WETLAND HABITATS ASSOCIATED WITH DON PEDRO RESERVOIR

STUDY REPORT
DON PEDRO PROJECT
FERC NO. 2299



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MID
Modesto Irrigation District

Prepared for:
Turlock Irrigation District – Turlock, California
Modesto Irrigation District – Modesto, California

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Wetland Habitats Associated with Don Pedro Reservoir
Study Report

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List of Acronyms

ac .....acres

ACEC .....Area of Critical Environmental Concern

AF .....acre-feet

ACOE.....U.S. Army Corps of Engineers

ADA .....Americans with Disabilities Act

ALJ.....Administrative Law Judge

APE .....Area of Potential Effect

ARMR.....Archaeological Resource Management Report

BA .....Biological Assessment

BDCP .....Bay-Delta Conservation Plan

BLM .....U.S. Department of the Interior, Bureau of Land Management

BLM-S .....Bureau of Land Management – Sensitive Species

BMI .....Benthic macroinvertebrates

BMP .....Best Management Practices

BO .....Biological Opinion

CalEPPC .....California Exotic Pest Plant Council

CalSPA.....California Sports Fisherman Association

CAS.....California Academy of Sciences

CCC.....Criterion Continuous Concentrations

CCIC .....Central California Information Center

CCSF .....City and County of San Francisco

CCVHJV .....California Central Valley Habitat Joint Venture

CD .....Compact Disc

CDBW.....California Department of Boating and Waterways

CDEC .....California Data Exchange Center

CDFA .....California Department of Food and Agriculture

CDFG .....California Department of Fish and Game (as of January 2013, Department of Fish and Wildlife)

CDMG.....California Division of Mines and Geology

CDOF .....California Department of Finance

CDPH .....California Department of Public Health

CDPR .....California Department of Parks and Recreation
CDSOD.....California Division of Safety of Dams
CDWR.....California Department of Water Resources
CE .....California Endangered Species
CEII.....Critical Energy Infrastructure Information
CEQA.....California Environmental Quality Act
CESA .....California Endangered Species Act
CFR.....Code of Federal Regulations
cfs.....cubic feet per second
CGS.....California Geological Survey
CMAP .....California Monitoring and Assessment Program
CMC.....Criterion Maximum Concentrations
CNDDB.....California Natural Diversity Database
CNPS.....California Native Plant Society
CORP .....California Outdoor Recreation Plan
CPUE .....Catch Per Unit Effort
CRAM.....California Rapid Assessment Method
CRLF.....California Red-Legged Frog
CRRF .....California Rivers Restoration Fund
CSAS.....Central Sierra Audubon Society
CSBP.....California Stream Bioassessment Procedure
CT .....California Threatened Species
CTR.....California Toxics Rule
CTS .....California Tiger Salamander
CVRWQCB .....Central Valley Regional Water Quality Control Board
CWA .....Clean Water Act
CWHR.....California Wildlife Habitat Relationship
Districts.....Turlock Irrigation District and Modesto Irrigation District
DLA .....Draft License Application
DPRA.....Don Pedro Recreation Agency
DPS .....Distinct Population Segment
EA .....Environmental Assessment
EC .....Electrical Conductivity

EFH.....Essential Fish Habitat
EIR.....Environmental Impact Report
EIS.....Environmental Impact Statement
EPA.....U.S. Environmental Protection Agency
ESA.....Federal Endangered Species Act
ESRCD.....East Stanislaus Resource Conservation District
ESU.....Evolutionary Significant Unit
EWUA.....Effective Weighted Useable Area
FERC.....Federal Energy Regulatory Commission
FFS.....Foothills Fault System
FL.....Fork length
FMU.....Fire Management Unit
FOT.....Friends of the Tuolumne
FPC.....Federal Power Commission
ft/mi.....feet per mile
FWCA.....Fish and Wildlife Coordination Act
FYLF.....Foothill Yellow-Legged Frog
g.....grams
GIS.....Geographic Information System
GLO.....General Land Office
GPS.....Global Positioning System
HCP.....Habitat Conservation Plan
HHWP.....Hetch Hetchy Water and Power
HORB.....Head of Old River Barrier
HPMP.....Historic Properties Management Plan
ILP.....Integrated Licensing Process
ISR.....Initial Study Report
ITA.....Indian Trust Assets
kV.....kilovolt
m.....meters
M&I.....Municipal and Industrial
MCL.....Maximum Contaminant Level
mg/kg.....milligrams/kilogram

mg/L .....milligrams per liter
mgd .....million gallons per day
mi .....miles
mi^2 .....square miles
MID.....Modesto Irrigation District
MOU .....Memorandum of Understanding
MSCS.....Multi-Species Conservation Strategy
msl.....mean sea level
MVA .....Megavolt Ampere
MW .....megawatt
MWh .....megawatt hour
mya.....million years ago
NAE .....National Academy of Engineering
NAHC .....Native American Heritage Commission
NAS.....National Academy of Sciences
NAVD 88 .....North American Vertical Datum of 1988
NAWQA .....National Water Quality Assessment
NCCP .....Natural Community Conservation Plan
NEPA .....National Environmental Policy Act
ng/g .....nanograms per gram
NGOs .....Non-Governmental Organizations
NHI .....Natural Heritage Institute
NHPA.....National Historic Preservation Act
NISC .....National Invasive Species Council
NMFS.....National Marine Fisheries Service
NOAA .....National Oceanic and Atmospheric Administration
NOI .....Notice of Intent
NPS .....U.S. Department of the Interior, National Park Service
NRCS .....National Resource Conservation Service
NRHP .....National Register of Historic Places
NRI.....Nationwide Rivers Inventory
NTU .....Nephelometric Turbidity Unit
NWI.....National Wetland Inventory

NWIS .....National Water Information System
NWR .....National Wildlife Refuge
NGVD 29 .....National Geodetic Vertical Datum of 1929
O&M .....operation and maintenance
OEHHA.....Office of Environmental Health Hazard Assessment
ORV .....Outstanding Remarkable Value
PAD.....Pre-Application Document
PDO.....Pacific Decadal Oscillation
PEIR.....Program Environmental Impact Report
PGA.....Peak Ground Acceleration
PHG.....Public Health Goal
PM&E .....Protection, Mitigation and Enhancement
PMF.....Probable Maximum Flood
POAOR.....Public Opinions and Attitudes in Outdoor Recreation
ppb.....parts per billion
ppm .....parts per million
PSP.....Proposed Study Plan
QA.....Quality Assurance
QC.....Quality Control
RA.....Recreation Area
RBP.....Rapid Bioassessment Protocol
Reclamation .....U.S. Department of the Interior, Bureau of Reclamation
RM .....River Mile
RMP .....Resource Management Plan
RP.....Relicensing Participant
RSP .....Revised Study Plan
RST .....Rotary Screw Trap
RWF.....Resource-Specific Work Groups
RWG .....Resource Work Group
RWQCB.....Regional Water Quality Control Board
SC.....State candidate for listing under CESA
SCD.....State candidate for delisting under CESA
SCE .....State candidate for listing as endangered under CESA

SCT .....State candidate for listing as threatened under CESA

SD1 .....Scoping Document 1

SD2 .....Scoping Document 2

SE.....State Endangered Species under the CESA

SFP.....State Fully Protected Species under CESA

SFPUC .....San Francisco Public Utilities Commission

SHPO .....State Historic Preservation Office

SJRA .....San Joaquin River Agreement

SJRGA .....San Joaquin River Group Authority

SJTA…… ..San Joaquin River Tributaries Authority

SPD .....Study Plan Determination

SRA.....State Recreation Area

SRMA .....Special Recreation Management Area or Sierra Resource Management Area (as per use)

SRMP.....Sierra Resource Management Plan

SRP .....Special Run Pools

SSC .....State species of special concern

ST.....California Threatened Species under the CESA

STORET .....Storage and Retrieval

SWAMP.....Surface Water Ambient Monitoring Program

SWE .....Snow-Water Equivalent

SWRCB.....State Water Resources Control Board

TAC.....Technical Advisory Committee

TAF .....thousand acre-feet

TCP .....Traditional Cultural Properties

TDS.....Total Dissolved Solids

TID.....Turlock Irrigation District

TMDL .....Total Maximum Daily Load

TOC.....Total Organic Carbon

TRT.....Tuolumne River Trust

TRTAC .....Tuolumne River Technical Advisory Committee

UC.....University of California

USDA.....U.S. Department of Agriculture

USDOC .....U.S. Department of Commerce
USDOI .....U.S. Department of the Interior
USFS .....U.S. Department of Agriculture, Forest Service
USFWS .....U.S. Department of the Interior, Fish and Wildlife Service
USGS .....U.S. Department of the Interior, Geological Survey
USR.....Updated Study Report
UTM.....Universal Transverse Mercator
VAMP .....Vernalis Adaptive Management Plan
VELB .....Valley Elderberry Longhorn Beetle
VRM .....Visual Resource Management
WPT .....Western Pond Turtle
WSA.....Wilderness Study Area
WSIP .....Water System Improvement Program
WWTP .....Wastewater Treatment Plant
WY .....water year
µS/cm .....microSeimens per centimeter

1.0 INTRODUCTION

1.1 General Description of the Don Pedro Project

Turlock Irrigation District (TID) and Modesto Irrigation District (MID) (collectively, the Districts) are the co-licensees of the 168-megawatt (MW) Don Pedro Project (Project) located on the Tuolumne River in western Tuolumne County in the Central Valley region of California. The Don Pedro Dam is located at river mile (RM) 54.8 and the Don Pedro Reservoir formed by the dam extends 24-miles upstream at the normal maximum water surface elevation of 830 ft above mean sea level (msl; NGVD 29). At elevation 830 ft, the reservoir stores over 2,000,000 acre-feet (AF) of water and has a surface area slightly less than 13,000 acres (ac). The watershed above Don Pedro Dam is approximately 1,533 square miles (mi^2).

Both TID and MID are local public agencies authorized under the laws of the State of California to provide water supply for irrigation and municipal and industrial (M&I) uses and to provide retail electric service. The Project serves many purposes including providing water storage for the beneficial use of irrigation of over 200,000 ac of prime Central Valley farmland and for the use of M&I customers in the City of Modesto (population 210,000). Consistent with the requirements of the Raker Act passed by Congress in 1913 and agreements between the Districts and City and County of San Francisco (CCSF), the Project reservoir also includes a "water bank" of up to 570,000 AF of storage. CCSF may use the water bank to more efficiently manage the water supply from its Hetch Hetchy water system while meeting the senior water rights of the Districts. CCSF's "water bank" within Don Pedro Reservoir provides significant benefits for its 2.6 million customers in the San Francisco Bay Area.

The Project also provides storage for flood management purposes in the Tuolumne and San Joaquin rivers in coordination with the U.S. Army Corps of Engineers (ACOE). Other important uses supported by the Project are recreation, protection of the anadromous fisheries in the lower Tuolumne River, and hydropower generation.

The Project Boundary extends from approximately one mile downstream of the dam to approximately RM 79 upstream of the dam. Upstream of the dam, the Project Boundary runs generally along the 855 ft contour interval which corresponds to the top of the Don Pedro Dam. The Project Boundary encompasses approximately 18,370 ac with 78 percent of the lands owned jointly by the Districts and the remaining 22 percent (approximately 4,000 ac) is owned by the United States and managed as a part of the U.S. Bureau of Land Management (BLM) Sierra Resource Management Area.

The primary Project facilities include the 580-foot-high Don Pedro Dam and Reservoir completed in 1971; a four-unit powerhouse situated at the base of the dam; related facilities including the Project spillway, outlet works, and switchyard; four dikes (Gasburg Creek Dike and Dikes A, B, and C); and three developed recreational facilities (Fleming Meadows, Blue Oaks, and Moccasin Point Recreation Areas). The location of the Project and its primary facilities is shown in Figure 1.1-1.

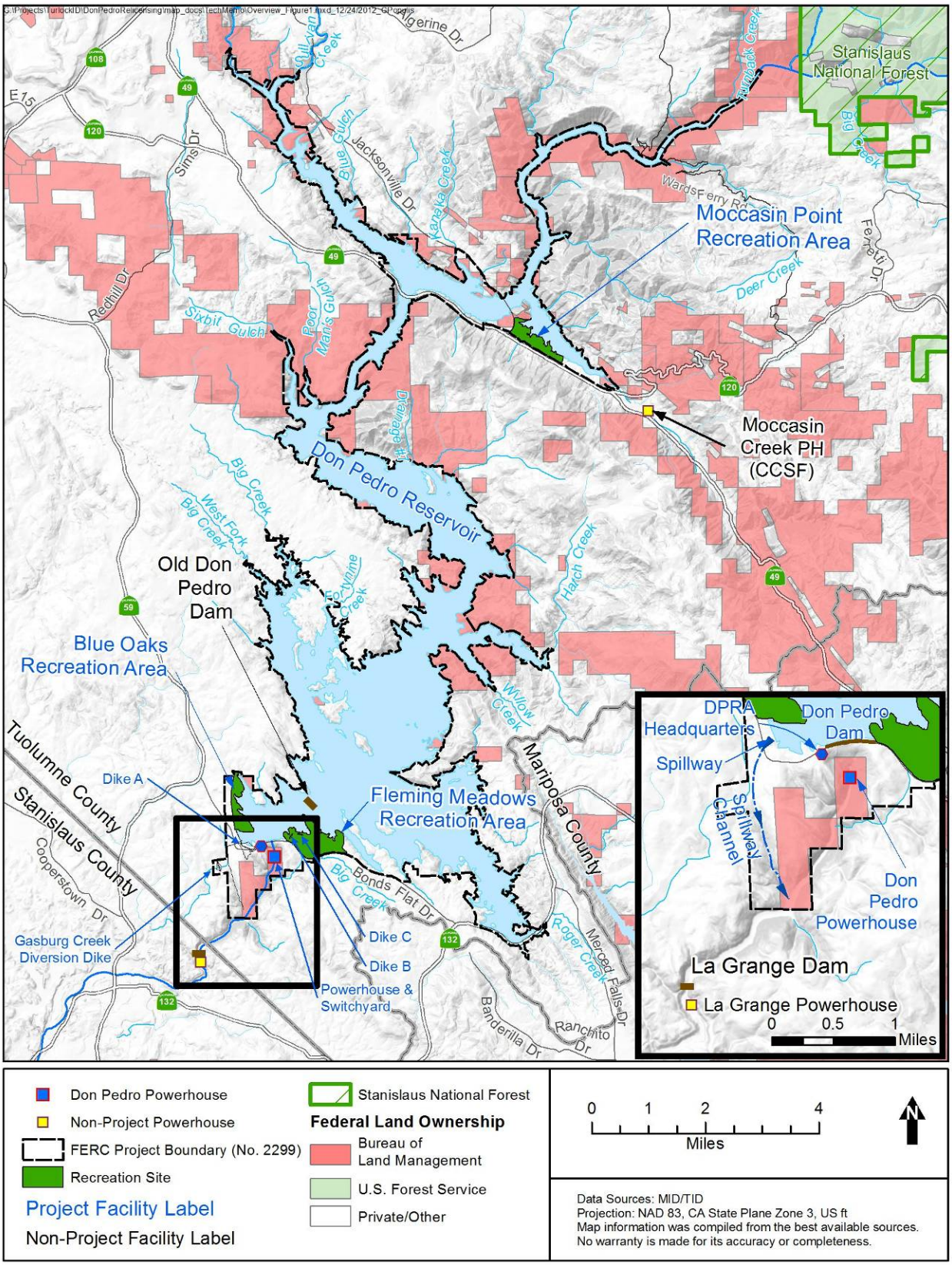

Figure 1.1-1. Don Pedro Project location.

1.2 Relicensing Process

The current FERC license for the Project expires on April 30, 2016, and the Districts will apply for a new license no later than April 30, 2014. The Districts began the relicensing process by filing a Notice of Intent and Pre-Application Document (PAD) with FERC on February 10, 2011, following the regulations governing the Integrated Licensing Process (ILP). The Districts' PAD included descriptions of the Project facilities, operations, license requirements, and Project lands as well as a summary of the extensive existing information available on Project area resources. The PAD also included ten draft study plans describing a subset of the Districts' proposed relicensing studies. The Districts then convened a series of Resource Work Group meetings, engaging agencies and other relicensing participants in a collaborative study plan development process culminating in the Districts' Proposed Study Plan (PSP) and Revised Study Plan (RSP) filings to FERC on July 25, 2011 and November 22, 2011, respectively.

On December 22, 2011, FERC issued its Study Plan Determination (SPD) for the Project, approving, or approving with modifications, 34 studies proposed in the RSP that addressed Cultural and Historical Resources, Recreational Resources, Terrestrial Resources, and Water and Aquatic Resources. In addition, as required by the SPD, the Districts filed three new study plans (W&AR-18, W&AR-19, and W&AR-20) on February 28, 2012 and one modified study plan (W&AR-12) on April 6, 2012. Prior to filing these plans with FERC, the Districts consulted with relicensing participants on drafts of the plans. FERC approved or approved with modifications these four studies on July 25, 2012.

Following the SPD, a total of seven studies (and associated study elements) that were either not adopted in the SPD, or were adopted with modifications, formed the basis of Study Dispute proceedings. In accordance with the ILP, FERC convened a Dispute Resolution Panel on April 17, 2012 and the Panel issued its findings on May 4, 2012. On May 24, 2012, the Director of FERC issued his Formal Study Dispute Determination, with additional clarifications related to the Formal Study Dispute Determination issued on August 17, 2012.

This study report describes the objectives, methods, and results of the Wetland Habitats Associated with Don Pedro Reservoir Study (TR-03) as implemented by the Districts in accordance with FERC's SPD and subsequent study modifications and clarifications. Documents relating to the Project relicensing are publicly available on the Districts' relicensing website at www.donpedro-relicensing.com.

1.3 Study Plan

The Districts operation and maintenance (O&M) of the Don Pedro Project (Project) may affect riparian and wetland habitats. The operation of Project facilities, recreational use, and the use of access roads may interrupt or change hydrologic processes in a manner that alters wetland habitats, and Project-related recreation may impact wetland habitats by physical disturbance or the introduction of noxious weeds.

This study addresses the following resource issue identified in Section 4.2.3 of FERC's Scoping Document 2 for the Project:

Effects of project operation, including water level fluctuations, ground-disturbing activities, and maintenance activities on wetland, riparian, cottonwood and willow, and littoral vegetation communities.

FERC's Study Plan Determination dated December 22, 2011 approved with modifications the Districts' Wetland Habitats Associated with Don Pedro Reservoir study plan as provided in the Districts' Proposed Study Plan filing dated July 25, 2011. In its Study Plan Determination, FERC ordered that the Districts 1) survey the full extent of each wetland during field studies; 2) collect data in vegetation transects within each wetland in the study area; and 3) specify in the final study report the protocol used to assess wetland functions. Addtionally, FERC recommended that the Districts should evaluate existing information on soils and hydrology, as well as the presence of lands dominated by facultative or obligate wetland plants within the specified drainages.

The Districts carried out the Wetland Habitats study consistent with each of these directives.

2.0 STUDY GOALS AND OBJECTIVES

The goal of this study is to map and describe wetland habitats within the study area and to characterize their functional condition. The study objective for individual study sites is to describe specific wetland habitats in a manner consistent with FERC's Study Plan Determination for the Don Pedro relicensing, as described in Section 4 of this study report.

3.0 STUDY AREA

The study area consists of wetland habitats (i.e., lands dominated by facultative or obligate wetland plants, and exhibiting indications of wetland soils and hydrology) that are at at least partially located within the Project Boundary or are otherwise potentially influenced by Project operations and occur within the following ten drainages:

- Sixbit Gulch
- Poor Man's Gulch
- Three Springs Gulch
- Moccasin Creek
- Hatch Creek
- Big Creek
- Kanaka Creek
- Deer Creek
- Drainage #7
- Drainage #8 (including Gardner Falls)

Within each of these drainages, the study area extends to the end of continuous wetland conditions that begin within the Project Boundary. Mapping and photographs for each of the individual study area drainages are attached to this report.

Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by shallow water. For the purposes of the classification, wetlands must have one or more of these three attributes:

(1) at least periodically, the land must support predominantly hydrophytes (wetland plants);
(2) the substrate is predominantly undrained hydric soil; or
(3) rocky, gravelly, or sandy areas that are saturated with or covered by shallow water at some time during the growing season (USFWS 1979).

As a requirement of the California Rapid Assessment Method (CRAM) used in wetland assessment, the drainages also supported at least five percent vegetative cover at the time of survey (during the growing season) (CWMW 2012).

The ten drainages for study were specified by Relicensing Participants during the Districts' study plan development meeting on September 15, 2011. Of these ten drainages, nine support wetland habitats; one (Three Springs Creek) is an intermittent drainage that does not include wetlands as mapped in the National Wetlands Inventory (NWI) (USFWS 1987) or as evident in aerial photographs and was not assessed.

4.0 METHODOLOGY

The study was conducted in three steps: 1) collect and review available data and information, 2) conduct field sampling, 3) check data accuracy and completeness, and 4) summarize and interpret the findings.

4.1 Collect and Review Available Data and Information

Prior to performing fieldwork, the Districts examined available data described in the Pre-Application Document, including Geographic Information System (GIS) data, reports, and maps relevant to wetland habitat. These sources were used to provide information on geology, topography, soils, vegetation coverage and type, invasive species, and land use (i.e., mining, timber management, recreation, road development, fires, grazing, and water diversions). Aerial photos of the study area were used in conjunction with other information to determine the likely location of wetland habitats in the study area, and to direct field survey efforts.

4.2 Field Sampling

The Districts conducted two forms of field study within the wetlands: assessments of the wetlands were performed using the CRAM protocol (CWMW 2012), and vegetation data were collected within belt transects at each wetland.

At all sites, the following data were collected: wetland location as derived from a handheld Global Positioning System (GPS) unit; photographs of the upstream and downstream ends of riverine study sites; observed hydrologic characteristics; wildlife observations; documentation of observed disturbances, with emphasis on roads and recreational use. Surveyors also collected data on the presence of elderberry (*Sambucus* spp.), occurrences of Federal Endangered Species Act (ESA) and California Endangered Species Act (CESA)-listed plants, special-status plants, and noxious weeds as defined in the Districts' Study Proposals. These data were collected in support of Districts' study of ESA-Listed Wildlife Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*), as well as studies involving ESA- and CESA-Listed Plants, special-status plants, and noxious weeds. Results are included in the following studies:

- Study Report TR-05, ESA-Listed Wildlife - Valley Elderberry Longhorn Beetle,
- Study Report TR-02, ESA- and CESA-Listed Plants,
- Study Report TR-01, Special-Status Plants, and
- Study Report TR-04, Noxious Weeds.

Botanical taxonomy and nomenclature is based on *The Jepson Manual: Vascular Plants of California*, Second Edition (Baldwin et al. 2012).

4.2.1 California Rapid Assessment Method (CRAM)

CRAM is an empirically validated, peer-reviewed protocol developed to "provide rapid, scientifically defensible, standardized, cost effective assessments of the status and trends in the condition of wetlands" in California (CWMW 2012). At each site, the CRAM protocol was conducted by qualified botanists with experience in wetland and riparian ecology and expertise in plant identification.

As part of the CRAM assessment, a general description of each wetland was developed, identifying specific influences contributing to the character of each wetland, including channel formation, upland influences (e.g., cattle grazing or landslides), excessive erosion or deposition, and the presence of noxious weeds or special-status plants. Observations of representative and noteworthy conditions (e.g., channel encroachment or site-specific erosion) were documented with digital photographs. In addition, recorded site information includes dominant and sub-dominant species; evidence of periodic recruitment; and the wetland indicator status of dominant and sub-dominant plants onsite.

4.2.1.1 CRAM Attributes and Wetland Services

The CRAM assesses the field conditions of wetland attributes (characteristics) that relate to key services[1] provided by each wetland. The attributes generally fall into one of four categories: buffer and landscape connectivity, hydrology, physical structure, and biotic structure. Increased health, abundance, complexity or diversity of each attribute field occurring within a wetland corresponds to the empirically derived likelihood of an increase in services provided by that wetland.

4.2.1.2 CRAM Assessment Areas (AA)

CRAM AAs were established within each drainage by examining aerial photographs and the extent of the wetland in the field. For standardization purposes, an AA is no less than 100 meters and no more than 200 meters in length. The AAs were established to fall within this 100-200 meter length and to have a width that is as close to 10 times bankfull width as possible. The width of the AA includes all riparian vegetation, plus upslope vegetation that contributes organic material to the channel. Within each wetland, an AA was placed to represent each type of geomorphic characteristic, with more than one AA established and CRAM assessment performed in areas with distinct changes in slope or bedform present within the wetland.

4.2.1.3 CRAM Overall AA Attribute Score Results

The CRAM assesses field conditions of wetland attributes (characteristics) that have an assigned metric value. The metrics for each attribute are combined to create an overall score for the wetland which reflects the degree to which services are provided by the wetland. According to the CRAM, these services include, but are not limited to:

[1] A wetland "service" is a CRAM term that describes a full suite of ecological functions and social benefits, such as, but not limited to, flood control, groundwater recharge, pollution control, and wildlife support.

- Short- or long-term surface water storage
- Subsurface water storage
- Moderation of groundwater flow or discharge
- Dissipation of energy
- Cycling of nutrients
- Removal of elements and compounds
- Retention of particulates
- Export of organic carbon
- Maintenance of plant and animal communities (CWMW 2012)

Table 4.2-1 lists key wetland services as defined by the CRAM Manual and the relationship between the CRAM Attribute scoring sheet and the characteristics of each wetland evaluated. Each checked box corresponds to the attributes section of the scoring sheet (top, horizontal row) with the key service provided (left, vertical column).

Table 4.2-1. CRAM expected relationships among wetland attributes and key wetland services (Source: CWMW 2012).

Key Services	Buffer and Landscape Context	Hydrology			Physical Structure		Biotic Structure				
	Buffer and Landscape Connectivity	Water Source	Hydroperiod or Channel Stability	Hydrologic Connectivity	Structural Patch Richness	Topographic Complexity	Number of Plant Layers	Number of Co-dominant Species and Native Species Richness	Percent Plant Invasion	Horizontal Interspersion and Zonation	Vertical Biotic Structure
Short or long-term surface water storage	X	--	X	X	X	X	--	--	--	X	X
Subsurface water storage	--	X	X	X	X	X	--	--	--	--	--
Moderation of groundwater flow or discharge	X	X	--	--	--	--	--	--	--	--	--
Dissipation of energy	--	--	X	X	X	X	X	--	--	X	X
Cycling of nutrients	X	--	X	X	X	X	X	X	X	--	X
Removal of elements and compounds	X	--	X	X	X	X	X	--	--	X	--
Retention of particulates	--	--	X	X	X	X	X	X	--	X	--

Key Services	Buffer and Landscape Context	Hydrology			Physical Structure		Biotic Structure				
	Buffer and Landscape Connectivity	Water Source	Hydroperiod or Channel Stability	Hydrologic Connectivity	Structural Patch Richness	Topographic Complexity	Number of Plant Layers	Number of Co-dominant Species and Native Species Richness	Percent Plant Invasion	Horizontal Interspersion and Zonation	Vertical Biotic Structure
Export of organic carbon	--	--	X	X	--	--	X	--	X	X	X
Maintenance of plant and animal communities	X	--	X	X	X	X	X	X	X	X	X

Source: CWMW 2012

CRAM defines metric values (scores) for various conditions of each attribute, with the best possible condition receiving a score of 12. Fixed metrics are associated with a description of the condition of each attribute; a best-fit assessment of field conditions to match the CRAM condition description and the metrics are compiled to create an over-all CRAM Overall AA Attribute Score. Table 4.2-2, below, describes the attributes and assessment criteria for each attribute.

Each wetland assessed using the CRAM receives an Overall AA Attribute Score; CRAM scores are standardized across all similarly classified wetlands. For this study, the wetlands exhibited characteristics of riverine wetlands (CWMW 2012) and were evaluated against all other riverine wetlands in the State of California. The highest score possible for an Overall AA Attribute Score is 100, indicating that every possible wetland service is provided and the wetland has reached its maximum potential for riparian wetlands. This provides a standardized approach for all riparian wetlands in California, but does not address the potential of each individual wetland that may be limited due to site characteristics. For example, a riverine wetland with bedrock-dominated substrates is less capable of supporting extensive vegetation and will have a lower Overall AA Attribute Score. Although the wetland may not meet the possible potential of all riverine wetlands, it may meet the potential of that individual wetland considering the limitations. In instances like these, the specific potential of the wetland is noted.

Table 4.2-2. CRAM Overall AA Attribute Scoring Sheet1 for riverine wetlands and assessment criteria description.

Attribute	Attribute Assessment Criteria	Score Possible
Buffer and Landscape Context		
Aquatic Area Abundance	Assessed as the continuity of the riparian corridor up and downstream, measured by non-buffer land types; naturally occurring breaks in vegetation are not measured.	12

Attribute	Attribute Assessment Criteria		Score Possible
Buffer Size and Condition (includes three submetrics)[2]	Assessed as the amount and quality of the area surrounding the wetland that protects the wetland from stress and disturbance:		12
	Final Attribute Score = (Raw Score/24) x 100		100%
Hydrology			
Water Source	Assessed in regard to water quality and alteration in natural flow patterns.		12
Channel Stability	Assessed as the degree of channel aggradation or degradation.		12
Hydrologic Connectivity	Assessed as the degree of connectedness to floodplains.		12
	Final Attribute Score = (Raw Score/36) x 100		100%
Physical Structure			
Structural Patch Richness	Assessed as the quantity of different physical surfaces or features that may provide habitat for aquatic or terrestrial species.		12
Topographic Complexity	Assessed as the macro- and micro-topographic relief and variety of elevations within a wetland due to physical features and elevation gradients.		12
	Final Attribute Score = (Raw Score/24) x 100		100%
Biotic Structure			
Number of Plant Layers (Submetric)	Assessed as the degree to which plants occur within various height classes, representing stratification in habitat and community functional groups.	12	12[3]
Number of Co-dominant Plant Species (Submetric)	Assessed as the number of co-dominant plant species in a wetland; co-dominant species make up at least 10% of a plant layer.	12	
Percent Invasion of Co-dominant Plant Species (Submetric)	Assessed as the percentage of co-dominant species that are invasive.	12	
Horizontal Interspersion	Assessed as the complexity of interspersion of plant zones (e.g., describes a micro-vegetation community; for example, an area of mixed graminoids or an area with shrubs and herbs may each be considered a "plant zone").		12
Vertical Biotic Structure	Assessed as the degree to which different plant layers overlap (short, medium, tall, and very tall plants) to provide vertical habitat connectivity.		12
	Final Attribute Score = (Raw Score/36) x 100		100%
Overall AA Attribute Score (average of four final scores)			**100**

[1] Source: CWMW 2012.

[2] The buffer metric is comprised of three buffer submetrics: 1) percent of AA with buffer; 2) average buffer width; and 3) buffer condition. The submetrics calculations have been condensed for this form.

[3] The plant submetric Attribute Score is calculated by averaging the scores from "Number of Plant Layers," "Number of Co-dominant Plant Species," and "Percent Invasion of Co-dominant Plant Species." The maximum Attribute Score of the three averaged submetrics is 12.

4.2.2 Vegetation Belt Transects

Vegetation belt transects were established to determine species dominance, abundance, richness, ground and canopy cover, as well as lateral and horizontal complexity. Transects are two meters wide and extend perpendicularly to the channel within the area dominated by wetland species. Transects were sampled every 50 meters within wetland habitats, with a target of four belt transects per drainage.

Each species in the belt transect was notated with its California region wetland indicator status. This status determined by the USFWS, represents the likelihood of a species to occur in a wetland in California. Wetlands supporting a greater richness (the number of species present) and abundance of hydrophytes (OBL, FACW, and FAC plants) tend to have stronger wetland characteristics such as prolonged or frequent inundation Areas dominated by wetland species represent wetlands, as defined by the USFWS, and were used to determine wetland boundaries. Wetland indicator status designations are described in Table 4.2-3, below.

Table 4.2-3. Wetland indicator status categories used to designate a plant species' likelihood to occur in a wetland or upland.

Indicator Code	Indicator Status	Criteria for Assigning the Indicator Status
FAC	Facultative	Equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%).
OBL	Obligate Wetland	Almost always is a hydrophyte, rarely in uplands. Under natural conditions, occurs almost always in wetlands (estimated probability 99%).
FACW	Facultative Wetland	Usually is a hydrophyte but occasionally found in uplands. Usually occurs in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands.
FACU	Facultative Upland	Usually occurs in non-wetlands (estimated probability 67%-99%), but occasionally found in wetlands (estimated probability 1%-33%).
UPL	Obligate Upland	Rarely is a hydrophyte, almost always in uplands. Under natural conditions occurs almost always in non-wetlands (estimated probability 99%).
NA	No agreement	The regional panel was not able to reach a unanimous decision on this species.
NL	Not listed	The species is not listed with a wetland indicator status.
NI	No indicator	Insufficient information was available to determine an indicator status.
NO	No occurrence	The species does not occur in that region.
UPL	Obligate Upland	Rarely is a hydrophyte, almost always in uplands. Under natural conditions occurs almost always in non-wetlands (estimated probability 99%).

Source: Reed 1988.

4.3 Prepare Data and Quality Assure/Quality Control Data

The Districts are commited to providing with information that best represents field conditions by using accurate and complete data for all study results and discussions. All field data collected, such as site characteristics and species compositon, were double-checked in the field by a second qualified scientist. All mapped results, such as the location of AAs and transect locations were checked by 1) one of the field scientists that performed the survey work, and 2) by the managing GIS coordinator. All written documentation, including the technical memorandum and attachments were reviewed by two scientists not involved in the field surveys and by the terrestrial resource lead. Combined, these quality assure/quality control (QA/QC) measures ensure the best possible product that describe the process and results of the study.

5.0 RESULTS

5.1 Overview of Study Area

Ten drainages in the study area were evaluated for the presence of, or potential to support, wetlands. Wetlands were identified within nine of these drainages, which were surveyed between June 5, 2012 and June 12, 2012. Those wetlands occur within drainages leading into the Reservoir, with the exception of Big Creek, which occurs within the study area, but has no direct hydrologic connection to the Reservoir. Wetland conditions are associated with nine of the ten drainages as identified by the presence of hydrophytic vegetation and hydrology, and wetland classification on the NWI maps (USFWS 1987).

The wetlands associated with the Reservoir are categorized as palustrine (wetlands dominated by trees, shrubs, and emergent, herbaceous vegetation) or riverine (wetlands and deepwater habitats that are within natural and artificial channels) (Cowardin et al. 1979), consisting primarily of riparian vegetation along intermittent or ephemeral drainages that flow into the Reservoir. They typically occur above the "bathtub ring" near the normal high water line. Many drainages support only limited wetland vegetation due to the composition of the bed and bank, steep channel gradient, or frequency, duration, and volume of water in the channel. The wetlands generally have bedrock or cobble and boulder dominated substrates that are unlikely to support hydric soils, but support hydrophytic vegetation and display watermarks or other indicators that the ground is saturated or inundated during some part of the growing season during most years.

The upland slopes surrounding the drainages consist primarily of non-native annual grasslands and foothill scrub or oak woodlands. Many of the drainages occur within steep canyons with a narrow valley floor, creating a narrow footprint for riparian wetlands and a clear boundary between the wetlands and upland plant communities. Cattle grazing was apparent at all wetlands downstream of Railroad Canyon, as evident by hoof puncture, grazed vegetation, the presence of cow patties, or direct observation of grazing cattle.

Other disturbances within the wetlands were very limited; recreational areas near the wetlands appeared to be primarily Reservoir-based, and there was little to no sign of human visitation in the drainages upstream of the reservoir. For example, boaters anchor at the base of Gardner Falls but there is no indication that they walk upslope to the wetlands at Drainage #8. The few exceptions to this included vehicle tracks crossing the wetlands; these exceptions are identified below.

Although noxious weeds[2] and other non-native plant species were present in several of the upland grass communities adjacent to wetlands examined for this study, there were few noxious weeds within the wetlands. The two noxious weeds-- occurring within only a few wetlands and in very limited quantities -- are Italian thistle (*Carduus pycnocephalus*) and Klamathweed (*Hypericum perforatum* [*Hypericum perforatum* ssp. *perforatum*]); although these species are present, they do not occur in high enough quantities to be considered co-dominants of a plant

[2] For the purposes of this report, a "noxious weed" is defined as those weeds listed for survey in TR-04, Noxious Weed Survey Study Plan (TID/MID 2011).

layer. Other species that are not rated as noxious, but defined as "invasive" by CRAM include Himalayan blackberry (*Rubus armeniacus*) and wooly mullein (*Verbascum thapsus*). Himalayan blackberry is present at the perimeter of many wetlands, and occurs as a co-dominant within several wetlands. Wooly mullein is scattered in limited quantities in several wetlands and is not co-dominant in any wetland.

Two ESA-Listed Plants, California vervain (*Verbena californica*) and Cleveland's ragwort (*Packera clevelandii* var. *heterophyllus*) occur within Sixbit Gulch and Poor Man's Gulch wetlands. One special-status plant, Red Hills soaproot (*Chlorogalum grandiflorum*), is present in Sixbit Gulch, Poor Man's Gulch, and Drainage #8. Specific information on the populations of noxious weeds, ESA- and CESA-Listed Plants, and Special-Status Plants is included in Study Reports TR-04, Noxious Weed Study; TR-02, ESA- and CESA-Listed Plants Study; and TR-01, Special-Status Plants Study, respectively (TID/MID 2013).

5.2 Sixbit Gulch

5.2.1 General Description

Sixbit Gulch is located within the Bureau of Land Management's (BLM) Area of Critical Environmental Concern (ACEC) and supports two types of NWI-classified wetlands: riverine intermittent streambed, seasonally flooded (R4SBC) and palustrine scrub-shrub, temporarily flooded (PSSA) (USFWS 1987). It is moderately confined by slopes of annual grasslands interspersed with buck brush (*Ceanothus cuneatus*) and grey pine (*Pinus sabiniana*); large bedrock and boulder outcrops occur along the perimeter of the wetland (Attachment B, Photo 1). The bed of the drainage is micro-topographically complex, with deep pools (~4 feet), chutes in bedrock between shallow pools, and well-sorted cobbles and gravels in many areas. The cross-section of the channel is less complex, with one bench occurring at bankfull width.

Vegetation communities alternate between hummocks of naked sedge (*Carex nudata*) interspersed with herbs (Attachment B, Photo 2), and dense patches of red willow (*Salix laevigata*) and spicebush (*Calycanthus occidentalis*) surrounding pools. The wetland area alternates between dense cover and open bedrock, with medium vertical and horizontal vegetation complexity. Although three vertical layers are present within the wetland vegetation, most areas support no more than two vertical overlapping layers (e.g., willow mid-story over sedge ground-cover) and have horizontally alternating, rather than mixed patches, of vegetation types.

An old road crosses the channel near transect #6, paved where it crosses the channel, and graded dirt on either side. The Districts do not utilize this road; the BLM closed the road to vehicle traffic and brush has overgrown the route both in and out of the channel (pers. comm. Jigour 2012). The road provides an opening in the dense riparian shrubs for sedge, springseep monkeyflower (*Mimulus guttatus*), and Sonoma hedgenettle (*Stachys stricta*) to flourish (Attachment B, Photo 3).

Two ESA-Listed Plants, California vervain and Cleveland's ragwort, and one special-status plant, Red Hills soaproot, were identified within and adjacent to the wetland, with no indicators

of stressors apparent. The weed, goat grass (*Triticum aestivum*), was present upslope of the wetland, but none occurred within the hydric soils of the wetland. Bullfrogs (*Rana catesbiana*) were present throughout the reach, with groups of tadpoles concentrated in the pools.

5.2.2 CRAM Overall AA Attribute Score

Sixbit Gulch supports a healthy riparian system with a CRAM Overall AA Attribute Score of 83. The score indicates that the wetland experiences few stressors from upland or hydrologic sources and provides a multitude of wetland services, but its channel and vegetation complexity is limited by the bedrock bed and banks that dominate the wetland. This is typical for confined bedrock drainages. The wetland meets the potential of the system; that is, a wetland in this setting could not be expected to achieve a higher score. Table 5.2-1, below, lists each Attribute Score with a description supporting the score. The CRAM AA used to evaluate the wetland is shown on Attachment A, Figure 1.

Table 5.2-1. CRAM Attribute Scoring Sheet for Sixbit Gulch.

Buffer and Landscape Context			**Score**
Aquatic Area Abundance	There are no significant (more than 10 meters) breaks in the riparian area within 500 meters up or downstream of the Assessment Area (AA).		12
Buffer Size and Condition (includes three submetrics)	There are no significant (more than 10 meters) breaks in the natural landscape (e.g., no residential or commercial areas) within 250 meters surrounding the AA.		12
	Final Attribute Score = (24/24) x 100		100%
Hydrology			
Water Source	The water source is unimpaired, draining natural runoff from surrounding hillslopes. There is no indication that dry season conditions are controlled by artificial water sources.		12
Channel Stability	The channel through the AA is characterized by equilibrium conditions, with little evidence of aggradation or degradation. Some fines and gravels are accumulated in pools, but occur in quantities that suggest they intermittently get flushed from the system during high flows.		12
Hydrologic Connectivity	The lateral movement of floodwaters is within parameters expected in confined channel conditions.		12
	Final Attribute Score = (36/36) x 100		100%
Physical Structure			
Structural Patch Richness	Several structural patch types were observed within the AA, including organic debris in the channel, cobbles and boulders, algal mats, pools, and a variegated shoreline.		9
Topographic Complexity	The cross-section shape of the wetland is simple, with one bench, which is within parameters expected of a bedrock-dominated channel and meets the potential of the system.		6
	Final Attribute Score = (15/24) x 100		63%
Biotic Structure			
Number of Plant Layers (Submetric)	Four plant layers are present in this system, which include short, medium, tall, and very tall plants. These are within parameters expected of a bedrock channel and meets the potential of the system.	9	10
Number of Co-dominant Plant Species (Submetric)	Nine co-dominant plants are present in the AA, which is within expected parameters of a confined, bedrock-dominated system.	9	
Percent Invasion of Co-dominant Plant Species (Submetric)	None of the co-dominant plant species is invasive.	12	

Horizontal Interspersion	The horizontal interspersion of plant zones is simple, with alternating zones of shrubs and herbs, which is within expected parameters of a confined, bedrock-dominated system.	6
Vertical Biotic Structure	The vertical structure has moderate overlap of two plant layers throughout the AA.	9
	Final Attribute Score = (25/36) x 100	69%
Overall AA Score (average of four final scores)		**83**

5.2.3 Vegetation Transects

Complete species lists from the 10 vegetation belt transects sampled at Sixbit Gulch are included in Table 5.2-2, below, and photos of the transects are shown on Attachment A, Figure 1.

Table 5.2-2. Plant species and their cover observed in vegetation belt transects at Sixbit Gulch.

Transect Number	Percent Cover[1]	Scientific Name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
SG-01	65%	*Carex nudata*	naked sedge	Herb	FACW	Native
	25%	--	open ground/water	--	--	--
	3%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	3%	*Digitaria sanguinalis*	large crabgrass	Herb	FACU	Naturalized
	3%	*Cynodon dactylon*	Bermuda grass	Herb	FAC	Naturalized
	1%	*Mimulus guttatus*	seepspring monkeyflower	Herb	OBL	Native
	< 1%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
SG-02	40%	*Salix laevigata*	red willow	Shrub	NL	Native
	35%	*Calycanthus occidentalis*	Spicebush	Shrub	FAC	Native
	15%	--	open ground/water	--	--	--
	5%	*Carex nudata*	naked sedge	Herb	FACW	Native
	5%	*Pinus sabiniana*	grey pine	Tree	NL	Native
	< 1%	*Stachys stricta*	hedge nettle	Herb	OBL	Native
	< 1%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	< 1%	*Trichostema lanceolatum*	vinegar weed	Herb	NL	Native
	< 1%	*Triteleia laxa*	Ithuriel's spear	Herb	NL	Native
SG-03	70%	*Salix laevigata*	red willow	Shrub	NL	Native
	25%	*Calycanthus occidentalis*	Spicebush	Shrub	FAC	Native
	10%	*Carex nudata*	naked sedge	Herb	FACW	Native
	5%	*Stachys stricta*	hedge nettle	Herb	OBL	Native
	1%	*Hoita macrostachya*	leather root	Shrub	OBL	Native
	< 1%	*Juncus xiphioides*	iris leaf rush	Herb	OBL	Native
SG-04	60%	*Salix laevigata*	red willow	Shrub	NL	Native
	40%	*Calycanthus occidentalis*	Spicebush	Shrub	FAC	Native
	5%	*Carex nudata*	naked sedge	Herb	FACW	Native

Transect Number	Percent Cover[1]	Scientific Name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
SG-05	40%	*Salix laevigata*	red willow	Shrub	NL	Native
	40%	*Calycanthus occidentalis*	Spicebush	Shrub	FAC	Native
	10%	--	open ground/water	--	--	--
	5%	*Carex nudata*	naked sedge	Herb	FACW	Native
SG-06	60%	*Salix laevigata*	red willow	Shrub	NL	Native
	40%	*Carex nudata*	naked sedge	Herb	FACW	Native
	20%	*Calycanthus occidentalis*	Spicebush	Shrub	FAC	Native
	1%	*Rhamnus tomentella*	hoary coffeeberry	Shrub	NL	Native
SG-07	85%	*Salix laevigata*	red willow	Shrub	NL	Native
	60%	*Calycanthus occidentalis*	Spicebush	Shrub	FAC	Native
	60%	*Carex nudata*	naked sedge	Herb	FACW	Native
	1%	*Solidago sp.*	Goldenrod	Herb	NL	Native
	< 1%	*Stachys stricta*	hedge nettle	Herb	OBL	Native
	< 1%	*Allium validum*	swamp onion	Herb	OBL	Native
	< 1%	*Solanum americanum*	American black nightshade	Herb	FAC	Native
	< 1%	*Hoita macrostachya*	leather root	Shrub	OBL	Native
	3%	--	unknown grass	Herb	--	--
SG-08	75%	*Calycanthus occidentalis*	Spicebush	Shrub	FAC	Native
	15%	*Carex nudata*	naked sedge	Herb	FACW	Native
	10%	--	open ground/water	--	--	--
SG-09	85%	*Calycanthus occidentalis*	Spicebush	Shrub	FAC	Native
	20%	*Salix laevigata*	red willow	Shrub	NL	Native
	5%	*Carex nudata*	naked sedge	Herb	FACW	Native
	5%	*Stachys stricta*	hedge nettle	Herb	OBL	Native
SG-10	80%	*Carex nudata*	naked sedge	Herb	FACW	Native
	20%	*Stachys stricta*	hedge nettle	Herb	OBL	Native
	10%	*Calycanthus occidentalis*	Spicebush	Shrub	FAC	Native
	< 1%	*Hoita macrostachya*	leather root	Shrub	OBL	Native

[1] Total percent coverage may add up to amounts greater than 100% where tree, shrub, and herb strata overlap.
[2] Source: Reed 1988.

5.3 Poor Man's Gulch

5.3.1 General Description

Poor Man's Gulch is located within the BLM's ACEC and supports one type of NWI-classified NWI-classified wetland: riverine intermittent streambed, seasonally flooded (R4SBC) (USFWS 1987). The drainage is unconfined within a narrow valley of non-native annual grasslands dotted with grey pines, buckbrush, and occasional hollyleaf redberry (*Rhamnus ilicifolia*). Shallow soils overlie bedrock. Hummocks of naked sedge and mixed herbs (Attachment B, Photo 4) alternate with exposed bedrock with tufts of perennial ryegrass (*Lolium perenne*), and rabbitfoot grass (*Polypogon monspeliensis*) occurs at the perimeter (Attachment B, Photo 5). Alternating

with these areas are patches of red willow and spicebush, which occur with more frequency near the upstream end of the AA around pools (Attachment B, Photo 6). The vertical and horizontal complexity is limited in this system, with few overlapping vertical layers, and alternating, rather than mixed, vegetation patches. The micro-topography is somewhat complex, while the macro-topography is simple, with the channel at the center of the gently sloping valley floor.

Near Transect PMG-09, the drainage splits around an island of upland grasses and forbs. The river right side of the drainage is pooled and surrounded by dense red willow and an isolated patch of tule (*Schoenoplectus acutus* var. *occidentalis*). The left side of the drainage is mostly open bedrock with red willow, naked sedge, and seepspring monkeyflower at the perimeter.

Two ESA-Listed Plants, California vervain and Cleveland's ragwort, and one Special-Status Plant, Red Hills soaproot, were identified adjacent to the wetland, with no indicators of stressors apparent. Bullfrogs were present throughout the reach, with groups of tadpoles concentrated in the pools.

5.3.2 CRAM Overall AA Attribute Score

Poor Man's Gulch supports a healthy riparian system with a CRAM Overall AA Attribute Score of 80. The score indicates that the wetland experiences few stressors from upland or hydrologic sources and provides a multitude of wetland services, but has somewhat limited channel and vegetation complexity. The CRAM AA used to evaluate the wetland is shown on Attachment A, Figure 2.

Table 5.3-1. CRAM Attribute Scoring Sheet for the lower portion of Poor Man's Gulch.

Buffer and Landscape Context		**Score**
Aquatic Area Abundance	There are no significant (more than 10 meters) breaks in the riparian area within 500 meters up or downstream of the Assessment Area (AA).	12
Buffer Size and Condition (includes three submetrics)	There are no significant (more than 10 meters) breaks in the natural landscape (e.g., no residential or commercial areas) within 250 meters surrounding the AA.	12
	Final Attribute Score = (24/24) x 100	100%
Hydrology		
Water Source	The water source is unimpaired, draining natural runoff from surrounding hillslopes. There is no indication that dry season conditions are controlled by artificial water sources.	12
Channel Stability	The channel through the AA is characterized by equilibrium conditions, with little evidence of aggradation or degradation. Some fines are accumulated in pools, but occur in quantities that suggest they intermittently get flushed from the system during high flows.	12
Hydrologic Connectivity	The lateral movement of floodwaters is unconfined and has high connectivity with adjacent upland areas.	12
	Final Attribute Score = (36/36) x 100	100%
Physical Structure		
Structural Patch Richness	A multitude of structural patch types was observed within the AA, including organic debris in the channel, cobbles and boulders, algal mats, pools in the channel, swales on the floodplain, vegetated islands, and a variegated shoreline.	12

Topographic Complexity	The cross-section shapeof the wetland is very simple, with no true bench. The channel is a depression in the gently sloping valley floor, which is within expected parameters and meets the potential of the system.		3
		Final Attribute Score = (15/24) x 100	63%
Biotic Structure			
Number of Plant Layers (Submetric)	Four plant layers are present in this system, which include short, medium, tall, and very tall plants. These are within parameters expected of a bedrock channel and meets the potential of the system.	12	12
Number of Co-dominant Plant Species (Submetric)	Ten co-dominant plants are present in the AA.	12	
Percent Invasion of Co-dominant Plant Species (Submetric)	One of the co-dominant species is an invasive plant species and constitutes less than 15 percent of the co-dominant plant species.	12	
Horizontal Interspersion	The horizontal interspersion of plant zones is simple, with alternating zones of shrubs and open bedrock areas supporting herbs.		3
Vertical Biotic Structure	The vertical structure has moderate overlap of two plant layers throughout the AA.		6
		Final Attribute Score = (21/36) x 100	58%
Overall AA Attribute Score (average of four final scores)			**80**

5.3.3 Vegetation Transects

Complete species lists from the nine vegetation belt transects sampled at Poor Man's Gulch are included in Table 5.3-2, below, and photos of the transects are included in Attachment A, Figure 2.

Table 5.3-2. Plant species and their cover observed in vegetation belt transects at Poor Man's Gulch.

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
PMG-01	30%	*Hordeum brachyantherum*	California barley	Herb	FACW	Native
	20%	*Madia* sp.	Tarweed	Herb	--	--
	1%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	< 1%	*Mimulus guttatus*	seepspring monkeyflower	Herb	OBL	Native
	< 1%	*Allium validum*	swamp onion	Herb	OBL	Native
	< 1%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
	< 1%	*Stachys stricta*	hedge nettle	Herb	OBL	Native
PMG-02	90%	*Carex nudata*	naked sedge	Herb	FACW	Native
	10%	*Stachys stricta*	hedge nettle	Herb	OBL	Native
	1%	*Rumex crispus*	curly dock	Herb	FACW-	Naturalized
	1%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
PMG-03	20%	*Digitaria sanguinalis*	large crabgrass	Herb	FACU	Naturalized
	20%	*Hordeum brachyantherum*	California barley	Herb	FACW	Native
	15%	*Madia* sp.	Tarweed	Herb	--	--
	15%	*Carex nudata*	naked sedge	Herb	FACW	Native

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
	10%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
	5%	*Stachys stricta*	hedge nettle	Herb	OBL	Native
	3%	--	open ground/water	--	--	--
	1%	*Asclepias fascicularis*	narrow leaf milkweed	Herb	FAC	Native
	< 1%	*Hypochaeris radicata*	hairy cat's ear	Herb	NO	Naturalized
	< 1%	*Taraxacum officinale*	common dandelion	Herb	NL	Naturalized
	< 1%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	< 1%	*Rumex crispus*	curly dock	Herb	FACW-	Naturalized
PMG-04	90%	*Carex nudata*	naked sedge	Herb	FACW	Native
	5%	*Salix laevigata*	red willow	Shrub	NL	Native
	3%	*Hordeum brachyantherum*	California barley	Herb	FACW	Native
	< 1%	*Asclepias fascicularis*	narrow leaf milkweed	Herb	FAC	Native
	< 1%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
PMG-05	40%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
	25%	--	open ground/water	--	--	--
	25%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	3%	*Juncus balticus*	mountain rush	Herb	OBL	Native
	3%	*Madia* sp.	Tarweed	Herb	--	--
	2%	*Trichostema lanceolatum*	Vinegar weed	Herb	NL	Native
	< 1%	*Asclepias fascicularis*	narrow leaf milkweed	Herb	FAC	Native
	< 1%	*Anagallis arvensis*	scarlet pimpernel	Herb	FAC	Naturalized
PMG-06	40%	--	open ground/water	--	--	--
	15%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
	15%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	10%	*Madia* sp.	Tarweed	Herb	--	--
	< 1%	*Asclepias fascicularis*	narrow leaf milkweed	Herb	FAC	Native
	< 1%	*Mimulus guttatus*	seepspring monkeyflower	Herb	OBL	Native
	< 1%	*Hoita macrostachya*	leather root	Shrub	OBL	Native
PMG-07	50%	*Salix laevigata*	red willow	Shrub	NL	Native
	30%	*Stachys stricta*	hedge nettle	Herb	OBL	Native
	20%	*Carex nudata*	naked sedge	Herb	FACW	Native
	20%	--	open ground/water	--	--	--
	1%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
	1%	*Asclepias fascicularis*	narrow leaf milkweed	Herb	FAC	Native
PMG-08	70%	*Carex nudata*	naked sedge	Herb	FACW	Native
	40%	*Salix laevigata*	red willow	Shrub	NL	Native
	10%	--	open ground/water	--	--	--
	10%	*Schoenoplectus acutus*	Tule	Herb	--	Native
	5%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	5%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
	5%	*Stachys stricta*	hedge nettle	Herb	OBL	Native
	< 1%	*Allium validum*	swamp onion	Herb	OBL	Native
	< 1%	*Carex feta*	greensheath sedge	Herb	OBL	Native

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
	< 1%	*Digitaria sanguinalis*	large crabgrass	Herb	FACU	Naturalized
	< 1%	*Juncus balticus*	mountain rush	Herb	OBL	Native
	< 1%	*Panicum acuminatum*	western panic grass	Herb	FACW	Native
	< 1%	*Solanum americanum*	American black nightshade	Subshrub	FAC	Native
	< 1%	*Trichostema lanceolatum*	vinegar weed	Herb	NL	Native
PMG-09	45%	--	open ground/water	--	--	--
	10%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
	7%	*Hordeum brachyantherum*	California barley	Herb	FACW	Native
	7%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	5%	*Hordeum murinum*	Foxtail	Herb		Naturalized
	5%	*Trifolium hirtum*	rose clover	Herb	--	Naturalized
	3%	*Madia* sp.	Tarweed	Herb	--	--
	3%	*Avena barbata*	slender wild oat	Herb	NL	Naturalized
	3%	*Taraxacum officinale*	common dandelion	Herb	NL	Naturalized
	2%	*Digitaria sanguinalis*	large crabgrass	Herb	FACU	Naturalized
	2%	*Anagallis arvensis*	scarlet pimpernel	Herb	FAC	Naturalized
	2%	*Eleocharis ovate*	ovate spikerush	Herb	NO	Native
	1%	*Hypochaeris radicata*	hairy cat's ear	Herb	NO	Naturalized
	< 1%	*Trichostema lanceolatum*	vinegar weed	Herb	NL	Native
	< 1%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
	< 1%	*Allium validum*	swamp onion	Herb	OBL	Native
	< 1%	*Bromus diandrus*	ripgut brome	Herb	NL	Naturalized
	< 1%	*Calycanthus occidentalis*	Spicebush	Shrub	FAC	Native
	< 1%	*Ceanothus cuneatus*	Buckbrush	Shrub	NL	Native
	< 1%	*Dianthus armeria*	deptford pink	Herb	NL	Native
	< 1%	*Eriogonum nudum*	naked buckwheat	Herb	NL	Native
	< 1%	*Lotus purshianus*	spanish clover	Herb	NL	Native
	< 1%	*Melilotus officinalis*	yellow sweetclover	Herb	FACU	Naturalized
	< 1%	*Mimulus guttatus*	seepspring monkeyflower	Herb	OBL	Native
	< 1%	*Plagiobothrys* sp.	popcorn flower	Herb	--	Native
	< 1%	*Sisyrinchium bellum*	western blue-eyed grass	Herb	FAC	Native
	< 1%	*Stachys stricta*	hedge nettle	Herb	OBL	Native
	< 1%	*Triteleia laxa*	Ithuriel's spear	Herb	NL	Native
	< 1%	*Chlorogalum grandiflorum*	Red Hills soaproot	Herb	NL	Native

[1] Total percent coverage may add up to amounts greater than 100% where tree, shrub, and herb strata overlap.
[2] Source: Reed 1988

5.4 Three Springs Creek

The Districts' examination of aerial photos and USFWS NWI maps (USFWS 1987) and on-site reconnaissance found that Three Springs Creek does not support any indicators of wetland

conditions (Attachment A, Figure 3). Survey from the boat on the Reservoir confirmed that no wetland conditions are present (Attachment B, Photo 7); this is supported by botanical surveys performed for Study Reports TR-01, Special Status Plants; TR-02, ESA- and CESA-Listed Plants Study; and TR-04, Noxious Weed Survey (TID/MID 2013). No wetland assessment was performed at this site.

5.5 Moccasin Creek

5.5.1 General Description

Moccasin Creek supports one type of NWI-classified wetland: riverine intermittent streambed, seasonally flooded, excavated (R4SBCx) (USFWS 1987). The portion of Moccasin Creek with the potential to be affected by Project O&M occurs downstream of San Francisco Public Utilities Commission's Moccasin Reservoir and the California Department of Fish and Game's (CDFG) Moccasin Creek Trout Hatchery (Hatchery). The creek flows through a tunnel under Moccasin Reservoir and into the channel upstream of the AA and the Hatchery. Water from Moccasin Reservoir is used by the Hatchery then released just downstream into Moccasin Creek, downstream of Transect MC-06. The discharge from the Trout Hatchery is estimated to be approximately 30 cubic feet per second (cfs).

Moccasin Creek is moderately confined, with floodplains within a valley that becomes more narrow and steep travelling upstream from Reservoir. Upslope vegetation is comprised of non-native annual grassland and oak woodlands. The channel is low gradient, with well-sorted bed material dominated by cobbles, with some boulders and finer sediments. The banks tend to be soil, stabilized by mature alder (*Alnus incana*) and red willow trees and shrubs, with occasional California sycamore (*Platanus racemosa*) and narrowleaf willow (*Salix exigua*). The canopy is well developed, providing shade throughout the creek. Herbaceous vegetation is rich, but not overly abundant, with many species occurring in small patches around tree roots (Attachment B, Photo 8). The creek supports complex vertical and horizontal stratification, with multiple layers of vegetation present throughout.

The creek is accessed frequently by fishermen, with trails weaving through upslope Himalayan blackberries, black mustard (*Brassica nigra*), and other weedy species. The river left bank just upstream of the Hatchery discharge has a short erosional area, where the dirt bank has collapsed (Attachment B, Photo 9), although established root systems on either side will prevent extension of the bank failure. The Highway 120 Bridge crosses over the creek near Transect MC-12, but does not create a break in riparian vegetation connectivity. Large rip-rap is present directly downstream of the bridge pillars on both sides, and some concrete paving (about 12 square meters) occurs in the channel. The paving does not appear to have a negative impact, with small sediments and aquatic plants covering a large portion of it.

Exposed alder roots within the wetted edge, diverse aquatic vegetation, and abundant bryophytes (non-vascular plants such as mosses and liverworts) on the banks indicate a healthy system with minimal fluctuation in flows (Attachment B, Photo 10). Macroinvertebrates, passerines, and fish were observed at the time of the survey, and no bullfrogs were observed.

5.5.2 CRAM Overall AA Attribute Scores

Two CRAM assessments were performed at Moccasin Creek to capture the differences in channel width and discharge. However, both AAs received the same CRAM Overall AA Attribute Score of 97, which indicates that the wetlands in Moccasin Creek experience few stressors from upland or hydrologic sources and provides most wetland services possible.

The lower portion of Moccasin Creek supports a healthy, diverse riparian system with a CRAM Overall AA Attribute Score of 97. This portion drains directly into Reservoir. The AA for the lower portion of Moccasin Creek is just downstream of the Hatchery discharge. The CRAM AA used to evaluate the wetland is shown on Attachment A, Figure 4.

Table 5.5-1. CRAM Attribute Scoring Sheet for the lower portion of Moccasin Creek.

Buffer and Landscape Context			**Score**
Aquatic Area Abundance	There are no significant (more than 10 meters) breaks in the riparian area within 500 meters up or downstream of the Assessment Area (AA).		12
Buffer Size and Condition (includes three submetrics)	There are no significant (more than 10 meters) breaks in the natural landscape (e.g., no residential or commercial areas) within 250 meters surrounding the AA.		12
	Final Attribute Score = (24/24) x 100		100%
Hydrology			
Water Source	The water source includes natural runoff from surrounding hillslopes and input from the California Department of Fish and Game's (CDFG) Moccasin Creek Trout Hatchery upstream. There is no indication that dry season conditions are controlled by artificial water sources, although water levels are modified by the discharge from the fish hatchery.		12
Channel Stability	The channel through the AA is characterized by equilibrium conditions, with some evidence of erosion for a very short length of the river right bank at the lower end of the AA. All other characteristics indicate channel and bank stability.		12
Hydrologic Connectivity	The lateral movement of floodwaters has connectivity with adjacent floodplains, and is within parameters expected in unconfined channel conditions.		12
	Final Attribute Score = (36/36) x 100		100%
Physical Structure			
Structural Patch Richness	Several structural patch types were observed within the AA, including cobbles and boulders, pools and riffles in the channel, pools and swales on the floodplain, point bars and islands, and a variegated shoreline.		12
Topographic Complexity	The cross-section shape of the wetland is simple, with one bench or two benches throughout the AA.		9
Biotic Structure			
Number of Plant Layers (Submetric)	Five plant layers are present in this system, which include floating, short, medium, tall, and very tall plants.	12	12
Number of Co-dominant Plant Species (Submetric)	Thirteen co-dominant plants are present in the AA, which is within expected parameters of an unconfined system.	12	
Percent Invasion of Co-dominant Plant Species (Submetric)	None of the co-dominant species is invasive.	12	
Horizontal Interspersion	The horizontal interspersion of plant zones is complex, with intermixed zones of vegetation throughout the AA.		12

Vertical Biotic Structure	The vertical structure has high overlap of two plant layers throughout the AA.	9
	Final Attribute Score = (21/24) x 100	88
Overall AA Attribute Score (average of four final scores)		**97**

The upper portion of Moccasin Creek supports a healthy, diverse riparian system with a CRAM Overall AA Attribute Score of 97. The AA for the upper portion of Moccasin Creek is downstream of the Highway 120 Bridge and upstream of the Hatchery discharge. The CRAM AA used to evaluate the wetland is shown on Attachment A, Figure 4.

Table 5.5-2. CRAM Attribute Scoring sheet for the upper portion of Moccasin Creek.

Buffer and Landscape Context			**Score**
Aquatic Area Abundance	There are no significant (more than 10 meters) breaks in the riparian area within 500 meters up or downstream of the Assessment Area (AA). The Highway 120 Bridge crosses Moccasin Creek above the riparian overstory, producing a reduction in riparian width only where cement support structures intersect with the banks.		12
Buffer Size and Condition (includes three submetrics)	The average buffer width is 200 meters; the California Department of Fish and Game's (CDFG) Moccasin Creek Trout Hatchery provides a break in the natural landscape.		12
	Final Attribute Score = (24/24) x 100		100%
Hydrology			
Water Source	The water source is unimpaired, draining natural runoff from surrounding hillslopes. There is no indication that dry season conditions are controlled by artificial water sources.		12
Channel Stability	The channel through the AA is characterized by equilibrium conditions, with little evidence of aggradation or degradation. The channel supports well-sorted cobbles and gravels, at least three different species of native aquatic plants, and several species of bryophytes and exposed alder (*Alnus incana*) roots at the wetted edge.		12
Hydrologic Connectivity	The lateral movement of floodwaters has connectivity with adjacent floodplains and is within parameters expected of unconfined channel conditions.		12
	Final Attribute Score = (36/36) x 100		100%
Physical Structure			
Structural Patch Richness	A multitude of structural patch types was observed within the AA, including organic debris in the channel, cobbles and boulders, submerged vegetation, pools and riffles, swales or secondary channels on the floodplain, and a variegated shoreline.		12
Topographic Complexity	The cross-section shape of the wetland has two benches, with somewhat simple micro-topographic complexity.		9
	Final Attribute Score = (21/24) x 100		88%
Biotic Structure			
Number of Plant Layers (Submetric)	Five plant layers are present in this system, which include floating, short, medium, tall, and very tall plants.	12	12
Number of Co-dominant Plant Species (Submetric)	Twelve co-dominant plants are present in the AA.	12	
Percent Invasion of Co-dominant Plant Species (Submetric)	One of the co-dominant species is invasive and constitutes less than 15 percent of the co-dominant plant species.	12	

Horizontal Interspersion	The horizontal interspersion of plant zones is complex, with well interspersed zones of vegetation throughout the AA.	12
Vertical Biotic Structure	The vertical structure has high overlap of three plant layers throughout most of the AA.	12
	Final Attribute Score = (36/36) x 100	100%
Overall AA Attribute Score (average of four final scores)		**97**

5.5.3 Vegetation Transects

Complete species lists from the 13 vegetation belt transects sampled at Moccasin Creek are included in Table 5.5-3, below, and photos at each vegetation belt transect are included in Attachment A, Figure 4.

Table 5.5-3. Plant species and their cover observed in vegetation belt transects at Moccasin Creek.

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
MC-01	90%	--	open ground/water	--	--	--
	< 1%	*Rubus armeniacus*	Himalayan blackberry	Vine	FACW*	Naturalized
	< 1%	*Brassica nigra*	black mustard	Herb	NL	Naturalized
	< 1%	*Poa pratensis*	Kentucky bluegrass	Herb	FACU	Naturalized
	< 1%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
	< 1%	*Vicia Americana*	American vetch	Herb	NI	Native
MC-02	60%	--	open ground/water	--	--	--
	20%	*Salix exigua*	narrowleaf willow	Shrub	OBL	Native
	20%	*Conium maculatum*	poison hemlock	Herb	FACW	Naturalized
	10%	*Carex feta*	greensheath sedge	Herb	OBL	Native
	5%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
	3%	*Anaphalis margaritacea*	pearly everlasting	Herb	NL	Native
	< 1%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
	< 1%	*Brassica nigra*	black mustard	Herb	NL	Naturalized
	< 1%	*Poa pratensis*	Kentucky bluegrass	Herb	FACU	Naturalized
	< 1%	*Plantago major*	common plantain	Herb	FACW-	Naturalized
MC-03	50%	--	open ground/water	--	--	--
	20%	*Salix exigua*	narrowleaf willow	Shrub	OBL	Native
	5%	*Salix laevigata*	red willow	Shrub	NL	Native
	3%	*Brassica nigra*	black mustard	Herb	NL	Naturalized
	< 1%	*Poa pratensis*	Kentucky bluegrass	Herb	FACU	Naturalized
	< 1%	*Conium maculatum*	poison hemlock	Herb	FACW	Naturalized
	< 1%	*Mentha arvensis*	field mint	Herb	FACW	Naturalized
	< 1%	*Glyceria occidentalis*	Western mannagrass	Herb	OBL	Naturalized
	< 1%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
	< 1%	*Rumex crispus*	curly dock	Herb	FACW-	Naturalized
MC-04	50%	--	open ground/water	--	--	--
	20%	*Conium maculatum*	poison hemlock	Herb	FACW	Naturalized
	10%	*Salix laevigata*	red willow	Shrub	NL	Native
	10%	*Salix exigua*	Narrowleaf willow	Shrub	OBL	Native
	10%	*Rubus armeniacus*	Himalayan blackberry	Vine	FACW*	Naturalized
	5%	*Conyza canadensis*	Horseweed	Herb	FAC	Naturalized
	3%	*Rumex crispus*	curly dock	Herb	FACW-	Naturalized

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
	3%	*Fraxinus latifolia*	Oregon ash	Tree	FACW	Native
	2%	*Poa pratensis*	Kentucky bluegrass	Herb	FACU	Naturalized
	< 1%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
	< 1%	*Glyceria occidentalis*	Western mannagrass	Herb	OBL	Naturalized
	< 1%	*Anaphalis margaritacea*	pearly everlasting	Herb	NL	Native
	< 1%	*Melilotus officinalis*	yellow sweetclover	Herb	FACU	Naturalized
	< 1%	*Brassica nigra*	black mustard	Herb	NL	Naturalized
	< 1%	*Stachys stricta*	hedge nettle	Herb	OBL	Native
	< 1%	*Mimulus guttatus*	seepspring monkeyflower	Herb	OBL	Native
	< 1%	*Galium parisiense*	wakk bedstraw	Herb	FACU	Naturalized
MC-05	50%	*Salix laevigata*	red willow	Shrub	NL	Native
	25%	--	open ground/water	--	--	--
	10%	*Salix exigua*	Narrowleaf willow	Shrub	OBL	Native
	3%	*Poa pratensis*	Kentucky bluegrass	Herb	FACU	Naturalized
	3%	*Foeniculum vulgare*	Fennel	Herb	FACU	Naturalized
	3%	*Rubus armeniacus*	Himalayan blackberry	Vine	FACW*	Naturalized
	1%	*Juncus effusus*	common rush	Herb	OBL	Native
	1%	*Hoita macrostachya*	leather root	Shrub	OBL	Native
	< 1%	*Eleocharis ovata*	ovate spikerush	Herb	NO	Native
	< 1%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	< 1%	*Carex feta*	greensheath sedge	Herb	OBL	Native
MC-06	70%	*Alnus incana*	Alder	Tree	NI	Native
	30%	--	open ground/water	--	--	--
	30%	*Rubus armeniacus*	Himalayan blackberry	Vine	FACW*	Naturalized
	5%	*Glyceria occidentalis*	Western mannagrass	Herb	OBL	Naturalized
	5%	*Salix exigua*	Narrowleaf willow	Shrub	OBL	Native
	3%	*Carex feta*	greensheath sedge	Herb	OBL	Native
	1%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	1%	*Poa pratensis*	Kentucky bluegrass	Herb	FACU	Naturalized
	< 1%	*Epipactis gigantea*	stream orchid	Herb	OBL	Native
MC-07	70%	*Alnus incana*	Alder	Tree	NI	Native
	70%	--	open ground/water	--	--	--
	10%	*Rubus armeniacus*	Himalayan blackberry	Vine	FACW*	Naturalized
	5%	*Salix laevigata*	red willow	Shrub	NL	Native
	1%	*Platanus racemosa*	Western sycamore	Tree	FACW	Native
	1%	*Glyceria occidentalis*	Western mannagrass	Herb	OBL	Naturalized
MC-08	80%	*Salix laevigata*	red willow	Tree	NL	Native
	60%	--	open ground/water	--	--	--
	30%	*Salix laevigata*	red willow	Shrub	NL	Native
	10%	*Rubus armeniacus*	Himalayan blackberry	Vine	FACW*	Naturalized
	1%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	1%	*Cyperus eragrostis*	tall flatsedge	Herb	FACW	Native
MC-09	50%	*Salix laevigata*	red willow	Tree	NL	Native
	30%	*Alnus incana*	Alder	Tree	NI	Native

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
	50%	--	open ground/water	--	--	--
	30%	*Salix laevigata*	red willow	Shrub	NL	Native
	20%	*Poa pratensis*	Kentucky bluegrass	Herb	FACU	Naturalized
MC-10	40%	*Alnus incana*	Alder	Tree	NI	Native
	40%	--	open ground/water	--	--	--
	20%	*Salix laevigata*	red willow	Tree	NL	Native
	20%	*Rubus armeniacus*	Himalayan blackberry	Vine	FACW*	Naturalized
	5%	*Ranunculus aquatilis*	water buttercup	Aquatic Herb	OBL	Native
	< 1%	*Carex nudata*	naked sedge	Herb	FACW	Native
	< 1%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	< 1%	*Glyceria occidentalis*	Western mannagrass	Herb	OBL	Naturalized
MC-11	50%	*Alnus incana*	Alder	Tree	NI	Native
	30%	*Salix laevigata*	red willow	Tree	NL	Native
	50%	--	open ground/water	--	--	--
	15%	*Rubus armeniacus*	Himalayan blackberry	Vine	FACW*	Naturalized
	15%	*Salix laevigata*	red willow	Shrub	NL	Native
	10%	*Fraxinus latifolia*	Oregon ash	Tree	FACW	Native
	5%	*Rorippa nasturtium-aquaticum*	yellow watercress	Aquatic Herb	OBL	Native
	3%	*Hoita macrostachya*	leather root	Shrub	OBL	Native
	1%	*Carex feta*	greensheath sedge	Herb	OBL	Native
MC-12	70%	--	open ground/water	--	--	--
	30%	*Alnus incana*	Alder	Tree	NI	Native
	30%	*Salix laevigata*	red willow	Tree	NL	Native
	10%	*Rubus armeniacus*	Himalayan blackberry	Vine	FACW*	Naturalized
	3%	*Juncus effusus*	common rush	Herb	OBL	Native
MC-13	70%	--	open ground/water	--	--	--
	40%	*Alnus incana*	Alder	Tree	NI	Native
	30%	*Rubus armeniacus*	Himalayan blackberry	Vine	FACW*	Naturalized
	20%	*Salix laevigata*	red willow	Shrub	NL	Native
	3%	*Calycanthus occidentalis*	Spicebush	Shrub	FAC	Native

[1] Total percent coverage may add up to amounts greater than 100% where tree, shrub, and herb strata overlap.
[2] Source: Reed 1988

5.6 Hatch Creek

5.6.1 General Description

Hatch Creek occurs almost exclusively on privately owned lands and supports one NWI mapped wetland type: riverine intermittent streambed, temporary flooded (R4SBA) (USFWS 1987). It is moderately unconfined with some incision in areas with soil terraces. Although access to the area is limited due to a lack of landowner permission, study of the area was possible to a limited extent by looking upstream or downslope from two public roads, respectively: Sunset Oaks Lane Bridge which crosses Hatch Creek at the Project Boundary and Marshes Flat Road which roughly parallels Hatch Creek for a short distance.

The channel bed alternates between bedrock and cobble dominated areas, with pooling in many of the bedrock areas. Non-native annual grasses meet the bankfull edge and continue upslope, dotted with canyon live oak (*Quercus chrysolepis*) and grey pines. Patches of riparian plants are present just downstream of the Project Boundary, but are discontinuous through the length of the AA. Cattle were present during the time of the survey and all herbaceous plants occurring within the bankfull area were grazed. Red willow, mule fat (*Baccharis salicifolia*), and spicebush are present between stretches of open, rocky banks and pools. Himalayan blackberry is present on many of the banks under a canopy of red willow or upland canyon live oaks (Attachment B, Photo 12). There is little vertical overlap and limited horizontal interspersion, with vegetation occurring in isolated patches. Upstream of the AA, the channel does not appear to support additional riparian vegetation, with canyon live oaks and annual grasses meeting the bankfull edge.

The Sunset Oaks Bridge that crosses Hatch Creek occurs in an area with limited vegetation that appears to be typical for the system and no adverse effects from the bridge were apparent. Bank failure is present at a short stretch of dirt terrace on the north bank, possibly from compounded effects of grazing and debris jam in the channel. Crawdads (*Austropotamobius* sp.), caddisflies, and algal mats were present throughout the wetland.

5.6.2 CRAM Overall AA Attribute Score

Hatch Creek supports a limited riparian system with a CRAM Overall AA Attribute Score of 68. The score indicates that the wetland experiences few stressors from upland or hydrologic sources and provides some wetland services, but channel and vegetation complexity are limited by the bedrock substrates and possibly by active cattle grazing (Belsky 1999, Poff 2011). The CRAM AA used to evaluate the wetland is shown on Attachment A, Figure 5.

Table 5.6-1. CRAM Attribute Scoring Sheet for Hatch Creek.

Buffer and Landscape Context		**Score**
Aquatic Area Abundance	There are no significant (more than 10 meters) breaks in the riparian area within 500 meters up or downstream of the Assessment Area (AA).	12
Buffer Size and Condition (includes three submetrics)	There are no significant (more than 10 meters) breaks in the natural landscape (e.g., no residential or commercial areas) within 250 meters surrounding the AA.	12
	Final Attribute Score = (24/24) x 100	100%
Hydrology		
Water Source	The water source is unimpaired, draining natural runoff from surrounding hillslopes. There is no indication that dry season conditions are controlled by artificial water sources.	12
Channel Stability	The channel through the AA is characterized by equilibrium conditions, with limited evidence of aggradation or degradation. A short length of terraced bank failure and evidence of cattle grazing in the channel are present. These have the potential to lead to degradation, but current conditions indicate that the system is in equilibrium.	9

Hydrologic Connectivity	The lateral movement of floodwaters is somewhat confined by soil terraces that overlie bedrock banks; the channel is slightly incised.		9
		Final Attribute Score = (30/36) x 100	83%
Physical Structure			
Structural Patch Richness	Several structural patch types were observed within the AA, including organic debris in the channel, bank slumps, cobbles and boulders, point and in-channel bars, algal mats, pools, and a variegated shoreline.		9
Topographic Complexity	The cross-section shape of the wetland is simple, with one bench, which is within parameters expected of a bedrock-dominated channel, and meets the potential of the system.		3
		Final Attribute Score = (12/24) x 100	50%
Biotic Structure			
Number of Plant Layers (Submetric)	Three plant layers are present in this system, which include short, medium, and tall plants. These are within parameters expected of a bedrock channel and meets the potential of the system.	9	8
Number of Co-dominant Plant Species (Submetric)	Six co-dominant plants are present in the AA.	6	
Percent Invasion of Co-dominant Plant Species (Submetric)	One of the co-dominant species is an invasive plant species and constitutes more than 15 percent of the co-dominant plant species.	9	
Horizontal Interspersion	The horizontal interspersion of plant zones is simple, with alternating zones of shrubs and open bedrock scattered with herbs.		3
Vertical Biotic Structure	The vertical structure has some overlap of two plant layers throughout the AA.		3
		Final Attribute Score = (14/36) x 100	39%
Overall AA Attribute Score (average of four final scores)			**68**

5.6.3 Vegetation Transects

Complete species lists from the six vegetation belt transects sampled at Hatch Creek are included in Table 5.6-2, below, and photos at each vegetation belt transect are included in Attachment A, Figure 5. Vegetation was sampled by examining vegetation occurring within the Project Boundary to determine species and gestalt of the vegetation. Species composition within the upstream vegetation transects were then determined from nearby roadways; most vegetation is large and easily identified, while herbaceous vegetation has unique colors and textures.

Table 5.6-2. Plant species and their cover observed in vegetation belt transects at Hatch Creek.

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
HC-01	50%	--	open ground/water	--	--	--
	20%	*Rubus armeniacus*	Himalayan blackberry	Vine	FACW*	Naturalized
	10%	*Salix laevigata*	red willow	Shrub	NL	Native
	5%	*Vitis californica*	California wild grape	Vine	FACW	Native
	3%	*Cynodon dactylon*	Bermuda grass	Herb	FAC	Naturalized
	< 1%	*Brickellia californica*	California brickellbush	Subshrub	FACU	Native
	< 1%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	< 1%	*Artemisia douglasiana*	California mugwort	Herb	FACW	Native
	< 1%	*Madia* sp.	Tarweed	Herb	--	--

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
	< 1%	*Grindelia camporum*	Great Valley gumweed	Herb	FACU	Native
	< 1%	*Dianthus armeria*	deptford pink	Herb	NL	Native
	< 1%	*Bromus diandrus*	ripgut brome	Herb	NL	Naturalized
HC-02	65%	--	open ground/water	--	--	--
	10%	*Cynodon dactylon*	Bermuda grass	Herb	FAC	Naturalized
	10%	*Eleocharis ovata*	ovate spikerush	Herb	NO	Native
	5%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	3%	*Lotus corniculatus*	bird's foot trefoil	Herb	FAC	Naturalized
	< 1%	*Anaphalis margaritacea*	pearly everlasting	Herb	NL	Native
	< 1%	*Torilis arvensis*	field hedge parsley	Herb	NL	Naturalized
	< 1%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
HC-03	50%	--	open ground/water	--	--	--
	20%	*Eleocharis ovata*	ovate spikerush	Herb	NO	Native
	10%	*Cynodon dactylon*	Bermuda grass	Herb	FAC	Naturalized
	5%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	5%	*Lotus corniculatus*	bird's foot trefoil	Herb	FAC	Naturalized
	3%	*Mentha arvensis*	field mint	Herb	FACW	Naturalized
	< 1%	*Helenium puberulum*	rosella	Herb	FACW	Native
	< 1%	*Anaphalis margaritacea*	pearly everlasting	Herb	NL	Native
	< 1%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
HC-04	90%	--	open ground/water	--	--	--
	5%	*Ficus carica*	common fig	Tree	NL	Naturalized
	1%	*Rhamnus tomentella*	Hoary Coffeeberry	Shrub	NL	Native
	1%	*Carex nudata*	naked sedge	Herb	FACW	Native
	1%	*Baccharis salicifolia*	mule fat	Shrub	NL	Native
	< 1%	*Mentha arvensis*	field mint	Herb	FACW	Naturalized
	< 1%	*Salix laevigata*	red willow	Shrub	NL	Native
	< 1%	*Grindelia camporum*	Great Valley gumweed	Herb	FACU	Native
	< 1%	*Cyperus eragrostis*	tall flatsedge	Herb	FACW	Native
	< 1%	*Torilis arvensis*	field hedge parsley	Herb	NL	Naturalized
	< 1%	*Cynodon dactylon*	Bermuda grass	Herb	FAC	Naturalized
HC-05	50%	--	open ground/water	--	--	--
	40%	*Rubus armeniacus*	Himalayan blackberry	Vine	FACW*	Naturalized
	5%	*Baccharis salicifolia*	mule fat	Shrub	NL	Native
	3%	*Mentha arvensis*	field mint	Herb	FACW	Naturalized
	< 1%	*Madia* sp.	Tarweed	Herb	--	--
	< 1%	*Grindelia camporum*	Great Valley gumweed	Herb	FACU	Native
HC-06	65%	--	open ground/water	--	--	--
	10%	*Populus fremontii*	Fremont cottonwooe	Tree	FACW	Native
	10%	*Carex nudata*	naked sedge	Herb	FACW	Native
	3%	*Hoita macrostachya*	leather root	Shrub	OBL	Native
	3%	*Baccharis salicifolia*	mule fat	Shrub	NL	Native
	3%	*Equisetum arvense*	common horsetail	Herb	FAC	Native
	1%	*Fraxinus latifolia*	Oregon ash	Tree	FACW	Native
	1%	*Calycanthus occidentalis*	Spicebush	Shrub	FAC	Native
	< 1%	*Mentha arvensis*	field mint	Herb	FACW	Naturalized

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
	< 1%	*Brickellia californica*	California brickellbush	Subshrub	FACU	Native
	< 1%	*Deschampsia danthonioides*	annual hairgrass	Herb	FACW	Native

[1] Total percent coverage may add up to amounts greater than 100% where tree, shrub, and herb strata overlap.
[2] Source: Reed 1988

5.7 Big Creek

5.7.1 General Description

Big Creek is located within the Project Boundary, roughly east of the Don Pedro Dam and south of the Reservoir. Big Creek is identified on U.S. Geological Survey (USGS 2012) topographic maps as "intermittent" and is not identified on NWI maps as supporting any wetland types (USFWS 1987). It drains runoff from surrounding slopes and does not have a surficial hydrologic association with the Reservoir.

Big Creek has characteristics similar to palustrine wetlands, but with signs of high flow such as laid down graminoids from previous seasons and debris wrack lines. The Big Creek drainage is a swale formed by the meeting of adjacent hillslopes with no distinct bed or banks. The surrounding landscape consists of non-native annual grasslands and blue oak (*Quercus douglasii*) woodland. The wetland is characterized by a change from upland grasses to more hydrophytic plants where it appears to be saturated to inundated for most of the year, with some intermittent ponding. The creek supports primarily herbaceous species, such as broad-leaved cattail (*Typha latifolia*), tall flatsedge (*Cyperus eragrostis*), rabbitfoot grass, dallisgrass (*Paspalum dilatatum*), spike rush (*Eleocharis ovata*), and lady's thumb (*Persicaria maculosa*) (Attachment B, Photo 13). A few red willow shrubs and trees occur near saturated areas. Two small ponds in the channel support aquatic plants, including floating primrose (*Ludwigia peploides*) and duckweed (*Lemna minor*), indicating that surface water is present during the majority of the year. The channel has very little vertical or horizontal complexity, consisting predominantly of the same herbaceous dominants throughout. Micro- and macro-topography are also simple, with very few patch types.

The study portion of Big Creek is bisected by Bonds Flat Road, a two lane road with a culvert connecting the upper and lower portions of the creek. A fenced area in the lower portion of the creek is highly grazed, with most of the wetland vegetation grazed to a nub, and recent cattle activity evident by hoof-puncture (Attachment B, Photo 14). In this same area, a vehicle crossing is present, near Transect BC-06, joining a dirt road on either side. The road is not currently used by the Districts, but was originally created to support transmission lines and other infrastructure in the area (pers. comm. Jigour 2012).

5.7.2 CRAM Overall AA Attribute Score

Big Creek supports wetland characteristics with a CRAM Overall AA Attribute Score of 71. The score indicates that the wetland experiences limited stressors from upland and hydrologic sources, and provides some wetland services. However, the system is simple, supporting limited

vegetative richness and complexity. The CRAM AA used to evaluate the wetland is shown on Attachment A, Figure 6.

Table 5.7-1. CRAM Attribute Scoring Sheet for Big Creek.

Topographic Complexity			**Score**
Aquatic Area Abundance	There is one significant (about 20 meters) break in the riparian area within 500 meters downstream of the Assessment Area (AA), although the combined total length of all non-buffer segments is less than 50 meters. Bonds Flat Road crosses Big Creek with a culvert connecting the up- and downstream portions.		12
Buffer Size and Condition (includes three submetrics)	There is one significant (more than 10 meters) break in the natural landscape within 150 meters northeast of the AA. A Don Pedro recreational swimming lagoon is upslope (but not upstream) of Big Creek. Despite the break in buffer, the total buffer is adjacent to more than 75 percent of the AA.		12
	Final Attribute Score = (24/24) x 100		100%
Hydrology			
Water Source	The water source is unimpaired, draining natural runoff from surrounding hillslopes. There is some indication that seepage may contribute to creek flow in the dry season from the upslope swimming lagoon.		9
Channel Stability	The channel through the AA is characterized by equilibrium conditions, with little evidence of aggradation or degradation.		12
Hydrologic Connectivity	The floodwaters have lateral access to adjacent upslope areas; the drainage is not entrenched.		12
	Final Attribute Score = (33/36) x 100		92%
Physical Structure			
Structural Patch Richness	Some structural patch types were observed within the AA, including pools, swales, and submerged vegetation.		6
Buffer and Landscape Context	The cross-section shape of the wetland is very simple, with a linear depression where the hillslopes meet. There are no bed or banks, but meets the potential of the intermittent drainage.		3
	Final Attribute Score = (9/24) x 100		38%
Biotic Structure			
Number of Plant Layers (Submetric)	Three plant layers are present in this system, which include floating, short, and tall plants. This is within the parameters of an intermittent drainage in an oak grassland and meets potential.	9	10
Number of Co-dominant Plant Species (Submetric)	Nine co-dominant plants are present in the AA, which is within expected parameters of the system.	9	
Percent Invasion of Co-dominant Plant Species (Submetric)	None of the co-dominant species is invasive.	12	
Horizontal Interspersion	The horizontal interspersion of plant zones is simple, with zones of floating or herbaceous plants alternating with shrubs and herbs.		3
Vertical Biotic Structure	The vertical structure has moderate overlap of two plant layers throughout the AA.		6
	Final Attribute Score = (19/36) x 100		53%
Overall AA Attribute Score (average of four final scores)			**71**

5.7.3 Vegetation Transects

Complete species lists from the 14 vegetation belt transects sampled at Big Creek are included in Table 5.7-2, below, and photos at each vegetation belt transect are included in Attachment A, Figure 6.

Table 5.7-2. Plant species and their cover observed in vegetation belt transects at Big Creek.

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
BC-01	75%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	50%	*Quercus douglasii*	blue oak	Tree	NL	Native
	10%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
	5%	*Mimulus guttatus*	seepspring monkeyflower	Herb	OBL	Native
	3%	*Cyperus eragrostis*	tall flatsedge	Herb	FACW	Native
	< 1%	*Torilis arvensis*	field hedge parsley	Herb	NL	Naturalized
	< 1%	*Briza minor*	little quaking grass	Herb	FACW-	Naturalized
	< 1%	*Paspalum dilatatum*	Dallisgrass	Herb	FAC	Naturalized
BC-02	60%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	40%	*Eleocharis ovata*	ovate spikerush	Herb	NO	Native
BC-03	33%	*Cyperus niger*	black flatsedge	Herb	FACW+	Native
	33%	*Typha latifolia*	broadleaf cattail	Herb	OBL	Native
	33%	*Paspalum dilatatum*	Dallisgrass	Herb	FAC	Naturalized
	1%	*Bidens frondosa*	Sticktight	Herb	FACW	Native
	< 1%	*Rumex crispus*	curly dock	Herb	FACW-	Naturalized
	< 1%	*Cyperus eragrostis*	tall flatsedge	Herb	FACW	Native
BC-04	30%	*Paspalum dilatatum*	Dallisgrass	Herb	FAC	Naturalized
	30%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	30%	*Typha latifolia*	broadleaf cattail	Herb	OBL	Native
	5%	*Bidens frondosa*	Sticktight	Herb	FACW	Native
	3%	*Cyperus eragrostis*	tall flatsedge	Herb	FACW	Native
	1%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
	1%	*Veronica anagallis-aquatica*	water speedwell	Aquatic Herb	OBL	Naturalized
BC-05	50%	--	open ground/water	--	--	--
	30%	*Ludwigia peploides*	water primrose	Aquatic Herb	OBL	Native
	10%	*Typha latifolia*	broadleaf cattail	Herb	OBL	Native
	3%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	1%	*Rorippa nasturtium-aquaticum*	yellow watercress	Aquatic Herb	OBL	Native
	< 1%	*Plantago major*	common plantain	Herb	FACW-	Naturalized
	< 1%	*Rumex crispus*	curly dock	Herb	FACW-	Naturalized

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
BC-06	33%	*Eleocharis ovata*	ovate spikerush	Herb	NO	Native
	33%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	33%	*Paspalum dilatatum*	Dallisgrass	Herb	FAC	Naturalized
BC-07	33%	*Eleocharis ovata*	ovate spikerush	Herb	NO	Native
	33%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	33%	*Paspalum dilatatum*	Dallisgrass	Herb	FAC	Naturalized
	1%	*Dianthus armeria*	deptford pink	Herb	NL	Native
BC-08	75%	*Salix laevigata*	red willow	Shrub	NL	Native
	50%	--	open ground/water	--	--	--
	40%	*Typha latifolia*	broadleaf cattail	Herb	OBL	Native
	3%	*Rorippa nasturtium-aquaticum*	yellow watercress	Aquatic Herb	OBL	Native
	3%	*Persicaria maculosa*	lady's thumb	Herb	FACW	Naturalized
	1%	*Cyperus eragrostis*	tall flatsedge	Herb	FACW	Native
	1%	*Arnica sp.*	Arnica	Herb	--	--
	1%	*Veronica anagallis-aquatica*	water speedwell	Aquatic Herb	OBL	Naturalized
BC-09	75%	*Salix laevigata*	red willow	Shrub	NL	Native
	50%	--	open ground/water	--	--	--
	30%	*Cyperus eragrostis*	tall flatsedge	Herb	FACW	Native
	10%	*Rorippa nasturtium-aquaticum*	yellow watercress	Aquatic Herb	OBL	Native
	5%	*Typha latifolia*	broadleaf cattail	Herb	OBL	Native
	1%	*Persicaria maculosa*	lady's thumb	Herb	FACW	Naturalized
	1%	*Lemna minor*	Duckweed	Aquatic Herb	OBL	Native
	1%	*Glyceria occidentalis*	Western mannagrass	Herb	OBL	Naturalized
BC-10	100%	*Typha latifolia*	broadleaf cattail	Herb	OBL	Native
BC-11	100%	*Typha latifolia*	broadleaf cattail	Herb	OBL	Native
	< 1%	*Rorippa nasturtium-aquaticum*	yellow watercress	Aquatic Herb	OBL	Native
	< 1%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
BC-12	60%	*Salix laevigata*	red willow	Shrub	NL	Native
	30%	*Typha latifolia*	broadleaf cattail	Herb	OBL	Native
	30%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	30%	*Cyperus niger*	black flatsedge	Herb	FACW+	Native
	3%	*Cyperus eragrostis*	tall flatsedge	Herb	FACW	Native
BC-13	30%	*Salix laevigata*	red willow	Shrub	NL	Native
	30%	*Eleocharis ovata*	ovate spikerush	Herb	NO	Native
	30%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	30%	*Cyperus niger*	black flatsedge	Herb	FACW+	Native
	5%	*Cyperus eragrostis*	tall flatsedge	Herb	FACW	Native
	1%	*Paspalum dilatatum*	Dallisgrass	Herb	FAC	Naturalized
	< 1%	*Mimulus guttatus*	seepspring	Herb	OBL	Native

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
			monkeyflower			
	< 1%	*Rumex crispus*	curly dock	Herb	FACW-	Naturalized
	< 1%	*Veronica anagallis-aquatica*	water speedwell	Aquatic Herb	OBL	Naturalized
BC-14	49%	*Rorippa nasturtium-aquaticum*	yellow watercress	Aquatic Herb	OBL	Native
	49%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	2%	*Veronica anagallis-aquatica*	water speedwell	Aquatic Herb	OBL	Naturalized
	< 1%	*Cyperus eragrostis*	tall flatsedge	Herb	FACW	Native
	< 1%	*Persicaria maculosa*	lady's thumb	Herb	FACW	Naturalized
	< 1%	*Paspalum dilatatum*	Dallisgrass	Herb	FAC	Naturalized

[1] Total percent coverage may add up to amounts greater than 100% where tree, shrub, and herb strata overlap.
[2] Source: Reed 1988

5.8 Kanaka Creek

5.8.1 General Description

Kanaka Creek is partially located on land managed by the BLM and supports one NWI-classified wetland: riverine intermittent streambed, seasonally flooded (R4SBC) (USFWS 1987). It is unconfined and supports riparian vegetation on narrow floodplains flanking both sides of the channel. Surrounding upslope areas support non-native annual grasslands and mixed oak woodlands.

Vegetation occurs throughout all vertical layers, and is horizontally complex with well-stratified vegetation communities throughout the channel, wetted edge, and floodplain (Attachment B, Photo 15). Watercress (*Rorippa nasturtium-aquaticum* [*Nasturtium officinale*]) is present in the channel where the canopy is more open, and herbaceous vegetation such as seepspring monkeyflower and sneezeweed (*Helenium puberulum*) dots the banks. The shrub layer alternates between spicebush and red willow, with patches of Himalayan blackberry and fig (*Ficus carica*) (Attachment B, Photo 16). An overstory of red willows and canyon live oak provides structure for climbing vines of California wild grape (*Vitis californica*), which traverses all layers of the vegetation.

The channel bed is steep bedrock and boulder controlled falls with deep pools alternating with low gradient cobble riffles. The macro- and micro-topography of the channel and floodplain are complex, with high connectivity between the channel and floodplain.

Some signs of human access were observed in the lower areas of the reach, where litter was present and a mining shack appeared to be in active use just east of Transect KC-06. A two-lane highway, Jacksonville Drive, crosses the wetland over a culvert, with pools formed on either side. The slopes of the highway support abundant yellow star thistle (*Centaurea solstitialis*), with a few individual plants occurring in the creek downstream.

The upper portion of Kanaka Creek appeared to have similar characteristics, with slightly steeper slopes confining the system to a greater degree. Himalayan blackberries and fig trees appeared to be the dominant species within the bankfull area, with an overstory of interior live oaks (*Quercus wislizeni*). This area was not assessed due to a lack of permission for access on the private property upstream of Jacksonville Drive.

5.8.2 CRAM Overall AA Attribute Score

Kanaka Creek supports a dynamic riparian system with a CRAM Overall AA Attribute Score of 87. The score indicates that the wetland experiences few stressors from upland or hydrologic sources and provides most wetland benefits; however, it supports two invasive species, fig and Himalayan blackberry. Table 5.8-1, below, lists each Attribute Score with a description supporting the score. The CRAM AA used to evaluate the wetland is shown on Attachment A, Figure 7.

Table 5.8-1. CRAM Attribute Scoring Sheet for Kanaka Creek.

Buffer and Landscape Context			**Score**
Aquatic Area Abundance	There is one significant (more than 10 meters) break in the riparian area within 500 meters upstream of the Assessment Area (AA), where Jacksonville Drive crosses Kanaka Creek over a culvert. The combined total length of all non-buffer segments is less than 50 meters.		12
Buffer Size and Condition (includes three submetrics)	There are no significant (more than 10 meters) breaks in the natural landscape (e.g., no residential or commercial areas) within 250 meters surrounding the AA.		12
	Final Attribute Score = (24/24) x 100		100%
Hydrology			
Water Source	The water source is unimpaired, draining natural runoff from surrounding hillslopes. There is no indication that dry season conditions are controlled by artificial water sources.		12
Channel Stability	The channel through the AA is characterized by equilibrium conditions, with little evidence of aggradation or degradation. Some fines and gravels are accumulated in pools, but occur in quantities that suggest they intermittently get flushed from the system during high flows.		12
Hydrologic Connectivity	The lateral movement of floodwaters has high connectivity with the surrounding floodplains, which is within expected parameters in an unconfined system.		12
	Final Attribute Score = (36/36) x 100		100%
Physical Structure			
Structural Patch Richness	A multitude of structural patch types are present within the system, including wrackline, organic debris in the channel, cobbles and boulders, debris jams, algal mats, pools, riffles, secondary channels and swales on floodplains, standing snags, variegated shoreline, and vegetated islands.		12
Topographic Complexity	The cross-section shape of the wetland is simple, with one bench or two benches in the AA.		6
	Final Attribute Score = (18/24) x 100		75%
Biotic Structure			
Number of Plant Layers (Submetric)	Five plant layers are present in this system, which include floating, short, medium, tall, and very tall plants.	12	11
Number of Co-dominant Plant Species (Submetric)	Eleven co-dominant plants are present in the AA.	9	
Percent Invasion of Co-	Two of the co-dominant species are invasive and	9	

dominant Plant Species (Submetric)	constitutes between 15 and 30 percent of the co-dominant plant species.		
Horizontal Interspersion	The interspersion of plant zones is complex, with intermixed zones of shrubs, herbs, vines, and trees.		6
Vertical Biotic Structure	The vertical structure has high overlap of three plant layers throughout the AA.		9
		Final Attribute Score = (26/36) x 100	72%
Overall AA Attribute Score (average of four final scores)			**87**

5.8.3 Vegetation Transects

Complete species lists from the eight vegetation belt transects sampled at Kanaka Creek are included in Table 5.8-2, below, and photos at each vegetation belt transect are included in Attachment A, Figure 7.

Table 5.8-2. Plant species and their cover observed in vegetation belt transects at Kanaka Creek.

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
KC-01	30%	*Rorippa nasturtium-aquaticum*	yellow watercress	Aquatic Herb	OBL	Native
	30%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	30%	*Anaphalis margaritacea*	pearly everlasting	Herb	NL	Native
	1%	*Torilis arvensis*	field hedge parsley	Herb	NL	Naturalized
	<1%	*Veronica anagallis-aquatica*	water speedwell	Aquatic Herb	OBL	Naturalized
	<1%	*Cyperus eragrostis*	tall flatsedge	Herb	FACW	Native
	<1%	*Mimulus guttatus*	seepspring monkeyflower	Herb	OBL	Native
KC-02	60%	*Rorippa nasturtium-aquaticum*	yellow watercress	Aquatic Herb	OBL	Native
	20%	*Mimulus guttatus*	seepspring monkeyflower	Herb	OBL	Native
	15%	--	open ground/water	--	--	--
	1%	*Rumex crispus*	curly dock	Herb	FACW-	Naturalized
	1%	*Cyperus eragrostis*	tall flatsedge	Herb	FACW	Native
	1%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
KC-03	80%	*Quercus wislizeni*	interior live oak	Tree	NL	Native
	60%	--	open ground/water	--	--	--
	20%	*Rubus ursinus*	california blackberry	Shrub	NO	Native
	20%	*Rorippa nasturtium-aquaticum*	yellow watercress	Aquatic Herb	OBL	Native
	15%	*Vitis californica*	California Wild Grape	Vine	FSCW	Native
	<1%	*Cyperus eragrostis*	tall flatsedge	Herb	FACW	Native
KC-04	60%		live oak			
	50%	--	open ground/water	--	--	--
	30%	*Rubus ursinus*	california blackberry	Shrub	NO	Native
	7%	*Rorippa nasturtium-aquaticum*	yellow watercress	Aquatic Herb	OBL	Native

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
	5%	*Vitis californica*	California Wild Grape	Vine	FSCW	Native
	3%	*Eriophyllum confertiflorum*	golden yarrow	Herb	NL	Native
	<1%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	<1%	*Cyperus eragrostis*	tall flatsedge	Herb	FACW	Native
	<1%	*Toxicodendron diversilobum*	poison oak	Subshrub	NL	Native
	<1%	*Ficus carica*	common fig	Tree	NL	Naturalized
KC-05	40%	*Vitis californica*	California Wild Grape	Vine	FSCW	Native
	30%	*Rorippa nasturtium-aquaticum*	yellow watercress	Aquatic Herb	OBL	Native
	20%	*Ficus carica*	common fig	Tree	NL	Naturalized
	15%	*Salix laevigata*	red willow	Shrub	NL	Native
	1%	*Stachys ajugoides*	bugle hedge nettle	Herb	OBL	Native
	<1	*Cyperus eragrostis*	tall flatsedge	Herb	FACW	Native
KC-06	50%	*Vitis californica*	California Wild Grape	Vine	FSCW	Native
	40%	--	open ground/water	--	--	--
	30%	*Salix laevigata*	red willow	Shrub	NL	Native
	10%	*Rorippa nasturtium-aquaticum*	yellow watercress	Aquatic Herb	OBL	Native
	<1%	*Rubus ursinus*	california blackberry	Shrub	NO	Native
	<1%	*Torilis arvensis*	field hedge parsley	Herb	NL	Naturalized
	<1%	*Helenium puberulum*	rosilla	Herb	FACW	Native
KC-07	60%	*Vitis californica*	California Wild Grape	Vine	FSCW	Native
	15%	--	open ground/water	--	--	--
	10%	*Calycanthus occidentalis*	spicebush	Shrub	FAC	Native
	5%	*Helenium puberulum*	rosilla	Herb	FACW	Native
	5%	*Heteromeles arbutifolia*	toyon	Shrub	NL	Native
	3%	*Cephalanthus occidentalis*	button willow	Shrub	OBL	Native
KC-08	80%	*Salix laevigata*	red willow	Shrub	NL	Native
	40%	*Rubus ursinus*	california blackberry	Shrub	NO	Native
	40%	*Rorippa nasturtium-aquaticum*	yellow watercress	Aquatic Herb	OBL	Native
	10%	*Vitis californica*	California Wild Grape	Vine	FSCW	Native
	5%	*Cephalanthus occidentalis*	button willow	Shrub	OBL	Native

[1] Total percent coverage may add up to amounts greater than 100% where tree, shrub, and herb strata overlap.
[2] Source: Reed 1988

5.9 Deer Creek

5.9.1 General Description

Deer Creek is located on land managed by the BLM and supports one type of NWI-classified wetland: riverine intermittent streambed, seasonally flooded (R4SBC) (USFWS 1987). The

channel is highly confined in a steep bedrock-dominated canyon, with non-native annual grasses, weedy forbs, poison oak (*Toxicodendron diversilobum*), and interior live oak scrub occurring upslope. Ward's Ferry Road roughly parallels Deer Creek for a short distance upslope on the north side.

The bed and banks of Deer Creek are dominated by bedrock and boulder substrates, with limited vegetation present below bankfull elevation (Attachment B, Photo 17). The channel is mostly bare, with small patches of herbaceous vegetation, alternating with lower gradient areas supporting red willow, spicebush, and button willow (*Cephalanthus occidentalis*). Many bedrock pools throughout the channel support bullfrogs, crawdads, macroinvertebrates, and algal mats (Attachment B, Photo 18). The vegetation community is horizontally and vertically simple, with patchy vegetation and few areas with overlapping layers. The micro- and macro-topography is somewhat complex, but limited by the bedrock substrates.

A limited amount of debris is present in Deer Creek, with car parts and other trash obviously dumped off of Ward's Ferry Road. Most of this debris is not retrievable because of steep slopes. Weedy herbaceous species dot the northern slope of the Deer Creek canyon wall, with denser populations near the top of the slope near the roadway. Weeds include Klamath weed, wooly mullein, and Italian thistle. Occasional weeds, primarily wooly mullein, are present within the riparian area, but are mostly limited to upslope areas.

5.9.2 CRAM Overall AA Attribute Score

Deer Creek supports a riparian system with a CRAM Overall AA Attribute Score of 71. The score indicates the wetland experiences few stressors from upland or hydrologic sources and provides some wetland services. The bedrock bed and banks limit the vegetative capacity of the wetland, although it meets the potential of the system. The CRAM AA used to evaluate the wetland is shown on Attachment A, Figure 8.

Table 5.9-1. CRAM Attribute Scoring Sheet for Deer Creek.

Buffer and Landscape Context		**Score**
Aquatic Area Abundance	Ward's Ferry Road crosses the drainage upstream from the Assessment Area (AA), but does not create a significant (more than 10 meters) break in the riparian area.	12
Buffer Size and Condition (includes three submetrics)	There are no significant (more than 10 meters) breaks in the natural landscape (e.g., no residential or commercial areas) within 250 meters surrounding the AA. Ward's Ferry Road roughly parallels Deer Creek on the north side, and does create a stressor to the system (garbage dumping) but does not have a significant impact on the effectiveness of the buffer.	12
	Final Attribute Score = (24/24) x 100	100%
Hydrology		
Water Source	The water source is unimpaired, draining natural runoff from surrounding hillslopes. There is no indication that dry season conditions are controlled by artificial water sources.	12
Channel Stability	The channel through the AA is characterized by equilibrium conditions, with little evidence of aggradation or degradation. Some fines and gravels are accumulated in pools, but occur in quantities that suggest they intermittently get flushed from the system during high flows.	12

Hydrologic Connectivity	The lateral movement of floodwaters is completely confined within the bedrock channel and has no connectivity with floodplains. This limited hydrologic connectivity is within parameters expected in a confined, bedrock channel and meets the potential of the system.		3
		Final Attribute Score = (27/36) x 100	75%
Physical Structure			
Structural Patch Richness	Several structural patch types were observed within the AA, including wrack in the channel, cobbles and boulders, algal mats, pools, and a variegated shoreline.		9
Topographic Complexity	The cross-section shape of the wetland is simple, with no true bench, but with boulder and bedrock banks leading up the drainage walls. This is within parameters expected of a bedrock-dominated channel and meets the potential of the system.		3
		Final Attribute Score = (12/24) x 100	50%
Biotic Structure			
Number of Plant Layers (Submetric)	Four plant layers are present in this system, which include short, medium, tall, and very tall plants.	12	12
Number of Co-dominant Plant Species (Submetric)	Seven co-dominant plants are present in the AA, which is within expected parameters of a confined, bedrock-dominated system.	12	
Percent Invasion of Co-dominant Plant Species (Submetric)	None of the co-dominant species is invasive.	12	
Horizontal Interspersion	The horizontal interspersion of plant zones is simple, with intermittent patches of herbs or shrubs within predominantly bedrock areas. Limited community complexity is within expected parameters of a confined, bedrock-dominated system.		3
Vertical Biotic Structure	The vertical structure has some overlap of two plant layers in the AA.		6
		Final Attribute Score = (21/36) x 100	58%
Overall AA Attribute Score (average of four final scores)			**71**

5.9.3 Vegetation Transects

Complete species lists from the ten vegetation belt transects sampled at Deer Creek are included in Table 5.9-2, below, and photos at each vegetation belt transect are included in Attachment A, Figure 8.

Table 5.9-2. Plant species and their cover observed in vegetation belt transects at Deer Creek.

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
DC-01	95%	--	open ground/water	--	--	--
	5%	*Cephalanthus occidentalis*	button willow	Shrub	OBL	Native
DC- 02	40%	*Cephalanthus occidentalis*	button willow	Shrub	OBL	Native
	10%	*Salix laevigata*	red willow	Shrub	NL	Native
	5%	*Rubus ursinus*	california blackberry	Shrub	NO	Native
	<1%	*Vitis californica*	California wild grape	Vine	FSCW	Native
DC- 03	70%	--	open water/bedrock	--	--	--
	10%	*Fraxinus latifolia*	Oregon ash	Tree	FACW	Native
	3%	*Brickellia californica*	California brickellbush	Subshrub	FACU	Native
	<1 %	*Rumex crispus*	curly dock	Herb	FACW-	Naturalized
	<1 %	*Verbascum thapsus*	wooly mullein	Herb	NL	Naturalized

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
	<1 %	*Trifolium hirtum*	rose clover	Herb	--	Naturalized
	<1 %	*Brassica nigra*	black mustard	Herb	NL	Naturalized
	<1 %	*Torilis arvensis*	field hedge parsley	Herb	NL	Naturalized
	<1 %	*Cyperus eragrostis*	tall flatsedge	Herb	FACW	Native
	<1 %	*Lactuca serriola*	prickley lettuce	Herb	FAC	Naturalized
	<1 %	*Mimulus guttatus*	seepspring monkeyflower	Herb	OBL	Native
	<1 %	*Avena barbata*	slender wild oat	Herb	NL	Naturalized
	<1 %	--	open ground/water	--	--	--
	<1 %	*Cynosurus cristatus*	crested dogstail grass	Herb	FACW*	Naturalized
	<1 %	*Bromus diandrus*	ripgut brome	Herb	--	Naturalized
	<1 %	*Carduus pycnocephalus*	Italian thistle	Herb	NL	Naturalized
	<1 %	*Vitis californica*	California Wild Grape	Vine	FSCW	Native
	<1 %	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	<1 %	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
DC-04	80%	--	open ground/water	--	--	--
	20%	*Mimulus guttatus*	seepspring monkeyflower	Herb	OBL	Native
	<1 %	--	open ground/water	--	--	--
	<1 %	--	Ash	--	--	--
	<1 %	*Cyperus eragrostis*	tall flatsedge	Herb	FACW	Native
	<1 %	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
	<1 %	*Lythrum californicum*	California Loosestrife	Herb	OBL	Native
	<1 %	*Cynodon dactylon*	Bermuda grass	Herb	FAC	Naturalized
DC-05	80%	--	open ground/water	--	--	--
	20%	--	ash overstory	--	--	--
	10%	--	Ash	--	--	--
	5%	*Datisca glomerata*	durango root	Herb	FACW	Native
	5%	*Mimulus guttatus*	seepspring monkeyflower	Herb	OBL	Native
	<1%	*Cynodon dactylon*	Bermuda grass	Herb	FAC	Naturalized
	<1%	*Stachys ajugoides*	bugle hedge nettle	Herb	OBL	Native
DC-06	95%	--	Bedrock	--	--	--
	2%	--	Ash	--	--	--
	2%	*Cephalanthus*	button bush	Shrub	OBL	Native
	<1%	*Cyperus eragrostis*	tall flatsedge	Herb	FACW	Native
	<1%	*Avena barbata*	slender wild oat	Herb	NL	Naturalized
DC-07	99%	--	Bedrock	--	--	--
	<1%	*Cephalanthus*	button bush	Shrub	OBL	Native
DC-08	99%	--	Bedrock	--	--	--
	<1%	*Cyperus eragrostis*	tall flatsedge	Herb	FACW	Native
	<1%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	<1%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
DC-09	95%	--	open ground/water	--	--	--
	3%	*Cephalanthus*	button bush	Shrub	OBL	Native
	3%	--	Ash	--	--	--
	<1%	*Mimulus guttatus*	seepspring monkeyflower	Herb	OBL	Native
	<1%	*Torilis arvensis*	field hedge parsley	Herb	NL	Naturalized
	<1%	*Cynosurus cristatus*	crested dogstail grass	Herb	FACW*	Naturalized

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
DC-10	99%	--	Bedrock	--	--	--
	1%	*Cephalanthus occidentalis*	button willow	Shrub	OBL	Native

[1] Total percent coverage may add up to amounts greater than 100% where tree, shrub, and herb strata overlap.
[2] Source: Reed 1988

5.10 Drainage #7

5.10.1 General Description

Drainage #7 is located within the BLM's ACEC and supports one type of NWI-classified wetland: riverine intermittent streambed, seasonally flooded (R4SBC) (USFWS 1987). Wetlands do not occur within the Project Boundary and no riparian or wetland vegetation is present until 100 meters upstream, near Transect D7-02, where water accumulates from upstream flows; below Transect D7-02 the drainage channel was dry at the time of the survey. The Districts chose to perform the CRAM and vegetation transects to provide information for Relicensing Participants, even though the wetland did not meet the FERC-determined requirement of occurring at least partially within the Project Boundary.

The areas surrounding Drainage #7 consist of steep slopes supporting non-native annual grasslands with buck brush intermittently interspersed throughout. The grasslands end abruptly at the edge of the drainage, which has almost vertical bedrock walls and bedrock floors (Attachment B, Photo 19). Limited shrubs, such as California buckeye (*Aesculus californica*), red willow, and spicebush grow from within the drainage, with the canopy just overtopping the lip of the drainage (Attachment B, Figure 20). Some herbaceous vegetation grows along the bed and walls, such as seepspring monkeyflower, naked sedge, and canyon liveforever (*Dudleya cymosa*).

Due to the steep and dangerous nature of accessing the drainage and upslope areas, surveys were performed only for 100 meters where riparian vegetation was present. Access to the channel floor was limited to a few locations; for the majority of the AA, these surveys were performed by viewing from upslope. The inclusion of this drainage as a wetland is based primarily on the NWI classification (USFWS 1987), as the plant species investigation indicated that the majority of plants present are not hydrophytic.

5.10.2 CRAM Overall AA Attribute Score

Drainage #7 supports limited riparian vegetation that meets the potential of the system with a CRAM Overall AA Attribute Score of 59. The score indicates that the wetland does not experience stressors from upland or hydrologic sources and provides some wetland benefits, but has little vegetation because of the bedrock substrate that compose the drainage. The CRAM AA used to evaluate the wetland is shown on Attachment A, Figure 9.

Table 5.10-1. CRAM Attribute Scoring Sheet for Drainage #7.

Buffer and Landscape Context			**Score**
Aquatic Area Abundance	There are no significant (more than 10 meters) breaks in the riparian area within 500 meters up- or down-stream of the Assessment Area (AA).		12
Buffer Size and Condition (includes three submetrics)	There are no significant (more than 10 meters) breaks in the natural landscape (e.g., no residential or commercial areas) within 250 meters surrounding the AA.		12
		Final Attribute Score = (24/24) x 100	100%
Hydrology			
Water Source	The water source is unimpaired, draining natural runoff from surrounding hillslopes. There is no indication that dry season conditions are controlled by artificial water sources.		12
Channel Stability	The channel through the AA is characterized by equilibrium conditions, with little evidence of aggradation or degradation. This system consists of bedrock bed and banks and is therefore very stable.		12
Hydrologic Connectivity	The lateral movement of floodwaters is completely confined within the incised bedrock channel and is within expected parameters for this type of system.		3
		Final Attribute Score = (27/36) x 100	75%
Physical Structure			
Structural Patch Richness	Minimal structural patch types were observed within the AA, including cobbles and boulders, pools, and riffles or runs.		3
Topographic Complexity	The cross-section shape of the wetland is very simple, with a U-shaped channel and banks; this is within parameters expected of a bedrock-dominated channel and meets the potential of the system.		3
		Final Attribute Score = (6/24) x 100	25%
Biotic Structure			
Number of Plant Layers (Submetric)	Two plant layers are present in this system, which include short and tall plants. These are within parameters expected of a bedrock channel and meets the potential of the system.	6	7
Number of Co-dominant Plant Species (Submetric)	Four co-dominant plants are present in the AA, which is within expected parameters of a confined, bedrock-dominated system.	3	
Percent Invasion of Co-dominant Plant Species (Submetric)	None of the co-dominant species is invasive.	12	
Horizontal Interspersion	The horizontal interspersion of plant zones is simple, with intermittent patches of herbs or shrubs, which is within expected parameters of a confined, bedrock-dominated system.		3
Vertical Biotic Structure	The vertical structure has very limited overlap of plant layers throughout the AA.		3
		Final Attribute Score = (13/36) x 100	36%
Overall AA Attribute Score (average of four final scores)			**59**

5.10.3 Vegetation Transects

Complete species lists from the four vegetation belt transects sampled at Drainage #7 are included in Table 5.10-2, below, and photos at each vegetation belt transect are included in Attachment A, Figure 9.

Table 5.10-2. Plant species and their cover observed in vegetation belt transects at Drainage #7.

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
D7-01	50%	*Pinus sabiniana*	grey pine	Tree	NL	Native
	50%	--	open ground/water	--	--	--
	20%	*Hordeum murinum*	Foxtail	Herb	NI	Naturalized
	15%	*Bromus diandrus*	ripgut brome	Herb	NL	Naturalized
	15%	*Bromus hordeaceus*	soft chess brome	Herb	FACU-	Naturalized
	< 1%	*Eschscholzia lobbii*	frying pans	Herb	NL	Native
	< 1%	*Rumex crispus*	curly dock	Herb	FACW-	Naturalized
	< 1%	*Trifolium pratense*	red clover	Herb	FACU+	Naturalized
D7-02		--	open ground/water	--	--	--
	10%	*Carex nudata*	naked sedge	Herb	FACW	Native
	10%	*Bromus diandrus*	ripgut brome	Herb	NL	Naturalized
	10%	*Rhamnus tomentella*	Hoary Coffeeberry	Shrub	NL	Native
	5%	*Aesculus californica*	California buckeye	Tree	NL	Native
	5%	*Panicum acuminatum*	Western panic grass	Herb	FACW	Native
	< 1%	*Dudleya cymosa*	canyon liveforever	Herb	NL	Native
D7-03	70%	--	open ground/water	--	--	--
	30%	*Aesculus californica*	California buckeye	Tree	NL	Native
D7-04	30%	--	open ground/water	--	--	--
	30%	*Aesculus californica*	California buckeye	Tree	NL	Native
	30%	*Calycanthus occidentalis*	Spicebush	Shrub	FAC	Native

[1] Total percent coverage may add up to amounts greater than 100% where tree, shrub, and herb strata overlap.
[2] Source: Reed Jr., P.B. 1988. National List of Plant Species that Occur in Wetlands. California (Region 0). U.S. Fish and Wildlife Service, Washington, DC, USA. Biol. Rep. 88 (24).

5.11 Drainage #8 (including Gardner Falls)

5.11.1 General Description

Drainage #8 is located within the BLM's ACEC and supports one type of NWI-classified wetland: riverine intermittent streambed, seasonally flooded (R4SBC) (USFWS 1987). The lower portion of Drainage #8, just upstream of Gardner Falls, is composed of bedrock and boulder bed, with banks of either bedrock or of shallow soils overlying bedrock. Areas dominated by bedrock and boulders have limited vegetation, with red willows and small patches of naked sedge or stream orchid (*Epipactis gigantean*) occurring in crevices between boulders (Attachment B, Photo 21). Alternating areas with soils support lush herbaceous vegetation with narrow-leaf milkweed (*Asclepias fasicularis*), Deptford pink (*Dianthus armeria*), stream orchid, and naked sedge. Spicebush and red willow occur with the forbs, becoming dense near the wetted edge. The alternating pattern of substrates and patchiness within each type of substrate provide complex horizontal stratification, although the vertical stratification is typically limited to two overlapping layers of herbs and shrubs. One ESA-Listed Plant, California vervain, was identified within this wetland; details of the population are included in Study Report TR-1, Special-Status Plants.

The upper portion of Drainage #8 has a steep gradient with exclusively bedrock and boulder bed and banks. A series of falls, plunge-pools, chutes, and sheets form the channel, with intermittent

red willows, spicebush, and buckeyes occurring in areas where sediment is present, or at the channel's edge (Attachment B, Photo 22).

Drainage #8 opens to Reservoir at Gardner Falls, a waterfall over bedrock cliff. The waterfall area supports very little vegetation, such as Deptford pink, with overhanging buckeye and California wild grape. This area is very scenic, and is a popular recreation area for boaters (Attachment B, Photo 23). Some cans and other trash were present near the water line at the time of the survey; the Don Pedro Recreation Agency frequently removes trash from this area (pers. comm. Jigour 2011).

5.11.2 CRAM Overall AA Attribute Score

Two CRAM assessments were performed at Drainage #8 to reflect the differences in the geomorphic and vegetative characteristics of the channel. The lower portion, just upstream of Gardner Falls, has a CRAM Overall AA Attribute Score of 91. The score indicates that the wetland does not experience stressors from upland or hydrologic sources and provides a multitude wetland services. The CRAM AA used to evaluate the wetland is shown on Attachment A, Figure 10.

Table 5.11-1. CRAM Attribute Scoring Sheet for Drainage #8.

Buffer and Landscape Context		**Score**
Aquatic Area Abundance	There are no significant (more than 10 meters) breaks in the riparian area within 500 meters up or downstream of the Assessment Area (AA).	12
Buffer Size and Condition (includes three submetrics)	There are no significant (more than 10 meters) breaks in the natural landscape (e.g., no residential or commercial areas) within 250 meters surrounding the AA.	12
	Final Attribute Score = (24/24) x 100	100%
Hydrology		
Water Source	The water source is unimpaired, draining natural runoff from surrounding hillslopes. There is no indication that dry season conditions are controlled by artificial water sources.	12
Channel Stability	The channel through the AA is characterized by equilibrium conditions, with little evidence of aggradation or degradation. Some fines and gravels are accumulated in pools, but occur in quantities that suggest they intermittently get flushed from the system during high flows. Bankside graminoids and plentiful macroinvertebrates in the channel suggest somewhat steady flows throughout most of the year.	12
Hydrologic Connectivity	Floodwaters have lateral access to floodplains.	12
	Final Attribute Score = (36/36) x 100	100%
Physical Structure		
Structural Patch Richness	A multitude of structural patch types were observed within the AA, including organic debris in the channel, cobbles and boulders, algal mats, pools, plant hummocks, and a variegated shoreline.	12
Topographic Complexity	The cross-section shape of the wetland is somewhat simple, with one bench, which is within parameters expected of a bedrock-dominated channel and meets the potential of the system.	6
	Final Attribute Score = (18/24) x 100	75%

Biotic Structure			
Number of Plant Layers (Submetric)	Three plant layers are present in this system, which include short, medium, and tall plants. These are within parameters expected of a bedrock channel and meets the potential of the system.	9	11
Number of Co-dominant Plant Species (Submetric)	Fourteen co-dominant plants are present in the AA, which is within expected parameters of a bedrock-dominated system.	12	
Percent Invasion of Co-dominant Plant Species (Submetric)	One of the co-dominant species is invasive and constitutes less than 15 percent of the co-dominant plant species.	12	
Horizontal Interspersion	The horizontal interspersion of plant zones is complex, with alternating zones of vegetation.		12
Vertical Biotic Structure	The vertical structure has moderate overlap of two plant layers throughout most of the AA.		9
	Final Attribute Score = (32/36) x 100		89%
Overall AA Attribute Score (average of four final scores)			**91**

The upstream portion of Drainage #8 is much steeper and is almost exclusively composed of bedrock or boulder; the riparian area meets the potential of the system with a CRAM Overall AA Attribute Score of 73. The CRAM Overall AA Attribute Score indicates the simplicity of the vegetation in terms of richness and abundance, as well as vertical and horizontal stratification. Although it is limited by the steep gradient and bedrock substrates. Survey of the drainage stopped just upstream of Transect D8-08, where the channel and falls become too steep to traverse safely. The CRAM AA used to evaluate the wetland is shown on Attachment A, Figure 9.

Table 5.11-2. CRAM Attribute Scoring Sheet for the upper portion of Drainage #8.

Buffer and Landscape Context		**Score**
Aquatic Area Abundance	There are no significant (more than 10 meters) breaks in the riparian area within 500 meters up or downstream of the Assessment Area (AA).	12
Buffer Size and Condition (includes three submetrics)	There are no significant (more than 10 meters) breaks in the natural landscape (e.g., no residential or commercial areas) within 250 meters surrounding the AA.	12
	Final Attribute Score = (24/24) x 100	100%
Hydrology		
Water Source	The water source is unimpaired, draining natural runoff from surrounding hillslopes. There is no indication that dry season conditions are controlled by artificial water sources.	12
Channel Stability	The channel through the AA is characterized by equilibrium conditions, with little evidence of aggradation or degradation. Some fines and gravels are accumulated in pools, but occur in quantities that suggest they intermittently get flushed from the system during high flows.	12
Hydrologic Connectivity	The lateral movement of floodwaters is limited to within the channel but is within parameters expected in a confined, bedrock system.	12
	Final Attribute Score = (36/36) x 100	100%
Physical Structure		
Structural Patch Richness	Several structural patch types were observed within the AA, including cobbles and boulders, algal mats, pools and riffles, and a variegated shoreline.	6

Topographic Complexity	The cross-section shape of the wetland is simple, with no distinct benches, but with boulders forming topographic complexity at the banks. This is within parameters expected of a bedrock-dominated channel and meets the potential of the system.		6
		Final Attribute Score = (12/24) x 100	50%
Biotic Structure			
Number of Plant Layers (Submetric)	Three plant layers are present in this system, which include short, medium, and tall plants. These are within parameters expected of a bedrock channel and meets the potential of the system.	9	9
Number of Co-dominant Plant Species (Submetric)	Eight co-dominant plants are present in the AA, which is within expected parameters of a confined, bedrock-dominated system.	6	
Percent Invasion of Co-dominant Plant Species (Submetric)	None of the co-dominant species is invasive.	12	
Horizontal Interspersion	The horizontal interspersion of plant zones is simple, with intermittent clumps of herbs or shrubs, which is within expected parameters of a confined, bedrock-dominated system.		3
Vertical Biotic Structure	The vertical structure has very limited overlap of plant layers in the AA.		3
		Final Attribute Score = (15/36) x 100	42%
Overall AA Attribute Score (average of four final scores)			**73**

5.11.3 Vegetation Transects

Complete species lists from the eight vegetation belt transects sampled at Drainage #8 are included in Table 5.11-3, below, and photos at each vegetation belt transect are included in Attachment A, Figure 10.

Table 5.11-3. Plant species and their cover observed in vegetation belt transects at Drainage #8.

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
D8-01	80%	--	open ground/water	--	--	--
	5%	*Anaphalis margaritacea*	pearly everlasting	Herb	NL	Native
	5%	*Salix lutea*	yellow willow	Shrub	OBL	Native
	5%	*Digitaria sanguinalis*	large crabgrass	Herb	FACU	Naturalized
	3%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	1%	*Bromus diandrus*	ripgut brome	Herb	NL	Naturalized
	1%	*Mimulus guttatus*	seepspring monkeyflower	Herb	OBL	Native
	< 1%	*Dianthus armeria*	deptford pink	Herb	NL	Native
D8-02	80%	*Salix laevigata*	red willow	Shrub	NL	Native
	25%	*Carex nudata*	naked sedge	Herb	FACW	Native
	10%	*Calycanthus occidentalis*	Spicebush	Shrub	FAC	Native
	5%	*Juncus balticus*	mountain rush	Herb	OBL	Native
	3%	*Solidago* sp.	Goldenrod	Herb	NL	Native
	1%	*Lythrum californicum*	California loosestrife	Herb	OBL	Native
	1%	*Polypogon monspeliensis*	rabbitfoot grass	Herb	FACW+	Naturalized
	< 1%	*Dianthus armeria*	deptford pink	Herb	NL	Native
	< 1%	*Epipactis gigantea*	stream orchid	Herb	OBL	Native

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
	< 1%	*Sonchus asper*	prickly sow-thistle	Herb	FAC	Naturalized
	< 1%	*Panicum acuminatum*	Western panic grass	Herb	FACW	Native
	< 1%	*Bromus hordeaceus*	soft chess brome	Herb	FACU-	Naturalized
	< 1%	*Anaphalis margaritacea*	pearly everlasting	Herb	NL	Native
	< 1%	*Juncus xiphioides*	iris leaf rush	Herb	OBL	Native
D8-03	30%	*Carex nudata*	naked sedge	Herb	FACW	Native
	5%	*Salix laevigata*	red willow	Shrub	NL	Native
	3%	*Hoita macrostachya*	leather root	Shrub	OBL	Native
	3%	*Solidago* sp.	Goldenrod	Herb	NL	Native
	3%	*Epipactis gigantea*	stream orchid	Herb	OBL	Native
	1%	*Lythrum californicum*	California loosestrife	Herb	OBL	Native
	1%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized
	< 1%	*Asclepias fascicularis*	narrow leaf milkweed	Herb	FAC	Native
	< 1%	*Stachys stricta*	hedge nettle	Herb	OBL	Native
	< 1%	*Dianthus armeria*	deptford pink	Herb	NL	Native
	< 1%	*Helianthus californicus*	California sunflower	Herb	OBL	Native
	< 1%	*Lotus purshianus*	spanish clover	Herb	NL	Native
D8-04	50%	--	open ground/water	--	--	--
	40%	*Carex nudata*	naked sedge	Herb	FACW	Native
	30%	*Calycanthus occidentalis*	Spicebush	Shrub	FAC	Native
	20%	*Salix laevigata*	red willow	Shrub	NL	Native
	2%	*Quercus wislizeni*	interior live oak	Tree	NL	Native
	1%	*Toxicodendron diversilobum*	poison oak	Subshrub	NL	Native
	1%	*Lythrum californicum*	California loosestrife	Herb	OBL	Native
	1%	*Epipactis gigantea*	stream orchid	Herb	OBL	Native
D8-05	50%	--	open ground/water	--	--	--
	20%	*Carex nudata*	naked sedge	Herb	FACW	Native
	15%	*Salix laevigata*	red willow	Shrub	NL	Native
	10%	*Hoita macrostachya*	leather root	Shrub	OBL	Native
	3%	*Calycanthus occidentalis*	Spicebush	Shrub	FAC	Native
	3%	*Brickellia californica*	California brickellbush	Subshrub	FACU	Native
	3%	*Epipactis gigantea*	stream orchid	Herb	OBL	Native
	< 1%	*Toxicodendron diversilobum*	poison oak	Subshrub	NL	Native
D8-06	90%	--	open ground/water	--	--	--
	3%	*Salix laevigata*	red willow	Shrub	NL	Native
	3%	*Carex feta*	greensheath sedge	Herb	OBL	Native
	1%	*Lythrum californicum*	California loosestrife	Herb	OBL	Native
	1%	*Epipactis gigantea*	stream orchid	Herb	OBL	Native
	< 1%	*Bromus diandrus*	ripgut brome	Herb	NL	Naturalized
	< 1%	*Lolium perenne*	perennial ryegrass	Herb	FAC*	Naturalized

Transect Number	Percent Cover[1]	Scientific name	Common Name	Stratum	Wetland Indicator Status[2]	Native Status
D8-07	65%	--	open ground/water	--	--	--
	30%	*Salix laevigata*	red willow	Shrub	NL	Native
	3%	*Carex feta*	greensheath sedge	Herb	OBL	Native
	1%	*Toxicodendron diversilobum*	poison oak	Subshrub	NL	Native
D8-08	90%	*Salix laevigata*	red willow	Shrub	NL	Native
	5%	*Calycanthus occidentalis*	Spicebush	Shrub	FAC	Native
	2%	*Carex feta*	greensheath sedge	Herb	OBL	Native
	2%	*Hoita macrostachya*	leather root	Shrub	OBL	Native
	1%	*Toxicodendron diversilobum*	poison oak	Subshrub	NL	Native
	< 1%	*Mimulus guttatus*	seepspring monkeyflower	Herb	OBL	Native
	< 1%	*Collinsia heterophylla*	Chinese houses	Herb	NL	Native

[1] Total percent coverage may add up to amounts greater than 100% where tree, shrub, and herb strata overlap.
[2] Source: Reed 1988

6.0 DISCUSSION AND FINDINGS

The Wetland Habitats Associated with Don Pedro Reservoir Study determined that normal Project O&M activities have no effect on wetland habitat conditions.

The Wetland Habitats Associated with Don Pedro Reservoir Study examined ten drainages for the presence of wetlands and assessed the condition of each wetland identified. Nine of these drainages were found to support wetlands with a minimum of five percent total cover of wetland vegetation and were assessed using the CRAM. The CRAM provides a standardized protocol for determining the extent to which wetland services are provided by each wetland and describing stressors potentially affecting each wetland.

FERC's Scoping Document 2 identified the following terrestrial resource issues potentially associated with the Don Pedro Project:

- Effects of project operation, including water level fluctuations, ground-disturbing activities, and maintenance activities on wetland, riparian, cottonwood and willow, and littoral vegetation communities.

Project O&M includes normal operations within the currently licensed surface water elevation range (up to 830 feet), as well as operation of three formal recreation areas (Moccasin Point, Blue Oaks, and Fleming Meadows), vegetation management within these recreation areas and Project facilities, and ongoing Reservoir debris removal and disposal near Deer Creek and Woods Creek. Recreation activities occur along portions of the shoreline and include dispersed camping, fishing, and hiking.

No Project facilities or access roads and no Project maintenance activities occur in the wetlands surveyed; although trash is removed from Gardiner Falls, the wetlands on the terrace above are not accessed for this activity. Normal O&M therefore have no effect on wetland habitat conditions. Drainage #8 and Big Creek have signs of occasional vehicle use on roads crossing the wetland, but neither road is used by the Districts for Project O&M (pers. comm. Jigour 2012); Sixbit Gulch has an old road crossing, but the BLM restricted it from legal use and it is not used by the Districts (pers. comm. Jigour 2012). There are no indicators that the hydrologic function of these wetlands is impaired or degraded by vehicle use.

All but one of the wetlands within the study area lies in valleys that drain into Don Pedro Reservoir from surrounding hillslopes. These wetlands each sustain hydrophytic vegetation that is influenced primarily by the channel gradient, substrate, and flow duration. Wetland conditions in these drainages begin at above the high-water mark of Don Pedro Reservoir, continuing upstream where conditions allow; wetland conditions below the high-water mark were not observed anywhere within the study area (except as open-water habitat) or Project Boundary. In addition, no water backs up into these wetlands as a result of Project operations. As a result, the Districts conclude that Project operations and Reservoir fluctuations do not affect these systems. One wetland system, Big Creek, does not drain into or out of the Reservoir. It is apparently created by downslope drainage from Project facilities but is not otherwise affected by Project

O&M, because no O&M activities occur in the vicinity. This wetland is generally meeting its functional potential, but has been subject to substantial grazing in places.

Noxious weeds and other non-native plants are common in the Project Boundary and ubiquitous throughout many California Central Valley habitats. However, wetlands examined during this study support few noxious weed infestations; these occur at low density with higher densities of the same weeds in upslope areas, primarily in association with public roadways. Soil and water can disperse weed seeds, although no signs of the "edge effect" (greater concentration of weeds at the perimeter of the high water line) were present in the wetlands studied. The most prevalent non-native plant occurring within the wetlands is Himalayan blackberry, which is known to disperse via animals, particularly birds, as well as root sprouts and stem tip rooting (DiTomaso and Healy 2007). Wooly mullien is also present in several wetlands in very low density and population sizes, sometimes limited to only one or two individual plants. Neither of these species is listed as a noxious weed.

7.0 STUDY VARIANCES AND MODIFICATIONS

This Wetland Habitats Associated with Reservoir Study was conducted according to the FERC-approved study plan, as modified by FERC's December 22, 2011 Study Plan Determination. No variances occurred.

8.0 REFERENCES

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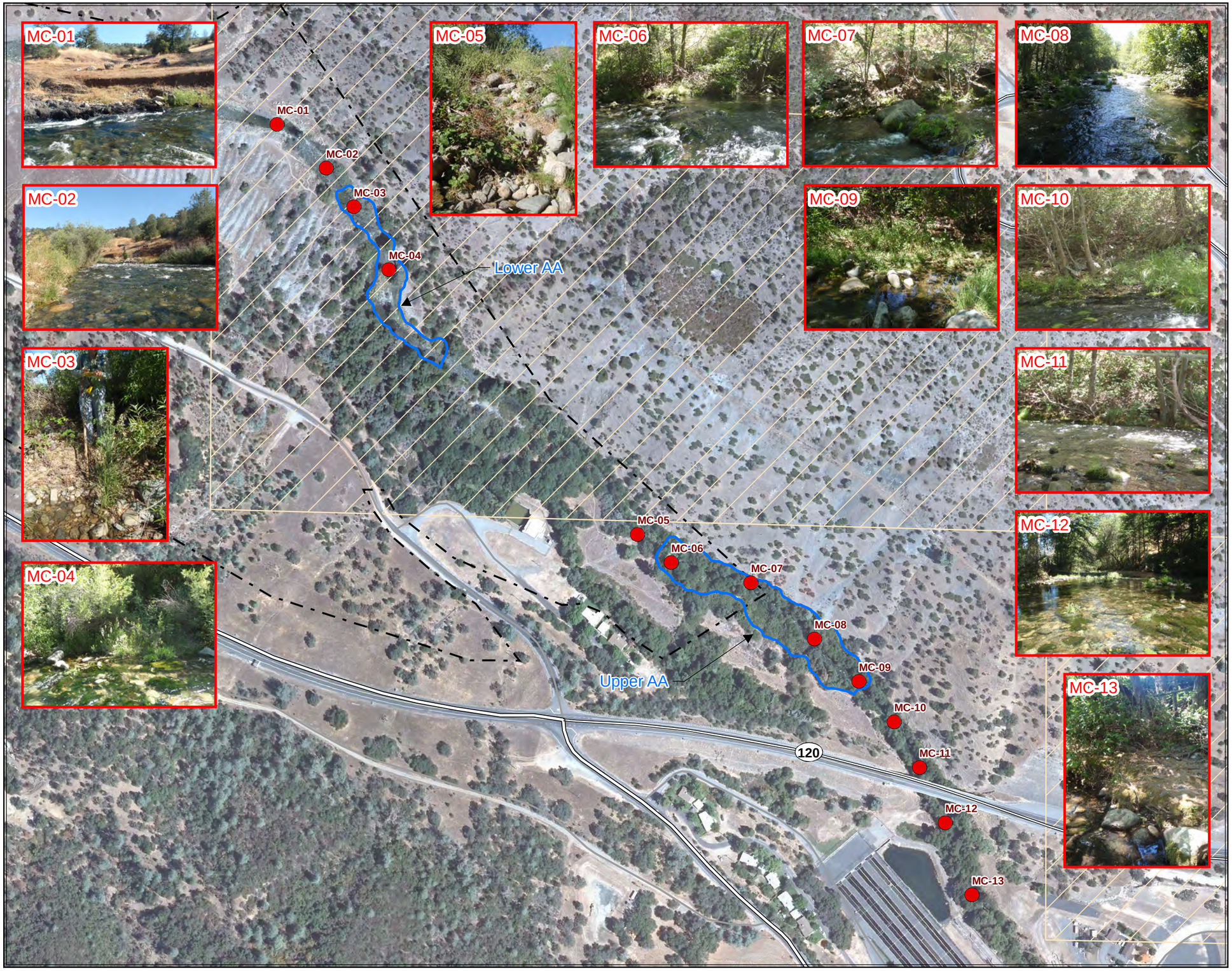
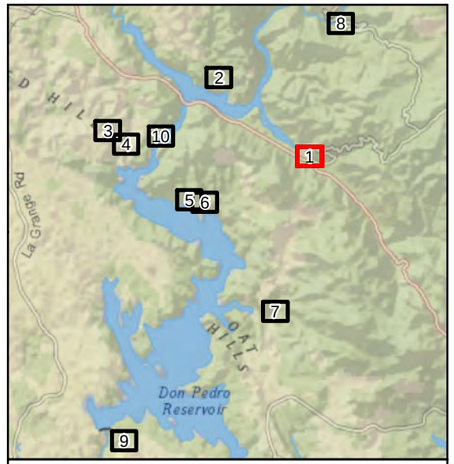
STUDY REPORT TR-03
WETLAND HABITATS

ATTACHMENT A

CRAM AAS AND VEGETATION TRANSECTS





Moccasin Creek

- Vegetation Belt Transect Location
- OHV Crossing
- CRAM Assessment Areas
- FERC Project Boundary (No. 2299)
- Dam
- Highway
- Major Road
- Minor Road
- BLM Area of Critical Environmental Concern 'Red Hills'
- Bureau of Land Management

0 150 300 600
Feet

N

Wetland Habitats Study

Don Pedro Project (FERC No.2299)

Map information was compiled from the best available sources. No Warranty is made for its accuracy or completeness.
Data Sources: Hydrography - USGS NHD; Roads - ESRI 9.3 Data (Teleatlas); Ownership, PLSS - CA BLM; FERC Boundary, Reservoir Bathy, Recreation & Project Facilities - MID/TID.
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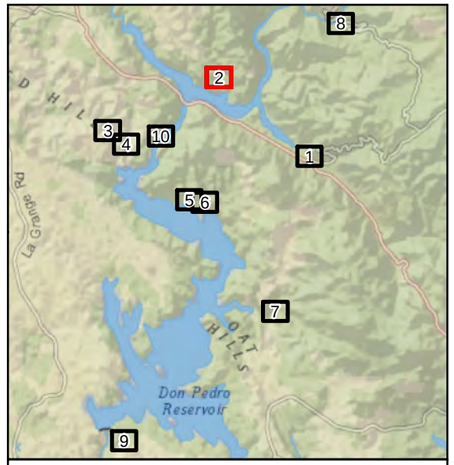

Kanaka Creek

- Vegetation Belt Transect Location
- OHV Crossing
- CRAM Assessment Areas
- FERC Project Boundary (No. 2299)
- Dam
- Highway
- Major Road
- Minor Road
- BLM Area of Critical Environmental Concern 'Red Hills'
- Bureau of Land Management

0 150 300 600
Feet

N

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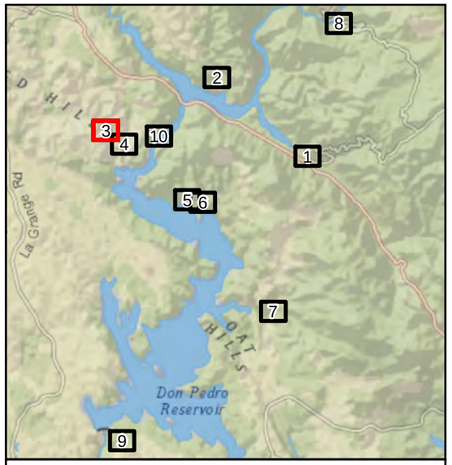

Sixbit Gulch

- Vegetation Belt Transect Location
- OHV Crossing
- CRAM Assessment Areas
- FERC Project Boundary (No. 2299)
- Dam
- Highway
- Major Road
- Minor Road
- BLM Area of Critical Environmental Concern 'Red Hills'
- Bureau of Land Management

0 150 300 600 Feet

N

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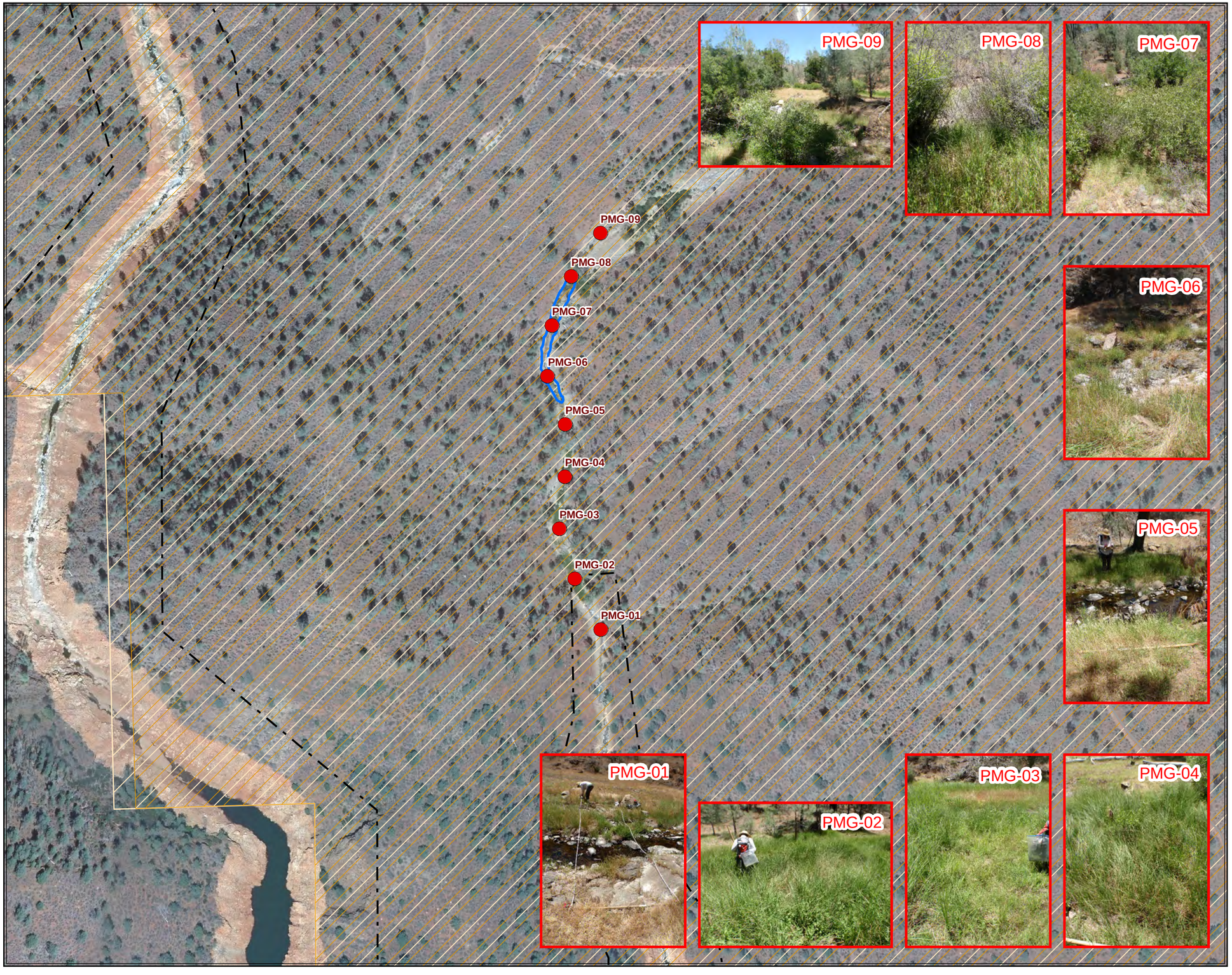

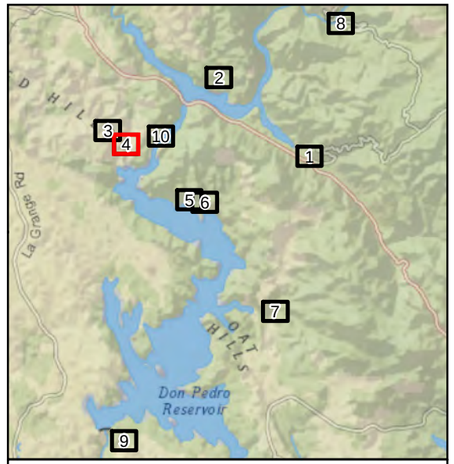

Poor Man's Gulch

- Vegetation Belt Transect Location
- OHV Crossing
- CRAM Assessment Areas
- FERC Project Boundary (No. 2299)
- Dam
- Highway
- Major Road
- Minor Road
- BLM Area of Critical Environmental Concern 'Red Hills'
- Bureau of Land Management

0 150 300 600
Feet

N

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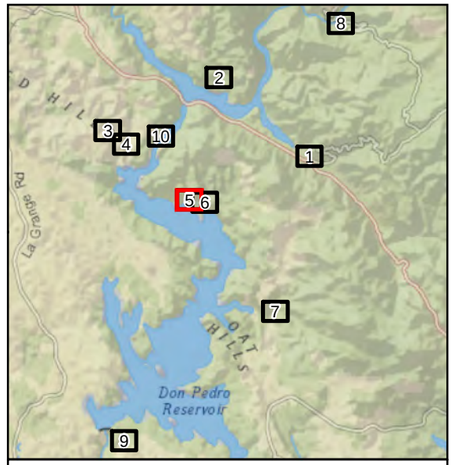
Data is CA SPCS, zone III, ft.



Drainage #7

- Vegetation Belt Transect Location
- OHV Crossing
- CRAM Assessment Areas
- FERC Project Boundary (No. 2299)
- Dam
- Highway
- Major Road
- Minor Road
- BLM Area of Critical Environmental Concern 'Red Hills'
- Bureau of Land Management

0 150 300 600 Feet

N

Wetland Habitats Study

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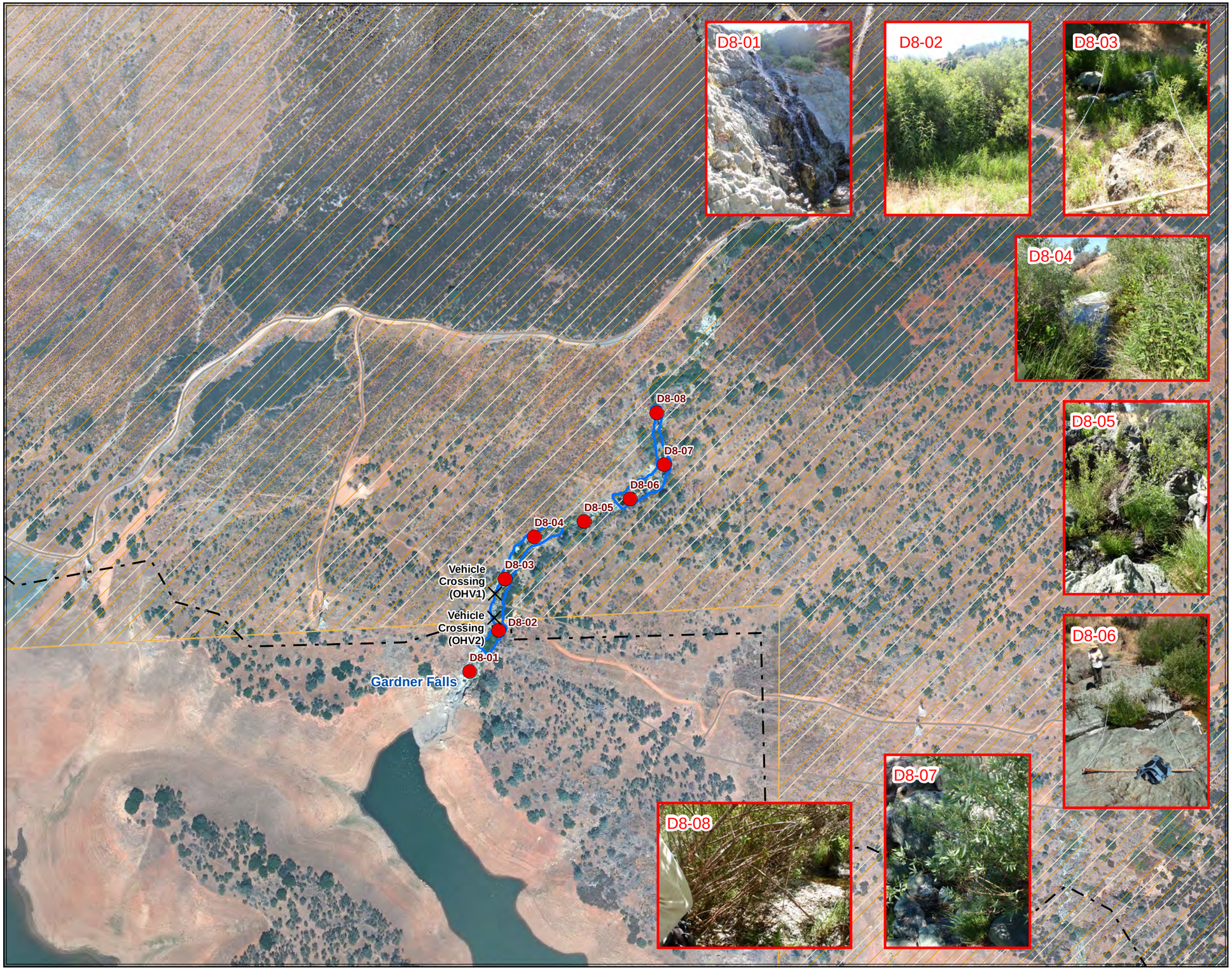

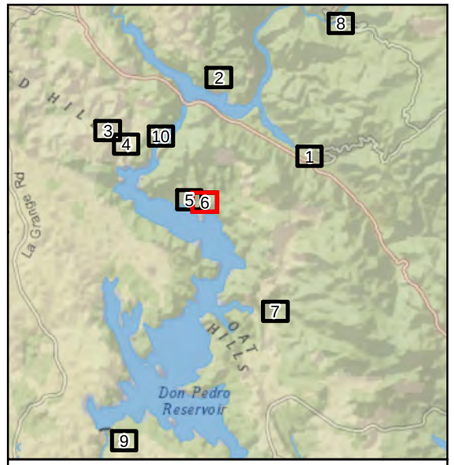

Drainage #8

- Vegetation Belt Transect Location
- OHV Crossing
- CRAM Assessment Areas
- FERC Project Boundary (No. 2299)
- Dam
- Highway
- Major Road
- Minor Road
- BLM Area of Critical Environmental Concern 'Red Hills'
- Bureau of Land Management

0 150 300 600 Feet

N

Wetland Habitats Study

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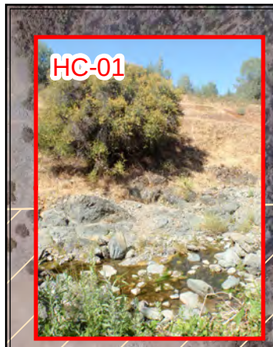

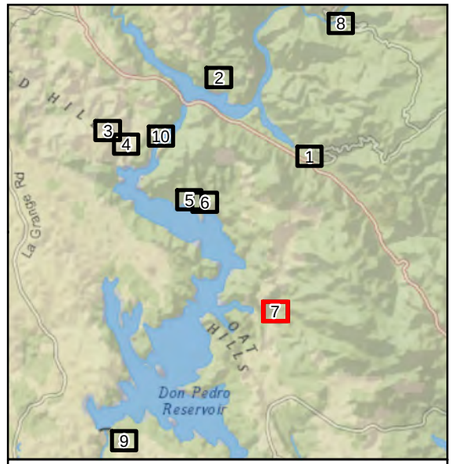

Hatch Creek

- Vegetation Belt Transect Location
- OHV Crossing
- CRAM Assessment Areas
- FERC Project Boundary (No. 2299)
- Dam
- Highway
- Major Road
- Minor Road
- BLM Area of Critical Environmental Concern 'Red Hills'
- Bureau of Land Management

0 150 300 600
Feet

N

Wetland Habitats Study

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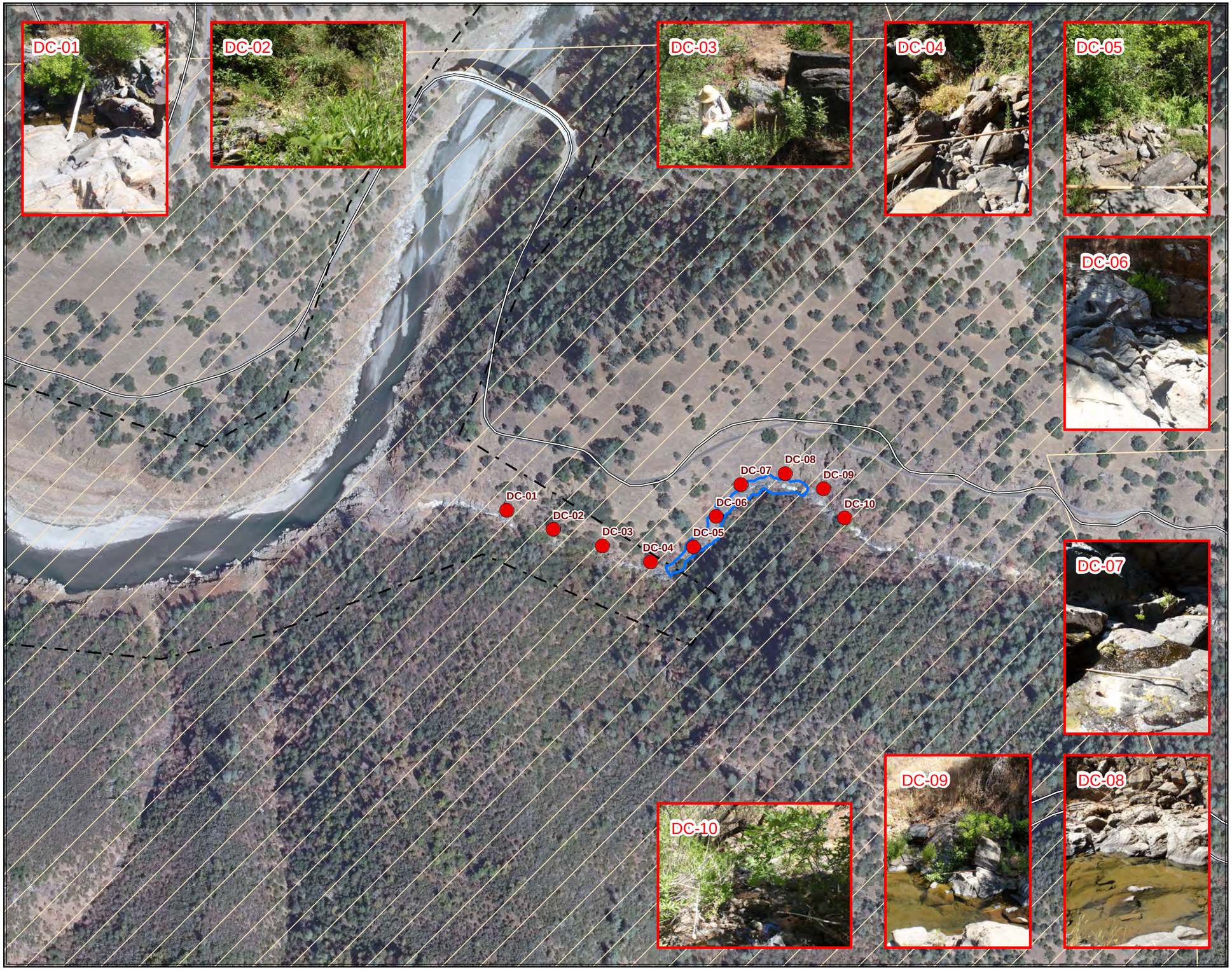

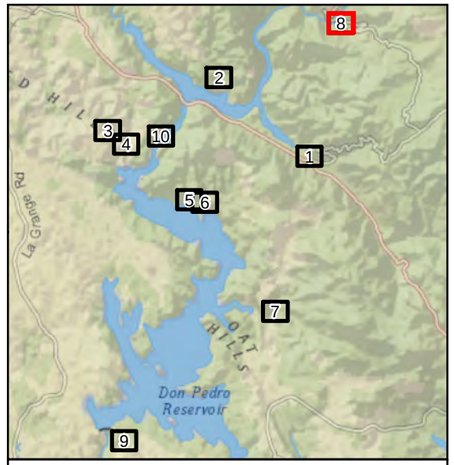

Deer Creek

- Vegetation Belt Transect Location
- OHV Crossing
- CRAM Assessment Areas
- FERC Project Boundary (No. 2299)
- Dam
- Highway
- Major Road
- Minor Road
- BLM Area of Critical Environmental Concern 'Red Hills'
- Bureau of Land Management

0 150 300 600
Feet

N

Wetland Habitats Study

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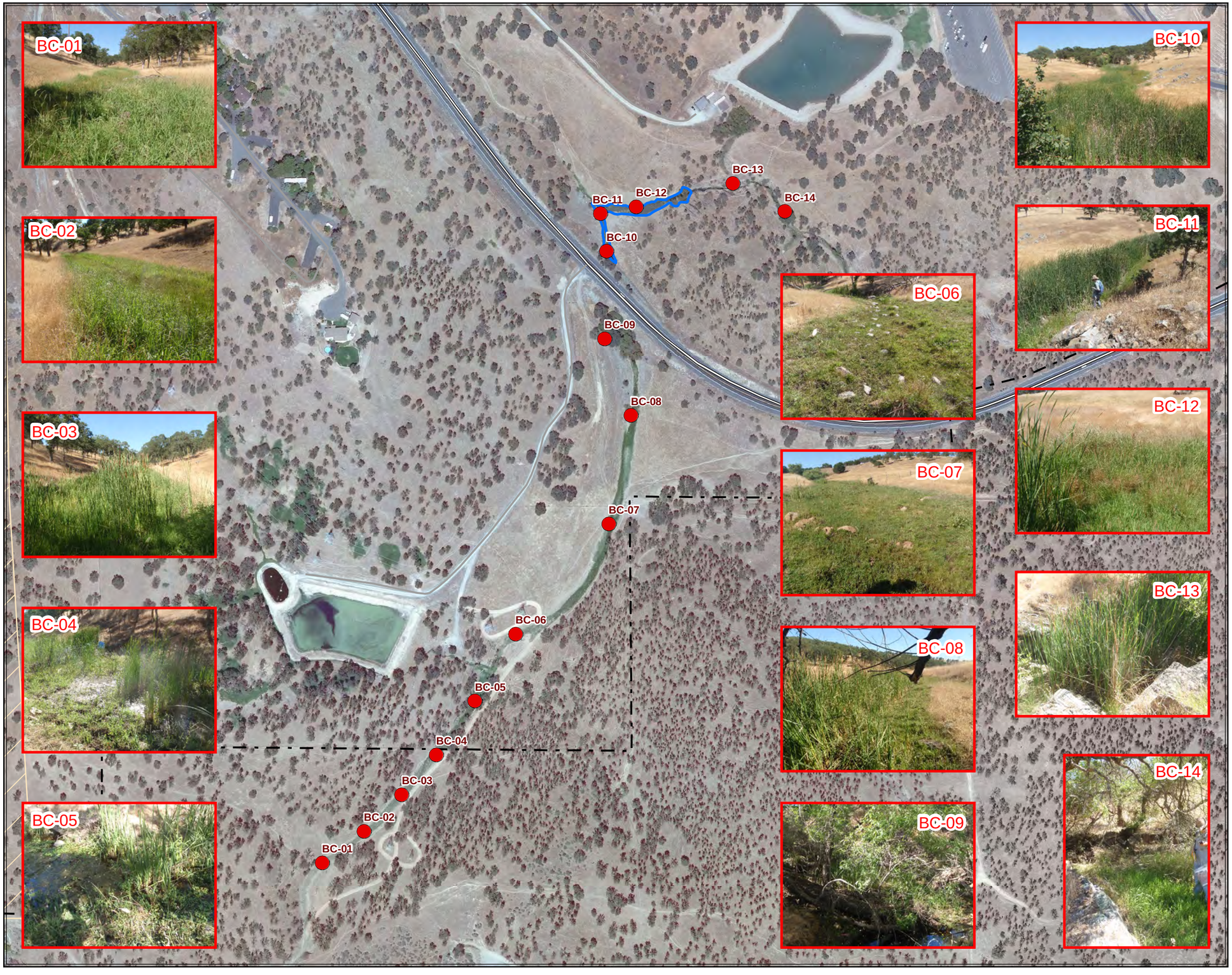

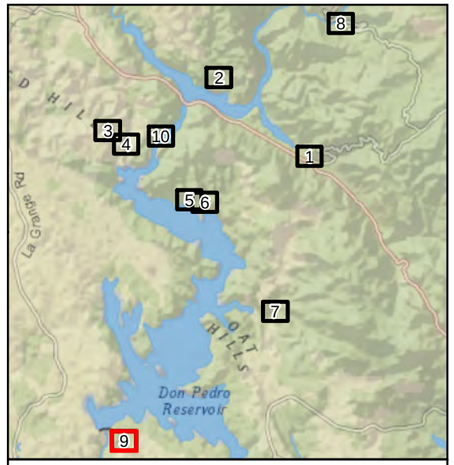

Big Creek

- Vegetation Belt Transect Location
- OHV Crossing
- CRAM Assessment Areas
- FERC Project Boundary (No. 2299)
- Dam
- Highway
- Major Road
- Minor Road
- BLM Area of Critical Environmental Concern 'Red Hills'
- Bureau of Land Management

0 150 300 600 Feet

N

Wetland Habitats Study

Don Pedro Project (FERC No.2299)

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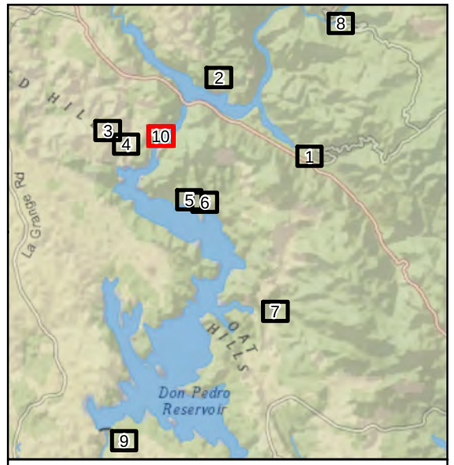
Data Sources: Hydrography - USGS NHD; Roads - ESRI 9.3 Data (Teleatlas); Ownership, PLSS - CA BLM; FERC Boundary, Reservoir Bathy, Recreation & Project Facilities - MID/TID.
Data is CA SPCS, zone III, ft.

3 Springs Gulch



Three Springs Creek

- Vegetation Belt Transect Location
- OHV Crossing
- CRAM Assessment Areas
- FERC Project Boundary (No. 2299)
- Dam
- Highway
- Major Road
- Minor Road
- BLM Area of Critical Environmental Concern 'Red Hills'
- Bureau of Land Management

0 150 300 600 Feet

N

Wetland Habitats Study

Don Pedro Project (FERC No.2299)

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Data Sources: Hydrography - USGS NHD; Roads - ESRI 9.3 Data (Teleatlas); Ownership, PLSS - CA BLM; FERC Boundary, Reservoir Bathy, Recreation & Project Facilities - MID/TID.
Data is CA SPCS, zone III, ft.

STUDY REPORT TR-03
WETLAND HABITATS

ATTACHMENT B

REPRESENTATIVE PHOTOGRAPHS

List of Photos

Photo 1. **Sixbit Gulch Large bedrock and boulder outcrops occurred along the perimeter of the wetland in this moderately confined drainage.**

Photo 2. **Sixbit Gulch Hummocks of naked sedge (*Carex nudata*) intermixed with Sonoma hedgenettle (*Stachys stricta*), springseep monkeyflower (*Mimulus guttatus*), and an occasional red willow (*Salix laevigata*).**

Photo 3. **Sixbit Gulch A paved road crossed the channel near transect SG-06, which appears to be unused due to dense vegetation coverage. The road provides an opening in the dense riparian shrubs for sedge, springseep monkey flower (*Mimulus guttatus*) and Sonoma hedgenettle (*Stachys stricta*) to flourish**

Photo 4. **Poorman's Gulch Shallow soils overlay bedrock substrates, with hummocks of naked sedge and mixed herbs.**

Photo 5. **Poorman's Gulch Exposed bedrock supports perennial ryegrass (*Lolium perenne*), and annual beardgrass (*Polypogon monspeliensis*) at the perimeter.**

Photo 6. **Poorman's Gulch Patches of red willow and spice bush (*Calycanthus occidentalis*) alternated with naked sedge hummocks and open bedrock, which occurred more frequently around pools located at the upstream end of the Assessment Area (AA) .**

Photo 7. **Three Springs Gulch Reconnaissance efforts using aerial photography and boat survey indicated that wetlands are not supported by Three Springs Gulch within or near the Project Boundary.**

Photo 8. **Moccasin Creek The banks were mainly comprised of soil, stabilized by mature alder (*Alnus incana*) and red willow trees and shrubs, with occasional California sycamore (*Platanus racemosa*) and narrowleaf willow (*Salix exigua*). The canopy was well-developed, providing shade throughout the creek. Herbaceous vegetation is rich, but not overly abundant; many species occurred in small patches around the tree roots**

Photo 9. **Moccasin Creek The creek is accessed frequently by fishermen, with trails throughout upland areas and into the riparian zone. The left bank just upstream of the discharge point had a short erosional area, where the dirt bank has collapsed; however the established root systems have stabilized the soil and prevented complete bank failure**

Photo 10. **Moccasin Creek Exposed alder roots at the wetted edge, diverse aquatic vegetation, and abundant bryophytes on the banks indicated a healthy system with minimal fluctuation in flows.**

Photo 11. **Hatch Creek Cattle grazing was present within Hatch Creek and surrounding upland areas**

Photo 12. **Hatch Creek Red willow, mule fat (*Baccharis salicifolia*), and spice bush were present between stretches of open, rocky banks and pools. Himalayan blackberry (*Rubus armeniacus*) was present on many of the banks under canopy of red willow or upland canyon live oaks (*Quercus chrysolepis*)**

Photo 13. **Big Creek The Big Creek channel had no distinct bed or banks and consisted of a shallow depression formed by hillslopes converging. The creek supported primarily herbaceous species, such as broad-leaved cattail (*Typha latifolia*), tall flatsedge (*Cyperus eragrostis*), annual beard grass, dallisgrass (*Paspalum dilatatum*), spike rush (*Eleocharis ovata*), and lady's thumb (*Persicaria maculosa*).**

Photo 14. **Big Creek The wetland is heavily influenced by cattle, as evident by grazed herbs and hoof puncture. Vehicles cross the wetland perpendicularly with no evidence of adverse effects on the wetland.**

Photo 15. **Kanaka Creek Downstream of the highway, multiple vertical layers of vegetation were present in horizontally diverse patches**

Photo 16. **Kanaka Creek Upper portions of the creek had reduced species richness and horizontal complexity due to the dominance of Himalayan blackberry and fig (*Ficus carica*) dominance over the mid and tall layers of vegetation.**

Photo 17. **Deer Creek The majority of the channel was comprised of bedrock streambed and banks and supports very limited vegetation**

Photo 18. **Deer Creek The landscape near the channel alternates between nearly barren areas of open bedrock and lower-gradient portions that support shrubs. Bedrock pools are present throughout the channel and support macroinvertebrates, crawfish, and bullfrogs (*Rana catesbiana*)**

Photo 19. **Drainage #7 The upland grasslands end abruptly at the edge of the drainage that has nearly vertical bedrock walls and bedrock floors**

Photo 20. **Drainage #7 Limited shrubs, such as buckeye (*Aesculus californica*), red willow, and spice bush grew from within the vertical-walled drainage, with the canopy just overtopping the banks of the channel**

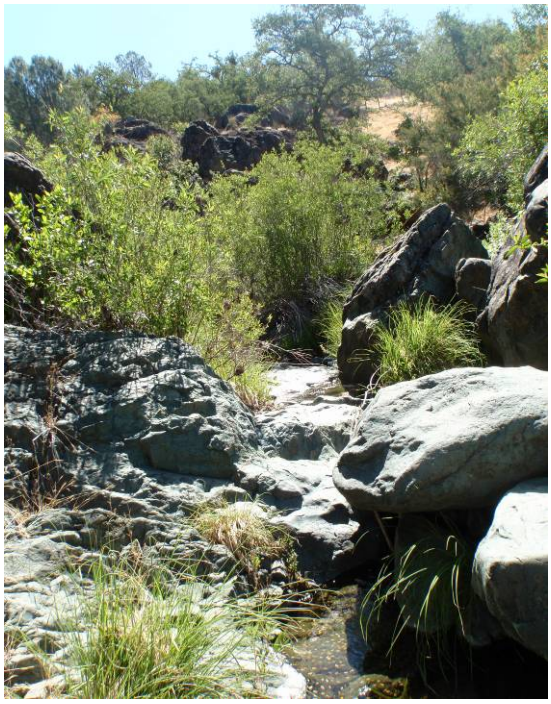

Photo 21. **Drainage #8 The lower portion of the channel was comprised mainly of bedrock and boulders. Vegetation was limited and included red willows and small patches of naked sedge or stream orchid (*Epipactis gigantean*) that occurred in crevices between boulders**

Photo 22. **Drainage #8 The upper portion of Drainage #8 had a steep gradient with the streambed and banks comprised exclusively of bedrock and boulders. A series of falls, plunge-pools, chutes, and sheets formed the channel; intermittent red willows, spice bush, and buckeyes occurred in areas where sediment was present and at the channel's edge**

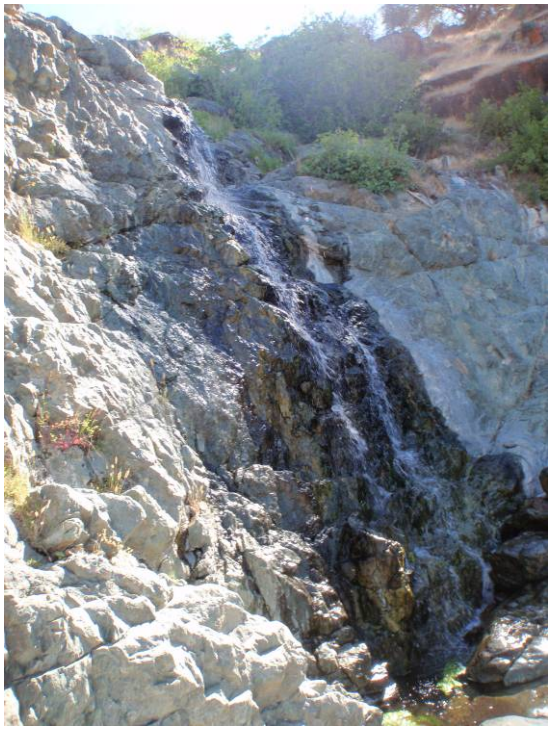

Photo 23. **Drainage #8 Gardner Falls discharges to Don Pedro reservoir over bedrock, supporting very little vegetation, such as Deptford pink (*Dianthus armeria*), with overhanging buckeye and California wild grape (*Vitis californica*). This area is very scenic, and is a popular recreation area for boaters**