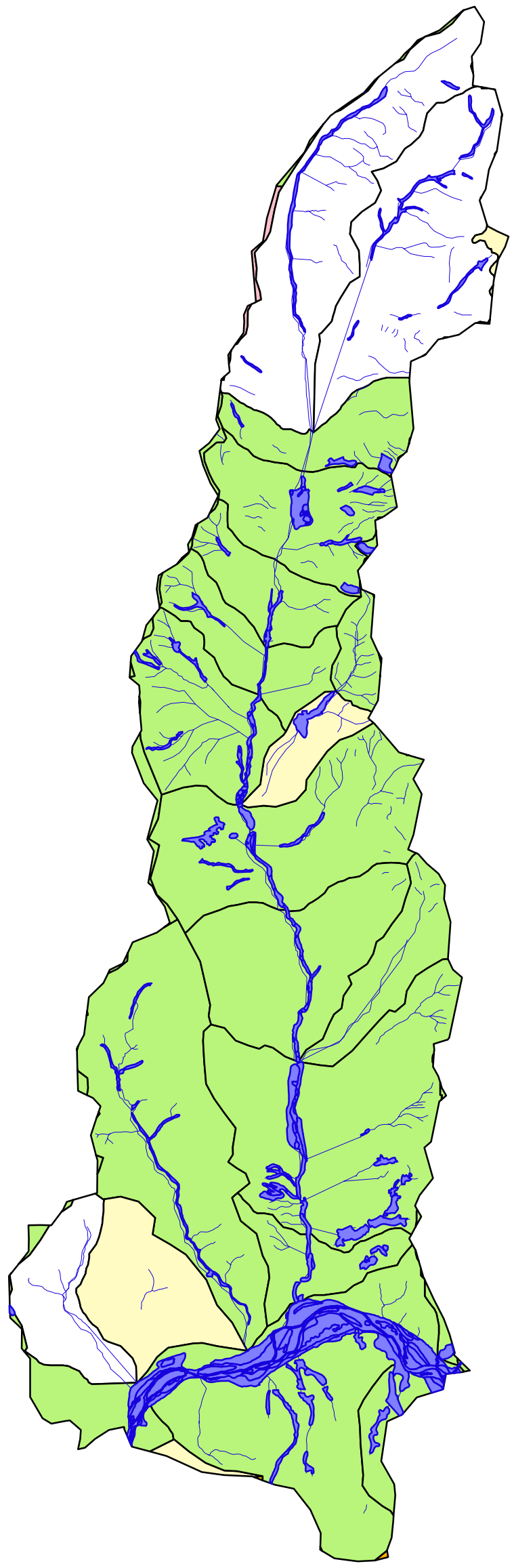
Source: ACOE 2000 and PCR 2002.

Figure 13

Hydrology Integrity Ranking

Canada Chiquita and Narrow Sub-basins





Waters

Habitat Ranking

5 Highest Integrity

4

3

2

1 Lowest Integrity

Note: Data from WES Functional Evalution.

N

0.4 0 0.4 0.8 Miles

Source: ACOE 2000 and PCR 2002.

Figure 14

Habitat Integrity Ranking

Canada Chiquita and Narrow Sub-basins

Planning Considerations - Significant Terrains and Hydrologic Features

- Main canyon and side canyon terrains are primarily sandy or silty sand and the sub-basin generally has high infiltration capacity.

- Side canyons (particularly east of the creek) contain deep sandy deposits and serve important hydrologic functions through infiltrating low volume storms to groundwater and high volume storms to the main stream channel.

- Ridges on the east side of the valley are characterized by, rock outcroppings, and areas of hardpan which are eroded remnants of claypans formed in the geologic past that have eroded to form mesas, and locally steep slopes. These areas have minimal infiltration and channel flows into the major side canyons.

- The sandy substrates beneath the tributary swales make them prone to incision under existing and altered hydrologic regimes.

- Based on comparisons with 1938 aerial photographs, the main creek channel has been relatively stable over the last 60 years. The deepening of the creek channel in portions of the mainstem of Chiquita Creek may be a result of long-term, gradual geologic processes, terrains, land use, or a combination of factors. The current channel bed elevation may be somewhat stabilized by pre-historic cohesive lake-bed or quiet-water sediments.

- Groundwater derived from beneath the hill slopes and ridges is a major source of water contributing to the perennial nature of the creek system. Inferences have been drawn indicating that water levels in the alluvium below Chiquita Creek are at least in large part isolated from those in the sands and gravels beneath San Juan Creek, by a sub-surface barrier to groundwater movement into San Juan Creek.

- The sub-basin provides some of the lowest predicted sediment yields and transport rates of the sub-basins analyzed in the San Juan watershed, except during extraordinary episodic events, when large volumes of coarse sediment may be mobilized and transported to San Juan Creek.

- Relative to Gobernadora Creek and lower Gabino Creek, the area of floodplain connection is fairly limited. The hydrologic connections, both surface and subsurface, to the main side canyons appear to be more important in hydrologic terms than the floodplain connection.

- The combination of perennial flow in the Chiquita Creek and subsurface water movement in Chiquita Canyon support riparian habitats, freshwater and alkaline marsh and slope wetlands.

- Many of the slope wetlands on the east side of the valley appear to be sustained by large volumes of stored groundwater within the Santiago (and to a lesser extent the Sespe) formations that move along low permeability silt beds and discharge at breaks in the slope. The slope wetlands on the west side of the valley are sustained by fairly localized recharge of San Onofre breccia and derivative landslide deposits.

Planning Recommendations

- Consistent with the SAMP Tenets, protect the headwaters of Upper Chiquita Canyon.

- Avoid creating impervious surfaces in the sandy soils of the canyon floor. To the extent feasible, land uses in the major side canyons should be limited to primarily pervious surfaces in order to maintain infiltration.

- Emulate existing terrains/hydrology and sediment transport processes by locating development on the ridges, which under present conditions have higher runoff rates and direct surface runoff flows to the permeable substrate of the major side canyons and along the valley floor.

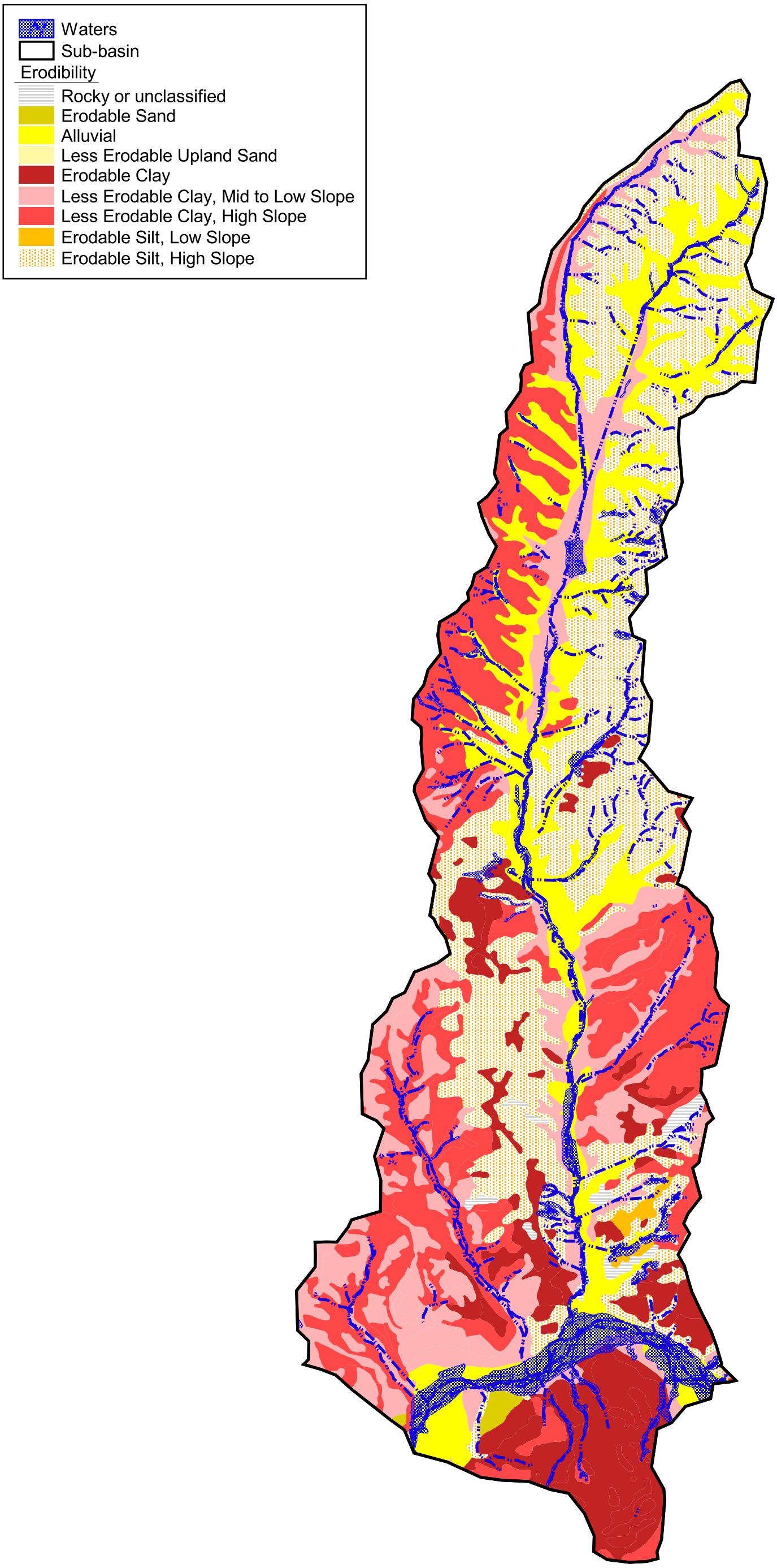
- Promote stormwater surface flow connectivity between the major side canyons and the main stream channel to maintain transient surface channel connections that occur following extreme rainfall events, without significantly changing connections during small storms.

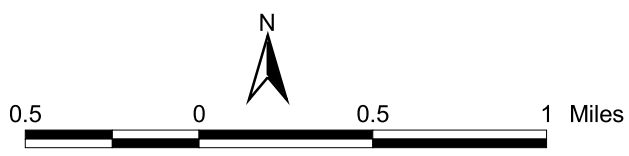
- Identify natural treatment systems for water quality treatment and stormwater detention that would be appropriate in the sandy soils of the major side canyons and the valley floor.

- Maintain groundwater recharge to the shallow subsurface water system to sustain flows to Chiquita Creek.

- Address existing areas of channel incision that result from primarily localized processes/land use practices, as contrasted with terrace-forming valley-deepening areas that are primarily a result of long-term geologic conditions. Site by site geomorphic analysis will be undertaken to define these areas.

- To the maximum extent practical, avoid direct impacts to the slope wetlands and maintain primary recharge characteristics that support these wetlands.





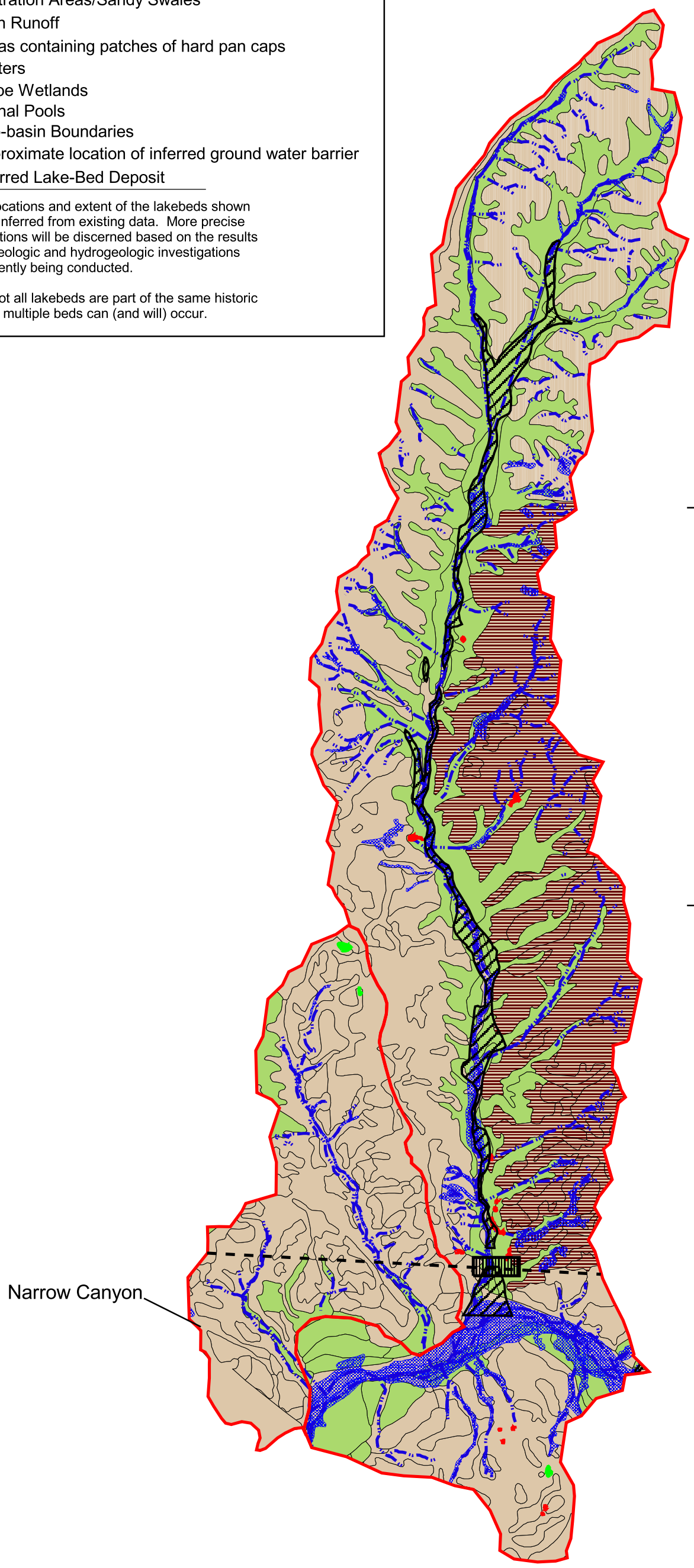
Source: ACOE and Balance Hydrologics, INC 2000.

Figure 15
Sub-Basin Geomorphic / Hydrologic Features
Landscape Scale Terrains for the
Chiquita and Narrow Canyon Sub-basins

Infiltration Areas/Sandy Swales
High Runoff
Areas containing patches of hard pan caps
Waters
Slope Wetlands
Vernal Pools
Sub-basin Boundaries
Approximate location of inferred ground water barrier
Inferred Lake-Bed Deposit

(a) locations and extent of the lakebeds shown are inferred from existing data. More precise locations will be discerned based on the results of geologic and hydrogeologic investigations currently being conducted.

(b) not all lakebeds are part of the same historic lake; multiple beds can (and will) occur.



Upper Chiquita

Middle Chiquita

Lower Chiquita

N

0.4 0 0.4 0.8 Miles

Source: ACOE, PWA 2000 and PCR 2002.

Figure 16
Sub-basin Geomorphic/Hydrologic Features
Chiquita and Narrow Canyon Sub-Basins
Infiltration and Runoff

Arroyo Toad
(# = approx # of observations in 1998 & 2001)
Least Bell's Vireo
Southwestern Willow Flycatcher
Vernal Pool
Slope Wetlands
Sub-basin Boundary
Rancho Mission Viejo Boundary

The narrow confined main channel results from long-term gradual geologic processes (i.e. long-term terrace-forming valley deepening), terrains, land use, or a combination of factors.

Break in riparian corridor

Narrow confined creek channel

Opportunity for water quality natural treatment systems

Road crossing

Opportunity for water quality natural treatment systems

Vernal Pool 4
- San Diego Fairy Shrimp
- Riverside Fairy Shrimp

Vernal Pool 5

Vernal Pool 6

Narrow confined creek channel

Opportunity for water quality natural treatment systems

Road crossing

Head cutting

Opportunity for water quality natural treatment systems

29

6

3

19

Vernal Pool 1
- San Diego Fairy Shrimp

Vernal Pool 2
- San Diego Fairy Shrimp
- Riverside Fairy Shrimp

Vernal Pool 8

Vernal Pool 7
- San Diego Fairy Shrimp
- Riverside Fairy Shrimp

N

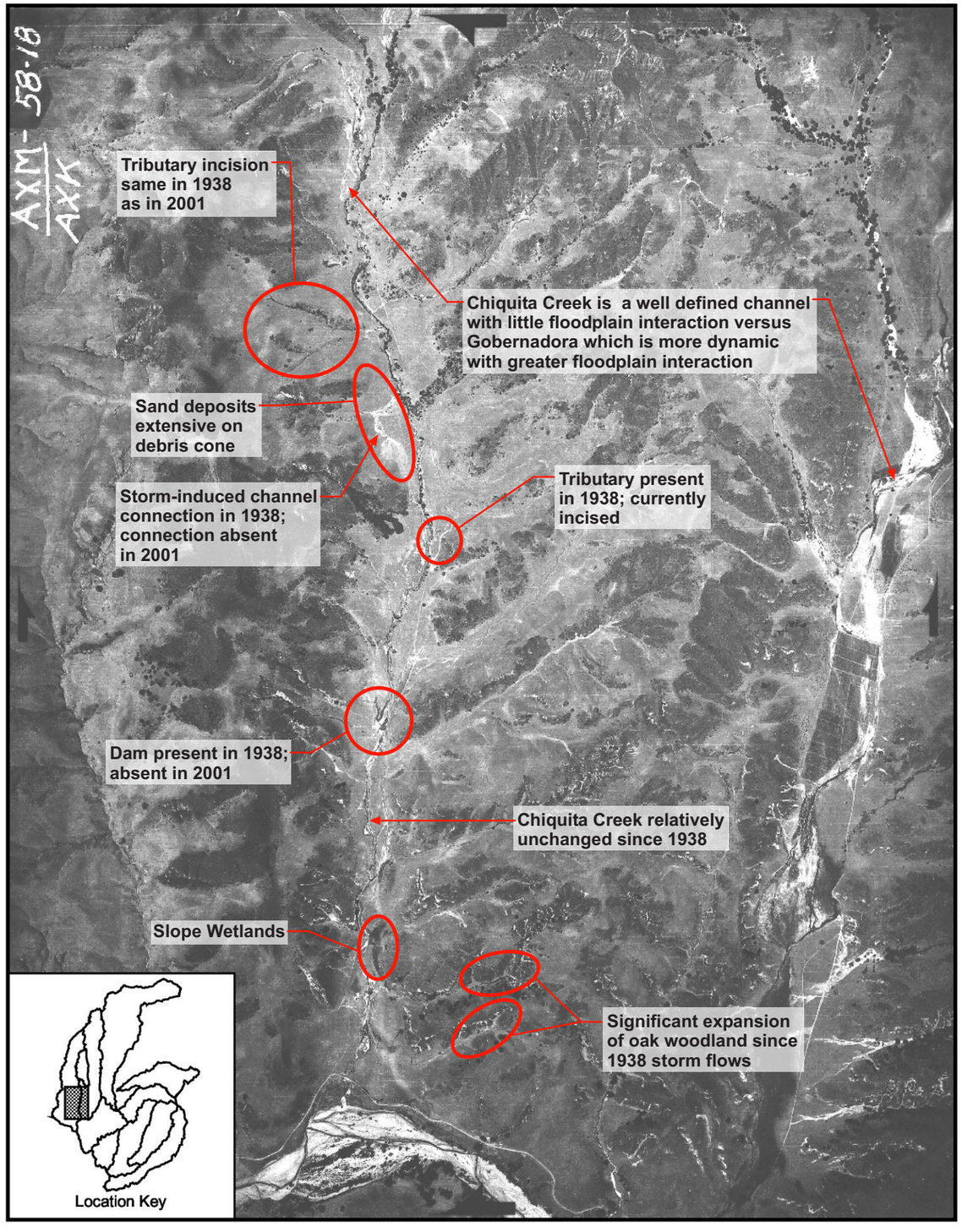
3000 0 3000 Feet

Source: Eagle Aerial Imaging 2001 and PCR 2002.

Figure 17

Sub-basin Geomorphic/Hydrologic Features Canada Chiquita Opportunities for Restoration/Stabilization and Water Quality Natural Treatment Systems

1938



2001

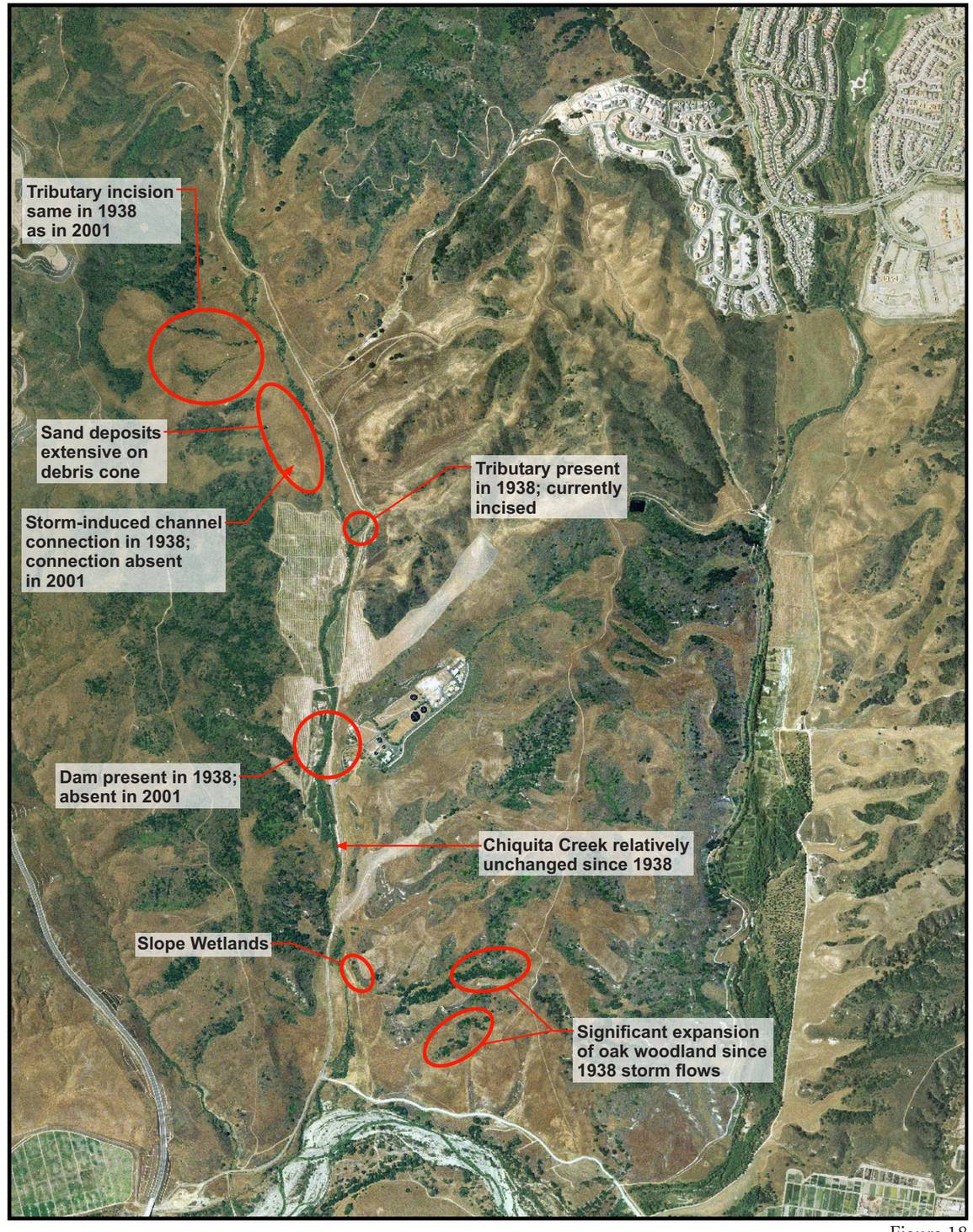
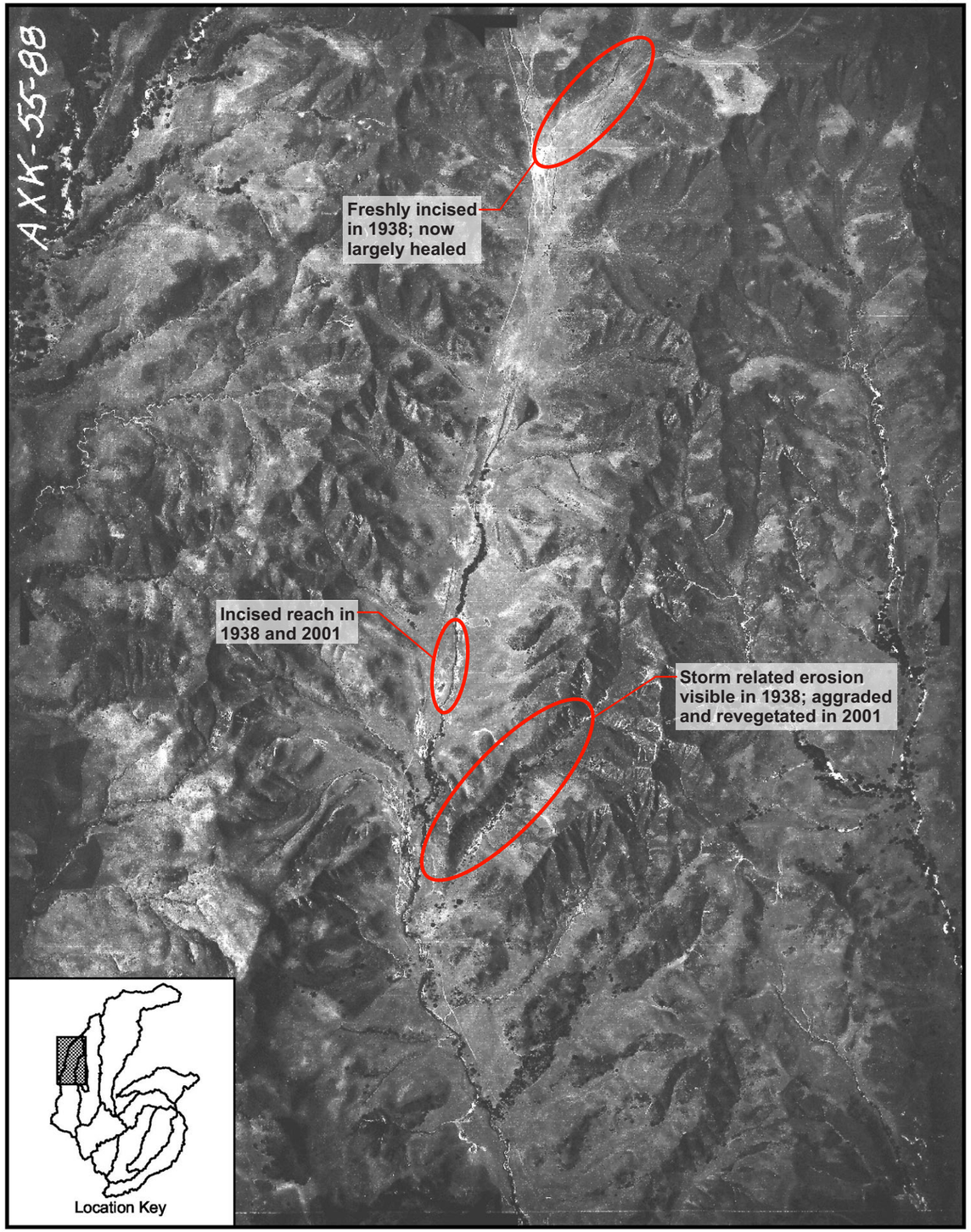


Figure 18
Lower Chiquita
1938 and 2001 Aerial Photographs

1938



2001

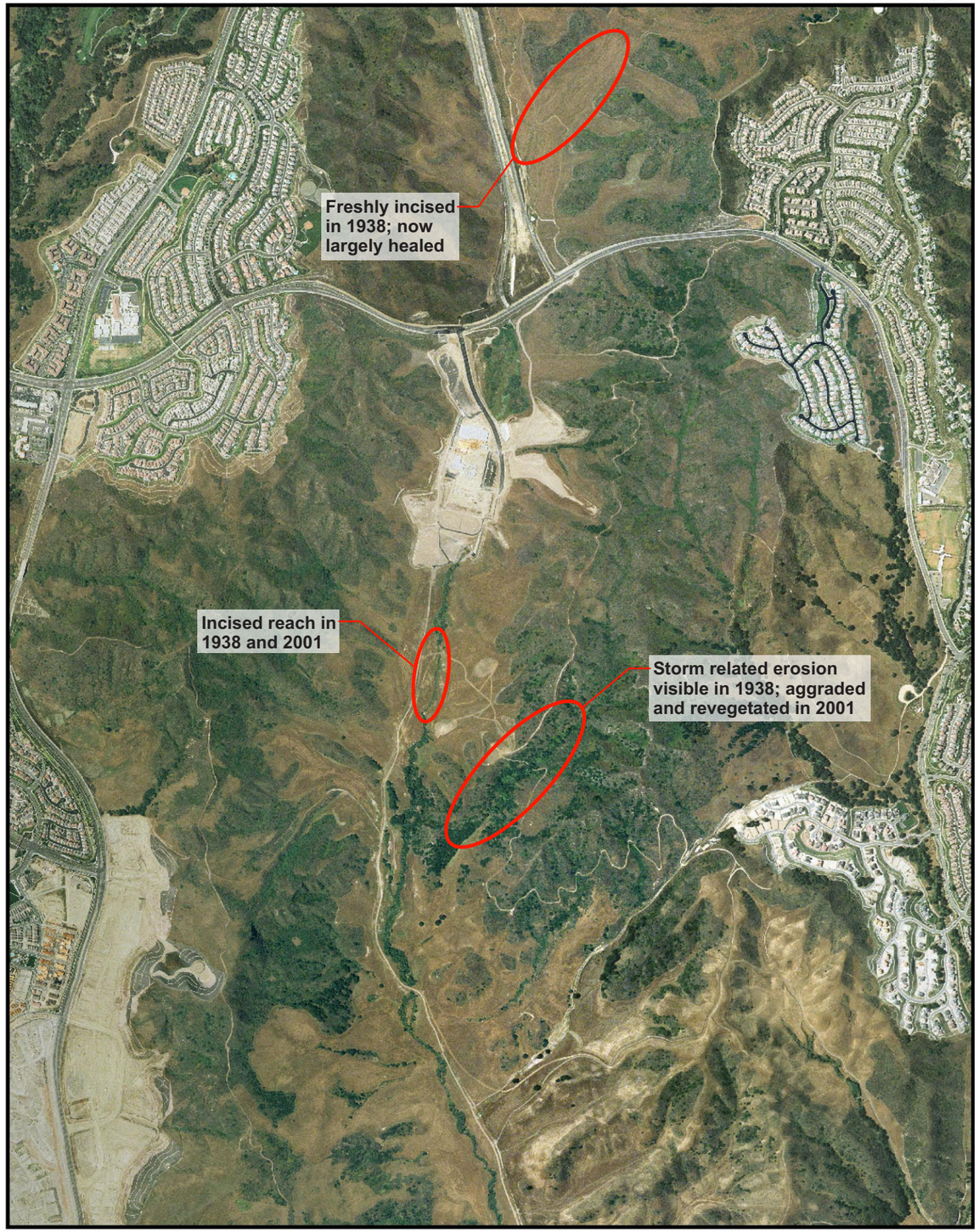


Figure 19
Upper Chiquita
1938 and 2001 Aerial Photographs

5

ii) Cañada Gobernadora Sub-basin and Central San Juan North of San Juan Creek

WES General Assessment and Conclusions

- Significant differences in riparian integrity below the RMV boundary vs. upstream of the RMV boundary (i.e., within Coto de Caza).
- Overall Hydrology and Water Quality integrity for the entire sub-basin is moderate. Overall Hydrology and Water Quality integrity for the portion of the sub-basin downstream of the RMV boundary is significantly higher than the portion upstream of the RMV boundary.
- Overall, Habitat Integrity for the entire sub-basin is low; however, Habitat Integrity for the portion of the sub-basin downstream of the RMV boundary is moderate.
- Downstream of the RMV boundary, the channel-floodplain interaction is generally intact and the flood-prone area supports riparian vegetation.
- The integrity of the mainstream is adversely affected by perennialized stream flow.
- Habitat integrity could be increased by establishment of native plant buffers adjacent to the stream.
- Water Quality integrity is adversely affected by altered sediment regime.
- Agricultural land uses result in risk of nutrient, pesticide and sediment loading to the stream.

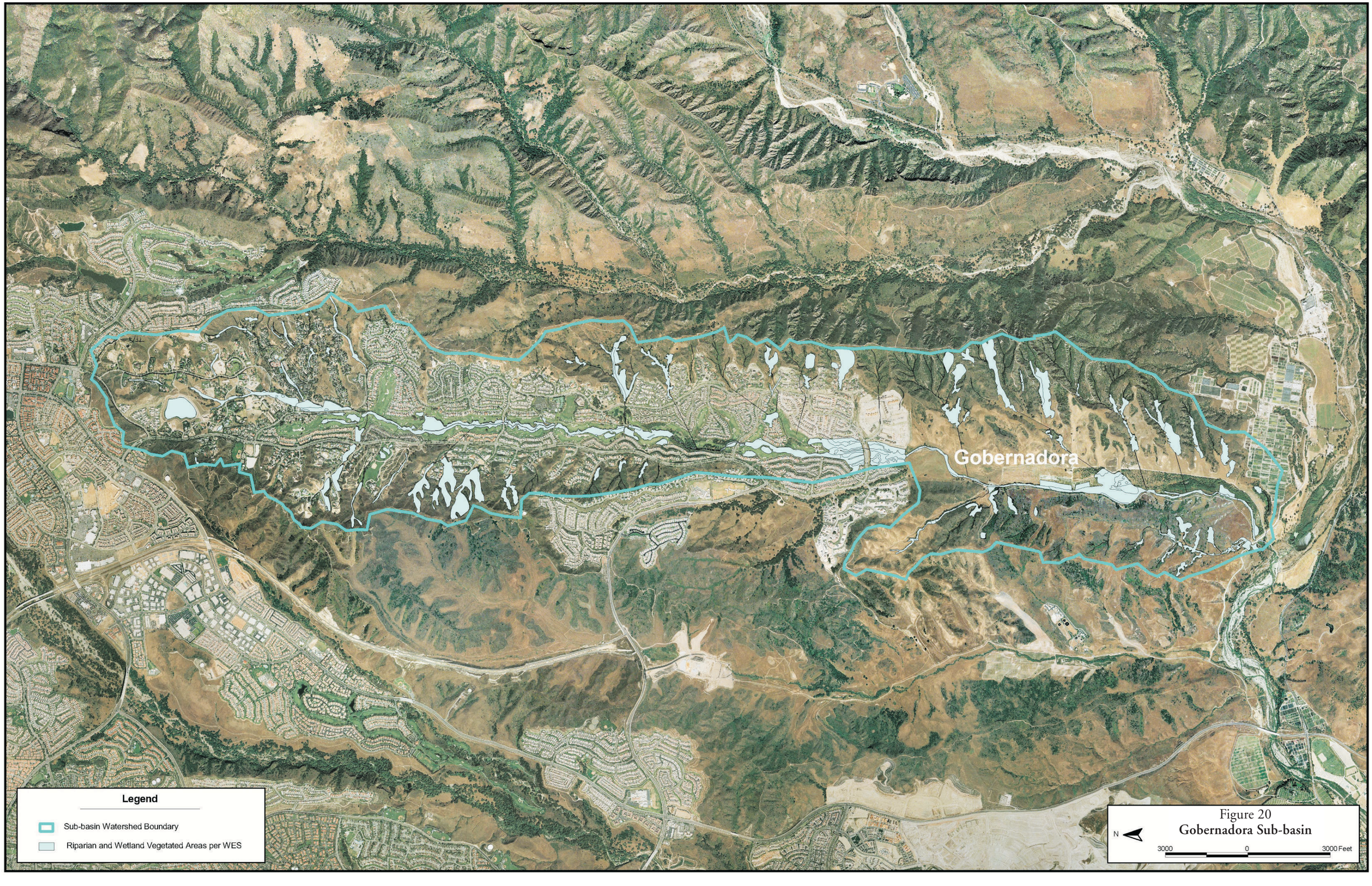
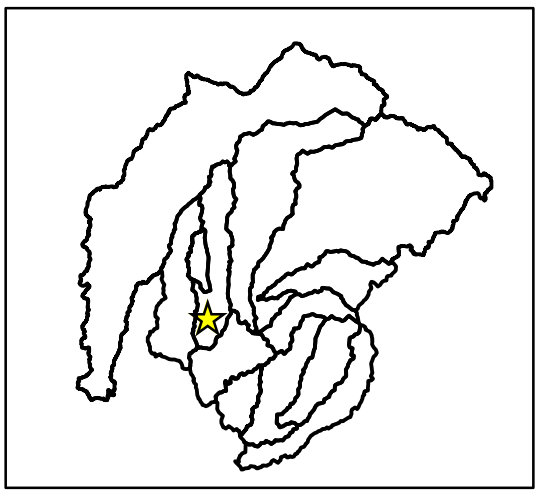
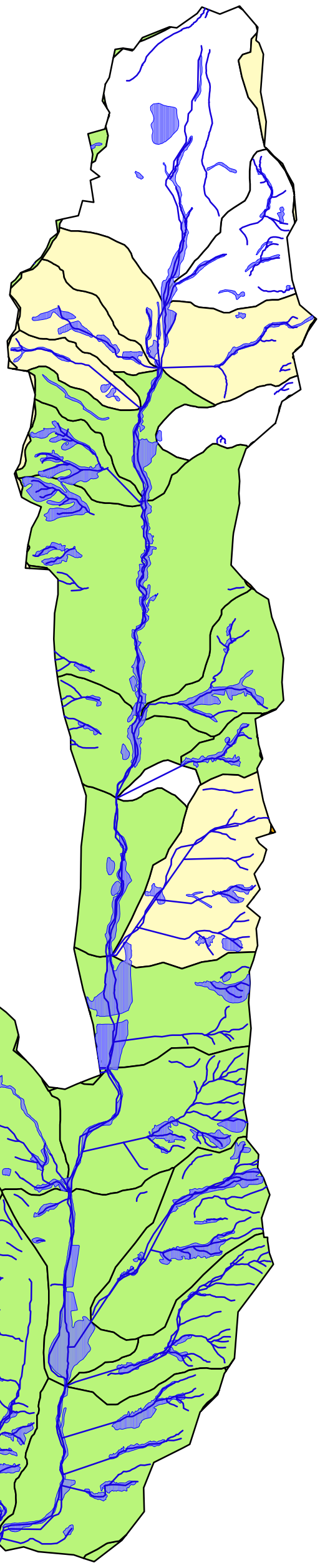


Figure 20
Gobernadora Sub-basin





Waters

Water Quality Ranking

5 Highest Integrity

4

3

2

1 Lowest Integrity

Note: Data from WES Functional Evalution.

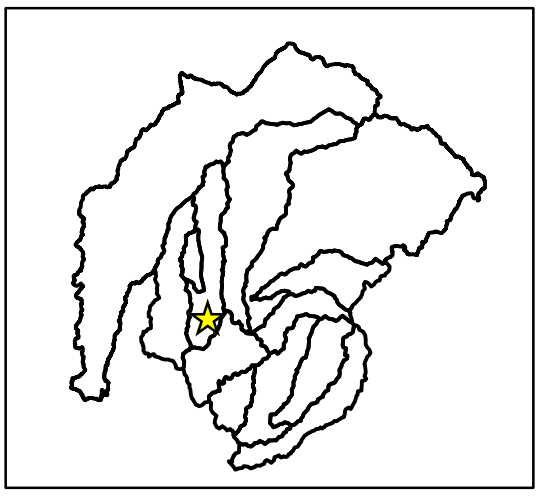
N

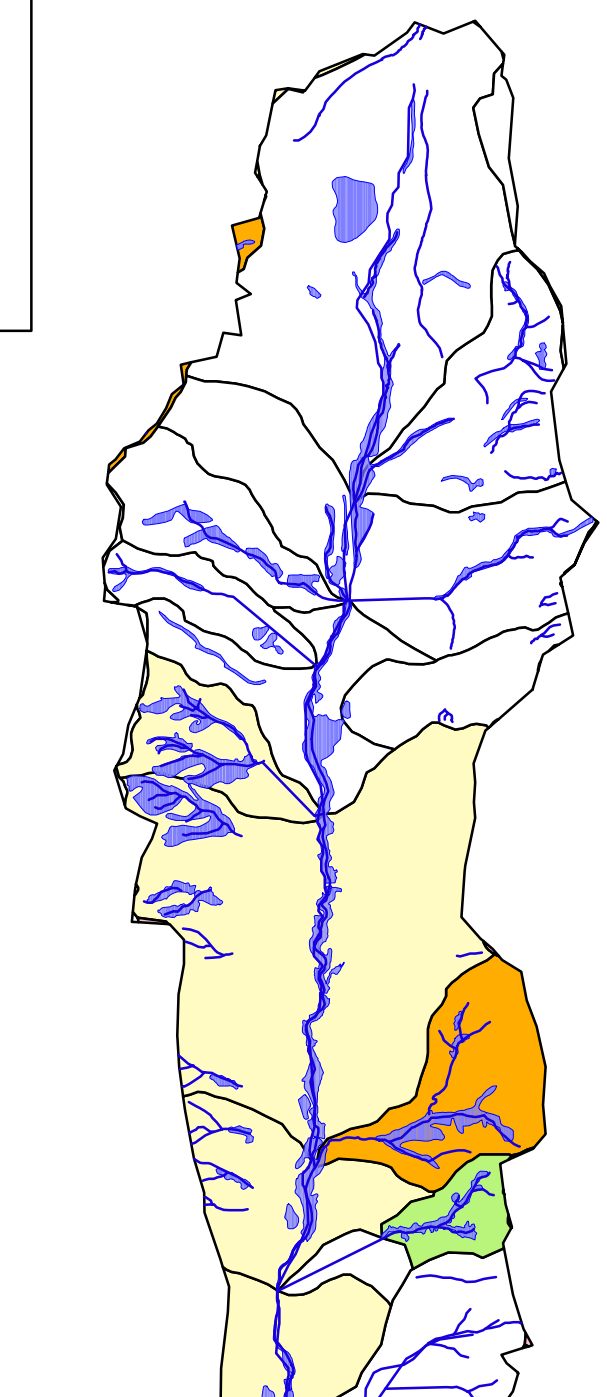
0.4 0 0.4 0.8 Miles

Source: ACOE 2000 and PCR 2002.

Figure 21

Water Quality Integrity Ranking
Canada Gobernadora Sub-basin





Waters

Hydrology Ranking

5 Highest Integrity

4

3

2

1 Lowest Integrity

Note: Data from WES Functional Evalution.

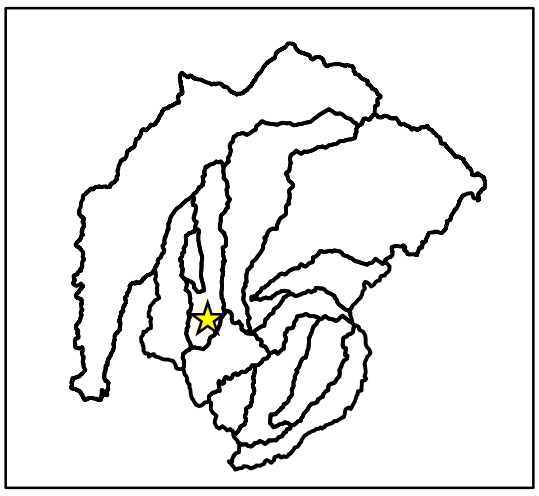
N

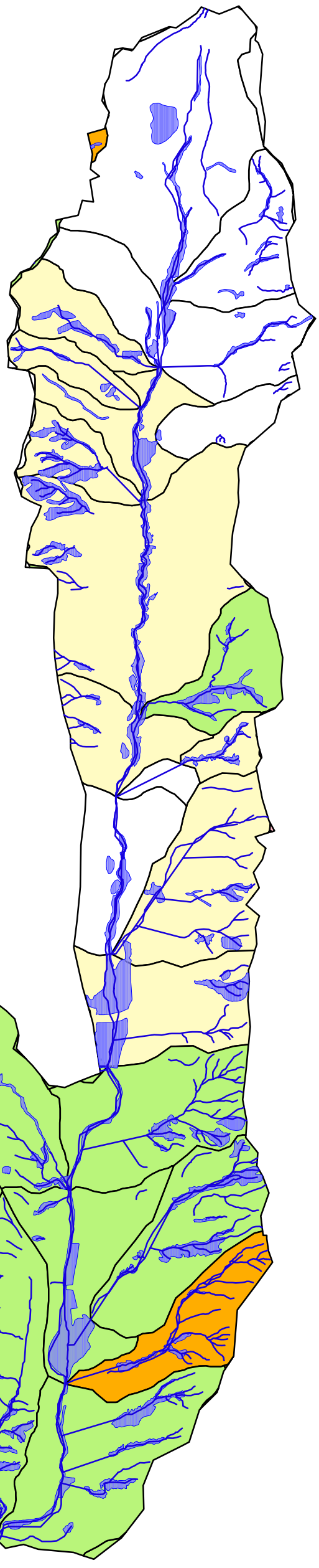
0.4 0 0.4 0.8 Miles

Source: ACOE 2000 and PCR 2002.

Figure 22

Hydrology Integrity Ranking
Canada Gobernadora Sub-basin





Waters

Habitat Ranking

5 Highest Integrity

4

3

2

1 Lowest Integrity

Note: Data from WES Functional Evalution.

N

0.4 0 0.4 0.8 Miles

Source: ACOE 2000 and PCR 2002.

Figure 23

Habitat Integrity Ranking

Canada Gobernadora Sub-basin

Planning Considerations - Significant Terrains and Hydrology Features

- Cañada Gobernadora contains some of the highest potential infiltration areas in the study area, particularly in the valley floor, which is characterized by deep alluvial deposits with interbedded clay lenses. However, high groundwater levels may affect the overall infiltration capacity of the sub-basin.

- Total runoff in Cañada Gobernadora is proportionately higher than other sub-basins, due to the size, elongated shape, and amount of existing development in the upper portion of the watershed.

- The hill slopes and ridges in the sub-basin exhibit areas of exhumed hardpan overlying sandy and silty substrates (the eroded remnants of claypans formed in the geologic past) or contain exposed rock outcrops or other areas of steep slopes. These areas presently exhibit rapid runoff comparable to Class D soils, although having less soil moisture storage they likely generate runoff with most storms.

- Due to the elongated configuration and the predominance of sandy terrains in the Gobernadora Sub-basin, first order streams are proportionally less of the total stream length than in several other sub-basins. Many of the tributaries consist of channel-less swales. These swales likely convey a combination of surface and subsurface flow to the main-stem creek and may exhibit surface connection following extreme runoff events.

- Historic photos indicate that the mainstem creek meandered freely across the valley floor over most of the length of the valley downstream from the mouth of Wagon Wheel Canyon.

- Groundwater derived from beneath the hill slopes and ridges is a major source of water contributing to the perennial nature of the creek system. Inferences have been drawn indicating that water levels in the alluvium below Cañada Gobernadora are at least in large part isolated from those in the sands and gravels beneath San Juan Creek, due to a sub-surface barrier to groundwater movement into San Juan Creek. The perennial nature of the creek in its upper reaches is likely influenced primarily by urban runoff from upstream development, while perennial flow in the lower portion of the creek is influenced by a combination of urban runoff, increased recharge from upstream areas, and lateral subsurface inflow to the valley floor.

- High sediment yields are currently generated from the already developed, disturbed upper portion of the sub-basin and have been deposited in the flats below Coto de Caza, where flows from Wagon Wheel Canyon enter the sub-basin. In 2001, the creek moved out of its previous channel in this location, cut a new channel (i.e., avulsed) and resulted in downstream deposition of sediments.

- Emergent marsh habitat, including alkali wetlands, and willow habitats are present in the Gobernadora Ecological Restoration Area (GERA) wetlands restoration area, with a mix of southern willow riparian and sycamore-willow woodland areas upstream to the boundary of Coto de Caza.

- The Central San Juan Sub-basin north of San Juan Creek has two major tributaries of note, one is a major canyon that bisects the Gobernadora Planning Area, beginning as a moderate- to high-gradient, scrub-oak dominated riparian zone in a chaparral matrix, transitioning to a mature oak woodland as the gradient decreases, until it becomes a moderately incised channel characterized by mule fat scrub. The other tributary consists of high gradient scrub-oak in a chaparral matrix in its upper portion, transitioning to southern-willow riparian habitat as the slope flattens. This second drainage flows into a man-made impoundment with limited wetland fringe vegetation.

- Unlike other sub-basins and Cañada Gobernadora, whose discharges join San Juan Creek at a primary confluence point, stormwater runoff from the Central San Juan catchments is distributed in numerous locations along the adjoining reach of the main San Juan Creek channel.

- The reaches of the central portion of San Juan Creek in the vicinity of the Gobernadora Sub-basin are important as sediment storage and transport reaches, conveying, storing and sorting coarse sediments from upstream terrains. Due to the size of this reach of San Juan Creek, there is a substantial amount of bedload sediment transport to downstream areas that occurs during major episodic events.

- The middle reach of the main stem of San Juan Creek is a broad, meandering stream with a coarse substrate and several floodplain terraces. The Creek supports a mosaic of southern willow riparian woodland, mule fat scrub, open water and sand bars, with the adjacent terraces supporting coast live oak woodland and southern sycamore riparian woodland.

- The high topographic complexity of San Juan Creek, which includes a variety of secondary channels, pits, ponds and bars, supports a small population of the federally listed arroyo toad. Several factors, such as the invasive species and the limited extent and duration of water sources may influence the arroyo toad populations in this area.

Planning Recommendations

- Protect Cañada Gobernadora valley floor above the knickpoint to provide for creek meandering (as occurred historically) and for restoration of riparian processes and habitat.

- In order to emulate current hydrologic patterns, development areas should be set back from the valley floor and focus on areas that presently manifest Class D soils runoff characteristics, including those areas with existing hardpan caps.

- Deep alluvial deposits that function as important infiltration/recharge areas underlie the valley floor and adjacent tributary swales. At the same time, any changes in future stormwater flows to these areas may need to be accompanied by groundwater management due to limited infiltration capacity resulting from high groundwater levels.

- Given the size of the valley floor, there are opportunities for creating natural treatment systems to treat potential existing and future urban runoff from the Gobernadora Sub-basin, as well as provide opportunities for expanded wetlands habitat areas.

- Sediment management and creek restoration activities may be necessary in lower Gobernadora Canyon to address the present excessive sediment input from upstream urbanized areas. The increased sediment resulting from upstream construction will likely be moving through the system for a prolonged period. Eventually, sediment loads may decrease due to buildout of the upper watershed. Consequently, floodplain restoration should account for both the existing and potential future sediment regimes.

- Existing channel incision that has isolated the Creek from the floodplain in some areas should be addressed as part of the restoration effort.

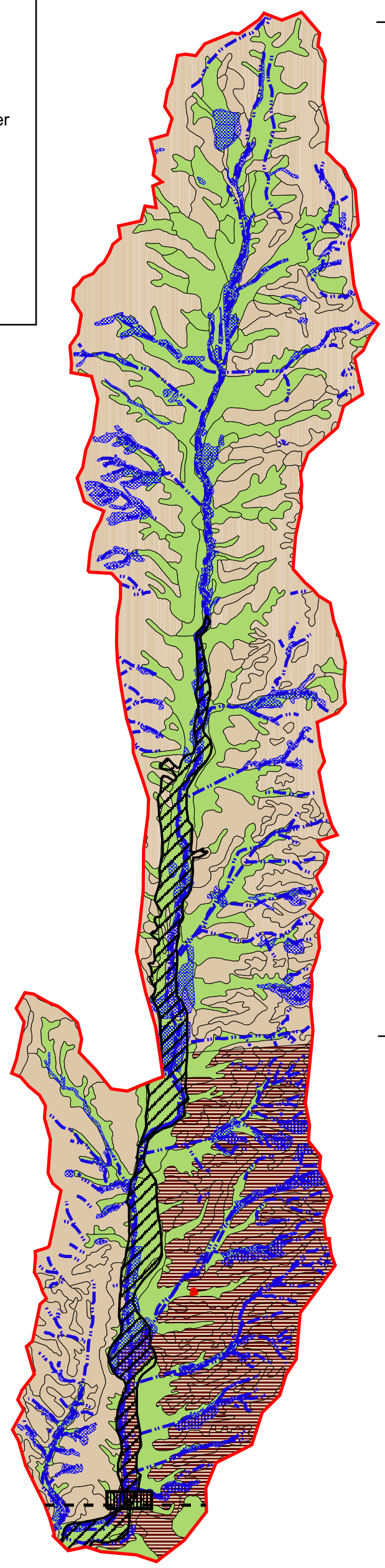
- Protect the GERA and, to the extent feasible, minimize impacts to major riparian areas consistent with the overall restoration and management plan.

- In order to help maintain the sediment transport functions of the central reach of San Juan Creek, the timing of peak flows in Cañada Gobernadora at the confluence with San Juan Creek should be managed to emulate existing conditions and avoid coincident peaks flows with San Juan Creek.

Infiltration Areas/Sandy Swales
High Runoff
Areas containing patches of hard pan caps
Waters
Slope Wetlands
Sub-basin Boundary
Approximate location of inferred ground water barrier
Inferred Lake-Bed Deposit

(a) locations and extent of the lakebeds shown are inferred from existing data. More precise locations will be discerned based on the results of geologic and hydrogeologic investigations currently being conducted.

(b) not all lakebeds are part of the same historic lake; multiple beds can (and will) occur.



Upper Gobernadora
(Existing Residential Development)

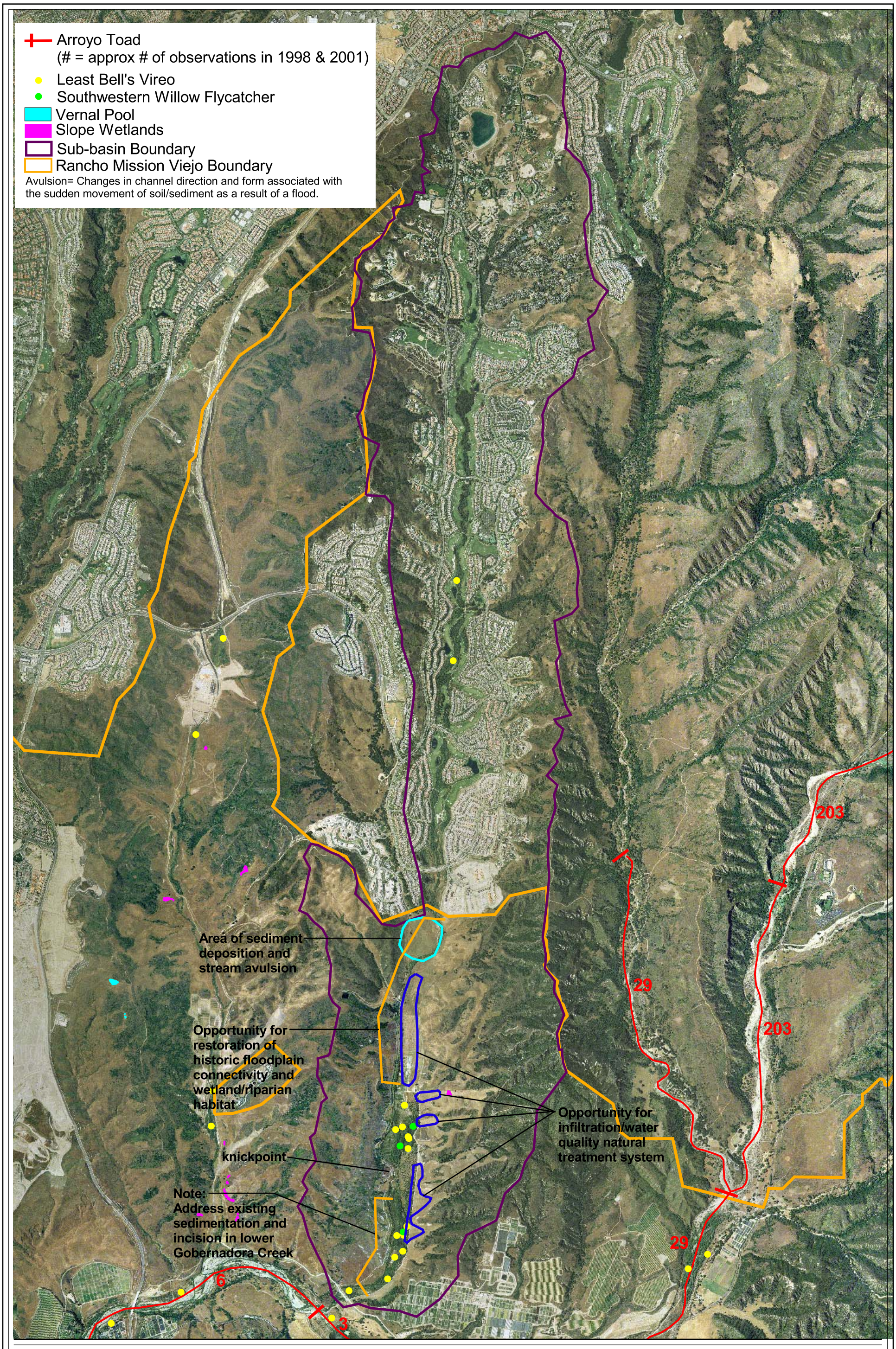
Lower Gobernadora

N

0.5 0 0.5 1 Miles

Source: ACOE, PWA 2000 and PCR 2002.

Figure 24
Sub-basin Geomorphic/Hydrologic Features
Canada Gobernadora
Infiltration and Runoff



Source: Eagle Aerial Imaging 2001 and PCR 2002.

Figure 25
Sub-basin Geomorphic/Hydrologic Features Canada Gobernadora
Opportunities for Restoration/Stabilization and
Water Quality Natural Treatment Systems

Arroyo Toad
(# = approx # of observations in 1998 & 2001)
Least Bell's Vireo
Southwestern Willow Flycatcher
Vernal Pool
Slope Wetlands
Sub-basin Boundary
Rancho Mission Viejo Boundary

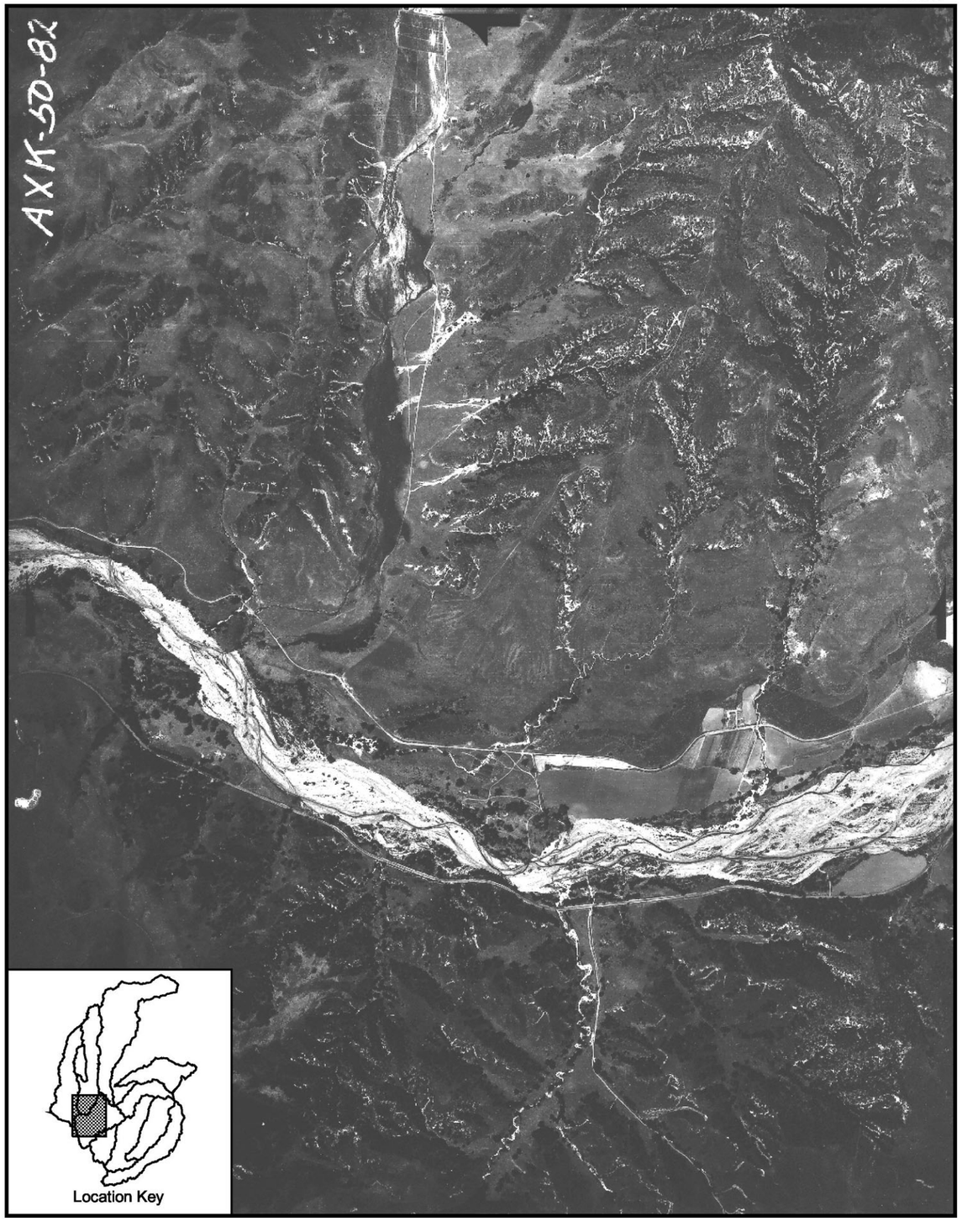
29
203
29
6
3
19
Existing nursery and agricultural operations along central San Juan Creek
Remnant of past aggregate mining in San Juan Creek
Maintain sediment transport and storage capacity of central San Juan Creek
Ongoing mining activity in Trampas Canyon
2
1
3
40

N
2400 0 2400 Feet

Source: Eagle Aerial Imaging 2001 and PCR 2002.

Figure 26
Sub-basin Geomorphic/Hydrologic Features
Central San Juan and Trampas

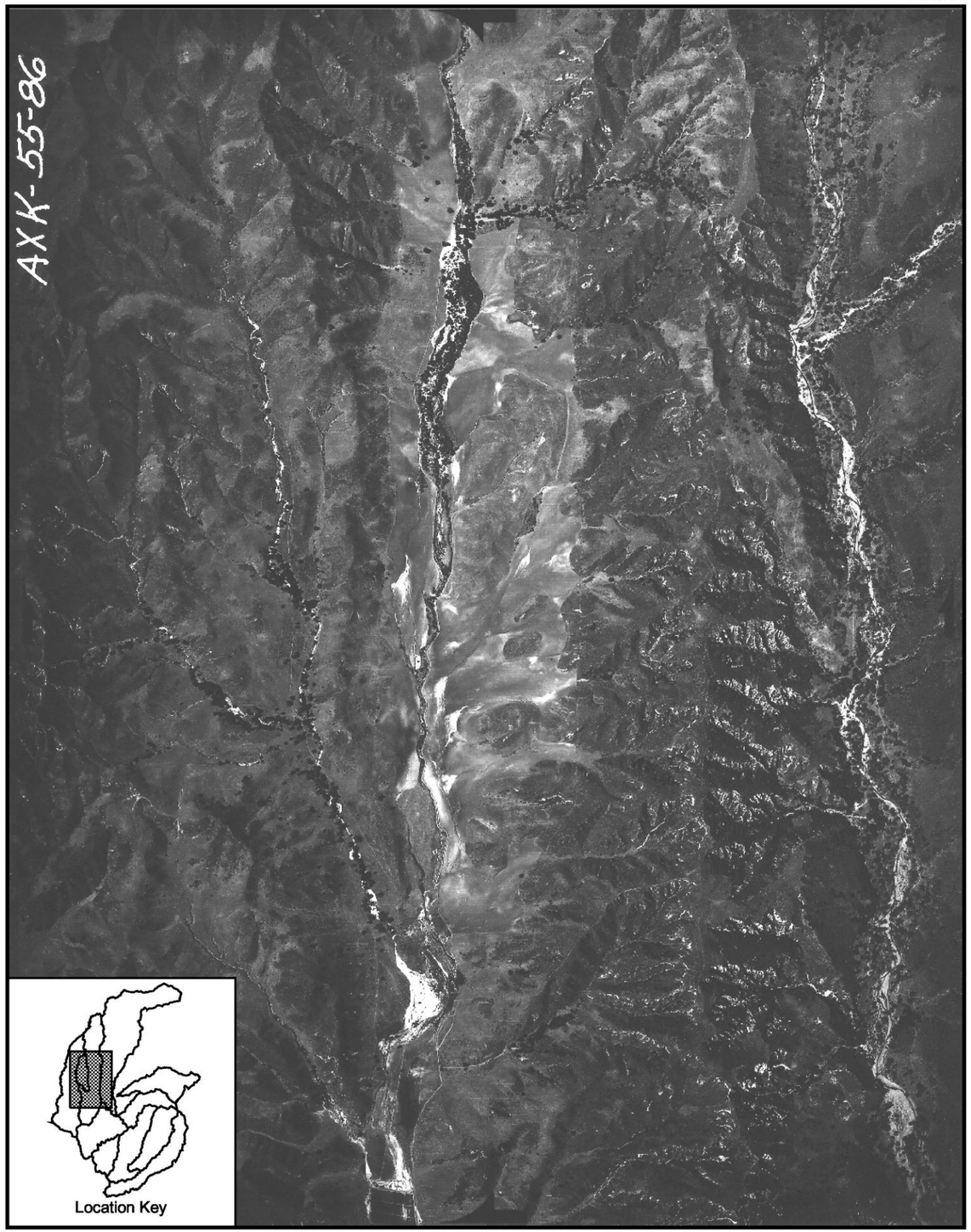
1938



2001

Figure 27
Lower Gobernadora
1938 and 2001 Aerial Photographs

1938



2001

Figure 28
Upper Gobernadora
1938 and 2001 Aerial Photographs

6

iii) Wagon Wheel Sub-basin

WES General Assessment and Conclusions

- Overall Hydrology Integrity is high and Water Quality Integrity is moderate to high.
- Overall Habitat Integrity is moderate.
- Hydrologic regime relatively intact, no channelization or major diversions.
- Riparian floodplain present and relatively intact.
- Perennialized stream flow in the lowest reaches.
- Moderately altered sediment regime.
- Culturally altered buffer in the lowest reaches.

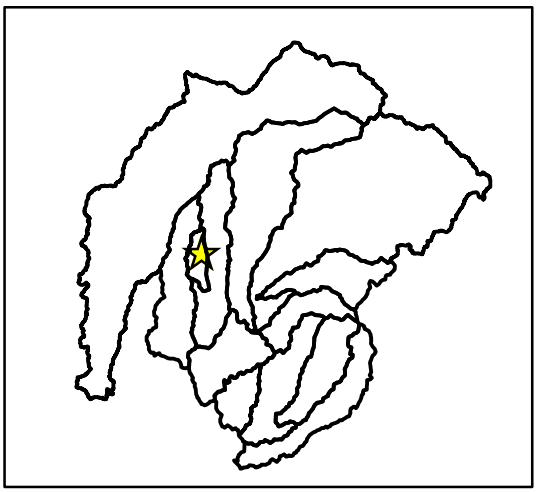
Planning Considerations - Significant Terrains and Hydrologic Features

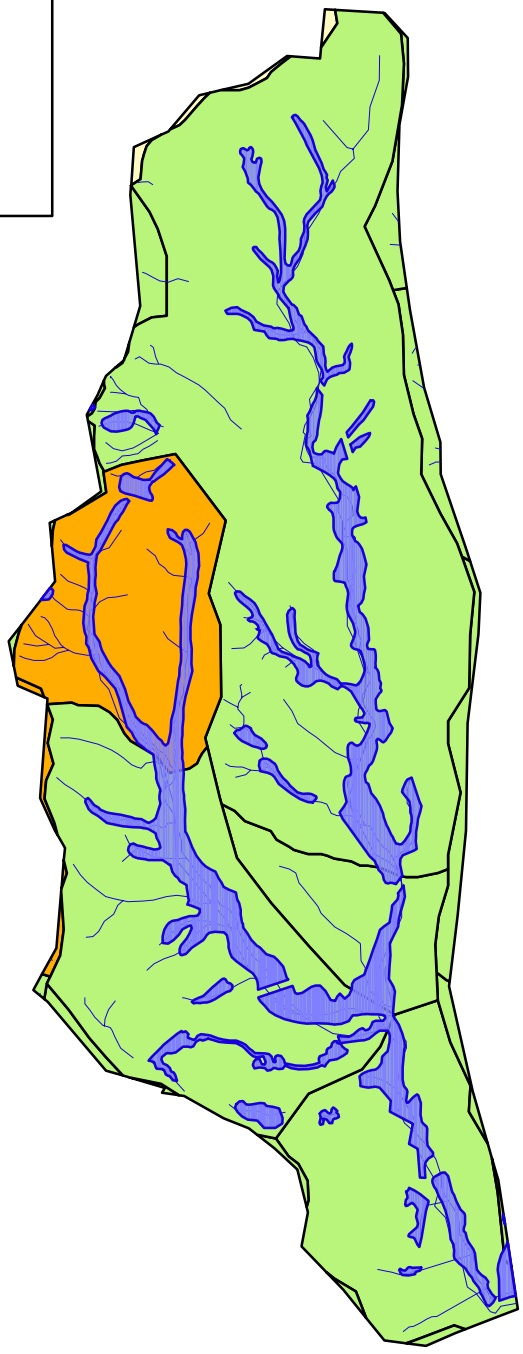
The Significant Terrains and Hydrologic Features identified, as Planning Considerations for Wagon Wheel are included in the Gobernadora Sub-basin.

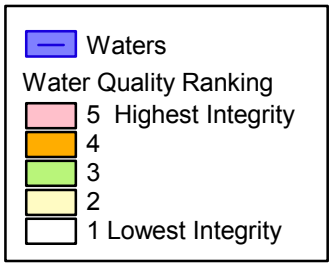
Planning Recommendations

The Planning Recommendations for Wagon Wheel are also included in the Gobernadora Sub-basin.

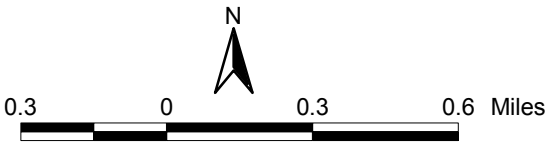
Figure 29
Wagon Wheel Sub-basin





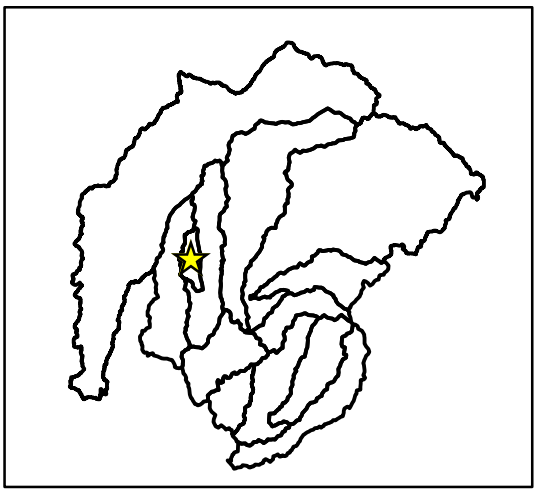


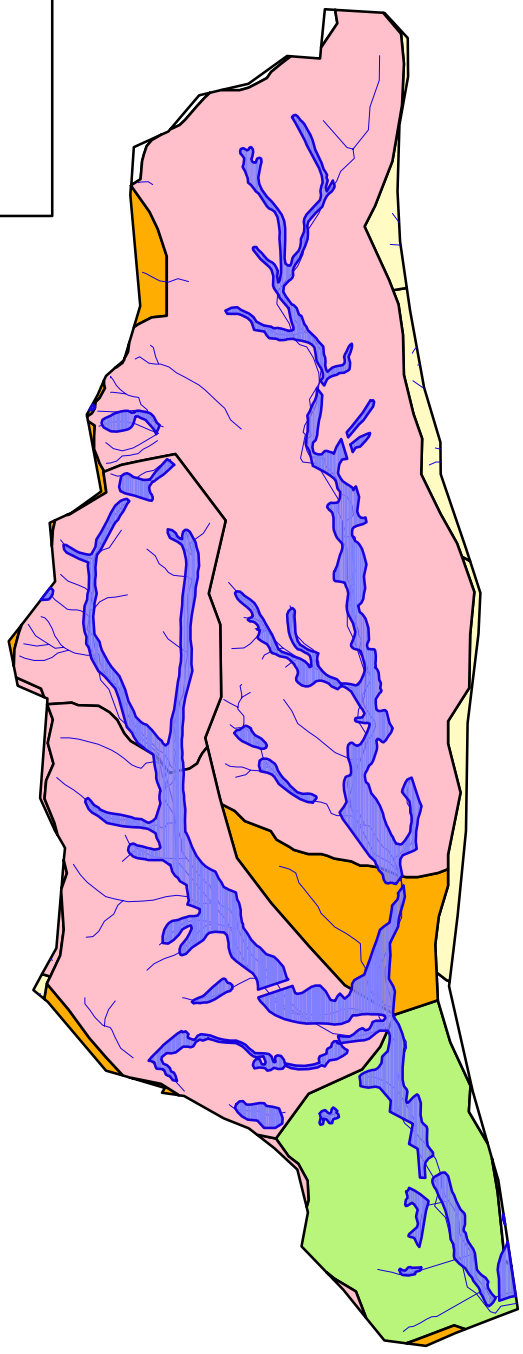
Note: Data from WES Functional Evalution.

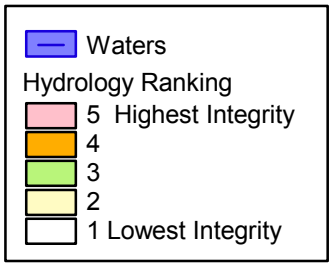


Source: ACOE 2000 and PCR 2002.

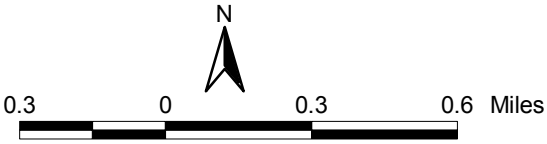
Figure 30
Water Quality Integrity Ranking
Wagon Wheel Sub-basin





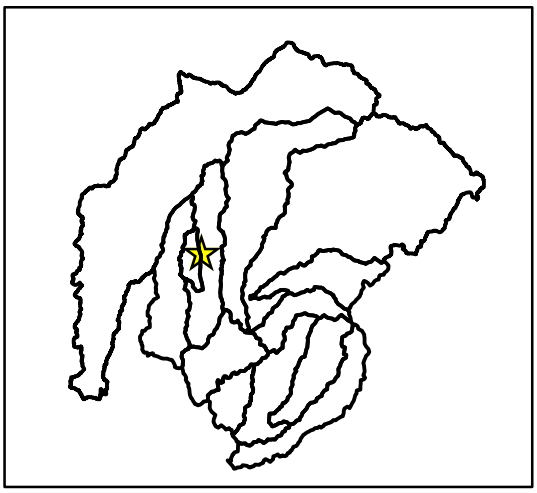


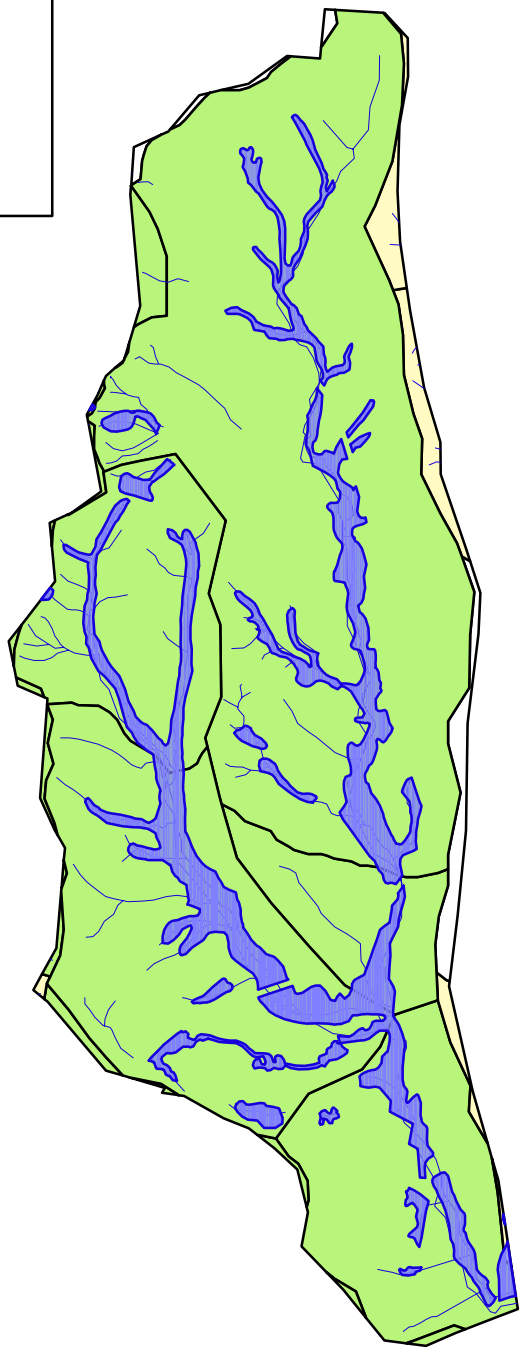
Note: Data from WES Functional Evalution.

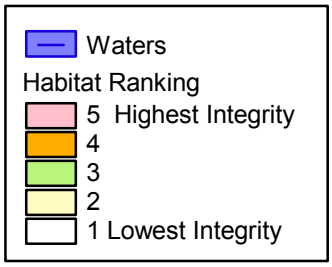


Source: ACOE 2000 and PCR 2002.

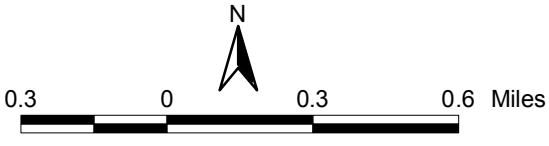
Figure 31
Hydrology Integrity Ranking
Wagon Wheel Sub-basin







Note: Data from WES Functional Evalution.



Source: ACOE 2000 and PCR 2002.

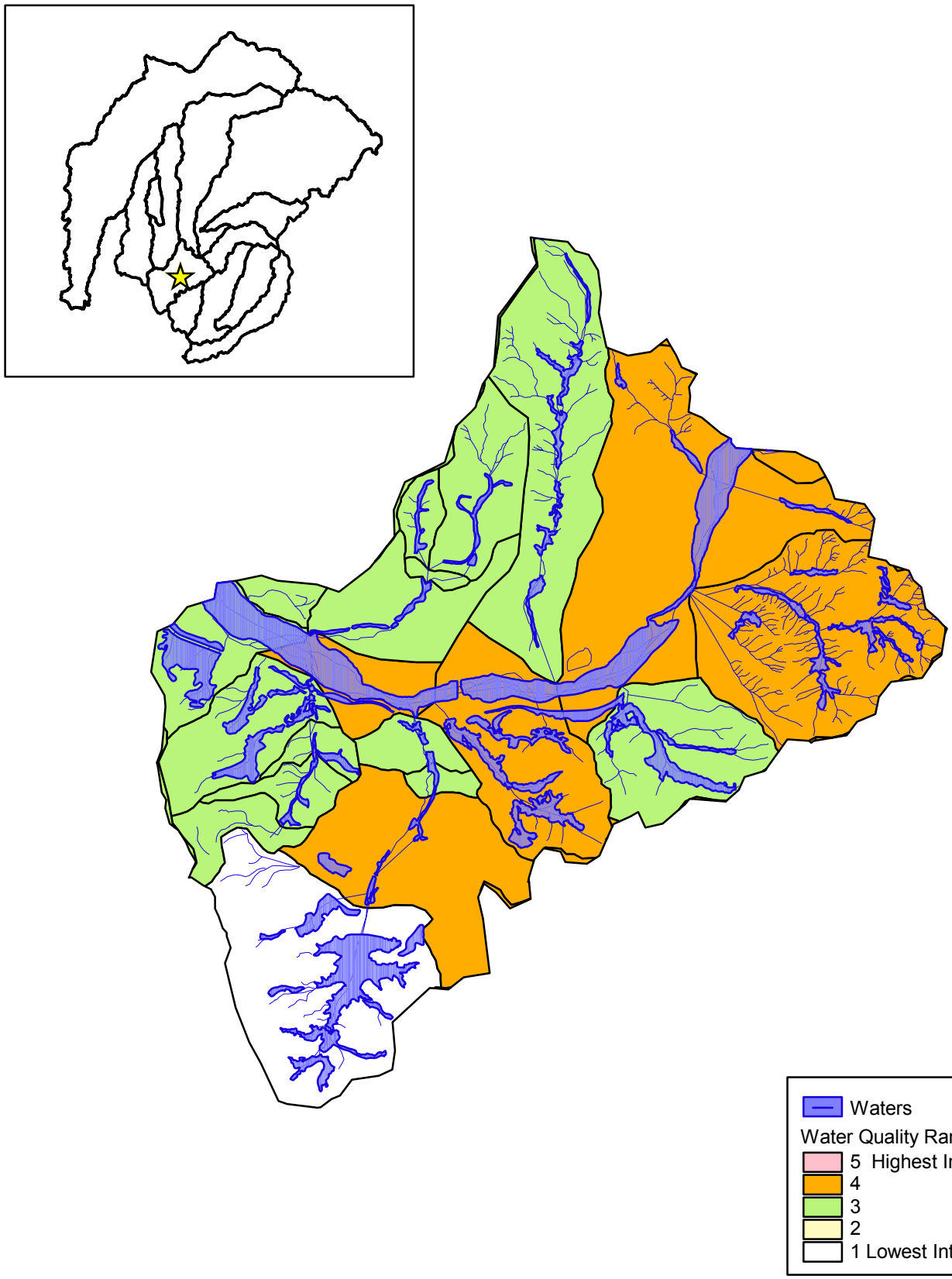
Figure 32
Habitat Integrity Ranking
Wagon Wheel Sub-basin

iv) Trampas Sub-basin and Central San Juan South of San Juan Creek

Wes General Assessment and Conclusions

- Relatively lower functional integrity, compared to other sub-basins in the study area.
- Overall Hydrology and Water Quality Integrity is moderate.
- Overall Habitat Integrity is low.
- Habitat integrity is affected by the lack of riparian vegetation in the flood prone area, breaks in the riparian corridor, and past adjacent land use practices.
- Most significant impacts result from altered sediment regime and surface water retention in the canyon.

Figure 33
Central San Juan and Trampas Sub-basins



Note: Data from WES Functional Evalution.

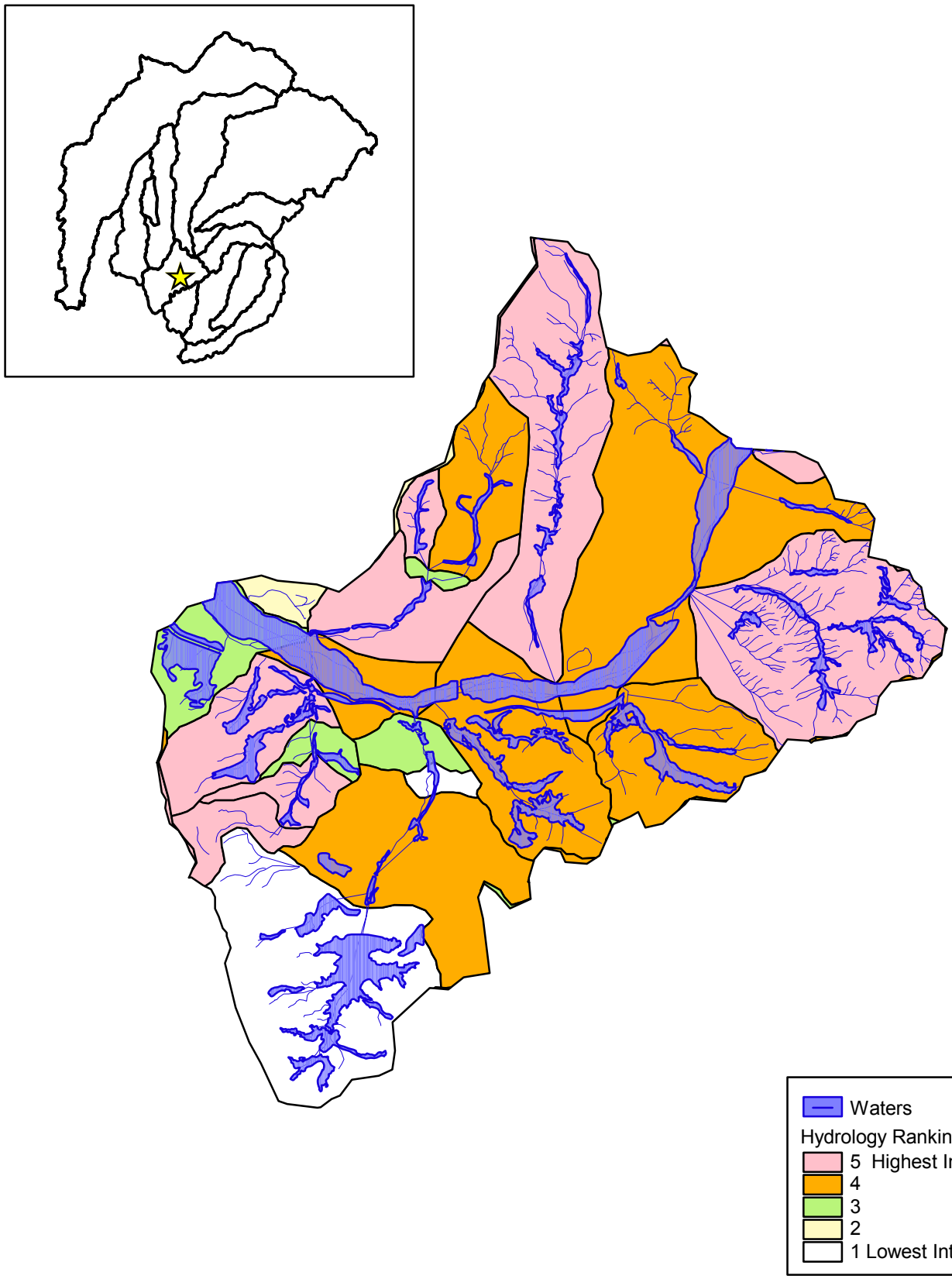
N

0.4 0 0.4 0.8 Miles

Source: ACOE 2000 and PCR 2002.

Figure 34

Water Quality Integrity Ranking
Central San Juan Sub-basin



Note: Data from WES Functional Evalution.

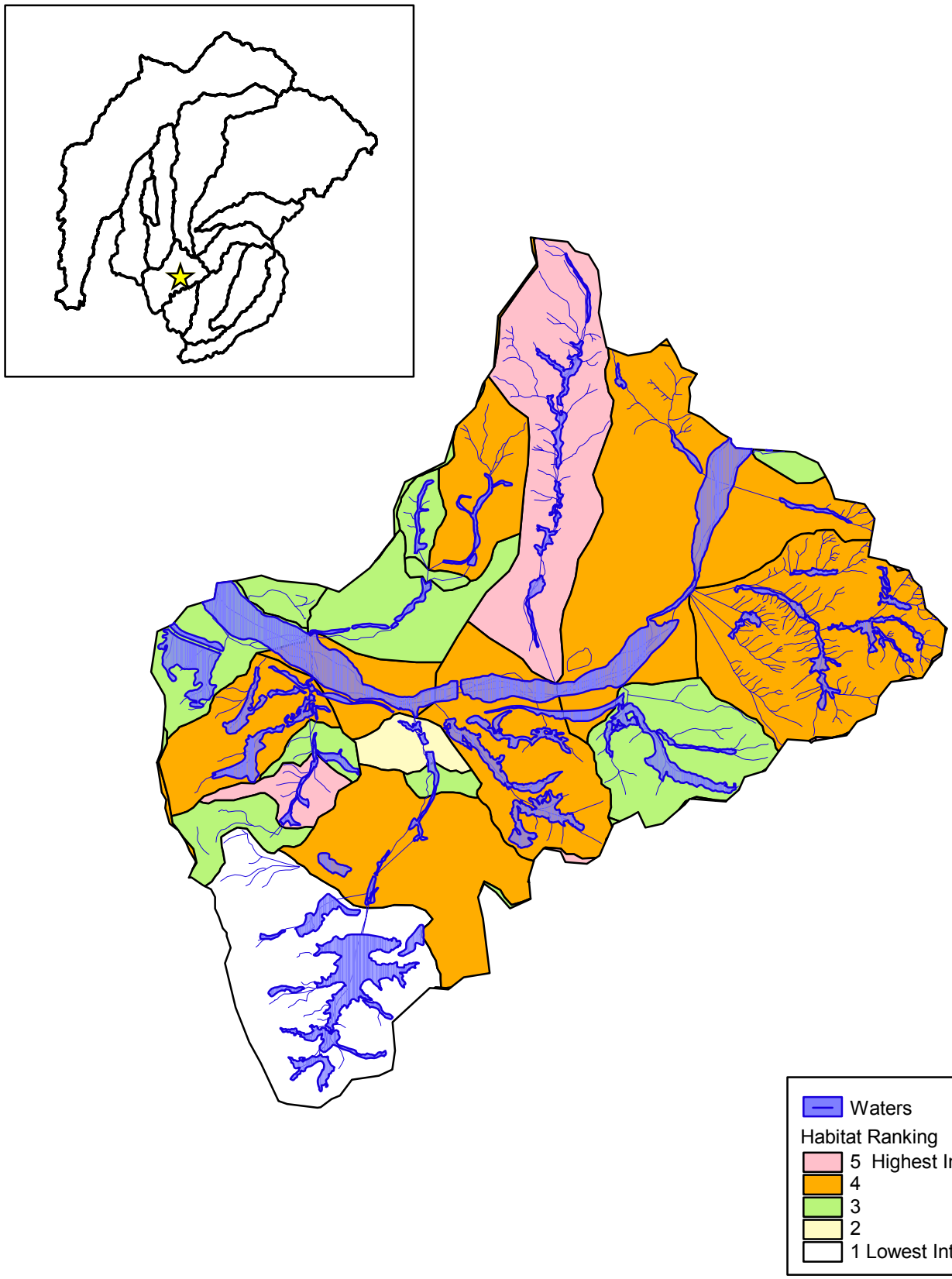
N

0.4 0 0.4 0.8 Miles

Source: ACOE 2000 and PCR 2002.

Figure 35

Hydrology Integrity Ranking
Central San Juan Sub-basin



Note: Data from WES Functional Evalution.

N

0.4 0 0.4 0.8 Miles

Source: ACOE 2000 and PCR 2002.

Figure 36

Habitat Integrity Ranking
Central San Juan Sub-basin

Planning Considerations - Significant Terrains and Hydrologic Features

- Clayey silts and sands that underlie smaller areas east of the Mission Viejo fault have a high propensity for shallow mudflows following periods of extended rainfall.

- The area along Radio Tower Road contains representative wetland types including riverine, alkali marsh, slope wetlands, vernal pool and lacustrine fringe wetlands. The slope wetlands appear to be associated with localized bedrock landslides from the San Onofre and Monterey formations that store groundwater discharge over a prolonged period. The vernal pools are also associated with landslides and support both the federally listed endangered San Diego and the Riversidean fairy shrimp. Manmade stock ponds support fringing lacustrine wetlands. Riverine reaches within this area are generally high-gradient, low-order streams characterized as steep canyons dominated by sycamore or willow riparian forest. Some areas appear to have perennial or near-perennial flow.

- Focus development in Trampas Canyon in disturbed and adjacent areas with low to moderate hydrologic, water quality and habitat integrity function and value.

- Sand, hard rock and minerals have been mined from Trampas Canyon over the last 50 years. An artificial lake dominates this sub-basin. The lake is steep-sided, relatively deep and the uplands surrounding the artificial lake are dominated by ruderal vegetation.

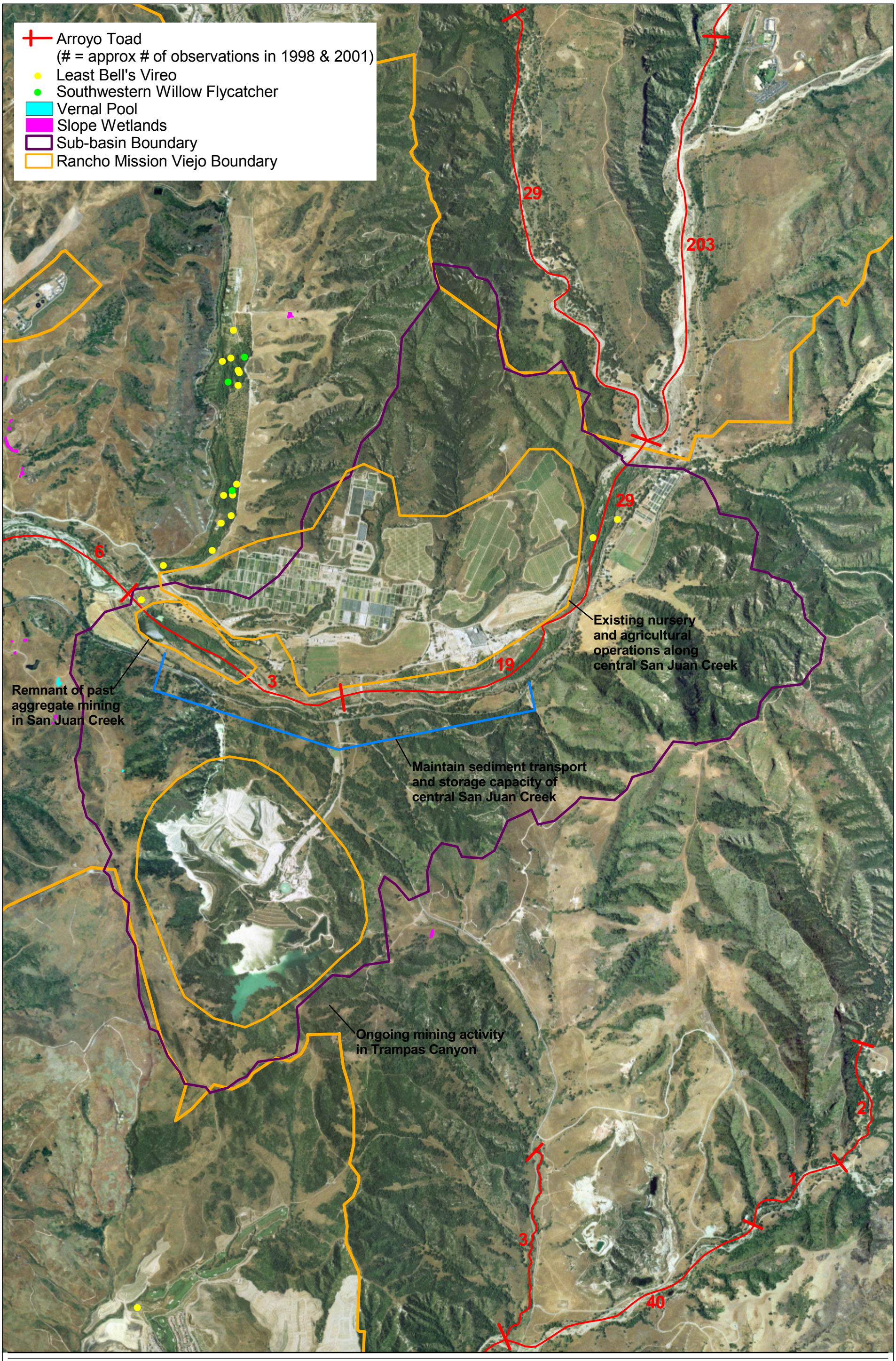
- Runoff and baseflow from Trampas Creek may contribute to supporting a small arroyo toad population near its confluence with San Juan Creek.

Planning Recommendations

- Trampas Canyon is suitable for development.

- The area along Radio Tower Road should be protected because it contains a diversity of wetland types and endangered fairy shrimp in close proximity to one another, thereby increasing the heterogeneity of the landscape from an aquatic resources perspective.

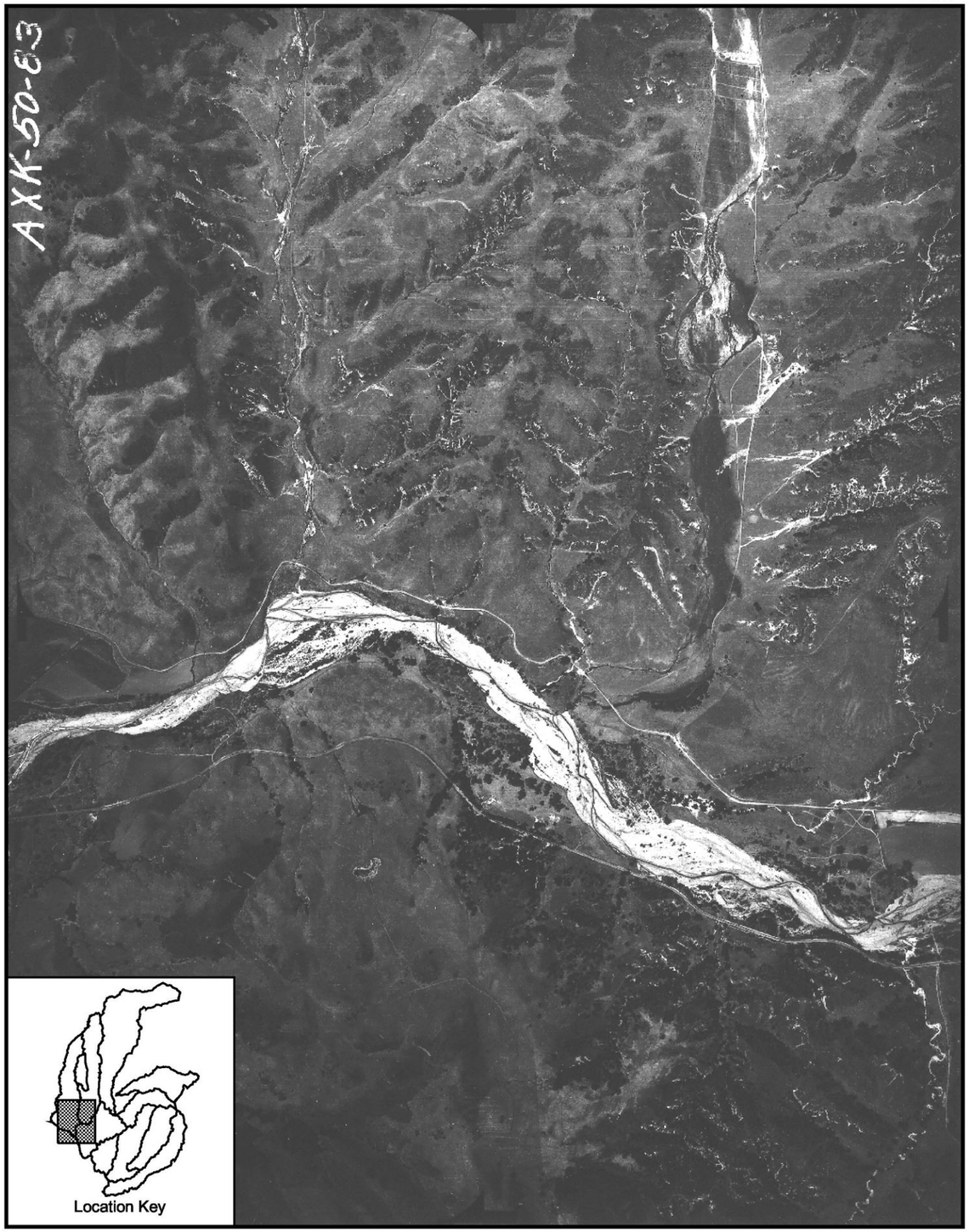
- Stormwater flows from Trampas Creek into San Juan Creek should be managed to provide flows comparable to existing conditions.



Source: Eagle Aerial Imaging 2001 and PCR 2002.

Figure 37
Sub-basin Geomorphic/Hydrologic Features
Central San Juan and Trampas

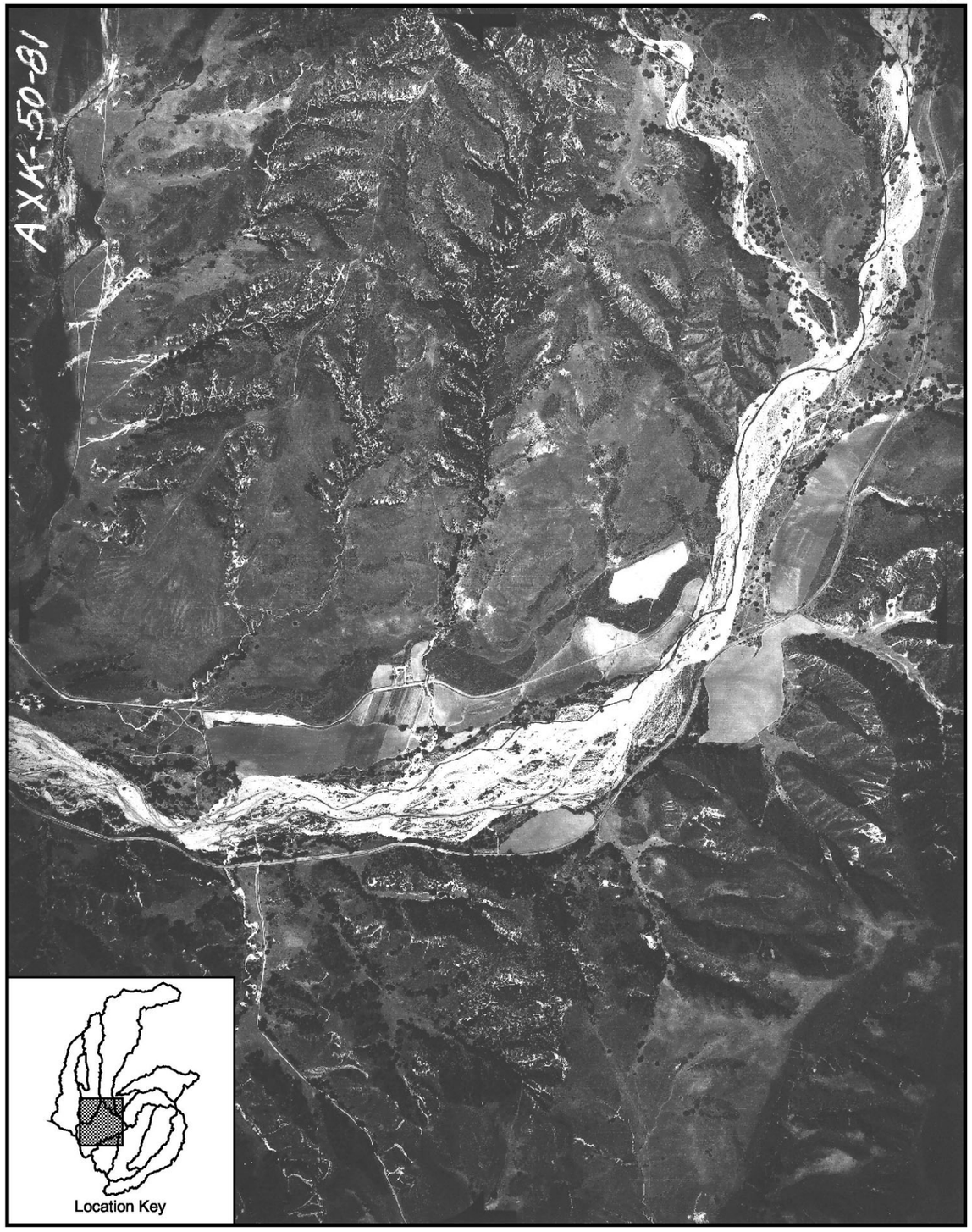
1938



2001

Figure 38
Central San Juan (West)
1938 and 2001 Aerial Photographs

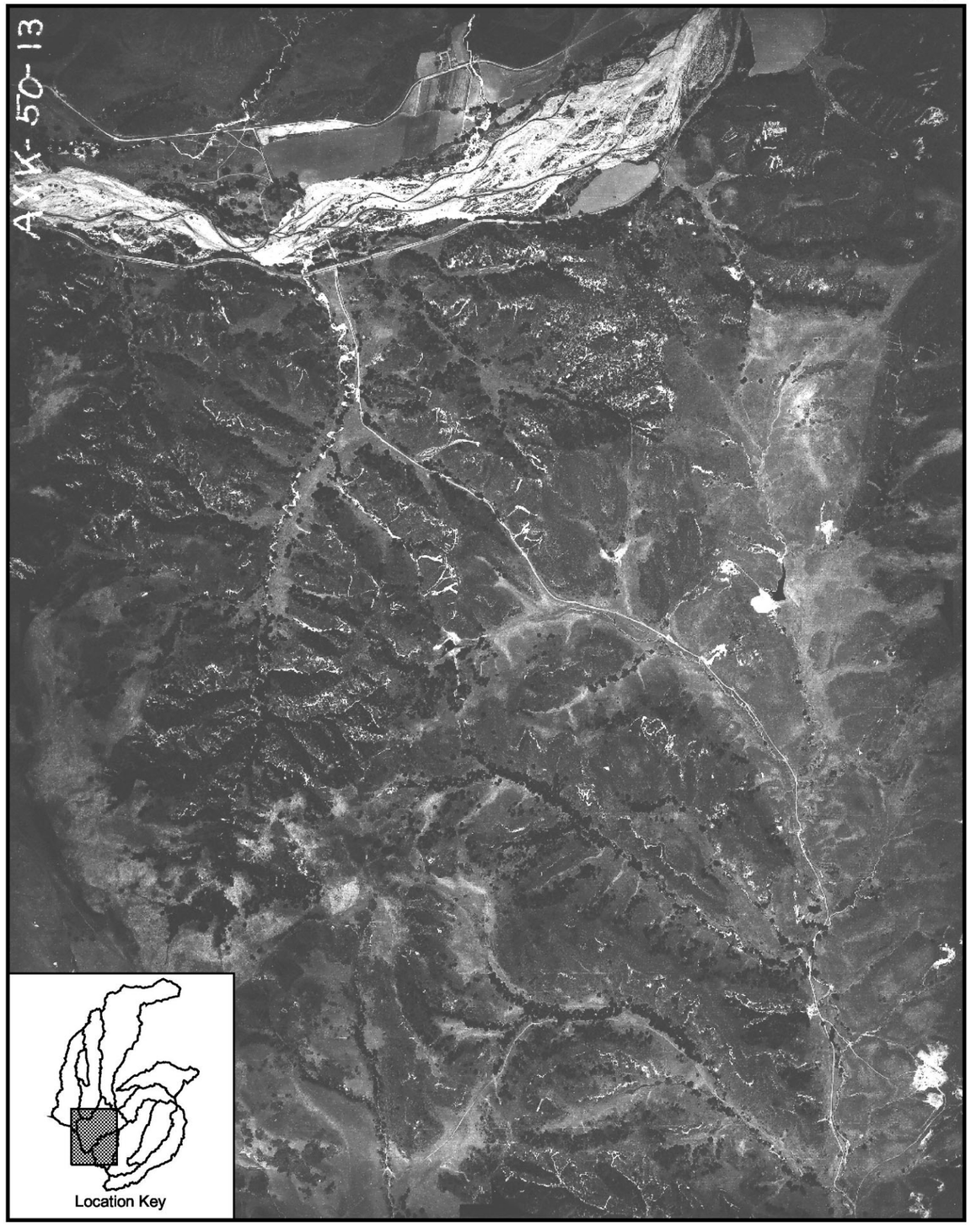
1938



2001

Figure 39
Central San Juan (East)
1938 and 2001 Aerial Photographs

1938



2001

Figure 40
Trampas
1938 and 2001 Aerial Photographs

v) Verdugo Sub-basin

WES General Assessment and Conclusions

- High scores for almost all indicators; overall, Verdugo Canyon received the highest integrity scores of any sub-basin evaluated.
- Overall Hydrology and Water Quality Integrity is very high.
- Overall Habitat Integrity is high.
- In lower portion of creek, a few locations with an opportunity to increase the riparian buffer.
- Moderately altered sediment regime in some locations.

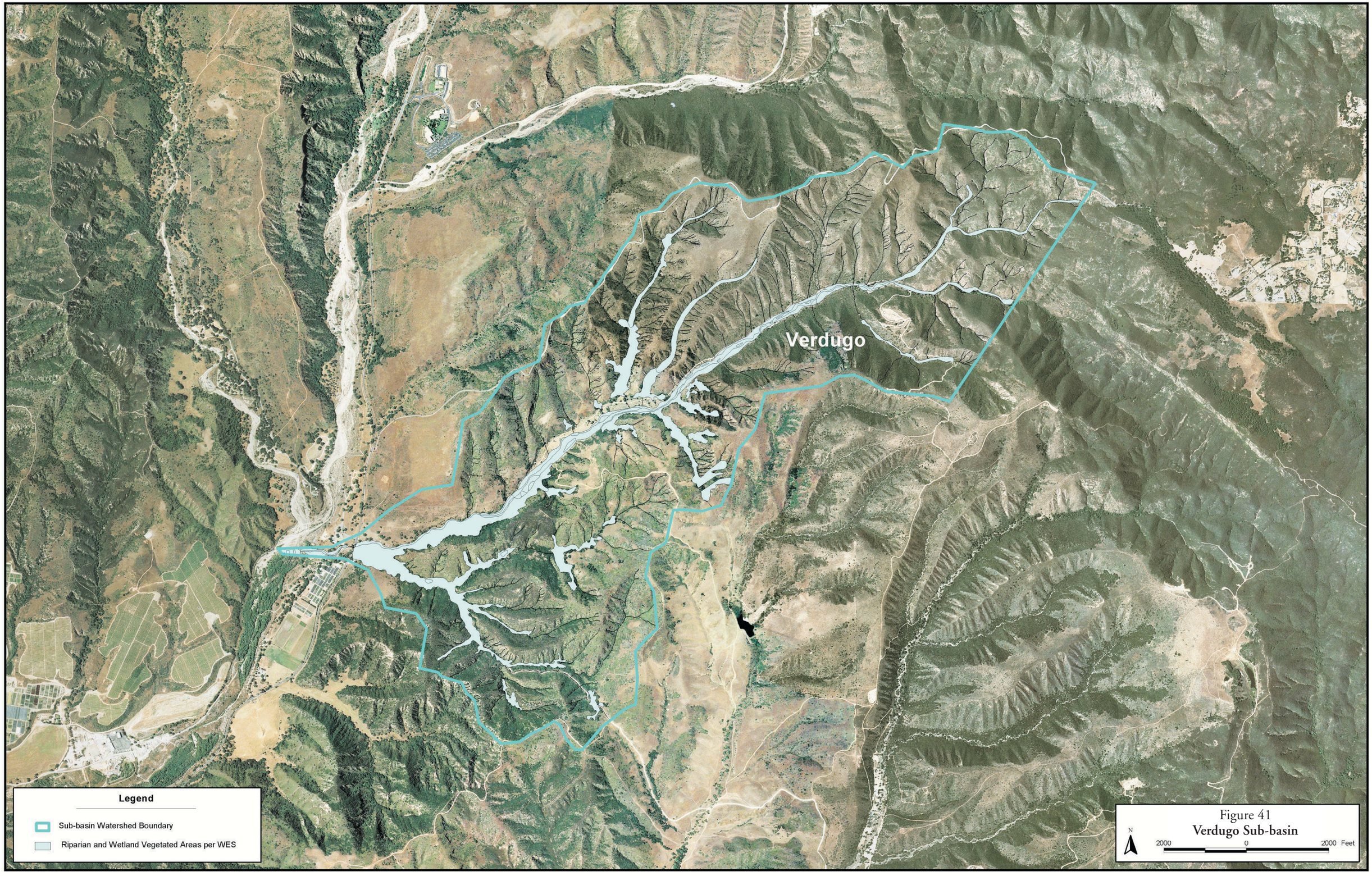
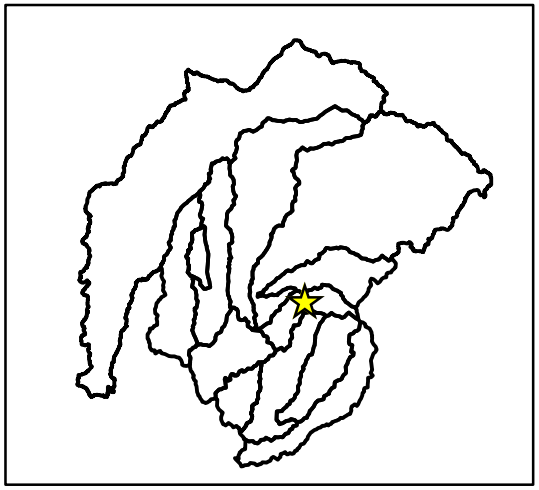
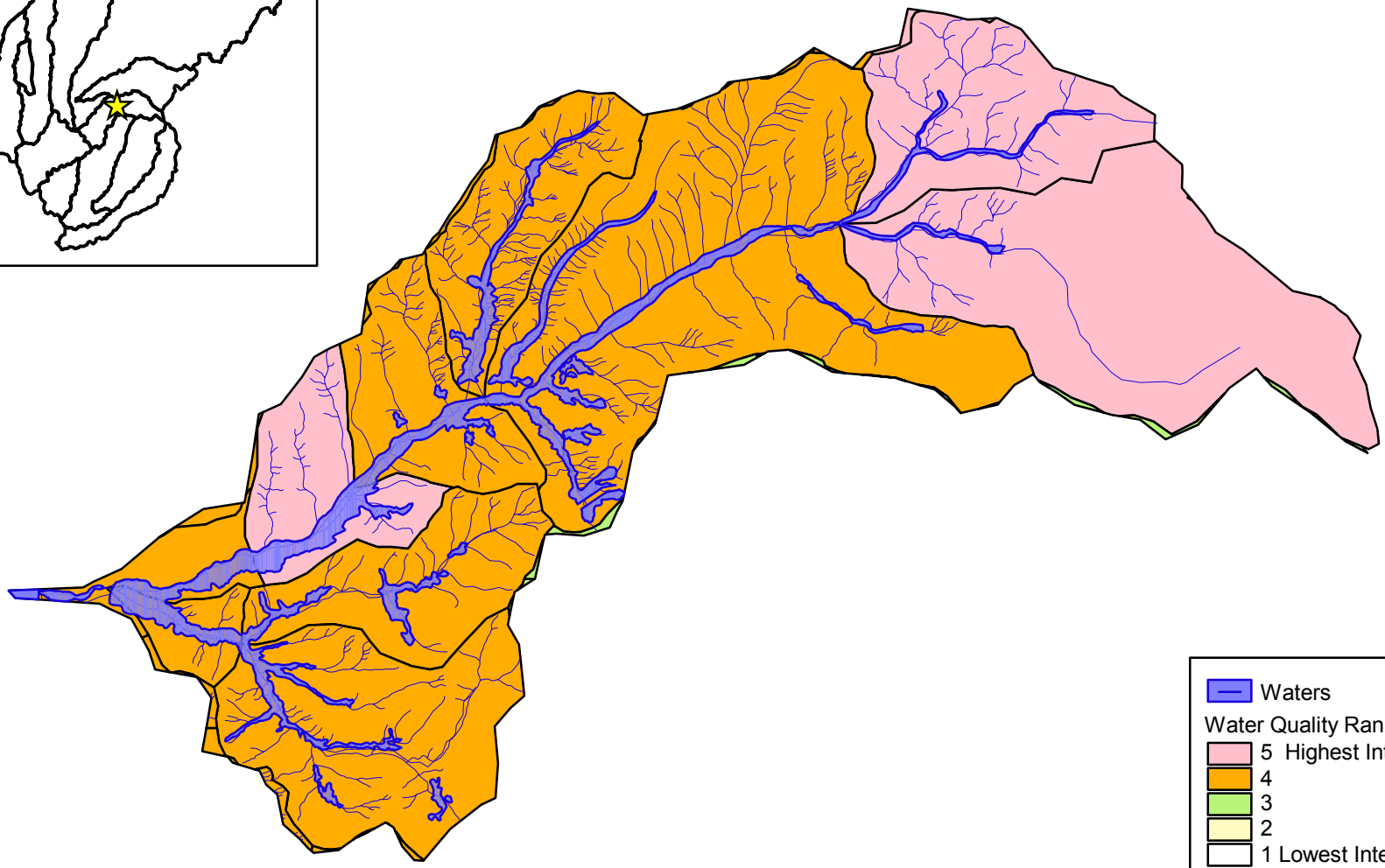


Figure 41
Verdugo Sub-basin





Note: Data from WES Functional Evalution.

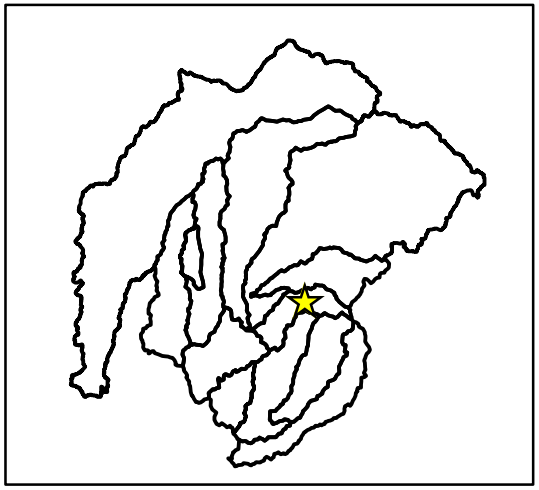
N

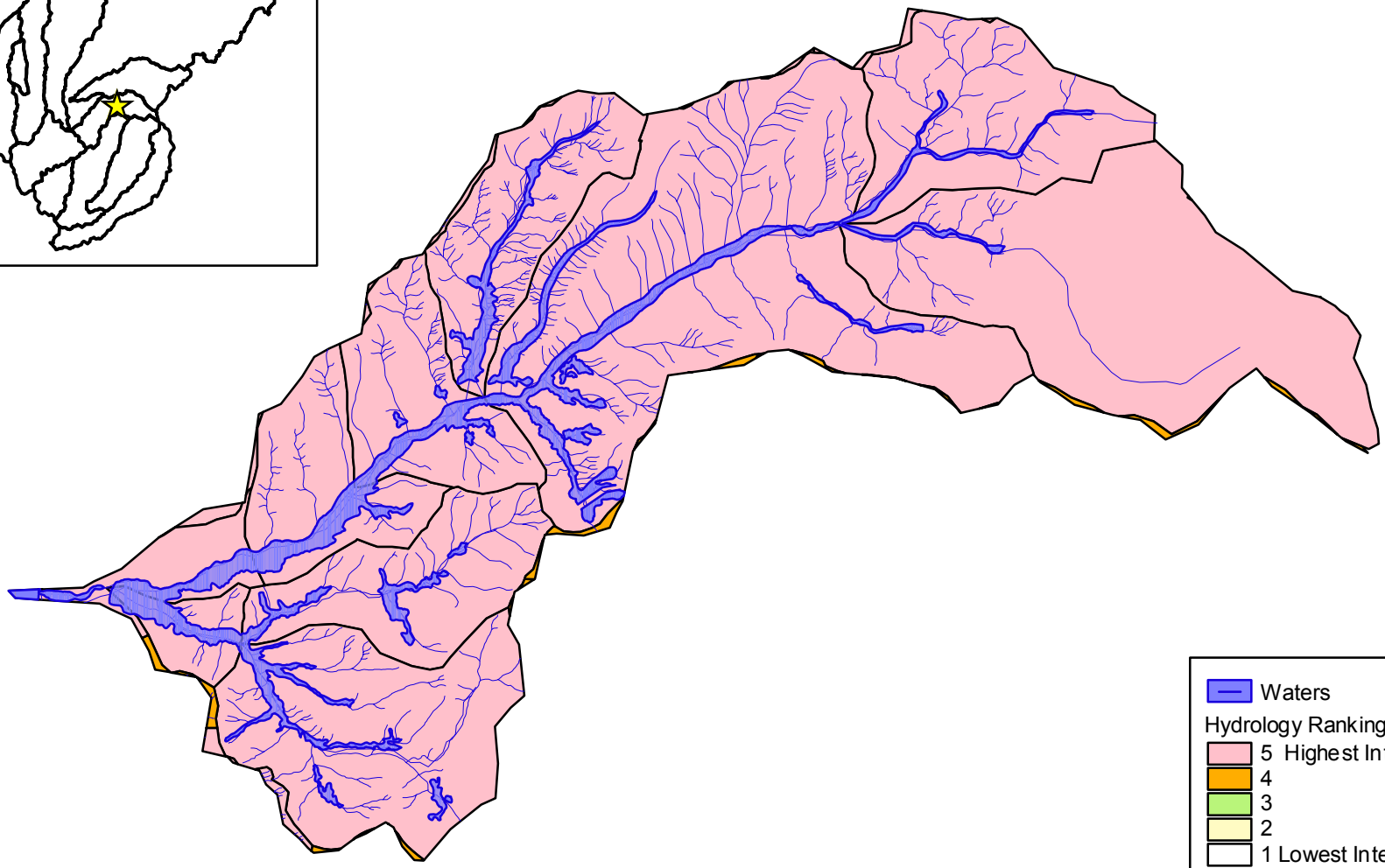
0.3 0 0.3 0.6 Miles

Source: ACOE 2000 and PCR 2002.

Figure 42

Water Quality Integrity Ranking
Verdugo Sub-basin





Note: Data from WES Functional E valution.

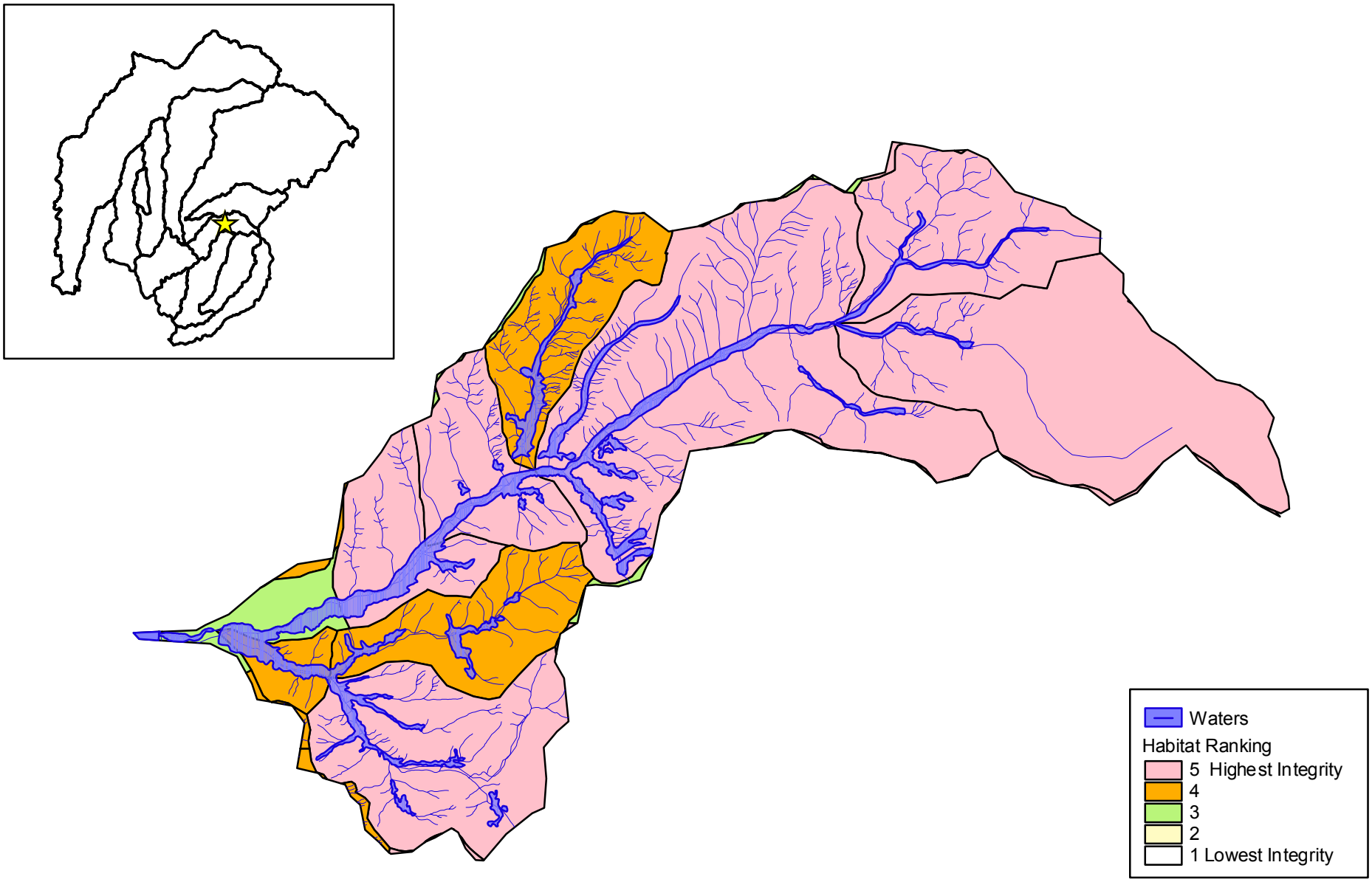
N

0.3 0 0.3 0.6 Miles

Source: ACOE 2000 and PCR 2002.

Figure 43

Hydrology Integrity Ranking
Verdugo Sub-basin



Note: Data from WES Functional E valution.

N

0.3 0 0.3 0.6 Miles

Source: ACOE 2000 and PCR 2002.

Figure 44
Habitat Integrity Ranking
Verdugo Sub-basin

Planning Considerations - Significant Terrains and Hydrology Features

- Verdugo Canyon has one of the highest soil infiltration rates of any of the sub-basins studies in the San Juan watershed.

- Substrate types and slope result in Verdugo Canyon having the highest sediment transport rate per unit area of any San Juan Creek watershed sub-basin, with sediment yield second behind Bell Canyon. Much of the sediment in Verdugo is mobilized during episodic events and, when mobilized, has the potential to have substantial effects on sediment delivery and on the geomorphology of downstream areas.

- The large quantities of highly erodible soils in the Verdugo Sub-basin are expected to provide a source of phosphorus loading to San Juan Creek.

- The upper portion of the Verdugo Sub-basin is underlain by the Trabuco and Ladd formations, which lack shallow groundwater and yield little baseflow. Due to the relative absence of groundwater and the presence of the steep slopes, both upland and riparian habitats reflect drier conditions than in other sub-basins.

- The stream course has a predominantly coarse substrate and is strongly influenced by the narrowness of the canyon.

Planning Recommendations

- Development with impervious surfaces should be limited in extent in order to protect the generation and transport of sediment to downstream areas, and to protect Verdugo Canyon from excessive erosion.

- Development should be set back from significant riparian habitat within the relatively narrow and geologically confined floodplain.

- Infiltration functions should be protected through site design. Cumulative stormwater flows should be managed in such a way as to not change peak flows that under present conditions lag behind those of the main stem of San Juan Creek. The area adjacent to the mouth of Verdugo Canyon provides opportunities for infiltration and flow attenuation.

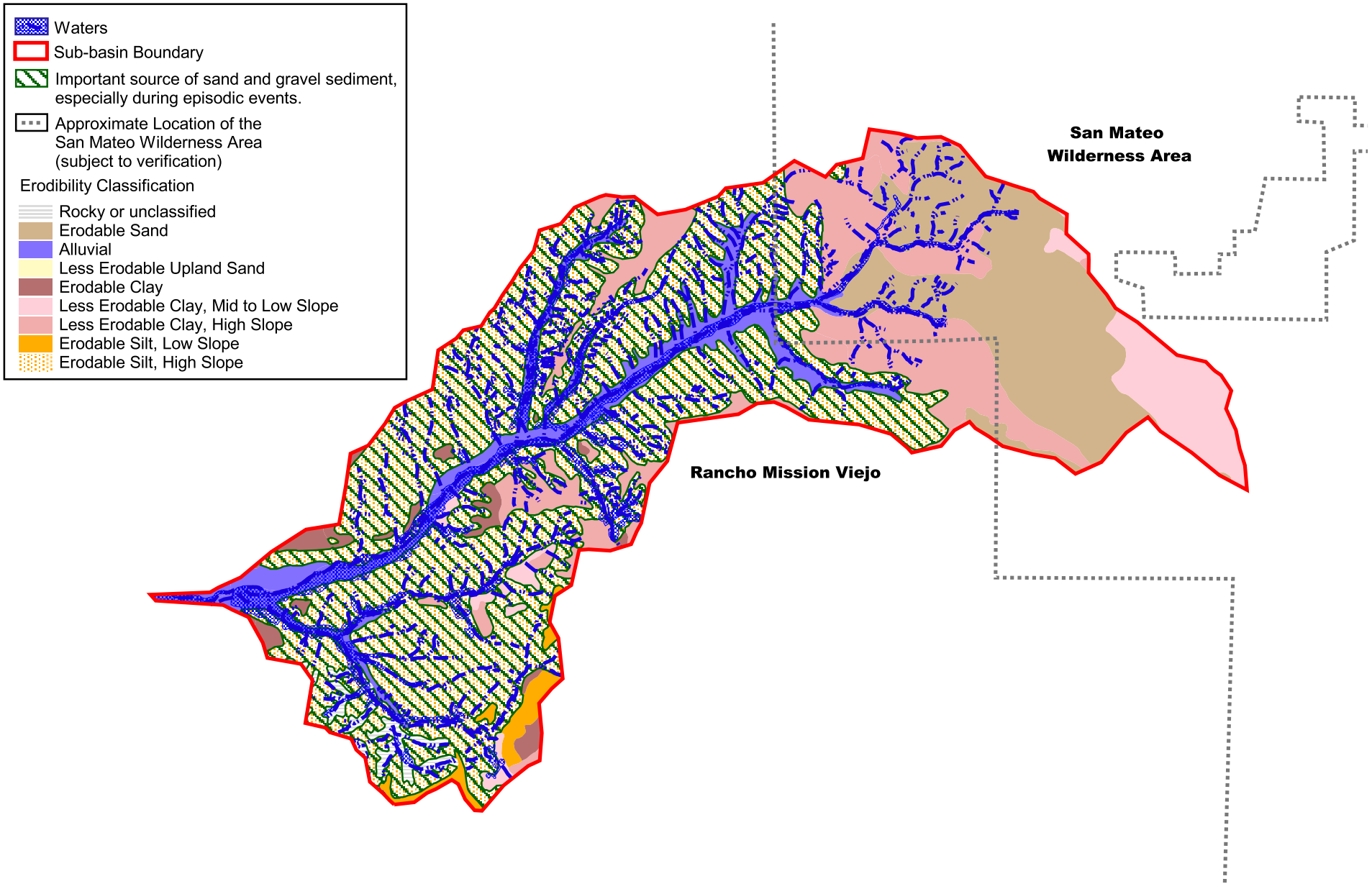
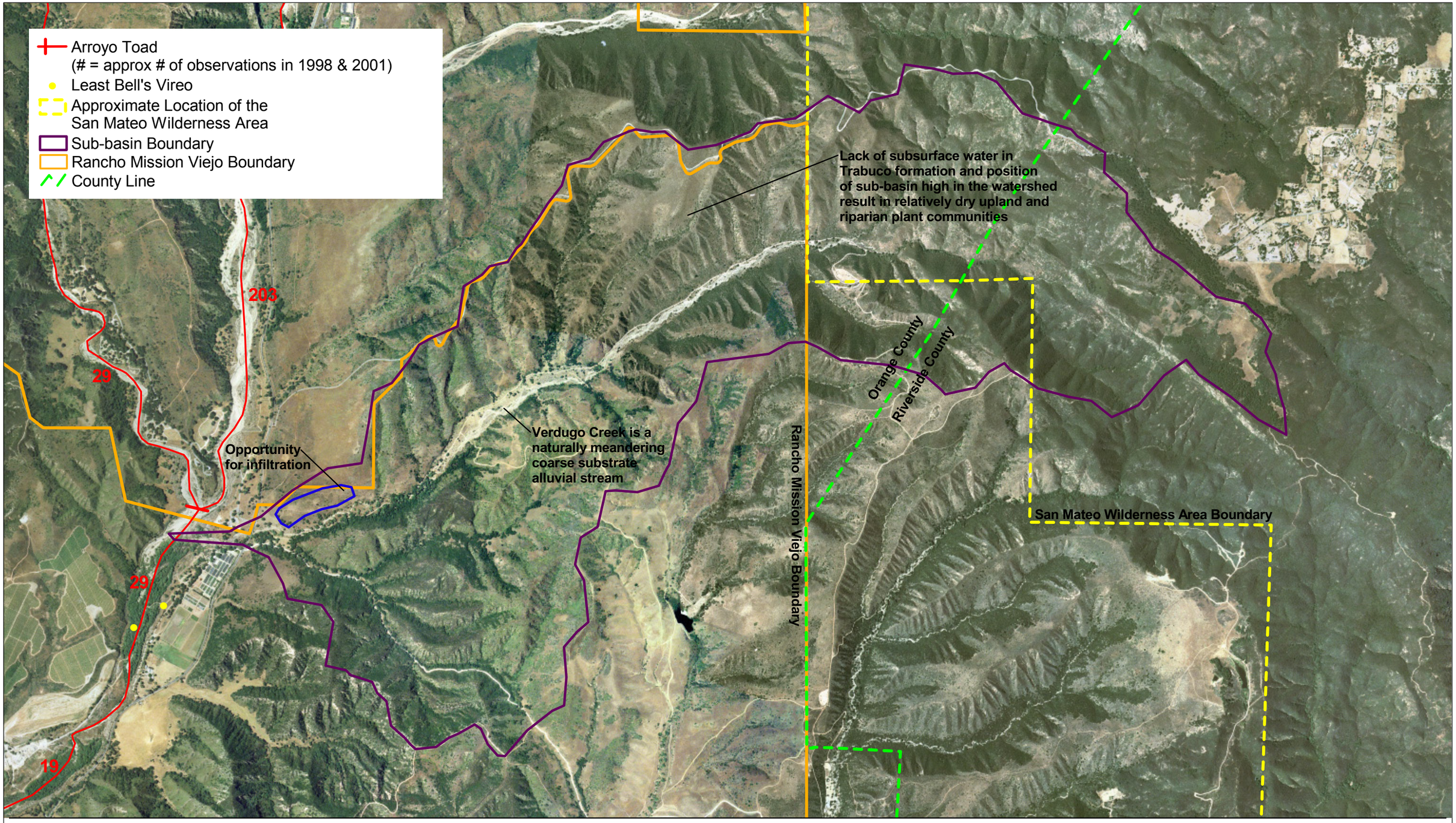


Figure 45
Sub-basin Geomorphic/ Hydrologic Features
Verdugo Canyon Sub-Basin
Sediment Yield



Source: Eagle Aerial Imaging 2001 and PCR 2002.

Figure 46
Sub-basin Geomorphic/Hydrologic Features
Verdugo Canyon

1938

2001

Figure 47
Verdugo
1938 and 2001 Aerial Photographs

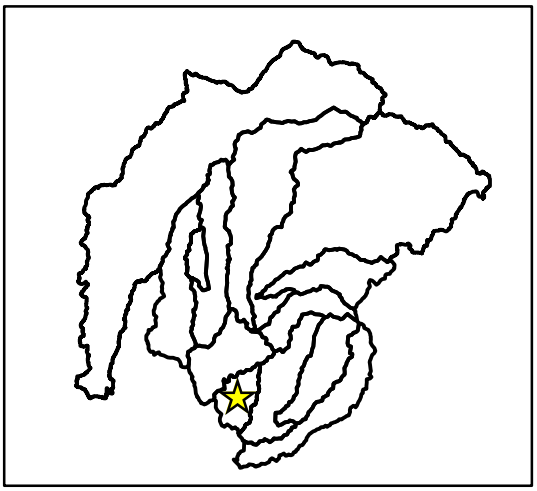
2B. SAN MATEO WATERSHED

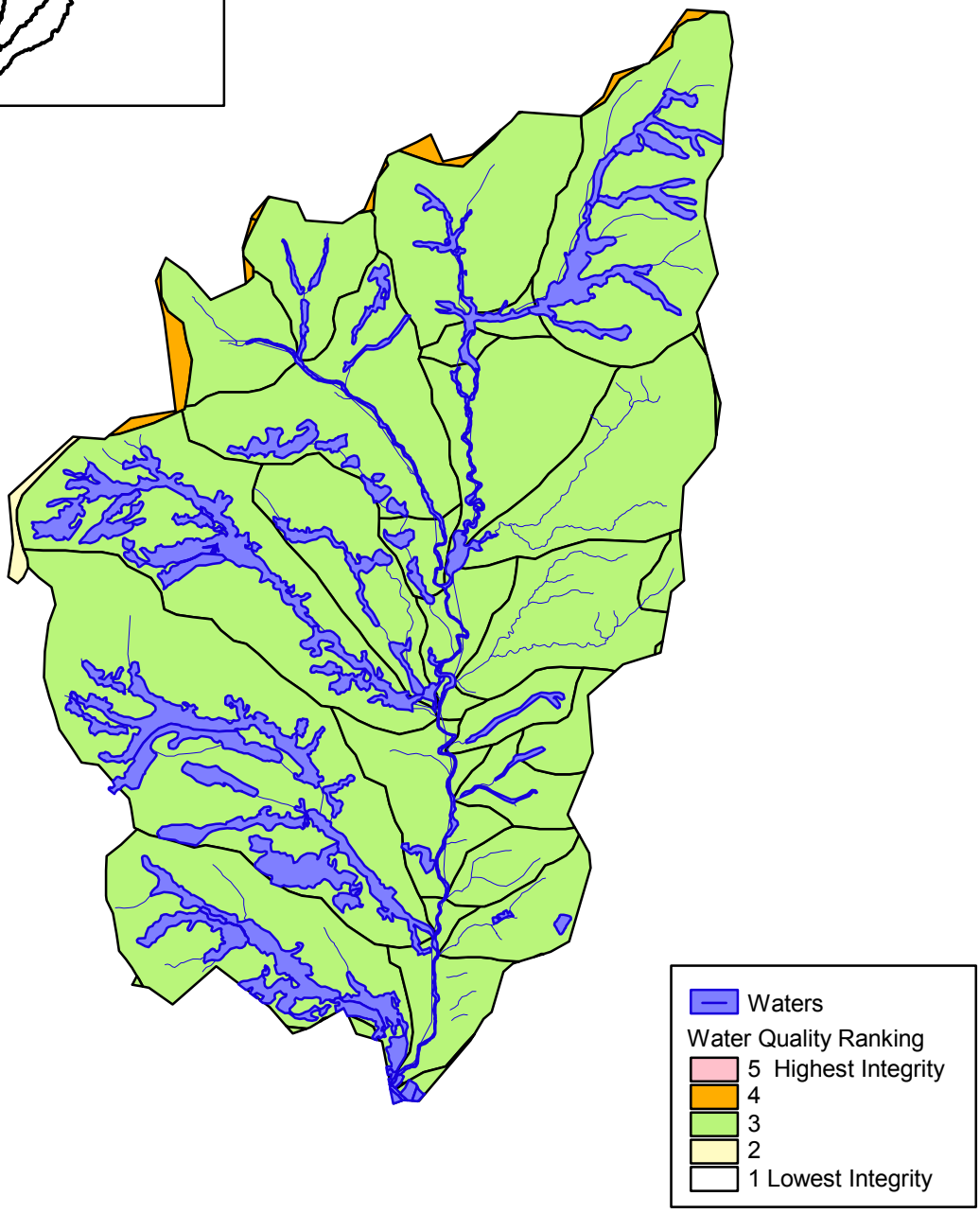
i) Cristianitos Sub-basin

WES General Assessment and Conclusions

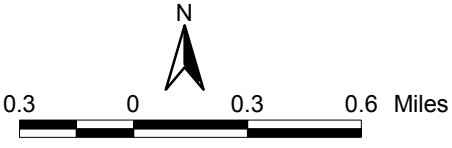
- Overall Hydrology and Water Quality Integrity is moderate to high.
- Overall Habitat Integrity is moderate.
- The hydrologic regime is relatively intact, no channelization or major diversions.
- Relatively contiguous riparian corridor in the main canyon.
- Very poor interaction between the channel and the floodplain throughout the length of the creek and portions of the creek has reduced riparian vegetation in the floodplain area.
- Culturally altered buffer area (due to the road), especially in more upstream areas result in reduced habitat integrity.
- Several locations of riparian corridor breaks (associated with road crossings).
- Moderately altered sediment regime.
- Upland land use poses a risk of nutrient, pesticide, and sediment loadings to the creek.

Figure 48
Cristianitos Sub-basin





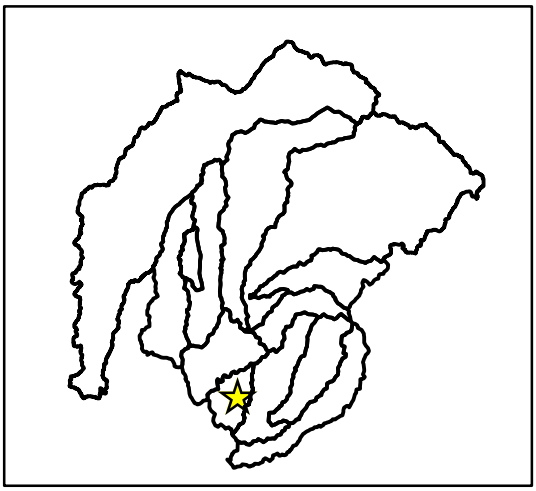
Note: Data from WES Functional Evalution.

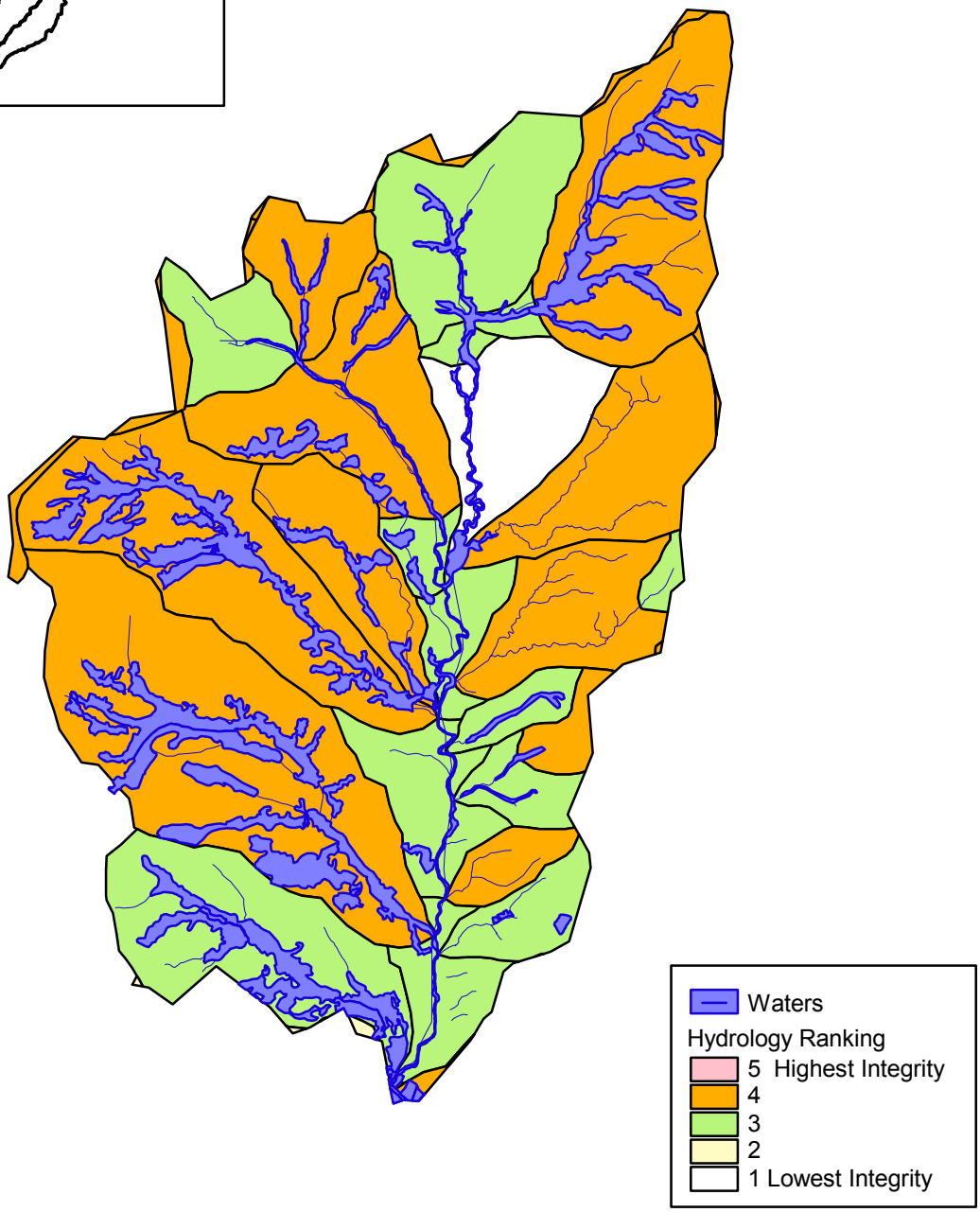


Source: ACOE 2000 and PCR 2002.

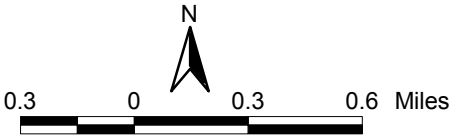
Figure 49

Water Quality Integrity Ranking
Cristanitos Sub-basin



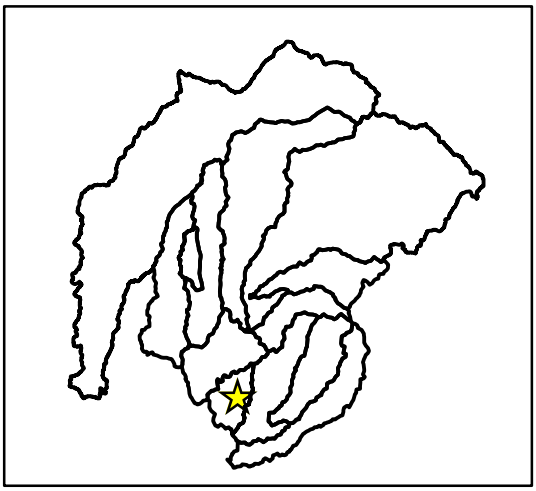


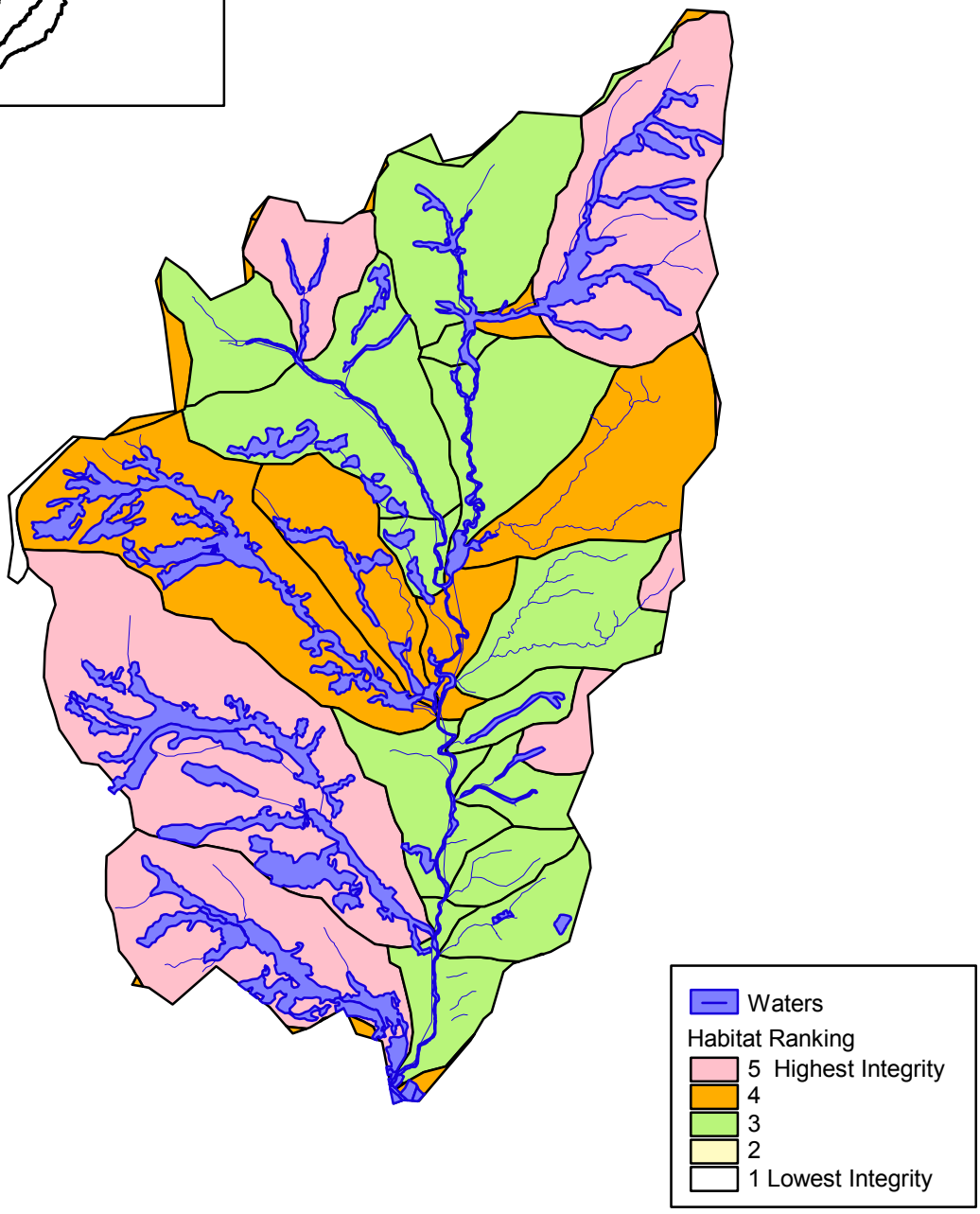
Note: Data from WES Functional Evalution.



Source: ACOE 2000 and PCR 2002.

Figure 50
Hydrology Integrity Ranking
Cristanitos Sub-basin





Note: Data from WES Functional Evalution.

N

0.3 0 0.3 0.6 Miles

Source: ACOE 2000 and PCR 2002.

Figure 51
Habitat Integrity Ranking
Cristanitos Sub-basin

Planning Considerations - Significant Terrains and Hydrology Features

- Cristianitos Sub-basin has a less "flashy" hydrograph than other sub-basins of the western San Mateo Watershed due to its shape, infiltration characteristics, and drainage network.

- The terrains to the west of Cristianitos Creek are generally erodible silty sands while the terrains to the east of the Creek are generally less erodible clays (where not disturbed). Intact clayey terrains tend to seal and functionally become nearly impervious upon saturation, generating more rapid runoff than sandy terrains.

- Major riparian areas exist in the northeast and southwest portions of the sub-basin.

- The middle and lower areas to the east of the creek contain few riparian areas and include numerous former open clay pits that are eroding and are not self healing.

- The middle portion of Cristianitos Creek supports alkaline wetlands. The hydrologic support of these wetlands in relation to the surface and subsurface hydrology of this portion of Cristianitos Creek is not fully understood, however, recently installed groundwater monitoring wells will help clarify this issue.

- The clay-rich soils to the east of the creek generate fine sediments, generally silts and clays, which contribute to turbidity in downstream waters (as contrasted with coarser sediments such as sands, silty sands, and cobbles contributed by Gabino and La Paz).

- A review of 1938 aerial photos indicates that the mainstem of Cristianitos Creek upstream from the confluence with Gabino Creek appears to have been deepening over the past 60 years.

Planning Recommendations

- The headwater area should be protected, with new impervious surfaces limited in extent within the headwater area.

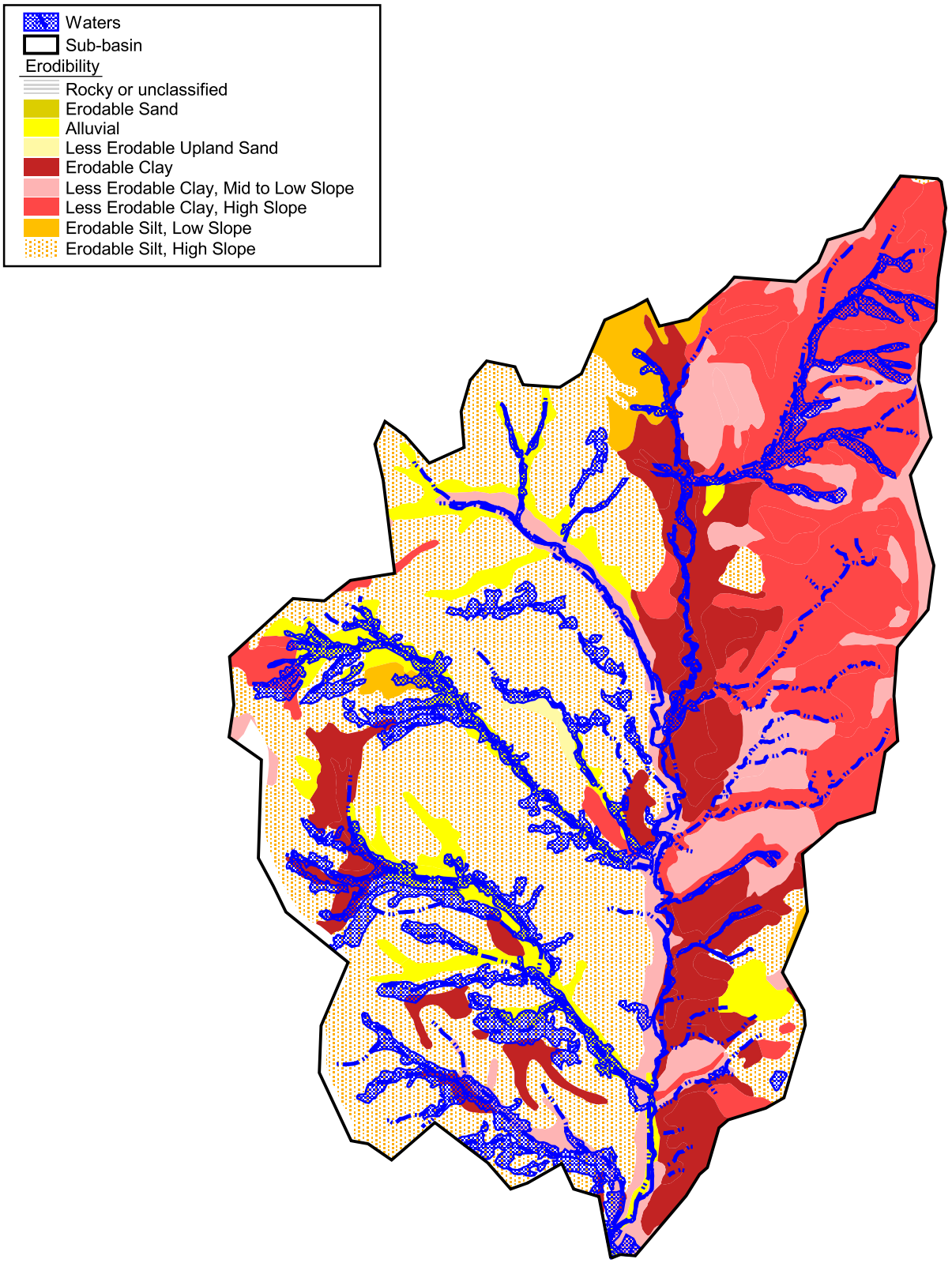
- Where feasible, protected headwater areas should be targeted for restoration of native vegetation to reduce the generation of fine sediments from the clayey terrains and to promote infiltration, and to enhance the value of upland habitats adjacent to the streams.

- In order to emulate existing hydrologic conditions, development should focus on areas with clayey soils, which presently seal fairly quickly under storm conditions and have relatively high runoff rates. The overall goal should be to reduce the generation of fine sediments compared with existing conditions to reduce turbidity

effects and other adverse impacts of fine sediments on downstream aquatic resources. Development in the middle and lower reach areas should be set back from the Creek and should be located in higher areas to the east of the Creek where existing erosion could be concurrently addressed.

- Stream stabilization opportunities should be examined in Cristianitos Creek (above the confluence with Gabino Creek) in the context of longer-term geologic processes.

- The alkali wetlands within the middle portion of the sub-basin should be protected in conjunction with protection of the overall riparian system.

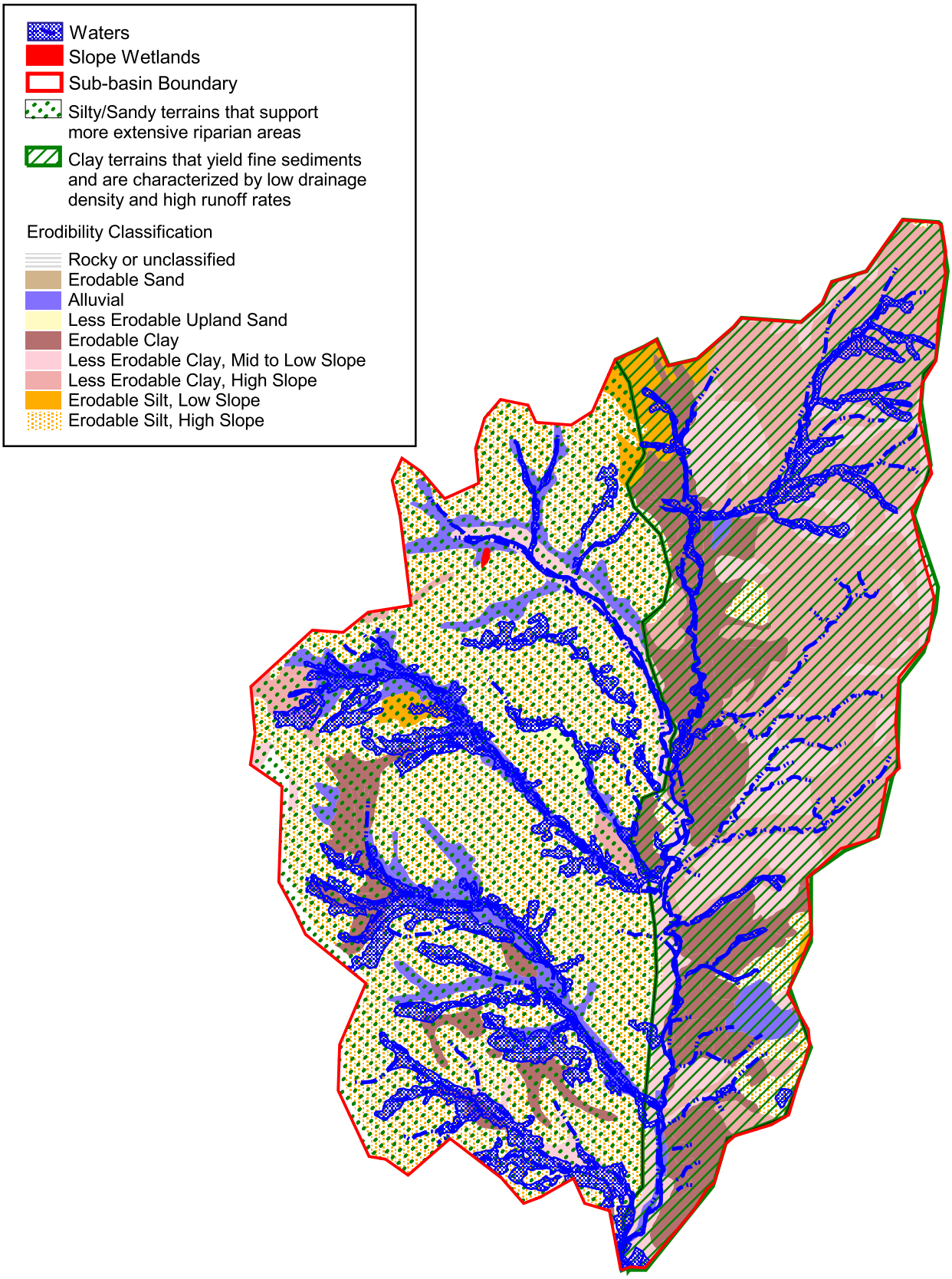


N

0.3 0 0.3 0.6 Miles

Source: ACOE and Balance Hydrologics, INC 2000.

Figure 52
Sub-Basin Geomorphic / Hydrologic Features
Landscape Scale Terrains for the
Cristianitos Canyon Sub-basin

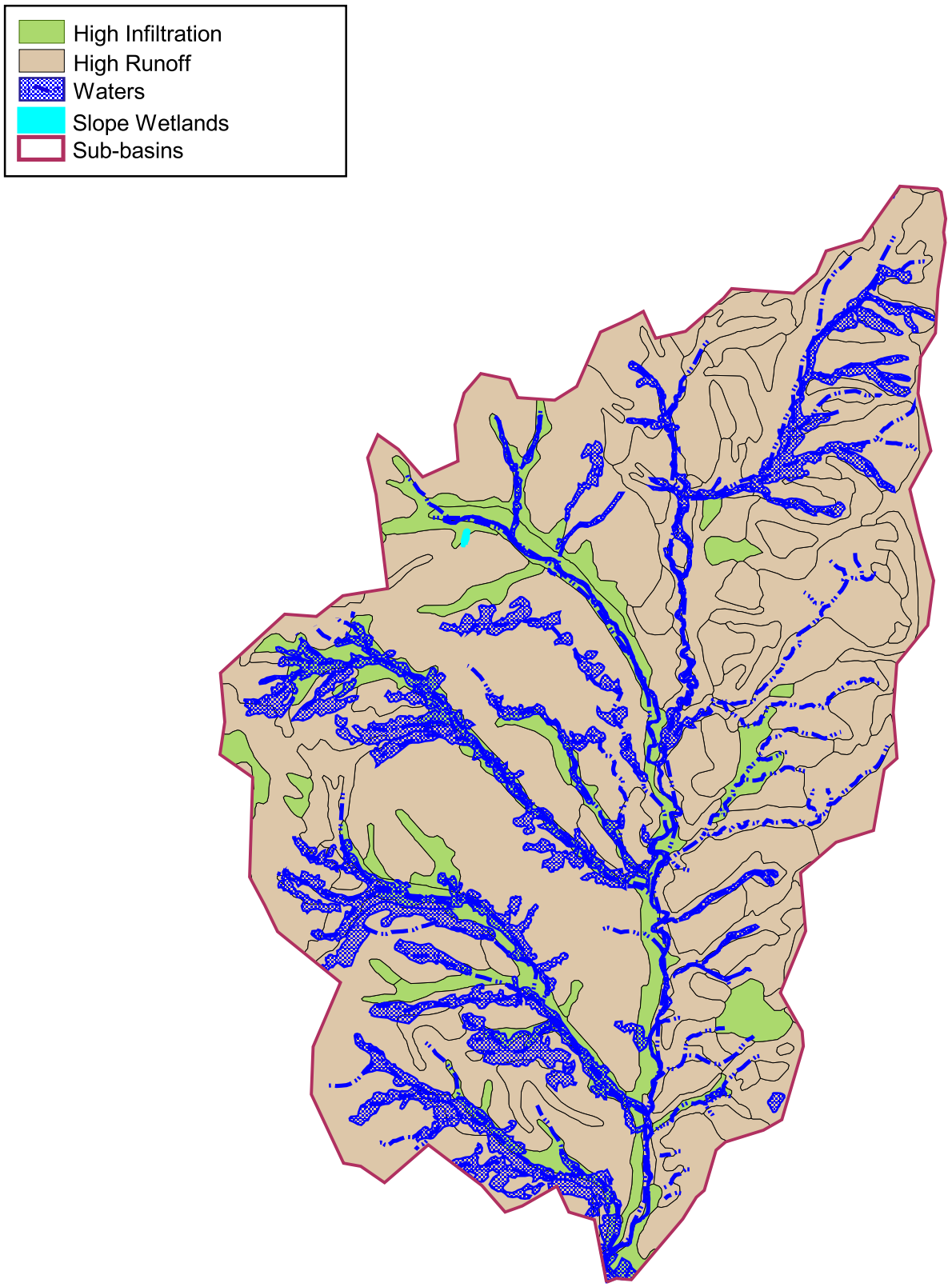


N

0.3 0 0.3 0.6 Miles

Source: ACOE,PWA 2000 and PCR 2002.

Figure 53
Sub-basin Geomorphic/ Hydrologic Features
Cristianitos Canyon Sub-Basin
Sediment Yield



N

0.3 0 0.3 0.6 Miles

Source: ACOE and PWA 2000.

Figure 54
Sub-Basin Geomorphic / Hydrologic Features
Runoff and Infiltration Patterns for the
Cristianitos Canyon Sub-basin

Arroyo Toad
(# = approx # of observations in 1998 & 2001)
Slope Wetlands
Sub-basin Boundary
Rancho Mission Viejo Boundary

The narrow confined main channel results from long-term gradual geologic processes (i.e. long-term terrace-forming valley deepening), terrains, land use, or a combination of factors.

Note: Sandy/silty terrains on west side of Cristianitos Creek promote higher infiltration and support more extensive riparian habitat.

Narrow confined creek channel

Area of alkaline wetlands

Note: Lower drainage density on east side of Cristianitos Creek due to clay soils that promote sheetflow runoff.

Narrow confined creek channel

Narrow confined creek channel

Clay pits

3

40

8

Gabino Creek is geomorphically dominant, characterized by sandier substrates and conveys more sediment inflows then Cristianitos Creek

N

1200 0 1200 Feet

Source: Eagle Aerial Imaging 2001 and PCR 2002.

Figure 55
Sub-basin Geomorphic/Hydrologic Features
Cristianitos Canyon
Opportunities for Restoration/Stabilization

1938

AXK-50-14

West Branch of Cristianitos highly eroded in 1938; now healed

Scrub expansion in grasslands

Incised in 1938 and 2001

Little or no incision in 1938; currently incised

Healing from 1938

Noticeable incision and growth of woody riparian species since 1938

Location Key

2001

West Branch of Cristianitos highly eroded in 1938; now healed

Scrub expansion in grasslands

Incised in 1938 and 2001

Little or no incision in 1938; currently incised

Healing from 1938

Noticeable incision and growth of woody riparian species since 1938

Figure 56
Upper Cristianitos
1938 and 2001 Aerial Photographs

ii) Gabino and Blind Sub-basin

WES General Assessment And Conclusions

Gabino Canyon

- Integrity of the upper watershed is slightly lower than that of the lower watershed.
- Overall Hydrologic Integrity is high. Overall Water Quality integrity is moderate.
- Overall, Habitat Integrity is moderate to high.
- Hydrologic regime relatively intact, no channelization, or major diversions.
- Generally poor interaction between the channel and the floodplain.
- Road adjacent to the creek in the middle and upper reaches represents an altered buffer condition and results in slightly decreased habitat integrity.
- Periodic breaks in the riparian corridor associated with road crossings.
- Altered sediment regime, especially in the upper watershed.
- Upland land use poses a risk of nutrient, pesticide, and sediment loadings to the creek, primarily in the upper portions of the sub-basin.

Blind Canyon

- Overall Hydrologic Integrity is high.
- Overall Water Quality Integrity is very high.
- Overall Habitat Integrity is moderate.
- Highest Overall Integrity of any sub-basin in San Mateo watershed (may be partially due to the small confined area compared to other sub-basins).
- Hydrologic regime relatively intact.
- Very poor interaction between the channel and the floodplain throughout the length of the creek.
- Reconnection of channel and floodplain represents a significant restoration opportunity.

- Upland land use poses a risk of nutrient, pesticide, and sediment loadings to the creek.

Gabino and Blind

Legend

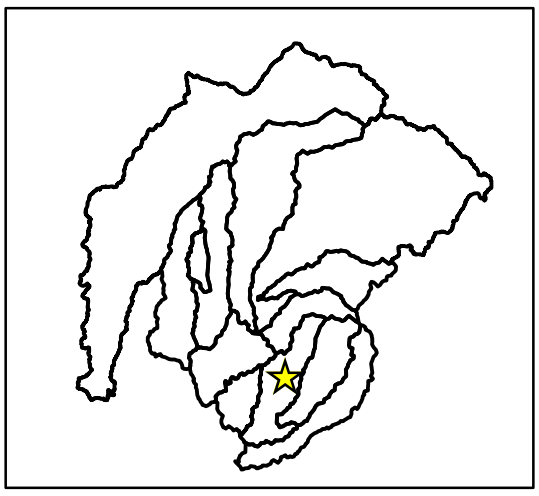
Sub-basin Watershed Boundary

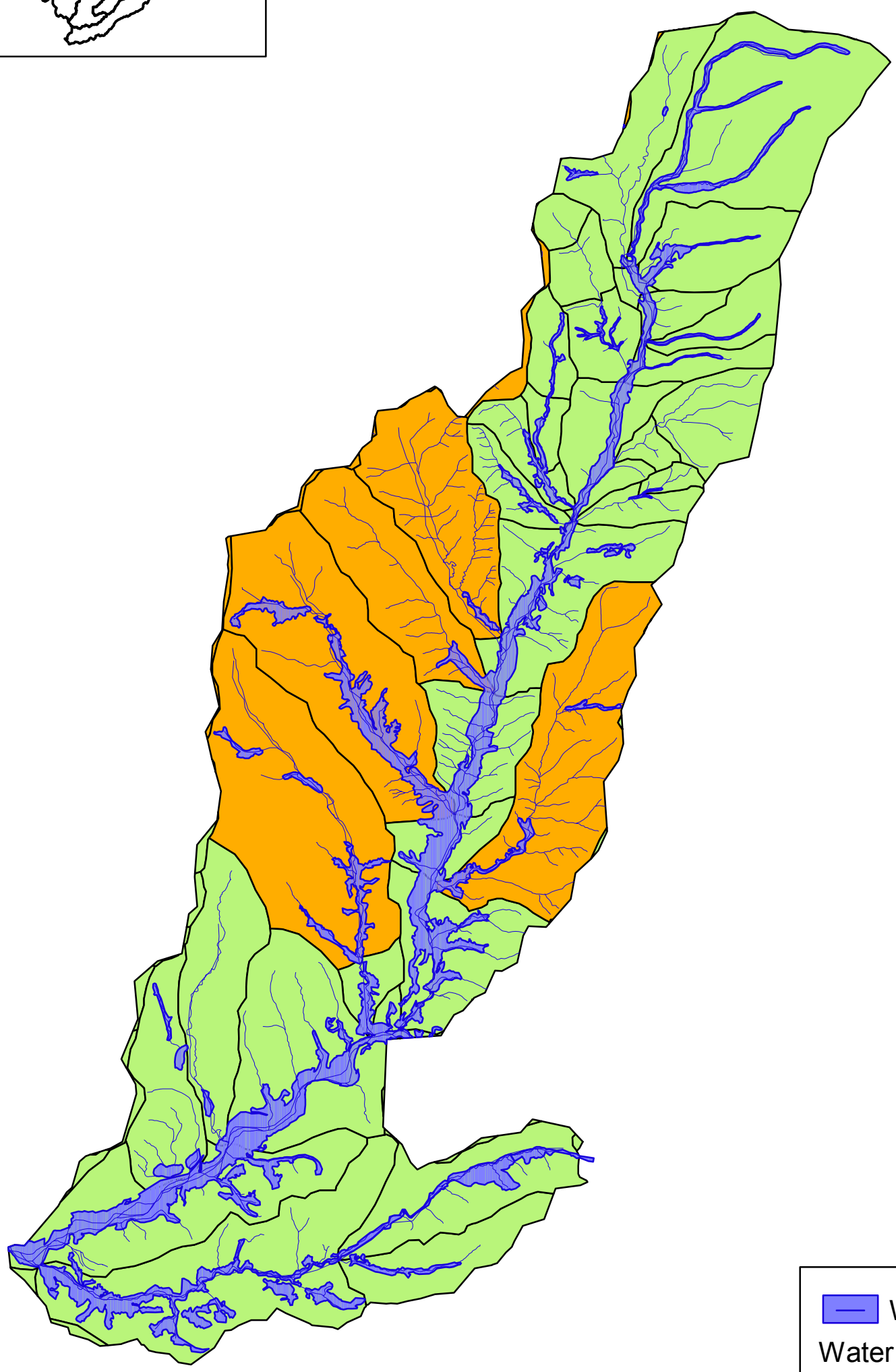
Riparian and Wetland Vegetated Areas per WES

N

2000 0 2000 Feet

Figure 57
Gabino and Blind Sub-basins





Waters

Water Quality Ranking

5 Highest Integrity

4

3

2

1 Lowest Integrity

Note: Data from WES Functional Evalution.

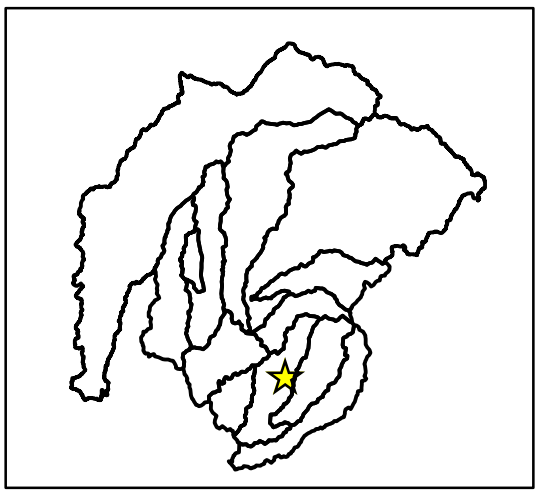
N

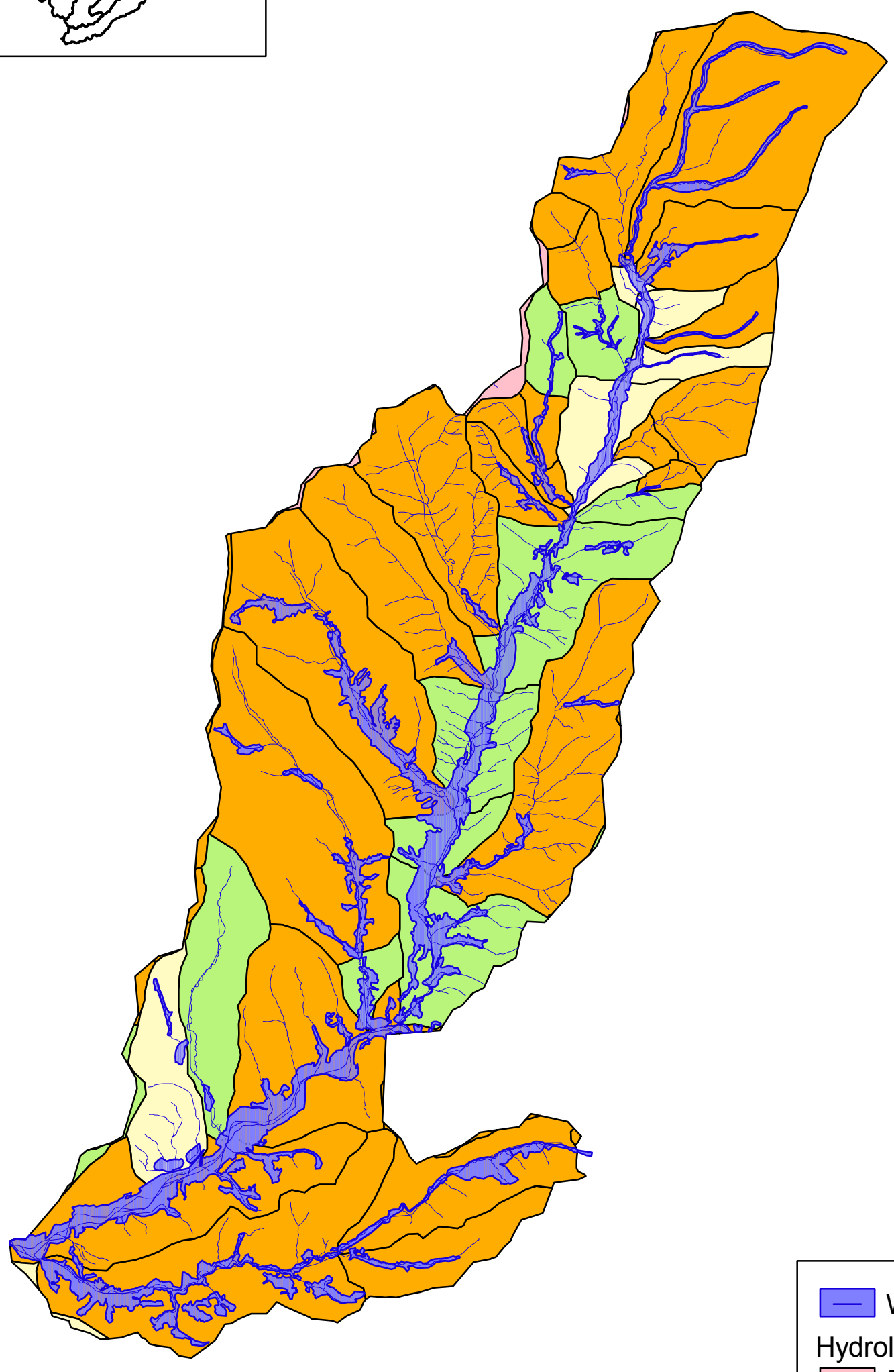
0.4 0 0.4 0.8 Miles

Source: ACOE 2000 and PCR 2002.

Figure 58

Water Quality Integrity Ranking
Gabino and Blind Canyon Sub-basins





Waters

Hydrology Ranking

5 Highest Integrity

4

3

2

1 Lowest Integrity

Note: Data from WES Functional Evalution.

N

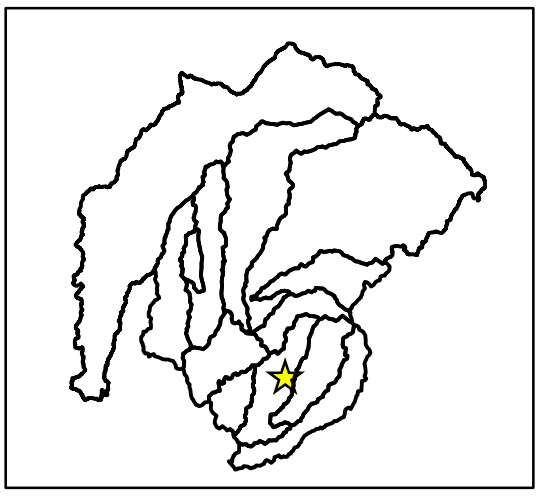
0.4 0 0.4 0.8 Miles

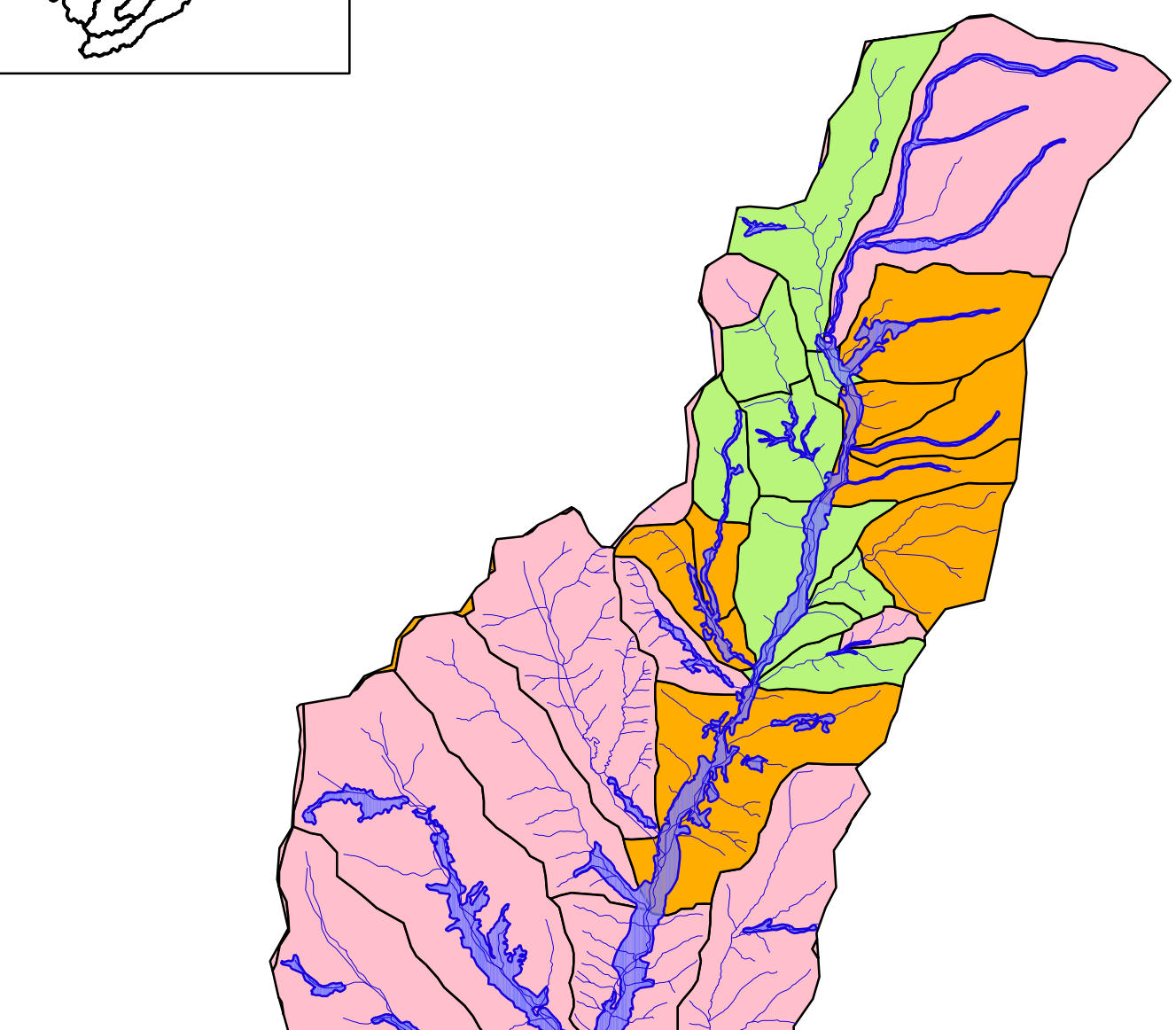
Source: ACOE 2000 and PCR 2002.

Figure 59

Hydrology Integrity Ranking

Gabino and Blind Canyon Sub-basins





Waters

Habitat Ranking

5 Highest Integrity

4

3

2

1 Lowest Integrity

Note: Data from WES Functional Evalution.

N

0.4 0 0.4 0.8 Miles

Source: ACOE 2000 and PCR 2002.

Figure 60

Habitat Integrity Ranking

Gabino and Blind Canyon Sub-basins

Planning Considerations - Significant Terrains and Hydrologic Features

- Gabino and Talega Canyons are the largest sub-basins in the western San Mateo watershed.

- Gabino Canyon has the highest predicted absolute peak flow and runoff volume of the sub-basins studied in the western San Mateo watershed. This is due to its size, position high in the watershed, steep topography, and the narrow geologically confined nature of the middle and lower reaches of the sub-basin. Simulated hydrographs indicate a somewhat "flashy" runoff response in this sub-basin.

- Gabino Canyon has the highest predicted sediment yield and transport rate of any sub-basin analyzed in the western San Mateo sub-watersheds.

- Fine sediment generation in the upper sub-basin may exceed natural conditions due to extensive gully formation in the headwater areas.

- Terrains in the middle reaches are very steep, with high drainage densities and have very limited stormwater infiltration capacity.

- Sediments produced from the middle portion of the sub-basin are primarily coarse sediments, including sands and cobbles, which are mobilized and transported during extreme episodic events. These sediments are probably very important to downstream channel structure and provide geomorphologic elements of habitats for sensitive species found in the middle and lower reaches of Gabino Creek and further downstream.

- In wet years, the creek flows through the late spring and seasonal pools persist in some locations (probably associated with bedrock outcrops). However, these pools seldom if ever persist through the summer.

- Groundwater does not appear to be a significant element of the Creek's hydrologic system, with the possible exception of the lower reaches (i.e., below the confluence with La Paz). It appears that the alluvium in this sub-basin is recharged during winter runoff events and once the limited aquifer storage has been seasonally depleted, little ongoing replenishment occurs until the next event.

- Along the lower reaches of the Creek, terrains to the north include clayey soils and a major unnamed side canyon that has been extensively modified by clay mining activities.

- The area south of Blind Canyon is comprised of a mesa top that has been grazed and is characterized by high gradient, coarse-bedded channel, and sycamore and oak

riparian forest. The slopes of the canyon contain other significant habitat including coast live oak.

Planning Recommendations

- Limit new impervious surfaces in the headwater area to locations that will not adversely impact runoff patterns.

- Protect the headwaters through restoration of existing gullies using a combination of slope stabilization, grazing management, and native grasslands and/or scrub restoration. To the extent feasible, restore native grasses to reduce sediment generation and promote infiltration of stormwater.

- Modify grazing management in the upper portion of the sub-basin to support restoration and vegetation management in the headwater areas.

- Minimize impacts to the steep side canyons in the middle portion of the sub-basin by limiting new impervious surfaces.

- To the extent feasible, focus development in the clayey soils and terrains in the lower portions of the sub-basin, where it could serve to reduce the generation of fine sediments and associated turbidity.

- To the extent feasible, utilize the side canyon currently degraded by past mining activities for natural water quality treatment systems.

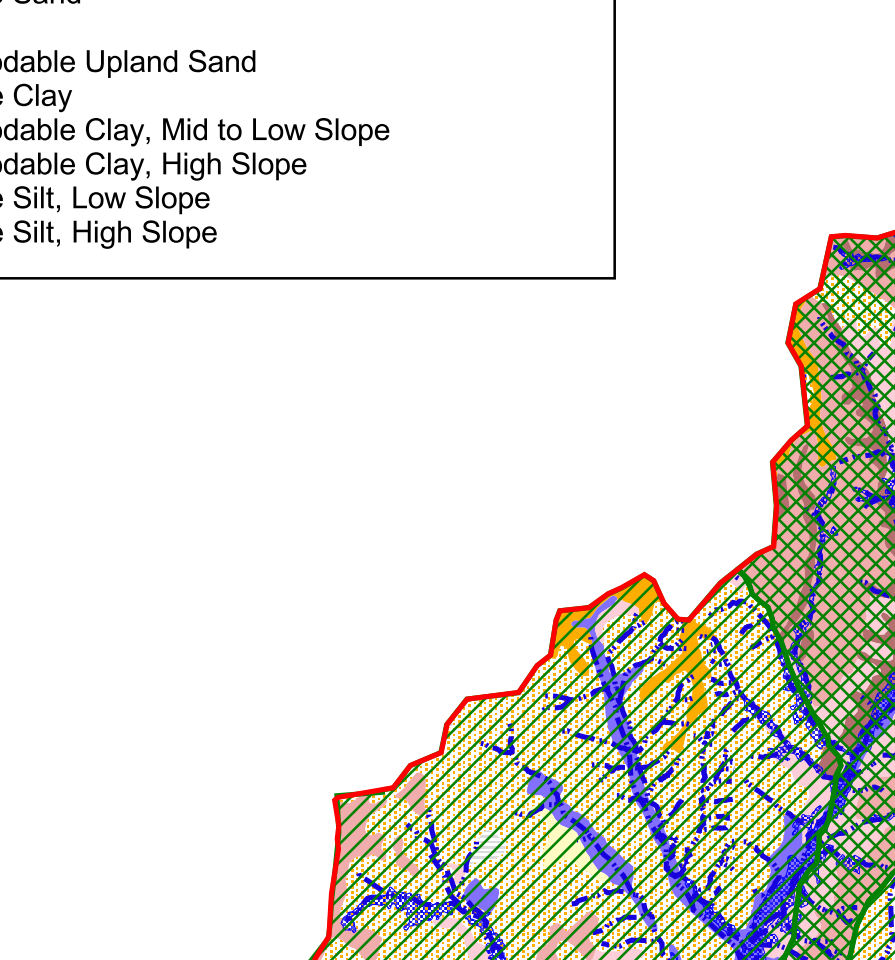
- In the lower reach of the Creek, protect significant riparian habitats along the south side of the Creek and on proximate side canyon slopes. Limit development and other uses in Blind Canyon to the grazed areas on the mesa and away from the major oak woodlands in Blind Canyon. Direct to and treat stormwater runoff in areas that will not contribute to appreciable increases in water delivery/flow to the oak woodlands in the lower portion of the sub-basin.

- Protect the integrity of arroyo toad populations in lower Gabino Creek by maintaining hydrologic and sediment delivery processes, including maintaining the flow characteristics of episodic events in the sub-basin. Utilize natural water quality treatment systems to manage and treat runoff from any new land uses in areas adjacent to the lower creek.

Waters
Sub-basin Boundary
Mix of sand and gravel and fine sediment yields
Primarily fine sediment yields
Primarily sand and gravel sediment yields

Erodability Classification

Rocky or unclassified
Erodable Sand
Alluvial
Less Erodable Upland Sand
Erodable Clay
Less Erodable Clay, Mid to Low Slope
Less Erodable Clay, High Slope
Erodable Silt, Low Slope
Erodable Silt, High Slope



Upper Gabino

Middle Gabino

Lower Gabino

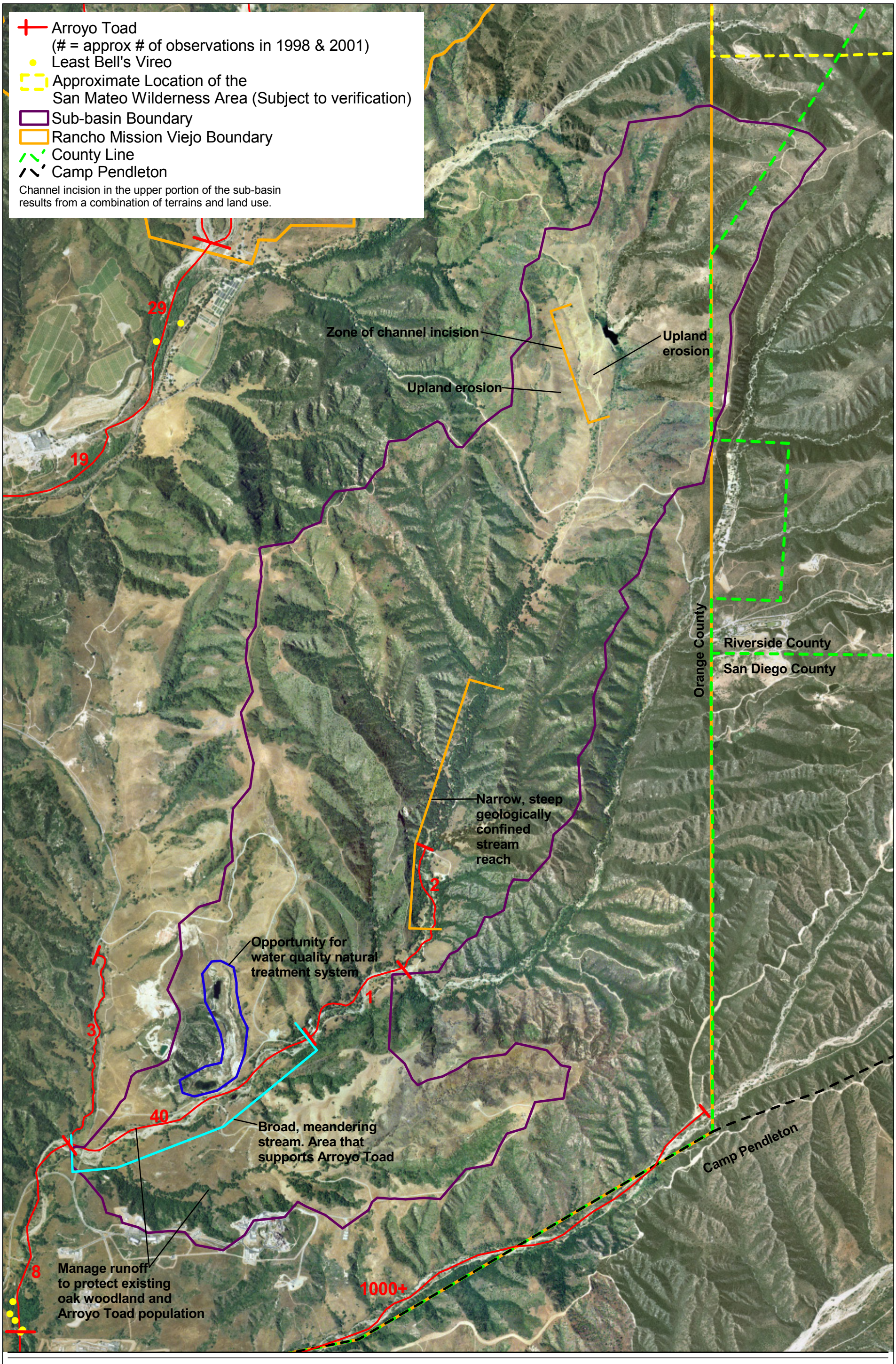
(Note: Erosion in middle and upper Gabino Canyon may be contributing to high sediment yield from this sub-basin.)

N

0.4 0 0.4 0.8 Miles

Source: ACOE, PWA 2000 and PCR 2002.

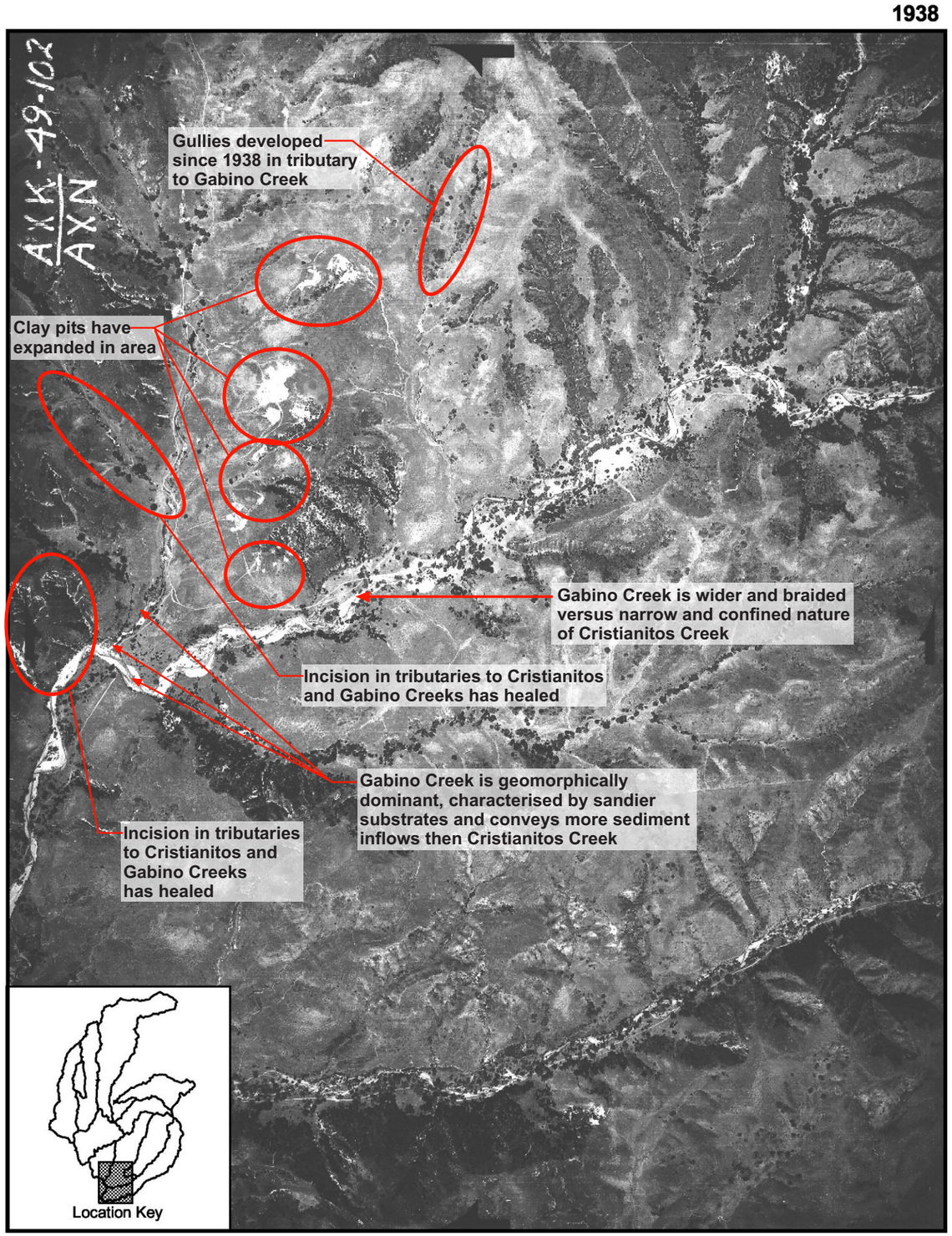
Figure 61
Sub-basin Geomorphic/Hydrologic Features
Gabino and Blind Canyon Sub-Basins
Sediment Yield



Source: Eagle Aerial Imaging 2001 and PCR 2002.

Figure 62

Sub-basin Geomorphic/Hydrologic Features Gabino and Blind Canyon Opportunites for Restoration/Stabilization and Water Quality Natural Treatment Systems



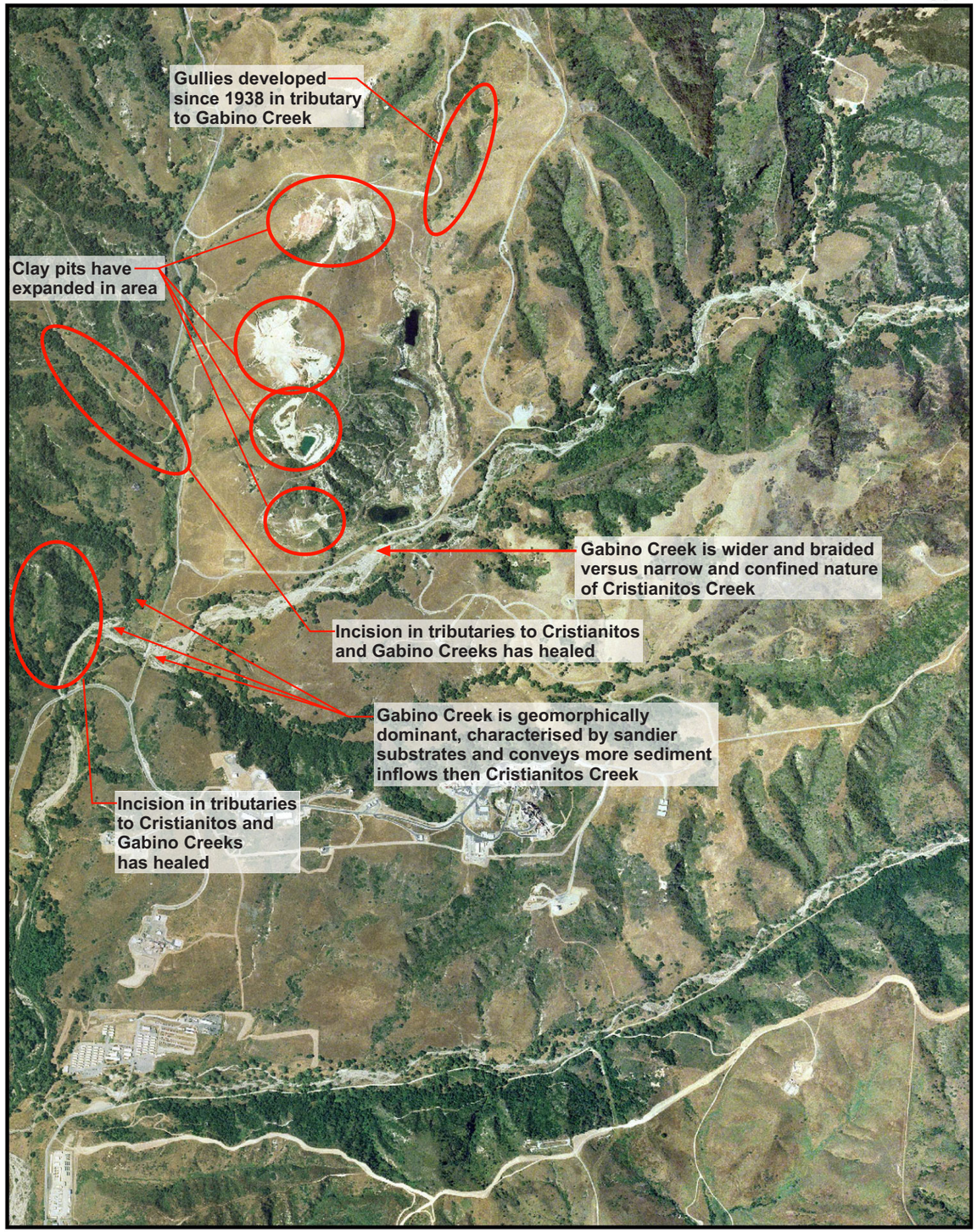


Figure 63
Gabino, Talega and Lower Cristianitos
1938 and 2001 Aerial Photographs

iii) La Paz Sub-basin

WES General Assessment and Conclusions

- Overall Hydrology and Habitat Integrity is high.
- Overall Water Quality Integrity is moderate.
- Hydrologic regime relatively intact, no channelization or major diversions.
- Mainstem creek has poor interaction between channel and the floodplain.
- Upland land use poses a risk of nutrient, pesticide, and sediment loadings to the creek; however, to a lesser extent than in Gabino Canyon.
- Lower portion of La Paz Canyon has areas with an altered or reduced buffer.

La Paz

Legend

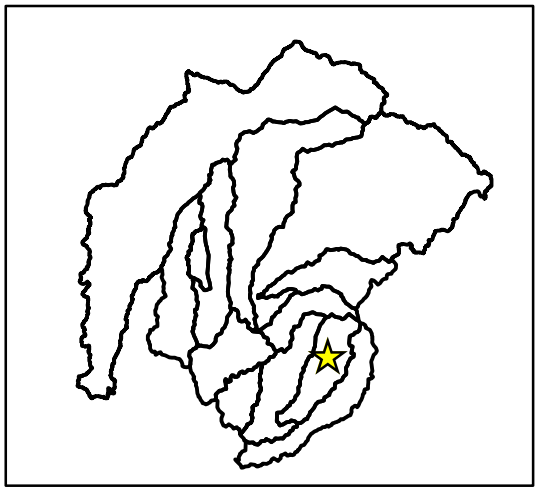
Sub-basin Watershed Boundary

Riparian and Wetland Vegetated Areas per WES

N

1500 0 1500 Feet

Figure 64
La Paz Sub-basin



Note: Data from WES Functional Evalution.

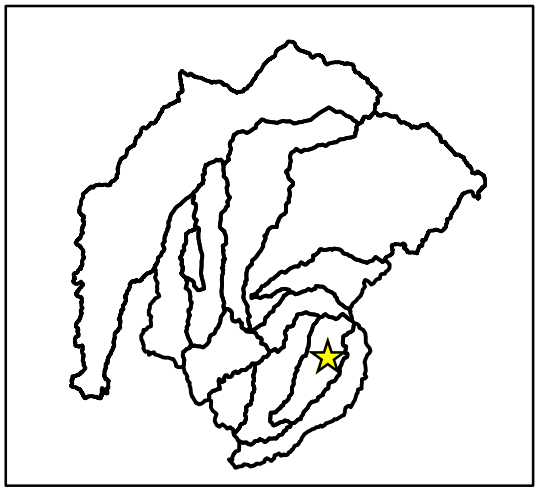
N

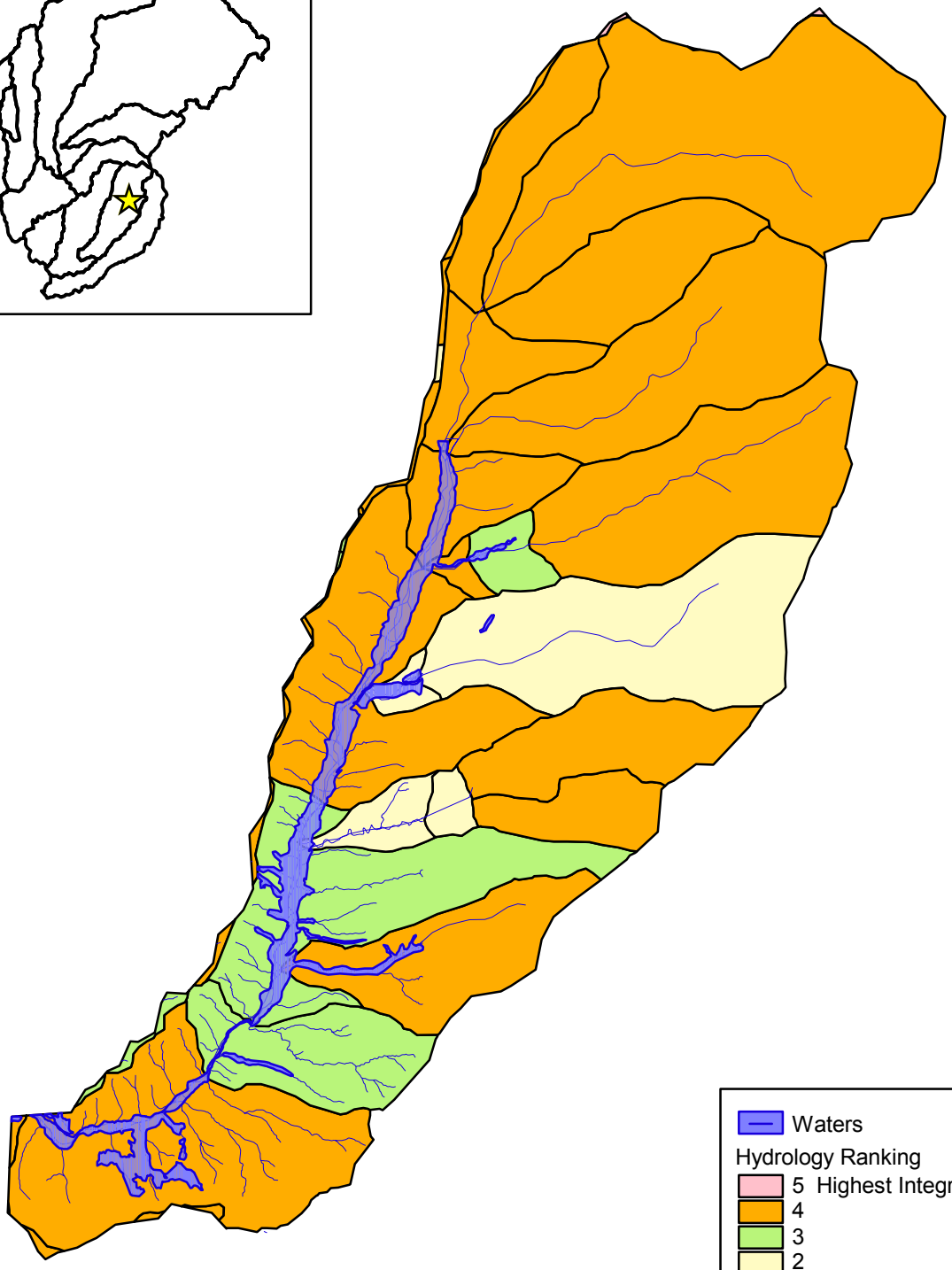
0.4 0 0.4 0.8 Miles

Source: ACOE 2000 and PCR 2002.

Figure 65

Water Quality Integrity Ranking
Laz Paz Sub-basin





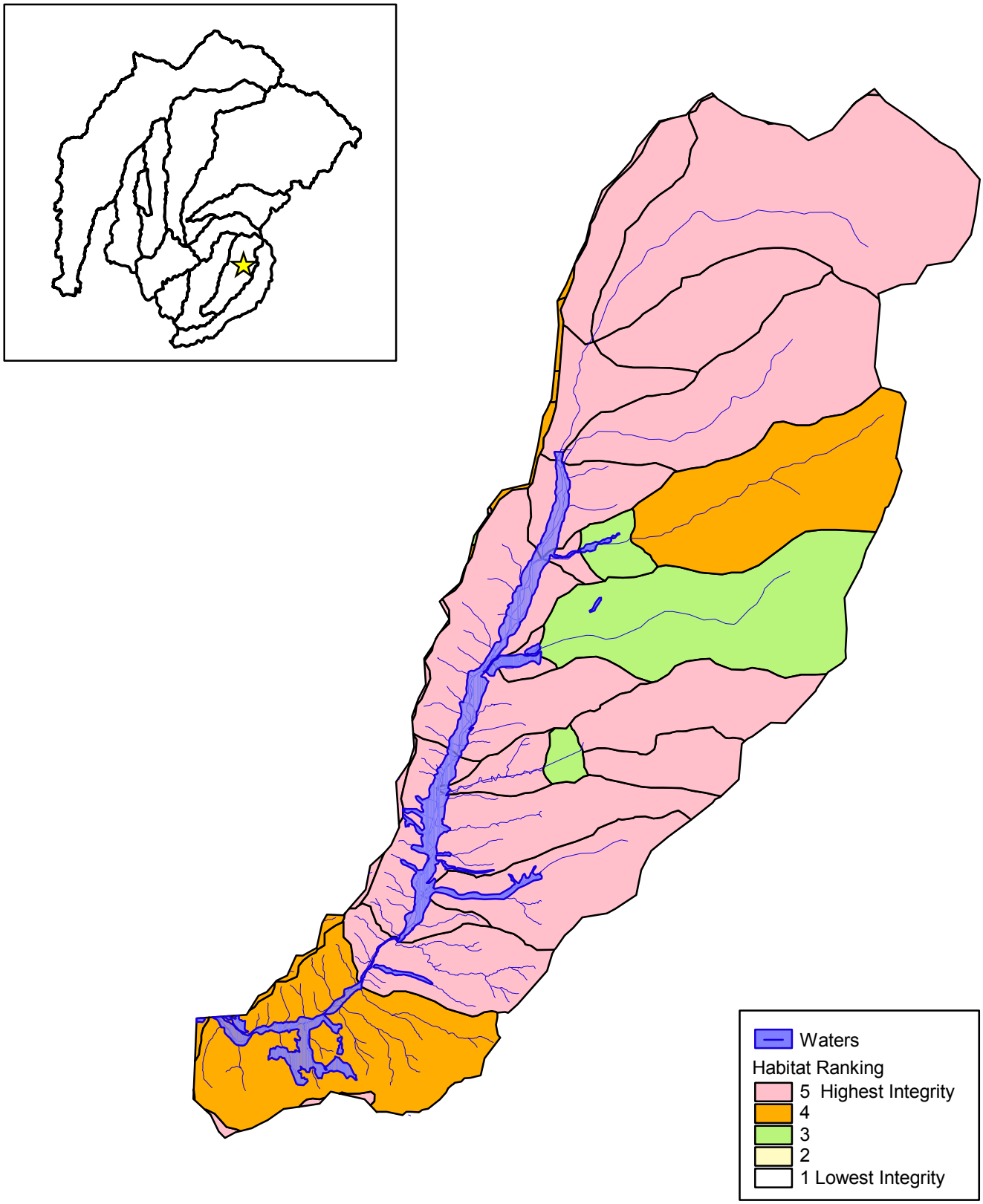
Note: Data from WES Functional Evalution.

N

0.4 0 0.4 0.8 Miles

Source: ACOE 2000 and PCR 2002.

Figure 66
Hydrology Integrity Ranking
Laz Paz Sub-basin



Note: Data from WES Functional Evalution.

N

0.4 0 0.4 0.8 Miles

Source: ACOE 2000 and PCR 2002.

Figure 67
Habitat Integrity Ranking
Laz Paz Sub-basin

Planning Considerations – Significant Terrains and Hydrologic Features

- The majority of the La Paz Sub-basin (including all of its headwaters) is located outside the SAMP/MSAA and NCCP/HCP study areas.

- Runoff per unit area is higher for the La Paz Sub-basin than for Gabino and Talega due to the altitude and steepness of the headwaters, higher rainfall in the upper watershed due to orographic effects, and high proportion of crystalline terrains and Class D soils.

- The headwaters of the La Paz Sub-basin are in the Trabuco formation, which yields more water than other sub-basins in the western San Mateo watershed (i.e., within the SAMP/MSAA study area).

- Predicted sediment yields and transport rates for La Paz Canyon are the lowest of any of the sub-basins analyzed in the San Mateo watershed. The low yields may be partially due to the relatively large proportion of very coarse substrates (i.e., large cobbles and boulders) produced from La Paz Canyon. These coarse substrates are likely mobilized very infrequently during large-scale episodic events, at which time they play a significant role in reshaping the geomorphology of the lower portions of the watershed.

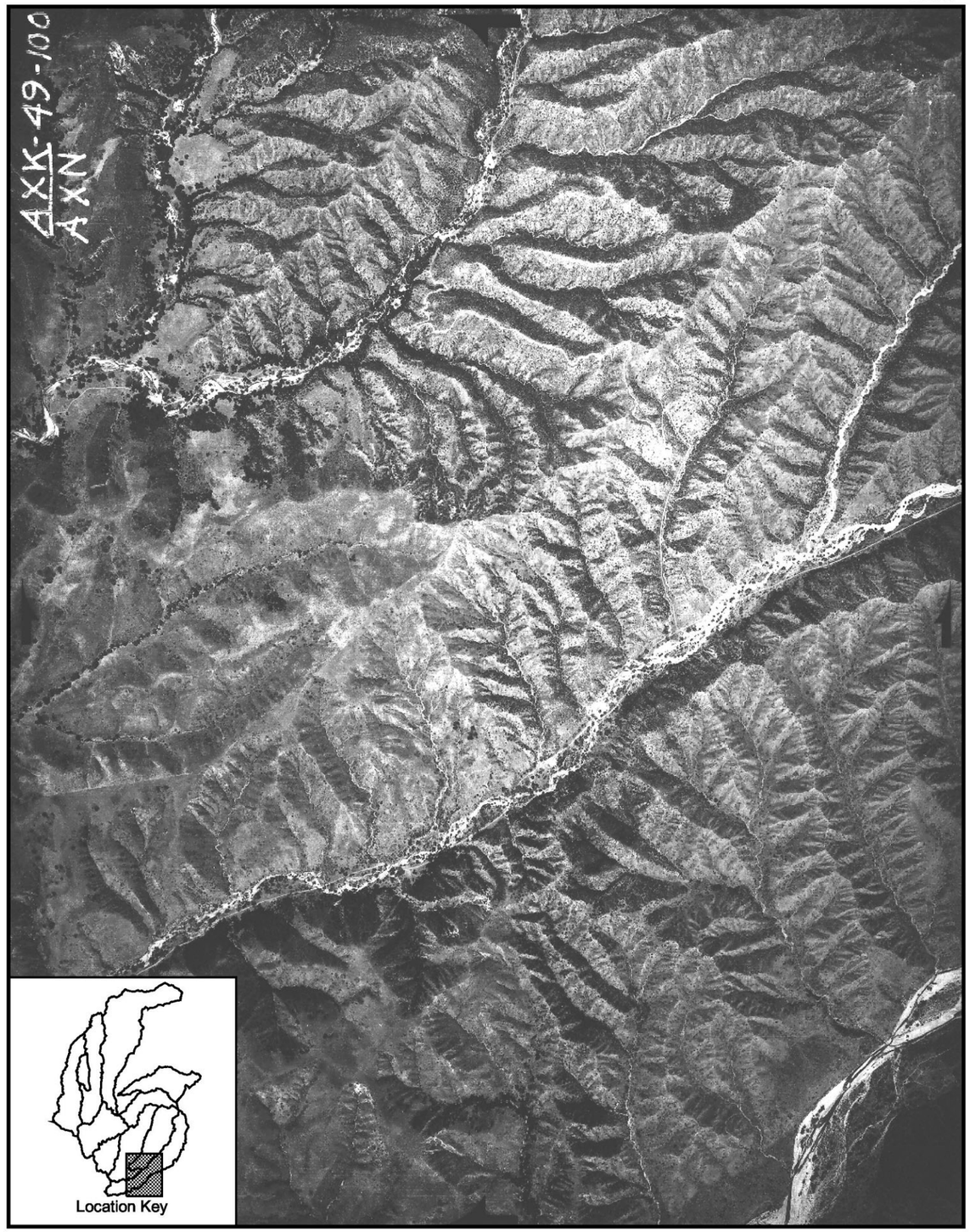
- The riparian zones within the La Paz Sub-basin are confined by the geology of the valley, but contain high topographic complexity (including bars and ponds that are inundated late into the spring), an abundance of coarse and fine woody debris, leaf litter, and a mosaic of understory plant communities. Portions of the streams that convey seasonal high velocity flows also retain water for extended periods of time in shallow depressions within the active channel.

Planning Recommendations

- Development should be limited in extent in order to protect the generation and transport of coarse sediment to downstream areas.

- Development should be set back from riparian habitat within the relatively narrow and geologically confined riparian zone.

1938



2001

Figure 68
La Paz
1938 and 2001 Aerial Photographs

iv) Talega Sub-basin

WES General Assessment and Conclusions

No WES general assessment and conclusions are available at this time for the Talega Sub-basin.

Planning Considerations - Significant Terrains and Hydrologic Features

- Talega Canyon straddles the boundary of RMV and Camp Pendleton, with at least a third of the upper watershed located outside the SAMP/MSAA and NCCP study areas in the San Mateo Wilderness Area. The existing TRW facilities are on the ridge above Talega Canyon, with runoff draining both to Talega Canyon and to Blind Canyon/Gabino Canyon.

- Talega Canyon has the highest proportion of poorer infiltrating Type D soils of any of the other sub-basins analyzed in the San Mateo watershed and yield relatively high runoff volumes. Although the simulated hydrographs for Talega Creek have a pronounced peak, they are relatively broad. The broader peaking is likely due to the elongated geometry of the sub-basin, which tends to attenuate flood movement as it travels through the sub-basin. Thus, runoff volumes are high but peak discharge rates are attenuated as stormwater travels downstream through the sub-basin.

- The headwaters of Talega Creek (which are outside the SAMP/MSAA and NCCP study areas) are in weathered granitic rocks that sustain a substantial density of springs. These springs help support a more dense riparian corridor in the upper portion of the sub-basin, and may contribute to late season moisture in Talega Creek.

- Talega Creek supports one of the two largest population of arroyo toads in the planning area. The creek substrate is rock/cobble with sandbars forming in depositional areas. Riparian habitat consists of dense stands of mature, structurally diverse coast live oak and southern sycamore riparian woodlands. Central reaches of the creek support mule fat scrub and open sand bar habitat. Riparian zones contain high topographic complexity, an abundance of coarse and woody debris, leaf litter and a mosaic of understory plant communities. The creek contains shallow pools that retain water into the late spring and early summer, a water supply likely to be of significance for arroyo toad breeding habitat, but does not appear to be sufficient to sustain steelhead.

Planning Recommendations

- To the extent feasible, major stormwater flows from development areas should emulate current runoff patterns. Runoff during the dry season and high frequency/low magnitude storms (generally 1–2 year storm events) should be routed through natural water quality treatment systems and, where feasible, encouraged to flow generally away from arroyo toad habitat in Talega Canyon and toward Blind Canyon.

- Development should focus on the ridge tops to avoid the canyon bottoms and preserve the steeper slopes. To the extent practical, development should generally be in the area of the existing TRW facilities and adjacent ridges to the east/northeast.

- The timing of peak flows should emulate the timing of flows under existing conditions.

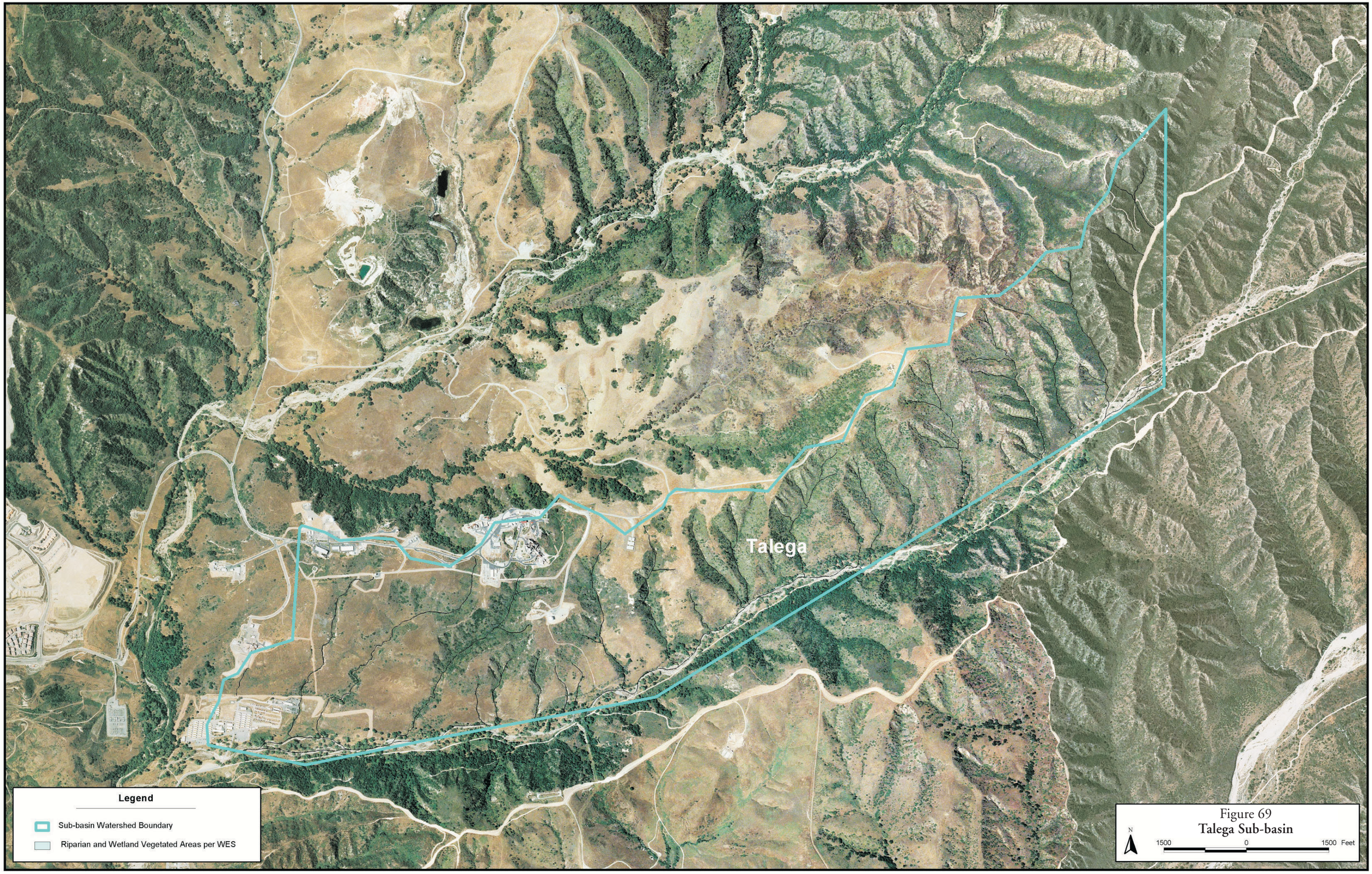
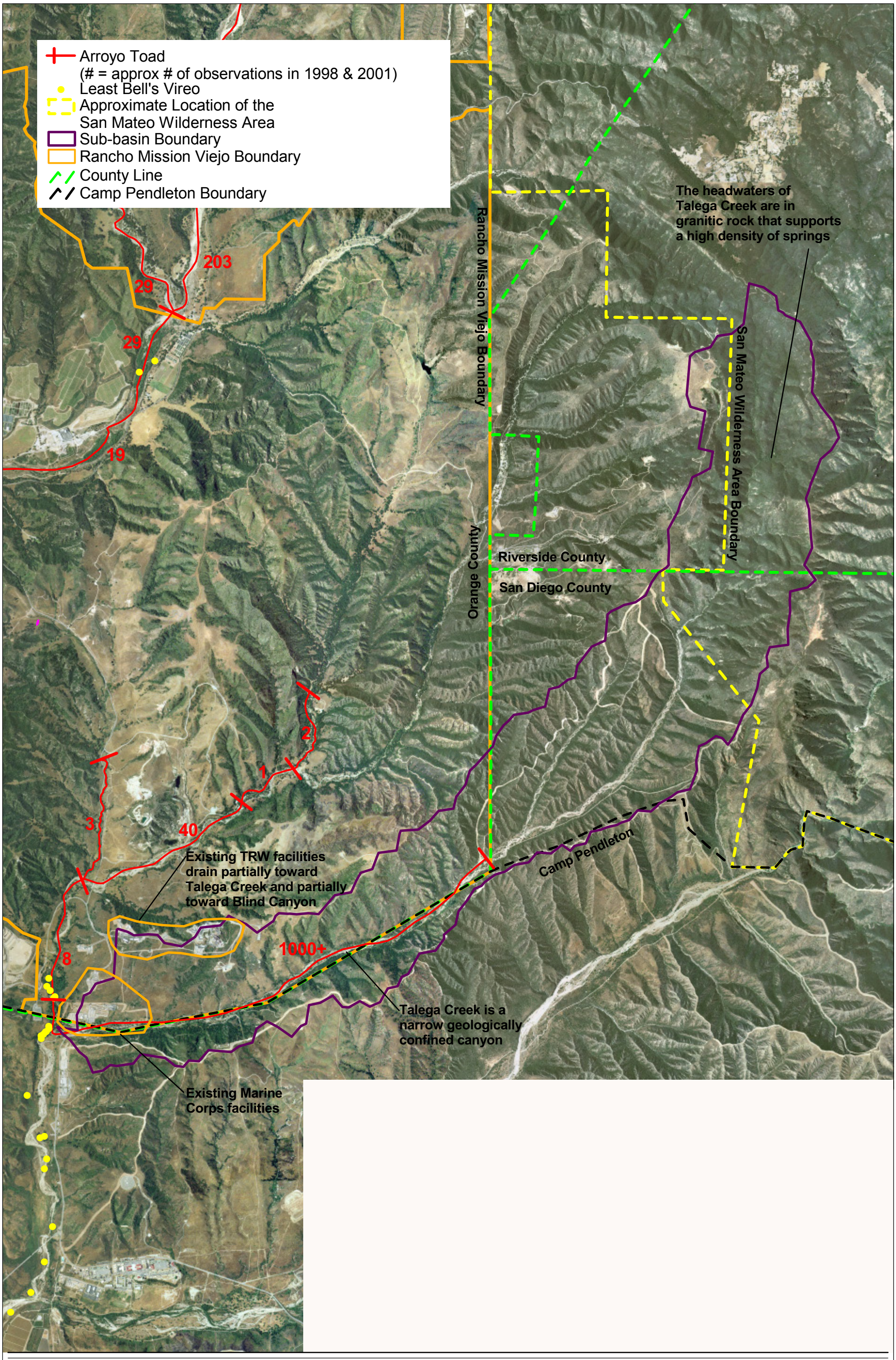


Figure 69
Talega Sub-basin



N

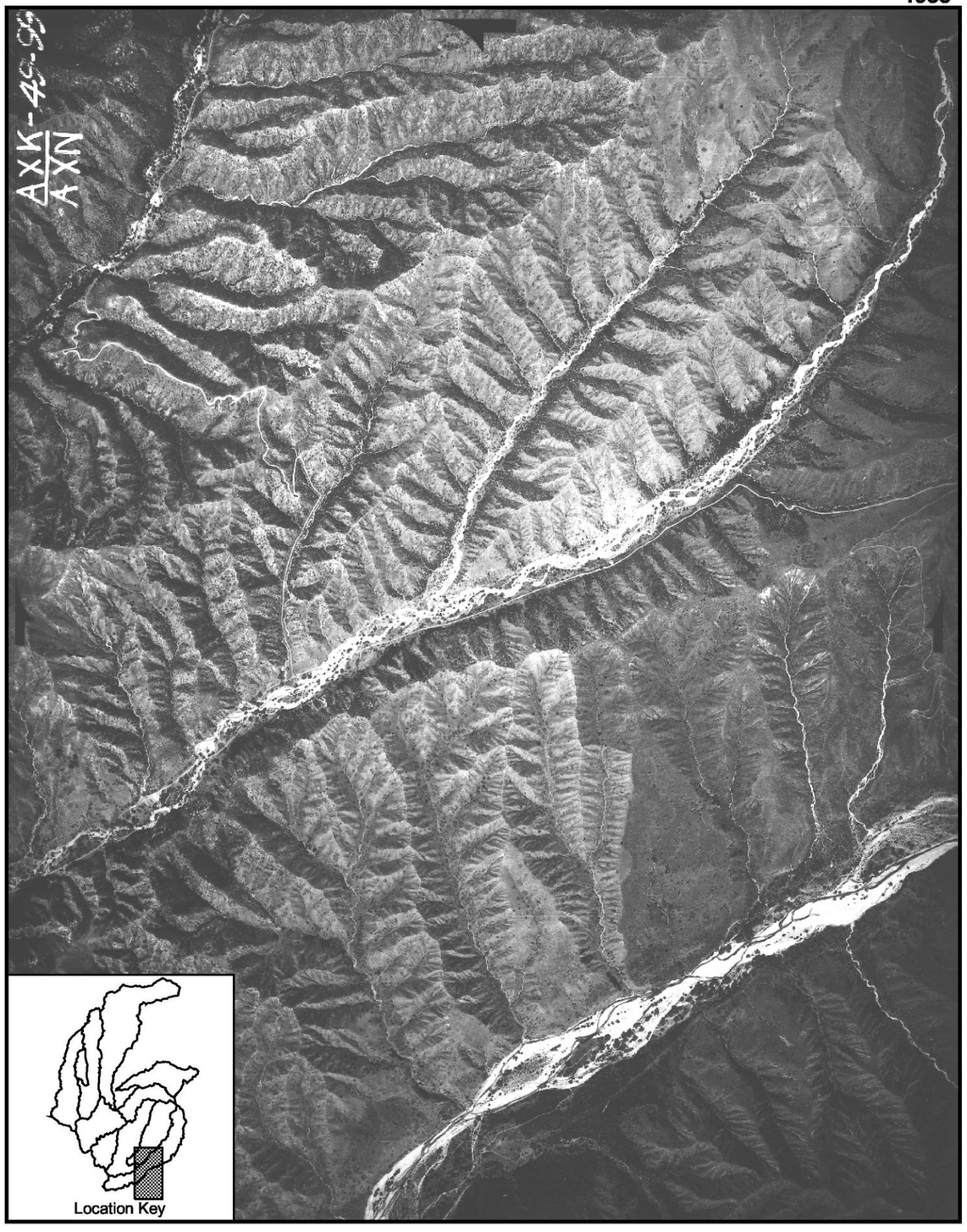
4000 0 4000 Feet

Source: Eagle Aerial Imaging 2001 and PCR 2002.

Figure 70

Sub-basin Geomorphic/Hydrologic Features
Talega Canyon

1938



2001

Figure 71
Talega
1938 and 2001 Aerial Photographs

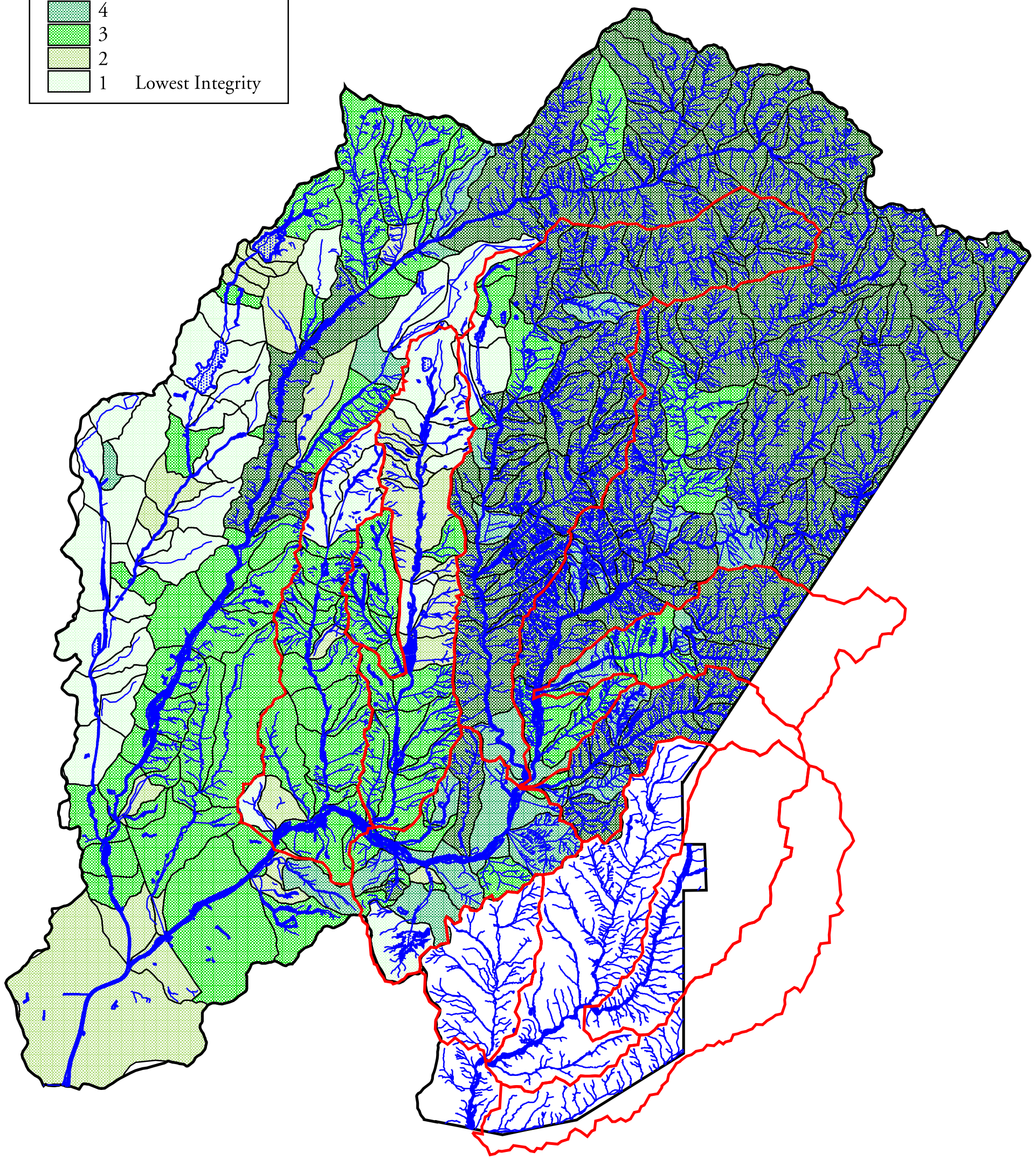
APPENDIX A

APPENDIX A
ACOE INTEGRITY INDICES FOR SAN JUAN AND SAN MATEO CREEK WATERSHEDS

Streams
Sub-Basins
Study Area

Habitat Ranking

5 Highest Integrity
4
3
2
1 Lowest Integrity



PCR

N

4000 0 4000 8000 12000 Feet

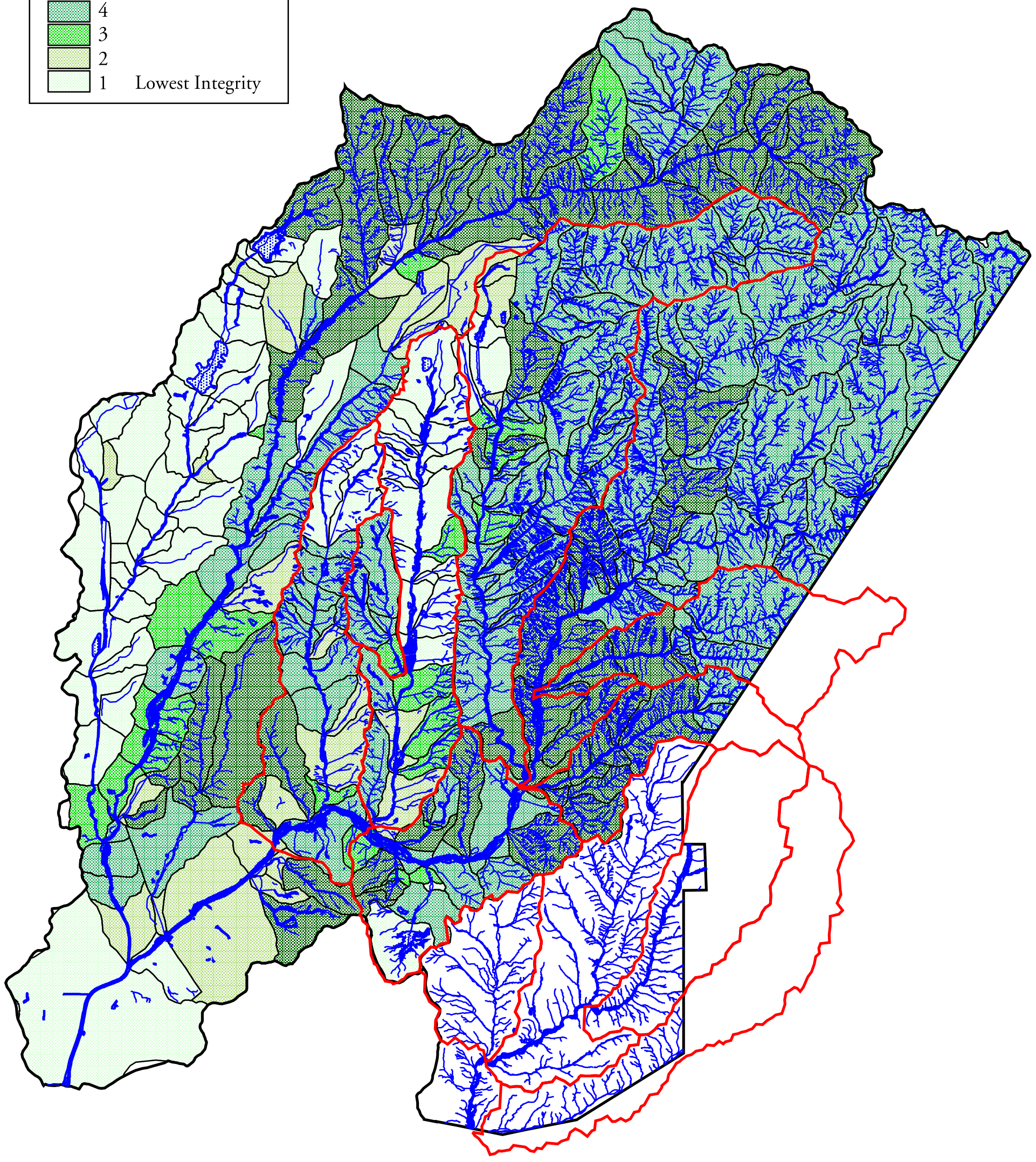
Source: ACOE 2000.

Habitat Integrity Indices
Within The Study Area

Streams
Sub-Basins
Study Area

Hydrology Ranking

5 Highest Integrity
4
3
2
1 Lowest Integrity



PCR

N

4000 0 4000 8000 12000 Feet

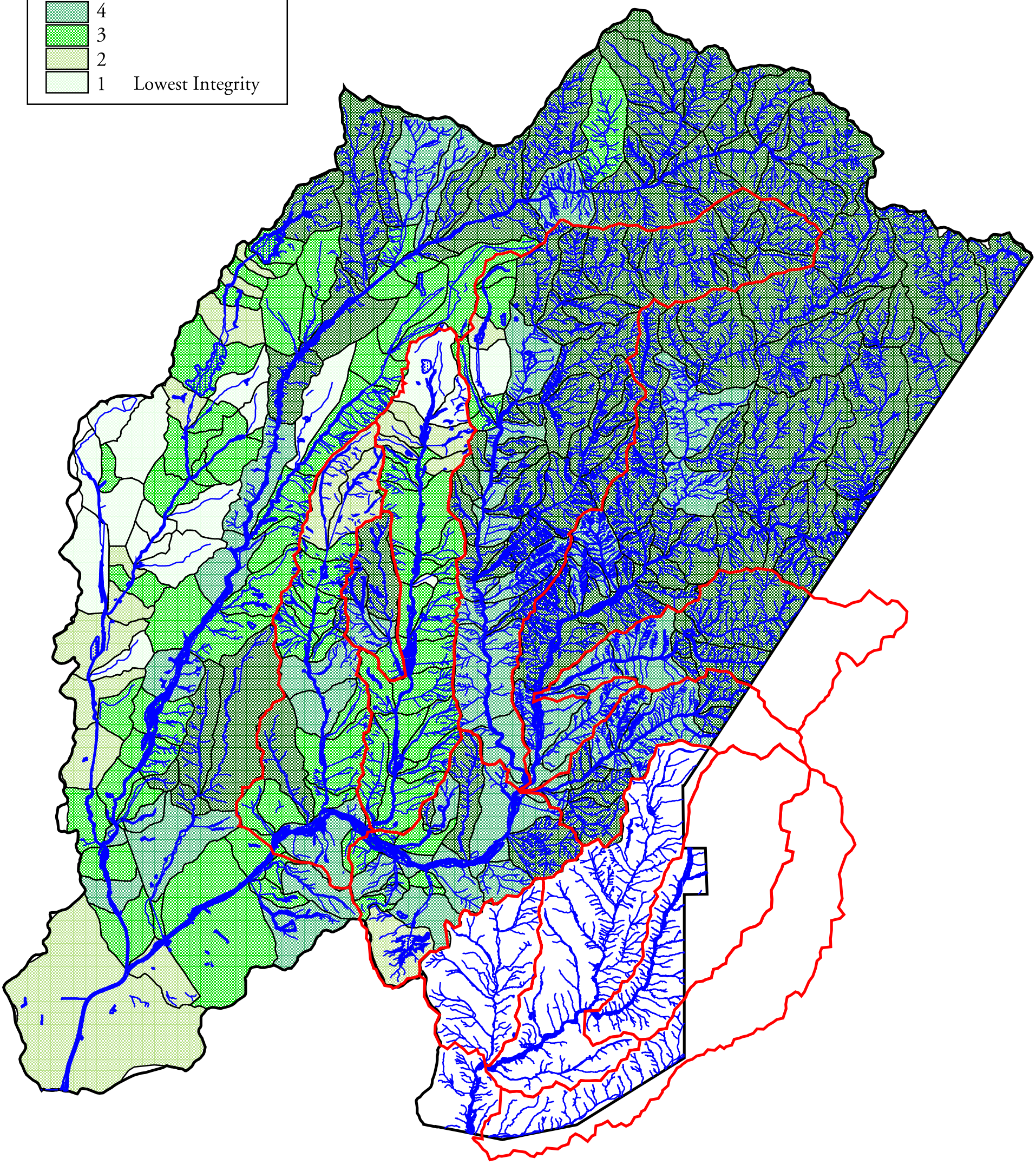
Source: ACOE 2000.

Hydrology Integrity Indices
Within The Study Area

Streams
Sub-Basins
Study Area

Water Quality Ranking

5 Highest Integrity
4
3
2
1 Lowest Integrity



PCR

N

4000 0 4000 8000 12000 Feet

Source: ACOE 2000.

Water Quality Integrity Indices
Within The Study Area

APPENDIX G-4

RELATIONSHIP OF THE PROPOSED PROJECT JURISDICTIONAL DELINEATION TO THE LANDSCAPE LEVEL DATABASES

RELATIONSHIP OF THE PROPOSED PROJECT JURISDICTIONAL DELINEATION TO THE LANDSCAPE LEVEL DATABASES

I. 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] The Corps' Cold Regions Research and Engineering Laboratory (CRREL) also prepared a "Functional Assessment" that addresses the extent and quality of wetlands and other waters of the U.S. located within the San Juan Creek and San Mateo Creek watersheds.[2]

The regional planning process also includes preparation of a Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP) that addresses long-term planning for both upland and aquatic resources. As part of the planning process for the NCCP/HCP, a database was developed that included the development of a vegetation layer based on habitat mapping originally performed by Dames and Moore, circa 1992. The mapping was based primarily on color aerial photo (circa 1990) interpretation. The original vegetation layer was updated by Dudek in response to changing biological conditions in the study area, primarily where grading for various large-scale developments has removed vegetation (e.g., Ladera Ranch, Talega) or where areas of habitat restoration has occurred (e.g., Gobernadora Ecological Restoration Area in Cañada Gobernadora and Chiquita Canyon). The most recent revision to the vegetation database was made in 2004. While, there is a substantial overlap between the wetland/riparian resources mapped for the SAMP/MSAA by WES/CRREL and wetland/riparian resources mapped for the NCCP/HCP vegetation database, the data are not interchangeable because of natural changes in the riparian/wetland communities and technical inconsistencies due to the use of different base mapping materials; e.g. vegetation polygons may be of similar size and shape but are not well edge-matched

Beginning in 2002, Wetland Specialists from Glenn Lukos Associates (GLA) conducted a project level jurisdictional delineation for the areas proposed for development under the SAMP/MSAA including the B4, B5, B6, B8 and B9 Alternatives to identify with a higher level of precision, the limits of Corps jurisdiction pursuant to Section 404 of the Clean Water Act[3] and the California

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[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] Smith, RD. 2000. Assessment of Riparian Ecosystem Integrity In the San Juan and San Mateo Creek Watersheds, Orange County, California. U.S. Army Corps of Enginerrs, Waterways Experiment Station, Vicksburg, MS, USA.

[3] Glenn Lukos Associates. 2003. Jurisdictional Delineation of Areas Subject to the Jurisdiction of the U.S.

Department of Fish and Game pursuant to Section 1600 of the Fish and Game Code, including areas of riparian habitat.[4] The jurisdictional delineation also identified areas with wetland/riparian resources, which while not subject to Corps or CDFG jurisdiction for various regulatory reasons, would be subject to evaluation under the California Environmental Quality Act (CEQA).

During performance of the project level Corps and CDFG jurisdictional delineation, it became apparent that many features identified by WES/CRREL as Waters of the United States (WoUS) at the landscape level did not meet the criteria set forth in 33 CFR 328.3 due to the lack of characteristics consistent with the presence of an Ordinary High Water Mark (OHWM) or jurisdictional wetlands in accordance with the 1987 Wetland Manual. It was also noted that, as a result of the inherent generalization based on aerial photo interpretation compared to a project-level delineation, areas identified as riparian habitat by WES/CRREL and/or the NCCP/HCP Database sometimes overestimated the extent of riparian habitat and in some instances mapped upland areas as riparian habitat.

The purpose of this analysis is to address the differences between (1) the WES/CRREL and NCCP/HCP landscape level riparian vegetation data and (2) the project-level delineation riparian habitat mapping criteria and results of extensive field mapping by GLA, Corps and CDFG staff. prepared by GLA. It is important to note that such differences are inherent due to the differing analytical tools associated with each work effort and the level of detail possible given the varied scales under which the different tasks were completed. For example, the precision achievable with mapping vegetation polygons on large-scale aerial photographs (e.g., one-inch = 1,000 feet) is low compared with a site-specific delineation where widths of the riparian canopy can be measured to the exact foot with a measuring tape or where wetland limits can be recorded using GPS accurate to one meter. The following analysis addresses these differences and is organized as follows:

- Discussion of the Corps' Regulatory Framework;
- Discussion of the CDFG Regulatory Framework;
- Discussion of WES/CRREL Delineation and NCCP Vegetation Mapping;
- Discussion of how CDFG functionally defines the limits between the limits of jurisdictional riparian habitat versus non-jurisdictional upland habitat;
- Discussion of Field Mapping Methods used in the Project-level Delineation.
- Results/Conclusions

Army Corps of Engineers pursuant to Section 404 of the Clean Water Act. *November 2003.*

[4] Glenn Lukos Associates. 2003. 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. *November 2003*.

II. CORPS REGULATORY FRAMEWORK

Pursuant to Section 404 of the Clean Water Act, the Corps regulates the discharge of dredged and/or fill material into waters of the United States. The term "waters of the United States" is defined in Corps regulations at 33 CFR Part 328.3(a) as:

> *(1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;*
> *(2) All interstate waters including interstate wetlands;*
> *(3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect foreign commerce including any such waters:*
> *(i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or*
> *(ii) From which fish or shell fish are or could be taken and sold in interstate or foreign commerce; or*
> *(iii) Which are used or could be used for industrial purpose by industries in interstate commerce...*
> *(4) All impoundments of waters otherwise defined as waters of the United States under the definition;*
> *(5) Tributaries of waters identified in paragraphs (a) (1)-(4) of this section;*
> *(6) The territorial seas;*
> *(7) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) (1)-(6) of this section.*

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 123.11(m) which also meet the criteria of this definition) are not waters of the United States.

> *(8) Waters of the United States do not include prior converted cropland.*[5] *Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA.*

In the absence of wetlands, the limits of Corps jurisdiction in non-tidal waters, such as intermittent streams, extend to the OHWM which is defined at 33 CFR 328.3(e) as:

> *...that line on the shore established by the fluctuation of water and indicated by physical characteristics such as clear, natural line impressed on the bank,*

[5] The term "prior converted cropland" is defined in the Corps' Regulatory Guidance Letter 90-7 (dated September 26, 1990) as "wetlands which were both manipulated (drained or otherwise physically altered to remove excess water from the land) and cropped before 23 December 1985, to the extent that they no longer exhibit important wetland values. Specifically, prior converted cropland is inundated for no more than 14 consecutive days during the growing season…." [Emphasis added.]

shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

The term "wetlands" (a subset of "waters of the United States") is defined at 33 CFR 328.3(b) as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support...a prevalence of vegetation typically adapted for life in saturated soil conditions." In 1987 the Corps published a manual to guide its field personnel in determining jurisdictional wetland boundaries. The methodology set forth in the 1987 Wetland Delineation Manual generally requires that, in order to be considered a wetland, the vegetation, soils, and hydrology of an area exhibit at least minimal hydric characteristics. While the manual provides great detail in methodology and allows for varying special conditions, a wetland should normally meet each of the following three criteria:

- more than 50 percent of the dominant plant species at the site must be typical of wetlands (i.e., rated as facultative or wetter in the National List of Plant Species that Occur in Wetlands[6]);

- soils must exhibit physical and/or chemical characteristics indicative of permanent or periodic saturation (e.g., a gleyed color, or mottles with a matrix of low chroma indicating a relatively consistent fluctuation between aerobic and anaerobic conditions); and

- hydrologic characteristics must indicate that the ground is saturated to within 12 inches of the surface for at least five percent of the growing season during a normal rainfall year[7].

Corps jurisdictional areas generally comprise smaller areas than areas regulated by CDFG, and in most cases are located fully within the larger CDFG-jurisdictional area.

III. CDFG REGULATORY FRAMEWORK

In *A Field Guide to Lake and Streambed Alteration Agreements: Section 1600-1607 California Fish and Game Code*, CDFG personnel are provided the following guidance relative to implementation of the Section 1600 Program.

> While there is no definition for the term lake in the Fish and Game Code or associated regulations, there has been little problem with applying the agreement process to lake bed alterations. The term stream, which includes creeks and rivers, is defined in Title 14, California Code of Regulations (CCR), Section 1.72:
>
> > "A stream is a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or

[6] Reed, P.B., Jr. 1988. National List of Plant Species that Occur in Wetlands. U.S. Fish and Wildlife Service Biological Report 88(26.10).

[7] For most of low-lying southern California, five percent of the growing season is equivalent to 18 days.

other aquatic life. This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation."

However, this definition is not complete with respect to Sections 1601 or 1603 because it does not define the terms bed, channel, or bank and does not define other stream-related features such a aquatic life, riparian vegetation, etc. It is therefore incumbent on Department personnel to develop a sense of what constitutes a stream for purposes of implementing and enforcing sections 1600 – 1607 and Lake/Streambed Alteration Agreements.

The following concepts have therefore been developed to assist Department employees in this endeavor.

1. The term stream can include intermittent and ephemeral streams, rivers, creeks, dry washes, sloughs, blue-line streams (United States Geological Survey Maps, USGS), and watercourses with subsurface flow. Canals, aqueducts, irrigation ditches, and other means of water conveyance can also be considered streams if they support aquatic life, riparian vegetation, or stream-dependent wildlife.
2. Biologic components of a stream may include aquatic and riparian vegetation, all aquatic animals including fish, amphibians, reptiles, invertebrates, and terrestrial species, which derive benefits from the stream system.
3. As a physical stream, a stream not only includes water (at least on an intermittent or ephemeral basis), but also a bed, bank, and/or levee, instream features such as logs or snags, and various flood plains depending on the return frequency of the flood event being considered (i.e., 10, 50, or 100 years, etc.)
4. The lateral extent of a stream can be measured in ways depending on a particular situation and the type of fish or wildlife resources at risk. The following criteria are presented in order from the most inclusive to the least inclusive.

    A. The floodplain of a stream can be the broadest measurement of a stream's lateral extent depending on the return frequency of the flood event used. For most flood control purposes, the 100-year flood event is the standard measurement and maps of the 100-year flood plain exist for many streams. However, the 100-year flood plain may include significant amounts of upland or urban habitat and therefore may not be appropriate in many cases.
    B. The outer edge of riparian vegetation is generally used as the line of demarcation between riparian and upland habitats and is therefore a reasonable and identifiable boundary for the lateral extent of a stream. In most cases, the use of this criterion should result in protecting the fish and wildlife resources at risk.
    C. Most streams have a natural bank which confines flows to the bed or channel except during flooding. In some instances, particularly on smaller streams or dry washes with little or no riparian habitat, the bank should be used to mark the lateral extent of a stream.

D. A levee or other artificial stream bank could be used to mark the lateral extent of a stream. However, in many instances, there can be extensive areas of valuable riparian habitat located behind a levee.

Any of the above criteria could be applicable in determining what constitutes a stream depending on the potential for the proposed activity to adversely affect fish and other stream-dependent wildlife resources.

Thus, with respect to the planning areas evaluated for the SAMP/MSAA, the outer limits of CDFG jurisdiction would be defined as the outer limits of habitat functionally considered to be riparian as contrasted with "uplands" habitat.

IV. WES/CRREL LANDSCAPE LEVEL DELINEATION

As mentioned in the introduction, both the WES/CRREL and the NCCP/HCP data were prepared for the purpose of landscape planning, and therefore lacked the precision of a project-level delineation. Smith (2000) described the WES/CRREL methodology in the *Assessment of Riparian Ecosystem Integrity in the San Juan and San Mateo Creek Watersheds, Orange County, California.*

> *For the purposes of this project, riparian ecosystems were defined from a functional perspective as the areas along perennial, intermittent or ephemeral streams where the interaction with surface and groundwater results in distinctive geomorphic features and vegetation communities.* ***Under natural circumstances, the riparian ecosystem includes that bank full stream channel, the active floodplain, and less frequently flooded, historical floodplains/terraces***. [Emphasis Added]

Although this definition is similar to the working definition of jurisdictional riparian habitat developed in the field with CDFG during the project-level delineation (see discussion below on pages 8-10), the WES/CRREL data generally encompasses much more upland habitat including areas that are not within the bank full channel and/or are not part of the active floodplain or historical terraces.[8] Many of these areas are identified as unregulated uplands in their assessment. Unfortunately, there is no simple way, using just the existing WES/CRREL data, to distinguish which portions of these unregulated areas are associated with jurisdictional streambeds.

Consequently, the resolution at which this landscape-level assessment is useful for large-scale planning purposes but more functional definition of " riparian" habitat is needed for a project level field delineation required to map Corps and CDFG jurisdictional areas.

[8] The differences are generally greater for first and second order drainages than for larger order streams such as San Juan Creek and Gabino Creek with the differences due to use of less precise analytical tools than used for the project-level delineation.

V. NCCP/HCP LANDSCAPE LEVEL VEGETATION MAPPING

Similar problems are apparent with the NCCP/HCP data. Differences between the NCCP vegetation layer and the Corps' WES and the CRREL planning level delineation were addressed in Chapter 3 of the Southern NCCP/HCP.

> *In 2000, a work plan in support of the SAMP/MSAA was undertaken in the San Juan Creek and San Mateo Creek watersheds to develop programmatic approaches for compliance with requirements of the federal CWA, State Porter Cologne Act, State Fish and Game Code and federal and State ESAs. A portion of the work conducted by the USACE WES and the CRREL was to evaluate the integrity and functional condition of riverine and non-riverine wetlands. This work effort included new mapping of the "aquatic" habitats (riparian habitats, wetlands, and streamcourses) using current aerial photographs and field verification. The other portion of the work supporting the SAMP/MSAA was conducted by the PCR/BALANCE/PWA team on the physical processes and the underlying geomorphology that contribute to the ecologic conditions of the riparian systems in the study area. This work was intended to supplement and complement the information gathered by the USACE WES and CRREL. The USACE WES/CRREL and PCR/BALANCE/PWA teams used the Gray and Bramlet (1992) habitat classification system, but mapped several additional riparian vegetation communities based on the presence of certain dominant plant species that were not described by Gray and Bramlet. This mapping effort covered the large majority of the NCCP/HCP study area, but did not include the northernmost portion of the CNF or the San Clemente Hydrological Unit in the southern portion of the study area (Figure 8).*
>
> *A comparison of the original aquatic habitats in the Southern NCCP/HCP vegetation database and the new mapping by WES/CRREL and PCR/BALANCE/PWA revealed overlapping, but somewhat different mapping results. While discrete vegetation polygons were similar in shape and size, the vegetation communities attributed to the polygons were sometimes different from the original database. This result would be expected because of actual changes in the habitat over the past decade (e.g., from succession or natural disturbances), technical advances in the aerial photography (i.e., geo-referenced photos) and different field workers, methodologies and mapping decision rules. For example, the labeling of vegetation polygons may be different to reflect current conditions and polygon shapes and positions may be different as a result of some distortion in the original aerial photographs, causing difficulties in edge-matching between different vegetation polygons. For these reasons, the data layers cannot be simply combined to produce a seamless vegetation map (i.e., simply inserting the new aquatic habitats in replacement of the original mapping). Because of the differences in the aquatics mapping in the two databases, they are kept*

separate in the discussion below. Discussion of the upland vegetation communities and non-natural land covers will be primarily based on the Southern NCCP/HCP database and the discussion of aquatic habitats primarily will be based on the WES/CRREL and PCR/BALANCE/PWA database. Also, because the two databases are not seamless, the total vegetation acreages do not sum to the approximately 92,000 acres in the planning area.

VI. METHOD BY WHICH CDFG FUNCTIONALLY DEFINES THE LIMITS BETWEEN THE LIMITS OF JURISDICTIONAL RIPARIAN HABITAT AS CONTRASTED WITH UPLAND HABITAT

Based on the regulatory framework and verified with CDFG personnel in the field, a number of factors were considered/evaluated in determining the limits of vegetation associations that would be regulated by CDFG as Riparian Habitat. The methodology provided for identification of the limits for riparian areas, associated with streambeds, within CDFG jurisdiction. Specific resources used to aid in the identification and delineation of vegetation defined as "riparian" include the following: *National List of Plant Species that Occur in Wetlands* (Reed, 1988)[9] and *A Manual of California Vegetation* (Sawyer and Keeler-Wolfe, 1996)[10]. Reed provides an indicator status for plants that occur in wetlands. Obligate Wetland species (OBL) are defined as species that occur in wetlands 99-percent of the time. Obligate Upland species (UPL) occur in uplands 99-percent of the time. Species between OBL and UPL include Faculative Wet (FACW), that are associated with wetlands 67- to 99-percent of the time with Facultative (FAC) species associated with wetlands 33- to 67-percent of the time. During the field-level delineation and review by CDFG, species considered to be "riparian" in all cases but one, coast live oak, exhibited an indicator status of FAC, FACW or OBL. Dominant species discussed below under descriptions of the identified riparian associations included black willow (*Salix gooddingii*, OBL), arroyo willow (*Salix lasiolepis*), red willow (*Salix laevigeta*, FACW), narrow-leaf willow (*Salix exigua*, OBL), white alder (*Alnus rhombifolia*, FACW), Fremont cottonwood (*Populus fremontii*, FACW), black cottonwood (*Populus trichocarpa balsamifera*, FACW), western sycamore (*Platanus racemosa*, FACW), and mulefat (*Baccharis salicifolia*, FACW). Coast live oak (*Quercus agrifolia*, UPL), as noted is the only upland species that is typically included as a dominant riparian species. Sawyer and Keeler-Wolfe, which classifies each vegetation series as either "wetlands" or "uplands" within their description for each series provides the following description for Coast Live Oak Series:

> ***Uplands:*** *slopes oftern very steep; raise stream banks and terraces. Soils mostly sandstone or shale-derived. The national inventory of wetland plants (Reed 1988) does not list coast live oak.* [Bold in original]

[9] Reed, P.B., Jr. 1988. National List of Plant Species that Occur in Wetlands. U.S. Fish and Wildlife Service Biological Report 88(26.10).

[10] Saywer, John, O. and Todd Keerler-Wolfe. 1995. *A Manual of California Vegetation*. California Native Plant Society, Sacramento.

Use of the wetland indicator status provided in Reed (1988), as a useful tool for separating "riparian" from "upland" species is supported by an understanding of the origins of riparian systems in areas governed by a Mediterranean climatic regime. The dominant tree and shrub species that occur along perennial and intermittent streams are recognized remnants of the Arcto-Tertiary Geoflora of the Late Tertiary and Quaternary Periods that included wet climates, explaining their high demands for water. [11] In areas now dominated by the drier Mediterranean climate, these species persist in areas where there is a permanent or seasonal surface or subsurface water supply. The dominant genera in southern California include: Willow (*Salix*, spp.), Cottonwood (*Populus* spp.), Alder (*Alnus rhombifolia*), Sycamore (*Platanus racemosa*), Maple (*Acer* spp.), Ash (*Fraxinus* spp.), and in some settings, oak (*Quercus* spp.).[12] The hydrologic requirements for many of these genera differ and are generally well known. For example, well-aerated water that is close to the surface will favor Alder whereas when the water table is relatively deep, Sycamores will predominate as long as the intervening soil aeration is high. Direct measurements of water use by red willow documented water-use rates at 52.7 acre-inches per year with Alder-dominated habitat using 47.0 acre inches of water during the peak growing season July to October).[13]

The methodology described here, incorporated the wetland indicator status for each species as provided by Reed (1988), with the hydrologic requirements as noted above. The methodology also follows Smith (2000) as described on page 6 above and is also consistent with the guidance provided by CDFG as excerpted on Pages 4 and 6. The convention for application of these tools in the field for the project-level delineation was developed with direct input from CDFG biologists during the verification process. The methodology for defining the dimensions of riparian habitat in the field is summarized as follows:

- Designation of an area as "riparian habitat" was generally limited to stands of vegetation that included a predominance of species that exhibited an indicator status of FAC, FACW or OBL. (Coast live oaks were included as riparian habitat in specific instances as further described/discussed below.)

- Where all riparian habitat was included within the bank-full stream channel (e.g., riparian herb), the outermost limits of either the bank or riparian habitat was mapped as the limits of CDFG riparian jurisdiction/habitat.

- Where riparian habitat extended beyond the bank-full channel to the active floodplain, and did not extend outside the active floodplain, the outermost limits of either the active floodplain or riparian habitat was mapped as the limits of CDFG riparian jurisdiction/habitat. By inclusion of the active flood plain and associated riparian habitat, the hydrologic, biogeochemical, and habitat functions not specifically associated with riparian vegetation, such as areas with localized ponding that support aquatic organisms (e.g., invertebrates,

[11] Holstein, Glen. 1984. California Riparian Forests: Deciduous Islands in an Evergreen Sea. In: Warner and Hendrix (Eds). *California Riparian Systems: Ecology Conservation, and Productive Management.* University of California Press, Berkeley.
[12] Holstein, Glen. 1984. California Riparian Forests: Deciduous Islands in an Evergreen Sea. In: Warner and Hendrix (Eds). *California Riparian Systems: Ecology Conservation, and Productive Management.* University of California Press, Berkeley.
[13] State of California Departmentof Public Works. 1942. *Bulletin No. 50: Use of Water by Native Vegetation.*

amphibians, etc.), but providing such hydrologic, biogeochemical and habitat functions, were captured and included within the jurisdictional area(s).

- Where riparian habitat extended beyond the active flood plain to active terraces, the outermost limits of the riparian habitat on the terrace (i.e., canopy edge or "drip line") was mapped as the limits of CDFG riparian jurisdiction/habitat. Similar to inclusion of the flood plain described above, inclusion of the active terraces ensured that functions such as hydrologic exchange with the adjacent uplands, nutrient cycling, shading by overhanging vegetation, bank and channel stabilization by roots, as well as habitat functions were included in the jurisdictional area(s).

  This latter case (i.e., channel stabilization by roots) was most typically applied to southern coast live oak riparian forest. In some cases, particularly in "U"-shaped canyons, the limits of the active terrace were not always discernible. In such cases, coast live oaks (and in a few instances California sycamores) were included as riparian where they either (1) exhibited roots that reached the banks of the drainage, thereby, benefiting from the drainage or by providing stabilization for the banks (i.e., a benefit for the stream) or (2) where meaningful portions of the canopy overhung the stream, thereby providing for shading or litter (nutrient cycling) which would benefit the stream. In some instances, FACW species such as Mexican rush (*Juncus mexicanus*) or clustered field sedge (*Carex praegracilis*) were indicators of shallow subsurface water that was at least seasonally available to the stream environment. Coast live oaks (and California sycamores) located above active terraces or (where terraces were not distinct) beyond where either roots or shading provided direct benefits to the stream, or that supported a predominance of UPL vegetation were not included as CDFG-regulated riparian vegetation.

VII. VEGETATION ASSOCIATIONS IDENTIFIED BY WES/CRREL AND NCCP/HCP

Twelve distinct associations of vegetation were considered in the field mapping of the limits of riparian vegetationin the study area (*Table 1*). In order of their prevalence, they include southern coast live oak riparian forest, willow riparian scrub (southern willow scrub), mule fat scrub, southern sycamore riparian woodland, white alder riparian forest, southern arroyo willow riparian forest, canyon live oak ravine forest, coastal freshwater marsh, giant reed, herbaceous riparian; lemonadeberry riparian, and narrow-leaved willow riparian forest. The lemonadeberry riparian, narrow-leaved riparian and giant reed associations are not included in the Gray and Bramlet (1992) habitat classification system, but were mapped in the WES/CRREL and PCR/BALANCE/PWA study based on the dominance of particular species. The descriptions of these riparian communities primarily are based on Gray and Bramlet (1992) and MBA (1996).

Eight of the habitat associations have high moisture requirements and exhibit a distinct or sharp boundary at the upland interface making them easier to distinguish in aerial photographs, and thus easier to map at a landscape level. The riparian associations that typically exhibit a distinct boundary include: (1) willow riparian scrub (southern willow scrub), (2) mule fat scrub, (3) white

alder riparian forest, (4) southern arroyo willow riparian forest, (5) giant reed, (6) herbaceous riparian; (7) coastal freshwater marsh, and (8)narrow-leaved willow riparian forest. The other four habitats, designated or described in the WES/CRREL and NCCP mappingas riparian habitats (southern coast live oak riparian, southern sycamore riparian woodland, canyon live oak ravine forest and lemonadeberry scrub[14]) have less distinct boundaries that typically make it more difficult to distinguish between riparian and upland communities in aerial photographs. Of these, southern coast live oak contributes most to the differences between the GLA project-level delineation and the WES/CRREL and Southern NCCP/HCP landscape-level delineation. A more detailed discussion of each association is provided below including an evaluation, where appropriate, of differences between the WES/CRREL and NCCP mapping versus the GLA project-level delineation field mapping functional criteria.

1. Southern Coast Live Oak Riparian Forest

Southern coast live oak riparian forest is dominated by coast live oak (*Quercus agrifolia*, UPL), with western sycamore (*Platanus racemosa*, FACW), Mexican elderberry (*Sambucus mexicana*, FAC) as subdominants. Arroyo willow (*Salix lasiolepis*, FACW), red willow (*Salix laevigata*, FACW), and Goodding's black willow (*Salix gooddingii*, OBL) sometimes occur in the most mesic areas as small clumps or patches. Understory vegetation includes holly-leaf redberry (*Rhamnus ilicifolia*, UPL), California coffeeberry (*Rhamnus californica*, UPL), mule fat (*Baccharis salicifolia*, FACW), coastal goldenbush (*Isocoma menziesii* ssp. *veneta*, UPL), poison oak (*Toxicodendron diversilobum*, UPL), toyon (*Heteromeles arbutifolia*, UPL), laurel sumac (*Malosma laurina*, UPL), California mugwort (*Artemisia douglasiana*, FACW)) and Douglas nightshade (*Solanum douglasiana*, FAC).

Southern coast live oak riparian forest is by far the most common riparian vegetation community in the study area. WES/CRREL mapped approximately 3,241 acres, with 2,074 acres (64 percent) in the planning area and 1,167 acres in the CNF (*Table 1*). This habitat type occurs throughout the study area, including Arroyo Trabuco, San Juan Creek, Cañada Gobernadora, Chiquita Canyon, Cristianitos Creek and its tributaries, Gabino Canyon, Airplane Canyon, Verdugo Canyon, Bell Canyon, Crow Canyon, Trampas Canyon, Live Oak Canyon, Lion Canyon, Hot Spring Canyon, Hickey Canyon and Rose Canyon (*Figure 14*).

[14] As discussed on page 13 below, lemonadeberrry scrub is not a riparian habitat and all areas mapped as lemonadeberry scrub should be considered as upland habitat.

TABLE 1
RIPARIAN AND WETLAND HABITATS IN THE SOUTHERN SUBREGION STUDY AREA[1]

Vegetation Community	Subregion-Total	(a) Planning area	(b) Cleveland National Forest
Riparian/Wetland Habitats Subtotal	***6,948***	***4,698***	***2,250***
Herbaceous Riparian	22	16	6
Willow Riparian Scrub[2]	777	465	312
Southern Arroyo Willow Riparian Forest	300	300	0
Narrow-leaved Willow Riparian	2	2	0
S. Coast Live Oak Riparian Forest[2]	3,241	2,074	1,167
Canyon Live Oak Ravine Forest[2]	376[1]	96	280
Southern Sycamore Riparian Woodland[2]	563[1]	476	87
White Alder Riparian Forest[2]	394[1]	4	390
Mule fat Scrub	746	739	7
Lemonadeberry Riparian	16	16	0
Giant Reed Riparian	24	23	<1
Open Water	344	344	0
Coastal Freshwater Marsh	141	141	0
Slope Wetlands	2	2	0
Watercourses Subtotal	***354***	***353***	***<1***
Intermittent Rivers and Streams	287	287	0
Perennial Rivers and Streams	58	57	<1
Ephemeral Rivers and Streams	1	1	0
Flood Control Channels	8	8	0
Total Aquatic Habitats	**7,301**	**5,051**	**2,250**

Notes:

[1] **Source:** WES/CRREL and PCR/BALANCE/PWA Database except as noted in footnote 2.

[2] For the CNF the NCCP Database was used because the WES/CRREL and PCR/BALANCE/PWA database does not cover the entire area of the CNF within the Southern Subregion study area.

Of the riparian associations mapped by WES/CRREL, this association was subject to the highest levels of over-estimation compared with the GLA project-level delineation as a result of the difficulty of identifying precise limits on large-scale aerial photographs. This is the case for two reasons. First, it is difficult on aerial photographs to distinguish between coast live oaks and other vegetation associations such as scrub oak chaparral, lemonadeberry chaparral, and mixed chaparral. Second, the use of vegetation alone is not sufficient to determine the limits of this association because it is necessary to evaluate the geomorphic surfaces on which the specific trees are associated [see description excerpted from Smith on page 6 above].

Coast live oaks that are not within the active floodplain or on active terraces, are not dependent on nor do they affect either fluvial processes or the morphology of the bed, bank or channel, and are not considered riparian habitat under a project-level delineation. This is the case for two reasons (see discussion in Section VI above). First, as noted on page 7, unlike species such as willows or alders, coast live oak (*Quercus agrifolia*, UPL) is an upland species and does not require proximity to a drainage course for survival due to high water usage. Therefore, individuals that grow beyond the active terrace that are not rooted in the bed, bank, or channel, are not deriving sustenance from the stream and are not considered "riparian". Second, because they are not rooted in the bed, bank, or channel, they are not providing benefits to the stream through bank or channel stabilization and are not affecting or affected by fluvial processes and hence not considered riparian.

2. Canyon Live Oak Ravine Forest

Canyon live oak ravine forest generally is a montane riparian community of steep headwaters of mainstreams dominated by canyon live oak (*Quercus chrysolepis*, UPL), big-leaf maple (*Acer macrophyllum*, FACW), California laurel (*Umbellularia californica*, FACW), coast live oak (*Quercus agrifolia*, UPL), bigcone Douglas-fir (*Pseudotsuga macrocarpa*, UPL), and interior live oak (*Quercus wislenzii*, UPL). Canyon live oak ravine forest comprises 376 acres in the study area, including 96 acres in the planning area and 280 acres in the CNF (*Table 1*). This habitat occurs in scattered locations in the CNF generally north of Arroyo Trabuco (*Figure 14*).

3. Southern Sycamore Riparian Woodland

Southern sycamore riparian woodland is an open to dense woodland dominated by western sycamore and coast live oak. Understory vegetation includes scalebroom, mule fat, willow riparian scrub (see description below), holly-leaf redberry, California coffeeberry, laurel sumac, Mexican elderberry, fuschia-flowered gooseberry (*Ribes speciosum*, UPL), poison-oak, giant ryegrass (*Leymus condensatus*, UPL), beardless wild rye (*Leymus tritocoides*, FAC), lemonadeberry (*Rhus integrifolia*, UPL), Douglas nightshade, and California mugwort. Large patches of grassland dominated by upland brome and Italian ryegrass (*Loliumm multiflorum*, UPL) also may be present.

Sycamore riparian woodland comprises approximately 563 acres in the study area, including 476 acres in the planning area and 87 acres in the CNF (*Table 1*). It generally is associated with floodplains and terraces of larger streams such Arroyo Trabuco, upper San Juan Creek, upper Bell Canyon, Fox Canyon, Lion Canyon, Gabino Canyon, and La Paz Canyon (*Figure 14*). This vegetation type does not exhibit an abrupt boundary with adjacent uplands. Western sycamore is a phreatophyte, meaning that it is deep rooted (sometimes at 60 feet or more), in contact with deep groundwater that is often beyond the rooting depth of upland species. This results in a community/vegetation type that supports FACW, FAC and UPL species with western sycamore exhibiting an indicator status of FACW. As such, CDFG jurisdiction typically was inclusive of the all areas beneath the canopy of sycamores, which in some instances included upland species in the understory.

4. Willow Riparian Scrub (Southern Willow Scrub)

Willow riparian scrub is dominated by willow trees (*Salix* spp.) and also may contain gooseberry (*Ribes* spp.), Mexican elderberry, and an understory of herbaceous hydrophytes. Arroyo willow is the dominant species within perennial and intermittent stream channels at elevations up to about 2,450 feet. Goodding's black willow occurs along streambanks and in wet places within drier habitats at elevations below about 1,500 feet (Faber and Keller 1985).

Willow riparian scrub comprises approximately 777 acres in the study area, including 465 acres in the planning area and 312 acres in the CNF (*Table 1*). Willow riparian scrub is found in lower Arroyo Trabuco and patchy distributions in upper Chiquita Canyon, throughout Cañada Gobernadora, lower San Juan Creek, Cristianitos Canyon, Trampas Canyon, tributaries to Verdugo Canyon, and in various smaller drainages and tributaries throughout the study area in the CNF (*Figure 14*). As noted above, this vegetation type is typically associated with areas that exhibit an abundance of water and there is generally a distinct boundary between the willow canopy and the adjacent upland scrub or grassland habitat.

5. Southern Arroyo Willow Riparian Forest

Southern arroyo willow riparian forest has a closed canopy of arroyo willow in arborescent form. It comprises approximately 300 acres in the study area, all of which are in the planning area. This vegetation community occurs in Chiquita Canyon south of Oso Parkway, portions of lower Arroyo Trabuco, San Juan Creek south of its confluence with Bell Canyon, Cañada Gobernadora throughout Coto de Caza, above and associated with Oso Reservoir, and lower Cristianitos Creek (*Figure 14*). This vegetation type is typically associated with areas that exhibit an abundance of water and there is generally a distinct boundary between the willow canopy and the adjacent upland scrub or grassland habitat.

6. Narrow-leaved Willow Riparian Forest

Narrow-leaved willow riparian forest is a classification created by the WES/CRREL and PCR/BALANCE/PWA study. It refers to areas dominated by narrow-leaved willow (*Salix exigua*, OBL). Narrow-leaved willow riparian forest comprises only 2 acres in two patches in San Juan Creek and upper La Paz Canyon (*Figure 14*). This vegetation type is typically associated with areas that exhibit an abundance of water and there is generally a distinct boundary between the willow canopy and the adjacent upland scrub or grassland habitat.

7. White Alder Riparian Forest

White alder riparian forest typically is a montane riparian community found along perennial streams above 4,000 feet. It is dominated by white alder (*Alnus rhombifolia*, FACW), with red willow, black cottonwood (*Populus balsamifera* spp. *trichocarpa*, FACW), California laurel, and big-leaf maple. California mugwort, California rose (*Rosa californica*, FACW) and California blackberry (*Rubus ursinus*, FACW) occur as understory species. White alder riparian forest comprises approximately 394 acres, of which 390 acres are in the CNF in upper Arroyo Trabuco and its tributaries Holy Jim Canyon and Falls Canyon, as well as upper Bell Canyon, Hot Spring Canyon, and Cold Spring Canyon (*Figure 14*). It also occurs in small patches at lower elevations in Cristianitos Creek and Bell Canyon. This vegetation type is typically associated with areas that exhibit an abundance of water and there is generally a distinct boundary between the alder canopy and the adjacent upland scrub or grassland habitat.

8. Mule fat Scrub

Mule fat scrub is dominated by mule fat, but also may include willows (*Salix* spp.), umbrella sedges (*Cyperus eragrostis*, FACW), stinging nettle (*Urtica dioica*, FACW), Bermuda grass (*Cynodon dactylon*, FAC), western ragweed (*Ambrosia psilostachya* var. *californica*, FAC), California mugwort, Douglas nightshade, castorbean (*Ricinus communis*, FACU), cocklebur (*Xanthium* spp., FAC+), rabbit's-foot grass (*Polypogon monspeliensis*, FACW+), knotgrass (*Paspalum distichum*p, OBL), and barnyard grass (*Echinochloa crus-galli*, FACW). (Gray and Bramlet 1992; Holland 1986; Sawyer and Keeler-Wolf 1995). Mule fat scrub usually occurs in intermittent streambeds, seeps, and the toe of landslides where local seeps develop.

Mule fat scrub comprises approximately 746 acres in the study area, of which 739 acres are in the planning area and only 7 acres are in the CNF (*Table 3-2*). Mule fat scrub occurs in drainages throughout the study area. Areas with large concentrations of mule fat scrub include Arroyo Trabuco, San Juan Creek, Cañada Gobernadora, Bell Canyon, lower Gabino Canyon, La Paz Canyon, Verdugo Canyon and upper Cristianitos Creek (*Figure 14*). This vegetation type is typically associated with areas that exhibit at least seasonal water and there is generally a distinct boundary between the mule fat canopy and the adjacent upland scrub or grassland habitat. In some cases, areas mapped as mule fat scrub by GLA for the purposes of determining riparian mitigation may actually include an ephemeral wash component or alluvial scrub species such as including buckwheat (*Eriogonum fasciculatum*, UPL), scalebroom (*Leptospartum squamatum*, UPL), and deerweed (*Lotus scoparius*, UPL).

9. Herbaceous Riparian

Herbaceous riparian is an early successional stage of riparian forest and scrub typically resulting from frequent flooding or scouring of woody vegetation. Disturbed sites are colonized by pioneer wetland species such as verbena (*Verbena lasiostachys*, FACU), California mugwort, knotgrass, barnyard grass, sweet clover (*Melilotus* spp.), Bermuda grass, cattails (*Typha* spp., OBL), smilo grass (*Piptatherum miliaceum*, UPL), Mexican sprangletop (*Leptochloa uninervia*, FAC), cocklebur, willow herb (*Epilobium ciliatum*, FACW), Johnson grass (*Sorghum halapense*, FACW), western ragweed, rabbits-foot grass, mustard, wild radish (*Raphanus sativa*, UPL), white watercress (*Rorippa nasturtium-aquatuicum*, OBL), and water speedwell (*Veronica anagallis-aquatica*, OBL).

Herbaceous riparian comprises approximately 22 acres in the study area, of which 16 acres are in the planning area and 6 acres are in the CNF. Herbaceous riparian occurs in scattered locations, including Chiquita Canyon, Cañada Gobernadora, Trampas Canyon, upper Arroyo Trabuco and lower Hot Spring Canyon (*Figure 14*). This vegetation type is typically associated with areas that exhibit an abundance of water and there is generally a distinct boundary between the herbaceous understory and the adjacent upland scrub or grassland habitat.

10. Lemonadeberry (*Rhus Integrifolia*) Riparian

Lemonadeberry riparian is a classification used in the WES/CRREL and PCR/BALANCE/PWA study and is not included in the Gray and Bramlet (1992) habitat classification system.

It comprises approximately 16 acres in the planning area and only occurs in patchy locations in upper Gabino Canyon, Verdugo Canyon, Lucas Canyon, and an unnamed drainage adjacent to Cristianitos Road northwest of Cristianitos Creek (*Figure 14*). It was not mapped in the CNF. Lemonadeberry is a xeric-adapted chaparral species that is not dependent upon stream or river courses. Lemonadeberry is listed by Reed (1988)[15] as an upland species (UPL) and by Sawyer and Keeler-Wolfe (1996)[16] (under sumac series) as an "uplands" vegetation type and is thus not a riparian species when considered in the context of aquatic functions.

In all cases, the vegetation identified by WES/CRREL as lemonadeberry were classified as southern willow scrub or upland non-riparian habitat in the Southern NCCP/HCP vegetation

[15] Reed, P.B., Jr. 1988. National List of Plant Species that Occur in Wetlands. U.S. Fish and Wildlife Service Biological Report 88(26.10).

[16] Saywer, John, O. and Todd Keerler-Wolfe. 1995. *A Manual of California Vegetation*. California Native Plant Society, Sacramento.

mapping. In addition, the three polygons that occur within the GLA project-level delineation study area were identified in the field as upland habitat with which CDFG concurred.

11. Giant Reed Riparian

Giant reed riparian refers to areas dominated by the non-native giant reed (*Arundo donax*, FACW), which is highly invasive and destructive of native riparian and aquatic habitats. It is a classification used in the WES/CRREL and PCR/BALANCE/PWA study and is not included in the Gray and Bramlet (1992) habitat classification system. Giant reed riparian comprises approximately 24 acres in the study area, of which 23 acres are in the planning area. It occurs in scattered patches in Arroyo Trabuco below Oso Parkway and in various locations in San Juan Creek (*Figure 14)*. This vegetation type is typically associated with areas that exhibit an abundance of water and there is generally a distinct boundary between the giant reed canopy and the adjacent upland scrub or grassland habitat.

VIII. PROJECT-LEVEL DELINEATION

Prior to beginning the project-level delineation in November 2002, GLA was provided a copy of a planning level delineation prepared by Lichevar in September of 2000. All areas identified as potentially jurisdictional in the planning level delineation were evaluated for Corps and CDFG jurisdiction based upon the regulatory framework and consideration of aquatic function provided on pages 8-10 above and further discussed below. All suspected or potential 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[17] (Wetland Manual). The limits of CDFG jurisdiction were determined as described on pages 8-10, in Section VI, above. 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.

A. Corps and CDFG Field Verification

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 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. In determining the limits of jurisdictional riparian habitat, CDFG followed the methodology noted below. The field verification was completed on October 27, 2003. Table 2 summarizes the dates of the delineation and verification site visits. The discussion/conclusion section below is based upon the field-verified limits as determined by CDFG.

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

TABLE 2
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

IX. RESULTS

The project-level delineation, as verified by the Corps and CDFG, provides more precise mapping, than the WES/CRREL and NCCP data, for the limits of riparian habitat meeting the criteria of Waters of the U.S. set forth in 33 CFR 328.3, the definition of streambed set forth in Section 1602, and the functional definition of riparian vegetation employed during field visits with CDFG within the planning areas identified for the SAMP/MSAA and NCCP/HCP.

In General Certain types of areas included in the WES/CRREL and NCCP mapping of the extent of riparian habitat did not include the functional definition of riparian habitat applied in the jurisdictional field mapping of wetlands and riparian field definition of riparian vegetation areas not meeting the field definition of riparian habitat include:

- Areas mapped as riparian where there was no streambed or other aquatic feature;

- Areas mapped as riparian where only upland vegetation is present;

- Areas mapped as riparian where the vegetation is not associated with active floodplains or terraces.

In some instances there is overlap between the noted categories; however, it is instructive to consider them separately below for purposes of this analysis:

A. Areas Mapped as Riparian where there was no Streambed or other Aquatic Feature

In general, during field verification visits that compared the project-level delineation with the mapping performed by WES/CRREL, it was evident that on larger systems such as San Juan Creek and Gabino Creek, there was a high level of agreement between the project level delineation and the mapping prepared by WES/CRREL. However, in smaller side canyons with smaller tributaries extending into uplands numerous areas were mapped as riparian by WES/CRREL and/or the NCCP/HCP database, which did not exhibit any associated aquatic features (i.e., streambeds, lakes, slope wetlands, etc.), as verified in the field by CDFG and the Corps staff. In many instances, direct observations in the field showed that the vegetation associations in these areas should be classified as southern coast live oak woodland (an upland habitat) rather than the WES/CRREL classification as southern coast live oak riparian [see Photographs 5, and 6]. In other instances, areas that were predominantly chaparral and/or coastal sage scrub (sometimes mixed with scattered oaks) were mapped by WES/CRREL as southern coast live oak riparian forest [see photographs 1, 2, 5, 6, 9, 10 and 13]. In all of these instances, the clear absence of a streambed was a primary reason for classification of these areas as non-riparian and this conclusion was supported by the fact that a substantial amount of the noted habitat consisted of upland coastal sage scrub or chaparral communities.

B. Areas Mapped as Riparian where only Upland Vegetation is Present

In many instances, ephemeral streams were mapped by WES/CRREL as supporting riparian habitat; however, upon review in the field, it was determined that no riparian plant species were present. Areas mapped, for example, as southern willow scrub, actually contained no willows, consisting instead of upland scrub that included coyote brush (*Baccharis pilularis*, UPL), lemondadeberry (*Rhus integrifolia*, UPL), coastal sagebrush (*Artemisia californica*, UPL) and laurel sumac (*Malosma laurina*, UPL) [see Photographs 7 and 8]. Similarly, areas mapped as southern coast live oak riparian forest, consisted of mostly lemonadeberry and coastal sage scrub [e.g., Photograph 13]. One large area in Planning Area 5 (Trampas Canyon) was mapped as southern coast live oak riparian forest which, when field checked during the delineation, indicated that this area supports a mosaic of upland habitats including coast live oak woodland, coastal sage scrub, and non-native grassland [see Sheet 14].

C. Areas Mapped as Riparian where the Vegetation is not Associated with Active Floodplains or Terraces

In numerous instances, extensive areas of southern coast live oak riparian forest was mapped by WES/CRREL far up slopes, sometimes all the way to ridgetops, where, in fact, the limits of the southern coast live oak riparian forest was limited to the channel, floodplain and/or active terraces [see Photographs 3, 4, 11, and 12 and Sheets 8, 9, 10, 11, and 12]. As discussed on pages 8-10 above, during both the delineation, and the verification by CDFG biologists, the limits of riparian habitat were established based on the presence of OBL, FACW and FAC species, associated with specific geomorphic surfaces (see Lichevar and Smith) including the bank-full channel, the active floodplain, and active terraces. In other words, as described above under jurisdictional mapping definitions and/or descriptions or riparian systems, there must be some hydrologic connection between the stream and adjacent vegetation. For "U"-shaped canyons that lacked clearly defined floodplains or active terraces, the limits of southern coast live oak riparian forest included all oaks, sycamores, elderberrys, mule fat, etc.) that were in some manner connected with the channel (e.g., roots were stabilizing channel or in proximity to the channel or where portions of the vegetation were overhanging the stream thereby providing shade or litter).

Oaks (or other species such as sycamores, elderberrys, or mule fat) that were not hydrologically connected to the channel, active flood plain, or active terraces, were not included in the riparian associations because they do not meet any of the functional definitions for riparian habitat as set forth in Section VI above.

X. CONCLUSIONS

The GLA project-level delineation provides an agency approved, project-level quantification of jurisdictional habitat within the B4, B5, B6, B8 and B9 Alternatives within the SAMP/MSAA study area. For the reasons described above, there are inconsistencies between the landscape-level WES/CRREL and Southern NCCP/HCP mapping of jurisdictional habitat. These differences do not preclude the use of either landscape-level database for planning purposes although the results would overestimate actual impacts, with greater overestimates in areas dominated by low-order ephemeral streams than in those areas characterized by higher-order streams such as Arroyo Trabuco Creek, San Juan Creek, Cristianitos Creek and Gabino Creek. Regardless of which database is used to conduct the large-scale planning review, the use of WES or NCCP landscape-level databases for project-level impact analysis would not reflect (a) "on the ground" vegetation conditions verified by extensive field mapping (see Table 2), and (b) the functional definition of riparian habitat reviewed and concurred in section VI and in by Corps and CDFG staff. . Since CEQA requires a comparison of "plan to ground" for impact assessment and mitigation purposes, the field level jurisdictional delineation using the riparian classification criteria presented in Sections III and VI is the most appropriate mapping under CEQA, as well as for assessing Section 404 and 1600 jurisdictional impacts.

APPENDIX G-5
SOUTHERN NCCP/HCP PLANNING GUIDELINES
CONSISTENCY FINDINGS

APPENDIX G-5
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE	PROPOSED PROJECT (B-4)
SAN JUAN CREEK WATERSHED	
Chiquita Canyon Sub-Basin Protection Recommendations	
1. 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.	**Consistent.** B-4 would be consistent because it would provide a habitat linkage in the Chiquita sub-basin to San Juan Creek by protecting Chiquita Ridge and proposing a pervious land use (golf course) west of Chiquita Creek.
2. 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 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 canyon north and east of the wastewater treatment plant.	**Consistent.** B-4 would be consistent because it would maintain east-west biological connectivity by protecting the "Narrows," protecting coastal sage scrub patches in the major canyon north and east of the wastewater treatment plant, and protecting Sulphur Canyon rim-to-rim. For B-4 to be consistent it would need to address wildlife movement across the proposed arterial within the Habitat Reserve proposed to connect the Gobernadora development area to Oso Parkway (i.e., the extension of Cristianitos Road) on Chiquadora Ridge and in the valley bottom. Avian species would be able to cross the roadways but culverts and possibly fencing would be needed to accommodate movement by ground-dwelling species.
3. Protect breeding and foraging habitat for the least Bell's vireo within Chiquita Canyon by focusing on protection of riparian habitat in Chiquita Creek.	**Consistent.** B-4 would be consistent because it would avoid impacts to the riparian habitat in Chiquita Creek and uplands west of the creek south of the wastewater treatment plant. B-4 also would restrict development west of the creek and north of the treatment plant to pervious surfaces and proposed golf course that would be consistent with maintaining upland foraging habitat for the vireo.
4. Protect breeding habitat and, to the extent feasible, protect foraging habitat for raptors and other species along Chiquita Creek.	**Consistent.** B-4 would be consistent because it would avoid raptor breeding habitat in Chiquita Creek. Adjacent foraging habitat would be maintained by the proposed golf course use north of the treatment plant and a development pattern which would avoid the major side canyons.
5. 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).	**Consistent.** B-4 would be consistent because the development pattern proposed under B-4 considers the influence of terrains and hydrology on Chiquita Creek. The major side canyons would either be avoided along the entire western side of the creek and along both sides of the creek north of the treatment plant or a pervious land use (golf course) would be constructed.
6. 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.	**Consistent.** B-4 would be consistent because it would avoid the Radio Tower Road vernal pools.

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE	PROPOSED PROJECT (B-4)
7. Protect slope wetlands and maintain their primary sub-surface water supply recharge characteristics and, where avoidance is infeasible, minimize and mitigate impacts.	**Not consistent.** B-4 would not be consistent because it would impact two slope wetlands north of the treatment plant and east of the creek. It would not impact slope wetlands below the treatment plant or west of the creek. With regard to maintaining the primary recharge characteristics that support these wetlands project grading will not intersect the primary groundwater movement formations. Given existing hardpan soils, future landscape irrigation and the protection of a significant portion of Chiquadora Ridge, recharge would be maintained into the deep groundwater system supporting the slope wetlands.
8. 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.	**Could be consistent.** B-4 could be consistent because it would protect the large population of 2,000 brodiaea and through specific avoidance and project design features that would avoid two of the four small populations thereby contributing to the protection of a major population.
9. Protect the Chiquita Ridge important population and key location of many-stemmed dudleya totaling about 2,430 individuals in approximately 35 discrete locations. This population includes seven locations totaling 100 to 420 individuals each.	**Consistent.** B-4 would be consistent because it would avoid the important population and key location of many-stemmed dudleya on Chiquita Ridge.
10. 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	N/A
11. 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.	N/A
12. 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).	**Could be consistent.** B-4 could be consistent because it proposes a golf course west of Chiquita Creek, the design of which would minimize impacts to the key location and major population of southern tarplant.
13. Protect the major population of southern tarplant in a key location in Lower Chiquita Canyon.	**Consistent.** B-4 would be consistent because it would avoid impacts to this major population in a key location.
14. 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.	**Could be consistent.** B-4 could be consistent because it proposes a golf course west of Chiquita Creek, the design of which would minimize impacts to the key location and major population of Coulter's saltbush.

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE	PROPOSED PROJECT (B-4)
15. Protect the two key locations of salt spring checkerbloom in the slope wetlands in lower Chiquita Canyon.	**Consistent.** B-4 would be consistent because it would avoid impacts to the slope wetlands in lower Chiquita supporting salt spring checkerbloom and their subsurface recharge characteristics would not be affected. With regard to maintaining the primary recharge characteristics that support these wetlands, Exhibit XX presents a cross section indicating that project grading will not intersect the primary groundwater movement formations. Given existing hardpan soils, future landscape irrigation and the protection of a significant portion of Chiquadora Ridge, recharge would be maintained into the deep groundwater system supporting the slope wetlands.
16. 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.	**Consistent.** B-4 would be consistent because it would avoid impacts to coastal sage scrub and gnatcatchers located south of San Juan Creek in the Chiquita sub-basin and therefore would maintain opportunities for resident and dispersal habitat between Chiquita Ridge and San Juan Capistrano and San Clemente.
17. Protect at least 80 percent of the existing coastal sage scrub and gnatcatcher locations within the major population within the Chiquita and Wagon Wheel sub-basins and the Chiquadora Ridge portion of the Gobernadora sub-basin.	**Consistent.** B-4 would be consistent because it would protect 88% of existing coastal sage scrub and 87% of gnatcatcher locations within the major population located in the Chiquita and Wagon Wheel sub-basins and the Chiquadora Ridge portion of the Gobernadora sub-basin.
18. 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).	**Consistent.** B-4 would be consistent because it proposes implementation of an Adaptive Management Program which includes cowbird trapping as part of the Invasive Species Control Plan.
19. 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.	**Consistent.** B-4 would be consistent because it proposes implementation of an Adaptive Management Program which includes an Invasive Species Control Plan and a Grazing Management Plan. In addition, access policies will be implemented to control human disturbances.
Chiquita Canyon Sub-Basin Restoration Recommendations	
20. Implement a coastal sage scrub (coastal sage scrub)/valley needlegrass grassland (VGL) restoration program to enhance habitat connectivity and mitigate for impacts to existing habitat associated with future development.	**Consistent.** B-4 would be consistent through implementation of the Adaptive Management Program, which includes a Habitat Restoration Plan component consistent with implementation of the CSS/VGL restoration recommendations.
21. 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.	**Consistent.** B-4 would be consistent because it would implement the Plant Species Translocation, Propagation, and Management Plan component of the Adaptive Management Program.
22. 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.	**Consistent.** B-4 would be consistent because it would implement the Plant Species Translocation, Propagation, and Management Plan component of the Adaptive Management Program.

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE	PROPOSED PROJECT (B-4)
23. Initiate an intermediate mariposa lily seed collection program in 2003 [should this be 2003?] if sufficient rain falls to warrant the collection program. Receiver sites should be identified in the winter of 2003 [should this be 2003?] and a pilot planting program should be implemented to determine the effectiveness of propagation from seed.	N/A
24. 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.	N/A
25. 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.	**Consistent.** B-4 would be consistent because it would implement the Plant Species Translocation, Propagation, and Management Plan component of the Adaptive Management Program.
26. Implement restoration efforts to address localized headcuts [what is this?] within the sub-basin as further described in the Watershed and Sub-basin Planning Principles – Chiquita Sub-basin.	**Consistent.** B-4 would be consistent because it would implement the Habitat Restoration Plan component of the Adaptive Management Program.
27. Maintain a continuous upland habitat linkage along the east-facing slopes of Chiquadora Ridge between San Juan Creek and Sulphur Canyon.	**Could be consistent.** B-4 could be consistent because it would provide for a continuous habitat linkage along the east-facing slope of Chiquadora Ridge. However, for B-4 to be consistent, it would have to address wildlife movement along Chiquadora Ridge where the extension of Cristianitos Road connecting the Gobernadora development area to Oso Parkway would cross the ridgeline. Avifauna would be able to cross the roadway, but accommodation of movement by ground-dwelling wildlife would need to be addressed by a culvert and possibly fencing.
28. 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.	**Consistent.** B-4 would be consistent because it would protect Sulphur Canyon rim-to-rim.
29. 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.	**Not consistent.** B-4 would not be consistent because it would provide an approximately 1,000 foot-wide area between proposed development and the southern boundary of Coto de Caza for east-west movement.
30. Minimize impacts to native grasslands. Any impacts resulting from future land uses will be addressed through an overall native grasslands restoration program. (Note: Anecdotal observations have documented native grassland in the Gobernadora sub-basin, but it has not been mapped or quantified. This task will be completed prior to completion of the EIR/EIS.	**Not consistent.** B-4 would not be consistent because the vast majority of grassland (native and non-native) in the sub-basin would be impacted. However, the Habitat Restoration Plan component of the Adaptive Management Program would provide for VGL restoration elsewhere in the planning area.
31. 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.	**Consistent.** B-4 would be consistent because it would avoid impacts to GERA as well as upstream habitat in Gobernadora.

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE	PROPOSED PROJECT (B-4)
32. Avoid and minimize impacts to oak woodlands in northern Gobernadora along the ridgelines between the Gobernadora and Bell Canyon sub-basins.	**Consistent.** B-4 would be consistent because it would include a setback from the Gobernadora/Bell ridgeline and also would provide for the protection of oak woodands adjacent to the estates area.
33. Keep open sufficient valley bottom south of Coto de Caza and above the knickpoint [what is this] to allow creek meander for floodplain connection. Refer also to the Watershed and Sub-basin Planning Principles – Chiquita Gobernadora Sub-basin.	**Consistent.** B-4 would be consistent because development in the sub-basin would provide for sufficient open valley bottom south of Coto de Caza and above the knickpoint to allow creek meander for floodplain connection.
34. Protect sufficient grassland habitat in the valley bottom in the northern portion of lower Gobernadora in the study area property to support a nesting population of the tricolored blackbird. (The existing nesting ponds are located within Coto de Caza.)	**Consistent.** B-4 would be consistent because it would protect grassland habitat in the valley bottom in the northern portion of lower Gobernadora. The SMWD Multipurpose Basin would result in impacts to a portion of this grassland area, but these potential impacts to foraging grasslands could be offset by the expansion of wetland breeding habitat associated with the basin.
35. Protect the thread-leaved brodiaea major population in a key location supporting approximately 2,000 flowering stalks on Chiquadora Ridge.	**Consistent.** B-4 would be consistent because it would avoid this population.
36. 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.	N/A
37. Protect the Chiquadora Ridge major population of many-stemmed dudleya totaling about 8,500 individuals in approximately 48 discrete locations. This population includes 24 locations totaling 100 to 750 individuals each, with nine of these locations numbering more than 500 individuals.	**Consistent.** B-4 would be consistent because it would protect about 40 of 48 locations (83%) totaling approximately 7,680 individuals (10%) in this major population of dudleya.
38. Protect the major population of southern tarplant totaling 10,000+ individuals located in GERA.	**Consistent.** B-4 would be consistent because it would avoid impacts to GERA and therefore would protect the major population of southern tarplant.
39. 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.	**Not consistent.** B-4 would not be consistent because it would protect 57% of existing coastal sage scrub and 68% of gnatcatcher locations. However, connectivity among protected coastal sage scrub would be maintained.

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE	PROPOSED PROJECT (B-4)
Gobernadora Canyon Sub-Basin Management Recommendations	
40. 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).	**Consistent.** B-4 would be consistent because it proposes implementation of an Adaptive Management Program which includes cowbird trapping as part of the Invasive Species Control Plan.
41. Protect existing riparian habitat downstream of the knickpoint [what is this?] in GERA for the least Bell's vireo, southwestern willow flycatcher and other riparian nesting bird species.	**Consistent.** B-4 would be consistent because it would avoid GERA and upstream development.
42. 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.	**Consistent.** B-4 would be consistent because management of water quality would occur in compliance with the County of Orange MS4 permit issued by the San Diego Regional Water Quality Control Board through implementation of a Water Quality Management Plan. Water quality would be adaptively managed by the development entities as described in Chapter 9. Hydrology and sediment transport would be improved through invasive species control.
43. 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.	**Consistent.** B-4 would be consistent because it proposes implementation of an Adaptive Management Program which includes an Invasive Species Control Plan and a Grazing Management Plan. In addition, access policies will be implemented to control human disturbances, as described in Chapter 9.
Gobernadora Canyon Sub-Basin Restoration Recommendations	
44. 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.	**Consistent.** B-4 would be consistent because it proposes no development in Sulphur Canyon and would implement an Adaptive Management Program that includes a Habitat Restoration Plan that targets Sulphur Canyon for coastal sage scrub restoration.
45. 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.	**Consistent.** B-4 would be consistent because it proposes development in this sub-basin consistent with implementation of the CSS/VGL restoration recommendations via implementation of the Adaptive Management Program and the Plant Species Translocation, Propagation, and Management Plan.
46. 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.	**Consistent.** B-4 would be consistent because it proposes development in this sub-basin consistent with implementation of the CSS/VGL restoration recommendations via implementation of the Adaptive Management Program and the Plant Species Translocation, Propagation, and Management Plan.
47. 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.	N/A

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE	PROPOSED PROJECT (B-4)
48. 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.	N/A
49. 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.	**Consistent.** B-4 would be consistent because it would implement the Habitat Restoration Plan component of the Adaptive Management Program.
CENTRAL SAN JUAN AND TRAMPAS CANYON SUB-BASIN	
Central San Juan Subunit Protection Recommendations	
50. 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.	**Consistent.** B-4 would be consistent because it would avoid riparian and aquatic habitats along San Juan Creek and management would occur through implementation of the Adaptive Management Program, including the Invasive Species Control Plan, Habitat Restoration Plan and Grazing Management Plan. Management of water quality would occur in compliance with the County of Orange MS4 permit issued by the San Diego Regional Water Quality Control Board through implementation of a Water Quality Management Plan. Water quality would be adaptively managed by the development entities as described in Chapter 9. Hydrology and sediment transport would be improved through invasive species control. A realigned Ortega Highway would bridge San Juan Creek and avoid aquatic resources.
51. 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.	**Consistent.** B-4 would be consistent because it would avoid San Juan Creek and adjacent floodplain terrace foraging habitat. Proposed development on the south side of the creek would be limited to the Trampas sub-basin and within the Central San Juan sub-basin low density development that would be set back from the creek. B-4 also proposes relocation of Ortega Highway which would provide improved foraging/estivation habitat south of the creek.
52. Protect upland habitat adjoining riparian and aquatic habitats to support nesting sites of southwestern pond turtle.	**Consistent.** B-4 would be consistent because it would avoid San Juan Creek and adjacent floodplain terrace foraging habitat. Proposed development on the south side of the creek would be limited to the Trampas sub-basin and within the Central San Juan sub-basin low density development that would be set back from the creek. B-4 also proposes relocation of Ortega Highway which would provide improved nesting/estivation habitat south of the creek.
53. Protect upland habitat adjoining riparian and aquatic habitats to support all life stages of western spadefoot toad.	**Consistent.** B-4 would be consistent because it would avoid San Juan Creek and adjacent floodplain terrace estivation habitat.

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE	PROPOSED PROJECT (B-4)
54. Protect breeding habitat and, to the extent feasible, protect foraging habitat for raptors adjacent to San Juan Creek.	**Not consistent.** B-4 would not be consistent because although breeding habitat in San Juan Creek and adjacent major tributaries (e.g., Chiquita, Gobernadora) would be protected and impacts to adjacent foraging habitat in Chiquita sub-basin would be reduced through avoidance of the major alluvial canyons, impacts to foraging habitat in Chiquita, Gobernadora, and Trampas would occur under B-4.
55. 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.	**Consistent.** B-4 would be consistent because it would provide for upland habitat linkages in an east-west direction by the protection of San Juan Creek and adjacent floodplain terraces. The north-south movement would be provided by protection of Chiquita and Chiquadora ridges, protection of San Juan Creek and adjacent floodplain terraces, and protection of the coastal sage scrub and gnatcatcher sites located in the northern portion of the Cristianitos sub-basin (linkages/corridors C, G, J, and N).
56. 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.	**Consistent.** B-4 would be consistent because it would provide for a habitat linkage (J) at the confluence of Bell, Verdugo and San Juan Creeks. Linkage J would have a minimum width of 300 ft within the San Juan Creek floodplain for approximately 1,000 linear feet along the edges of the Gobernadora and East Ortega development areas, beyond which it then broadens at either end (i.e., an hourglass shape). B-4 would protect linkages between central San Juan Creek (J) and Chiquita Ridge (C), Canada Gobernadora (G), Bell Canyon (J), upper San Juan Creek (J), Verdugo Canyon (J, L, M), Trampas Canyon (J, K), and Cristianitos Canyon (J, N). The realignment of Ortega Highway would include a bridge over San Juan Creek south of the confluence with Bell Canyon which would be constructed to avoid impacts to the habitat linkage.
57. 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.	**Consistent.** B-4 would be consistent because it proposes the relocation of Ortega Highway to the north side of San Juan Creek.
58. Implement a bullfrog control program for the Cal-Mat Lake within San Juan Creek to help protect arroyo toads.	**Consistent.** B-4 would be consistent because it proposes implementation of an Adaptive Management Program which includes bullfrog control as part of the Invasive Species Control Plan.
59. 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.	**Consistent.** B-4 would be consistent because it proposes implementation of an Adaptive Management Program which includes an Invasive Species Control Plan and a Grazing Management Plan. In addition, access policies will be implemented to control human disturbances, as described in Chapter 9.
Central San Juan Subunit Restoration Recommendations	
60. In coordination with upstream eradication efforts, implement a giant reed control program for San Juan Creek within Rancho Mission Viejo boundaries to protect arroyo toad habitat and other riparian areas.	**Consistent.** B-4 would be consistent because it proposes implementation of an Adaptive Management Program which includes giant reed control as part of the Invasive Species Control Plan.

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE	PROPOSED PROJECT (B-4)
61. Translocate salvaged many-stemmed dudleya to CSS/VGL restoration and enhancement areas where feasible and appropriate. Potential nearby restoration and enhancement 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.	**Consistent.** B-4 would be consistent because it proposes implementation of an Adaptive Management Program which includes many-stemmed dudleya salvage and translocation to Chiquadora Ridge as part of the Plant Species Translocation, Propagation, and Management Plan.
62. 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.	**Consistent.** B-4 would be consistent because it would implement the Plant Species Translocation, Propagation, and Management Plan as part of the Adaptive Management Program.
63. 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.	N/A
64. 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.	N/A
Trampas Canyon Subunit Planning Recommendations	
65. 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.	**Consistent.** B-4 would be consistent because it would protect the Radio Tower Road vernal pools and slope weltands and their contributing hydrologic sources.
66. 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.	**Consistent.** B-4 would be consistent because it would avoid important population 9 (Trampas Canyon) and minimize impacts to important population 11 (upper Cristianitos Canyon). B-4 thus would provide for resident and dispersal habitat from San Juan Creek through the Trampas sub-basin to the Cristianitos sub-basin southward to Camp Pendleton.
67. 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.	**Consistent.** B-4 would be consistent because it would protect the north-south habitat linkages J and K. B-4 would minimize impacts to linkage N through flexible golf course design and provision of a setback from Cristianitos Creek.
68. 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 Land 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.	**Not consistent.** B-4 would not be consistent because the east-west portion of habitat linkage K south of Trampas Canyon Dam, which links to Prima Deshecha, Talega Open Space and other habitat to the west in San Juan Capistrano and San Clemente, would be constrained.

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE		PROPOSED PROJECT (B-4)
69.	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.	**Consistent.** B-4 would be consistent because it proposes the relocation of Ortega Highway to the north side of San Juan Creek.
70.	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.	**Consistent.** B-4 would be consistent because would avoid riparian and aquatic habitats along San Juan Creek and management would occur through implementation of the Adaptive Management Program, including the Invasive Species Control Plan, Habitat Restoration Plan, and Grazing Management Plan. Management of water quality would occur in compliance with the County of Orange MS4 permit issued by the San Diego Regional Water Quality Control Board through implementation of a Water Quality Management Plan. Water quality would be adaptively managed by the development entities as described in Chapter 9. Hydrology and sediment transport would be improved through invasive species control.
71.	Protect upland terraces and habitat adjoining San Juan Creek to support arroyo toad foraging and estivation.	**Consistent.** B-4 would be consistent because it would avoid the upland terraces within the 100-year floodplain of San Juan Creek and therefore protect arroyo toad breeding and estivation habitat. In addition, B-4 would protect most of the uplands south of San Juan Creek and the East Ortega development would be low density and allow for minimization of impacts.
72.	Protect the Trampas Canyon subunit component (approximately nine 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.	**Consistent.** B-4 would be consistent because it would avoid the locations of many-stemmed dudleya in the Trampas Canyon subunit.
73.	Protect the eight known locations of intermediate mariposa lily comprising an important population in the subunit.	N/A
Trampas Canyon Subunit Management Recommendations		
74.	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.	**Consistent.** B-4 would be consistent because it would maintain stormwater flow characteristics comparable to existing conditions from Trampas Canyon into San Juan Creek through implementation of the water quality management. Management of water quality would occur in compliance with the County of Orange MS4 permit issued by the San Diego Regional Water Quality Control Board through implementation of a Water Quality Management Plan. Water quality would be adaptively managed by the development entities as described in Chapter 9. Hydrology and sediment transport would be improved through invasive species control.
75.	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.	**Consistent.** B-4 would be consistent because it would implement an Adaptive Management Program which includes an Invasive Species Control Plan and a Grazing Management Plan. In addition, access policies will be implemented to control human disturbances, as described in Chapter 9.

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE		PROPOSED PROJECT (B-4)
Verdugo Canyon Sub-Basin Protection Recommendations		
76.	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.	**Consistent.** B-4 would be consistent because it would maintain adequate contiguous patches of coastal sage scrub around proposed estate lots to provide dispersal habitat 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.
77.	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.	**Consistent.** B-4 would be consistent because it would provide for habitat connectivity along San Juan Creek to the CNF (linkage J), and between upper Verdugo Canyon and the headwaters of Gabino Creek (linkage M). B-4 proposes no development in upper Verdugo Canyon, thus allowing for unrestricted wildlife movement.
78.	Protect riparian habitat that provides nest sites for Cooper's hawk, red-tailed hawk, red-shouldered hawk, and barn owl.	**Consistent.** B-4 would be consistent because it would avoid impacts to raptor riparian breeding habitat by siting estate homes in the sub-basin away from habitat. B-4 proposes to upgrade an existing gravel Ranch road to rural collector road through a portion of the sub-basin to the south of Vedugo Canyon. This road is not anticipated to have substantial impacts on riparian habitat.
79.	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.	**Not consistent.** B-4 would not be consistent because while it would avoid impacts to wetland/riparian habitat at the mouth of Verdugo Canyon, proposed estates in the southern portion of the mouth of the canyon would impact grassland habitat.
80.	Protect Verdugo Canyon hydrology to maintain sources of coarse sediment that are important for arroyo toad breeding habitat in downstream areas.	**Consistent.** B-4 would be consistent because it would maintain existing hydrology in Verdugo Canyon through siting of the estate lots to avoid Verdugo Creek and implementation of the Water Quality Management Plan component of the Adaptive Management Program which addresses both pollutants of concern and conditions of concern.
81.	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.	**Consistent.** B-4 would be consistent because it would provide an area along the east side of Cristianitos Creek which, when combined with the O'Neill Conservancy, would form a north-south habitat linkage (N) connecting gnatcatcher populations in upper Cristianitos sub-basin to other populations in Lower Gabino Creek and Camp Pendleton. B-4 also would maintain habitat integrity through connectivity within the O'Neill Conservancy.
82.	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.	**Could be consistent.** B-4 could be consistent through golf course design features (e.g., water features) and the Adaptive Management Program that would avoid impacts to breeding and nesting/estivation habitat for the pond turtle.
83.	Protect wetlands and adjoining upland habitat to support all life stages of western spadefoot toad.	**Could be consistent.** B-4 could be consistent through golf course design features (e.g., water features) and the Adaptive Management Program that would avoid impacts to breeding and estivation habitat for the spadefoot toad in the stockpond in upper Cristianitos. In lower Cristianitos at the confluence with Gabino Creek, breeding and estivation habitat would be avoided.

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE	PROPOSED PROJECT (B-4)
84. Avoid riparian/wetland habitat, including alkali wetlands, to the maximum extent feasible.	**Could be consistent.** B-4 could be consistent through project design features incorporated into the golf course in upper Cristianitos that would avoid wetland/riparian habitat, and particularly the alkali wetlands, to the maximum extent feasible. Impacts to the remainder of Cristianitos Creek downstream would be avoided.
85. Protect the majority of native grasslands in the sub-basin.	**Not consistent.** B-4 would not be consistent because only 27% of native grasslands in the sub-basin would be protected. However, the amount of native grassland protected could be increased through golf course design features in upper Cristianitos, but the acreage protected cannot be estimated at this time.
86. Protect breeding habitat and, to the extent feasible, foraging habitat for resident and wintering raptor species.	**Not consistent.** B-4 would not be consistent because while riparian breeding habitat associated with Cristianitos Creek would be avoided, substantial impacts to adjacent grassland foraging habitat would occur.
87. Protect the majority of the cactus wren locations within the sub-basin.	**Consistent.** B-4 would be consistent because 63% of cactus wren locations in the sub-basin would be protected
88. 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.	**Could be consistent.** B-4 could be consistent because potential impacts to linkage N in upper Cristianitos would be minimized through flexibility of the golf course design and provision of a setback of the Cristianitos Canyon "development bubble" from the creek of typically about 500 ft, with a minimum of about 200 ft.
89. 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.	**Consistent.** B-4 would be consistent because it would provide adequate open space to protect wildlife movement along Gabino Creek (linkage O), at the Gabino/Cristianitos confluence, and to the O'Neill Conservancy. (Note: A new collector road would be required to connect to development in the Cristianitos sub-basin, but the segment in the Habitat Reserve would be constructed in the Gabino and Blind Canyons sub-basin discussed below).
90. Protect the three locations supporting approximately 4,500 flowering stalks of thread-leaved brodiaea on the hill outcrop adjacent to the clay mine pits in the southern portion of Cristianitos Canyon.	**Could be consistent.** B-4 could be consistent if the three locations of thread-leaved brodiaea are protected by achieving performance criteria for avoidance of the three locations.
91. Protect 10 of the 13 small, scattered locations of thread-leaved brodiaea in Cristianitos Canyon, totaling approximately 285 flowering stalks, to achieve the objective of protecting important populations in key locations. Maintain a continuous habitat connection between these scattered populations to allow for interactions and genetic exchange between the populations. These locations provide a linkage between other brodiaea locations in the area and the area has good potential for enhancement and restoration.	**Could be consistent.** B-4 could be consistent through golf course design features in upper Cristianitos designed to avoid at least 10 of 13 locations totaling 285 individuals.
92. 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 19,300 individuals in about 69 discrete locations.	**Could be consistent.** B-4 could be consistent because with golf course design features to avoid dudleya in upper Cristianitos, it would protect approximately 90% of discrete locations and 69% of individuals in the Cristianitos sub-basin portion of the major population.

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE	PROPOSED PROJECT (B-4)
93. Protect the two known important populations of Coulter's saltbush in the sub-basin.	**Could be consistent.** B-4 could be consistent because (1) the eastern population would be completely avoided, and (2) the western population could be protected by incorporating golf course design features that would protect the population.
Cristianitos Canyon Sub-Basin Management Recommendations	
94. 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.	**Consistent.** B-4 would be consistent because it proposes implementation of an Adaptive Management Program which includes a Grazing Management Plan component.
95. 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.	**Consistent.** B-4 would be consistent because it proposes implementation of an Adaptive Management Program which includes an Invasive Species Control Plan and a Grazing Management Plan. In addition, access policies will be implemented to control human disturbances, as described in Chapter 9.
Cristianitos Canyon Sub-Basin Restoration Recommendations	
96. Implement a native grasslands restoration program, which will likely include grazing as a grassland restoration technique, as set forth in the Grazing Management Plan, for the upper portion of the sub-basin.	**Not consistent.** B-4 would not be consistent because although it proposes implementation of an Adaptive Management Program which includes a Grazing Management Plan and Habitat Restoration Plan, the proposed development pattern under B-4 conflicts with some areas targeted for restoration in upper Cristianitos. It would, however, allow partial implementation of the CSS/VGL restoration recommendations.
97. 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.	**Not consistent.** B-4 would not be consistent because the proposed development pattern sub-basin conflicts with some areas targeted for restoration in upper Cristianitos. However, B-4 would allow partial implementation of the CSS/VGL restoration recommendations and the Plant Species Translocation, Propagation, and Management Plan. Translocation could occur in the Trampas sub-basin and portions of the Cristianitos sub-basin.
98. 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.	**Consistent.** B-4 would be consistent because the proposed development pattern would allow partial implementation of the CSS/VGL restoration recommendations and the Plant Species Translocation, Propagation, and Management Plan. Salvage and transport of clay soils to the Trampas sub-basin and portions of the Cristianitos sub-basin, and elsewhere, could occur.
99. 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.	N/A

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE	PROPOSED PROJECT (B-4)
100. 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.	N/A
101. 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."	**Consistent.** B-4 would be consistent because habitat restoration to address erosion in the eastern part of the headwaters would be implemented. The proposed golf course in the western portion of the headwaters area would provide a pervious surface to help reduce erosion of fine sediments. Development of the residential estates would impact only a very small portion of the headwaters area. Finally, B-4 would address erosion from the clay pits and implement creek stabilization actions to address localized erosion.
GABINO AND BLIND CANYONS SUB-BASIN	
Upper Gabino Subunit Protection Recommendations	
102. Protect a habitat linkage along Upper Gabino to allow dispersal of large mammals.	**Consistent.** B-4 would be consistent because it proposes limited development consisting of a golf course, estate homes and 20 acres of attached homes the Upper Gabino subunit. The limited development area allows for protection of considerable open space outside the development area and through the golf course itself. Wildlife movement along Gabino Creek would be maintained under B-4, as would wildlife movement from Gabino into Verdugo (linkages O and M).
103. Maintain contiguity and connectivity of coastal sage scrub to provide dispersal habitat for the cactus wren and other sensitive coastal sage scrub species.	**Consistent.** B-4 would be consistent because it proposes limited development consisting of a golf course, estate homes and 20 acres of attached homes for the Upper Gabino subunit, largely in grassland habitat. The limited development area allows for protection of considerable open space outside the development area and through the golf course itself. The contiguity of coastal sage scrub would be maintained under this development pattern.
104. 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.	**Consistent.** B-4 would be consistent because approximately 358 acres (70%) of grasslands (annual and native) would be protected in the Upper Gabino subunit.
105. Protect Jerome Lake and surrounding uplands to maintain nesting habitat for the southwestern pond turtle.	**Could be consistent.** B-4 could be consistent because it would protect Jerome's Lake and surrounding upland habitat through golf course project design features that would ensure adequate upland habitat for pond turtle nesting and estivation.
106. 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.	**Consistent.** B-4 would be consistent because 64% of native grasslands in the subunit would be protected. In addition, B-4 proposes implementation of the Adaptive Management Program including the Habitat Restoration Plan and Grazing Management Plan to restore protected native grasslands in the subunit. Approximately 14 acres of annual grassland that are restorable to native grassland would be protected in the subunit.

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE	PROPOSED PROJECT (B-4)
107. 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. (Note that two of the locations mapped as part of the major population are in the Middle Gabino Canyon subunit but are included in this analysis.)	**Could be consistent.** B-4 could be consistent because through careful siting and design of estate lots, it would avoid all 6 locations.
108. Protect the important population of Coulter's saltbush in the subunit.	**Could be consistent.** B-4 could be consistent because it would protect Coulter's saltbush through avoidance criteria incorporated into golf course project design.
Upper Gabino Subunit Restoration Recommendations	
109. Implement a CSS/VGL restoration and enhancement program, which will likely include grazing grassland restoration techniques set forth in the Grazing Management Plan.	**Not consistent.** B-4 would not be consistent because the proposed development pattern would conflict with areas targeted for the CSS/VGL restoration plan proposed under the Adaptive Management Program. However, the proposed development pattern would provide for partial implementation of the CSS/VGL restoration recommendations in the northern portion of the subunit.
110. 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.	**Could be consistent.** B-4 could be consistent because the proposed development pattern would provide for translocation on many-stemmed dudleya to any areas in the northern portion of the CSS/VGL restoration area that supports clay soils.
111. 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.	**Consistent.** B-4 would be consistent because clay topsoil salvage and transport to other restorations areas could occur via implementation of Plant Species Translocation, Propagation, and Management Plan component of the Adaptive Management Program.
112. Implement a creek restoration program in the subunit to address erosion that is generating increases in fine sediment yields in Upper Gabino.	**Consistent.** B-4 would be consistent because through implementation of the Habitat Restoration Plan component of the Adaptive Management Program and the development proposed for Upper Gabino under B-4, fine sediment yields would be decreased.
Middle Gabino Canyon Subunit Protection Recommendations	
113. Limit impacts to ridgelines to the extent feasible in order to protect coarse sediments.	**Consistent.** B-4 would be consistent because it proposes no development within the Middle Gabino subunit.
114. 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.	**Consistent.** B-4 would be consistent because it proposes no development within the Middle Gabino subunit, including the major western tributary.
115. 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.	**Consistent.** B-4 would be consistent because it proposes no development in the Middle Gabino subunit.
116. 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.	**Consistent.** B-4 would be consistent because it proposes no development in the Middle Gabino subunit and therefore would protect raptor nesting habitat.
117. Protect the four known discrete locations of many-stemmed dudleya in the subunit that are part of a major population in a key location.	**Consistent.** B-4 would be consistent because it proposes no development within the Middle Gabino subunit, and therefore all dudleya populations in the subunit would be protected.

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE	PROPOSED PROJECT (B-4)
Middle Gabino Canyon Subunit Management Recommendations	
118. 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.	**Consistent.** B-4 would be consistent because it proposes implementation of an Adaptive Management Program which includes an Invasive Species Control Plan and a Grazing Management Plan. In addition, access policies will be implemented to control human disturbances, as described in Chapter 9.
119. 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.	**Consistent.** B-4 would be consistent because it proposes implementation of an Adaptive Management Program, including a Grazing Management Plan component.
120 Implement a management program for protected raptor nesting habitat in the sub-basin, including the minimization of human disturbance during the breeding season.	**Consistent.** B-4 would be consistent because it proposes implementation of an Adaptive Management Program. In addition, access policies will be implemented to control human disturbances, as described in Chapter 9.
Lower Gabino Subunit including Blind Subunit Protection Recommendations	
121. 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.	**Consistent.** B-4 would be consistent because it would avoid direct impacts to Gabino Creek and provide for setbacks from the creek to provide adequate adjacent alluvial terraces to support arroyo toad estivation. Development in the Blind Canyon portion of the sub-basin would be limited to the area below the ridgeline separating Gabino and Blind canyons. B-4 would require construction of a two-lane collector road with a substantial bridge span over the creek that would have to be designed and constructed to avoid arroyo toad breeding habitat and streamcourse morphology.
122. Protect riparian habitat for nesting yellow-breasted chat within the subunit.	**Consistent.** B-4 would be consistent because it would avoid impacts to riparian nesting habitat for the chat within the Lower Gabino subunit subunit and the Blind Canyon portion supports limited chat habitat.
123. Minimize impacts to California gnatcatcher locations.	**Could be consistent.** B-4 could be consistent through achieving performance criteria for avoidance of all five gnatcatcher locations.
124. Minimize impacts to cactus wren locations.	**Not consistent.** B-4 would not be consistent because proposed development would impact 42% of the cactus wren locations.
125. Minimize impacts to native grasslands within the subunit	**Could be consistent.** B-4 could be consistent because proposed development includes golf course and low density residential estates, thus allowing for the opportunity to avoid, minimize, and restore native grasslands.
126. Protect breeding habitat, and to the extent feasible, protect raptor foraging habitat for resident and wintering species.	**Not consistent.** B-4 would not be consistent because although raptor breeding habitat in the Gabino Canyon portion of the subunit would be avoided, breeding habitat in the Blind Canyon portion and foraging areas, and particularly grasslands, are proposed for development.
127. 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.	**Consistent.** B-4 would be consistent because it would avoid Gabino Creek to the confluence with Cristianitos Creek, maintaining an east-west habitat linkage to the Conservancy.
128. 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.	**Not consistent.** B-4 would not be consistent because 67% of locations would be protected. However, 81% of individuals of many-stemmed dudleya would be protected under B-4.

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE	PROPOSED PROJECT (B-4)
129. Protect the two known locations of intermediate mariposa lily in Lower Gabino Canyon.	N/A
130. Protect the major population of brodiaea in a key location bordering the Lower Gabino Canyon sub-unit and Cristianitos Canyon sub-basin supporting approximately 4,500 flowering stalks of thread-leaved brodiaea in three locations on the hill outcrop adjacent to and east of the clay mine pits in the southern portion of Cristianitos Canyon and in the western portion of the Gabino subunit.	**Could be consistent.** B-4 could be consistent by incorporating project design features that would achieve avoidance of the three locations.
Lower Gabino Subunit including Blind Subunit Management Recommendations	
131. 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.	**Consistent.** B-4 would be consistent because it proposes implementation of an Adaptive Management Program which includes an Invasive Species Control Plan and a Grazing Management Plan. In addition, access policies will be implemented to control human disturbances, as described in Chapter 9.
132. 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.	**Consistent.** B-4 would be consistent because it would avoid Lower Gabino Creek, lower Cristianitos Creek and San Mateo Creek, thereby protecting the toad population. Hydrologic and sediment delivery processes would be maintained by implementation of the comprehensive of water quality management. Management of water quality would occur in compliance with the County of Orange MS4 permit issued by the San Diego Regional Water Quality Control Board through implementation of a Water Quality Management Plan. Water quality would be adaptively managed by the development entities as described in Chapter 9. The protection of Upper and Middle Gabino and La Paz canyons also would be key in protecting hydrologic and seditment delivery processes. Finally, hydrology and sediment transport would be improved through invasive species control.
133. Implement an invasive plant species control effort in Cristianitos Creek between Gabino Creek and Talega Creek.	**Consistent.** B-4 would be consistent because it proposes an Invasive Species Control Plan component of the Adaptive Management Program which addresses species of concern in the sub-basin such as tamarisk and pampas grass.
Lower Gabino Subunit including Blind Subunit Restoration Recommendations	
134. Implement a VGL restoration and enhancement program, which will likely include grazing grassland restoration techniques set forth in the Grazing Management Plan.	**Not consistent.** B-4 would not be consistent because proposed development in the Blind Canyon portion of the subunit would preclude implementation of the Habitat Restoration Plan and Grazing Management Plan components of the Adaptive Management Program in the subunit.
La Paz Canyon Sub-Basin Protection Recommendations	
135. Maintain a habitat linkage along La Paz Canyon to convey movement and dispersal by mountain lion, bobcat, coyote and mule deer.	**Consistent.** B-4 would be consistent by incorporating siting and design guidelines for the four proposed estate lots in the northmost part of the sub-basin that would occupy a very small percentage of the 1,589-acre La Paz sub-basin. Because the estate lots would occupy such a small percentage of the sub-basin, the function of the habitat linkage would be maintained.

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE	PROPOSED PROJECT (B-4)
136. Maintain contiguity and connectivity of coastal sage scrub to provide dispersal habitat for the cactus wren and other sensitive coastal sage scrub species.	**Consistent.** B-4 would be consistent by incorporating siting and design guidelines for the four proposed estate lots in the northmost part of the sub-basin that would occupy a very small percentage of the 1,589-acre La Paz sub-basin. Because the estate lots would occupy such a small percentage of the sub-basin, contiguity and connectivity of coastal sage scrub to provide dispersal habitat for the cactus wren and other sensitive coastal sage scrub species would be maintained.
137. Maintain riparian habitat supporting nesting raptors.	**Consistent.** B-4 would be consistent because riparian nesting habitat in La Paz sub-basin would be maintained.
138. Protect alluvial fan scrub and hydrological conditions that support this plant community.	**Consistent.** B-4 would be consistent because alluvial fan scrub and hydrological conditions that support this plant community would be maintained.
139. Protect the locations of many-stemmed dudleya in the upper portion of the sub-basin.	**Could be consistent.** B-4 could be consistent by siting the four estate lots such that both locations of many-stemmed dudleya would be avoided.
140. Protect the two discrete locations of intermediate mariposa lily in the middle portion of the sub-basin.	N/A
141. 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.	**Could be consistent.** B-4 could be consistent by siting and construction of estate lots according to guidelines to ensure that the generation and transport of coarse sediments to downstream areas would be protected.
Talega Canyon Sub-Basin Protection Recommendations	
142. Protect the integrity of arroyo toad populations in Talega Canyon by maintaining current stormwater runoff patterns and hydrologic conditions.	**Consistent.** B-4 would be consistent because it would avoid Talega Creek, thereby protecting the arroyo toad population. Hydrologic and sediment delivery processes would be maintained by implementation of the water quality management. Management of water quality would occur in compliance with the County of Orange MS4 permit issued by the San Diego Regional Water Quality Control Board through implementation of a Water Quality Management Plan. Water quality would be adaptively managed by the development entities as described in Chapter 9.
143. Provide for comprehensive water quality treatment consistent with protection of arroyo toads in Talega Creek.	**Consistent.** B-4 would be consistent because water quality would be maintained by implementation of the Water Quality Management Plan. Management of water quality would occur in compliance with the County of Orange MS4 permit issued by the San Diego Regional Water Quality Control Board through implementation of a Water Quality Management Plan. Water quality would be adaptively managed by the development entities as described in Chapter 9.
144. 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.	**Consistent.** B-4 would be consistent because it would avoid direct impacts to Talega Creek and would include minimum setbacks of approximately 80 feet in elevation above the creek to provide for adequate upland habitat for lateral movement within adjacent alluvial terraces. Development would be concentrated on the clay soils that are less suitable habitat for the toad.

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE	PROPOSED PROJECT (B-4)
145. 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. (Note that one long-eared owl and three white-tailed kite historic nest sites are located in Talega Creek just south of the RMV boundary.)	**Consistent.** B-4 would be consistent because one long-eared owl and three white-tailed kite historic nesting locations, as well as other raptor nest sites, associated with Talega Creek riparian habitat would be protected under B-4.
146. Maintain an east-west habitat linkage for gnatcatcher and cactus wren to protected habitat in the Talega and Forster Ranch Planned Communities.	**Consistent.** B-4 would be consistent because it would avoid habitat linkage Q along Talega Canyon.
147. 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.	**Consistent.** B-4 would be consistent because it would avoid habitat linkage Q along Talega Canyon.
148. Protect the four known locations of thread-leaved brodiaea east of the Northrup Gruman facilities that constitute an important population	**Could be consistent.** B-4 could be consistent because careful siting of estate lots would avoid impacts to the four brodiaea locations.
149. Protect eight locations of many-stemmed dudleya east of the Northrup Gruman facilities that may constitute an important population.	**Could be consistent.** B-4 could be consistent because careful siting of estate lots would avoid impacts to the three dudleya locations in this important population that are within the designated estate lot area. The other five locations fall outside the designated estate lot area.
Other Planning Area Protection Recommendations	
150. 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.	**Consistent.** B-4 would be consistent because it would provide for a habitat linkage (N) along Cristianitos Creek and the O'Neill Conservancy by providing a setback from Cristianitos Creek for development in the Cristianitos and Talega sub-basins.
151. Protect the majority of native grasslands in the area.	**Not consistent.** B-4 would not be consistent because it would impact 84% of native grassland in the sub-basin.
152. Protect the integrity of arroyo toad populations in lower Cristianitos Creek by maintaining current hydrologic conditions.	**Consistent.** B-4 would be consistent because hydrologic and sediment delivery processes would be maintained by addressing "hydrologic conditions of concern" in compliance with the County of Orange MS4 permit issued by the San Diego Regional Water Quality Control Board through implementation of a Water Quality Management Plan. "Hydrologic conditions of concern" would be adaptively managed by the development entities as described in Chapter 9.
153. 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.	**Consistent.** B-4 would be consistent because it would avoid direct impacts to lower Cristianitos Creek and Talega Creek and would include setbacks at a minimum of 80 feet above the creek to provide for adequate upland habitat for lateral movement within adjacent alluvial terraces.
154. Protect breeding and foraging habitat for the least Bell's vireo, yellow-breasted chat, and yellow warbler along lower Cristianitos Creek.	**Consistent.** B-4 would be consistent because it would avoid impacts to lower Cristianitos Creek and adjacent uplands and thus protect breeding and foraging habitat for the least Bell's vireo, yellow-breasted chat, and yellow warbler.

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE	PROPOSED PROJECT (B-4)
155. Protect breeding habitat and to the extent feasible foraging habitat for resident and wintering raptor species.	**Not consistent.** B-4 would not be consistent because although it would avoid impacts to lower Cristianitos Creek, a substantial area of adjacent grasslands would be impacted.
156. 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.	**Consistent.** B-4 would be consistent because it would provide for a habitat linkage (N) along Cristianitos Creek and the O'Neill Conservancy by providing setbacks from Cristianitos Creek associated with development in this sub-basin, as well as the Cristianitos and Talega sub-basins.
157. 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.	**Consistent.** B-4 would be consistent because it proposes a setback between development and the confluence of Cristianitos and Gabino creeks, thus maintaining an east-west habitat linkage (O) to the Conservancy.
Other Planning Area Management Recommendations	
158. In conjunction with upstream and adjacent control efforts, implement an invasive plant species control program.	**Consistent.** B-4 would be consistent because it would include an Invasive Plant Species Control Plan component of the Adaptive Management Program which addresses species of concern in the sub-basin such as tamarisk and pampas grass.
PLANNING AREA-WIDE SPECIES CONSIDERATIONS	
Golden Eagle Protection Recommendations	
159. Protect foraging habitat for the golden eagle to the extent feasible in the Chiquita, Gobernadora, Upper Gabino, Cristianitos and Talega sub-basins. (Note: As described in the NCCP Planning Guidelines, "Golden eagles are an uncommon resident in the subregion. They are known to nest in the Cleveland National Forest, and although not known to nest in the study area, 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.")	**Consistent.** B-4 would be consistent with this recommendation. Under B-4, potential golden eagle foraging habitat in the Chiquita, Gobernadora, Cristianitos, and Talega sub-basins would be impacted. However, within the context of occasional use of RMV for foraging, the golden eagle likely would continue to forage in the planning area under the B-4 alternative in areas such as Upper Gabino Canyon and Upper Chiquita Canyon.
Mountain Lion Protection Recommendations	
160. Protect "live-in" habitat within the RMV portion of the San Mateo Creek Watershed 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.	**Consistent.** B-4 would be consistent because it would provide for a large habitat block consisting of Verdugo Canyon, upper and Middle Gabino, and La Paz canyons, and the eastern Talega sub-basin, which would link to Caspers Wilderness Park, the CNF, and Camp Pendleton. The proposed golf course and estates in Upper Gabino may locally affect behavior but with the extensive open space overall in the Habitat Reserve and CNF, the overall impact would not be significant.

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE	PROPOSED PROJECT (B-4)
161. 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.	See individual sub-basins for consistency.
Mountain Lion Management Recommendations	
162. In areas identified as "live-in" habitat or habitat connections for mountain lion, 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.	**Consistent.** B-4 would be consistent because roads constructed as part B-4 would comply with the recommendation regarding siting, wildlife movement, bridges and culverts, and lighting.
Mule Deer Protection Recommendations	
163. Protect "live-in" habitat within the portion of the San Mateo Creek 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.	**Consistent.** B-4 would be consistent because it would provide for a large habitat block consisting of the upper and Middle Gabino and La Paz sub-basin and the eastern Talega sub-basin which would link to Caspers Wilderness Park, the CNF, and Camp Pendleton. The proposed golf course and estates in Upper Gabino may somewhat affect the mule deer's use of this area and bring them into greater contact with humans (e.g., vehicle collisions), but this impact likely would not be significant because of the deer's tolerance for human presence.
164. 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.	See individual sub-basins for consistency.

APPENDIX G-5 (Continued)
SOUTHERN NCCP/HCP PLANNING GUIDELINES CONSISTENCY FINDINGS

PLANNING GUIDELINE	PROPOSED PROJECT (B-4)
165. 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.	**Consistent.** See individual sub-basins for specific consistency determinations for this recommendation. In addition, the Arroyo Trabuco would be protected under B-4. As a designated Existing Use area, habitat connections in the Foothill-Trabuco Specific Plan Area will be determined through the environmental review and permitting process for projects in the Specific Plan area.
Mule Deer Management Recommendations	
166. 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.	**Consistent.** B-4 would be consistent because roads constructed as part B-4 would comply with the recommendation regarding siting, wildlife movement bridges and culverts, and lighting.

APPENDIX G-6

WATERSHED AND SUB-BASIN PLANNING PRINCIPLES CONSISTENCY FINDINGS

APPENDIX G-6
WATERSHED AND SUB-BASIN PLANNING PRINCIPLES CONSISTENCY FINDINGS

Planning Principle	Proposed Project (B-4)
SAN JUAN WATERSHED	
Chiquita Sub-Basin	
1. Consistent with the SAMP Tenets, protect the headwaters of Upper Chiquita Canyon.	**Consistent.** B-4 would be consistent because Upper Chiquita Canyon north of Oso Parkway was conserved as mitigation for the FTC-N segment between Oso Parkway and Antonio Parkway.
2. Avoid creating impervious surfaces in the sandy soils of the canyon floor. To the extent feasible, land uses in the major side canyons should be limited to primarily pervious surfaces in order to maintain infiltration.	**Consistent.** B-4 would be consistent because it would avoid creating impervious surfaces in the valley floor throughout the sub-basin and in the major side canyons above the treatment plant, and it also would avoid the major side canyon below the treatment plant. Uses proposed in the major side canyons above the treatment plant and the major canyon below the treatment plant would be pervious uses, including golf course and habitat protection.
3. Emulate existing terrains/hydrology and sediment transport processes by locating development on the ridges, which under present conditions have higher runoff rates and direct surface runoff flows to the permeable substrate of the major side canyons and along the valley floor.	**Consistent.** B-4 would be consistent because development north of the treatment plant would be located on the ridgelines and development south of the treatment plant would avoid the major side canyon. The Water Quality Management Plan would include provisions for directing surface runoff flows to permeable substrates in the major side canyons and along the valley floor.
4. Promote stormwater surface flow connectivity between the major side canyons and the main stream channel to maintain transient surface channel connections that occur following extreme rainfall events, without significantly changing connections during small storms.	**Consistent.** B-4 would be consistent because it would maintain connectivity between the side canyons and the main channel throughout the sub-basin. Golf course design would include features to maintain connectivity for larger storms and infiltration/connectivity for smaller storms. The Water Quality Management Plan would include provisions for directing surface runoff flows to permeable substrates in the major side canyons and along the valley floor.
5. Identify natural treatment systems for water quality treatment and stormwater detention that would be appropriate in the sandy soils of the major side canyons and the valley floor.	**Consistent.** B-4 would be consistent because the Water Quality Management Plan for this alternative identifies natural treatment systems and stormwater detention appropriate for the sandy soils in the major side canyons and the valley floor. Management of water quality would occur in compliance with the County of Orange MS4 permit issued by the San Diego Regional Water Quality Control Board through implementation of a Water Quality Management Plan. Water quality would be adaptively managed by the development entities as described in Chapter 9.
6. Maintain groundwater recharge to the shallow subsurface water system to sustain flows to Chiquita Creek.	**Consistent.** B-4 would be consistent because stormwater flows would be directed to the major side canyons and detention areas along the valley floor as provided for in the Water Quality Management Plan. Management of water quality would occur in compliance with the County of Orange MS4 permit issued by the San Diego Regional Water Quality Control Board through implementation of a Water Quality Management Plan. Water quality would be adaptively managed by the development entities as described in Chapter 9. Groundwater recharge thus would be maintained to Chiquita Creek under this alternative.
7. Address existing areas of channel incision that result from primarily localized processes/land use practices, as contrasted with terrace-forming valley-deepening areas that are primarily a result of long-term geologic conditions. Site-by-site geomorphic analysis will be undertaken to define these areas.	**Consistent.** B-4 would be consistent because it proposes implementation of an Adaptive Management Program which includes a Habitat Restoration Plan to address localized headcuts.

APPENDIX G-6 (Continued)
WATERSHED AND SUB-BASIN PLANNING PRINCIPLES CONSISTENCY FINDINGS

Planning Principle	Proposed Project (B-4)
8. To the maximum extent practical, avoid direct impacts to the slope wetlands and maintain primary recharge characteristics that support these wetlands	**Not consistent.** B-4 would not be consistent because it would impact two slope wetlands north of the treatment plant and east of the creek. It would not impact slope wetlands below the treatment plant or west of the creek. With regard to maintaining the primary recharge characteristics that support these wetlands, project grading will not intersect the primary groundwater movement formations. Given existing hardpan soils, future landscape irrigation and the protection of a significant portion of Chiquadora Ridge, recharge would be maintained into the deep groundwater system supporting the slope wetlands.
Gobernadora Sub-Basin and Central San Juan North of San Juan Creek	
9. Protect Cañada Gobernadora valley floor above the knickpoint to provide for creek meandering (as occurred historically) and for restoration of riparian processes and habitat.	**Consistent.** B-4 would be consistent because it would protect the valley floor above the knickpoint, allowing for restoration of creek meander and riparian processes and habitat.
10. In order to emulate current hydrologic patterns, development areas should be set back from the valley floor and focus on areas that presently manifest Class D soils runoff characteristics, including those areas with existing hardpan caps.	**Not consistent.** B-4 would not be consistent because although it proposes development generally set back from the valley floor and located primarily on class C and D soils, a portion of the "development bubble" would allow development to the edge of the valley floor in a few locations and would allow for development in the alluvial side canyons.
11. Deep alluvial deposits that function as important infiltration/recharge areas underlie the valley floor and adjacent tributary swales. At the same time, any changes in future stormwater flows to these areas may need to be accompanied by groundwater management due to limited infiltration capacity resulting from high groundwater levels.	**Consistent.** B-4 would be consistent because it would include special groundwater management provisions for Gobernadora as part of the Water Quality Management Plan "conditions of concern" element. Management of water quality would occur in compliance with the County of Orange MS4 permit issued by the San Diego Regional Water Quality Control Board through implementation of a Water Quality Management Plan. Water quality would be adaptively managed by the development entities as described in Chapter 9.
12. Given the size of the valley floor, there are opportunities for creating natural treatment systems to treat potential existing and future urban runoff from the Gobernadora sub-basin, as well as provide opportunities for expanded wetlands habitat areas.	**Consistent.** B-4 would be consistent because it would provide for the use of tributary side canyons for stormwater and water quality management. Opportunities for expanded wetlands habitat areas would be preserved above the knickpoint.
13. Sediment management and creek restoration activities may be necessary in lower Gobernadora Canyon to address the present excessive sediment input from upstream urbanized areas. The increased sediment resulting from upstream construction will likely be moving through the system for a prolonged period. Eventually, sediment loads may decrease due to buildout of the upper watershed. Consequently, floodplain restoration should account for both the existing and potential future sediment regimes.	**Consistent.** B-4 would be consistent because the Sulphur Canyon restoration program, intended in part to reduce the generation of fine sediments in the Sulphur Canyon tributary, would be consistent with the floodplain/meander and surface/subsurface flow restoration provisions of the Gobernadora Creek restoration plan.
14. Existing channel incision that has isolated the creek from the floodplain in some areas should be addressed as part of the restoration effort.	**Consistent.** B-4 would be consistent because the Sulphur Canyon restoration program, intended in part to reduce the generation of fine sediments in the Sulphur Canyon tributary, would be consistent with the floodplain/meander and surface/subsurface flow restoration provisions of the Gobernadora Creek restoration plan.

APPENDIX G-6 (Continued)
WATERSHED AND SUB-BASIN PLANNING PRINCIPLES CONSISTENCY FINDINGS

Planning Principle	Proposed Project (B-4)
15. Protect the GERA and, to the extent feasible, minimize impacts to major riparian areas consistent with the overall restoration and management plan.	**Consistent.** B-4 would be consistent because it would protect GERA, and other major upstream and downstream riparian areas, except in the "fertile crescent" area.
16. In order to help maintain the sediment transport functions of the central reach of San Juan Creek, the timing of peak flows in Cañada Gobernadora at the confluence with San Juan Creek should be managed to emulate existing conditions and avoid coincident peaks flows with San Juan Creek.	**Consistent.** B-4 would be consistent because under the Water Quality Management Plan new development would be required to regulate the timing of peak flows in order to avoid coincident peak flows with San Juan Creek. Management of water quality would occur in compliance with the County of Orange MS4 permit issued by the San Diego Regional Water Quality Control Board through implementation of a Water Quality Management Plan. Water quality would be adaptively managed by the development entities as described in Chapter 9.
Trampas Sub-Basin and Central San Juan South of San Juan Creek	
17. Trampas Canyon is suitable for development	**Consistent.** B-4 would be consistent because it proposes development in Trampas Canyon.
18. Focus development in Trampas Canyon in disturbed and adjacent areas with low to moderate hydrologic, water quality and habitat integrity function and value.	**Consistent.** B-4 would be consistent because it would confine development to Trampas Canyon.
19. The area along Radio Tower Road should be protected because it contains a diversity of wetland types and endangered fairy shrimp in close proximity to one another, thereby increasing the heterogeneity of the landscape from an aquatic resources perspective.	**Consistent.** B-4 would be consistent because it would avoid the area along Radio Tower Road and protect the diversity of wetland types and the fairy shrimp.
20. Stormwater flows from Trampas Creek into San Juan Creek should be managed to provide flows comparable to existing conditions.	**Consistent.** B-4 would be consistent because it would maintain flows comparable to existing conditions in conjunction with its stormwater and dry season flows management system.
Verdugo Sub-Basin	
21. Development with impervious surfaces should be limited in extent in order to protect the generation and transport of sediment to downstream areas, and to protect Verdugo Canyon from excessive erosion.	**Consistent.** B-4 would be consistent because although it proposes estate lots under the O'Neill Ranch concept, it would utilize the current Ranch road system alignment and thus would provide for limited development and allow for protection of sediment processes in Verdugo Canyon.
22. Development should be set back from significant riparian habitat within the relatively narrow and geologically confined floodplain.	**Consistent.** B-4 would be consistent because development would be set back from significant riparian habitat. B-4 proposes to upgrade an existing gravel Ranch road to rural collector road through a portion of the sub-basin to the south of Vedugo Canyon. This road is not anticipated to have substantial impacts on riparian habitat.
23. Infiltration functions should be protected through site design. Cumulative stormwater flows should be managed in such a way as to not change peak flows that under present conditions lag behind those of the mainstem of San Juan Creek. The area adjacent to the mouth of Verdugo Canyon provides opportunities for infiltration and flow attenuation.	**Consistent.** B-4 would be consistent because with very limited development in Verdugo Canyon, infiltration and peak flow functions would be maintained.
SAN MATEO WATERSHED	
Cristianitos Sub-Basin	
24. The headwater area should be protected, with new impervious surfaces limited in extent within the headwater area.	**Consistent.** B-4 would be consistent because development of in the headwater area would be limited to golf course-estate residential in the western portion of the headwaters.

APPENDIX G-6 (Continued)
WATERSHED AND SUB-BASIN PLANNING PRINCIPLES CONSISTENCY FINDINGS

Planning Principle	Proposed Project (B-4)
25. Where feasible, protected headwater areas should be targeted for restoration of native vegetation to reduce the generation of fine sediments from the clayey terrains and to promote infiltration, and to enhance the value of upland habitats adjacent to the streams.	**Not consistent.** B-4 would not be consistent because it proposes a golf course in an area also proposed for VGL enhancement under the Habitat Restoration Plan in the vicinity of the area where the creek forms a west branch. B-4 thus would preclude full implementation of this recommendation.
26. In order to emulate existing hydrologic conditions, development should focus on areas with clayey soils, which presently seal fairly quickly under storm conditions and have relatively high runoff rates. The overall goal should be to reduce the generation of fine sediments compared with existing conditions to reduce turbidity effects and other adverse impacts of fine sediments on downstream aquatic resources. Development in the middle and lower reach areas should be set back from the creek and should be located in higher areas to the east of the creek where existing erosion could be concurrently addressed.	**Consistent.** B-4 would be consistent because the "development bubble" east of the creek would focus on clay soils, would be set back from the creek, and would be located in higher areas where existing erosion could be concurrently addressed with development.
27. Stream stabilization opportunities should be examined in Cristianitos Creek (above the confluence with Gabino Creek) in the context of longer-term geologic processes.	**Consistent.** B-4 would be consistent because the siting of development areas would allow opportunities for future consideration of stream stabilization. B-4 would implement the Habitat Restoration Plan component of the Adaptive Management Program which includes stream stabilization in Crisitianitos Creek.
28. The alkali wetlands within the middle portion of the sub-basin should be protected in conjunction with protection of the overall riparian system.	**Could be consistent.** B-4 could be consistent because project design features would be incorporated into the golf course in upper Cristianitos to avoid wetland/riparian habitat, and particularly the alkali wetlands, to the maximum extent feasible. Impacts to the remainder of Cristianitos downstream would be avoided.
Gabino and Blind Sub-Basin	
29. Limit new impervious surfaces in the headwater area to locations that will not adversely impact runoff patterns.	**Consistent.** B-4 would be consistent because it would focus golf course development in areas that are already severely eroded. All lots would be estate size with limited impervious surface and thus would be able to manage runoff patterns.
30. Protect the headwaters through restoration of existing gullies using a combination of slope stabilization, grazing management, and native grasslands and/or scrub restoration. To the extent feasible, restore native grasses to reduce sediment generation and promote infiltration of stormwater.	**Not consistent.** B-4 would not be consistent because it would preclude restoration of native grasses in the two lower CSS/VGL restoration areas and potentially limited a portion of the upper restoration area.
31. Modify grazing management in the upper portion of the sub-basin to support restoration and vegetation management in the headwater areas.	**Consistent.** B-4 would be consistent because it would implement the Adaptive Management Program, which includes a Grazing Management Plan that would support the portion of the restoration program that could be carried out.
32. Minimize impacts to the steep side canyons in the middle portion of the sub-basin by limiting new impervious surfaces.	**Consistent.** B-4 would be consistent because it would avoid all of the steep side canyons in the middle portion of the sub-basin.

APPENDIX G-6 (Continued)
WATERSHED AND SUB-BASIN PLANNING PRINCIPLES CONSISTENCY FINDINGS

Planning Principle	Proposed Project (B-4)
33. To the extent feasible, focus development in the clayey soils and terrains in the lower portions of the sub-basin, where it could serve to reduce the generation of fine sediments and associated turbidity.	**Consistent.** B-4 would be consistent because it would focus the vast majority of development on the clayey soils in the lower portions of the sub-basin and thus development on clay soils (particularly in eroded or grazed areas) would reduce the generation of fine sediments. The small estates lots would be located in very limited areas on ridgelines with clay soils and would not generate new fine sediments due to siting and limited impervious surface.
34. To the extent feasible, utilize the side canyon currently degraded by past mining activities for natural water quality treatment systems.	**Consistent.** B-4 would be consistent because it would allow for use of the degraded side-canyon for natural water quality treatment systems through implementation of the Water Quality Management Plan. Management of water quality would occur in compliance with the County of Orange MS4 permit issued by the San Diego Regional Water Quality Control Board through implementation of a Water Quality Management Plan. Water quality would be adaptively managed by the development entities as described in Chapter 9.
35. In the lower reach of the creek, protect significant riparian habitats along the south side of the creek and on proximate side canyon slopes. Limit development and other uses in Blind Canyon to the grazed areas on the mesa and away from the major oak woodlands in Blind Canyon. Direct to and treat stormwater runoff in areas that will not contribute to appreciable increases in water delivery/flow to the oak woodlands in the lower portion of the sub-basin.	**Could be consistent.** B-4 could be consistent if construction of a collector road across lower Gabino Creek would avoid significant riparian habitat. In addition a paved fire evacuation road along Gabino Canyon to connect with development in upper Gabino Canyon that could affect riparian habitat and streamcourse geomorphology may be required, and thus these potential significant impacts would have to be avoided for consistency. Otherwise, B-4 would be consistent because no development is proposed along the south side of the Gabino Creek. Development would be focused on the grazed areas on the mesa and away from the major oak woodlands in Blind Canyon. Runoff from the Blind Canyon subunit would be managed through implementation of water quality management. Management of water quality would occur in compliance with the County of Orange MS4 permit issued by the San Diego Regional Water Quality Control Board through implementation of a Water Quality Management Plan. Water quality would be adaptively managed by the development entities as described in Chapter 9.

APPENDIX G-6 (Continued)
WATERSHED AND SUB-BASIN PLANNING PRINCIPLES CONSISTENCY FINDINGS

Planning Principle	Proposed Project (B-4)
36. Protect the integrity of arroyo toad populations in lower Gabino Creek by maintaining hydrologic and sediment delivery processes, including maintaining the flow characteristics of episodic events in the sub-basin. Utilize natural water quality treatment systems to manage and treat runoff from any new land uses in areas adjacent to the lower creek.	**Could be consistent.** B-4 could be consistent if a required two-lane collector road with a substantial bridge span over the creek that would be designed and constructed to avoid arroyo toad breeding habitat and streamcourse morphology. In addition a paved fire evacuation road along Gabino Canyon to connect with development in upper Gabino Canyon that could affect riparian habitat and streamcourse geomorphology may be required, and thus these potential significant impacts to riparian and streamcourse resources would have to be avoided for consistency. Otherwise, B-4 would be consistent because the hydrology program for B-4, as described in the Water Quality Management Plan. Management of water quality would occur in compliance with the County of Orange MS4 permit issued by the San Diego Regional Water Quality Control Board through implementation of a Water Quality Management Plan. Water quality would be adaptively managed by the development entities as described in Chapter 9. B-4 would maintain hydrologic and sediment processes, including the flow characteristics of episodic events, as set forth in the first part of this recommendation. As provided in the second part of the recommendation, water quality treatment systems would manage and treat runoff from any new development in areas adjacent to but separated from the lower creek.
La Paz Sub-Basin	
37. Development should be limited in extent in order to protect the generation and transport of coarse sediment to downstream areas. Note: The avoidance of impacts in this sub-basin is extremely important because: (1) La Paz canyon provides a very important source of cobbles that contribute to downstream arroyo toad breeding habitat (in conjunction with coarse sediments generated within the middle reach of Gabino Canyon) both within the planning area and in the stream system outside the planning area, and (2) episodic storm events occurring within the La Paz Canyon watershed will not be altered in any way, thereby contributing important streamcourse processes for arroyo toad and other aquatic species both within the planning area and downstream of the planning area. Therefore, the protection of the La Paz basin physical processes is an important element in overall consistency of the NCCP/ HCP with the Watershed and Sub-Basin Planning Principles.	**Consistent.** B-4 would be consistent because the four estate lots proposed in the upper portion of the sub-basin would have limited impervious surface and thus would be able to manage runoff patterns such that natural sediment transport processes in La Paz Canyon would not be disrupted.
38. Development should be set back from riparian habitat within the relatively narrow and geologically confined riparian zone.	**Consistent.** B-4 would be consistent because the four proposed estate lots in the upper portion of the sub-basin have a minimum setback of about 500 feet from the riparian habitat.

APPENDIX G-6 (Continued)
WATERSHED AND SUB-BASIN PLANNING PRINCIPLES CONSISTENCY FINDINGS

Planning Principle	Proposed Project (B-4)
Talega Sub-Basin	
39. To the extent feasible, major stormwater flows from development areas should emulate current runoff patterns. Runoff during the dry season and high frequency/low magnitude storms (generally 1-2 year storm events) should be routed through natural water quality treatment systems and, where feasible, encouraged to flow generally away from arroyo toad habitat in Talega Canyon and toward Blind Canyon.	**Consistent.** B-4 would be consistent because under B-4, and like B-9 which has a similar development pattern in the sub-basin, the hydrology section of the Water Quality Management Plan indicates that runoff would be directed to existing drainages in order to emulate current runoff patterns consistent with the first part of the recommendation. The Water Quality Management Plan also provides for routing both dry season flows and 1-2 year storm flows in excess of existing conditions toward Blind Canyon consistent with the second part of the recommendation.
40. Development should focus on the ridge tops to avoid the canyon bottoms and preserve the steeper slopes. To the extent practical, development should generally be in the area of the existing Northrup Gruman facilities and adjacent ridges to the east/northeast.	**Not consistent.** B-4 would not be consistent because although it proposes development for the ridge tops in order to avoid canyon bottoms and to preserve the steeper slopes facing Talega Creek consistent with the first recommendation, a portion of the development bubble would extend into the steeper slopes of Blind Canyon, inconsistent with the recommendation. Although development would generally be located in the area of existing Northrup Gruman facilities and on the ridges to the east/northeast of Northrup Gruman, some development areas would extend to the south of Northrup Gruman; since the second part of the recommendation is qualified by the phrase "to the extent practical," development south of Northrup Gruman will need to be addressed in the EIR/EIS for the NCCP/HCP in terms of practicability considerations.
41. The timing of peak flows should emulate the timing of flows under existing conditions.	**Consistent.** B-4 would be consistent because the Water Quality Management Plan indicates that the timing of peak flows will emulate existing conditions consistent with the recommendation. Management of water quality would occur in compliance with the County of Orange MS4 permit issued by the San Diego Regional Water Quality Control Board through implementation of a Water Quality Management Plan. Water quality would be adaptively managed by the development entities as described in Chapter 9.

APPENDIX G-7

ELEMENTS OF THE ADAPTIVE MANAGEMENT PROGRAM FOR THE RMV OPEN SPACE THAT CONTRIBUTE TO MAINTAINING AND ENHANCING LONG-TERM NET HABITAT VALUE

Elements of the Adaptive Management Program for the RMV Open Space that Contribute to Maintaining and Enhancing Long-Term Net Habitat Value

The NCCP Conservation Guidelines define the manner in which the creation and long-term adaptive management of reserves provide for assuring no net reduction, over the long term, in the ability of the subregion to sustain populations of Identified Species (termed "target species" in the Conservation Guidelines) and their associated habitats:

> *…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.*
>
> *With improved techniques for management and restoration, the goal of no net loss of habitat value may be attainable even if there is a net loss of habitat acreage.*
> (NCCP Conservation Guidelines, November 1993, CDFG, pg. 9)

Thus, the purpose of adaptive management within the framework of the statewide NCCP/HCP Program is to maintain and, where feasible, enhance the long-term net habitat value within a subregion.

Establishing the RMV Open Space is clearly the necessary pre-condition for maintaining net habitat value and for enhancing net habitat value over the long-term. However, it is the Adaptive Management Program that creates the implementation mechanism for both protecting and increasing net habitat value on a long-term basis. The RMV Open Space Adaptive Management Program is premised on concepts presented in the NCCP Conservation Guidelines and in the Southern Orange County NCCP Science Advisors Report. As stated in the latter Report:

> *Adaptive management assumes that managers will take actions (including leaving habitats 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. The process is based on a feedback loop in which individual management activities are flexible and can be changed as new information becomes available or as conditions or priorities change [cites]. Adaptive management is iterative, meaning that managers constantly monitor and evaluate the consequences of their activities and refine them.*
> (Science Advisors Report, pp. 22-23; cf. Fish & Game Code Sections 2805(a) and 2852)

This management focus is necessarily embodied in the monitoring program for the RMV Open Space. As stated in the Science Advisors Report:

> *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 <u>iterative refinement</u> of the management program.*
> (Science Advisors, Principles for Adaptive Management, pg. 4, emphasis added)

Appendix J describes the RMV Open Space Adaptive Management Program focus on "environmental factors known or thought to be directly or indirectly responsible for ecosystem changes." Appendix J goes on to indicate, "These factors, called 'environmental stressors,' may have both adverse and beneficial effects on ecosystem characteristics such as vegetation communities and species." Hence by addressing "environmental stressors," the Adaptive Management Program focuses on factors that influence the habitat value of the RMV Open Space. The "environmental stressor" approach to managing

and monitoring natural resources provides a conceptual method, along with an applied management system for testing concepts that is amenable to an enhanced understanding of causal relationships that can be addressed through management actions. According to Noon (2003), and as further reviewed in Appendix J:

> *To be most meaningful, a monitoring program should provide insights into cause-and-effect relations between environmental stressors or between specific management practices and anticipated ecosystem responses. Prior knowledge of the factors likely to stress an ecological system or the expected outcomes from management should be incorporated into the selection of variables to measures and the sampling design. Indicators should be chosen based on a conceptual model that clearly indicates stressors (e.g., pollutants, management practices) and indicators with pathways that lead to effects on the structure and function of the ecological system (NRC 1995, 2000). This process enables the monitoring program to investigate relations between anticipated stressors, or between management practices and environmental consequences, and provides the opportunity to develop predictive models.*
> [Noon 2003, pg 3]

Hence, the uncertainties addressed by the Adaptive Management Program are not "data gaps" relating to species proposed for regulatory coverage such as the species "data gaps" referenced in the USFWS Five-Point Policy (dated June 1, 2000). Given the abundant data gathered regarding listed species on RMV lands , species data gaps are not an issue. Instead, the uncertainties that are addressed by the Adaptive Management Program are the scientific uncertainties inherent in our understandings of complex habitat considerations as vegetation communities and ecosystem processes react to both natural and anthropogenic stressors over time.

Appendix J describes the methodology used to prioritize management measures and strategies for the RMV Open Space vegetation communities and site-specific resources. Appendix J also reviews the adaptive management models that will be used in carrying out the management program. This section will further review the various substantive elements of the overall management program in relation to the manner in which these program elements contribute to maintaining and increasing net habitat value on a long-term basis.

Goals of the Adaptive Management Program in Relation to the Objective of Maintaining, and Where Feasible, Increasing Net Habitat Value over the Long-Term

Appendix J identified three broad goals for the Adaptive Management Program, each of which is related to the objective of maintaining, and where feasible, increasing net habitat value of the RMV Open Space over the long-term:

Goal 1 Ensure the persistence of a native-dominated vegetation mosaic in the RMV Open Space –

The Adaptive Management Program is comprised of four steps to ensure the persistence of a native-dominated vegetation mosaic in the RMV Open Space: **(1)** preparation of conceptual stressor models and conceptual management plans for vegetation communities; **(2)** periodic assessment of the status of the vegetation communities; **(3)** management of the vegetation communities; and **(4)** evaluation of the effect of the management actions. With regard to conceptual stressor models, these models address management and monitoring of resources at three fundamental scales: **(1)** natural community landscape mosaic; **(2)** specific vegetation communities and habitats; and **(3)** species and species assemblages. Although there is overlap, dependence and interaction among the different scales, clearly stated conceptual relationships and

coordinated management objectives at all three scales will need to be articulated in order to help maintain and, where feasible, increase net habitat value:

(1) "Landscape management" pertains to the dynamic and interacting biotic natural communities and abiotic factors within the subregion, and focuses on the natural processes that maintain the condition and dynamics of the natural communities (see Goal "(3)" below).

(2) "Management and monitoring of specific vegetation communities and habitats" refers to site-specific conditions, as contrasted with the broader landscape scale that focuses on the dynamic interaction of biotic and abiotic processes. The Adaptive Management Program addresses vegetation communities through periodic monitoring and adaptive management of the major native-dominated vegetation communities in the RMV Open Space (coastal sage scrub, chaparral, grassland, riparian/wetlands and woodlands). Vegetation communities will be monitored and managed in terms of net habitat value, recognizing natural stressor-induced changes (i.e., *intrinsic drivers*) that occur in vegetation community associations that will alter the relative amounts of the community at any given time (e.g., natural succession, fire flooding, etc.). Special habitats, such as vernal pools, and habitat functions, such as habitat linkages/wildlife corridors, are also addressed at this scale.

(3) "Management and monitoring of species and species assemblages" refers to maintaining species populations, including Identified Species or other "focal species" (indicator or umbrella species).

Passive management will be the default initial approach to natural, periodic perturbations or disturbances of vegetation communities (e.g., major flood events). Active management will be employed where direct active manipulation may be effective in addressing a vegetation community that is becoming degraded and no longer responding naturally. Particular emphasis is placed on monitoring and responding to potential "stressors" affecting one or more of the major vegetation communities.

Goal 2 Restore the quality of degraded vegetation communities and other habitat types –

Habitat restoration is broadly defined as the process of intentionally altering a degraded habitat area or creating new habitat to re-establish a defined pre-existing habitat or ecosystem or enhance the functioning of a degraded habitat or ecosystem. The goal of restoration is to emulate the structure, function, diversity and dynamics of the habitat or ecosystem. This goal generally will be achieved through implementation of several coordinated/integrated restoration plans and related management plans, including:

- A Habitat Restoration Plan that includes: (1) coastal sage scrub and valley needlegrass grassland (coastal sage scrub/native grassland) restoration plans; and (2) riparian/wetlands restoration plans focusing initially on controlling flows in Gobernadora Creek and invasives control in San Juan Creek

- A Fire Management Plan

- A Grazing Management Plan

- An Invasive Species Control Plan

Elements of the initial enhancement and restoration program are responses to past and present "stressors," including prior conversion of coastal sage scrub and native grasslands to non-native annual grasslands, the conversion of riparian habitat due to the impacts of giant reed (giant reed) and erosion in portions of lower Gobernadora Creek resulting from excessive surface and subsurface water supplies from upstream areas. Enhancement and restoration measures often include the integration of two or more management plan elements in relation to specific restoration actions (e.g., invasive species control in San Juan Creek in combination with measures to increase water supplies for arroyo toad and least Bell's vireo habitat). Further, the Management Plans listed above – Fire, Grazing and Invasive Species Control,– are also central elements or tools to be used by the Adaptive Management Program in response to future "stressors" of vegetation communities identified over time.

Goal 3 Maintain and restore biotic and abiotic natural processes, at all identified scales, for the RMV Open Space.

The Science Advisors fashioned a new tenet of reserve design – Tenet 7 – to focus on maintaining ecosystem processes and structures. Particular emphasis was placed on fire and on hydrologic/erosional processes. With regard to fire, the Adaptive Management Program will combine fieldwork information derived from undertaking experimental prescribed burns for habitat management and restoration purposes with baseline and comparative information assembled both for RMV Open Space and from other protected open space areas.

With regard to geomorphologic processes, information gained and lessons learned from the future implementation of the Habitat Restoration Plan, including the Gobernadora restoration plan, the San Juan Creek restoration plan and the restoration of soils regimes in upper Cristianitos and upper Gabino, will be related to the Baseline Conditions Report analyses of geomorphology and terrains, hydrology, sediment yield and transport, water quality and groundwater and the species-directed information presented in the Geomorphic and Hydrologic Needs of Aquatic and Riparian Endangered Species Report. The combination of applied adaptive management restoration actions and prior baseline studies will provide the foundation for future adaptive management actions directed toward riparian/wetlands system processes. In these ways, the Adaptive Management Program will be able to gain further understandings of fundamental processes – within the context of the unique attributes of each sub-basin reflected in the Southern NCCP Planning Guidelines and Watershed and Sub-Basin Planning Principles – in order to maintain and to increase net habitat value of the RMV Open Space over the long-term.

The mitigation contributions of the Adaptive Management Program will be reviewed under three broad headings:

(1) Adaptive Management Goals and Objectives for each of the five major vegetation communities (coastal sage scrub, chaparral, grasslands, riparian/wetlands and woodlands) and site-specific resources (vernal pools, Identified Species of plants and habitat linkages/wildlife movement corridors) addressed by the Adaptive Management Program, including specific restoration measures proposed to be included in the first implementation phases of the Adaptive Management Program;

(2) Analysis of the role that will be played by the Management Plans, both in the initial phases of the Adaptive Management Program and over the long term; and

(3) Analysis of the manner in which management measures (including enhancement and restoration actions) will increase net habitat value so as to contribute to recovery of listed species in the Southern Subregion.

Adaptive Management Goals and Objectives

This section reviews the manner in which the overall goals and objectives, as well as management and enhancement/restoration recommendations, define the framework and implementation programs for helping maintain and increase net habitat value for each of the habitat resources, including the five major vegetation communities identified as the habitat focus for the RMV Open Space, vernal pools, Identified Species of plants and habitat linkages/wildlife movement corridors. For each of the foregoing resources, the following are identified and reviewed:

- Broad goals ,
- Management objectives
- Stressors
- Enhancement/restoration measures

The following subsections contain materials excerpted from Appendix J, The Adaptive Management Program. The reason for assembling these excerpts is to allow a focused summary of elements of the Adaptive Management Program that help articulate its contribution to maintaining and increasing net habitat value (all of the elements of the Adaptive Management Program contribute to net habitat value but the excerpted elements allow for a more focused understanding of the Adaptive Management Program's contributions).

Coastal Sage Scrub Vegetation Community – Goals, Objectives, Potential Stressors and Management, Enhancement and Restoration Actions

a. Adaptive Management Goals and Objectives

The conservation goals for adaptive management of coastal sage scrub and associated focal species are:

Maintain the physiographic diversity of coastal sage scrub and associated focal species in the RMV Open Space.

Restore coastal sage scrub and enhance the quality of degraded existing coastal sage scrub in the RMV Open Space such that the net habitat value of the existing coastal sage scrub system within the subregion is maintained.

Consistent with these goals, the following management objectives will be addressed to help maintain and enhance long-term habitat value:

Conduct monitoring of coastal sage scrub and focal species in a manner that allows RMV to track the long-term habitat value of the coastal sage scrub habitat community.

Restore 375 acres of coastal sage scrub in designated locations to enhance habitat carrying capacity and connectivity.

Manage coastal sage scrub fire regimes such that a natural diversity of age-stands is maintained throughout the RMV Open Space.

Manage cattle grazing to sustain net habitat value and diversity of coastal sage scrub.

Control exotics invasions of coastal sage scrub, especially along the RMV Open Space-urban interface or other identified vulnerable areas (e.g., along existing paved and dirt roads, utility easements).

b. Stressors Management Considerations Associated with the Coastal Sage Scrub Vegetation Community

Conceptual stressor models are presented in Appendix J-2 for coastal sage scrub and associated focal species. The key stressors on the coastal sage scrub vegetation community are fire, over-grazing and exotic species, with drought as a natural stressor to a lesser extent. Management issues generally fall into two categories: (1) general, habitat-wide issues; and (2) species-specific management issues. Management issues relevant to several species include:

- Fire management
- Grazing management
- Invasive plant and animal species control
- Non-native and native mesopredators
- Brown-headed cowbird nest parasitism
- Use of roads and trails
- Use of pesticides and fertilizers
- Noise
- Artificial lighting

c. Restoration of Coastal Sage Scrub

The Adaptive Management Program includes a coastal sage scrub restoration plan comprised of two main components:

1. Pre-designated restoration of areas in the near term to mitigate for authorized losses of coastal sage scrub to development and/or to increase net habitat value of the coastal sage scrub vegetation community; and

2. Case-by-case restoration undertaken during the course of long-term adaptive management of the RMV Open Space in response to changing conditions and emergencies.

(1) Near-Term Restoration Priorities

The main goal of the coastal sage scrub restoration plan is to establish coastal sage scrub in areas that would contribute to the RMV Open Space by increasing the carrying capacity for the California gnatcatcher and other sage scrub species. With this goal in mind, several areas have been tentatively identified for coastal sage scrub restoration (Appendix J):

- Sulphur Canyon in the Gobernadora sub-basin;

- Several side canyons between Chiquita Ridge and Chiquita Creek;

- Upper Gabino coastal sage scrub/native grassland restoration to reduce downstream impacts of fine sediments on aquatic species in Gabino and Cristianitos creeks.

- The details of the coastal sage scrub restoration program are provided in the coastal sage scrub/native grassland restoration plan component of the Habitat Restoration Plan.

(2) Long-Term Restoration Priorities

Case-by-case restoration of coastal sage scrub also will occur over the long term under the Adaptive Management Program as areas suitable for restoration are identified. Types of areas that may warrant active restoration include the following:

- Existing areas of degraded coastal sage scrub that are not naturally recovering through passive management;

- Areas that are degraded or disturbed by future natural events and that are unlikely to recover naturally (e.g., an area that has burned too frequently);

- Areas that have been temporarily disturbed either by authorized (e.g., an approved infrastructure project) or unauthorized (e.g., an illegal trail) activity; and

- Specific adaptive management research involving restoration treatments.

The key management activities of the restoration plan are listed here:

- Identification of priority coastal sage scrub restoration areas;

- Revegetation of existing degraded habitat;

- Re-establishment of coastal sage scrub in areas that have been converted to annual grassland or disturbed habitat due to human activities or too frequent fires;

- Control of invasive or exotic plant and wildlife species, such as artichoke thistle, black mustard, Argentine ants, fire ants, and cowbirds;

- Fire management activities;

- Management of grazing and other agricultural activities that adversely affect habitat values and diversity; and

- Controlling public access and recreation to protect/enhance habitat values, including seasonal restrictions during nesting or temporary restrictions designed to provide opportunities for recovery of overused areas.

Chaparral Vegetation Community – Goals, Objectives, Potential Stressors and Management, Enhancement and Restoration Actions

a. Adaptive Management Goals and Objectives

The conservation goals for adaptive management of chaparral and associated focal species:

- Maintain the physiographic diversity of chaparral and associated focal species in the RMV Open Space.

- Restore and enhance the quality of future degraded chaparral in the RMV Open Space such that net habitat value of the existing chaparral system is preserved.

Consistent with these goals, the following management objectives will be addressed to help maintain and enhance habitat value:

- Conduct monitoring of chaparral and focal species in manner that allows reserve owners/managers to track the long-term habitat value of the chaparral system.

- Manage chaparral fire regimes such that a natural diversity of age-stands and resprouters/obligate seeders is maintained throughout the RMV Open Space and that existing chaparral stands do not irreversibly type-convert to grassland.

- Manage cattle grazing such that adverse impacts to chaparral are controlled to preserve net habitat value and that existing chaparral stands do not irreversibly type-convert to grassland.

- Control exotics invasions of chaparral, especially along the RMV Open Space-urban interface or other identified vulnerable areas (e.g., along existing paved and dirt roads, utility easements).

The chaparral vegetation community in the RMV Open Space generally is healthy, and, at this time, no specific areas warranting restoration have been identified. However, areas within the RMV Open Space requiring restoration may be identified in the future, either as a result of more detailed field investigation of existing conditions or as triggered by natural or human-induced events (e.g., frequent wildfires).

b. Stressors Management Associated with the Chaparral Vegetation Community

Because chaparral appears to be more resilient to state-transitions than coastal sage scrub, it is anticipated that passive management will be the predominant management approach for this community within the RMV Open Space. As noted above, partly reflecting this resiliency and because it has a relatively low Importance Value score pursuant to the Appendix J-1 analysis, chaparral received a low Vegetation Community Ranking score with regard to management priorities.

The greatest risk to maintaining healthy stands of chaparral in the RMV Open Space appears to be frequent fire. Short fire intervals (< 25 years) in chaparral may eliminate obligate seeding species in favor of resprouters and very frequent fires (1, 2 or 3 year intervals) may result in invasion by exotic weeds and annual grasses (e.g., *Brassic nigra*, *Bromus* spp., *Schismus barbatus*) (e.g., Haidinger and Keeley 1993; Keeley 1986; Zedler 1983). The fire management of chaparral is treated in detail in the Fire Management Plan. Although over-grazing also is a

potential stressor, biologists familiar with the RMV property have not observed a significant adverse effect of grazing on chaparral.

The conceptual stressor model for chaparral focal species presented in Appendix J depicts known and potential stressors. The stressors management issues for chaparral species are essentially the same as for coastal sage scrub species because of the broad overlap between the two lists. They include:

- Fire management
- Grazing management
- Invasive plant and animal species control
- Non-native and native mesopredators
- Brown-headed cowbird nest parasitism
- Use of roads and trails
- Use of pesticides and fertilizers
- Noise
- Artificial lighting

c. Restoration of Chaparral

The Adaptive Management Program includes case-by-case restoration of chaparral undertaken during the course of long-term adaptive management of the RMV Open Space, with the overall goal on maintaining the existing diversity of chaparral in the RMV Open Space.

The main objective of the chaparral restoration program is to restore chaparral in areas that are degraded or disturbed by future natural events and where it is determined that such areas will not, or are unlikely to, recover naturally (e.g., an area that has burned too frequently). The objective of restoring areas that are disturbed in the future is important for maintaining long-term net habitat value. As documented in several studies, frequent disturbances of chaparral (e.g., fire) can result in state-transition to annual grassland and weedy, disturbed habitats. Likewise, areas that have been temporarily disturbed either by authorized (e.g., an approved infrastructure project) or unauthorized (e.g., an illegal trail) activity may be at risk of long-term degradation. In such cases, restoration may be required to re-establish chaparral to both maintain existing habitat value and protect adjacent areas from invasions by exotic species that could be established without intervention.

Annual and Native Grasslands Vegetation Community – Goals, Objectives, Potential Stressors and Management, Enhancement and Restoration Actions

a. Adaptive Management Goals and Objectives

The conservation goals for adaptive management of grasslands and associated focal species:

- Maintain the physiographic diversity of native and annual grasslands and associated focal species in the Habitat Reserve.

- Restore native grassland and enhance the quality of degraded existing native grassland in the RMV Open Space such that net habitat value of the existing grassland system is preserved.

Consistent with these goals, the following management objectives will be addressed to help maintain and enhance habitat value:

- Conduct monitoring of grassland and focal species in manner that allows RMV to track the long-term habitat value of the grassland habitat community.

- Restore 200 acres of native grassland to maintain and enhance habitat quality, diversity, and connectivity over the long-term.

- Manage native grassland fire regimes such that germination of native grasses (*Nasella* spp.) is enhanced

- Manage cattle grazing to facilitate restoration of existing areas of native grassland.

- Control invasions of herbaceous exotic species in both native and annual grasslands, including artichoke thistle, mustards and sweet fennel.

b. Stressors Management Associated with Grasslands Communities

Because the management issues related to annual and native grasslands are quite different, they are discussed separately.

1. Annual Grassland

For the most part management of annual grasslands will be passive, except for the control of artichoke thistle. This species readily invades disturbed annual grassland and is especially pernicious in southern Orange County in areas where control programs are absent. On RMV lands, ongoing control efforts over the past 30 years have limited the occurrence and spread of artichoke thistle. The control of artichoke thistle is discussed in the Invasive Species Control Plan. Other common exotic species such as black mustard and sweet fennel may be kept in check by fire and grazing management.

Much of the management related to annual grasslands will be directed toward limiting the conversion of other upland native communities (coastal sage scrub, chaparral, oak woodland, and native grassland) to annual grassland so that the long-term net habitat value of the RMV Open Space is not diminished. From the perspective of habitat value, passive conversion of annual grassland and shrub habitats to native grassland in the RMV Open Space is not considered an adverse effect that would require management.

2. Native Grassland

Existing native grasslands in the RMV Open Space likely will require substantial active management because they are subject to "stressors" invasions by annual grasses and other exotic forbs. For example, of the approximately 1,020 acres of valley needlegrass grasslands mapped by Dudek on RMV in 2001, or included from other mapping efforts, only 17 acres (2 percent) were mapped as high quality (> 25 percent cover of needlegrass), 580 acres (57 percent) were medium quality (10-25 percent cover), 294 acres (29 percent) were low quality (~10 percent cover), and 128 acres (12 percent) had no rating (these areas were from previous mapping efforts that did not quantitatively assess quality). All native grasslands in the RMV Open Space have a substantial non-native component that likely will need to be actively managed to sustain and enhance the quality of the existing native grassland. Common non-native species observed by DUDEK in native grasslands include filarees (*Erodium* spp.),

bromes (*Bromus hordaceous, B. diandrus, B. madritensis*), wild oat (A*vena* spp.), black mustard (*Brassica* nigra), tocalote (*Centaurea* melitensis), smooth cat's-ear (*Hypochoeris glabra*), common catchfly (*Silene gallica*), bristly ox-tongue (*Picris echiodes*), and Russian-thistle (*Salsola tragus*). As stated by Menke (1996):

> *Introduced, alien grasses and forbs native to southern France, Spain and Portugal present a formidable obstacle to restoration and enhancement of native perennial grass populations in California foothill and valley grasslands. … Their diverse set of plant growth forms and phonologies cause fierce resource competition for light and water beginning soon after fall germination and often continue for the entire growing season.* Fremontia 1996, pg 22)

c. Restoration of Native Grassland

The Adaptive Management Program includes a native grassland restoration plan comprised of three main components:

1. Pre-designated restoration of areas with native grassland to mitigate for authorized losses to development;

2. Pre-designated restoration of coastal sage scrub/grassland; and

3. Case-by-case restoration undertaken during the course of long-term adaptive management of the RMV Open Space.

The main goals of the native grassland restoration program are: (1) to enhance native grasslands in selected areas that currently support low quality grasslands (i.e., <10 percent cover of native grass); (2) to restore native grasslands in appropriate areas that currently support annual grasslands; and (3) restore a mix of coastal sage scrub and native grassland in appropriate areas.

(1) Near-term Restoration Priorities

With these goals in mind, several areas have been tentatively identified for native grassland restoration or coastal sage scrub/native grassland restoration (*Appendix J):*

- Upper Cristianitos
- Portions of Blind Canyon

In some areas, the desired habitat is a mosaic of coastal sage scrub and native grassland that emulates the surrounding habitat characteristics. Such areas (*Appendix J*) include:

- Upper Gabino

Case-by-case restoration of native grassland also may occur under the Adaptive Management Program. As part of the management of the RMV Open Space, RMV will identify areas suitable or desirable for restoration. Instances that may warrant active restoration consist of the following:

(2) Long-Term Restoration Priorities

- Existing areas of degraded or low quality native grassland that are not naturally recovering through passive management;

- Areas that are degraded or disturbed by future natural events and it is determined that they will not, or are unlikely to, recover naturally (e.g., an area that has burned too frequently or is infested with exotic species);

- Areas that have been temporarily disturbed either by authorized (e.g., an approved infrastructure project) or unauthorized (e.g., an illegal trail) activity; and

- Specific adaptive management research involving restoration treatments.

The details of the native grassland restoration program are provided in the coastal sage scrub/native grassland restoration plan element of the Habitat Restoration Plan. The key management activities of the plan are listed here:

- Identification of priority native grassland restoration areas;

- Revegetation of existing degraded habitat;

- Re-establishment of native grassland in selected areas in upper Cristianitos that currently support annual grassland;

- Grazing management;

- Fire management; and

- Control of invasive or exotic plants such as non-native grasses (bromes, oats, wild rye), artichoke thistle, black mustard, and other non-native forbs.

Grazing will be the preferred management technique in the RMV Open Space because it meshes well with the existing and future cattle operations on the Ranch. Also, as suggested by Menke (1991), grazing is a primary component of native grassland restoration and management, with fire as a secondary component. Appropriately timed grazing can have several beneficial effects on the vigor native grasslands:

- Removal of litter and thatch
- Recycling of nutrients
- Stimulation of tillering (sprouting of new stalks)
- Removal and control of alien species
- Reduced transpiration (loss of water) by alien species making more water available for native grasses

Fire can also have beneficial effects on native grassland, especially with regard to reducing litter and thatch and alien species, but frequent burning can damage native grasses. Menke (1991) recommends that burning be used every third or fourth year. In addition, burning may be an effective management tool for native grasslands in conjunction with managing coastal sage scrub and chaparral. In natural mosaics of shrublands, openings often support small patches of native grassland. Periodic burning of sage scrub and chaparral likely will help maintain these native grassland patches and enhance biodiversity and habitat value in these areas.

Wetland/Riparian Vegetation Community – Goals, Objectives, Potential Stressors and Management, Enhancement and Restoration Actions

a. Adaptive Management Goals and Objectives

The conservation goals for adaptive management of wetland/riparian habitats and associated focal species are:

- Maintain the physiographic diversity of wetland/riparian habitats and associated focal species in the RMV Open Space.

- Restore wetland/riparian habitats and enhance the quality of wetland/riparian habitats in the RMV Open Space such that the net habitat value of the existing wetland/riparian habitat system is preserved.

Consistent with these goals, the following management objectives will be addressed to help maintain and enhance habitat value of the wetland/riparian habitat system in the RMV Open Space. These primary objectives are captured by the SAMP tenets stated here:

i. No net loss of acreage and functions of the waters of the U.S./State
ii. Maintain/restore riparian ecosystem integrity
iii. Protect headwaters
iv. Maintain/protect/restore riparian corridors
v. Maintain and/or restore floodplain connection
vi. Maintain and/or restore sediment sources and transport equilibrium
vii. Maintain adequate buffer for protection of riparian corridors
viii. Protect riparian areas and associated habitats of listed and sensitive species.

With respect to objective viii, the "Geomorphic and Hydrologic Needs of Aquatic and Riparian Endangered Species" document was prepared in support of the Southern NCCP/HCP and SAMP/MSAA process to provide information on the physical processes that significantly affect structural habitat and life history requirements of listed riparian/wetland species in the planning area – arroyo toad, least Bell's vireo and southwestern willow flycatcher.

The Watershed and Sub-basin Planning Principles describes the relationship of the watershed planning principles to the SAMP tenets in format that allows a direct translation to appropriate management actions. As an example, Tenet 1 of no net loss of acreage and functions of the waters of the U.S./State is related to the following watershed planning principles:

- Principle 2: emulate existing runoff/infiltration patterns
- Principle 3: address potential effects of future land uses on hydrology
- Principle 5: maintain geomorphic structure of major tributaries/floodplains
- Principle 8: protect existing groundwater recharge areas.

Although these are stated as "planning principles," they also are adaptive management principles because their function will have to be monitored and potentially managed over the long term.

b. Stressors Management Considerations Associated with the Wetland/ Riparian Vegetation Community

As with other habitats, the Adaptive Management Program for wetland/riparian habitats will involve two basic types of management activities:

1. Passive Management
2. Active Management
   a. Routine Management
   b. Experimental Management

These two approaches are described in Appendix X. However, the wetland/riparian systems are often much more complex than the upland systems, probably more sensitive to disturbances (e.g., giant reed or tamarisk invasion, surface flow and ground water levels), and likely will require more active management than the upland systems.

(1) Species' Geomorphic and Hydrologic Needs

The "Geomorphic and Hydrologic Needs of Aquatic and Riparian Endangered Species" summarizes the landscape processes and specific habitat requirement for listed riparian species that occur in the RMV Open Space- arroyo toad, least Bell's vireo and southwestern willow flycatcher. General issues that likely will require near-term active management at a landscape watershed and sub-basin level, include:

- Emulating natural flood regimes to maintain coarse sediment yields, storage and transport processes.
- Emulating, to the extent feasible, the existing runoff and infiltration patterns in consideration of specific terrains, soil types and ground covers.
- Emulating natural timing of peak flows of each sub-basin relative to mainstem creeks.
- Managing existing groundwater recharge areas supporting riparian zones and maximize groundwater recharge of alluvial aquifers to the extent consistent with aquifer capacity and habitat management goals.
- Managing water quality through various strategies, with an emphasis on natural treatment systems such as water quality wetlands, swales and infiltration areas and application of Best Management Practices.

(2) Near-Term Habitat Management Priorities

Issues that likely will require near-term active management at a habitat level include:

- Management of excessive surface and subsurface water flows and sediment in Gobernadora Creek.
- Potential increase in water supply to San Juan Creek.
- Control of invasive exotic plant species such as giant reed, tamarisk and pampas grass in riparian zones, particularly in San Juan Creek.
- Management of ponds and other open waters with lacustrine and fresh emergent vegetation.
- Grazing management.

- Fire management.

- Control of human access and recreational activities in wetland/riparian habitat areas.

- Management of sand and gravel mining operations.

(3) Near-Term Species Management Issues

Issues that likely will require near-term active management at the species and species assemblage level include:

- Control of cowbirds.
- Control of Argentine and red imported fire ants.
- Control of human activities around sensitive nesting areas.
- Control of vehicular traffic in the RMV Open Space.
- Control of exotic aquatic predators (bullfrogs, crayfish, introduced fishes)
- Control of terrestrial mesopredators (feral cats, dogs, skunks, raccoons, opossums)
- Control of collections and harassment by humans.
- Provision of adequate wildlife crossings/habitat linkages and fences along roadways at key crossing locations.
- Control of artificial lighting and noise.

(4) Experimental Adaptive Management Hypotheses

Adaptive management actions should be undertaken within the framework of experimental management hypotheses to the extent feasible. A substantial amount of baseline work has already been completed on RMV that will provide a basis for experimental management hypotheses. This baseline work is summarized in the following documents:

- Geomorphic and Hydrologic Needs of Aquatic and Riparian Endangered Species
- Slope Wetlands Report
- Vernal Pools Report

d. Restoration of Wetland/Riparian Vegetation Communities

The Adaptive Management Program Habitat Restoration Plan includes a wetland/riparian restoration plan comprised of two main components:

1. Pre-designated enhancement and revegetation areas; and

2. Case-by-case restoration undertaken during the course of long-term adaptive management of the RMV Open Space.

(1) Near-Term Restoration Priorities

The wetland/riparian restoration plan is intended to complement and supplement the protection and management measures for the wetland/riparian ecosystem in the RMV Open Space. The goals of this integrated protection and restoration program are to:

- Maintain and restore riparian ecosystem integrity
- Maintain/protect/restore riparian corridors

To achieve these goals, restoration, including invasive species control, is recommended for middle San Juan Creek, Gobernadora Creek, upper Gabino Creek, and lower Cristianitos Creek. Identification of these areas for restoration is based on a riparian system invasive species mapping by PCR (2002) and GLA (2003) as well as the Watershed and Sub-basin Planning Principles.

- Middle San Juan Creek between the creek crossing south of the Colorspot Nursery and the RMV boundary near Bell Canyon supports abundant giant reed and scattered locations of pampas grass and tamarisk. This reach of San Juan Creek supports a major population of the arroyo toad and important populations of yellow warbler and yellow-breasted chat.

- Gobernadora Creek is recommended for riparian/wetland restoration to address: (1) the historic meander conditions; and (2) excessive sediment input resulting from upstream land uses. Restoration may include the construction of a detention/water quality basin below Coto de Caza (Gobernadora Multipurpose Basin). The GERA portion of the creek supports important populations of the least Bell's vireo, southwestern willow flycatcatcher, yellow warbler, and yellow-breasted chat. 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 vireo, flycatcher, chat, 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 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.

- Lower Cristianitos Creek supports patches of tamarisk near the confluence and giant reed and pampas grass west of the TRW facility south to the RMV boundary. This reach supports important populations of the arroyo toad and yellow-breasted chat, a well as several nest sites for least Bell's vireo. Restoration in this area also would benefit several listed species downstream of the RMV boundary Cristianitos and San Mateo creeks: least Bell's vireo, southwestern willow flycatcher, tidewater goby and southern steelhead.

In addition to habitat restoration focused on the control of invasive exotic species, several smaller scale creek stabilizations are recommended to address locally induced headcuts in Chiquita Creek and upper Cristianitos Creek.

(2) Long-Term Restoration Priorities

Wetland/riparian enhancement and restoration also will be conducted on a case-by-case basis over the long-term monitoring and management of the RMV Open Space. Through

the periodic overall vegetation communities monitoring program and focused frequent monitoring of potential exotics hotspots, RMV will target areas for local enhancement and restoration. Because the invasion of the wetland/riparian areas by giant reed, tamarisk and pampas grass is dynamically related to natural events and somewhat unpredictable, RMV will develop protocols for checking areas susceptible to invasions.

As discussed for upland habitats, the case-by-case enhancement and restoration actions primarily will be the decision of the RMV. However, because invasions of exotic species into riparian systems have profound implications for downstream resources, and are likely to cross different ownerships it will be crucial for RMV to coordinate with upstream landowners, specifically the County of Orange (Casper's Regional Park) for San Juan Creek. Restoration in a downstream location will have little long-term beneficial effect if upstream sources of invasives also are not controlled. Generally, restoration should start in the upstream locations and work downstream.

Woodlands Vegetation Community – Goals, Objectives, Potential Stressors and Management, Enhancement and Restoration Actions

a. Adaptive Management Goals and Objectives

The conservation goals for adaptive management of oak woodland habitats and associated focal species are:

- Ensure the persistence of the physiographic diversity of oak woodland habitats and associated focal species in the RMV Open Space.

- Restore oak woodland habitats and enhance the quality of oak woodland habitats in the RMV Open Space such that the net habitat value of the existing wetland/riparian habitat system is preserved.

Consistent with these goals, the following management objectives will be addressed to help maintain and enhance long-term habitat value of the oak woodland habitat system in the RMV Open Space:

- Conduct monitoring of oak woodlands and focal species in a manner that allows RMV to track the long-term habitat value of the oak woodland system.

- Maintain appropriate subsurface hydrology to avoid under- and over-watering.

- Manage fire regimes in oak woodlands such that a natural diversity and balance of age-stands are maintained throughout the RMV Open Space; i.e., there is an appropriate mix of mature trees and recruitment of new trees.

- Manage cattle grazing such that adverse impacts to oak woodlands are controlled to preserve net habitat value.

- Control exotics invasions of oak woodlands, especially along the RMV Open Space-urban interface or other identified vulnerable areas (e.g., along existing paved and dirt roads, utility easements).

- Maintain suitable nesting habitat in oak woodlands, and specifically potential nest cavities in snags, dead or decaying limbs, and hollow trunks for species such as acorn

woodpecker, ash-throated flycatcher, Nuttall's woodpecker and western screech owl. As a primary cavity nester (i.e., species that excavate their own holes for nests), acorn woodpeckers may be a keystone species for secondary cavity nesters that utilize abandoned holes.

- Retain large oaks (> 50 dbh) to the maximum extent possible to provide granaries for acorn woodpeckers.

- Identify trees with high acorn productivity.

- Maintain acorn production to support establishment of new trees, as well as provide forage for native wildlife such as acorn woodpeckers, scrub jays, squirrels, mice and mule deer. (It is important to maintain native predators of acorns, seedlings and saplings because they may be important components of the oak woodland ecosystem, especially in regard to dispersal of acorns or mycorrhizal fungi. Acorn predators such as mice also provide food for other oak woodland species such as Cooper's hawks and white-tailed kites.)

- Protect seedlings and saplings in stands of oak woodlands in the RMV Open Space, including by the use of protective structures where necessary.

- Maintain the complex understory of shrubs, grasses annual forbs, leaf litter and downed woody debris that provide habitat for a variety of wildlife species.

- Maintain native habitats adjacent to oak woodlands in the RMV Open Space to the extent possible to preserve the landscape mosaic.

- Maintain upper trophic predators such as bobcats and coyotes within oak woodlands to control native and non-native mesopredators.

- Restore oak woodlands in areas that currently support stands that are damaged or stressed by natural or anthropogenic events, and the adverse impact may not be naturally reversible (e.g., irrigation of drought-stressed trees). At this time specific areas warranting restoration of oak woodlands have not been identified. However, areas within the RMV Open Space requiring restoration may be identified in the future, either as a result of more detailed field investigation of existing conditions or as triggered by natural or anthropogenic events.

- Conduct management activities and disturbance events (e.g., prescribed fire, disking, mowing, grazing) outside the breeding season of oak woodland wildlife species to the extent feasible.

b. Stressors Management Considerations Associated with Woodlands

(1) Habitat Management Priorities

Issues that likely will require active management at a habitat level include:

- Control of invasive exotic plant species, especially annual grasses.

- Management of surface and subsurface hydrology to avoid both over- and under-watering.

- Grazing management.
- Fire management.
- Control of predation on seedlings and saplings.
- Maintain snags, decaying wood, and dead limbs to provide nesting habitat for primary and secondary cavity species (i.e., acorn woodpecker, Nuttall's woodpecker, ash-throated flycatcher, and western screech owl).
- Maintain understory litter and debris to provide habitat for understory species (i.e., orange-throated whiptail and lark sparrow).

(2) Species Management Priorities

Issues that likely will require active management at the species and species assemblage levels include:

- Control of Argentine and red imported fire ants.
- Control of human activities around sensitive nesting areas.
- Control of vehicular traffic in the RMV Open Space.
- Control of terrestrial mesopredators (feral cats, dogs, skunks, raccoons, opossums)
- Control of artificial lighting and noise

c. Restoration of Woodlands

The Adaptive Management Program provides for case-by-case restoration of oak woodlands undertaken during the course of long-term adaptive management of the RMV Open Space, with the overall goal on maintaining the existing diversity and habitat value of oak woodlands in the RMV Open Space.

The two main objectives of the oak woodlands restoration program are:

1. To restore oak woodlands in areas that support existing mature trees, but where recruitment and regeneration are being inhibited by factors such as exotic weeds and grasses or over-grazing.
2. To restore oak woodlands in areas that are degraded or disturbed by future natural events and it is determined that they will not, or are unlikely to, recover naturally (e.g., an area that has burned too frequently).

The first objective of restoring oak woodlands in areas that currently are degraded by non-native exotics or over-grazing will be achieved by focusing the restoration effort in degraded areas adjacent to healthy stands of oak woodland to the extent possible. A near-term management task will be to identify any such areas in the RMV Open Space. Following management recommendations of CalPIF (2002), sites identified for restoration should then be prioritized on basis of their proximity to high quality sites and their likely success of regeneration and

transplanted oak viability. Restoration of sites in close proximity to existing high quality sites have a better chance of being colonized by oak woodland species.

The second objective of restoring areas that are disturbed in the future is important for maintaining long-term net habitat value. For example, sites that currently support high quality oak woodlands but are damaged by a high intensity fire or several fires in a short period of time may be identified for restoration.

As part of the management of lands in the RMV Open Space supporting oak woodlands, RMV will identify areas suitable or desirable for restoration. Generally it will be the decision of RMV whether to undertake an enhancement or restoration project in the RMV Open Space. However, where the project may affect adjacent ownerships, or be affected by habitat conditions on other ownerships, a coordinated effort may be desirable. For example, if restoration is called for following a wildfire that affected both RMV Open Space and adjacent lands, the effort should be to include both areas to provide the greatest net benefit to the RMV Open Space.

Restoration sites will be evaluated for their suitability including water table and soil conditions. Merrick et al. (1999) describe a knowledge-based model to evaluate sites for restoration suitability for valley oak (Q. lobata). If oaks currently are present or the site supported oaks in the recent past, it is considered to be suitable. If the site is not currently occupied by oaks, but has high soil water holding capacity, a high water table and loam soils, it is considered favorable for restoration.

Vernal Pools – Goals, Objectives, Potential Stressors and Management Actions

a. Adaptive Management Issues

The RMV Open Space supports two main areas of vernal pools. The Dudek/PCR study conducted in 2001 mapped three pools on Chiquita Ridge and three pools on the Radio Tower Road mesa located between Highway 74 and Trampas Canyon. The large pool on Chiquita Ridge supports both the Riverside and San Diego fairy shrimp and a smaller pool supports the San Diego fairy shrimp. Two of the three pools on the Radio Tower Road mesa support both species and the third supports only the San Diego fairy shrimp. Important populations of the western spadefoot toad also occur in the Chiquita Ridge and Radio Tower Road pools.

Five main issues are relevant to the adaptive management of the vernal pools and associated species in the RMV Open Space:

1. Hydrology
   a. Water quality
2. Grazing
3. Invasive exotic species
4. Human disturbance

Hydrology is a key management issue because the flora and fauna of the vernal pools have evolved adaptations to the unique hydrological conditions of vernal pools. Although dramatic year-to-year variations in rainfall occur, and vernal pools species are well adapted to this variation, over the long-term too little inundation may not support the full life cycle of the vernal pool species and extended inundation may lead to mortality of the species that are not truly adapted to an aquatic existence (Barry 1998; USFWS 1998). Extended runoff from developed areas can be a substantial problem for vernal pools (e.g., Clark et al. 1998). In order for the vernal pools in the RMV Open Space to persist and support species such as the Riverside and San

Diego fairy shrimp, they will need to be managed such that the normal hydrological variation is maintained.

Vernal pools species have adapted to specific water quality tolerances. Alteration in alkalinity, pH, turbidity, and water temperature may have significant impacts on vernal pools species (Simovitch et al. 1996).

Grazing can have both positive and negative impacts on vernal pools. Grazing helps control of the proliferation of invasive exotics species such as annual grasses that choke out native plants (e.g., Barry 1998), but poorly timed grazing can result in trampling of fairly shrimp cysts and hatchlings. The management issue is timing grazing in way that helps control non-native plants, but does not interfere with the reproductive cycle of vernal plant and animal species. Lis and Eggeman (2000) describe an adaptive management study where a combination of grazing and burning was used to control invasive species in vernal pools in the Dales Lake Ecological Reserve in Tehama County, California. They found that carefully timed grazing did not interfere with fairy shrimp reproduction of any immediate negative effects on rare plants. They concluded that while grazing "may not return the vernal pool landscape to its condition five hundred years ago…it is likely to move the landscape in that direction." (pg.23). Prescribed burning as a management tool for grasslands generally, and vernal pools specifically, also is recommended by Pollack and Kan (1998) based on studies on the Jepson Prairie Preserve showing that late-spring burning reduces non-native grasses and increases the dominance of native species. They also suggest that a combined burning-grazing regime can be used to reduce fire intensity.

Invasive exotic species threaten vernal pools because they compete with and displace the native plants and they also interfere with normal surface runoff patterns essential for sustaining vernal pool hydrology (e.g. Barry 1998). The problem with most non-natives occurs in drier years when moisture conditions are conducive to annual grasses such as bromes (Bromus spp.) and wild oats (Avena spp.) (USFWS 1998). During wetter years these annual grasses are reduced, but several non-native species such as rabbit's-foot grass (Polypogon monspeliensis), wild rye (Lolium spp.) and brass-buttons (Cotula coronopifolia) still can dominate vernal pools (USFWS 1998).

b. Adaptive Management Goals and Objectives

The overall goal of the Adaptive Management Program for vernal pools and associated species is to maintain existing vernal pools and plants and wildlife species that occur in the pools within the RMV Open Space. This broad goal will be achieved by meeting the following management objectives:

- Conduct monitoring of vernal pools and associated species in a manner that allows **RMV** to track the long-term status of the vernal pools and species.

- Manage the hydrological regime of the pools by maintaining the existing local contributing hydrological sources (i.e., the local contributing watershed of the vernal pool).

- Eliminate or control any identified existing threats to existing vernal pools, including poorly timed grazing and invasion of pools and the surrounding hydrology source area by non-native species.

- Develop management tools to control the proliferation of non-native species, including grazing, prescribed burns, mowing and selective weeding.

- Manage water quality to emulate baselines conditions in the vernal pools in the RMV Open Space known to support the Riverside and San Diego fairy shrimp.

- Control public access to vernal pools.

c. Stressors Management Considerations Associated with Vernal Pools

The primary management approach for vernal pools in the RMV Open Space will be passive. These pools are not likely to suffer the same level of disturbance that many other preserved pools complexes do that are in close proximity to urban development, such as increased runoff, pesticides, trampling by the public, off-road vehicles, trash dumping, and pets and feral animals. The Chiquita Ridge pools are located approximately 1,000 feet east of the Ladera Ranch and the Radio Tower Road pools are located 1,000 feet west of planned development in Trampas Canyon to the east and 3,500 feet southeast of planned Ortega Gateway development. The potential Trampas Canyon, and Ortega Gateway development areas have no connection to the hydrologic source areas for the vernal pools and thus no effects on hydrology or water quality. In addition, the vernal pools are located far enough away from potential development areas such that trespass by the public into vernal pools areas should be minimal.

Stressors impacts will be addressed through the following management tools:

- Grazing
- Prescribed fire
- Mowing
- Selective Weeding
- Fencing

Identified Plant Species – Goals, Objectives, Potential Stressors And Potential Management Actions

a. Adaptive Management Issues

Potential stressors identified in Appendix J for the Identified Plant Species (chaparral beargrass, Coulter's saltbush, many-stemmed dudleya, salt spring checkerbloom, southern tarplant and thread-leaved brodiaea) include too-frequent fire, non-native plants, over-grazing, human activities and altered hydrology. The main stressor is identified as non-native or exotic plant species including artichoke thistle, ryegrass, bromes, wild oats, smooth cat's ear, Crete hedypnosis, mustards and wild radish. The impact of exotic species can be exacerbated by drought, too-frequent fire and over-grazing.

b. Adaptive Management Goals and Objectives

The overall goal for plant Identified Species is to maintain major and important populations of Identified Species in the RMV Open Space. This overall goal will be achieved through the following management objectives:

- Conduct periodic monitoring of major and important populations of Identified Species in a manner that tracks the long-term status of the species in the RMV Open.

- Control invasions of herbaceous exotic species in areas supporting major and important populations of Identified Species.

- Manage grazing to avoid adverse impacts to, and to the extent feasible benefit, major and important populations of Identified Species.

- Manage fire to avoid adverse impacts to, and to the extent feasible benefit, major and important populations of Identified Species.

- Maintain habitat to support plant dispersal and pollinators between major and important populations to the extent possible.

c. Potential Management and Restoration Actions

The management actions for each Identified Plant Species are different, as each species has different needs. The following is a summary of the management actions for each species.

- Thread-leaved brodiaea: exotics control through multiple techniques including continuation of current timed grazing practices for the Chiquadora Ridge population and the lower Cristianitos Canyon population. An experimental adaptive management study is recommended for the lower Cristianitos Canyon population to determine the effects of continuing the current grazing which does not avoid the flowering season and/or prescribed burns as an exotics control technique. Translocation of impacted brodiaea is described in detail in the Plant Species Translocation, Propagation and Management Plan.

- Chaparral beargrass: no management actions are recommended for this species pending the outcome of three-year interval monitoring program.

- Coulter's saltbush: no management actions are recommended for this species pending the outcome of a five-year monitoring program to define stressors. Translocation of impacted Coulter's saltbush is described in detail in the Plant Species Translocation, Propagation and Management Plan.

- Many-stemmed dudleya: exotics control through multiple techniques including continuation of current timed grazing practices for the Chiquadora Ridge, Chiquita Ridge and the lower Cristianitos Canyon populations. Monitoring is recommended for the lower Cristianitos Canyon population to determine the effects of continuing the current grazing which does not avoid the flowering season and/or prescribed burns as an exotics control technique. Translocation of impacted dudleya is described in detail in the Plant Species Translocation, Propagation and Management Plan.

- Salt Spring Checkerbloom: no management actions are recommended for this species pending the outcome of three-year interval monitoring program.

- Southern Tarplant: no management actions are recommended for this species pending the outcome of three-year interval monitoring program. Translocation of impacted tarplant is described in detail in the Plant Species Translocation, Propagation and Management Plan.

Wildlife Movement Corridors – Goals, Objectives, Potential Stressors and Potential Management Actions

Appendix J describes the approach to monitoring and management of key habitat linkages and wildlife corridors. Both avian and ground-dwelling species will be monitored and managed to ensure that the habitat linkages and wildlife corridors are functioning as designed.

a. Potential Stressors Management Considerations Associated with Wildlife Movement Corridors

Maintaining functional habitat linkages and wildlife corridors both within the RMV Open Space and to habitat areas outside the open space (i.e., CNF, Camp Pendleton) will be essential for conserving landscape ecosystem processes, habitats and species in the Southern Subregion. Generally threats to habitat linkages and wildlife corridors are greater than to "interior" habitat blocks within the RMV Open Space because linkages corridors have a greater perimeter edge-to-area ratio than large habitat blocks (i.e., they tend to be longer and more narrow or have more edge variations). Mostly as a result of relatively greater edge area, potential constraints and threats to functioning habitat linkages and wildlife corridors include:

- Disturbance and degradation of habitat quality such that habitat linkages may no longer provide suitable "live-in" habitat for sedentary species or that mobile species no longer use corridors for movement or dispersal. Disturbance or degradation of habitat may include loss of protective cover that provides refugia or invasion by exotic wildlife and plant species that displace native vegetation communities and native wildlife species.

- Higher levels of human disturbance such as illegal trails, off-road vehicles, trampling of vegetation, trash and garbage dumping, and accidental and deliberation ignitions of fires.

- Increased chance of vehicle collisions where roads cross linkages and corridors.

- Increased lighting and noise.

- Increased urban run-off.

b. Adaptive Management Goals and Objectives

The adaptive management goals for habitat linkages and wildlife corridors include the following:

- Maintain the function of key habitat linkages and wildlife corridors within the RMV Open Space.

- Maintain the function of key habitat linkages and wildlife corridors that connect to important resources areas outside the planning area, including the, CNF, and Camp Pendleton.

These broad goals will be achieved by meeting the following monitoring and management objectives:

- Monitor occupation and/or uses of identified key habitat linkages and wildlife corridors by the species identified as using or depending on these linkages and corridors.

- Maintain suitable habitat in the key habitat linkages and wildlife corridors for the species associated with the specific linkage/corridor.

- Identify and rectify constraints to use or movement (e.g., physical obstacles or bottlenecks) or sources of habitat disturbance or degradation in key habitat linkages and wildlife corridors.

c. Potential Stressor Management Actions

Based on the results of the monitoring program, if certain desired species are absent or uncommon at important habitat linkages or wildlife corridors in the RMV Open Space, appropriate management actions may be taken, including, but not limited to:

- Enhancement or restoration of the corridor with natural vegetation to provide additional cover.
- Placement of fencing to funnel wildlife to safe crossings and away from exposed roadways.
- Redirection or placement of lighting.
- Placement of sound walls or other methods of attenuating noise.
- Fencing or gating to control unauthorized human access and activities.
- Control of native and domestic mesopredators.

Summary of the Contributions of Near-Term and Long-Term Management of Vegetation Communities, Site Specific Habitats and Species and Habitat Linkages/Wildlife Corridors to Helping Maintain and Increase Net Habitat Value Over the Long-Term.

a. Near Term Management and Restoration of High Priority Vegetation Communities and Site Specific Resources

With regard to near-term net habitat value considerations, currently existing stressors are identified and specific management and enhancement/restoration actions are set forth in the Habitat Restoration Plan component of the Adaptive Management Program with regard to the three major vegetation communities selected as the focus of near-term vegetation community management actions (coastal sage scrub, grasslands and riparian/wetlands – see the Upland Habitat Restoration Plan and Aquatic Resources Habitat Restoration Plan elements of the Habitat Restoration Plan). Table XX summarizes the near term habitat management and enhancement/restoration actions for each of the three priority vegetation communities.

TABLE -1
NEAR TERM MANAGEMENT AND RESTORATION ACTIONS OF THREE PRIORITY VEGETATION COMMUNITIES

Habitat Type	Management Action	Restoration Acres/Location
Coastal Sage Scrub	Manage coastal sage scrub fire regimes to maintain natural diversity of age-stands. Manage cattle grazing to sustain net habitat value and diversity of CSS. Control exotic invasives within CSS.	375 acres total of restoration in: Sulphur Canyon; Chiquita Ridge/Creek; and Upper Gabino (combined coastal sage scrub/native grassland restoration site).
Grasslands	Manage native grassland fire regime to enhance germination of native grasses. Manage cattle grazing to facilitate restoration of existing areas of native grassland. Control invasions of herbaceous exotic species in both native and annual grasslands, including artichoke thistle, mustards and sweet fennel.	200 acres total of restoration in: Upper Cristianitos; Portions of Blind Canyon mesa; and Upper Gabino (combined coastal sage scrub/native grassland restoration site)
Wetlands/Riparian	Management of excessive surface and subsurface water flows and sediment in Gobernadora Creek. Management of potential increase in water supply to San Juan Creek. Control of invasive exotic plant species such as giant reed, tamarisk and pampas grass in riparian zones, particularly in San Juan Creek and the San Mateo Watershed.	Exotic species control, including bullfrogs, fire ants, etc. Restoration actions in the following areas: Invasives control in Middle San Juan Creek between Cow Camp crossing and RMV boundary. Invasives control in Lower Cristianitos Creek west of the TRW facility to RMV boundary. Restoration in Gobernadora to address 1) historic meander and 2) excessive surface, subsurface flows and sediment from upstream. Restoration may include construction of Gobernadora Multipurpose Basin. Restoration in Upper Gabino to address fine sediment generation.

b. Long Term Management of Vegetation Communities

As summarized above, for each of the five major vegetation communities, the Adaptive Management Program sets forth overall goals and specific management objectives directed toward helping maintain and increase net habitat value over the long term. Many of the management objectives focus on intrinsic and extrinsic stressors that have previously or may in the future affect net habitat value of the particular vegetation community or site-specific resource. Specific stressors likely to affect particular vegetation communities are identified and potential management actions are outlined. The understanding of stressors and potential management responses will be modified over time as a result of feedback information gained from monitoring and adaptive management actions. Important abiotic processes (e.g., fire, hydrology, terrains/geomorphology) affecting vegetation communities and associated habitats and processes are identified and are related to species needs in the context of the particular vegetation community associated with individual species. Special management considerations for vernal pools, sensitive plants and habitat linkages/wildlife movement corridors are also identified.

TABLE 2
LONG-TERM MANAGEMENT AND RESTORATION ACTIONS OF MAJOR VEGETATION COMMUNITIES

Habitat Type	Management Action	Restoration Acres/Location
Coastal Sage Scrub	Manage CSS fire regimes to maintain natural diversity of age-stands. Manage cattle grazing to sustain net habitat value and diversity of coastal sage scrub. Control exotic invasives within coastal sage scrub.	Case by case restoration of: Existing areas of degraded coastal sage scrub that are not naturally recovering through passive management; Areas that are degraded or disturbed by future natural events and that are unlikely to recover naturally (e.g., an area that has burned too frequently); Areas that have been temporarily disturbed either by authorized (e.g., an approved infrastructure project) or unauthorized (e.g., an illegal trail) activity; and Specific adaptive management research involving restoration treatments.
Chaparral	Manage chaparral fire regimes such that a natural diversity of age-stands and resprouters/obligate seeders is maintained and that existing chaparral stands do not irreversibly type-convert to grassland. Manage cattle grazing such that adverse impacts to chaparral are controlled to preserve net habitat value and that existing chaparral stands do not irreversibly type-convert to grassland. Control exotics invasions of chaparral.	Case by case restoration of: Areas that are degraded or disturbed by future natural events and that are unlikely to recover naturally (e.g., an area that has burned too frequently);
Grasslands	Manage native grassland fire regime to enhance germination of native grasses. Manage cattle grazing to facilitate restoration of existing areas of native grassland. Control invasions of herbaceous exotic species in both native and annual grasslands, including artichoke thistle, mustards and sweet fennel.	Case by case restoration of: Existing areas of degraded or low quality native grassland that are not naturally recovering through passive management; Areas that are degraded or disturbed by future natural events and it is determined that they will not, or are unlikely to, recover naturally (e.g., an area that has burned too frequently or is infested with exotic species); Areas that have been temporarily disturbed either by authorized (e.g., an approved infrastructure project) or unauthorized (e.g., an illegal trail) activity; and Specific adaptive management research involving restoration treatments.
Wetlands/riparian	Management of excessive surface and subsurface water flows and sediment in Gobernadora Creek. Management of potential increase in water supply to San Juan Creek. Control of invasive exotic plant species such as giant reed, tamarisk and pampas grass in riparian zones, particularly in San Juan Creek, Arroyo Trabuco and the San Mateo Watershed.	Case by case restoration of exotics hotspots determined by the individual reserve owners/managers based on overall vegetation communities monitoring program and targeted monitoring of potential hotspot locations.

Habitat Type	Management Action	Restoration Acres/Location
Woodlands	Maintain appropriate subsurface hydrology to avoid under- and over-watering. Manage fire regimes in oak woodlands to maintain a natural diversity and balance of age-stands. Manage cattle grazing such that adverse impacts to oak woodlands are controlled to preserve net habitat value. Control exotics invasions of oak woodlands.	Case by case restoration of: Areas that are degraded or disturbed by future natural events and it is determined that they will not, or are unlikely to, recover naturally (e.g., an area that has burned too frequently or is infested with exotic species);
Vernal Pools	Manage the hydrological regime of the pools by maintaining the existing local contributing hydrological sources (i.e., the local contributing watershed of the vernal pool). Eliminate or control any identified existing threats to existing vernal pools, including poorly timed grazing and invasion of pools and the surrounding hydrology source area by non-native species. Develop management tools to control the proliferation of non-native species, including grazing, prescribed burns, mowing and selective weeding. Manage water quality to emulate baselines conditions in the vernal pools in the RMV Open Space known to support the Riverside and San Diego fairy shrimp. Control public access to vernal pools	No restoration actions are identified at this time

The Role of Management Plans in Helping to Maintain and, Where Feasible, Increase Net Habitat Value within the Subregion over the Long Term

Appendix J provides a discussion of specific management plans that establish substantive management framework for carrying out long-term adaptive management. As reviewed previously, each of the stressors discussed has the potential to impact and reduce long-term habitat value within the RMV Open Space. Additionally, certain stressors have already impacted habitat values, and if addressed through management, enhancement and restoration actions, provide opportunities for the Adaptive Management Program to increase long-term habitat values. In effect, the management plans in Appendix J, serve as the operational tools for helping maintain and enhance net habitat value over time. Thus, given the stressor focus of the Adaptive Management Program, the management plans specifically address each of the stressors identified in Appendix J:

Stressor	**Associated Management Plan**
Fire	– Fire Management Plan
Grazing	- Grazing Management Plan
Exotics	- Invasive Species Control Plan
Altered Hydrology	- Water Quality Management Plan ("Conditions of Concern")
Altered Geomorphologic Processes	- Water Quality Management Plan ("Conditions of Concern" and Sediment Management)
Edge Effects / Disturbance	- Management of Public Access

Additionally, the Habitat Restoration Plan reviewed in Appendix J serves to integrate enhancement and restoration aspects of the above management plans that address existing impacts caused by stressors so that habitat values can be increased over both the near term and long-term (see discussions of the Habitat Restoration Plan above).

Each of the above management plans is reviewed in the following subsections with respect to the ways in which the particular management plan helps maintain and increase net habitat value. The final subsections will review how the various management plans interact with and support the Habitat Restoration Plan, including the Upland Habitat Restoration Plan and the Aquatic Resources Habitat Restoration Plan components.

The Role of the Fire Management Plan in Helping to Maintain and Increase Net Habitat Value

The Fire Management Plan helps maintain and increase net habitat value in three basic ways. First, the Fire Management Plan contains objectives and measures intended to further the management, enhancement and restoration of the major vegetation communities within the RMV Open Space. Second, the Fire Management Plan provides objectives and measures intended to reduce the incidence and severity of wildfires (e.g., the use of prescribed burns to reduce fuel

loads). Third, the Fire Management Plan includes a "Strategic Fire Suppression Plan" intended to guide fire suppression actions that protect sensitive habitat areas from repeated wildfires (e.g., by identifying high priority "aggressive" fire suppression areas) and that minimize physical impacts from fire protection activities (e.g., the use of heavy fire suppression equipment).

a. Habitat management and fire-reduction objectives and measures

The following are the Management Objectives for the Fire Management Plan:

- Identify appropriate spatial scales and patterns for the long-term management of fire;
- Develop active fire management prescriptions consisting of (1) Management Objectives, (2) preparing Management Plans and Models for shrublands (coastal sage scrub and chaparral) and (3) identifying uncertainties for valley needlegrass grasslands, focused on increasing diversity of native plants and promoting community structure and composition favored by target wildlife species;
- Utilize prescribed fire to reduce unplanned fire events from known ignition corridors;
- Define fire prescriptions that aid in the restoration of degraded shrublands and riparian areas;
- Identify active restoration techniques for application following fire treatments; and
- Develop a public understanding and support for active fire management.

Management goals related to vegetation communities include the following approaches:

- The reduction of unplanned fire events through the use of maintained firebreaks and strategic prescribed burns;
- Implementation of a seasonally and frequency-focused fire regime as part of a management/restoration strategy for valley needlegrass grassland;
- Careful experimentation using fire as part of a restoration and management program in currently degraded coastal sage scrub stands;
- Implementation of low to moderate intensity ground fires in the oak woodland habitats where undergrowth is too thick and dense for cattle in order to reduce the threat of a "stand replacement" fire that occurs when wildfires ladder through underbrush into the crown of oak trees (goats are an alternative to prescribed fire to reduce understory vegetation beneath the oaks); and
- Prevention of fire in riparian zones through periodic fuel load reduction, particularly ladder fuels, through the application of timed grazing techniques.

b. The Strategic Fire Protection Plan

As indicated in the introduction to this subsection, another major element of the Fire Management Plan is "The Strategic Fire Protection Plan." This plan identifies those specific natural resource areas that will require enhanced fire protection through fuel management and specific tactical fire suppression measures. The first step in formulating the Strategic Fire Protection Plan was to delineate Fire Management Compartment (FMC) boundaries based upon the most likely locations to make a stand against an approaching wildfire. FMC boundaries were determined by their potential to contain a wildland wildfire and included roads, ridge tops, watercourses, key vegetation changes, other natural or physical barriers to wildland fire or key changes in fuel continuity (see Table 3-1 in the Fire Management Plan). Each FMC was further divided into subunits called Fire Management Units (FMU) that are based on sub-basin boundaries (see Figure 3-1 in the Fire Management Plan).

The fire suppression tactical strategy is that all wildland fires occurring within a FMU should be contained to that specific FMU and should not be allowed to encroach upon another FMU if at all possible. It is fully understood that under severe wildland fire weather conditions (Santa Ana winds, or other periods of extreme hot, dry weather and strong winds) wildland fires may not be able to be contained to the FMU or even within the compartment of origin. However, this is a reasonable fire suppression guideline for all other average or above average fire weather conditions. Fire protection treatments (fuel management by mechanical means, hand-labor or prescribed fire, or a combination of all three) have been planned by specific FMUs. The role that fire will play in maintaining or enhancing target habitats will also be planned by individual FMUs.

One of the major elements of the fire suppression tactical strategy involves the preparation of the Short-Term Tactical Fire Suppression Plan. Suppression plans have been prepared for each FMC. One important element of the Tactical Fire Suppression Plan was to define fire management "compartments" that encompass major populations of Identified Species and the overall RMV Open Space, and prepare specific fire attack measures that would protect these areas as "refugia" in the event of a wildfire with the least impact on sensitive habitat in or near the refugia. Specific fire suppression policies have been defined for Biologically Sensitive Areas addressing the use of bulldozers or other land altering equipment, limitations on new fire roads, the use of natural features such as ridgelines and roads and pre-fire constructed firebreaks/fuelbreaks for containment lines, limiting the number of fire suppression vehicles off-road where practicable, and erosion control measures for disturbed areas following wildfire response. Further, the Fire Suppression Plan establishes two distinct Tactical Operations Modes/Fire Suppression Guidelines for application to all RMV Open Space lands, (1) "Aggressive" (immediate containment using all available resources) and (2) "Standard" (standard wildfire response with minimal disruption to natural resources).

The Role of the Grazing Management Plan in Helping to Maintain and Increase Net Habitat Value

The Grazing Management Plan helps maintain and increase net habitat value in three basic ways. First, the Grazing Management Plan contains objectives and measures intended to further the management, enhancement and restoration of the major vegetation communities within the Habitat Reserve, specifically the management and restoration of native grasslands and coastal sage scrub through the application of timed grazing techniques. Second, the Grazing Management

Plan provides objectives and measures intended to reduce the potential impacts to Identified Species, specifically those associated with aquatic habitats such as the arroyo toad and Riverside and San Diego fairy shrimp through seasonal and permanent habitat exclusions. Third, the Grazing Management Plan provides an alternative method of reducing fuel loads where prescribed burns are not an option, such as for lands proximate to developed areas, or in riparian zones.

a. Grazing management objectives and measures

The following are the Management Objectives for the Grazing Management Plan:

1. Establish a minimum RDM per acre for active and proposed pastures, and adjust as necessary to reflect changes developed as a result of objective/task 2 below.
2. Identify interim and long-term changes to existing and proposed pasture configurations and stocking levels to maximize use of available forage and facilitate the restoration of perennial grasses including native grasses.
3. Identify a timed rotational grazing scheme to maximize use of available forage and facilitate the restoration and/or long-term management of native grasses and coastal sage scrub.
4. Identify sensitive habitat areas where cattle grazing shall be excluded seasonally or permanently.
5. Identify additional facilities required to promote better distribution of cattle within pastures as a strategy to manage biotic and abiotic resources (e.g., water sources, shade, supplemental feed/ nutritional blocks).
6. Outline methods (i.e., cattle exclosures) for monitoring forage levels in order to assess range conditions and to provide guidance on the introduction and removal of cattle.
7. Identify pastures that may be subject to prescribed fire. Identify appropriate pasture rest periods following burns to promote habitat recovery.
8. Outline procedures for re-evaluating grazing management practices every 3 to 5 years to ensure that existing practices are achieving the desired results.

The Role of the Invasive Species Control Plan in Helping to Maintain and Increase Net Habitat Value

The management and control of invasive plant and animal species has become a major consideration in habitat management throughout California, whether it is aquatic species in the Bay Delta, pampas grass on the San Mateo coast or giant reed in southern California. In some cases, invasive plant species are associated with uses such as grazing (e.g., artichoke thistle) whereas in other cases invasive plant and animal species are present due to random, inadvertent acts (e.g., giant reed, bullfrogs). In the case of the Southern Subregion, artichoke thistle has been kept largely in check due to control activities undertaken as part RMV ranching operations. Significant efforts at controlling giant reed have been undertaken by the County of Orange in upper San Juan Creek and upper Arroyo Trabuco. Ongoing invasive species control has also been undertaken regularly in portions of lower Cristianitos Creek by TRW pursuant to Corps 404/CDFG 1603 permit requirements.

The failure to control invasive species in the RMV Open Space would have severe consequences for species and habitats both within the RMV Open Space and downstream of the study area (the latter in the San Mateo watershed). A severe giant reed infestation in San Juan Creek has displaced riparian habitat and consumes large quantities of water important both to riparian

vegetation and to arroyo toad breeding pools, thus impacting arroyo toad populations and reducing least Bell's vireo nesting habitat, as well as habitat for numerous other wildlife species. Although invasive plant species are less intrusive in the San Mateo watershed portion of the study area, they are fairly widespread and several invasive plant species are found in significant numbers below the confluence of lower Gabino and Cristianitos creeks; tamarisk is found in only a few locations in the San Mateo watershed but, if not eradicated, can result in type-conversion of riparian habitat in a manner comparable to giant reed. Similarly invasive animal species such as bullfrogs severely impact arroyo toad populations, while cowbird nest parasitism impacts California gnatcatcher and least Bell's vireo populations.

In order to maintain and increase net habitat value, the Invasive Species Control Plan proposes to specifically address the following invasive plants and introduced invertebrates in a comprehensive manner:

Plants

- Giant reed
- Pampas grass
- Castor bean
- Tamarisk
- Tree tobacco
- Spanish sunflower
- Artichoke thistle

Animals

- Bullfrog
- Crayfish
- Brown-headed cowbird
- European starling

With respect to riparian/wetlands habitats, the removal of giant reed is expected to increase the net amount of riparian habitat in two ways: (1) increase the area of streamcourses available for re-colonization by riparian plants such as willows; and (2) increase water supply both to nourish the growth of riparian plants and to help support arroyo toad breeding habitat. The removal of other invasive plant species such as pampas grass, castor bean and tree tobacco will also allow a greater area available for riparian plant species. The control of tamarisk is expected to remove the very considerable long-term threat, due to the plant's extensive seed proliferation. This threat is felt both within the study area and in downstream areas outside the subregion within the lower San Mateo watershed that support the tidewater goby and steelhead. Bullfrog and crayfish control will benefit arroyo toad populations both within the San Juan Creek and San Mateo Creek watersheds. Invasive plant control is also expected to help maintain and increase habitat value within vernal pools and slope wetlands.

With respect to uplands plant species, the control of pampas grass, tree tobacco and artichoke thistle are expected to help maintain and increase the habitat value of upland plants. Thread-leaved brodiaea populations are expected to benefit in a number of locations. Additionally, restoration programs for coastal sage scrub and native grasslands will have an enhanced likelihood of success.

Prior individual efforts to eradicate invasive plant species have helped maintain habitat value within portions of the subregion. However, absent coordination between RMV and adjacent

landowners, it is unlikely that net habitat value can be maintained within the RMV Open Space and in adjoining habitat areas. The re-emergence of giant reed in downstream areas of San Juan Creek following a localized control program attests to the inability to effectuate meaningful protection against invasive plant species without ongoing regular coordination. Similarly, the control of bullfrog and crayfish populations will benefit a wide array of riparian animal species, both listed and unlisted. As noted above, bullfrog control is particularly important to improving net habitat value for arroyo toads. Reductions in cowbird populations are expected to benefit gnatcatchers and least Bell's vireo – increases in California gnatcatcher and vireo populations over the past several years have been attributed in part to the beneficial effects of reducing cowbird populations.

With regard to long-term management of invasive species, the extensive vegetation and species-monitoring program reviewed in Appendix J will include a focus on invasive plant and animal "stressors." Since invasive species threats vary over time as new species are introduced or conditions change for existing species, the Adaptive Management Plan monitoring program will contribute directly to helping maintain and increase net habitat value in the RMV Open Space and throughout the planning area.

Summary of the Contributions of the Management Plans to the Ability of the Adaptive Management Program to Help Maintain and Increase Net Habitat Value over the Long-Term.

The foregoing subsections summarize the manner in which individual management plans that would be implemented within the RMV Open Space would be directed toward specific types of stressors. As conceptual models of stressors and their impacts on vegetation communities and species are developed and reformed over time, each of the management plans reviewed in the prior subsections provides a set of management tools that will be used to tactically and strategically address *extrinsic stressors* in relation to the natural dynamics of *intrinsic stressors.* Thus, threats to existing habitat value generated by extrinsic stressors can be addressed in the context of an increasing understanding of the effects of intrinsic stressors. In this way, the various management plans provide essential tools for helping maintain net habitat value.

Over time, as *extrinsic stressors* are addressed, management actions such as invasive species control, grazing management and prescribed fire can be used to increase net habitat value over the long term. For example, as reviewed in the prior section, actions taken in the San Mateo Watershed portion of the RMV Open Space to reduce the generation of fine sediments – including native grasslands restoration, remediation of the clay pits and the re-contouring of existing eroding areas in clay soils – would, in combination, reduce the present excessive generation of fine sediments that adversely impact arroyo toad breeding and streamcourse hydrologic/terrains processes within the planning area and other aquatic species downstream of the planning area.

The Role of the Water Quality Management Plan, in Conjunction with Aspects of the Upland and Aquatic Resources Habitat Restoration Plans, in Helping to Maintain and Increase Net Habitat Value

The proposed Water Quality Management Plan (WQMP) will be implemented in an "adaptive" manner complimentary to the Adaptive Management Program. The WQMP addresses three "stressors:"

- "Pollutants" generated by urban development with the potential to impact species and habitats;

- "Altered hydrology" due to urban development or public works projects with the potential to impact species and habitats, and

- "Altered geomorphic processes" with the potential to impact species and habitats

The SAMP Tenets and Watershed Planning Principles set forth in the "Watershed and Sub-Basin Planning Principles" provide the policy direction for addressing each of the above stressors. The SAMP Tenets policies include:

- Protect headwaters

- Maintain and/or restore floodplain connection

- Maintain and/or restore sediment sources and transport equilibrium

Similarly, the Baseline Conditions Watershed Planning Principles address the three sets of stressors (Altered Hydrology is sub-divided into Changes in Surface Water Hydrology and Changes in Groundwater Hydrology) under the following sets of principles, each of which is accompanied by specific policy direction intended to maintain net habitat value:

- ***Pollutants*** **–Watershed Planning Principles Section "v) Water Quality"** sets forth the following principle for water quality/pollutants:

  - Principle 9 - *Protect water quality by using a variety of strategies, with particular emphasis on natural treatment systems such as water quality wetlands, swales and infiltration areas and application of Best Management Practices within development areas to assure comprehensive water quality treatment prior to the discharge of urban runoff into the Habitat Reserve.*

- ***Changes in Surface Water Hydrology*** – **Watershed Planning Principles Section "ii) Hydrology"** sets forth the following principles for surface water hydrology:

  - Principle 2 – *Emulate, to the extent feasible, the existing runoff and infiltration patterns in consideration of specific terrains, soil types and ground cover*
  - Principle 3 – *Address potential effects of future land use changes on hydrology*
  - Principle 4 – *Minimize alterations of the timing of peak flows of each sub-basin relative to the mainstem creeks*
  - Principle 5 – *Maintain and/or restore the inherent geomorphic structure of major tributaries and their floodplains*

- ***Changes in Groundwater Hydrology*** – **Watershed Planning Principles Section " iv) Groundwater Hydrology"** sets forth the following principles:

  - Principle 7 – *Utilize infiltration properties of sandy terrains for groundwater recharge to offset potential increases in surface runoff and adverse effects to water quality*
  - Principle 8 – *Protect existing groundwater recharge areas supporting slope wetlands and riparian zones; and maximize groundwater recharge of alluvial aquifers to the extent consistent with aquifer capacity and habitat management goals*

- ***Changes in Geomorphic Processes*** – **Watershed Planning Principles Sections "i) Geomorphology/Terrains" and "iii) Sediment Sources, Storage and Transport"** set forth the following principles;

  - Principle 1 – Recognize and account for the hydrologic response of different terrains at the sub-basin and watershed scale
  - Principle 6 – Maintain coarse sediment yields, storage and transport processes

As noted previously each of the above Principles includes specific policies providing more specific guidance for maintaining net habitat value at a watershed scale (see Baseline Conditions Watershed Planning Principles Consistency Analysis, infra). The Water Quality Management Plan addresses the above principles within the water quality management framework established by the County of Orange and the San Diego Regional Water Quality Control Board. The County and SDRWQCB require that potential development impacts are to be analyzed under two broad headings: (1) "Pollutants of Concern" and (2) Hydrologic Conditions of Concern:

- "Pollutants of Concern" addressed in the WQMP include

  - Bacteria and viruses
  - Metals
  - Nutrients
  - Organic Compounds
  - Sediments
  - Trash and Debris
  - Oxygen-Demanding Substances
  - Oil and Grease

Appropriate regulatory standards, including special standards applicable to species pursuant to the California Toxics Rule, have been applied in formulating WQMP Best Management Practices and in addressing the Water Quality principles set forth in the Baseline Conditions Watershed Principles.

- "Hydrologic Conditions of Concern" are addressed in the WQMP in accordance with the following methodology established by the County/SDRWQCB;

  (1) Determine if the downstream channel is fully natural or partially improved with a significant potential for erosive conditions or alteration of habitat integrity to occur as a result of upstream development.

  (2) Evaluate the project's conditions of concern considering the project area's location (from the larger watershed perspective), topography, soil and vegetation conditions, percent impervious area, natural and infrastructure drainage features and other relevant hydrologic and environmental factors to be protected specific to the project area's watershed.

  (3) Review watershed plans; drainage area master plans or other planning documents to the extent available for identification of specific implementation requirements that address hydrologic conditions of concern.

  (4) Conduct a field reconnaissance to observe and report on representative downstream conditions, including undercutting erosion, slope stability,

vegetative stress (due to flooding, erosion, water quality degradation, or loss of water supplies) and the area's susceptibility to erosion or habitat alteration as a result of an altered flow regime or change in sediment transport.

(5) Compute rainfall runoff characteristics from the project area including peak flow rate, flow velocity, runoff volume, and time of concentration and retention volume. These characteristics shall be developed for the two-year and 10-year frequency, Type I storm, of six-hour or 24-hour duration (whichever is the closer approximation of the site's time of concentration) during critical hydrologic conditions for soil and vegetative cover.

(6) A drainage study report must be prepared identifying the project's conditions of concern based on the hydrologic and downstream conditions discussed above. Where downstream conditions of concern have been identified, the drainage study shall establish that pre-project hydrologic conditions affecting downstream conditions of concern would be maintained by the proposed project by incorporating site design, source control and treatment control requirements identified in the County/San Diego RWQCB Model Water Quality Management Plan. For conditions where a reduction in sediment transport from the project development and features would significantly impact downstream erosion, the Treatment Control BMPs proposed should be evaluated to determine if use of the BMPs would result in reducing sediment significantly belbw pre-development levels. Under such conditions alternative BMPs (such as watershed based approaches for erosional sediment control) may need to be considered.

The WQMP includes sections documenting the consistency of the WQMP both with the above County SDRWQCB requirements and with applicable principles of the Watershed Planning Principles. In particular, the WQMP analyses of Hydrologic Conditions of concern specifically analyze hydrologic conditions specified in the Watershed Planning Principles for the purpose of maintaining net habitat value with regard to: (1) potential increases in dry season streamflow and wet season baseflow between storms; (2) changes in the magnitude, frequency, and duration of annually expected flow events (1-2 year events); (3) changes in hydrologic response to major episodic storm events; (4) potential changes in sediment supply, with short term increases related to construction and longer term reductions related to impervious/landscaped ground cover; and (5) potential changes in the infiltration of surface/soil water to groundwater.

For the Gobernadora Creek sub-basin, the sub-basin exhibiting existing conditions stressors due to prior upstream development in Coto de Caza, specific performance criteria for implementation of the Gobernadora Multipurpose Basin have been prepared to complement Gobernadora sub-basin water management measures set forth in the WQMP and thereby increase net habitat value.

Potential changes in "Geomorphic Processes" are addressed in part through the above WQMP consistency review relating to Hydrologic Conditions of Concern (including sediment generation and sediment transport) and in part through specific restoration measures reviewed in above. In particular, habitat restoration and erosion control measures in clay soils will reduce the generation of fine sediments and improve stormwater infiltration/runoff, benefiting species and streamcourse processes. Specific restoration measures in clay soils reviewed *above* include: **(1)** coastal sage scrub/native grassland restoration in Sulphur Canyon; **(2)** grasslands restoration in the Upper Cristianitos sub-basin; **(3)** restoration in the former clay pits in Cristianitos Canyon; **(4)** landform restoration and coastal sage scrub/native grassland restoration in Upper Gabino.

Thus, the WQMP provides specific measures addressing three stressors – potential pollutants, changes in hydrologic processes and changes in geomorphic processes – in helping assure that these three stressors do not significantly impact net habitat value. The WQMP, in conjunction with specific restoration/enhancement measures reviewed above, helps increase net habitat value in **(1)** Gobernadora Creek; **(2)** the Upper Cristianitos sub-basin; and **(3)** Upper Gabino. To the extent that restoration and management measures in the San Mateo Watershed reduce the generation of fine sediments, habitat conditions will be improved for the arroyo toad within the subregion and for other aquatic species downstream in San Mateo Creek.

The Role of Management of the Urban/Wildlands Interface in Contributing to Net Habitat Value within the Southern Subregion

General Policy 5 of the Southern NCCP/HCP Guidelines calls for the creation of an "urban/wildlands interface zone" that would be located outside the RMV Open Space and provide a physical separation between the RMV Open Space and non-reserve/urbanized areas. In addition to establishing barriers (fences, walls, etc.) and signs to direct and control unwanted access to the RMV Open Space by people and pets, and shielding the RMV Open Space from harmful light sources, the urban/wildlands interface zone would be adaptively managed to:

- Provide for native plantings combining irrigated and non-irrigated species;
- Control invasive species of pest plants and animals;
- Manage pesticide, herbicide and fertilizer use adjacent to the RMV Open Space in conjunction with the WQMP; and

Implement fuel management measures designed to protect upland and aquatic resources within the Habitat Reserve.