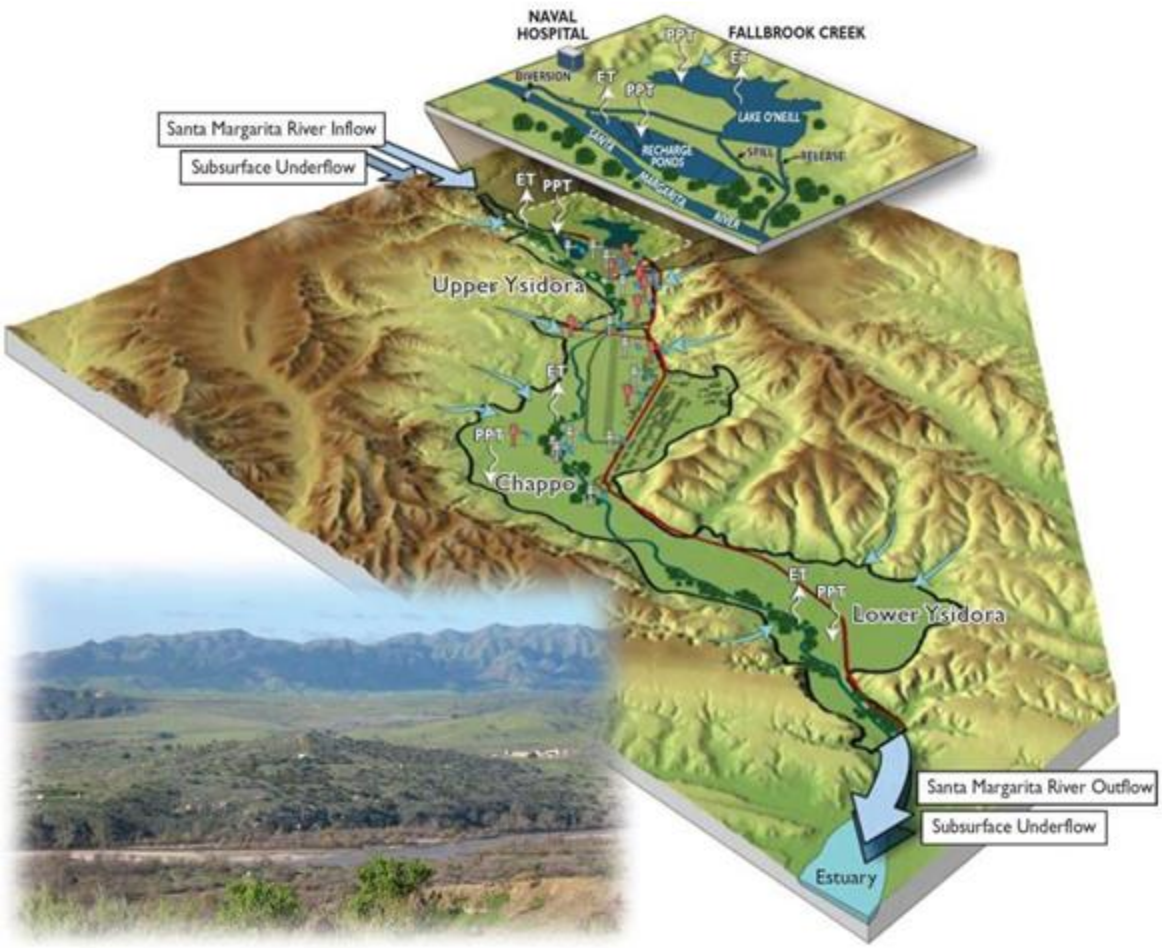
Final

Environmental Impact Statement/ Environmental Impact Report
Santa Margarita River Conjunctive Use Project



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Acronyms and Abbreviations

ºF	degree Fahrenheit
A.D.	Anno Domini
af	acre-feet
AFY	acre-feet per year
AFM	acre-feet per month
AMP	Adaptive Management Plan
APE	Area of Potential Effect
ARTO	arroyo toad
AWTP	Advanced Water Treatment Plant
BA	Biological Assessment
BMP	Best Management Practice
BO	Biological Opinion
B.P.	Before Present
BSSP	Belding's savannah sparrow
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
$CaCO_3$	calcium carbonate
CAGN	coastal California gnatcatcher
Cal EPA	California Environmental Protection Agency
CARB	California Air Resources Board
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGP	Construction General Permit
CGS	California Geological Survey
CH_4	methane
CLTE	California least tern
cm	centimeter(s)
CMP	corrugated metal pipe
CNIC	Commander Navy Installations Command
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CRHR	California Register of Historic Resources
CRPR	California Rare Plant Rank
CSS	coastal sage scrub
CSV	chaparral sand-verbena
CUP	Conjunctive Use Project
CWA	Clean Water Act
CWRMA	Cooperative Water Resources Management Agreement
cy	cubic yard
dB	decibel
DET Fallbrook	Naval Weapons Station Seal Beach, Detachment Fallbrook
DOD	U.S. Department of Defense
DON	U.S. Department of the Navy
DPH	California Department of Public Health
DPS	distinct population segment
DTSC	Cal EPA, Department of Toxic Substances Control
EA	Environmental Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMWD	Eastern Municipal Water District
EO	Executive Order
EPP	Environmental Protection Plan
EPSO	Environmental Program Services Office
ES	Environmental Security
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FEAD	Facilities Engineering and Acquisition Division
ft	foot/feet
ft^2	square feet
FFA	Federal Facilities Agreement
FOP	facility operation plan
FPUD	Fallbrook Public Utility District
FY	fiscal year
GHG	greenhouse gas
GIS	Geographic Information System
GWP	global warming potential
HA	Hydrologic Area
HDPE	high-density polyethylene
HAS	Hydrologic Sub-Area
HU	Hydrologic Unit
I-	Interstate
ICRMP	Integrated Cultural Resources Management Plan
IM-1	Iron and Manganese Plant 1
IM-2	Iron and Manganese Plant 2
IM	iron and manganese
in	inch(es)
INRMP	Integrated Natural Resources Management Plan
IR	Installation Restoration
km	kilometer(s)
km^2	square kilometer(s)
kph	kilometers per hour
kV	kilovolt
kWH	kilowatt hours
LBVI	least Bell's vireo
LFCR	light-footed clapper rail
m	meter(s)
m^2	square meter(s)
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
MCL	Maximum Contaminant Level
MCO	Marine Corps Order
MGD	million gallons per day
µg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
mi	mile(s)
mi^2	square mile(s)
mg/L	milligrams per liter
mL	milliliters

MOU	Memorandum of Understanding
mph	miles per hour
msl	mean sea level
MW	megawatt
MWD	Metropolitan Water District of Southern California
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
$Na_2S_2O_5$	sodium metabisulphate
NaOCl	sodium hypochlorite
NaOH	sodium hydroxide
NAVFAC SW	Naval Facilities Engineering Command Southwest
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NOAA Fisheries	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NOD	Notice of Determination
NOI	Notice of Intent
NOP	Notice of Preparation
NOT	Notice of Termination
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NTU	National Turbidity Unit
O_3	ozone
OB	Orcutt's Brodiaea
OPNAVINST	Naval Operations Instruction
OSMZ	Open Space Management Zone
OSRP	Oil Spill Response Plan
OWR	Office of Water Resources
OU	Operable Unit
P.L.	Public Law
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
PM_{10}	particulate matter less than or equal to 10 microns in diameter
POD	point of diversion
ppb	parts per billion
ppm	parts per million
PRC	public resources code
PWA	Public Works Administration
RAQS	Regional Air Quality Strategy
RCRA	Resource Conservation and Recovery Act
RCWD	Rancho California Water District
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
RFS	Riverside fairy shrimp
RIRA	Ridgway's Rail
RM	Rainbow manzanita
RO	reverse osmosis
ROD	Record of Decision
ROI	region of influence
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RWQCB	Regional Water Quality Control Board
SCADA	Supervisory Control and Data Acquisition
SCM	Special Conservation Measure
SCS	southern California steelhead
SDAB	San Diego Air Basin
SDCAPCD	San Diego County Air Pollution Control District
SDCWA	San Diego County Water Authority
SDFS	San Diego fairy shrimp
SDG&E	San Diego Gas & Electric
SECNAVINST	Secretary of the Navy Instruction
SHPO	State Historic Preservation Office(r)
SIP	State Implementation Plan
SKR	Stephens' kangaroo rat
SMARTS	California Stormwater Multi-Application and Report Tracking System
SMR	Santa Margarita River
SNPL	western snowy plover
SO_2	sulfur dioxide
SO_x	sulfur oxides
SR	State Route
SSC	California Species of Special Concern
SSC Pacific	Space and Naval Warfare Systems Center Pacific
Stetson	Stetson Engineers, Inc.
STP	sewage treatment plant
SWFL	southwestern willow flycatcher
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
TMDL	Total Maximum Daily Load
TWG	tidewater goby
USACE	U.S. Army Corps of Engineers
U.S.	United States
UFC	Unified Facilities Criteria
USC	U.S. Code
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USMC	U.S. Marine Corps
VOC	volatile organic compound
WDID	Waste Discharge Identification
WTP	Water Treatment Plant
WY	Water Year

ENVIRONMENTAL IMPACT STATEMENT/ENVIRONMENTAL IMPACT REPORT

NEPA Lead Agency:	U.S. Department of the Navy, Marine Corps U.S Department of the Interior, Bureau of Reclamation
CEQA Lead Agency:	Fallbrook Public Utility District
Title of Proposed Action:	Santa Margarita River Conjunctive Use Project
Affected Jurisdiction:	San Diego County
Designation:	Environmental Impact Statement/Environmental Impact Report

Abstract

The U.S. Marine Corps (USMC), U.S. Department of the Interior, Bureau of Reclamation (Reclamation), and Fallbrook Public Utility District (FPUD) have prepared this Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the proposed Santa Margarita River (SMR) Conjunctive Use Project (CUP) in compliance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code § 4321-4370d); as implemented by the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (Title 40 Code of Federal Regulations [CFR] §§ 1500-1508); U.S. Department of the Navy Procedures for Implementing NEPA (32 CFR § 775); Marine Corps Environmental Compliance and Protection Manual (Marine Corps Order P5090.2A, change 3, dated August 2013); California Environmental Quality Act (CEQA) (California Public Resources Code 21000 *et seq.*); California State CEQA Guidelines (14 California Code of Regulations § 15000 *et seq.*), as amended; and resource-specific regulatory guidelines. The Proposed Action would resolve the water rights issues between MCB Camp Pendleton and FPUD and satisfy the Court's order to find a "physical solution" to the ongoing dispute in *United States v. Fallbrook Public Utility District, et al.* Implementation of the Proposed Action would include improvements to existing facilities and construction of new facilities to efficiently meet the long-term water demands of Marine Corps Base (MCB) Camp Pendleton and FPUD, reduce FPUD's dependence on imported water, maintain watershed resources, and improve water supply reliability by managing the yield of the Lower SMR Basin. The Proposed Action is needed to upgrade/develop infrastructure and cooperative water management processes that satisfy MCB Camp Pendleton's and FPUD's respective current and future water requirements. This EIS/EIR evaluates the potential environmental impacts of two action alternatives and the No-Action Alternative on the following resource areas: geological resources, water resources, biological resources, cultural resources, air quality, hazardous materials and wastes, and utilities.

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EXECUTIVE SUMMARY

INTRODUCTION

The U.S. Marine Corps (USMC), U.S. Department of the Interior, Bureau of Reclamation (Reclamation), and Fallbrook Public Utility District (FPUD) have prepared this joint Environmental Impact Statement/Environmental Impact Report (EIS/EIR) to evaluate the environmental impacts associated with the proposed Santa Margarita River (SMR) Conjunctive Use Project (CUP). The Proposed Action would resolve the water rights issues between MCB Camp Pendleton and FPUD and satisfy the Court's order to find a "physical solution" to the ongoing dispute in *United States v. Fallbrook Public Utility District, et al.* The proposed project would involve the conjunctive use of surface water and groundwater within the Lower SMR Basin. "Conjunctive use" would consist of adaptive management of surface water and groundwater resources and would be achieved through the diversion of SMR surface waters to groundwater recharge ponds and the active use of groundwater aquifers for water storage. The Proposed Action would efficiently meet the long-term water demands of U.S. Marine Corps Base (MCB) Camp Pendleton and the FPUD, reduce dependence on imported water, maintain watershed resources, and improve water supply reliability by managing the yield of the Lower SMR Basin. The USMC and Reclamation are the designated co-lead agencies for review of this project under the National Environmental Policy Act (NEPA) and FPUD is the designated lead agency for review of this project under California Environmental Quality Act (CEQA) in the preparation of this joint EIS/EIR.

The SMR CUP may include some or all of the following components, which are configured or combined differently for each action alternative:

- Replacement of the existing diversion structure on the SMR, within MCB Camp Pendleton;
- Improvements to O'Neill Ditch and headgate, within MCB Camp Pendleton;
- Improvements to existing storage and recharge ponds (also referred to as recharge ponds), within MCB Camp Pendleton;
- Installation of new production wells, gallery wells, and associated collection system infrastructure, within MCB Camp Pendleton;
- Construction or expansion of water treatment facilities, within MCB Camp Pendleton or in the community of Fallbrook;
- Construction of pumping plants and a bi-directional pipeline, between MCB Camp Pendleton and FPUD; and
- An open space management zone (OSMZ), in the community of Fallbrook.

PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the Proposed Action is to resolve the water rights issues between MCB Camp Pendleton and FPUD and satisfy the Court's order to find a "physical solution" to the ongoing dispute in *United States v. Fallbrook Public Utility District, et al.* It would efficiently meet the long-term water demands of MCB Camp Pendleton and FPUD, reduce FPUD's dependence on imported water, maintain watershed resources, and improve water supply reliability by managing the yield of the Lower SMR Basin. The Proposed Action is needed to upgrade/develop infrastructure and cooperative water management processes that satisfy MCB Camp Pendleton's and FPUD's respective current and future water requirements. MCB Camp Pendleton and FPUD entered into a Memorandum of Understanding (MOU) in

2001 agreeing to jointly participate in the project in good faith and with full cooperation. MCB Camp Pendleton, Reclamation, and FPUD signed a Conceptual Points of Agreement in January 2011.

PUBLIC INVOLVEMENT PROCESS

Public involvement in the development of the EIS/EIR is designed to involve the public in the federal and state decision-making process. NEPA and CEQA regulations require an early and open process for determining the scope of issues related to a Proposed Action or project. In accordance with NEPA and CEQA, the USMC, Reclamation, and FPUD initiated a public and agency scoping process to assist in determining the range of issues to be addressed in this EIS/EIR.

The range of issues analyzed in this EIS/EIR was determined from initial USMC, Reclamation, and FPUD evaluation of the action alternatives as well as comments received during the public scoping process and written and verbal comments received during the 2010 public review period for the California State Water Resources water rights permit petitions (refer to Appendix A).

A Notice of Availability/Notice of Completion for the Draft EIS/EIR was published in the *Federal Register* on 09 May 2014 and a Notice of Completion was provided to the State Clearinghouse on 09 May 2014 to initiate a 45-day public review of the Draft EIS/EIR. A public meeting was held on 29 May 2014 at FPUD and the public review period for the Draft EIS/EIR concluded on 10 July 2014. The EIS/EIR has been made available to the public via the MCB Camp Pendleton website: http://www.pendleton.usmc.mil/base/environmental/index.asp and the Fallbrook Public Utility District website: http://www.fpud.com, and at the following local libraries: City of San Clemente Public Library, Fallbrook Public Library, and the City of Oceanside Public Library. Written and verbal comments on the Draft EIS/EIR were provided by the U.S. Environmental Protection Agency (USEPA) (refer to Appendix A) and FPUD Board members, respectively.

REGULATORY ENVIRONMENT

This EIS/EIR has been prepared pursuant to the following:

- NEPA of 1969 (42 United States Code [USC] §§ 4321-4370h), which requires an environmental analysis for major federal actions having the potential to significantly impact the quality of the human environment;
- Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] §§ 1500-1508), which implement the requirements of NEPA;
- U.S. Department of the Navy (DON) regulations for implementing NEPA (32 CFR § 775) and Secretary of the Navy Instruction (SECNAVINST) 5090.6A, which provides the DON policy for implementing the CEQ regulations and NEPA;
- Marine Corps Order (MCO) P5090.2A, change 3, dated August 2013, Environmental Compliance and Protection Manual, which establishes procedures for implementing NEPA;
- CEQA (California Public Resources Code [PRC] §§ 21000-21177);
- California State CEQA Guidelines (14 California Code of Regulations (CCR) §§ 1500-15387).

This EIS/EIR has also been prepared considering the following federal and state regulations and orders:

Federal Regulations, Statutes, and Orders

- Clean Water Act (CWA) (33 USC §§ 1251-1387);
- Department of Defense (DOD) Ammunition and Explosives Safety Standards (C5.4.1.1.2);

- Federal Endangered Species Act (ESA) (16 USC § 1531 *et seq.*);
- Fish and Wildlife Coordination Act (16 USC § 661 *et seq.*);
- Executive Order (EO) 11990: *Protection of Wetlands*;
- National Historic Preservation Act (NHPA) Section 106 (16 USC § 470 *et seq.*);
- Clean Air Act (CAA) - Authority to Construct and Permit to Operate;
- EO 11988: *Floodplain Management*;
- EO 13547: *Stewardship of the Ocean, Our Coasts, and the Great Lakes*;
- Migratory Bird Treaty Act (16 USC § 703-712);
- Marine Mammal Protection Act (16 USC § 1361 and 50 CFR § 216);
- Marine Protection, Research, and Sanctuaries Act (33 USC § 1401);
- EO 13112: *Invasive Species*;
- EO 12898: *Environmental Justice in Minority Populations and Low-Income Populations*;
- EO 13045: *Environmental Health and Safety Risks to Children*;
- Secretary of the Interior Order 3215, Principles for the Discharge of the Secretary's Trust Responsibility;
- Department of the Interior Manual, Part 303, DM 2, Principles for Managing Indian Trust Assets;
- Coastal Zone Management Act (16 USC § 1451 *et seq.* and 15 CFR § 930), Federal Consistency with Approved Coastal Management Programs;
- Archaeological Resources Protection Act (16 USC 470aa-mm);
- Native American Graves Protection and Repatriation Act (25 USC §§ 3001-3013);

State Regulations

- State Fish and Wildlife Code § 1601;
- California ESA (California Fish and Wildlife Code § 2081 *et seq.*);
- California Coastal Act (PRC § 30000 *et seq.*)

PROCESS USED TO FORMULATE ALTERNATIVES

Numerous studies have been conducted and reports written regarding use of water from the SMR and how to best achieve the water supply improvement objectives of MCB Camp Pendleton and FPUD. The common goal of these studies was to develop feasible alternatives that would enhance and optimize the productivity of the Lower Santa Margarita groundwater basin, while considering the

Least Environmentally and Damaging Practicable Alternative (LEDPA). Various potential alternatives were examined in these previous studies, including local and regional projects located within and outside the SMR Basin. Factors that were considered when identifying potential project alternatives included:

- The quantity of water diverted from the SMR;
- The amount of water available for direct and indirect use;
- Potential direct and indirect impacts to the local environment;
- Engineering efficiencies;

- Costs

Forty-four conceptual alternatives, selected during a June 2004 workshop attended by Reclamation, FPUD, MCB Camp Pendleton, and Naval Weapons Station Seal Beach, Detachment Fallbrook (DET Fallbrook), were subsequently evaluated and compared at an appraisal level to determine which alternatives could be constructed to put to beneficial use naturally occurring streamflow, groundwater, and tertiary treated wastewater. The collective project features presented some opportunity for flexibility with alternative locations and design of some features. The resulting report, *Santa Margarita River Conjunctive Use Pre-Feasibility Plan Formulation Study* provided Reclamation, MCB Camp Pendleton, and FPUD with information sufficient to screen and consider alternatives and/or project components to be carried forward for evaluation in a feasibility study and under NEPA and CEQA.

A December 2006 Decision Memo was created by MCB Camp Pendleton, Reclamation, and FPUD describing an inter-agency agreement on a Proposed Action and two alternatives recommended for economic and environmental feasibility analysis. After approval of the 2006 Decision Memo, the Proposed Action and alternatives were further refined through additional feasibility analysis and design.

A Preliminary Draft EIS/EIR, along with an engineering/economic feasibility analysis was to address the three Decision Memo alternatives in August 2009. However, work on the draft documents was placed on hold as coordination meetings were held to address significant design issues associated with the proposed expansion of the Haybarn Canyon Advanced Water Treatment Plant (AWTP). Additionally, in the summer of 2010, the California State Water Resources Control Board (SWRCB) published for public review the project's water rights time extension and change petitions. Comments received during public review provided new information regarding the anadromous form of steelhead trout (*Oncorhynchus mykiss*). The AWTP design coordination meetings and steelhead trout comments resulted in the removal of two alternatives (former Alternatives 1 and 2), and the inclusion of a new alternative. The EIS/EIR now addresses two action alternatives and a No-Action Alternative. The action alternatives provide water supply for both MCB Camp Pendleton and FPUD.

Those alternatives and/or project components that were eliminated from further analysis are discussed in Section 2.4, *Alternatives Considered and Eliminated from Detailed Study*.

DESCRIPTION OF THE PROPOSED ACTION

The Proposed Action would resolve the water rights issues between MCB Camp Pendleton and FPUD and satisfy the Court's order to find a "physical solution" to the ongoing dispute in *United States v. Fallbrook Public Utility District, et al.* It would increase the sustainable basin yield of the Lower SMR Basin by developing a conjunctive use program that improves the existing groundwater recharge and recovery capacity within the Lower SMR. The SMR CUP would rehabilitate existing, and build new facilities within the Lower SMR Basin to capture surface runoff during high streamflow events that currently flows to the Pacific Ocean. The captured surface water would be used to recharge groundwater through existing groundwater recharge ponds, and stored or "banked" in groundwater basins during wet years in order to augment water supplies during dry years, thereby reducing reliance on imported water. Specifically included are improvements to the diversion works; increased capacity of the headgate and the O'Neill Ditch; improvements to seven existing recharge ponds; installation of new groundwater production wells or gallery wells; treatment of water at an existing, expanded, or new FPUD Water Treatment Plant (WTP); and a bi-directional pipeline that both delivers water to FPUD and provides MCB Camp Pendleton with an off-base water supply during drier than normal conditions or emergency situations. The majority of improvements would occur on MCB Camp Pendleton.

The following sections describe the two action alternatives that are carried forward for analysis in this EIS/EIR. A comparison of the various project components associated with Alternative 1 and Alternative 2 are presented in Table ES-1. In accordance with NEPA and CEQA, Alternatives 1 and 2 represent a range of reasonable alternatives that would meet the purpose of and need for the Proposed Action. The preferred alternative is the Least Environmentally Damaging and Practicable Alternative (LEDPA).

Alternative 1

Improvements to Existing Facilities

Replacement of the Existing Sheet Pile Diversion with Inflatable Weir Diversion Structure. The proposed action will replace the existing vertical steel sheet pile weir with a new four-section inflatable weir spanning the entire 250-foot width of the SMR, and anchored with a 2 foot thick concrete slab foundation extending 12 feet downstream. The inflatable weir diversion structure will allow water diversion to O’Neill Ditch to increase from a maximum of 60 cubic feet per second (cfs) to 200 cfs. The four separate steel gate panels will be separately raised and lowered pneumatically using heavy gauge inflatable air bladders that support the gates on their downstream side. Normal, non-flood stream flows (which are typically well below 60 cfs) will continue to be diverted in a manner consistent with existing operations. The increase in diversion capacity will increase water diversions during higher than normal flood flows associated with high rain storm events. The diverted water will flow through the improved O’Neill Ditch to recharge ponds, that once full, will limit diversions to the infiltration rate of the ponds for the remainder of the storm event.

The number and size of the panels allows for riparian low-flow bypass and the optimization of fish passage through an incorportated fish ladder. The inflatable weir diversion structure was designed to accommodate a maximum flow rate of 1,200 cfs, which is only exceeded 0.8% of the time based on average daily flow. When the river is flowing 1,200 cfs or less (greater than 99% of the time), water will either flow through the low-flow sluiceway, the three primary sluiceways, or will be diverted into the recharge ponds. During large rain events, when the flow exceeds 2,000 cfs, the last weir section will be deflated, thus protecting the diversion structure from excessive hydraulic loading, allowing for unimpeded sediment transport and maintaining unimpeded fish passage.

Operation of the inflatable weir gates, headgate, and O’Neill Ditch would be based on the operation plan outlined in Table ES-2 and the AMP/FOP guidelines and procedures as described below.

Table ES-1. Components of Alternative 1 and Alternative 2

Project Components	Alternative 1	Alternative 2
Improvements to Existing Facilities		
Replacement of Existing Sheet Pile Diversion with Inflatable Weir Diversion Structure (within MCB Camp Pendleton)	X	X
Improvements to O'Neill Ditch and Headgate (within MCB Camp Pendleton)	X	X
Improvements to Recharge Ponds 1-7 (within MCB Camp Pendleton)	X	X
Expand Haybarn Canyon AWTP and Add a Surface Water Treatment Facility (within MCB Camp Pendleton)		X
Proposed New Facilities		
Four New Groundwater Production Wells and Associated Collection System Infrastructure (within MCB Camp Pendleton)	X	X
Water Conveyance/Distribution System, including Bi-Directional Pipeline from MCB Camp Pendleton to new FPUD Water Treatment Plant (within MCB Camp Pendleton and the community of Fallbrook)	X	X
FPUD WTP (community of Fallbrook)	X	
Four New Gallery Wells and Associated Collection System Infrastructure (within MCB Camp Pendleton)		X

Notes: AWTP = Advanced Water Treatment Plant; MCB = Marine Corps Base; FPUD = Fallbrook Public Utility District; WTP = Water Treatment Plant; SCADA = Supervisory Control and Data Acquisition.

Table ES-2. Bypass and Diversion Schedule for the Inflatable Weir Diversion Structure and O'Neill Ditch Headgate, MCB Camp Pendleton

Range of Flows in River (cfs)	Minimum Bypass Requirement (cfs)	Maximum Diversion of Remaining Flow (Percent)	Typical Diversion Rates (cfs)[1]
December through February – Upstream Migration			
0 to 3	0 to 3	0%	0
3 to 60	3	100%	3-57
61 to 150	60[2]	20%-100%[A]	10-30
> 150	150	100%	50-70
Note A) Ramp Down Schedule when flows drop below 150 cfs.	80% on Days 1, 2, & 3[3] 3 cfs on Day 4[4]	20% on Day 1, 2, & 3 100% on Day 4	25-30
March through May – Upstream and Downstream Migration			
0 to 3	0 to 3	0%	0
3 to 60	3	100%	3-57
61 to 150	60[2]	20%[B]	10-30
> 150	150	100%	40-60
Note B) Ramp Down Schedule when flows drop below 150 cfs.	80% until flow in river reaches 60 cfs	20% until flow in river reaches 60 cfs	10-30
June through November – Non-migration			
0 to 3	0 to 3	0%	0
> 3	3	100%	3-70

Notes: Limited by pond capacity/infiltration or maximum diversion percentage

2 On the rising limb of an event, 3-cfs bypass will be used until flow reaches 150 cfs. On falling limb, see notes A and B for ramp down schedule which uses 60 cfs bypass.

3 Days (i.e. "day 1", "day 2", etc.) on the falling limb of the hydrograph are referenced to the starting time when flow on the hydrograph drops to 150 cfs.

4 Bypass becomes 3 cfs on Day 4or when the hydrograph falls to 60 cfs, whichever occurs first.

Improvements to O'Neill Ditch, and Headgate. The headgate (i.e., a gate for controlling the flow of water into a ditch) and O'Neill Ditch would be modified to increase the capacity from 60 cfs to 200 cfs to accommodate the amount of water required under the project design. This component includes excavation of approximately 6,000 cubic yards (cy) of depositional material along the length of O'Neill Ditch; replacement of existing undersized road crossing culverts, Parshall flumes, and control gates. The first 2,000 ft of the ditch (from the diversion point on the SMR to the recharge pond turn-off structure) would be concrete-lined and sized to allow 200 cfs flow. The lower 2,850 ft long portion of the ditch, from the recharge pond turn-off to the lake diversion structure, would be concrete-lined and sized to allow 50 cfs flow. This component of the proposed action would line O'Neill Ditch with geotextile and concrete layers and replace flow-restrictive structures to improve the efficiency of conveying water into the lake and recharge ponds by eliminating infiltration losses. This element of the proposed action is also intended to reduce maintenance costs.

The initial site preparation for the O'Neill Ditch repairs and improvements would consist of clearing and grubbing the canal, and removing vegetation and debris to prepare the site for fill material and the correct sloped compaction of the sub-grade. This project element would require the following: initial site preparation; demolition of existing facilities; filling and compaction; installing/constructing new structures; and lining the canal. The construction work would require the following equipment: backhoe, concrete mix machine, construction equipment, excavator/crane to install the new culverts and backfilling, compactor to restore the roads, and construction truck. The approximate construction time is four months.

Existing structures, including two Parshall flumes, two road crossing culverts, the recharge ponds turnout structure, and the lake turnout structure, would be replaced and resized. A plan view of this project element is shown in Figure 2.1-4. Removing the culverts would require stockpiling materials close to the structure and reuse after installation of the new culverts. This would require the following equipment: excavator/crane; concrete hammer breaker; and construction truck.

Improvements to Recharge Ponds 1-7. The overall performance of the existing MCB Camp Pendleton Recharge Ponds 1-7 is currently reduced by operational inefficiencies related to lack of water level control and the inability to measure flow between ponds. Proposed improvements to Recharge Ponds 1-7 include redesigning the culverts and weirs that transfer water from one pond to the next. This includes increasing the capacity of the culverts and adding new control structures to better regulate the flow between ponds. Operation of the recharge ponds would be based on the AMP/FOP guidelines and procedures as described below.

<u>Proposed New Facilities</u>

Groundwater Production Wells and Associated Collection System Infrastructure. The existing groundwater production wells operated and maintained by MCB Camp Pendleton would be augmented by the installation of four new groundwater production wells in the Upper Ysidora and Chappo sub-basins, along with appurtenant collection pipelines, power lines, and access roads.

The groundwater available for pumping fluctuates seasonally and varies by hydrologic condition. Operation of existing and new production wells would be based on AMP/FOP guidelines and procedures as described below. The pumping schedule would be designed to optimize groundwater levels during the winter to create storage in the aquifer, capture wintertime flow events, and minimize groundwater mounding at the recharge ponds. Pumping would be reduced during dry years, with restricted groundwater pumping continuing until wetter hydrologic conditions occur. The groundwater produced from existing and new groundwater production wells operated and maintained by MCB Camp Pendleton would be collected via new and existing conveyance pipelines connected to the existing raw water collection system and conveyed to the Haybarn Canyon area.

Water Conveyance/Distribution, including Bi-Directional Pipeline from MCB Camp Pendleton to new FPUD Water Treatment Plant. Raw groundwater would be pumped from the aquifer and conveyed to the Haybarn Canyon area on MCB Camp Pendleton. The water delivered to Haybarn Canyon would then be diverted to either MCB Camp Pendleton's existing Haybarn Canyon AWTP (P-113), or to a new FPUD WTP via a new bi-directional pipeline. The bi-directional pipeline between FPUD and MCB Camp Pendleton would allow imported water to be delivered back to MCB Camp Pendleton during drier than normal periods or emergency conditions when local groundwater is insufficient to meet demands. FPUD is improving the water conveyance pipeline between the new WTP and the Gheen zone, which may then go to distribution or via existing pipeline to storage in the Red Mountain Reservoir (refer to Appendix C, Figures C-22-C-27 for more detailed FPUD figures). FPUD's Red Mountain Reservoir has an existing connection to receive water from the San Diego County Water Authority's (SDCWA) Aqueduct.

MCB Camp Pendleton would continue to process water for its own use at the existing Haybarn Canyon AWTP and FPUD would treat its portion of the project water at a new FPUD WTP (see detailed description below). Raw groundwater delivered to FPUD would average 3,100 acre-feet per year (AFY) and would not exceed 800 acre-feet (AF) in any given month. However, total volumes of raw water deliveries to FPUD would vary annually dependent upon multiple factors including, but not limited to, precipitation, river surface flows, surface diversions, and environmental considerations.

FPUD WTP. A new FPUD WTP would be constructed on FPUD property adjacent to DET Fallbrook. The new FPUD WTP would be located on the same property as the existing FPUD wastewater treatment plant and would retrofit some of the existing solids drying beds. The FPUD WTP would use a treatment facility designed to provide potable water and would include an iron and manganese removal and demineralization plant. The FPUD WTP would have the capacity to treat a maximum of 800 AF per month. The average annual raw water delivery to the FPUD WTP would be 3,100 AFY. The FPUD WTP would be connected to and controlled by the existing FPUD supervisory control and data acquisition (SCADA) system.

Brine from the FPUD WTP would be discharged to the Pacific Ocean via FPUD's Fallbrook Outfall pipeline to the Oceanside Ocean Outfall. FPUD's existing National Pollutant Discharge Elimination System (NPDES) Permit (CA0108031) would be amended to allow for the inclusion of the additional brine from the project. The existing FPUD NPDES Permit currently has a permitted average annual discharge of 2.4 MGD.

SCADA System. Operation of a SCADA system, as included in the project, would be overseen and managed by MCB Camp Pendleton. The spillway gates on the inflatable weir diversion structure, turnouts to the recharge ponds and Lake O'Neill, production and monitoring wells; flow measurement, and pumping plants would be designed for remote operation and/or data acquisition.

Open Space Management Zone. A framework would be established by FPUD to permanently preserve 1,392 acres (563 hectares) of riparian open-space land in the community of Fallbrook that was acquired by FPUD in 1958 for water supply development purposes. Under Alternative 1 and Alternative 2, all or most of the OSMZ is intended to be placed in conservation management to preserve open space and riparian values that currently exist on the site and preserve current passive recreation uses. Conservation approaches currently being considered by FPUD include, but are not limited to: (1) purchase and management of the OSMZ by Reclamation, MCB Camp Pendleton, or another agency or conservation related organization; (2) continued ownership of the property by FPUD subject to a conservation easement purchased by a third party that restricts future development; or (3) management of the property as a mitigation bank by FPUD or its designee.

Whichever conservation approach is ultimately selected by FPUD would comply with Senate Bill 1148, guidelines developed to implement Senate Bill 1148, and any other applicable federal, state, and local regulations and policies. Senate Bill 1148 authorizes private and public conservation and mitigation banks to serve an important function of managing the mitigation provided by private applicants when aquatic or terrestrial mitigation is required as a condition of a permit from a public agency. Should the site be established as a mitigation bank, mitigation credits would be sold to proponents of other projects within San Diego and Riverside counties having mitigation responsibilities that require compensation for impacts to wetlands, threatened or endangered species, and other sensitive resources, but the intended approach is for the open space status of the 1,392 acres (563 hectares) to be maintained.

The OSMZ would continue to serve as a critical parcel for ensuring a healthy watershed in the community of Fallbrook. It would also have the effect of protecting downstream water quality and preventing development of riparian water rights within the OSMZ that, if developed, would decrease in-stream flows reaching MCB Camp Pendleton and the SMR Estuary.

Adaptive Management Plan. As part of the project, an AMP/FOP would be developed by MCB Camp Pendleton to manage project diversion, recharge, production, and delivery facilities. The AMP/FOP would rely on near real-time environmental and hydrologic data from existing and proposed gauges to determine project operations and meet delivery requirements. Actual field data gathered during project operations would be processed using a numerical groundwater model to determine future locations and rates of pumping that would protect environmental concerns while meeting project proponents' water requirements. The pumping schedules and proposed operations would then be published annually in a FOP that would describe how and when the inflatable weir, headgate, turnout gates, and wells are operated on a seasonal and monthly basis. The use of the AMP/FOP and its ability to rely on an alternative water supply (i.e., imported water via a bi-directional pipeline) to meet demands on MCB Camp Pendleton would allow for increased sustained basin yield in the Lower SMR Basin. The AMP/FOP would be developed, updated, and implemented by appropriate MCB Camp Pendleton and FPUD subject matter experts (e.g., hydrologists and biologists).

Alternative 2

Alternative 2 is similar to Alternative 1 in terms of diversion system upgrades, groundwater recharge, and groundwater production (see Table ES-1). Alternative 2 includes the following components described under Alternative 1 (see Alternative 1 description for details on each of the following components):

- Replacement of Existing Sheet Pile Diversion with Inflatable Weir Diversion Structure;
- Improvements to O'Neill Ditch and Headgate, within MCB Camp Pendleton;
- Improvements to Recharge Ponds 1-7;
- Groundwater Production Wells and Associated Collection System Infrastructure;
- The OSMZ;
- SCADA system;

Alternative 2 differs from Alternative 1 in that the existing Haybarn Canyon AWTP would be expanded to treat all groundwater produced under the project. Additionally, a new surface water treatment facility located adjacent to the Haybarn Canyon AWTP would treat surface water diverted from four new gallery wells installed between the recharge ponds and SMR. Treated water would be delivered to FPUD via a bi-directional pipeline through MCB Camp Pendleton and DET Fallbrook.

The project components specific to Alternative 2 are discussed below:

Expand Haybarn Canyon AWTP and Add a Surface Water Treatment Facility, at MCB Camp Pendleton. Groundwater from MCB Camp Pendleton's existing wells and SMR CUP's four new production wells would be treated at an expanded Haybarn Canyon AWTP. The expansion of MCB Camp Pendleton's existing Haybarn Canyon AWTP (P-113) would occur to handle the increased Alternative 2 flow volumes. The existing Haybarn Canyon AWTP's groundwater water quality treatment goals would continue to be met under this expansion.

The gallery wells would produce surface water that would be treated at the proposed new surface water treatment facility located adjacent to the existing Haybarn Canyon AWTP. The surface water treatment facility would be designed to treat surface water with organics removal and membrane filtration to comply with the surface water treatment rule. The treated surface water would then be blended with the treated groundwater and distributed to MCB Camp Pendleton and FPUD.

Under SMR CUP, an additional average daily brine discharge of 3.5 cfs would be produced and discharged to the Pacific Ocean via the existing Oceanside Ocean Outfall. The additional brine would be conveyed to the Oceanside Ocean Outfall via the existing brine discharge pipeline constructed for MCB Camp Pendleton's P-113 project, which is connected to the Oceanside Ocean Outfall via P-113's connection to the Oceanside Ocean Outfall Pump Station. Under P-113, this connection provides for secondary emergency brine discharge; however, under Alternative 2 of this project, all additional brine would utilize this connection. The brine discharge would be covered under either an amendment to FPUD's existing NPDES Permit (CA0108031) to the Oceanside Ocean Outfall or an amendment to MCB Camp Pendleton's NPDES Permit (CA0109347). The existing FPUD NPDES Permit currently has a permitted average annual discharge of 2.4 MGD.

Gallery Wells and Associated Collection System Infrastructure. Four gallery wells would be installed adjacent to the SMR along the west side of Recharge Ponds 1, 4, and 5, at MCB Camp Pendleton. Operation of the gallery wells would be based on AMP/FOP guidelines and procedures as described under Alternative 2. Each gallery well would include a caisson connected to a series of lateral pipelines projected under the river channel bottom to collect and filter surface water from the SMR. Gallery wells would capture water in the streambed sediments and induce additional streambed recharge during periods of increased flow in the SMR during the wet season. The four gallery wells would have the capacity to extract a combined maximum of 18 cfs of surface water. Water extracted from the gallery wells would be transported to the proposed new surface water treatment facility located adjacent to the existing Haybarn Canyon AWTP.

Water Conveyance/Distribution System, including Bi-Directional Pipeline to the Gheen Zone. A bi-directional water conveyance pipeline would be installed between the Haybarn Canyon AWTP storage tanks and FPUD's Gheen pressure zone where it would tie into an existing pipeline to Fallbrook's Red Mountain Reservoir. The new pipeline would have two main turnouts to provide water directly to the MCB Camp Pendleton and FPUD users. Booster pumping stations would be required near the guard station on the MCB Camp Pendleton side of the boundary between MCB Camp Pendleton and DET Fallbrook and at the site of the Gheen Zone in the community of Fallbrook. The bi-directional pipeline between FPUD and MCB Camp Pendleton would allow water to be delivered back to MCB Camp Pendleton during drier than normal periods when groundwater is insufficient to meet demands or emergency situations.

NO-ACTION ALTERNATIVE

Without implementation of a "physical solution," the ongoing *United States v. Fallbrook Public Utility District et al.* litigation likely would not be settled. Although other alternatives may exist, they are neither feasible nor prudent. Failure to reach a physical solution may propel the parties into active litigation prone to lead to a court judgment not likely satisfactory to either party.

Under the No-Action Alternative, both MCB Camp Pendleton and FPUD would obtain all of their potable water demands from existing water supplies, with an increased reliance on imported water. MCB Camp Pendleton would continue to use its existing diversion, recharge, storage, and recovery system to meet its water demands. FPUD would rely solely on imported water purchased from the SDCWA. If the No-Action Alternative is chosen and the water rights are not perfected, other water development projects upstream of MCB Camp Pendleton could occur that would result in a reduction of water supply available to meet existing and future water demand.

Existing and future water demands on MCB Camp Pendleton would be met through the use of existing facilities or from the development of more expensive alternative water supplies, such as ocean desalination or construction of a new pipeline to an off-base water purveyor and purchase of imported water. Without access to an alternative water supply through the bi-directional pipeline, groundwater level declines during extended drought periods could not be mitigated nor could MCB Camp Pendleton demands be met during emergency conditions.

Although the No-Action Alternative would not meet the purpose of and need for the Proposed Action, it is included to serve as the baseline against which impacts of the alternatives can be compared.

Under the No-Action Alternative, FPUD has no direct water supply benefit from the OSMZ property and no remaining justification for maintaining this property as open space. Without implementation of SMR CUP, the OSMZ could revert to the original condemnees and be developed, in which case there could be adverse impacts on wildlife, water quality, aesthetics, and other environmental values at the site and downstream. Under this alternative, the potential development of water resources by condemnees could result in a reduction of available water supply to downstream users.

SUMMARY OF ENVIRONMENTAL IMPACTS AND POTENTIAL MITIGATION MEASURES

Environmental impacts on the following resources are evaluated in this EIS/EIR: geological resources, water resources, biological resources, cultural resources, air quality, hazardous materials and wastes, and utilities. Table ES-3 provides a summary of potential environmental impacts by resource area. A detailed impact analysis for each of these resources is provided in Chapter four and cumulative impact analysis is provided in Chapter five.

Several additional resources were evaluated: traffic, noise, socioeconomics and environmental justice, land use and recreation, and visual resources. However, because potential impacts under the action alternatives were considered to be negligible or non-existent for these resources, it was determined that detailed evaluation in the EIS/EIR was not required. A list of these resources as well as the rationale for eliminating them from detailed analysis is presented at the beginning of Chapter three of this EIS/EIR.

Table ES-3. Summary of Potential Environmental Consequences and Proposed Mitigation Measures by Resource Area

Alternative 1	Alternative 2	No-Action Alternative
Geological Resources		
Through implementation of Special Conservation Measures (SCMs) and the AMP/FOP, significant impacts would not occur; therefore, no additional mitigation measures would be implemented.	Same as Alternative 1.	Without an alternate source of water or reduced demand during sustained dry years, groundwater pumping could exceed safe yield and, therefore, aquifer subsidence is possible. Otherwise, adverse impacts are not anticipated.
Water Resources		
Potential impacts to groundwater resources in the Upper Ysidora and Chappo Sub-basins would occur with implementation of Alternative 1. The following mitigation measure to monitor and reduce impacts to groundwater resources to below a level of significance would be implemented: •The AMP/FOP would include the maintenance of groundwater levels within historical range constraint. Groundwater levels would be monitored by a series of telemetered groundwater monitoring wells and pumping would be reduced or shut off if the groundwater level drops to within historic levels and remain reduced until the average monthly groundwater levels recover to above historic levels.	Gallery wells would adversely impact Upper Ysidora Sub-basin groundwater by reducing recharge with implementation of Alternative 2. The following mitigation measure to monitor and reduce impacts to groundwater resources to below a level of significance would be implemented: The AMP/FOP under Alternative 2 would be modified to include the maintenance of groundwater levels within historical range constraint (*Note:* this measure is included in the AMP/FOP as described under Alternative 1). Groundwater levels would be monitored by a series of telemetered groundwater monitoring wells and pumping would be reduced or shut off if the groundwater level drops to within historic levels and remain reduced until the average monthly groundwater levels recover to above historic levels.	Impacts to groundwater could occur if an increase in pumping were to occur during sustained dry years.

Table ES-3. Summary of Potential Environmental Consequences and Proposed Mitigation Measures by Resource Area

Alternative 1	Alternative 2	No-Action Alternative
Biological Resources		
Facilities construction would have direct and indirect impacts due to vegetation removal and disturbance of individuals resulting in the disruption of feeding or reproduction, energetic costs, and predation risks. In most respects, these impacts would be less than significant because they would be temporary and minimized with the implementation of SCMs that are part of the project. Established conservation measures for special status wildlife species would be followed to lessen construction-related disturbance and loss of habitat. Additional mitigation measures (provided below) involving site-specific avoidance, minimization, and/or restoration would be implemented to lessen construction impacts to levels that would be less than significant. The project's use of water in the Lower SMR may reduce streamflow and groundwater levels relative to historic averages. This could indirectly impact riparian habitat through flow-mediated changes in the distribution and duration of seasonal aquatic habitats, as well as reduced productivity of groundwater-dependent riparian vegetation and would have the potential for impacts on riparian habitats and associated special status species, including impacts on least Bell's vireo, southwestern willow flycatcher, arroyo toad, and southern California steelhead. However, potential impacts to these species would not be significant with successful implementation of the AMP/FOP and the terms and conditions of the USFWS and NOAA Fisheries Biological Opinions (BOs). Impacts from discharging the dilute brine to the Pacific Ocean from the existing Oceanside Ocean Outfall would be minor and any secondary effects on organisms in the runoff areas from the pipe would be negligible. Mitigation measures for Alternative 1 include: Mitigation for any permanent losses of jurisdictional wetlands and other waters of the U.S.	Construction impacts and mitigation measures are similar to Alternative 1. Impacts from discharging the dilute brine to the Pacific Ocean from the existing Oceanside Ocean Outfall would be minor and any secondary effects on organisms in the runoff areas from the pipe would be negligible. Mitigation measures for Alternative 2 include: Mitigation for any permanent losses of jurisdictional wetlands and other waters of the U.S.	Without an alternate source of water or reduced demand during sustained dry years, groundwater depletion and its indirect effects on riparian habitat and associated species are anticipated.

Table ES-3. Summary of Potential Environmental Consequences and Proposed Mitigation Measures by Resource Area

Alternative 1	Alternative 2	No-Action Alternative
Cultural Resources		
Through implementation of SCMs, significant impacts would not occur; therefore, no additional mitigation measures would be implemented.	Same as Alternative 1.	No impacts would occur.
Air Quality		
Through implementation of SCMs, significant impacts would not occur; therefore, no additional mitigation measures would be implemented.	Same as Alternative 1.	No impacts would occur.
Hazardous Materials and Wastes		
The proposed new wells have been sited so that groundwater pumping would not impact the mapped plumes associated with Installation Restoration Program sites and would be monitored and managed through the AMP/FOP. Through implementation of SCMs and the AMP/FOP, significant impacts would not occur; therefore, no additional mitigation measures would be implemented.	Same as Alternative 1.	No impacts would occur.
Utilities		
Through implementation of SCMs and the AMP/FOP, significant impacts would not occur; therefore, no additional mitigation measures would be implemented.	Same as Alternative 1.	No significant impacts would occur; any future projects to develop potable water for MCB Camp Pendleton would be subject to the NEPA and/or CEQA process, as appropriate.

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CHAPTER 1
PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

This Environmental Impact Statement/Environmental Impact Report (EIS/EIR) evaluates the environmental impacts associated with the proposed Santa Margarita River (SMR) Conjunctive Use Project (CUP). The proposed project would resolve the water rights issues between MCB Camp Pendleton and FPUD and satisfy the Court's order to find a "physical solution" to the ongoing dispute in *United States v. Fallbrook Public Utility District, et al* and would involve the conjunctive use of surface water and groundwater within the Lower SMR Basin. "Conjunctive use" would consist of adaptive management of surface water and groundwater resources and would be achieved through the diversion of SMR surface waters to groundwater recharge ponds and the active use of groundwater aquifers for water storage. The Proposed Action would efficiently meet the long-term water demands of U.S. Marine Corps (USMC) Base Camp Pendleton and the Fallbrook Public Utility District (FPUD), reduce dependence on imported water, maintain watershed resources, and improve water supply reliability by managing the yield of the Lower SMR Basin.

SMR CUP may include some or all of the following components, which are configured differently for each action alternative:

- Replacement of the existing diversion structure on the SMR, within MCB Camp Pendleton,
- Improvements to O'Neill Ditch and headgate (i.e., a gate for controlling the flow of water into a ditch) within MCB Camp Pendleton,
- Improvements to existing storage and recharge ponds within MCB Camp Pendleton,
- Installation of new production wells, gallery wells, and associated collection system infrastructure within MCB Camp Pendleton,
- Construction or expansion of water treatment facilities within, MCB Camp Pendleton and the community of Fallbrook,
- Construction of pumping plants and a bi-directional pipeline within MCB Camp Pendleton and the community of Fallbrook, and
- An open space management zone (OSMZ), within the community of Fallbrook.

The two action alternatives and the No-Action Alternative are described in further detail in Chapter 2.

The USMC, U.S. Department of the Interior, Bureau of Reclamation (Reclamation), and FPUD have prepared this EIS/EIR for the proposed SMR CUP in compliance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [USC] § 4321-4370d); as implemented by the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (Title 40 Code of Federal Regulations [CFR] §§ 1500-1508); U.S. Department of the Navy (DON) Procedures for Implementing NEPA (32 CFR § 775); Marine Corps Environmental Compliance and Protection Manual (Marine Corps Order [MCO] P5090.2A, change 3, 26 Aug 2013); California Environmental Quality Act (CEQA) (California Public Resources Code [PRC] 21000 *et seq.*); California State CEQA Guidelines (14 California Code of Regulations [CCR] § 15000 *et seq.*), as amended; and resource-specific regulatory guidelines presented in Chapter 4 of this document.

NEPA requires consideration of environmental concerns in the decision-making process for major federal actions. The CEQ regulations implement the "action forcing" provision of NEPA to ensure that federal agencies comply with the letter and spirit of the Act. MCO P5090.2A, change three (August 2013) provides specific guidance for the USMC in preparing environmental documentation for USMC actions subject to NEPA. Secretary of the Navy Instruction (SECNAVINST) 5090.6A provides specific policies and responsibilities under NEPA to the DON and USMC. USMC and Reclamation are the designated lead agencies for review of this project under NEPA.

CEQA requires state, local, and other public agencies subject to the jurisdiction of California to evaluate the environmental implications of their actions. It aims to prevent environmental effects by requiring agencies to avoid or reduce, when feasible, the significant environmental impacts of their decisions. CEQA guidelines provide detailed procedures that state and local agencies must follow to implement the law. The Proposed Action qualifies as a "project" under CEQA (Section 21065). FPUD is the designated lead agency for review of this project under CEQA.

NEPA (40 CFR § 1506.2) requires that federal agencies must "cooperate with state and local agencies to the fullest extent possible to reduce duplication between NEPA and state and local requirements." Therefore, this joint EIS/EIR will be utilized by state and local agencies to meet both NEPA and CEQA requirements.

As defined in the CEQ regulations and CEQA guidelines, an EIS/EIR is a public document that identifies environmental impacts of a Proposed Action or project for which both a public and federal agency is responsible. The EIS/EIR provides full and objective discussion of potential environmental impacts and mitigation measures. An EIS/EIR ensures that the programs and actions of both the federal government and California public agency meet the policies and goals set forth in NEPA and CEQA, respectively.

The Final EIS/EIR will be filed with the U.S. Environmental Protection Agency (USEPA) and the California State Clearinghouse and distributed to appropriate federal, state, local, and private agencies; organizations; and individuals for review and comment.

1.2 Content and Scope of the EIS/EIR

The scope of issues analyzed in this EIS/EIR was determined through initial MCB Camp Pendleton, Reclamation, and FPUD evaluation and analysis of the action alternatives; written and verbal comments received during the public scoping process; written and verbal comments received during the 2010 public review period for the California State Water Resources Control Board (SWRCB) water rights permit petitions; written and verbal comments received during the 2014 public review period; and requirements specified in NEPA and CEQA. This EIS/EIR focuses on those environmental resources with a reasonable potential for environmental impacts. The Proposed Action has the potential to impact the following elements of the natural and human environment: geological resources, water resources, biological resources, cultural resources, air quality, hazardous materials and wastes, and utilities.

Conversely, resource areas for which potential impacts are considered to be negligible have been considered, but eliminated from a detailed analysis/evaluation in this EIS/EIR (40 CFR 1501.7[a][3]). Those resource areas that have been eliminated from a detailed analysis/evaluation include: traffic, noise, socioeconomics and environmental justice, land use and recreation, and visual resources. A list of these resources as well as the rationale for eliminating them from full analysis is presented at the beginning of Chapter three in this EIS/EIR.

This EIS/EIR also evaluates direct, indirect, and cumulative impacts that may result from the action alternatives and the No-Action Alternative.

1.2.1 Similarities and Differences between NEPA and CEQA

NEPA and CEQA sometimes use different terms for similar concepts. For example, NEPA uses the term "Proposed Action" while CEQA uses the term "proposed project." For readability, this EIS/EIR uses the term "Proposed Action" except when the context requires CEQA terminology.

The characterization of individual impacts in an EIR as being either "significant" or "less than significant" is very important under CEQA. CEQA requires that an EIR propose mitigation measures for each significant effect of the project subject to the approval of an agency governed by California law, even where the mitigation measure cannot be adopted by the "lead agency," but can only be imposed by another responsible agency (i.e., California Department of Fish and Wildlife [CDFW], San Diego Regional Water Quality Control Board [RWQCB]).

1.2.2 Role of NEPA and CEQA

As discussed in Section 1.1, this document is a joint EIS/EIR. It has been prepared because the federal lead agencies (USMC and Reclamation) determined that an EIS is required under NEPA. Additionally, FPUD, as the CEQA lead agency, determined that the potential impacts of the project on non-federal lands were sufficient to trigger an EIR under CEQA. This EIS/EIR has been prepared to meet requirements under both NEPA and CEQA. MCB Camp Pendleton and Naval Weapons Station Seal Beach, Detachment Fallbrook (DET Fallbrook) are only required to comply with NEPA, and FPUD is required to comply with CEQA.

1.2.3 Use of the EIS/EIR

The Draft EIS/EIR was submitted to responsible public resource agencies, permitting agencies, trustee agencies, the State Clearinghouse, and interested stakeholders. Written and oral comments received in response to the Draft EIS/EIR are addressed in the Final EIS/EIR. Once the environmental review process has been completed, the Final EIS/EIR will be utilized by USMC in preparing a Record of Decision (ROD) for the project. The ROD will document which alternative is selected for implementation and the reasons for its selection. If the Proposed Action is implemented, USMC and FPUD will certify the EIS/EIR and approve development of the proposed project facilities. The CEQA lead agency will issue a Notice of Determination (NOD) to document FPUD's parallel decision to USMC's ROD.

The Final EIS/EIR may also be utilized by federal, state, regional, and local agencies in their decision-making process in compliance with NEPA and CEQA.

1.3 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The purpose of the Proposed Action is to resolve the water rights issues between MCB Camp Pendleton and FPUD and satisfy the Court's order to find a "physical solution" to the ongoing dispute in *United States v. Fallbrook Public Utility District, et al* and would efficiently meet the long-term water demands of MCB Camp Pendleton and FPUD, reduce FPUD's dependence on imported water, maintain watershed resources, and improve water supply reliability by managing the yield of the Lower SMR Basin. The Proposed Action is needed to upgrade/develop infrastructure and cooperative water management processes that satisfy MCB Camp Pendleton's and FPUD's respective current and future water requirements. Specifically, the Proposed Action would achieve the following needs of each EIS/EIR lead agency:

- Resolve water rights issues between MCB Camp Pendleton and FPUD and satisfy the Court's order to find a "physical solution" to the ongoing dispute in *United States v. Fallbrook Public Utility District, et al.*

- Satisfy MCB Camp Pendleton's and FPUD's future water demands while reducing FPUD's dependence on costly imported water.
- Connect MCB Camp Pendleton to an off-Base water supply (i.e., imported water from the San Diego County Water Authority [SDCWA] Aqueduct via existing FPUD facilities) to provide a supplemental water source during drought or emergency situations.
- Upgrade MCB Camp Pendleton's existing groundwater diversion and recovery facilities, and maximize subsurface water storage and water rights to meet future water supply demands.
- Provide FPUD with a local water source, reduce its dependency on imported water supplies, and thereby reduce costs. As a publicly held water district, FPUD has an obligation to provide adequate water quantities of acceptable quality to customers within its service area at the lowest possible cost. In addition to providing additional water supply, development of an adaptive groundwater management program would allow FPUD significant flexibility in meeting water demands and controlling water costs.

MCB Camp Pendleton and FPUD entered into a Memorandum of Understanding (MOU) in 2001 agreeing to jointly participate in the project in good faith and with full cooperation. Reclamation, MCB Camp Pendleton, and FPUD signed a Conceptual Points of Agreement in January 2011.

1.4 PROJECT BACKGROUND

1.4.1 Legal History of Santa Margarita River Conjunctive Use Project

In the late 1880s, developers of land in the Fallbrook area of northern San Diego County formed Fallbrook Water and Power Company, seeking to construct a dam on the Lower SMR as the source of both water and power. Rancho Santa Margarita, MCB Camp Pendleton's predecessor and the original owner of MCB Camp Pendleton and DET Fallbrook lands, filed suit to stop the dam construction, giving rise to more than 100 years of water rights litigation on the river.

Due to litigation and lack of finances, the Fallbrook Water and Power Company dissolved and the original dam project was abandoned. In 1891, attempts were made to form an entity known as Fallbrook Irrigation District. However, the Supreme Court ruled that the statute under which the irrigation district had been formed, the Wright Act, was unconstitutional, halting those water development plans. In 1922, FPUD was formed to provide water to the 500-acre (200-hectare) Fallbrook township. Then, in 1925, Fallbrook Irrigation District was reinstituted. After years of studies, FPUD pursued investigations to construct a dam in the lower basin near the confluence of the SMR and Sandia Creek. In the meantime, Rancho Santa Margarita had started a long-running battle with Vail Ranch, the main upstream water user, over rights to the river's waters.

In 1928, Fallbrook Irrigation District filed suit to condemn (take possession of) unused riparian rights on the river, notwithstanding the ongoing dispute between Rancho Santa Margarita and Vail Ranch. In 1930, the year of the initial judgment in the Vail litigation, Fallbrook Irrigation District was issued a permit to construct a dam and appropriate 35,000 acre-feet (AF) for SMR storage and 15,000 acre-feet per year (AFY) for annual use. However, because of financial problems, Fallbrook Irrigation District could not build the dam and, in 1937, the irrigation district was taken over by FPUD.

In 1940, Rancho Santa Margarita and Vail Ranch settled their lawsuit by way of a stipulated judgment. Under the 1940 settlement, one-third of the natural flow of the river was allocated to Vail Ranch and two-thirds to Rancho Santa Margarita. FPUD was not a party to the suit. Later in 1942, the DON condemned part of Rancho Santa Margarita as the site for MCB Camp Pendleton.

Following further investigations by the U.S. Army Corps of Engineers (USACE), MCB Camp Pendleton and FPUD applied for water rights permits to divert and store water from the SMR. In 1946 and 1947, FPUD was granted three 10,000-AF permits for the diversion and storage of water from the SMR at the Fallbrook Reservoir site. In 1948, DON filed for a permit to build De Luz Dam at MCB Camp Pendleton. Then in 1949, the two parties agreed on a plan to build a multi-purpose dam at the De Luz site to serve them both.

In 1951, the United States (on behalf of MCB Camp Pendleton) abandoned its state water rights application and brought suit against FPUD and about 3,600 other upstream users to claim MCB Camp Pendleton's right to the flow of the SMR (*United States v. Fallbrook Public Utility District, et al*; Case No 1247-SD-C). In September 1963, following the Final Judgment and Decree in the case, the United States filed Application 21471 for diversion and storage of SMR surface flow. In 1973, the SWRCB separated this application into two parts, 21471A and 21471B. The SWRCB ordered a license be issued for Application 21471A to allow diversion of up to 4,000 AFY into recharge ponds for storage in the MCB Camp Pendleton's Lower Santa Margarita underground basins and later use for military, domestic, municipal, and agricultural purposes. Application 21471B was for aboveground storage of up to 165,000 AFY in De Luz Dam for such uses as well as for incidental flood control and recreational purposes. The SWRCB ultimately issued a license for Application 21471A (recharge pond license) and a permit for Application 21471B for the facility that, five years later, was to become part of the MCB Camp Pendleton-FPUD "Two-Dam Project."

Following years of decisions and appeals, the U.S. District Court issued a Modified Final Judgment and Decree in 1966. In 1968, MCB Camp Pendleton and FPUD entered into a MOU for the purpose of settling the SMR water rights claims that had been the subject of litigation between them since 1951. This 1968 MOU called for the construction of two aboveground storage facilities that became known as the "Two-Dam Project." In his 1968 Order Approving Memorandum of Understanding and Agreement and Amending Modified Final Judgment and Decree, Federal District Court Judge Carter emphasized "that the water rights of the stream system cannot be developed fully in the absence of a "physical solution" which makes equitable provisions as between [MCB Camp Pendleton and FPUD] for the manner in which each of them shall make use of the waters of the stream system to which it is entitled under its water rights . . ." In 1974, Fallbrook and MCB Camp Pendleton assigned their water rights permits to Reclamation (Permits 15000, 8511, and 11357) in anticipation of construction of the Two-Dam Project.

Because of environmental and funding concerns as well as other factors associated with the Two Dam Project, in the late 1980s the parties decided to pursue an alternative, environmentally preferable "physical solution." In 1990, FPUD and MCB Camp Pendleton entered into an agreement entitled the "Conjunctive Use Agreement," to cooperatively manage the aquifer and river on MCB Camp Pendleton, giving birth to the currently used name for the long sought "physical solution" to the water supply needs of MCB Camp Pendleton and FPUD. This agreement was contingent upon the use of reclaimed water under the 1990 Four Party Agreement between MCB Camp Pendleton, FPUD, Rancho California Water District (RCWD) and Eastern Municipal Water District (EMWD). Under the Four Party Agreement, MCB Camp Pendleton and FPUD agreed to support a Basin Plan Amendment that relaxed the water quality standards in SMR watershed to facilitate the use and discharge of excess treated wastewater by EMWD and RCWD. In return, EMWD and RCWD agreed to augment the flows of the SMR with the discharge of the highly treated wastewater and make a significant capital investment in a Reverse Osmosis (RO) plant at MCB Camp Pendleton in order to mitigate the degradation of MCB Camp Pendleton's groundwater supply resulting from upstream stormwater pollution and agricultural return flows. For a variety of reasons, the Four Party Agreement never materialized and the failed Four Party

Agreement was the subject of the 2008 litigation in the Central District of California *United States v. Eastern, et al.* FPUD joined the United States as a co-plaintiff in this litigation.

Also occurring in the early 1990s, RCWD petitioned the SWRCB to change its Permit 7032 in a manner that would allow it to increase its pumping in the Upper Basin and change the place it could use that water. MCB Camp Pendleton submitted a protest to the SWRCB on RCWD's Permit 7032 change petition. MCB Camp Pendleton's protest of RCWD's change petition led to a negotiated settlement in 2002: Cooperative Water Resources Management Agreement (CWRMA) between RCWD and MCB Camp Pendleton. Under CWRMA, RCWD guarantees certain minimum flows in the SMR by directly discharging water in the river upstream from MCB Camp Pendleton. Additionally, CWRMA requires that RCWD manage its groundwater pumping in an area upstream of the Gorge on a safe yield basis and mandates a cooperative monitoring program to assess the impacts of CWRMA on the water supply, water quality, and riparian habitat within MCB Camp Pendleton. In 2009, the SWRCB approved RCWD's petition to change Permit 7032 and included the CWRMA flow requirements as a condition to RCWD's Permit 7032.

MCB Camp Pendleton and FPUD have continued and focused their efforts to find an alternative "physical solution." MCB Camp Pendleton and FPUD entered into an MOU in 2001 agreeing to jointly pursue a project with full cooperation. In fiscal year (FY) 2004, an appropriation was made to Reclamation to study the feasibility of SMR CUP. On 13 September 2004, Reclamation, MCB Camp Pendleton, and FPUD signed an MOU agreeing to jointly participate in the design and possible construction/operation of a "physical solution" to the *United States v. Fallbrook Public Utility District, et al.* lawsuit. Reclamation is responsible for completing the feasibility study; the USMC is lead agency for completing the EIS; and FPUD is lead agency for completion of the EIR. On 01 November 2004, a Notice of Intent (NOI) to prepare an EIS was published in the *Federal Register*. On 14 December 2004, a Notice of Preparation (NOP) was sent to the California State Clearinghouse. On 30 March 2009, President Obama signed Public Law (P.L.) 111-11 (HR 146), the *Omnibus Public Land Management Act of 2009*. Title IX, Section 9108 of this act contains the construction authority for SMR CUP. This authority expires in April 2019. In January 2011, Reclamation, USMC, and FPUD signed a Conceptual Points of Agreement that outlines the framework for the division and distribution of water resources and the construction and operation of a joint water project between MCB Camp Pendleton and FPUD.

1.4.2 Context and Legal and Institutional Framework

1.4.2.1 Context

This subsection discusses the context within which the Proposed Action has been planned and its alternatives developed.

MCB Camp Pendleton is being progressively pressured between the urbanization occurring all around it and the increasing habitat and species stewardship requirements resulting from such urban growth. There is a direct correlation between urban growth and the increase in endangered species populating the base. This pinch between the related phenomena of urbanization and endangered species is most strongly exemplified in the resultant management pressures attending the Base's substantial native water supply. The pressure from surrounding urbanization is particularly relevant to the SMR, whose tributaries extend far off the base's property into the highly developing communities of Temecula and Murrieta and which, as noted in Section 1.3, above, satisfies more than 70% of the base's military, municipal, agricultural, domestic, and industrial water demand.

Upstream of MCB Camp Pendleton, increased development in the SMR watershed causes more urban runoff, adversely affecting the quality of the Base's water supply. Downstream from these urban centers, on the Base itself, the USMC's commitments under the Endangered Species Act (ESA) may necessitate an allocation of surface water (stream flow) to the conservation of riparian habitats and associated species. Thus, the Base's own military, municipal, and domestic water demand is under dual pressures from upstream urban development and downstream ecosystem needs.

FPUD currently relies on the purchase of imported water from Metropolitan Water District of Southern California (MWD) and SDCWA for 100% of its potable water supply (FPUD 2010). FPUD's *2010 Urban Water Management Plan* identifies two projects to utilize local sources of water and reduce dependence on imported water: the SMR CUP being analyzed in this EIS/EIR and a cooperative agreement with MWD to store rainfall in Lake Skinner in Temecula. The Lake Skinner project is expected to provide an average of 300 AFY (FPUD 2010).

1.4.2.2 Legal and Institutional Framework

The Proposed Action would operate within a legal and institutional framework that has been shaped by legislative, judicial, and federal and state regulatory action.

Congressional Authorization

The *Omnibus Public Land Management Act of 2009* was signed 30 March 2009 (P.L. 111-11). It includes a section that authorizes the Secretary of the Interior, after certain conditions are met, to construct the facilities needed to extract additional water from the SMR through a joint project. SMR CUP legislation is an outgrowth of the "physical solution" recommended by a Federal Judge in 1968 in order to facilitate the settlement of the longstanding water rights dispute outlined above in Section 1.4.1. SMR CUP legislation contains certain conditions that must be satisfied before Reclamation is authorized to construct the Project.

Federal Court

The Proposed Action constitutes the "physical solution" that, if implemented, would conclude more than 60 years of negotiation and litigation between MCB Camp Pendleton and FPUD over the right to use water from the SMR. The litigation commenced in 1951 with a federal lawsuit *United States v. Fallbrook Public Utility District, et al.* (1247-SD-C) filed by the United States on behalf of MCB Camp Pendleton against FPUD and all water users within the SMR to challenge the intended exercise of certain FPUD water rights on the SMR. The 1951 litigation is still open today with regular Court status calls, quarterly Watershed Steering Committee meetings, and an Annual Report filed by the court-appointed SMR Watermaster. The Proposed Action would settle the longstanding water rights dispute between MCB Camp Pendleton and FPUD. A detailed settlement agreement would be filed with the Federal Court for approval. A Court approved settlement agreement is a condition that must be satisfied before MCB Camp Pendleton and FPUD are authorized to construct the Project.

Secretariat Decisions

P.L. 111-11 identifies Secretariat level decisions impacting the Proposed Action. Namely, the Secretary of Interior must determine that the Proposed Action has completed the economic, environmental, and engineering feasibility studies as a condition that must be satisfied before MCB Camp Pendleton and FPUD are authorized to construct the Project. Additionally, pursuant to P.L. 111-11, the Secretary of the Navy is authorized to make decisions concerning the DON's share of Project costs, control of Project facilities located aboard MCB Camp Pendleton, and sale of DON's excess water produced by the Project.

Federal and State Regulatory Agencies

Numerous federal and state laws have been enacted to establish requirements for adequate planning, implementation, and management of water resources. Regulations have been developed to augment and clarify the laws and provide details not included in the laws. The Proposed Action must achieve compliance with applicable rules and regulations promulgated by the USEPA, U.S. Fish and Wildlife Service (USFWS), USACE, CDFW, SWRCB, and California Department of Public Health (DPH). Additionally, several of these Agencies have some level of discretionary project approval authority over the Proposed Action, including San Diego RWQCB, SWRCB, and USACE. Lastly, consultations with USFWS, National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries), CDFW, and the State Historic Preservation Office (SHPO) are required and must be completed per Navy and USMC policy before the Final EIS can be approved. Supporting documentation is being prepared and submitted to these agencies separately from this EIS. The federal and state regulatory requirements are briefly outlined in Section 1.7. While the Proposed Action must comply with all applicable state and federal regulatory requirements and approvals, the SWRCB must grant the necessary water right permits to implement the Proposed Action before Reclamation is authorized to construct the Project.

Water Rights Permitting

Water right approvals are needed from the State of California to implement the Proposed Action (i.e., either Alternative 1 or 2) and are being requested concurrent with the NEPA and CEQA requirements covered in this EIS/EIR. The relevant agency is the SWRCB, which has the authority to administer previously issued water rights and to grant new water rights.

Reclamation, the DON, and FPUD hold various water rights to waters of the SMR Basin (Tables 1.4-1 and 1.4-2). The project proponents intend to exercise the majority of the below listed water rights for the benefit of their constituents by means of the Proposed Action. The water yield resulting from SMR CUP would be shared between MCB Camp Pendleton and FPUD. Details on how the project water would be treated and allocated between MCB Camp Pendleton and FPUD are provided for Alternatives 1 and 2 in Sections 2.3.1 and 2.3.2, respectively.

Table 1.4-1. Reclamation, DON, and FPUD SMR Basin Water Rights Permits and Licenses

Permit / License Number	Status	Owner	Priority Date	Storage Site	Annual Amount (AF)	Storage Period
8511	Permit	Reclamation	10/11/46	Fallbrook Reservoir	10,000	01/01-12/31
11356	Permit	FPUD	11/28/47	Lake Skinner	10,000	11/01-06/01
11357	Permit	Reclamation	11/28/47	Fallbrook Reservoir	10,000	11/01-06/01
15000	Permit	Reclamation	09/23/63	De Luz Reservoir	165,000	01/01-12/31
10494	License	DON	09/23/63	Underground	4,000	10/01-06/30

Notes: AF = acre-feet; FPUD = Fallbrook Public Utility District; DON = U.S. Department of the Navy.

Table 1.4-2. Other MCB Camp Pendleton SMR Basin Water Rights

Water Right	Status	Owner	Annual Amount	Diversion Period
Riparian	Active	MCB Camp Pendleton	Not Applicable	Year-round
Pre-1914 Appropriative Right	Active	MCB Camp Pendleton	1,200 AFY	Year-round

Note: MCB = Marine Corps Base.

In addition to Federal Court Case 1247, there is a 1940 state court stipulated judgment settling a dispute between MCB Camp Pendleton's predecessors and certain upstream water right holders (*Rancho Santa Margarita v Vail*, San Diego Superior Court No. 42850) which addresses MCB Camp Pendleton's riparian water rights. CWRMA is one of the tools used to manage the division of water addressed under the 1940 stipulated judgment. CWMRA has been incorporated into Case 1247, and is subject to the continuing jurisdiction of the Federal Court in that case.

As discussed above in Section 1.4.1, the DON was issued a permit through Application 21471 for the Two-Dam Project and the existing groundwater recharge operations with a priority date in 1963. In 1973 the SWRCB separated the two portions of the permit, issued a license to the DON for the groundwater portion (License 10494), and required the DON to assign the surface water portion (Application 21471B) to Reclamation (Permit 15000). Similarly, FPUD's three 10,000-AF permits (Permits 8511, 11356, and 11357) were to be assigned to Reclamation for the storage of water in Fallbrook Reservoir (the second dam of the Two-Dam proposal in the Santa Margarita Project). The permit assignments to Reclamation were in anticipation that the water facilities would be constructed by Reclamation for the benefit of the DON and FPUD. These permits (15000, 8511, 11356, and 11357) were assigned to Reclamation by DON and FPUD under SWRCB Order WR 73-50.

Since that time, Reclamation assigned Permit 11356 back to FPUD for its Lake Skinner project. FPUD has worked to perfect Permit 11356 by re-locating the point of diversion to Lake Skinner in Riverside County. Lake Skinner and Permit 11356 are not part of SMR CUP. The three remaining water rights permits held by Reclamation provide the legal basis for appropriating additional water for a joint conjunctive use project. SMR CUP is the environmentally preferable approach to the Two-Dam Project.

Implementation of Alternative 1 or 2 would require SWRCB approval to change three of the existing permits (15000, 8511, and 11357), and possibly the license (10494), to conform the water rights to the project, and to extend the time within which water can be put to beneficial use. The required petitions for change and extension rights for the permits have been submitted to the SWRCB (Petitions) and approval is pending on CEQA requirements being met through completion of this EIS/EIR. The license already authorizes diversion at the weir, and proposed changes would conform the place and purposes of use to the permits. Among other things, the petitions on the permits propose to move the points of diversion downstream to the point of diversion on MCB Camp Pendleton, where the existing sheet pile weir would be replaced by an improved inflatable diversion facility under the project. Direct diversion and diversion to storage would be accommodated through proposed SMR CUP facilities. Implementation of this project also requires a petition to redistribute storage from the unconstructed aboveground reservoirs previously contemplated to the underground storage basin on MCB Camp Pendleton. The required underground storage supplement has also been filed with the SWRCB. A water availability analysis (Reclamation *et al.* 2012) has been conducted and is incorporated as part of this EIS/EIR to support changes to and extension of the existing permits, and any new water right permits that may be required. This EIS/EIR includes an evaluation of the impacts of the action alternatives on water, biological, and other resources, and identifies mitigation measures for environmental impacts. Impact analysis specific to these water and biological resources is provided in Sections 4.2 and 4.3, respectively.

Additional Information Regarding the Water Right Filings

Extensions of Time. The petitions for extension of time apply to Permits 8511, 11357, and 15000. They are necessary to allow project development, diversion, and use of water under these permits in the future. These petitions were timely filed in advance of the 2008 expiration date, and request extension for a 50-year period. Recurrence interval analysis of the 85-year hydrologic period of record available for the SMR watershed shows that 50 years is required to represent the extreme variability of the hydrologic conditions that occur in the watershed, and thus provide a reasonable opportunity to divert the full amount of water proposed to be diverted under SMR CUP.

Petitions for Change and Redistribution of Storage. Reclamation has filed Petitions for Change and Petitions for Redistribution of Storage for Permits 8511, 11357, and 15000 to conform these entitlements to the operations proposed under SMR CUP. Fundamentally, these petitions propose to replace the originally permitted construction of two large on-stream storage reservoirs, and replace that approach with the environmentally preferable conjunctive use approach using the existing groundwater aquifers on MCB Camp Pendleton as storage. Accordingly, the petitions propose authorization for direct diversion, diversion to (and extraction from) underground storage, and diversion to off-stream storage. The petitions also propose to unify the places and purposes of use among the three permits to facilitate operation of SMR CUP for the benefit of MCB Camp Pendleton and FPUD, as well as allow for future exchanges of water with the SDCWA.

Change in Points of Diversion, Rediversion, and Storage. The petitions for Permits 8511 and 11357 propose to move the point of diversion from the site of the proposed Fallbrook Dam to the location of the existing SMR diversion structure (i.e., the sheet pile weir), which is presently used by MCB Camp Pendleton to make diversions of water under License 10494 (Application 21471), riparian rights, and the pre-1914 appropriative water right. The petition for Permit 15000 proposes to move the point of diversion from the site of the proposed De Luz Dam to the existing SMR diversion structure. All three petitions propose the following:

- Identify the upstream and downstream limits of groundwater sub-basins to be used for underground storage of water diverted and infiltrated from the SMR;
- Add four shallow-aquifer wells (i.e., gallery wells) as points of direct diversion; and
- Add 25 existing and proposed new production wells as points of diversion (PODs), rediversion, and withdrawal from underground storage.

All of the change petitions seek to divert surface flows from the SMR at the diversion structure for diversion to and storage in the SMR groundwater basin (comprised of three sub-basins discussed in detail in Sections 1.5.1 and 3.2.3.2) and diversion to off-stream storage in MCB Camp Pendleton's existing Lake O'Neill. Water diverted from the river would be percolated to the groundwater basin for storage by way of existing recharge ponds located on MCB Camp Pendleton. Such recharge would enhance naturally occurring infiltration from the river channel to the groundwater basin. Diversions from the river to off-stream storage at Lake O'Neill are currently allowed under MCB Camp Pendleton's pre-1914 water right and are used for military training, recreation, and subsequent groundwater recharge and use. Water placed into underground storage would be withdrawn by any of 25 existing and proposed new production wells situated within the SMR groundwater basin. The license may also be amended to conform to the permits (consistent with how they are proposed to be changed), which would enable the project to be operated uniformly and facilitate water rights reporting and administration. This would not alter the proposed rates or volumes of water diversion, storage or use.

Changes in Water Diversion and Use

The Permittee intends to change the method of diversion from diversion to surface storage in two earlier proposed on-stream reservoirs to direct diversion, diversion to underground storage.

Present Operations. MCB Camp Pendleton presently diverts water at an existing sheet pile weir structure on the SMR to underground and surface storage pursuant to License 10494 and a pre-1914 appropriative water right. License 10494, which is not part of the pending petitions at the SWRCB, authorizes the diversion of up to 4,000 AF to underground storage by way of recharge ponds and natural infiltration in the river during the season of 1 October to 30 June for subsequent extraction for military, domestic, municipal, and irrigation purposes. MCB Camp Pendleton also diverts water from the SMR to surface storage in the existing Lake O'Neill pursuant to a pre-1914 appropriative water right. Under the pre-1914 right, MCB Camp Pendleton is entitled to divert up to 1,200 AF annually (plus carriage losses) at a diversion rate of 20 cubic feet per second (cfs). The allowed uses are military training, recreation, and groundwater recharge. Accordingly, the two storage rights exercised by MCB Camp Pendleton entitle it to divert up to 5,200 AFY, plus carriage losses under the pre-1914 right, to surface and underground storage. MCB Camp Pendleton also directly diverts water under riparian rights for various beneficial uses within MCB Camp Pendleton, including maintenance of a salt-water intrusion barrier in the Lower Ysidora Sub-basin.

MCB Camp Pendleton releases water stored in Lake O'Neill at controlled rates for recharge to the groundwater basin for later recapture and use. Water is extracted from the underground basin by existing wells. During the period of 1979 to 2011, maximum groundwater well production from the Lower SMR Basin was 7,200 AFY for potable use and 1,500 AFY for irrigation use.

Proposed Operations. For the proposed SMR CUP, MCB Camp Pendleton's existing vested rights would be exercised in conjunction with the diversions and uses described in the petitions. As noted above, the license may also be changed to conform it to the other post-1914 appropriative rights primarily for ease of water rights administration. This will not change the proposed volumes or rates of water to be diverted, stored and used.

<u>Rates of Diversion and Extraction</u> – The capacity of the diversion structure for diversions to O'Neill Ditch would be increased from 60 cfs to 200 cfs. Alternative 1 would rely entirely on existing and proposed groundwater production wells. The existing and proposed groundwater production wells would each have a maximum capacity of up to 2.5 cfs each, with the total pumping rate not to exceed 28 cfs. Alternative 2 would combine surface water gallery wells and groundwater production wells. The proposed gallery wells would each have a maximum capacity of 4.5 cfs each, with the total directly diverted from these wells not to exceed 18 cfs. Total groundwater well pumping rates would not exceed 28 cfs. The maximum combined rate of diversion and extraction from the four gallery wells and groundwater production wells would not exceed 44 cfs.

<u>Storage Amounts</u> – This section describes the storage amounts proposed under Alternative 1, because the maximum storage would occur if this alternative is implemented. Based on SMR CUP modeling studies, the maximum annual amounts diverted from the SMR to storage are estimated to be up to 30,100 AFY to underground storage (inclusive of amounts diverted to underground storage under MCB Camp Pendleton's existing rights under License 10494 and 1,200 AFY to Lake O'Neill for subsequent release and recharge to underground storage) The total amount of water diverted to storage also includes a

maximum of 6,800 AFY of induced infiltration of natural stream flow from the river to the groundwater aquifer.

The maximum diversion to storage assumes no losses from the recharge ponds and approximately 600 AFY losses from Lake O'Neill. Hence, the net maximum diversion to groundwater storage from Lake O'Neill would be 1,200 AFY.

The total amount of water diverted to storage under SMR CUP would vary depending upon the result from the environmental analysis of the two action alternatives. The estimated diversion to storage described in this section encompasses all of the facilities that may be included under the action alternatives.

<u>Production (Direct Diversion, Extractions from Underground Storage, and Beneficial Use)</u> – The maximum annual groundwater production, defined for purposes of the subject petitions as the combined direct diversions (i.e., from gallery wells) and extractions from underground storage for beneficial uses, is estimated to be 22,800 AF, of which a maximum of 7,000 AF would be from the gallery wells (assuming implementation of Alternative 2). The estimated combined direct diversion and extraction from underground storage for the Proposed Action is based on constructing all facilities identified in both action alternatives. This is a conservative approach. Completion of the environmental review of the action alternatives would likely result in lower volumes, and depend on the facilities ultimately constructed.

<u>Maximum Potential Amount Taken from the Source</u> – The maximum potential combined amount taken from the source in any one year under all of the subject vested rights and permits would not exceed 45,900 AF. Water taken from the SMR would occur as both storage (i.e., diversion to surface storage in Lake O'Neill, diversion to underground storage via the recharge ponds, and induced infiltration to underground storage) and production (i.e., direct diversion via the gallery wells and groundwater extraction via the production wells). The total quantities of storage and production would be dependent upon the facilities that are constructed. Facilities based on an alternative that includes gallery wells (i.e., Alternative 2) would reduce the amount of water diverted to underground storage and increase the amount of surface water directly diverted from the source for beneficial use. Facilities based on an alternative that includes groundwater wells only (i.e., Alternative 1) would rely more on diversion to underground storage and subsequent groundwater extraction from underground storage than direct diversion from the source for beneficial use. All project alternatives would rely on directly diverting water from the SMR for surface and underground storage for subsequent rediversion and beneficial use. The estimated maximum potential combined amount taken from the source is based on constructing all facilities identified in both action alternatives. Again, this is a conservative approach; completion of the environmental review of the action alternatives would likely result in lower volumes of water, depending on the facilities ultimately constructed.

Changes in Land Use

The permitted place of use under Permits 8511 and 11357 is described as 8,192 acres (3,315 hectares) within the boundary of FPUD. The place of use under Permit 15000 is described as being within the boundary of the "Camp Pendleton Naval Enclave" within which irrigation of up to 5,600 acres (2,266 hectares) is allowed. Under these petitions, the place of use is more broadly defined as being within the boundaries of the FPUD and Camp Pendleton Naval Enclave.

Changes in Operations and Purposes of Use

Operationally, these petitions seek to change the presently allowed collection of water to surface storage in on-stream reservoirs to the diversion of water, either directly or to underground/off-stream storage, at defined rates. The SMR CUP project proposes to manage the underground basin conjunctively for the benefit of MCB Camp Pendleton and FPUD. The effects on surface water and groundwater hydrology are evaluated in this EIS/EIR.

The various purposes of use presently allowed by the respective permits are being made uniform among all three permits and the license to facilitate commingling of water commensurate with a joint conjunctive use project. Groundwater recharge is being added to the purpose of use under each of these water rights as a necessary element in the conjunctive operation. Recreation and Fish and Wildlife Enhancement are being added to all of the permits to cover activities associated with Lake O'Neill.

1.5 Project Location

The project study area is located in the northwest corner of San Diego County, on the southwest coast of California (Figure 1-1). The study area includes the geographic boundaries of MCB Camp Pendleton, DET Fallbrook, and the FPUD service area. Action alternatives address the construction and use of facilities primarily within the boundaries of the SMR watershed (small portions of the bi-directional pipeline are located in the neighboring San Luis Rey River watershed). The following sections generally describe the SMR watershed, MCB Camp Pendleton, DET Fallbrook, and FPUD. Proposed project facilities and their locations are described in detail in Chapter 2.

1.5.1 Santa Margarita River Watershed

The SMR flows southwesterly to the Pacific Ocean, draining a portion of the Peninsular Range in southern California. The entire watershed encompasses 744 square miles (mi^2) (1,927 square kilometers [km^2]) within San Diego and Riverside counties, and is divided by a coastal range of mountains. The upper portion of the watershed, located in Riverside County, is drained by Temecula and Murrieta creeks. Located below the confluence of Temecula and Murrieta creeks, the SMR flows 29 miles (mi) (47 kilometers [km]) southwesterly to the Pacific Ocean and drains the lower portion of the watershed. Major tributaries to the lower portion of the SMR are De Luz, Sandia, Rainbow, and Fallbrook creeks. The SMR supports sensitive riparian and wetland habitats that depend on both surface waters and groundwater. Approximately 10% of the SMR watershed includes lands owned by MCB Camp Pendleton and DET Fallbrook and approximately 4% of the watershed includes lands within the FPUD service area.

Groundwater is found in the alluvial basin located downstream from the confluence of the SMR and De Luz Creek and, to a lesser extent, in the shallow alluvium upstream of that confluence. The alluvial basin located downstream from the confluence of the SMR and De Luz Creek is further divided into three separate sub-basins: the Upper Ysidora, Chappo, and Lower Ysidora sub-basins. The Upper Ysidora Sub-basin is the farthest upstream of the three sub-basins. The Chappo Sub-basin, located down-gradient from the Upper Ysidora Sub-basin and the Lower Ysidora is the farthest downstream sub-basin. The three sub-basins range from less than 0.5 mi (0.8 km) wide (Upper and Lower Ysidora sub-basins) to more than 2 mi (3 km) wide (Chappo Sub-basin). Section 3.2, *Water Resources*, provides additional information about the SMR watershed and its hydrology.

1.5.2 Marine Corps Base Camp Pendleton

MCB Camp Pendleton comprises approximately 125,000 acres (50,000 hectares). Los Angeles lies 75 mi (121 km) to the north and San Diego lies 38 mi (61 km) to the south (Figure 1-1). MCB Camp Pendleton is located within San Diego County and is bordered by the City of San Clemente and Orange County to the northwest, the city of Oceanside to the south, and the community of Fallbrook to the east. MCB Camp Pendleton's westernmost boundary fronts approximately 17 mi (27 km) of beaches and coastal bluffs. Principal access to MCB Camp Pendleton is via Interstate (I-) 5. I-15 and State Route (SR-) 76, respectively, located east and south of MCB Camp Pendleton, provide regional access. SR-76/Mission Road provides local access from Oceanside and Fallbrook.

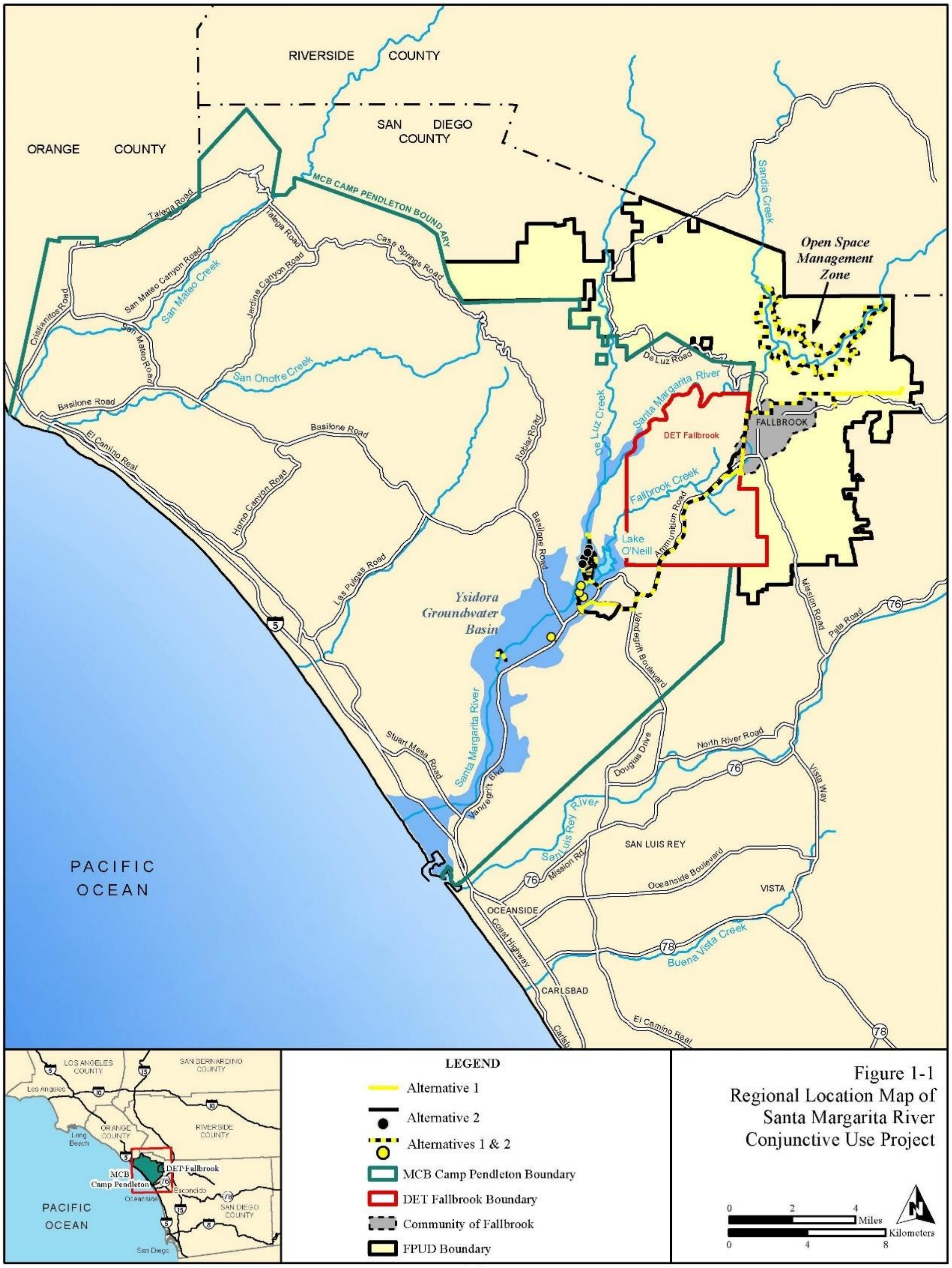

Figure 1-1
Regional Location Map of
Santa Margarita River
Conjunctive Use Project

Figure 1.5-1. Regional Location Map of Santa Margarita River Conjunctive Use Project

The mission of MCB Camp Pendleton is to operate an amphibious training base that promotes the combat readiness of operating forces by providing facilities, services, and support response to the needs of Marines, sailors, and their families (MCB Camp Pendleton 2002). MCB Camp Pendleton has served as a training base since its establishment in 1942. MCB Camp Pendleton provides a broad range of training facilities that allows live-fire aviation training, artillery and infantry training, tracked vehicle operations and maintenance, reconnaissance training, and field medical treatment. In addition, the varied landscape (consisting of the Pacific Ocean, mountains, and flat ranges) provides excellent terrain for amphibious landing exercises, armor unit training, anti-tank maneuvers, aerial weapons delivery, airlifting of troops and supplies, and loading and unloading of ships and aircraft. The approximately 17 mi (27 km) of coastal land, the diverse inland range and maneuver areas provide the only west coast setting available to the military where the full spectrum of Marine combat doctrine can be exercised: amphibious landings and all elements of the Marine Air Ground Task Force, including aviation and combat arms support. MCB Camp Pendleton supports over 80,000 military and civilian personnel daily. The mild coastal California climate allows for year-round training, making MCB Camp Pendleton a valuable military installation.

1.5.3 Naval Weapons Station Seal Beach, Detachment Fallbrook

Commissioned in February 1942, then Naval Ammunition Depot Fallbrook was constructed next to the community of Fallbrook, just east of MCB Camp Pendleton, in the northwest corner of San Diego County. Unique among naval weapons facilities, DET Fallbrook is located 20 mi (32 km) inland. DET Fallbrook provides weapons storage, loading, maintenance, and support to ships and submarines of the U.S. Pacific Fleet. DET Fallbrook is also home to the West Coast Air-Launched Missile Production and Storage Facility. Here, air-launched missiles are inspected, maintained, and recertified.

1.5.4 Fallbrook Public Utility District

FPUD operates as a public agency under the Public Utility District Act of the State of California, and was established to provide potable water service to customers within its jurisdictional boundaries. Its services also include sewage treatment and production and distribution of recycled water. FPUD was originally formed to provide water to the community of Fallbrook and the delivered water was drawn from wells in the San Luis Rey Valley. FPUD was incorporated on 5 June 1922 and originally consisted of about 500 acres (200 hectares) within its service area. In 1937, the Fallbrook Irrigation District voted to dissolve and a portion of the former Irrigation District became a part of FPUD, increasing the size of FPUD’s service area to 5,000 acres (2,000 hectares). Significant expansions of the FPUD service area took place in 1950 when it annexed the last remaining portion of the Fallbrook Irrigation District and in 1958 when the areas lying north of Fallbrook on both sides of the SMR were annexed to FPUD. In 1990, the De Luz Heights Municipal Water District was annexed to FPUD, adding 11,789 acres (4,771 hectares) to FPUD’s service area. FPUD’s current service area is approximately 28,000 acres (11,300 hectares).

1.6 Existing Water Supply and Associated Facilities

The following sections describe MCB Camp Pendleton’s existing water use, surface water diversion, recharge facilities, groundwater pumping, and water treatment; and FPUD water use, facilities, and operations.

1.6.1 MCB Camp Pendleton Facilities

MCB Camp Pendleton satisfies more than 99% of its total water demand from four stream systems that run through the Base: San Mateo Creek, San Onofre Creek, Las Flores Creek, and the SMR. The remaining 1% (or 70 AFY) is supplied to the San Mateo Point Housing area, on the north side of MCB

Camp Pendleton, by the South Coast Water District of Orange County (i.e., imported water). SMR CUP would focus on the Lower SMR Basin. The Lower Santa Margarita groundwater basin supports the service areas at the south end of MCB Camp Pendleton and supplies more than 70% of MCB Camp Pendleton's water. MCB Camp Pendleton does not receive imported water from the MWD or SDCWA to satisfy its demand in the southern part of the Base. Following floods in 1993, MCB Camp Pendleton received emergency access through Oceanside for a potable water supply line. A connection was built between the city and MCB Camp Pendleton in the vicinity of Morro Hill. This connection has not been used and is intended for emergency use only.

1.6.1.1 MCB Camp Pendleton South Water System

The majority of development within MCB Camp Pendleton is located in the southern portion of the Base and is served by the MCB Camp Pendleton South Water System (South System). The SMR and Las Flores Creek groundwater basins make up the South System while water pumped from San Onofre Creek and San Mateo Creek groundwater basins make up the MCB Camp Pendleton North Water System. An EIS was prepared for the construction of a pipeline that would connect the North and South Water Systems (P-1045) (MCB Camp Pendleton 2012a).

The South System includes 1 Advanced Water Treatment Plant, 2 iron and manganese removal plants, 1 chlorination station, 15 production wells, 16 booster pump stations, 27 reservoirs, and 16 pressure zones. Of the 15 wells, 3 are located in the Las Flores Creek watershed and the remaining 12 wells are within the Lower SMR Basin. 12 of the 15 wells are utilized; three wells are inactive. The South System also includes water transmission and distribution pipelines in some of the same corridors in which the project pipelines would be constructed.

Key features of the existing facilities of the MCB Camp Pendleton South System are in listed in Table 1.6-1 and shown Figure 1.6-1.

Table 1.6-1. Key Features of MCB Camp Pendleton South Water System

Facility	Notes/Capacity
Production Wells and Manifold System	Approximately 20 cfs
IM-2 at Haybarn Canyon	Approximately 13.4 cfs
AWTP at Haybarn Canyon (P-113)	Approximately 11,600 AFY
Reservoir Ridge tank	4 million gallons, elevation 540 ft
South System distribution system	
SRTTP	3.75 million gallons per day

Notes: cfs = cubic feet per second; IM-2 = Iron and Manganese Plant 2; AWTP = Advanced Water Treatment Plant; AFY = acre-feet per year; FY = fiscal year; ft = foot/feet; SRTTP = Southern Region Tertiary Treatment Plant.

<u>Water Treatment Facilities</u>

Construction of the Iron and Manganese Plant 2 (IM-2) in Haybarn Canyon was completed in 2006 to comply with California Health and Safety Code 11655(a) and CCR, Title 22, 64449(s), 64449(b)(3), and 64449.5(d) by delivering water to customers that meets secondary standards for manganese, iron, color, and particulate matter. Naturally occurring manganese levels in parts of the South System can be approximately 100 times the secondary maximum contaminant level of 0.05 milligrams per liter (mg/L). In 2003, MCB Camp Pendleton prepared an Environmental Assessment (EA) and issued a Finding of No Significant Impact for the Iron/Manganese Treatment Plant and Reservoir (MCB Camp Pendleton 2003a).

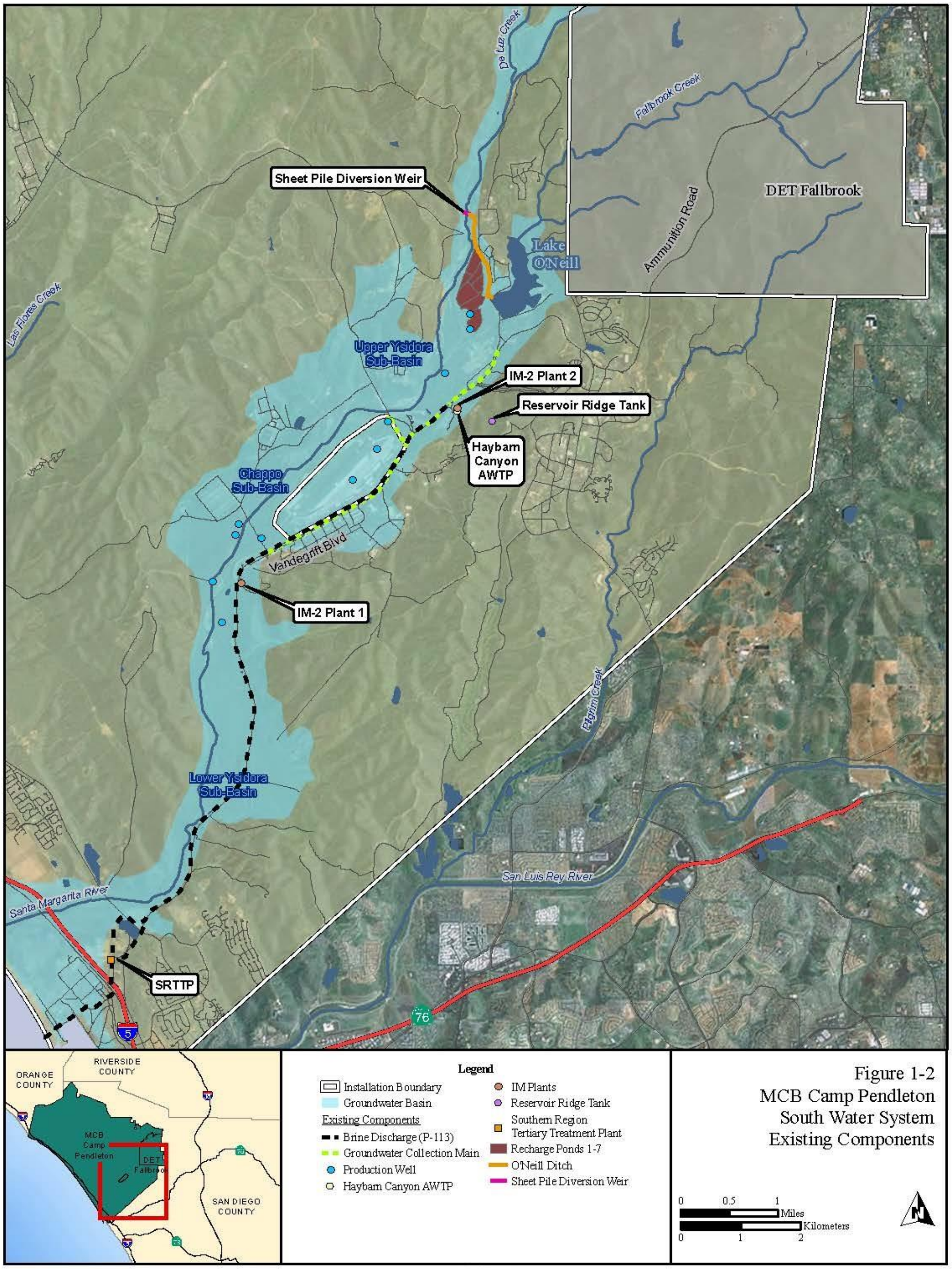

Figure 1.6-1. MCB Camp Pendleton South Water System Existing Components

The capacity of IM-2 was expanded and a new advanced water treatment plant (AWTP) (P-113) was constructed adjacent to IM-2 in FY 2013. The Haybarn Canyon AWTP ensures compliance with more stringent secondary drinking water standards for total dissolved solids (TDS) and to meet the Federal Stage 2 Disinfectants and Disinfection Byproducts Rule requirements for total trihalomethanes in drinking water by removing the total organic carbon in well water. The Haybarn Canyon AWTP also provides corrosivity reduction by controlling the acidity (pH) in the water. This method of corrosion control supports efforts by MCB Camp Pendleton to meet wastewater discharge requirements by reducing the levels of dissolved copper below the level which requires that wastewater sludge be handled as hazardous waste. An additional benefit of reducing TDS in potable water at the Haybarn Canyon AWTP is the subsequent reduction of TDS levels in wastewater, allowing MCB Camp Pendleton to meet current wastewater standards necessary for the wastewater's reuse.

The Haybarn Canyon AWTP consists of two primary components: granulated activated carbon (GAC) and reverse osmosis (RO) filtration; and two secondary components: pH stabilization/corrosion control and disinfection units. In addition, there is an up to 16-inch (in) (41 centimeters [cm]) internal diameter pipeline for disposal of brine generated by the upgraded facility. The pipeline is centered along Vandegrift Boulevard for discharge to the Pacific Ocean via the Oceanside Ocean Outfall. The total production capacity is 11,600 AFY (10.4 million gallons per day [MGD]) of potable water. More than half of the water is treated by the RO system to obtain the final product water TDS objective of 325 mg/L for treated water. In 2010, MCB Camp Pendleton prepared an EA and issued a Finding of No Significant Impact for the Advanced Water Treatment Facility/Utility Corridor Project (P-113) (USMC 2010). Construction of the P-113 project began in 2011 and was completed in 2013.

Existing Production Wells

The South System water supply is exclusively from groundwater, of which approximately 90% is developed within the Lower SMR Basin, specifically the Upper Ysidora and Chappo sub-basins. The existing water diversion and production facilities pump groundwater from the lower basin of the SMR to supply domestic, industrial, military, and agricultural water for beneficial use to the southern portion of MCB Camp Pendleton. Twelve wells within the Lower SMR Basin provide MCB Camp Pendleton with an average production rate of 3,350 gallons per minute based on calendar years 2007-2010. MCB Camp Pendleton previously used approximately 1,500 AFY of groundwater from the Lower Ysidora Sub-basin, primarily to irrigate agricultural lands leased to contracting agricultural businesses at Stuart Mesa. However, this use for agricultural purposes ceased in 2011 when the last agricultural business lease expired.

Twelve production wells in the Upper Ysidora and Chappo sub-basins are already connected to an existing raw water manifold system. These wells and the existing raw water collection pipe system were designed to convey water to MCB Camp Pendleton's Iron and Manganese Plant 1 (IM-1) or IM-2/AWTP (P-113). The main collection pipeline runs in a northeast to southwest direction, along Vandegrift Boulevard, from the Upper Ysidora Sub-basin to the Chappo Sub-basin near MCAS. Water under pressure is collected from the wells along the way, pumped into the main pipe, and then treated at either plant.

1.6.1.2 Diversion, Storage, and Recharge Facilities

Facilities currently exist within MCB Camp Pendleton to divert surface water from the SMR and recharge the groundwater basins. This existing system consists of a steel sheet pile diversion weir constructed across the SMR that diverts water through a headgate (i.e., a gate for controlling the flow of water into a ditch) and ditch to a series of seven interconnected groundwater recharge ponds, Lake O'Neill, or back to the SMR via an outlet ditch.

Diversion Facilities

The existing sheet pile weir allows water to be collected and diverted into O'Neill Ditch through an existing headgate and diversion structure located on the eastern bank of the river. Diversion typically occurs during the rainy season, November to June.

O'Neill Ditch is used to convey water either to the seven groundwater recharge ponds (Recharge Ponds 1-7) or Lake O'Neill, depending on the time of year, available supply, and required demand. During the diversion, a series of control structures and measuring devices allows MCB Camp Pendleton personnel to manage, control, and measure the diversion to each of the different facilities. Repairs conducted in 1996 included installation of two 6.33-ft (1.93-m) wide by 5-ft (1.5-m) high removable stoplog slots. However, sediment building on the upstream side has made these difficult to remove and reinstall (Reclamation 2004a). Two road crossings, two concrete Parshall flumes, and two turnout structures are located along O'Neill Ditch between the head of the diversion channel and the lake (Stetson Engineers, Inc. [Stetson] 2004). Table 1.6-2 summarizes the existing diversion facilities on MCB Camp Pendleton used to divert water from the SMR.

Table 1.6-2. Summary of Existing Diversion Facilities

Facility	Description	Current Capacity
Conveyance Facility		
River diversion structure, steel	Sheet pile weir, 283 ft long	
River diversion inlet	60-in × 48-in slide gate mounted on concrete headwall 65-in × 40-in × 45-ft arch corrugated metal pipe	75 cfs
O'Neill Ditch		
Earthen ditch	Unlined earth ditch approximately 5,100 ft long	73-174 cfs
Road crossing (double culvert)	36-in corrugated metal pipe and 36-in reinforced concrete pipe	60 cfs
Upper flume	5-ft Parshall flume; concrete block and concrete lined	105 cfs
Recharge pond turnout structure	Concrete turnout structure with two 48-in slide gates	82 cfs
Lower flume	4-ft Parshall flume; concrete block and concrete lined	62 cfs
Road crossing (single culvert)	42-in corrugated metal pipe	39 cfs
Lake O'Neill turnout structure	Concrete turnout structure with 24-in slide gate	20 cfs
Recharge Facilities		
Groundwater recharge ponds	7 groundwater recharge ponds totaling 74 acres	371 AF
Lake O'Neill	Lake formed by earthen levee	1,680 AF

Notes: Capacity of conveyance facilities was calculated based on river water levels equal to crest height of the sheet pile weir.

ft = foot/feet; cfs = cubic feet per second; AF= acre-feet.

Source: Stetson 2004.

The original SMR diversion structure was lost during the winter rains of 1978 and was reconstructed in 1980, which immediately failed during the winter rains of 1980. The existing diversion structure was constructed in 1982 and consists of a 280-ft (85-m) steel sheet pile weir. The sheet pile weir was constructed as a more permanent structure to replace previous rock weir designs that washed out during the large flood events. According to the 1982 construction drawings, the sheet piles are 30 ft (9 m) long and were driven to a depth that fixed the weir crest elevation at 115.5 ft (35.2 m). The recently reported crest elevation is 116.6 ft (35.5 m) (Reclamation 2004a).

The sides of the sheet pile weir taper into the river channel side banks. Water impounded behind the sheet pile weir may be diverted through a 60-in by 48-in (152-cm by 122-cm) (span by rise) slide gate mounted on a concrete headwall on the eastern bank of the river. The existing slide gate was constructed as a result of MCB Camp Pendleton's Department of Public Works 1970 plans to repair the flood-damaged diversion system. The slide gate is manually operated to pass river diversions through a 45-ft (14 m) long section of arch Corrugated Metal Pipe (CMP) with dimensions of 65 in by 40 in (165 cm by 102 cm). The invert elevation of the arch CMP at the entrance of the diversion is 112.1 ft (34.2 m) according to the 1982 construction drawings.

The capacity of the arch CMP diversion pipe is estimated to be 75 cfs with a water surface elevation 3.4 ft (1.0 m) (115.5 ft to 112.1 ft [35.2 m to 34.2 m]) above the pipe inlet. The riverbed elevation downstream of the diversion is estimated to be approximately 109.25 ft (33.30 m). Current operations require sediment removal behind the sheet pile weir and in front of the headwall and headgate every few years (Reclamation 2004a).

Lake O'Neill

Lake O'Neill is a 1,680 AF manmade reservoir formed by an earthen levee/dam located on Fallbrook Creek, a tributary to the SMR. The lake is filled by diversions from the SMR. Originally constructed in 1883 by Richard O'Neill, Sr., the lake was intended to store water to irrigate crops on the Rancho Santa Margarita y Las Flores during the dry season. The water rights associated with Lake O'Neill carry a priority date of 1883 and a maximum diversion rate to the lake of 20 cfs and a total annual volume not to exceed 1,200 AF plus carriage and storage losses. Since acquisition by the federal government for MCB Camp Pendleton, Lake O'Neill has been used primarily for water storage and groundwater recharge, and secondarily for military training and recreation (Leedshill and Herkenhoff, Inc. 1988).

Sedimentation has altered the composition of the lake bottom and the bathymetry of Lake O'Neill. The capacity of the lake was last recorded in 2004 at approximately 1,380 AF (Stetson 2004). MCB Camp Pendleton recently completed dredging the open water portion of Lake O'Neill (Phase I). Phase II was planned to follow and include the removal of wetland and perimeter vegetation as well as sediment below the wetland areas; however, Phase I may have provided the capacity necessary and Phase II is currently not planning to remove vegetation. This two-phase process will return Lake O'Neill to its original storage capacity of approximately 1,680 AF.

Surface water from the SMR is conveyed approximately 5,100 ft (1,800 m) through O'Neill Ditch to the lake. Conveyance of water from the ditch to the lake is made through a concrete turnout structure and a 24-in (61-cm) reinforced concrete pipe located at the lower end of O'Neill Ditch. Adjacent to the 24-in (61-cm) pipe that fills the lake is a concrete overflow outlet structure with four 60-in (150-cm) reinforced concrete pipes. The overflow outlet structure returns reservoir spills to a ditch that drains back to the river. Controlled releases from the lake are made through an outlet pipe located in the southern corner of the lake (Reclamation *et al.* 2005).

Groundwater Recharge Ponds

The SMR diversion system conveys water to either Lake O'Neill or Recharge Ponds 1-7. The recharge ponds have been in operation since 1955 and replenish water pumped from the groundwater basins. This system is located west of the old Naval Hospital by Lake O'Neill and approximately 8 mi (13 km) upstream from the Pacific Ocean. The groundwater recharge pond system was constructed between 1955 and 1962, and SMR diversions to the recharge ponds were first recorded in October 1960. The total surface area of the seven-pond system is approximately 74 acres (30 hectares), and the capacity of the ponds is estimated to be approximately 371 AF. Ponds 6 and 7 were rehabilitated in late 2011, but are not currently used for recharge. Table 1.6-3 summarizes the capacity of the seven groundwater recharge ponds.

Table 1.6-3. Capacity of Existing Groundwater Recharge Ponds

Pond	Surface Area (acres)	Average water depth (ft)	Volume (AF)
1	13.9	3.2[1]	44.5
2	7.0	6.1[1]	42.7
3	7.0	8.4[1]	58.8
4	16.5	5.4[1]	89.1
5	4.7	5.1[1]	24.0
6[2]	11.8	4.5	53.1
7[2]	13.1	4.5	59.0
Total	**74**		**371**

Note: [1] Approximate average depth of existing ponds based on 1962 survey map
[2] Ponds rehabilitated in late 2011; currently unused.

ft = foot/feet; AF = acre-feet.

Source: Reclamation *et al.* 2005; MCB Camp Pendleton 2012a.

Under the current recharge pond operations, water is diverted from O'Neill Ditch into the recharge pond system through a single 79-in by 49-in (201-cm by 125-cm) CMP pipe at the head of Pond 1. When the water level in Pond 1 rises to the pond's outlet pipe invert elevations, flow passes ("spills") from Pond 1 into either Pond 2 or 5. The pipe invert elevations from Pond 1 to Pond 2 are slightly lower (12-15 in [31-38 cm]) than the pipe invert elevations from Pond 1 to Pond 5; therefore, water first spills from Pond 1 into Pond 2 before spilling into Pond 5. Water filling above the invert elevation of the outlet pipes of Pond 2 spills into Pond 3, and water filling above the outlet pipes from Pond 3 spills into Pond 4. Similarly, water filling above the invert elevation of the outlet pipes from Pond 5 spills into Pond 4. Water is designed to spill from Pond 3 and 4 to Pond 6 and subsequently to Pond 7. At the lower end of Pond 7, two 30-in (76-cm) CMP pipes return spills from Pond 4 to the floodplain. Since 1983, Pond 4 has filled four times, spilling twice to the floodplain in March of 1983 and again in February of 2005.

1.6.1.3 Water Rights Permits

Historical operations of the diversion ditch, groundwater recharge ponds, and Lake O'Neill indicate that the diversion facilities are operated in accordance with the requirements of the various water rights held by MCB Camp Pendleton. Existing water rights allow for over 1,100 AFY of water to be diverted to Lake O'Neill and over 4,000 AFY of water to be diverted to the groundwater recharge ponds annually (see Section 1.4 for further details concerning existing water rights). A performance review of the existing facilities was completed as part of the *Santa Margarita River Recharge and Recovery Enhancement Program Feasibility Study* (Stetson 2001). This study determined that the existing facilities were not properly designed to meet the diversion goals, as evidenced by the large amount of sediment accumulation associated with the diversion weir and headgate and the performance of the recharge ponds. Maintenance and repair projects are required to return the existing system to the capacity it was originally designed for and to allow MCB Camp Pendleton to fully exercise its appropriative rights. These projects include replacement and minor relocation of the existing headwall and headgate, scraping fine sediment from the existing recharge ponds, and installation of control and monitoring devices (sliding weir gate structures) between the ponds.

1.6.2 FPUD Facilities

FPUD is located approximately 5 mi (8 km) northeast of the Upper Ysidora Sub-basin and does not contain large alluvial basins that may be used to produce groundwater. Groundwater supplies are limited to the shallow alluvial fill beneath the SMR upstream of the DET Fallbrook boundary. The alluvial materials along the SMR, within the boundaries of FPUD, are no more than 200 yards wide and approximately 30 to 50 ft (9 to 15 m) deep.

Use of SMR water by FPUD dates back to the 1920s, when wells along the SMR channel were utilized to supply water to Fallbrook area water users. In 1968, an MOU and Agreement was signed with the federal government to develop the Two Dam Project on the river for the benefit of FPUD and MCB Camp Pendleton (see Section 1.4 for further details regarding the Santa Margarita Project). At this point in time, FPUD ceased operations on the SMR. In 1969 floods destroyed the FPUD's diversion works, which were not replaced.

Today, FPUD provides service to approximately 35,000 residents, and includes 28,000 acres (11,331 hectares) in its service area. The FPUD service area includes portions of the community of Fallbrook that border DET Fallbrook and MCB Camp Pendleton to the west and extends into both the SMR and the San Luis Rey river basins.

Since 1969 when the FPUD abandoned the San Luis Rey Valley wells, the domestic, agricultural, and commercial water demands have been exclusively met by imported water supplies purchased from SDCWA, which is the largest single customer of MWD. FPUD currently imports water from the Colorado River and the State Water Project (i.e., water delivered from northern California rivers). FPUD currently has one groundwater well near Red Mountain Reservoir that produces approximately 100 AFY. Based on records published by the SMR Watermaster's office, FPUD purchased 11,760 AF of water from the SDCWA in 2010. FPUD's largest import purchase year was water year (WY) 2007 when FPUD received 20,450 AF (*Note*: a WY is a 12-month period from 01 October to 30 September). All of the potable water distributed by FPUD is treated at the Lake Skinner Filtration plant, located just east of the City of Temecula. FPUD operates one wastewater treatment plant located along Fallbrook Creek, a tributary of the Lower SMR Basin. Tertiary treated wastewater from the plant is currently either discharged to an outfall pipeline, which is connected near the Pacific Ocean to the city of Oceanside ocean outfall; or used as recycled water to irrigate nurseries, playing fields, landscaped freeway medians, and common areas (Stetson 2002). From 2005 to 2010, FPUD recycled approximately 500 AFY (FPUD 2010).

Key features of the FPUD system are as follows:

- *Pressure Zones* – FPUD features 7 different pressure zones linked by 18 pressure control valves.
- *Reservoirs* – FPUD has 11 reservoirs. The Red Mountain Reservoir, an earthen dam, asphalt-lined reservoir with a total capacity of 1,350 af, is the largest reservoir in the FPUD system. Two main 24-in (61-cm) pipelines carry water from the Red Mountain Reservoir and connect into the various pressure zones.

- *Aqueduct Connections* – FPUD receives treated imported water from four connections to aqueducts of the MWD and SDCWA. From regional MWD storage and treatment facilities at Lake Skinner near Temecula, California, five large-diameter MWD and SDCWA pipeline aqueducts deliver the imported supply to San Diego County water retail agencies. Turnout Fallbrook Number 3 on the first aqueduct, which feeds the Red Mountain Reservoir, is generally the most heavily used FPUD aqueduct connection.

1.7 Cooperating, Responsible, and Trustee Agencies

Numerous regulatory agencies are involved in the planning and implementation of actions with the potential to affect water resources. As defined under 40 CFR § 1508.5, a cooperating agency may be any federal agency other than the lead agency that has jurisdiction by law or special expertise with respect to the environmental impacts expected to result from a proposal. An agency has "jurisdiction by law" if it has the authority to approve, veto, or finance all or part of the proposal. An agency has "special expertise" if it has statutory responsibility, agency mission, or related program experience with regard to a proposal. A cooperating agency's responsibility includes participation in the NEPA process as early as possible, participation in the scoping process, and, on the lead agency's request, development of information to be included in the EIS and staff support in its preparation (40 CFR § 1501.6). Under 40 CFR § 1501.6, federal agencies with jurisdiction by law shall be cooperating agencies if requested by the lead agency(s). No federal agency volunteered to be a cooperating agency for the proposed project.

Under Section 15381 of CEQA, a "responsible agency" means a public agency that proposes to carry out or approve a project, for which a lead agency is preparing or has prepared an EIR or Negative Declaration. Responsible agencies include all public agencies other than the lead agency that have discretionary approval power over the project. Under Section 15386 of CEQA, a "trustee agency" means a state agency having jurisdiction by law over natural resources affected by a project that are held in trust for the people of the State of California. The CDFW is a trustee agency under CEQA. CEQA responsible agencies include the San Diego RWQCB, SWRCB, and DPH, *Division of Drinking Water and Environmental Management*.

Table 1.7-1 provides a description of the responsible and trustee agencies with regulatory oversight applicable to the Proposed Action. In addition to the regulatory agencies listed below, the Proposed Project must also be in compliance with the requirements of all agencies with discretionary project approval authority.

1.8 Regulatory Setting

Numerous federal and state laws have been enacted to establish requirements for adequate planning, implementation, management, and enforcement of water resource regulations. Regulations and plans have been developed to augment and clarify the laws and provide details not included in the laws. Those adopted by the authoritative governmental body have legal stature and are enforceable. Federal guidelines and state policies express the intent of the governing body and, while they may not be legally enforceable, set forth direction that should be followed to achieve the goals expressed in the laws. The Proposed Action must achieve compliance with applicable rules and regulations promulgated by the USEPA, USFWS, USACE, CDFW, SWRCB, and DPH, among others. A summary of laws, general policies, and regulations that govern each specific resource in the study area is provided in Chapter four.

Table 1.8-1. Regulatory Agencies Applicable to the Proposed Action

CDFW – CEQA Trustee Agency
As a trustee agency, CDFW cannot approve or disapprove a project; however, CEQA lead agencies and federal lead agencies proposing impoundments or diversions of surface waters are required to consult with CDFW. CDFW, as the trustee agency for fish and wildlife resources, shall provide the requisite biological expertise to review and comment upon environmental documents and impacts arising from project activities, and shall make recommendations regarding those resources held in trust for the people of California according to the Fish and Game Code Section 1802.
SWRCB – CEQA Responsible Agency
The SWRCB has authority over water allocation and water quality protection by assigning water rights, adjudicating water right disputes, developing statewide water protection plans, and establishing water quality standards. The SWRCB guides nine regional water quality control boards, which oversee state and federal water pollution control measures in each of the major watersheds in the state.
San Diego RWQCB – CEQA Responsible Agency
The San Diego RWQCB regulates all discharge of wastewater to groundwater or surface water by issuing discharge permits, enforcement orders, cleanup orders, and fines for non-compliance. Specifically, the San Diego RWQCB issues Waste Discharge Requirement permits and NPDES permits for discharge of treated wastewater into the ocean, into inland surface waters, or on land. Waste disposal requirements are established by the San Diego RWQCB for any entity discharging wastes to waters in the San Diego Basin, including MCB Camp Pendleton.
DPH, Division of Drinking Water and Environmental Management – CEQA Responsible Agency
The DPH is responsible for establishing state drinking water standards that are at least as stringent as the federal standards. In addition, the DPH determines the extent to which a water source influenced by effluent may be used as a potable water source. The DPH also protects groundwater sources or potable water supplies through a series of guidelines that address treatment and recharge methods, the proximity of wells, and the aquifer characteristics. The Drinking Water Program regulates public water systems; oversees water recycling projects; permits water treatment devices; certifies drinking water treatment and distribution operators; supports and promotes water system security; provides support for small water systems and for improving technical, managerial, and financial capacity; oversees the Drinking Water Treatment and Research Fund for Methyl Tertiary Butyl Ether and other oxygenates; and provides subsidized funding for water system improvements under the State Revolving Fund and Proposition 50.

Notes: CDFW = California Department of Fish and Wildlife; CEQA = California Environmental Quality Act; SWRCB = State Water Resources Control Board; RWQCB = Regional Water Quality Control Board; NPDES = National Pollutant Discharge Elimination System; MCB = Marine Corps Base; DPH = California Department of Public Health.

1.8.1 Permits and Consultations Required for Project Implementation

In addition to consideration under NEPA and CEQA, the Proposed Action is subject to various federal and state regulatory requirements that help to mitigate its potential effects on the environment. The anticipated compliance requirements of broadest application to the Proposed Action are briefly described in Table 1.8-1. Agencies that may have discretionary project approval authority over the Proposed Action include the SWRCB, San Diego RWQCB, and USACE. Additionally, consultation is required with the following agencies: USFWS; NOAA Fisheries; CDFW; SHPO; and four tribes within the SMR watershed – Cahuilla, Pechanga, Pauma, and Ramona.

1.9 PUBLIC INVOLVEMENT PROCESS

Both NEPA and CEQA regulations require an early and open process for determining the scope of issues related to a Proposed Action or project. Figure 1-3 depicts the various components of the scoping process and how they are integrated with the EIS/EIR process. In accordance with NEPA and CEQA, the USMC and FPUD initiated a public and agency scoping process to assist with determining the scope of issues to be addressed in this EIS/EIR.

Table 1.9-1. Anticipated Compliance Requirements for Project Alternatives

Law	Responsible Agency
Federal Laws	
NEPA (CEQ Regulations for Implementing the Procedural Provisions of NEPA, 40 CFR §§ 1500-1508, as amended, 42 USC §§ 4321-4370h)	USMC and Reclamation (co-lead agencies)
CWA Section 404 (33 USC § 1344)	USACE
CWA Section 401 (33 USC § 1341)	SWRCB San Diego RWQCB
CWA Section 402 (33 USC §§ 1311, 1342)	San Diego RWQCB
CWA Section 403 (33 USC § 1343)	San Diego RWQCB
DOD Ammunition and Explosives Safety Standards (C5.4.1.1.2)	DOD Explosive Safety Board
ESA (16 USC § 1531 et seq.)	USFWS NOAA Fisheries
Fish and Wildlife Coordination Act (16 USC § 661 *et seq.*)	USFWS CDFW
Federal EO 11990: Protection of Wetlands	USMC USACE
NHPA Section 106 (16 USC § 470 *et seq.*)	SHPO Native American Heritage Commission
NHPA Section 110 (16 USC § 470 *et seq.*)	SHPO Native American Heritage Commission
CAA – Authority to Construct and Permit to Operate	SDAPCD
EO 11988: Floodplain Management	USMC
EO 13547: Stewardship of the Ocean, Our Coasts, and the Great Lakes	USMC
Marine Mammal Protection Act (16 USC § 1361 and 50 CFR § 216)	NOAA Fisheries
Marine Protection, Research, and Sanctuaries Act (33 USC § 1401)	USEPA
EO 13112: Invasive Species	Invasive Species Council USDA
EO 13045: Environmental Health and Safety Risks to Children	All federal agencies
Secretary of the Interior Order 3215, Principles for the Discharge of the Secretary's Trust Responsibility	USDI
USDI Manual, Part 303, DM 2, Principles for Managing Indian Trust Assets	USDI
Native American Graves Protection and Repatriation Act (25 USC §§ 3001-3013)	Native American Graves Protection and Repatriation Review Committee
State Laws	
CEQA (PRC Section 21000-21177) and CEQA Guidelines (CCR Sections 1500-15387)	FPUD (lead agency)
State Fish and Game Code Section 1601	CDFW
California ESA (California Fish and Game Code Section 2081 *et seq.*)	CDFW

Law	Responsible Agency

Notes: NEPA = National Environmental Policy Act; CEQ = Council on Environmental Quality; CFR = Code of Federal Regulations; USC = United States Code; USMC = U.S. Marine Corps; Reclamation = U.S. Department of the Interior, Bureau of Reclamation; CWA = Clean Water Act; USACE = U.S. Army Corps of Engineers; SWRCB = State Water Resources Control Board; RWQCB = Regional Water Quality Control Board; DOD = U.S. Department of Defense; ESA = Endangered Species Act; USFWS = U.S. Fish and Wildlife Service; NOAA Fisheries = National Oceanic and Atmospheric Administration, National Marine Fisheries Service; USC = United States Code; CDFW = California Department of Fish and Wildlife; EO = Executive Order; NHPA = National Historic Preservation Act; SHPO = State Historic Preservation Office(r); CAA = Clean Air Act; SDAPCD = San Diego Air Pollution Control District; USEPA = U.S. Environmental Protection Agency; USDA = U.S. Department of Agriculture; USDI = U.S. Department of the Interior; PRC = Public Resources Code; FPUD = Fallbrook Public Utility District.

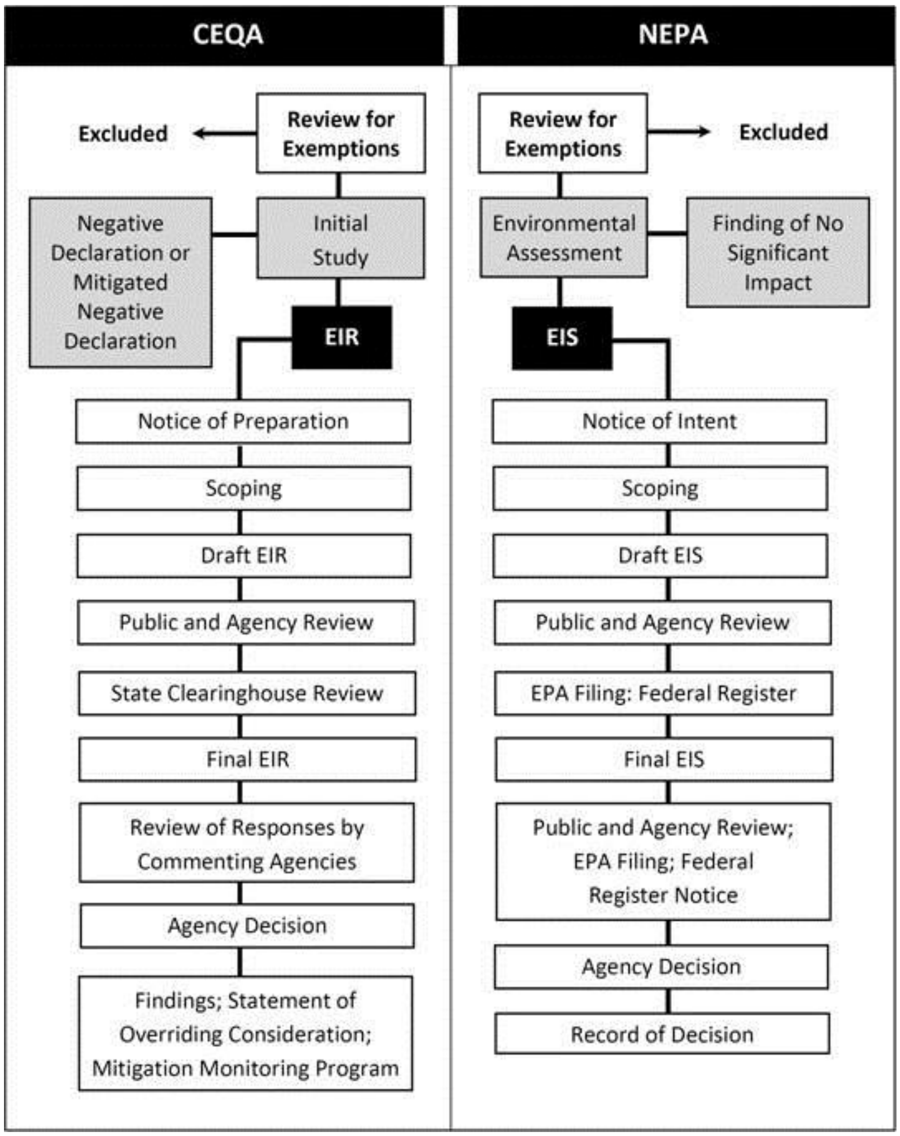

Figure 1.9-1. Flowchart of the NEPA/CEQA Process

On 1 November 2004, an NOI to *Prepare an EIS/EIR for the Santa Margarita River Conjunctive Use Project, San Diego County, California*, was published in the *Federal Register* (refer to Appendix A). In addition, an NOP was submitted to the State Clearinghouse and County Clerk on 15 December 2004 and published in three local newspapers: the San Diego Tribune, Press Enterprise, and North County Times (refer to Appendix A). The NOI and NOP invited agencies, organizations, and the general public to provide written comments relative to the Proposed Action and issues to be addressed in the Draft EIS/EIR. The NOI and NOP also announced two public scoping meetings, which were held on 12 January 2005 at the Oceanside Civic Center Library and Community Rooms in Oceanside, California, and on 13 January 2005 at the FPUD office in Fallbrook, California. A total of 39 individuals attended the scoping meetings (5 at Oceanside Civic Center and 34 at FPUD).

On 29 October 2008 and 28 January 2013, public meetings were held at the FPUD office in Fallbrook, California. The purpose of the meetings was to update the public on the status and changes that have been made to the project since the Public Scoping meetings held in January 2005. A total of 33 individuals attended the meeting on 29 October 2008 and 9 individuals on 28 January 2013.

As discussed under Section 1.2, the range of issues analyzed in this EIS/EIR was determined from initial Reclamation, USMC, and FPUD evaluation of the action alternatives as well as comments received during the public scoping process and written and verbal comments received during the 2010 public review period for the SWRCB water rights permit petitions. Written comments received during the public scoping process and the government's responses to those comments are presented in Appendix A.

A Notice of Availability/Notice of Completion for the Draft EIS/EIR was published in the *Federal Register* on 09 May 2014 and a Notice of Completion was provided to the State Clearinghouse on 09 May 2014 to initiate a 45-day public review of the Draft EIS/EIR. A public meeting was held on 29 May 2014 at FPUD and the public review period for the Draft EIS/EIR concluded on 10 July 2014. The Draft EIS/EIR has been made available to the public via the MCB Camp Pendleton website: http://www.pendleton.usmc.mil/base/environmental/index.asp and the Fallbrook Public Utility District website: http://www.fpud.com, and at the following local libraries: City of San Clemente Public Library, Fallbrook Public Library, and the City of Oceanside Public Library. Written and verbal comments on the Draft EIS/EIR were provided by the USEPA (refer to Appendix A) and FPUD Board members, respectively.

1.10 AUTHORITY

In 2003, Congress directed Reclamation, through P.L. 108-7, "to perform the studies needed to address current and future municipal, domestic, military, environmental, and other water uses from the SMR, California." In 2004, Congress appropriated funds to initiate the studies (P.L. 108-137). Reclamation divided the studies into two parts: pre-feasibility and feasibility. The pre-feasibility study was completed by Reclamation in May 2005. The purpose of the pre-feasibility study was to evaluate a wide range of alternatives at an appraisal level of analysis to recommend the most attractive alternatives for further study during feasibility analysis. The pre-feasibility analysis and recommendations are described in greater detail in Chapter two. Following completion of the pre-feasibility analysis and report, the feasibility study, public scoping, and NEPA and CEQA compliance were initiated.

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CHAPTER 2
PROPOSED ACTION AND ALTERNATIVES

2.1 Introduction

This chapter includes detailed descriptions of the Proposed Action and action alternatives. It describes the process used to formulate the action alternatives selected for analysis in this EIS/EIR and outlines other potential alternatives that were initially considered but eliminated from detailed analysis.

2.2 Process Used to Formulate Alternatives

Numerous studies have been conducted and reports written regarding use of water from the SMR and how to best achieve the water supply improvement objectives of MCB Camp Pendleton and FPUD. These studies include the following:

- *Santa Margarita Project, San Diego County, California, Draft Supplemental Environmental Impact Statement* (Reclamation 1984). This supplemental EIS analyzed the Santa Margarita Project or Two Dam Project (refer to Section 1.4 for details on this project), which consisted of the 36,500 AF Fallbrook Dam and Reservoir; the 142,950 AF De Luz Dam and Reservoir; the Fallbrook Pumping Plants and Conveyance Line; the Cross-Base Aqueduct and Pumping Plants; recreation and fishing facilities; and wildlife conservation and enhancement management areas.
- *Santa Margarita River Recharge and Recovery Enhancement Program: Permit 15000 Feasibility Study for Marine Corps Base Camp Pendleton* (Stetson 2001). This study analyzed the alternatives for perfecting Permit 15000, maximizing the amount of water available for diversion from the SMR without adversely impacting the groundwater basins located within MCB Camp Pendleton.
- *Draft Recycle and Reuse Study: Conjunctive Use Project for the Lower Santa Margarita River Basin. Supplemental Study to Santa Margarita River Recharge and Recovery Enhancement Project - Permit 15000 Feasibility Study for Marine Corps Base Camp Pendleton* (Stetson 2002). This study analyzed project alternatives that may be used to develop a conjunctive use program between the FPUD and MCB Camp Pendleton, and focused on enhancing local water supplies, the recycling and reuse of tertiary treated wastewater effluent, and improving the SMR Basin water quality.
- *Santa Margarita River Conjunctive Use Project Pre-Feasibility Plan Formulation Study, San Diego, California* (Reclamation *et al.* 2005). This pre-feasibility plan formulation report compared, at appraisal level, conceptual alternatives to put to beneficial use both naturally occurring streamflow, groundwater, and tertiary treated wastewater to provide additional and/or replacement water supplies for FPUD and MCB Camp Pendleton. The intent was to provide information needed to select alternatives and/or project elements to be studied at a feasibility level.
- *Final Technical Memorandum No. 1: Santa Margarita River Conjunctive Use Project, Statistical Analysis of Santa Margarita River Surface Water Availability at the Conjunctive Use Project's Point of Diversion* (Reclamation 2007a). This technical memorandum described the hydrology and hydrogeology of the SMR Basin, addressed the historical variation of flows in the SMR over the historical period of record, and presented statistics that described those flows in terms of both total water supply and water available for project diversion.
- *Final Technical Memorandum No. 2.2: Santa Margarita River Conjunctive Use Project, Surface Water and Groundwater Modeling Analysis to Determine Santa Margarita River Conjunctive*

Use Project Yield (2 Volumes) (Reclamation 2007b). This technical memorandum continued to build upon the characterization of the SMR Basin's water resources by developing the 2006 groundwater model which was originally developed by MCB Camp Pendleton in 2001. The purpose of the model was to characterize the total groundwater yield from aquifers in the Lower SMR watershed. Twelve management scenarios were developed to estimate impacts on basin yield as a result of variations in SMR CUP components and management strategies.

- *Surface Water and Groundwater Modeling Analyses of Gallery Well Alternatives for the Santa Margarita River Conjunctive Use Project (CUP)* (Stetson 2008a). This technical memorandum presented surface water and groundwater modeling analyses to characterize gallery well alternatives for SMR CUP.

The common goal of these studies was to develop feasible alternatives that would enhance and optimize the productivity of the Lower SMR groundwater basin while protecting environmental resources. Various potential alternatives were examined in these previous studies, including local and regional projects located within and outside the SMR Basin. Factors that were considered in these studies when identifying potential action alternatives included:

- the quantity of water diverted from the SMR,
- the amount of water available for direct and indirect use,
- potential direct and indirect impacts to the local environment,
- engineering efficiencies, and
- costs.

On 29 and 30 June 2004, Reclamation, FPUD, MCB Camp Pendleton, and DET Fallbrook conducted a pre-feasibility alternatives development workshop. The purpose of the workshop was to refine the purpose of and need for the Proposed Action, as well as to develop conceptual alternatives that could be constructed to provide additional and/or replacement water supplies to FPUD and MCB Camp Pendleton. The 44 conceptual alternatives that were selected during the workshop were subsequently evaluated and compared at an appraisal level, to determine which alternatives could be constructed to put naturally occurring streamflow, groundwater, and tertiary treated wastewater to beneficial use. The collective project features presented some opportunity for flexibility. Alternative locations and design of some features, such as pipeline routing and recharge ponds were reviewed. For example, various river diversion types and designs and pipeline alignments were considered during formulation of the alternatives selected for further consideration. The resulting report, *Santa Margarita River Conjunctive Use Project Pre-Feasibility Plan Formulation Study* (Reclamation *et al.* 2005) provided Reclamation, MCB Camp Pendleton, and FPUD with information sufficient to screen and identify alternatives and/or project components to be carried forward for evaluation in a feasibility study and under NEPA and CEQA.

In 2006, a Decision Memo was created by Reclamation, MCB Camp Pendleton, and FPUD describing an inter-agency agreement on a Proposed Action and two action alternatives recommended for economic and environmental feasibility analysis (Reclamation 2006a). The alternatives were selected or modified from the Pre-Feasibility Plan through engineering designs from the Reclamation Technical Service Center, hydrologic models provided by Stetson (an engineering company hired by MCB Camp Pendleton), and environmental work performed by North State Resources, Inc. The agencies considered jurisdictional wetlands and designed/revised the action alternatives to avoid (to the maximum extent practicable) jurisdictional areas. Post approval of the 2006 Decision Memo, the Proposed Action and alternatives were further refined following additional feasibility analysis and design.

Preliminary Draft EIS/EIR, engineering, and economic feasibility documents addressing the three modified Decision Memo alternatives were prepared in August 2009. Work on the draft documents was placed on hold as coordination meetings were held to address significant design issues between MCB Camp Pendleton's Haybarn Canyon AWTP (P-113) and the proposed expansion of the Haybarn Canyon AWTP to meet the treatment needs under the 2009 Proposed Action. In addition, in the summer of 2010 the SWRCB published for public review the project's water rights time extension and change petitions. Comments received during public review provided new information regarding the anadromous form of steelhead trout (*Oncorhynchus mykiss*). The AWTP design coordination meetings and steelhead trout comments resulted in the revision of the former Proposed Action (now Alternative 2 in this EIS/EIR), the removal of two alternatives (former Alternatives 1 and 2), and the inclusion of a new alternative (Alternative 1 in this EIS/EIR). The EIS/EIR now addresses two action alternatives and a No-Action Alternative. The action alternatives provide water supply for both MCB Camp Pendleton and FPUD.

Those alternatives and/or project components that were eliminated from further analysis are discussed in Section 2.4, *Alternatives Considered and Eliminated from Detailed Study*.

2.3 Proposed Action

The Proposed Action would enhance groundwater recharge and recovery capacity within the Lower SMR Basin and develop a conjunctive use program that would increase the sustained basin yield of the Lower SMR Basin for the benefit of MCB Camp Pendleton and FPUD. The SMR CUP would construct facilities within the Lower SMR Basin to capture additional surface runoff during high streamflow events that currently flows to the Pacific Ocean. This surface water would be recharged through renovated groundwater recharge ponds and stored or "banked" in groundwater basins during wet years and used to augment water supplies during dry years. Specifically included are improvements to the diversion weir and increased capacity of the headgate and the O'Neill Ditch; improvements to seven existing recharge ponds; installation of new groundwater production wells and gallery wells; treatment of water at an existing, expanded, or new water treatment plant (WTP); and a bi-directional pipeline to deliver water to FPUD and provide MCB Camp Pendleton with an off-base (i.e., imported) water supply during drought or emergency situations; and the potential establishment of an OSMZ.

The diversion and recharge components of the Proposed Action would include improvements to the existing surface water diversion and groundwater recharge facilities located on MCB Camp Pendleton near the old Naval hospital by Lake O'Neill. The proposed improvements to the existing diversion and recharge facilities would allow for the proper management of flows to Lake O'Neill and the seven recharge ponds. The proposed improvements to the diversion facilities are designed to capture larger amounts of water in shorter periods of time and, therefore, would provide additional groundwater supplies to meet current and future pumping requirements. The maximum diversion rate of 200 cfs would occur only during infrequent periods of higher flow, which typically occur between October and April of each year. The average monthly distribution of groundwater pumping would meet the seasonal demands of both MCB Camp Pendleton and FPUD.

MCB Camp Pendleton could receive imported water via the bi-directional pipeline during extended drought. This would allow for curtailment of groundwater pumping during these dry periods, and thereby expand the sustained basin yield of the Lower SMR Basin. Due to the natural variability of the hydrology that controls water supply in the Lower SMR Basin, the Proposed Action would rely on reductions in groundwater pumping to meet hydrogeological constraints during drought or consecutive-year dry hydrologic conditions. These environmental constraints vary by alternative and would include maintenance of groundwater levels within their historical range (Alternative 1), no aquifer compaction (both action alternatives), and/or no seawater intrusion (both action alternatives) (*Note*: additional environmental constraints may be identified and developed through the consultation process). All water supplies available to MCP Camp Pendleton would be assessed during these hydrologic conditions, including water from the Northern Water System (P-1045) as well as imported water deliveries through the bi-directional pipeline. Therefore, access to imported water via the bi-directional pipeline or the P-1045 pipeline would allow for a more liberal pumping schedule that can be adjusted in real-time through an Adaptive Management Plan/Facilities Operation Plan (AMP/FOP), thus resulting in expanded sustained basin yield within the physical and environmental constraints of the project. In addition, delivery of project water to FPUD would reduce FPUD's dependence on imported water.

The following sections describe the two action alternatives that are carried forward for analysis in this EIS/EIR. A comparison of the various project components associated with Alternative 1 and Alternative 2 is presented in Table 2.3-1; details on each component are provided in Sections 2.3.1 and 2.3.2, respectively. In accordance with NEPA, Alternatives 1 and 2 represent a range of reasonable alternatives that would meet the purpose of and need for the Proposed Action.

Table 2.3-1. Components of Alternative 1 and Alternative 2

Project Components	Alternative 1	Alternative 2
Improvements to Existing Facilities		
Replacement of Existing Sheet Pile Diversion with Inflatable Weir Diversion Structure	X	X
Improvements to O'Neill Ditch and Headgate	X	X
Improvements to Recharge Ponds 1-7	X	X
Expand Haybarn Canyon AWTP and Add a Surface Water Treatment Facility		X
Proposed New Facilities		
Four New Groundwater Production Wells and Associated Collection System Infrastructure	X	X
Water Conveyance/Distribution System, including Bi-Directional Pipeline from MCB Camp Pendleton to Red Mountain Reservoir via new FPUD WTP	X	
FPUD WTP	X	
SCADA System	X	X
OSMZ (1,392 acres)	X	X
Four New Gallery Wells and Associated Collection System Infrastructure		X
Water Conveyance/Distribution System, including Bi-Directional Pipeline from Reservoir Ridge to the Gheen Zone		X

Notes: AWTP = Advanced Water Treatment Plant; MCB = Marine Corps Base; FPUD = Fallbrook Public Utility District; WTP = Water Treatment Plant; SCADA = Supervisory Control and Data Acquisition; OSMZ = Open Space Management Zone.

2.3.1 Alternative 1

This alternative would include diversion system upgrades, groundwater recharge, and groundwater production (Figure 2.3-1). Raw groundwater would then be delivered to Haybarn Canyon for delivery to MCB Camp Pendleton and FPUD. Raw groundwater delivered to MCB Camp Pendleton would be treated at the Haybarn Canyon AWTP; while water would be delivered to FPUD via a new bi-directional pipeline for treatment in a new WTP operated by FPUD. Project components associated with Alternative 1 are described in detail below and depicted in Figure 2.3-1 with additional figures found in Appendix C.

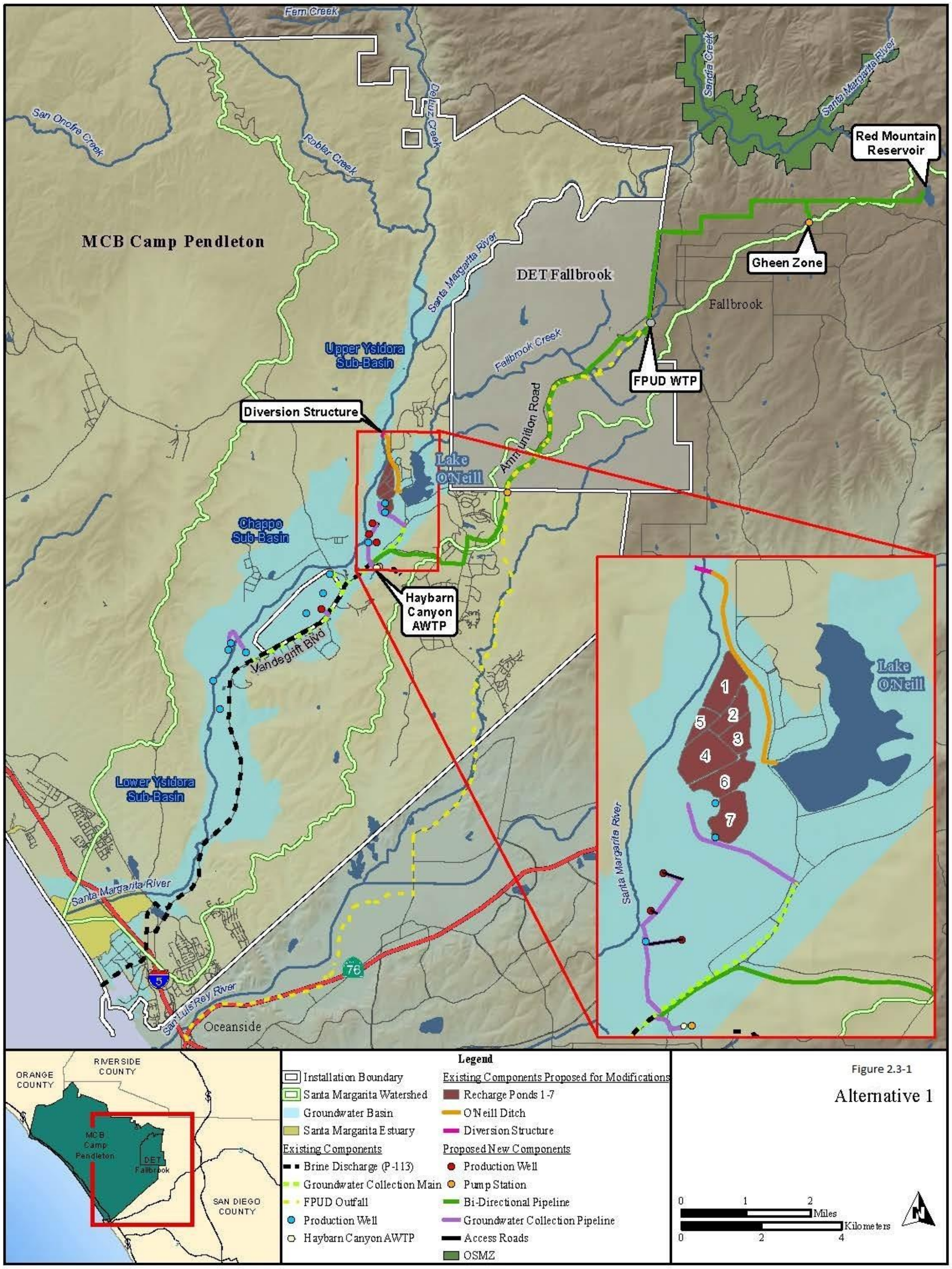

Figure 2.3-1. Alternative 1

2.3.1.1 Improvements to Existing Facilities

Alternative 1 includes improvements and/or replacement of the existing structures discussed below.

Replacement of Existing Sheet Pile Diversion with Inflatable Weir Diversion Structure

The existing sheet pile diversion structure on the SMR would be replaced by a new four section inflatable weir diversion structure consisting of rubber bladders and steel plates (**Figure 2.3-2**). The new inflatable weir would allow increased diversions up to 200 cfs of surface flow from the SMR, while also providing the opportunity of being deflated during stormwater runoff events. Fully lowering the weir would restore a more natural sediment transport regime, thereby reducing the recurrent costs of removing sediment accumulated behind the weir, in front of the diversion headwall and headgate, and within O'Neill Ditch. Water diverted at the proposed inflatable weir diversion structure would be conveyed to Lake O'Neill, the recharge ponds, or bypassed back to the SMR.

New Inflatable Weir Diversion Structure

Prior to the construction of the new weir, the existing sheet pile weir would be cut off at ground level (about 5 feet below the top of the sheet piles) and the remaining underground portion would be capped by a concrete slab foundation for the new structure. The concrete foundation would span the entire 250 ft (76 m) width of the SMR and would be 2 feet thick. The concrete slab would extend 12 feet downstream from the capped sheet piles for the entire width of the structure.

The four-section inflatable weir has been design to accommodate velocity and depth requirements for upstream fish passage, as well as protect juvenile steelhead during downstream migration periods. Each section of the weir has been designed to deflate sequentially as flows increase to 2,000 cfs in order to meet fish passage requirements as described below and shown in Figure 2.3-2.

- Long weir section (width = 200 ft): long weir section would remain inflated during most operational conditions. The long weir section would deflate only during large storm events (i.e. events when the depth of water will be 1 foot greater than the crest elevation – approximately 2,000 cfs).
- Sluiceway 2 (width = 19.0 ft): short weir section 2 would provide fish passage when flows exceed the flow capacity of the fish ladder and Sluiceway 1 sections.
- Fish ladder (width = 16.0 ft): pool and chute fish ladder would provide fish passage for flows between 60 and 200 cfs.
- Sluiceway 1 (width = 9.5 ft): short weir section that would provide fish passage when flows exceed the capacity of the fish ladder. Sluiceway 1 will also act as means to flush sediment in front of fish screens.

The design includes a low-flow vertical gate sluiceway adjacent to the inflatable weir sections, which would convey riparian maintenance bypass flows at lower flow rates. Water would be diverted to O'Neill ditch through fish screens or a screen bypass sluiceway located perpendicular to the weir. The screens would be placed in front of a sand trap and headgates, which control flow to O'Neill ditch. The screen bypass sluiceway may be operated during times of the year in when migration is not occurring.

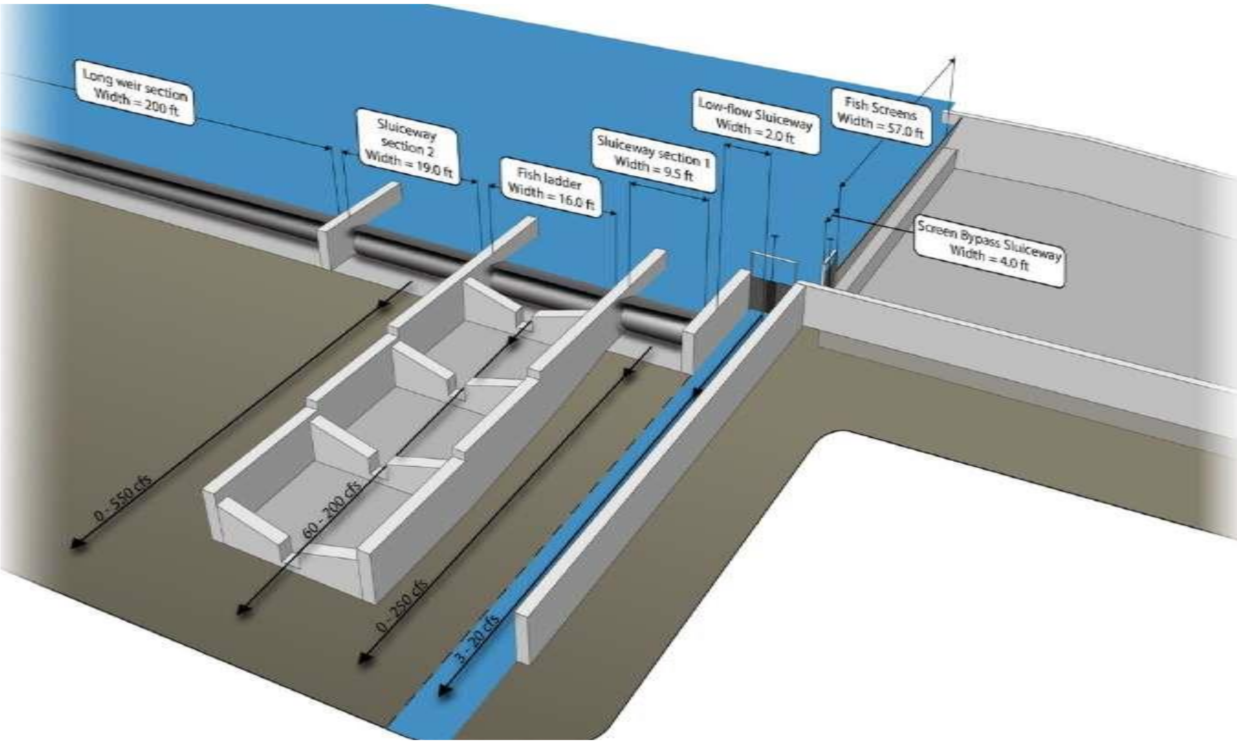

Figure 2.3-2. Conceptual Design of the Four Inflatable Sections of the Proposed Weir and Fish Passage Facility.

The weir gates would be hinged to the concrete slab on the upstream side; inflation of the bladders would raise the gates (Figure 2.3-3). The maximum height of both sections of the dam would be approximately 4.5 feet above the height of the concrete foundation. A small (4-foot wide), vertical sluice gate for minimum bypass flows would be installed between the eastern side of the short gate section and the headgate structure (described below) near the east bank of the river. The intake and outlet for the vertical sluice gate would be separated from inflatable sluiceway 1 by a narrow concrete wall.

The reinforced concrete fish ladder would be designed in accordance with CDFW's 2009 California Salmonid Stream Habitat Restoration Manual and for a minimum flow of 60 cubic feet per second (cfs). The fish ladder would be designed to drop the water surface elevation from 118.5 feet to 114.5 feet, which requires four step pools in order to drop the water surface elevation at 1-foot increments between each pool. Each pool length shall be 45-50% of the pool width. Preliminary sizing is for the fish ladder/pool width to be 16 feet and the pool length between weirs is 8 feet.

Fish Screen, Sand Trap, and Appurtenant Facilities

A total of six fish screens, totaling almost 60 feet in length, would protect juvenile and adult steelhead from being entrained in O'Neill Ditch. A trash rack and automatic rake system would protect the screens from large debris and clogging, respectively. The automatic rake system would convey material from the screens to a conveyor system that disposes of material in a dumpster located in a staging area. These facilities, as well as a control building for compressors and electrical equipment, are shown in Figure 2.3-3 Diversion Facility Overview.

Water would be diverted to O'Neill Ditch through fish screens or a screen bypass sluiceway located perpendicular to the weir. The screens would be placed in front of a sand trap and Obermeyer control gate, which control flow to O'Neill Ditch. The fish screen would be designed and constructed in accordance with NOAA Fisheries Southwest Region Fish Screening Criteria for Anadromous Salmonids, January 1997.

The target fish species and life stage would be juvenile- sized salmonids. The screen face would be generally parallel to the flow and aligned with the adjacent SMR bank line, with ¼ inch screen openings as required by NOAA Fisheries criteria. The submerged screen area required by NOAA FISHERIES and CDFG Criteria for the 0.8 fps approach velocity criterion is 250 sq ft (excluding the area of structural components). The height of the fish screen would 4.5 feet, which is the same height of the long-section Obermeyer weir. The fish screen shall be sloped at an angle 25° off vertical to improve debris removal capability and per manufacturer recommendations. Based on required screen area, screen height, and screen angle, there would be six screen sections, each with a width of 9.5 feet, for a total width of 57 feet.

Each fish screen would be cleaned by a separate automatic cleaning apparatus that scrapes the debris up onto a conveyor belt located at the horizontal reinforced concrete deck which is set at 1.5 feet above the top of the Obermeyer weir. The conveyor belt transports debris to a dumpster adjacent to the sand trap. For this application, the automatic cleaning system would consist of separate units, one for each of the fish screen bays of the diversion facility.

A debris boom would also be provided that consists of floating, cylindrical rubber segments attached by wire. The boom would be anchored to the reinforced concrete intake structure on both the upstream and downstream ends. The boom would extend 4 feet out into the channel to block floating debris from approaching the trash racks and fish screen.

The fish screen bypass gate would be controlled by a 4 ft wide by 4 ft high manual slide gate to divert up to 25 cfs into the O'Neill Ditch during low flows when the fish screens are not required to be operating.

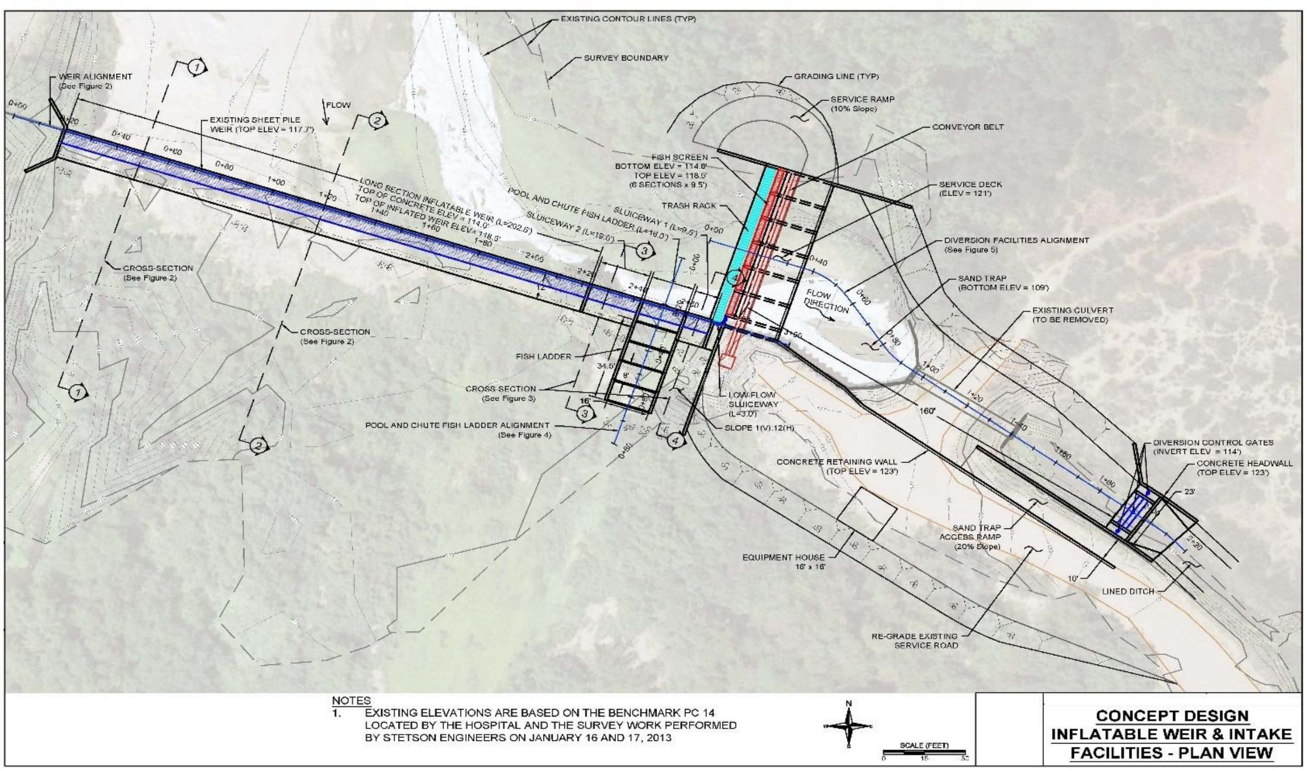

Figure 2.3-3. Concept Design for Proposed Weir and Intake Facilities

The sand trap would be sized to allow for settling of fine sand (1/8 mm – ¼ mm) and coarser material. A basin with a width of 40 feet and a length of 160 feet would remove 100% of the fine sand particles. Since the fish screen is longer than 40 feet, the sand trap would be tapered, with an initial width matching the fish screen. The minimum width near the control gates would be less than 40 feet based on the location of the bedrock slope. The bottom depth of the sand trap would be at elevation 109 feet to allow for 5 feet depth of sand without interfering with the flow in the ditch. A reinforced concrete retaining wall would be constructed to form the western edge of the sand trap, adjacent to the access road. The top of the retaining wall would be 1 foot higher than the access road. The sand trap would have a natural bottom (elevation 109 feet) and natural (bedrock) eastern edge.

The new access road would be constructed adjacent to the sand trap at elevation 122 feet sloping at 2% away from the sand trap with 2-inch crushed rock surface to provide access to the diversion facility and channel bottom for repair and maintenance.

A reinforced concrete deck would be constructed over the top of the sand trap at elevation 120 feet.

A 14 foot by 20 foot equipment house shall be located on the east bank of the channel near the fish screens to house ancillary equipment for monitoring and controlling inflation/deflation of the Obermeyer weir, and monitoring and controlling pool water level and diversion flow. The ventilated metal building would be raised on steel columns bolted to reinforced concrete slab similar to the existing well pump building constructed for well number 26003.

A small building would be required to shelter air compressors and system control equipment for the inflatable weir structure. The proposed building would be a maximum of 12 ft by 15 ft (4 m by 5 m), prefabricated, and installed on a concrete base on the east bank of the river near the headgate. Elevation for this building base slab would be about 127 ft (39 m). Power would be supplied by a drop from existing lines serving the old Naval hospital. Air piping would cross the sluiceway and run in a channel in the concrete apron.

Construction

The inflatable weir diversion structure would take about six months to construct and would be coordinated with improvements to the headgate and O'Neill Ditch (described below). All in-channel construction would occur during the dry season when surface flows in the SMR are low. These flows would be bypassed around the construction activities to minimize impacts to riparian habitat.

Sediment (upstream and downstream) and riprap (downstream) of the existing weir would be removed to access the existing sheet pile structure for demolition. About 350 cubic yards of accumulated sediment, 500 cubic yards of streambed sediment, and 200 cubic yards of imported rip-rap will be removed prior to demolition of the existing weir and construction of the new weir.

After removing the upper part of the sheet piles, temporary diversion of the SMR to one side of the river channel may be required. Although exact details of the diversion are not known, likely methods (e.g., coffer dams, temporary diversion channels, culverts, and shallow wells) would divert flows to one side of the channel while work is occurring on the other side. The temporary diversion would convey surface and shallow subsurface water around the construction area downstream into the existing channel, avoiding loss of flow below the construction area. Construction of the diversion structure would occur within the overall footprint of weir construction, with access by existing roads.

Operations Inflatable Weir, Headgate Structure, O'Neill Ditch and Recharge Ponds

The inflatable weir diversion structure would allow water diversion to O'Neill Ditch to increase from a maximum of 60 cfs to 200 cfs and would typically operate in a manner consistent with existing operations. The increase in diversion capacity would mostly increase the capacity to divert more water during higher than normal flood flows associated with high rain storm events. Normal non-flood stream flows, which are typically well below 60 cfs, would continue to be diverted in a manner consistent with existing operations.

A bypass flow and diversion schedule for a 200-cfs diversion structure at the POD is described in Table 2.3-2 for any given range of flows occurring in the Santa Margarita River. The diversion schedule is broken into three seasons:

- December 1 through February 28/29 – Upstream Migration Period
- March 1 through May 31 – Upstream and Downstream Migration Period
- June 1 through November 30 – Non-Migration Period

The bypass requirement changes between the periods based on whether migration of adults and/or juveniles is expected to occur. A fish bypass requirement is not provided during the non-migration season between June 1st and November 30th, although a minimum bypass flow of 3 cfs is maintained year-round to support riparian habitat and maintain a wetted channel at the POD.

The diversion table has been developed such that bypass flows (second column) are always given first priority of available water in the river once fish passage criteria is met (150 cfs on the rising limb of the hydrograph), then diversions are then based on remaining flow. The third column of the table represents the maximum amount of water that can be diverted from the river, expressed as a percent of remaining flows, after bypass flows have occurred. The fourth column provides the typical range of diversions, expressed in cubic feet per second (cfs), given physical limitations of recharge pond capacity and infiltration rates.

Upstream Adult Migration Season (Dec 1 – Feb 28). During the upstream migration season, the fish passage priority bypass is 150 cfs. If flow in the river is greater than 150 cfs, the minimum bypass is 150 cfs through the pool and chute. If flow in the river is less than 150 cfs, the minimum bypass is 3 cfs following a three-day ramp down period. The ramp down occurs on the falling limb of the hydrograph to avoid abrupt changes in flow and to match the slope of the natural hydrograph as closely as possible. When the hydrograph is falling and reaches 150 cfs, diversions are limited to 20% of flow in the river for 3 days or until the flow in the river drops to 60cfs. On Day 4, diversions resume at 100% of flow in the river, less the 3-cfs riparian bypass requirement. Days (i.e. "Day 1", "Day 2", etc.) are referenced to the point on the hydrograph when 150 cfs is reached.

Upstream Adult and Downstream Juvenile Migration Season (March 1 – May 31). When downstream migration is likely to occur, additional bypass flows have been added on the falling limb of the hydrograph to support downstream emigration. As in the upstream passage season, the fish passage priority bypass is triggered when flow in the river is greater than 150 cfs on the rising limb of the hydrograph. When the flow reaches 150 cfs, then a minimum 150 cfs bypass is maintained through thepool and chute. The falling limb of the hydrograph between 150 cfs and 60 cfs is treated similarly as in the upstream passage season: to avoid abrupt changes in flow, and to match the slope of the natural hydrograph as closely as possible, a ramp down schedule is also utilized. Allowable diversion percentages are reduced so that bypass flows are increased: when the hydrograph is falling and reaches

Table 2.3-2. Bypass and Diversion Schedule for 200-cfs Capacity Weir and Headgate

Range of Flows in River (cfs)	Minimum Bypass Requirement	Maximum Diversion of Remaining Flow	Typical Diversion Rates (Limited by Pond Capacity/Infiltration or Maximum Diversion Percentage)
Season: December 1 through February 28/9 – Upstream Migration			
0 to 3 cfs	0 to 3 cfs	0%	0 cfs
3 to 60 cfs	3 cfs	100%	0-57 cfs
61 to 150 cfs	60 cfs[1]	20%[A]	10-30 cfs
> 150 cfs	150 cfs	100%	50-70 cfs
Note A) Ramp Down Schedule when flows drop below 150 cfs.	80% on Days 1, 2, and 3[2] 3 cfs on Day 4[3]	20% on Day 1, 2, and 3 100% on Day 4	25-30 cfs
Season: March 1 through May 31 – Upstream and Downstream Migration			
0 to 3 cfs	0 to 3 cfs	0%	
3 to 60 cfs	3 cfs	100%	3-57 cfs
61 to 150 cfs	60 cfs[1]	20%[B]	10-30 cfs
> 150 cfs	150 cfs	100%	40-60 cfs
Note B) Ramp Down Schedule when flows drop below 150 cfs.	80% until flow in river reaches 60 cfs	20% until flow in river reaches 60 cfs	10-30 cfs
Season: June 1 through November 30 – Non-migration			
0 to 3 cfs	0 to 3 cfs	0%	0 cfs
> 3 cfs	3 cfs	100%	3-70 cfs

[1]On the rising limb of an event, 3-cfs bypass will be used until flow reaches 150 cfs. On falling limb, see notes A and B for ramp down schedule which uses 60 cfs bypass.

[2] Days (i.e. "day 1", "day 2", etc.) on the falling limb of the hydrograph are referenced to the starting time when flow on the hydrograph drops to 150 cfs.

[3] Bypass becomes 3 cfs on Day 4 or when the hydrograph falls to 60 cfs, whichever occurs first.

150 cfs, diversions are limited to 20% of flow in the river until flow in the river reaches 60 cfs. This extends the period during which bypass flows are provided so that downstream migration is supported. Note that as flows decrease toward 60 cfs, a diversion rate of 20% may mean bypass flows are less than 60 cfs (i.e. if flow in the river is 70 cfs, diversions are 14 cfs and bypass flow is 56 cfs). Though this bypass flow is less than 60 cfs, the flow in the river is supportive of downstream migration due to the gaining nature of the stream during these springtime events. When flows are less than 60 cfs, the riparian maintenance flow of 3 cfs occurs at all times based on availability of streamflow.

Non-fish-passage season (June 1 through November 30). During the non-fish-passage season, a 3-cfs riparian bypass is maintained. Once flows exceed 3 cfs, 100% of the flow is available for diversion.

Other operational activities would include the implementation of Best Management Practices (BMPs) to maintain the capacity in the ditch and water quality in the aquifer. The weir would be operated to allow for occasional water diversions that clean debris and sediment from O'Neill Ditch, typically at the beginning of the rainy season, by opening the bypass structure at the end of O'Neill Ditch. The short inflatable sluiceway 1 gate may occasionally be lowered to allow bypass flows that exceed the capacity of the sluice gate in order to maintain groundwater quality. High intensity flushing events associated with the first rains of the season may be bypassed in this manner to prevent the diversion of contaminants to either Lake O'Neill or the recharge ponds.

The diversion headgate would be operated to allow flow into the O'Neill Ditch following the schedule outlined in Table 2.3-2

Headgate Replacement and O'Neill Ditch Improvement

An inflatable-type diversion headgate would be installed at the end of the sand trap to control the water diversion into O'Neill Ditch and maintain the water level in the sand trap and pool behind weir and fish screens. This inflatable weir would be 250 ft long across the channel of the SMR, have a concrete slab foundation extending 12 ft downstream, and have elevations of 114 ft msl (deflated) and 118.5 ft msl (inflated) (. The inflatable weir will be designed to divert up to 200 cfs in the fully inflated position.

The O'Neill Ditch and groundwater recharge pond improvements consist of modifications to the headworks to increase the diversion capacity from 60 cfs to 200 cfs, concrete lining the O'Neill Ditch, replacement of culverts to accommodate higer flow diversions, and improvement of flow control structures between the seven recharge ponds in the Upper Ysidora Sub-basin. Improvements to the ditch and recharge ponds assure that these facilities are compatible with the diversion capacity of the new inflatable-type weir and headgate structure.

The O'Neill Ditch would be improved using reinforced concrete lining with a 10-foot bottom width with a 1:1 slope designed to pass 200 cfs for the Upper Ditch and a 7-foot bottom width with a 1:1 slope designed to pass 50 cfs for the Lower Ditch. A drain swale would be installed adjacent to the new ditch liner to prevent groundwater buoyant uplift forces from undermining or displacing the ditch lining. Ditch design would include escape ramps with a 3:1 slope for amphibians and mammals to exit on either side of lined ditch upstream of the Upper Road Crossing, Pond Turnout, Lower Road Crossing, and Lake O'Neill Turnout.

The Upper Parshall Flume would be moved to a location immediately downstream of the O'Neill Ditch headgate and be monitored by the inflatable weir control panel. The two 24-inch culverts in the upper road crossing would be removed and replaced with a reinforced concrete box culvert designed to pass 200 cfs. The existing turnout structure at the head of Pond 1 would be replaced with a reinforced concrete box culvert approximately 9 feet wide by 4 feet tall intended to pass 200 cfs to pond 1 with a 4-foot wide slide gate. The turnout structure would also be equipped with a second 4-foot wide slide gate to control flow to Lake O'Neill, allowing up to 50 cfs to pass to Lake O'Neill. Spillway gates on the weir diversion structure; turnouts to the perolation ponds and Lake O'Neill; production and monitoring wells; flow measurement; and pumping plands would be designed for remote operation and or data acquisition using a SCADA system. The Lower Parshall Flume would remain in its existing location immediately downstream of the Upper Turnout Structure at Pond 1 and would measure diversions to Lake O'Neill. The lower road crossing would be removed and replaced with a reinforced concrete box culvert designed to pass 50 cfs.

Lining O'Neill Ditch with concrete would improve the water transfer efficiency and reduce seepage and losses. Prior to lining with concrete, a backhoe would be used to move existing ditch material (soil, rock, etc.) to adjust ditch elevations and construct the bed for the ditch lining. No import or export of soil is expected during these modifications. Ditch lining would apply shotcrete (sprayed concrete) over leveled and engineered soil; wire matting would be used reinforce concrete instead of rebar. These modifications would result in side slopes of the lined ditch that would be shallower than the existing earthen ditch.

While the width and depth of the newly lined ditch would be reduced from current dimensions, the lined ditch would provide increased capacity by increasing water velocity. No improvements would be made to existing ditches downstream from the control structure directing O'Neill Ditch flows to Lake O'Neill[1].

Replacement of constrictive road crossings over O'Neill Ditch would include excavation of overlying material, removal of culverts, replacement with larger capacity culverts, and replacement of removed material back on top of new culverts. Construction of Parshall flumes and control structures would consist of form construction; rebar placement; and pouring concrete. All new construction would occur within the footprint of the existing ditch.

Construction

As stated earlier, construction of the headgate structure (including the sediment trap and fish screen) and O'Neill Ditch would occur concurrently with construction of the new inflatable weir and is expected to be completed within six months. If necessary, installations of fish screens, motors, and other devices may occur after the three month period.

This project element would require the following: initial site preparation; demolition of existing facilities; filling and compaction; installing/constructing new structures; and concrete lining the canal. Initial site preparation would consist of clearing and grubbing the canal, and removing vegetation and debris to prepare the site for fill material and the correct compaction of the sub-grade. The material would be placed in Ponds 6 and/or 7 for dewatering and then used as topsoil or hauled off to Las Pulgas Landfill.

Construction would also include replacement of existing undersized road crossing culverts, Parshall flumes, and control gates.

Operations

The diversion headgate would be operated to allow flow into the O'Neill Ditch following the schedule outlined in Table 2.3-2. The proposed design includes a fish screen to protect steelhead from entrainment in the ditch during downstream migration. In addition to the operation plan outlined in Table 2.3-2, operations of the headgate and O'Neill Ditch would be based on AMP/FOP guidelines and procedures as described in Section 2.3.1.4, *Special Conservation Measures*.

<u>Improvements to Recharge Ponds 1-7</u>

The recharge pond improvements would consist of low flow control structures and high flow control structures. During periods of low flow, the rate of flow from one pond to another would be controlled and measured using sliding weir gates that allow flows to pass through culverts interconnecting the ponds. The new low flow structures would be constructed at the interfaces between each adjoining recharge pond. The low flow structures would include three 8-foot wide sliding weir gates that allow water to pass over the gates and into a reinforced concrete box structure connected to three 36-inch diameter culverts. Weir gates allow for accurate flow measurement and can be adjusted to maintain desired upstream pond

[4] There are two ditches connecting to O'Neill Ditch below the turnout to Lake O'Neill: the main outlet channel from Lake O'Neill that starts at the southeast end of the lake and runs southeast, eventually flowing back into the SMR; and the "spill channel" that connects O'Neill Ditch to the outlet channel. The spill channel acts as bypass when the recharge ponds and Lake O'Neill are at capacity but there is still water in the upper end of O'Neill Ditch. The spill channel connects to the outlet channel about halfway between Lake O'Neill and the outlet back into the SMR.

water levels, allowing up to 50 cfs to pass from one pond to another. Each low flow structure would also be equipped with 2-foot wide low level sluice gate to allow for draining of a pond. The sliding weir gates and sluice gate would be manually operated and would include walkways and guardrails for access from the top of the levees.

High flow overflow spillways would be constructed between ponds to allow for a maximum of 200 cfs to flow from one pond to another in the following sequence: 1, 2, 3, 4, 6, 7. Due to the small volume of Pond 5, there would be no high-flow control structure between Ponds 1 and 5 and it would be filled via the low flow structure as other ponds fill via overflow spillways. Each overflow spillway would be configured to flow over a low point in the roadway on the crest of the pond levee. This configuration, also known as an "Arizona Crossing", would allow vehicles to drive along the top of the pond levee and across the spillway when no flows are passing over the spillway. A high-flow spillway would be installed in Pond 7 to allow for emergency spills to occur from Pond 7 to the O'Neill Spill bypass ditch.

Additional improvements may include the use of remote-controlled floating dredges for cleaning of one or more of the recharge ponds. Historically, fine sediments suspended in flows diverted to the recharge ponds have consolidated on the bottom into a hardened crust layer that reduces the infiltration capacity of the ponds. Automatic silt removal equipment of this type is currently being tested by the Orange County Water District and the results may be used to make recommendations for use in MCB Camp Pendleton's recharge ponds. Future use of this type of equipment is considered in this document.

Construction

All construction activities associated with pond upgrades would be conducted concurrently with construction on the inflatable weir, headgate, and O'Neill Ditch. Operations

Under Alternative 1, Ponds 1-7 would be operated and maintained to provide continued infiltration capacity. Operation of the recharge ponds would be based on AMP/FOP guidelines and procedures as described in Section 2.3.1.4, Special Conservation Measures.

2.3.1.2 Proposed New Facilities

<u>Groundwater Production Wells and Associated Collection System Infrastructure</u>

After recharge into the aquifer, raw groundwater would be pumped from the aquifer and conveyed via a collection pipeline to the Haybarn Canyon area. Four new groundwater production wells would be installed in the Lower SMR Basin[2] downstream from the new weir (three in the Upper Ysidora Sub-basin, one in the Chappo Sub-basin), along with collection pipelines, power lines, and access roads (refer to Section 1.6.1.1 for a description of existing wells). These four new wells will augment the existing twelve production wells within the Lower SMR Basin. The new production wells would have the combined maximum capacity to extract up to 10 cfs of water and increase the operational flexibility of groundwater extractions. Temporary cconstruction impacts at each well would require ground disturbance of about 240 ft x240 ft, permanent impacts would be substantially less and may be 120ft x 120 ft.

Placement locations for the new groundwater production wells are located within the Lower SMR Basin and downstream of the existing percolation recharge ponds. New 12-inch pipelines would be constructed to connect the four wells to the main distribution trunk line that delivers groundwater to the Advanced

[2] The Lower SMR Basin consists of three sub-basins: the Upper Ysidora, the Chappo, and the Lower Ysidora

Water Treatment Plant in Haybarn Canyon. Pipeline segments within the existing system that cause hydraulic constraints would be identified and replaced; most of these segments are expected to occur underneath existing roadways (both paved and dirt). Raw water lateral lines would be installed underground through trenching to connect the wells with the existing raw water collection system. Collection system pipeline construction would occur within a 50-foot wide construction buffer corridor centered on the pipeline alignment. These potable water pipelines would be vertically or horizontally separated from sewer pipelines. In addition, sections of MCB Camp Pendleton's existing raw water collection system would be repaired and/or expanded to handle additional capacity. The raw water lateral lines and collection system pipelines would convey groundwater and be subject to requirements for potable water pipelines (refer to Section 2.3.1.4 for special conservation measures [SCMs] specific to potable water pipelines).

Access to the three new groundwater production wells in the Upper Ysidora Sub-basin would be provided by a new graded dirt access road off of the existing access roads in the well basin. The new roads would be 12 ft (4 m) wide and may be covered with gravel. The roads would be bordered on both sides by a 20 ft (6 m) wide buffer that would be used to accommodate power poles, overhead power lines, and a collection pipeline. The power pole centerline would be approximately 4 ft (1.2 m) off the road edge, with power poles located approximately every 100 ft (30 m). Access to the one new groundwater production well in the Chappo Sub-basin would be provided by existing roads and no access road is needed.

Pipeline construction would occur within only a portion of the 50 ft wide construction buffer. Wells and/or pipelines and access roads would be sited to avoid known cultural resources. Whenever practicable, impacts on riparian vegetation and any sensitive species would be avoided or mitigated through measures developed through coordination of MCB Camp Pendleton Environmental Security (ES) with USFWS. The locations of the proposed production wells were selected to achieve the necessary aquifer storage and to minimize potential adverse impacts on riparian vegetation resulting from the periodic lowering of groundwater levels in the aquifer.

Placement of the proposed new production wells would also require coordination and approval by MCB Camp Pendleton's Federal Facilities Agreement (FFA) team, which consists of the San Diego RWQCB, the USEPA (Region IX), the California Environmental Protection Agency (Cal EPA) Department of Toxic Substances Control (DTSC), DON, and MCB Camp Pendleton. MCB Camp Pendleton's FFA team makes joint decisions on Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) cleanup actions at MCB Camp Pendleton. A number of former and active sites identified under the CERCLA and petroleum cleanup programs exist in the Lower SMR groundwater basin; if unaccounted for, drinking water wells located in the groundwater basin have the potential to draw in contaminated groundwater from some of these sites if situated too close or down-gradient. Groundwater modeling utilized to locate proposed new SMR CUP well sites relied on the best available information on contaminant plumes provided by the FFA team. The proposed four new well locations depicted in Figure 2.3-3 have been sited, using available data and models, to avoid adverse impacts from known contaminant plumes. Based on the dynamic nature of contaminant transport in the aquifer, and currently undiscovered plumes that may exist, measures would be taken in the AMP/FOP to avoid production of contaminated groundwater as new data become available.

Operations

The groundwater available for pumping fluctuates seasonally and varies by hydrologic condition. Operation of existing and new production wells would be based on AMP/FOP guidelines and procedures as described in Section 2.3.1.4, *Special Conservation Measures*. The pumping schedule would be designed to optimize groundwater levels during the winter to create storage in the aquifer, capture wintertime flow events, and minimize groundwater mounding at the recharge ponds. The operation and management of groundwater production under Alternative 1 would be constrained by: (1) maintenance of groundwater levels within their historical range, (2) no aquifer compaction, and (3) no seawater intrusion. Pumping rates would be managed during the summer to reduce potential impacts to riparian habitat. Pumping would also be reduced during dry years to prevent seawater intrusion and protect riparian habitat by maintaining minimum groundwater levels. During consecutive below normal water years, pumping rates would be further reduced, with restricted groundwater production continuing until wetter hydrologic conditions occur.

The groundwater produced from existing and new groundwater production wells operated and maintained by MCB Camp Pendleton would be collected via new and existing conveyance pipelines connected to the existing raw water collection system. The collection main conveys water to the Haybarn Canyon area and has a flow capacity of approximately 20 cfs to handle the existing and new groundwater well capacity. Where undersized, the collection main would be replaced or enlarged within its existing footprint to convey the maximum groundwater pumping capacity to Haybarn Canyon. The collection pipelines would be installed by trenching. Well operations would follow the facility operation plan (FOP). Wells would be turned on or off according to water demands and the monitored groundwater table levels in the aquifers.

Typical annual operational activities associated with pipeline systems would include painting aboveground storage tanks, monitoring pressure, repairing occasional pipe breaks, exercising valves, and corrosion monitoring. Pumps and motors have life spans of about 20 to 30 years, depending on water quality. Typical operational activities would include occasional replacement of parts and other minor repairs.

<u>Water Conveyance/Distribution System, including Bi-Directional Pipeline from MCB Camp Pendleton to new FPUD Water Treatment Plant</u>

Raw groundwater would be pumped from the aquifer and conveyed to the Haybarn Canyon area on MCB Camp Pendleton. The water delivered to MCB Camp Pendleton would be treated at the existing Haybarn Canyon AWTP (P-113). Raw groundwater would be delivered to FPUD via a new bi-directional pipeline and then would be treated at the new FPUD WTP. MCB Camp Pendleton would continue to process water for its own use at the existing Haybarn Canyon AWTP (P-113) (refer to description of the *Water Treatment Facilities* in Section 1.6.1.1) and FPUD would treat its portion of the project water at a new FPUD WTP (see detailed description below). Raw groundwater delivered to FPUD would average 3,100 AFY and would not exceed 800 AF in any given month. However, total volumes of raw water deliveries to FPUD would vary annually, depending upon multiple factors including, but not limited to, precipitation, river surface flows, surface diversions, and environmental considerations (refer to *Replacement of Existing Sheet Pile Diversion with Inflatable Weir Diversion Structure* in Section 2.3.1.1 for details on the operation plan). Treated imported water from SDCWA would also be delivered through the same bi-directional facility from FPUD to MCB Camp Pendleton, if and when needed.

Construction

From Haybarn Canyon, a new pump station would lift raw groundwater through a new bi-directional pipeline to the new FPUD WTP. The new pump station would be located in either a disturbed area across from the existing Haybarn Canyon AWTP (P-113) that was used as a laydown and staging area for construction of the Haybarn Canyon AWTP (P-113) (Option 1; preferred option) or just to the west of the Haybarn Canyon AWTP (P-113) in a previously disturbed area (Option 2).

The pipeline alignment would run north from Haybarn Canyon along Vandegrift Boulevard, then turn east and follow Rattlesnake Canyon Road to Vandegrift Boulevard (Vandegrift Boulevard makes a loop around a ridgeline and circles back). At Vandegrift Boulevard, the pipe would turn north along the road to the intersection with 19th Street. The pipe would then turn east and follow 19th Street, which becomes Fallbrook Street on MCB Camp Pendleton, and then Ammunition Road on the DET Fallbrook. A booster pump station would be located along the pipe alignment on the east side of Fallbrook Road at the boundary of MCB Camp Pendleton and the DET Fallbrook; the pump station would require associated electrical power drops. The pipe alignment would exit the pump station, continuing northeast on Ammunition Road and crossing Fallbrook Creek. Near the intersection of Ammunition Road and Redeye Road, the pipe would turn east, then northeast around an existing storage yard, and then turn east again, crossing Fallbrook Creek and continuing across the boundary of DET Fallbrook to a connection with the new FPUD WTP. At the two Fallbrook Creek crossings, the bi-directional pipeline would be trenched through the stream channel, with the Fallbrook Creek crossing nearest to the FPUD WTP being increased to accommodate a restoration footprint.

The total length of the pipeline from Haybarn Canyon to the Fallbrook WTP would be 36,818 ft (11,222 m) of which 17,000 ft (5,182 m) would be located on MCB Camp Pendleton and 19,818 ft (6,041 m) on DET Fallbrook.

The total length of the pipeline within DET Fallbrook, from the Fallbrook WTP to the Fallbrook service area, would be 7,380 ft (2,249 m). At the Fallbrook WTP a new lift station will lift the water into the Gheen zone elevation. Piping will be constructed East along Merida Ln and then Palomino Street to an existing pipeline at Palomino and McDonald which will convey water to the Gheen Reservoir site. At this site a new clearwell and pump station will be constructed to lift water to the Red Mountain zone and Red Mountain reservoir through existing piping. Some limited piping will be constructed North to Mission Rd. and South to Gumtree Ln from Gheen reservoir to connect to existing pipeline into the Red Mountain zone. All construction by FPUD would be conducted within already distrurbed areas.

Red Mountain Reservoir has an existing connection to receive water from the San Diego County Aqueduct.

The bi-directional pipeline would be installed in a Type 1 flexible pipe trench by trenching with at least 2 ft (0.6 m), and on average 4 ft (1.2 m) of cover over the pipe. Construction within Fallbrook would follow FPUD guidelines. The pipe would be cement mortar lined and coated. The bi-directional pipeline would be subject to requirements for potable water pipelines (refer to Section 2.3.1.4 for SCMs specific to potable water pipelines).

Operations

The rate of raw water pumped from Haybarn Canyon to the FPUD WTP would vary based on hydrologic conditions. Maximum pumping would occur during the winter months of very wet years while minimum pumping would occur during drier conditions. During the driest years, project groundwater would not be delivered to FPUD. Normal daily operations would be at a rate that would be dependent upon the hydrologic relationship between groundwater levels, aquifer volumes, and predicted incoming flows in the SMR.

The bi-directional pipeline between FPUD and MCB Camp Pendleton would also allow imported water to be delivered to MCB Camp Pendleton from the SDCWA Aqueduct during drought periods when groundwater is insufficient to meet demands or during emergency situations. Delivery of imported water would be based on the AMP/FOP that triggers the curtailment of groundwater pumping if physical and environmental constraints are not being met (refer to SCM in Section 2.3.1.4 for guidelines and procedures outlined in the AMP/FOP). The average annual delivery of imported water to MCP Camp Pendleton would be anticipated to be 500 AFY.

Flow metering would occur upstream of the pump station at Haybarn Canyon, where meters would measure the total raw water made available under Alternative 1; and downstream of the pump station at Haybarn Canyon where meters would measure the flow going to FPUD. Alternately, for bypass flow, the meters would measure flow conveyed to MCB Camp Pendleton from FPUD.

Typical annual operational activities associated with pipeline systems would include painting aboveground storage tanks, monitoring pressure, repairing occasional pipe breaks, exercising valves, and corrosion monitoring. Pumps and motors have life spans of about 20 to 30 years, depending on water quality. Typical operational activities would include occasional replacement of parts and other minor repairs.

FPUD WTP

A new FPUD WTP would be constructed on FPUD property adjacent to DET Fallbrook (Figure 2.3-3). The new FPUD WTP would be located on the same property as the existing FPUD wastewater treatment plant and would retrofit some of the existing solids drying beds. The FPUD WTP would use a treatment facility designed to provide potable water and would include an iron and manganese removal and demineralization plant. The FPUD WTP would have the capacity to treat a maximum of 800 AF per month. The average annual raw water delivery to the FPUD WTP would be 3,100 AFY. The FPUD WTP would be connected to and controlled by the existing FPUD SCADA system.

Pretreatment/Iron and Manganese Removal

Groundwater delivered from MCB Camp Pendleton via the bi-directional pipeline would enter an equalization tank. The groundwater would first undergo pretreatment oxidation with sodium hypochlorite (NaOCl) and then the iron and manganese filters would remove 97% of the iron and manganese in the system, reducing the effluent iron and manganese concentrations to below 0.3 mg/L and 0.05 mg/L, respectively. Iron and manganese system reject streams would flow to reclaim tanks for solids separation. The liquid would be decanted and returned to the start of the iron and manganese process for treatment. The remaining solids would be pumped to existing sludge drying beds at the facility. Decant from the drying beds would be pumped to the sewer and remaining dry solids would be removed for disposal at a landfill. The volumetric product from the iron and manganese plant is expected to be 99.7% of the feed flow.

Demineralization

The feed water for the plant would have relatively low salinity based on water quality data from existing production wells in the Lower SMR Basin. Therefore, to maximize the RO treatment process efficiency, the effluent from the iron and manganese plant would be split into two lines prior to demineralization. The first split line would be the RO bypass line which would feed directly into the clearwell and receive no further treatment until the post-treatment disinfection. The volumetric flow of this line would be 4.27 MGD (6.6 cfs) or 49% based on the RO unit salt rejection and recovery to ensure that the blended flow in the clearwell achieves a TDS concentration of 500 mg/L.

The second line would feed the RO demineralization process at a maximum flow of 4.46 MGD (6.9 cfs). Sodium bisulfite would be added prior to contact with the RO system for membrane protection from chlorine. Antiscalant would also be added to the RO feed. Treated flows from the RO plant would be neutralized with sodium hydroxide with maximum flows of 3.81 MGD (5.9 cfs). Concentrate flows (i.e., brine) from the RO unit would be discharged to the Pacific Ocean via Fallbrook's Oceanside Ocean Outfall with a maximum flow of about 0.65 MGD (1.0 cfs) and a TDS concentration of 5,816 mg/L based on the 900 mg/L design TDS feed concentration.

Post-treatment

The RO feed water product and the RO bypass line would be blended in the clearwell to achieve the target TDS of 500 mg/L. NaOCl would be added for primary disinfection and ammonia hydroxide would be added last to form a chloramine residual in the pipeline. The maximum treated flow for the FPUD AWTP is estimated to be about 8.01 MGD (12.4 cfs), or 92% of the feed groundwater flow based on cumulative process recoveries in the system. Treated water from the clearwell would be transported to the Gheen Tank.

Brine Discharge to Fallbrook's Oceanside Ocean Outfall

Brine from the FPUD WTP would be discharged to the Pacific Ocean via FPUD's Fallbrook Outfall pipeline to the Oceanside Ocean Outfall (Figure 2-1). FPUD's existing National Pollutant Discharge Elimination System (NPDES) Permit (CA0108031) would be amended to allow for the inclusion of the additional brine from the project. The existing FPUD NPDES Permit currently has a permitted average annual discharge of 2.4 MGD.

SCADA System

A Supervisory Control and Data Acquisition (SCADA) system would be included in the project. The spillway gates on the inflatable weir diversion structure, turnouts to the recharge ponds and Lake O'Neill, production and monitoring wells, flow measurement, and pumping plants would be designed for remote operation and/or data acquisition. These facilities would be connected to a control room for the SCADA via existing utility poles. The control room would be located in Building 1142 and operated by OWR personnel (*Note*: The FPUD WTP would be connected to and controlled by the existing FPUD SCADA system).

Open Space Management Zone

A framework would be established by FPUD to permanently preserve 1,392 acres (563 hectares) of riparian open-space land that was acquired by FPUD in 1958 for water supply development purposes. Under Alternative 1, all or most of the OSMZ is intended to be placed in conservation management to preserve open space and riparian values that currently exist on the site, as well as preserve current passive recreation uses. Conservation approaches currently being considered by FPUD include, but are not limited to: (1) purchase and management of the OSMZ by Reclamation, MCB Camp Pendleton, or another agency or conservation related organization; (2) continued ownership of the property by FPUD subject to a conservation easement purchased by a third party that restricts future development; or (3) management of the property as a mitigation bank by FPUD or its designee.

Whichever conservation approach is ultimately selected FPUD would comply with guidelines developed to implement Senate Bill 1148, and any other applicable federal, state, and local regulations and policies. Senate Bill 1148 authorizes private and public conservation and mitigation banks to serve an important function of managing the mitigation provided by private applicants when aquatic or terrestrial mitigation is required as a condition of a permit from a public agency. Should the site be established as a mitigation bank, FPUD would mitigation credits to proponents of other projects within San Diego and Riverside counties having mitigation responsibilities that require compensation for impacts to wetlands, threatened or endangered species, and other sensitive resources, but the intended approach under Alt 1 is for the open space status of the 1,392 acres (563 hectares) to be maintained.

The OSMZ would continue to serve as a critical parcel for ensuring a healthy watershed in the community of Fallbrook. It would also have the effect of protecting downstream water quality and preventing development of riparian water rights within the OSMZ that, if developed, would decrease in-stream flows reaching MCB Camp Pendleton and the SMR Estuary.

2.3.1.3 General Construction Methods

New facilities associated with the project would be located in roadways, existing rights-of-way, and other disturbed areas as much as possible to minimize impacts to existing environmental resources. It is assumed, unless otherwise noted, that the direct impact area for proposed new facilities (e.g., pump stations, groundwater production wells, and treatment facilities) would include the following: a 30-ft (9-m) perimeter for parking/facility access, a fence surrounding the facility at the edge of the 30-ft (9-m) perimeter, and a 10-ft (3 m) wide firebreak outside and surrounding the fence line (i.e., a permanent impact area of 98 ft by 98 ft [30 m by 30 m] for each new groundwater production well and pump station). For the purpose of this analysis, it is assumed that construction-related activity and temporary disturbance may also occur within a 50-ft (15-m) wide "buffer" around these areas.

<u>Pipeline Construction</u>

Pipeline construction would be similar to previous projects in northern San Diego County. The descriptions below are expected to be equivalent to construction methods for SMR CUP. For the purposes of analysis in this EIS/EIR, an approximately 50-ft (15-m) wide construction buffer corridor has been identified for the conveyance pipeline from the wells and an approximately 100-ft (30-m) wide construction buffer corridor has been identified for the bi-directional pipeline. The construction buffer corridor is centered on the anticipated pipeline alignment and has been identified for impact analysis. For the conveyance pipeline, construction would occur within the entire 50-ft (15-m) wide corridor (impacted temporarily for pipeline burial). For the bi-directional pipeline, construction would occur within a 50-ft (15-m) wide corridor (impacted temporarily for pipeline burial) situated within the 100-ft (30-m) wide construction buffer corridor to avoid significant biological/cultural resources and drainages, as feasible. For some areas where bends occur along the conveyance and bi-directional pipelines, an additional 75-ft (23-m) wide by 150-ft (46-m) long area (centered on the bend) would be needed to accommodate pipeline construction (impacted temporarily during pipeline construction). Potable water pipelines, including groundwater collection system pipelines and the bi-directional pipeline, would be vertically or horizontally separated from sewer pipelines.

The 50-ft (15-m) wide corridor would be cleared and grubbed prior to construction. A typical pipe trench would be approximately 3 to 5 ft (1 to 1.5 m) wider than the outside diameter of the pipe. Pipelines would be placed at typical depth to ensure a minimum of 2-3 ft (0.6-1 m) of cover over the pipe. Accordingly, the trench for the 18- to 24-in (46- to 61 cm) diameter bi-directional pipeline to the community of Fallbrook would be 4 ft (1.2 m) wide and 7 ft (2 m) deep, with up to a maximum depth of 10 ft (3 m) below ground surface at road crossings, where 5 ft (1.5 m) of cover fill above the pipe would be used. Shallower trenches would be used for the 12-in (30-cm) diameter groundwater collection pipeline system.

Trenches would be excavated using common excavating equipment (i.e., trenchers and track backhoes). An exception to the mechanical excavation would be hand-digging to locate buried utilities, such as other pipelines, cables, water mains, and sewers. No blasting would be required. The trench would be excavated and backfilled incrementally as pipeline assembly progresses. After placement of pipelines, the trench would be backfilled, the original ground contours would be restored, and, where applicable, the roadway would be repaved to match existing roadway. There would be little or no export of materials from the trenches or import of backfill for the pipe sections since the material would be suitable for backfill into the trenches. Pipeline excavations would occur above the groundwater table; however, dewatering may be necessary if perched groundwater is encountered during wet months (refer to SCMs listed in Section 2.3.1.4 for measures taken when groundwater is encountered). Pipeline would be installed on the surface in locations where trenching is infeasible. In locations where the pipeline would be on the surface, it would be elevated sufficiently to allow high-water flows and wildlife to pass underneath. Surface laid pipe would be secured to ground with anchors. If feasibility design determines that pipeline construction would differ significantly than as described below, additional analysis would be necessary.

Pipe Handling

Pipe-stringing trucks would be used to transport the pipe from the shipment point or storage yards to the pipeline construction area. Trucks would carry the line pipe along the pipeline construction area, and sideboom tractors would unload the joints of pipe from the stringing trucks and lay them end to end beside the ditch line for future line-up and assembly. The pipe joints would be rubber gasketed and would be tested for leaks during construction. The entire pipeline would be hydrostatically tested before being used to convey water under pressure.

Lowering and Backfilling

The pipe would be lifted and lowered into the ditch by two side-boom tractors spaced so that the weight of unsupported pipe would not cause mechanical damage. Cradles with rubber rollers or padded slings would be used so the tractors could lower the pipe without damage as they travel along the ditch line.

Backfill material would be obtained from excavation ditch spoils. Spoils would generally be returned to the ditch within one week of trenching. Spoils would be screened as the material is returned to the ditch using standard construction screening equipment, as required. The pipe would be covered along the sides with a maximum of 6 in (15 cm) of native fill free of rocks, and then covered on top with a minimum of 12 in (30 cm) of backfill free of rocks. This zone is referred to as the pipeline padding and shading. In certain areas where damage might occur to the pipe coating from abrasive soils, clean sand or gravel backfill would be used to pad the pipeline. Any required padding material would be obtained from local commercial sources. The backfill in the remainder of the trench above the padding would be native material excavated during trenching. At the time of backfilling, a colored warning tape and/or locator wire would be buried approximately 18 in (46 cm) above the pipeline to indicate the presence of a buried pipeline to future third-party excavators. In roadways, the backfilled soil would be compacted using a roller or hydraulic tamper before paving or sand slurry. Any excess ditch spoils generated during construction would be spread along the construction right-of-way, used as topsoil, or hauled off to Las Pulgas landfill.

Water Course Crossings

The SMR, Fallbrook Creek, and Lake O'Neill overflow outlet are the major waters of the U.S. that would be crossed by pipelines, while several smaller drainage channels, tributaries, and wetlands would also need to be crossed. The SMR and Lake O'Neill overflow outlet would be crossed by conveyance pipelines from the production wells. Where possible, the conveyance pipelines would be installed through pipe-bursting and/or trenchless construction in areas with sensitive water resources and wetlands.

Trenchless construction refers to the installation of underground pipelines with minimal surface disturbance by avoiding the use of open-trench construction. Methods of trenchless construction that would be used include bore-and-jack or horizontal directional drilling. Trenchless construction would involve the use of boring and receiving pit sites that would be filled and restored after construction is completed. The boring and receiving pit sites would be located within a 100-ft by 100-ft (30-m by 30-m) construction area on either side of the stream/river crossing and outside any jurisdictional wetlands or waters of the U.S. or any other sensitive habitats.

Where it is not feasible to conduct trenchless construction crossings may be open trench-cut and cover. The process entails creating an open cut at minimum 3 feet of cover; installing the pipe and associated hardware; installing slope protection; encasing the pipe in concrete; and replacing in-kind any material removed. Design stipulated a requirement on the construction contractor of less than 24 hour turn around for the cut and cover, meaning that the construction contractor is required to cut the trench, lay aside the top soil, and replace the top soil and be out of the trench in 24 hours or less. The 2 exceptions to this requirement are on NWS, within Fallbrook Creek. The first of which is steep and rocky and will likely require longer than 24 hours to complete, but will be required to be completed with the same cut and cover requirements as the 24 hour sites. The second exception is also on NWS, within Fallbrook Creek . MCB Camp Pendleton in coordination with the NWS Det Fallbrook is proposing to restore approximately 300 linear feet of channel and riparian habitat. This will be utilized to off set any impacts related to construction within the jurisdictional Waters of the U.S.

Road Crossings

The proposed pipeline would be constructed along or parallel to Vandegrift Boulevard, Ammunition Road, and roads within the community of Fallbrook. Where road crossings are necessary, surface preparation would include breaking and removing pavement with concrete saws, pavement breakers, and, where necessary, jack hammers. Once traffic control measures are in place, ditching operations would begin. Typically, the excavated trench depth would be enough to provide 5 ft (1.5 m) of cover over sections of pipe located under roads. The trench would be excavated using backhoes and trackhoes. An exception to the mechanical excavation would be hand-digging to locate buried utilities, such as other pipelines, cables, water mains, and sewers. The crossings would occur during non-peak traffic periods, as determined by the contractor.

Equipment and Material

Most of the heavy construction equipment would be delivered to staging areas on lowboy trucks or trailers. Mobile cranes and dump trucks would be driven in from existing local contractors' yards. Construction equipment would be left overnight at the site as feasible, at the contractor yards, or at other existing storage yards in the area. All construction materials would be taken to the staging/laydown areas by truck on existing roadways.

The construction contractor would be required to implement approved safety measures for lane closures or other disruptions in traffic. Construction in corridors would be designed to allow at least one lane of traffic wherever feasible. Appropriate warning signs would be placed at strategic locations to warn drivers of closed lanes. Flagmen may also be used at particularly busy intersections or roadways.

The construction equipment that would be utilized would include bulldozers, excavators, loaders, a bore-and-jack machine, and dump trucks. All construction equipment would be fitted with appropriate mufflers and all engines would be maintained regularly according to manufacturers' specifications.

The major material component of the project would be ductile iron, welded-steel, or high-density polyethylene (HDPE) pipe. It would be stored at a vendor's coating yard or existing storage yards until it is unloaded along the pipeline route. Aggregate, asphalt, sand, and slurry materials would be purchased locally and storage would be provided by local suppliers until it is unloaded along the route. During all phases of construction, refueling and lubrication of construction equipment would occur in areas designated by MCB Camp Pendleton ES, DET Fallbrook Public Works, or FPUD, as applicable.

Construction Access, Staging, and Storage Areas

During construction, existing roads would be used to provide access from public streets to staging areas, laydown and storage areas, and work zones. Preference would be given to utilizing existing roads over developing new roads. All construction by FPUD would be in previously disturbed areas.

Excavation spoils from construction would be stored in either construction laydown areas or exported from the construction site to a location approved by the Facilities Engineering and Acquisition Division (FEAD) or FPUD, as applicable. The staging, laydown, and storage areas include heavy use recreation areas with a high percentage of bare ground, areas that are currently paved or otherwise disturbed, and road shoulders. Staging area locations on MCB Camp Pendleton and DET Fallbrook would be approved by MCB Camp Pendleton ES, DET Fallbrook's Department of Public Works and Conservation Program Manager in coordination with a biological monitor, if needed, prior to the start of construction related activities.

For construction on MCB Camp Pendleton and DET Fallbrook, the construction contract would require the contractor to identify all MCB Camp Pendleton and DET Fallbrook laydown and storage areas on construction plans and to have all laydown and storage areas approved by MCB Camp Pendleton ES, DET Fallbrook's Department of Public Works and Conservation Program Manager, and the FEAD, with final approval by the FEAD.

Tentative Schedule

Construction is contingent on Congressional appropriations and would follow a ROD, local approvals, and issuance of necessary permits. Construction of the project is estimated to take 36 months, assuming that some project components would be constructed concurrently when feasible. Pipeline construction would proceed at approximately 100-150 ft (30-46 m) per day. Within FPUD, construction would take approximately 18 months; MCB Camp Pendleton construction would take approximately 30 months, and DET Fallbrook construction would take approximately 12 months. Construction activities would be anticipated to occur during normal working hours between 7:00 am and 4:30 pm, Monday through Friday.

2.3.1.4 Special Conservation Measures

Implementation of Alternative 1 would incorporate the SCMs identified below, as part of project development to avoid or minimize any potential environmental impacts. The operations SCMs (i.e., the AMP/FOP) has been provided first, including those specified in the Section 7 ESA consultations with the resource agencies; followed by general construction SCMs that apply to multiple resource areas, and then resource-specific construction SCMs.

Adaptive Management Plan/Facility Operation Plan

As part of the proposed action, an Adaptive Management Plan (AMP), followed by a separate Facility Operation Plan (FOP) will be developed by MCBCP to manage project diversion, recharge, production, and delivery facilities. The AMP is a managerial decision making process used to operate water facilities within physical, environmental, and legal constraints based on pre-established AMP goals (Table 2.3-3). The AMP employs the adaptive management process to manage water resources through monitoring, learning, and changing operations to meet evolving environmental and physical constraints. Managerial decisions using the AMP are then translated into the FOP, which provides the instructions for the operators on MCBCP for facility operations.

The AMP/FOP manages water diversion, recharge, production, and delivery facilities to assure sufficient water is available to meet water demands while minimizing or avoiding impacts to the riparian system. The adaptive management plan defines how management goals, such as protection of the aquifer and minimizing operational effects, are achieved through a systematic and cyclic process of observations and predictions; while the Facilities Operation Plan (FOP) defines how project facilities are operated to satisfy legal, environmental and physical constraints. Real-time, near real-time, and seasonal monitoring of hydrological and biological data are used to continually update the AMP and FOP as our understanding of hydrologic-environmental relationships improves. Operations can be adapted if necessary, and improvements in future management may occur over time.

Table 2.3-3. AMP Goals

1. **Fulfill Settlement Agreement Requirements**. Ensure sufficient water is available to meet CPEN and FPUD water demands, as stipulated in the Settlement Agreement.

2. **Protect the SMR Aquifer.** Modulate pumping locations and maintain groundwater at levels in order to prevent aquifer compaction and seawater intrusion.

3. **Minimize Operational Effects.** Ensure operational impacts to the riparian wetlands, native riparian vegetation and wildlife do not exceed the maximum impacts described in the Final EIS (Chapter 4 Environmental Consequences) and associated ESA Section 7 consultation documents (USFWS and NOAA Fisheries BO).

MCBCP will meet the AMP goals by following a set of triggers, thresholds, and action items to ensure project related impacts remain within the physical, environmental, and legal constraints (Table 2.3-4). Triggers are based on parameters such as groundwater and streamflow levels, as well as operational concerns such as planned or unplanned maintenance. Other important triggers are based on environmental data, including project-related BO requirements for riparian vegetation and species. Legal triggers are associated with water rights and settlement obligation responsibilities.

Thresholds are numerical values placed on those triggers, resulting in execution of action items if those thresholds are met. For example, if a groundwater level (trigger) drops below a minimum elevation (threshold), then pumping is shifted to alternative wells (action item). These triggers, thresholds, and action items are the decision support matrix of the AMP to ensure physical, environmental, and legal compliance.

Table 2.3-4. AMP Constraints

Constraint Type	Types of Triggers to be Developed
1. Environmental	Riparian Vegetation Aquatic Habitat Estuarine Habitat Water Quality Habitat Water Quality Drinking
2. Physical	Operation of Diversion Structure Aquifer Recharge Management Groundwater in Storage Infrastructure
3. Legal	Water Rights Compliance Settlement Compliance

The hydrologic condition that establishes how the goals and objectives of the AMP/FOP will be met is determined on May 1st of each year following the October through April winter-time streamflow events (Table 2.3-5). The hydrologic condition will be categorized as Extremely Dry, Very Dry, Below Normal, Above Normal, or Very Wet based on the winter-time streamflow. Based on the hydrologic condition, the operation of the water diversion facilities, and the total quantity of groundwater that may be produced during the next 12 months, will be outlined in the FOP issued no later than June 1st of each year following quantification of the winter-time streamflow. Subsequent adjustments may be made if the AMP determines environmental, physical, or legal constraints are not being met. The AMP will be reviewed continuously and updated as required such that managers may adjust the FOP throughout the May 1st through April 30th pumping year to meet constraints. The following table outlines the annual AMP/FOP schedule.

Table 2.3-5. AMP/FOP Annual Schedule

Date	Event/Action Item
October 1st – April 30th	Winter-time streamflow data collection
May 1st	Determine hydrologic condition Issue Initial FOP[a]
June 1st	Issue FOP
June 1st – April 30th	Perform AMP process and implement changes through updates to FOP if necessary.

Note: Initial FOP outlines interim groundwater pumping schedule for May 1st through May 31st until FOP for current year is released on or before June 1st.

Project Pumping Year is from May 1st to April 30th of the following year.

The FOP's directives of the proposed facility operations and groundwater production are based on simulation of future conditions using the AMP Groundwater Model on May 1st of each year. Based on the recent streamflow and recharge, the future groundwater conditions throughout the Lower SMR Basin are simulated during the next 12 months. The simulation then provides predicted monthly water levels at three riparian and three grassland wells that can be compared to observed data during the following 12 months.

Hydrological and biological field data will be monitored, and compared to model predicted data, to determine if the management goals are being met through the FOP. If threshold values for specific triggers are exceeded, hydrologic conditions and facility operations will be assessed, and if necessary, the FOP will be revised to minimize or avoid adverse impacts to the resource. This system of monitoring and assessment is an on-going process through the collection and assessment of real-time, near real-time, and biological datasets. The AMP/FOP are maintained, assessed, and implemented by appropriate subject matter experts (e.g., hydrologists and biologists).

Additionally, the AMP collects data on the operation of the inflatable weir gate(s); the FOP will establish guidelines for lowering and raising the gate(s) during significant flows to flush accumulated sediments downstream. Water diverted from the SMR is conveyed to the percolation ponds for recharge to the groundwater aquifer or bypassed to Lake O'Neill. Water stored at Lake O'Neill will continue to be released to the SMR for recharge during periods of low river flow and/or low groundwater levels on an annual basis consistent with current practice. These operations would be monitored by a Supervisory Control and Data Acquisition system and controlled by on-site adjustments to the weir gates.

The AMP will use hydrologic and biological monitoring data from the Lower SMR, in conjunction with data from stream gages and groundwater monitoring wells, to refine the water use strategy for withdrawals to avoid the loss of essential aquatic habitat and to avoid significant losses of riparian scrub and woodland habitats for other protected species. Observed data will be compared to simulated model results. This data, along with environmental, legal, and physical constraints will be used to guide project operations and set monthly diversion, pumping, and bypass amounts. The FOP is the plan that specifies how operations will achieve those goals and objectives.

The AMP and FOP are intended to guide decision making so resources are balanced with legal and regulatory requirements associated with managing the groundwater basin. The goals of an effective AMP and FOP are to facilitate institutional learning and continuous process improvement, and to assure long-term sustainability of environmental and physical resources. As new information and data become available, short-term and long-term adjustments are made to pumping and other processes in order to meet these goals. The success of adaptive management depends upon a comprehensive and integrated approach based on these goals. The approach is collaborative, emphasizing communication between subject matter experts and MCBCP.

To understand the past, present, and future status of aquatic and riparian habitats and species of the Lower SMR, MCBCP will coordinate SMR CUP project operations with on-going MCBCP ES Natural Resource Programs and the Integrated Natural Resources Management Plan (INRMP) monitoring programs, with long term monitoring actions from the SMR CUP project incorporated into INRMP, that focus on riparian ecosystem health monitoring and federally-listed species nesting microhabitat monitoring. The AMP will incorporate physical and environmental parameters that are currently monitored in the SMR Watershed to actively improve and empirically manage the effect of the project on environmental resources. As part of the AMP process, MCBCP will review all parameters periodically and maintains the authority to eliminate programs that are not producing useful data and incorporate any new or revised parameters for monitoring. MCBCP currently monitors the following parameters:

- Annual sampling of arroyo toad breeding effort to determine presence/absence in order to inform a population model based on proportion area occupied (i.e., an ongoing 5-year trend analysis) (ES)
- Annual sampling of vireo territories and flycatcher occupancy and nest success (ES)
- Continue monitoring bird species biodiversity and survivorship using the existing Monitoring Avian Productivity and Survivorship on a yearly basis to detect trends (ES)
- Groundwater quality samples from groundwater production wells (ES)
- Surface water quality grab samples (ES)

- Lake O'Neill precipitation and evaporation data (WRD)
- USGS Streamflow Gaging Stations on the SMR, De Luz Creek, Sandia Creek, Fallbrook Creek, O'Neill Ditch and bypass, and Lake O'Neill spill and release (WRD, USGS)
- Recharge Pond Diversion and infiltration rate (WRD)
- Groundwater level data from six riparian and grassland wells (WRD)
- Monthly Groundwater production data (WRD)
- Soil Moisture data near riparian vegetation (WRD)
- Soil Moisture data arroyo toad reference site (TBD) (WRD)
- Stream channel geometry cross-sections following 10-year storm events (WRD)
- Continue yearly insect biodiversity and abundance monitoring in both the riparian and estuary system to detect trends (ES)
- Continue yearly live and dead fuel moisture monitoring to determine if impacts to riparian habitats are caused from ambient humidity or water diversion (ES)
- Continue to remove exotic aquatic animal species that may be competitors or predators of sensitive species found in riparian/estuarine zones and check the stomach contents of invasive species to determine their impact on listed species (ES)
- Riparian Ecosystem Health Monitoring (ES)
- Monitoring of restoration activities of temporary impacts from construction (via Restoration Plans) to riparian and upland habitats to ensure that success criteria is met (ES)
- Monitoring of both prescribed fire and wildfire conditions through Remote Access Weather Stations (RAWS) including temperature, relative humidity, wind speed/ direction, rainfall, 10 hour fuels, and solar (ES)

1. MCBCP will make the current monitoring programs more robust by collecting additional data that is relevant to measuring impacts to federally-listed species from operations. The AMP will assess data collected under the current monitoring programs with additional parameters proposed below, by comparing their hydrologic indicators to simulated groundwater and surface water levels using the AMP Model discussed in the following section. The AMP will then provide recommendations to adaptively manage water withdrawals to minimize adverse impacts on the river and its resources (e.g., federally-listed species habitats), if any, through implementation of the FOP.

   a. <u>Arroyo Toad</u>

   An arroyo toad monitoring program has been conducted annually throughout the SMR using a Proportion Area Occupied Model (PAOM) since 2003, and will be continued and enhanced, as necessary. Additional physical and environmental parameters collected under MCBCP's on-going arroyo toad management program would be incorporated into the AMP to strengthen, and to actively improve and empirically manage, the effect of the project on environmental resources:

   i. The arroyo toad survey effort will provide additional information regarding arroyo toad breeding success in the Lower SMR and in Survey Reaches 4-8 in particular. Arroyo toad survey efforts above the new weir or in other watersheds on MCBCP will not be reduced from current levels to offset the increase on the Lower SMR.

   ii. Water quality parameters (e.g., temperature, salinity, turbidity, flow velocity) will be collected at established points within annual monitoring transects.

iii. The wetted width of the channel will be measured at established points within annual monitoring transects.

iv. Aquatic life stages and early terrestrial life stage arroyo toad surveys will be conducted in the lower SMR from May 1 to July 15 to document breeding effort and success.

b. Riparian Ecosystem Health Monitoring

A Riparian Ecosystem Health Monitoring Program (REHMP) has been established in the Lower SMR by a current ES program and will be continued and enhanced, as necessary. ES developed a rigorous approach to monitor riparian health with a Riparian Habitat Monitoring Plan in 2007 to determine if the Lower SMR riparian areas are recovering post extensive Arundo and Tamarisk removal. To document the natural recovery of the system as compared to untreated adjacent riparian woodland, treatment stratification categories (“Years Since Last Treatment”) are measured against two main success criteria: Absolute Native Cover and Less than 1% of the Three Main Exotics Absolute Cover (Arundo, Tamarisk, and Lepidium). Secondary success standards are also measured to further understand the health of the riparian system: Native Herb Frequency and California Rapid Assessment Methods. As developed, the Primary Success standards need to be met, while secondary success standards do not have to be met, but provide information about the state of the riparian system.

2. Data sets were collected in 2009 and in 2012 and show that the riparian system is moving towards meeting the Primary Success standards; this data reveals that it takes approximately 5 years to meet these standards. Another data set will be collected in spring of 2016 and is expected to show full recovery of the riparian system, unless the large Basilone Complex wildfire of May 2014 has impaired this recovery.

Additional parameters collected under MCBCP’s on-going Riparian Ecosystem Health Monitoring program would be incorporated into the AMP to strengthen, and to actively improve and empirically manage, the effect of the project on environmental resources. To meet the goals of the AMP, the monitoring program will be adjusted in 2017: the “Years Since Last Treatment” stratified sampling methods will be replaced by a stratified sampling method located in each aquafer sub-basin and adjacent to drinking water wells. Historic data will not be lost and will be incorporated into the vegetation baseline.

i. Maintaining the Natural Variability within the Riparian System that Supports Listed Species

- The AMP will incorporate parameters from the MCBCP Riparian/Estuarine Biological Opinion consistent with managing groundwater levels and withdrawals to minimize loss and degradation of habitat quality, to the extent practicable (BO; Service 1995a). Additionally, MCBCP will utilize information from project P527B (Removal of Wastewater Plants from the SMR) that assessed the relationship between groundwater levels and plant health with the Riparian Monitoring and Modeling Sewage Effluent Compliance Projects on Marine Corps Base, Camp Pendleton Report (SDSU 2007). The 2007 report found that willows resilience and ability to survive high variation in groundwater by a variety of physiological and morphological adjustments allow the willows to go through cycles of impairment or decline and recovery.
- The AMP will continually monitor groundwater levels, and their rate of change, for the purpose of evaluating conditions for the riparian woodlands. The AMP will review hydrological and biological data that establishes the relationship between the riparian vegetation root zone, depth to water, and rate of decline to assess the health of the riparian vegetation to prevent changes that are not within natural variability.

- The following possible additional information at these sites will be collected to ascertain possible changes in riparian habitat that is valuable to federally-listed riparian species: vertical distribution of foliage, abundance of seedlings (i.e., recruitment), stem diameter, soil moisture, and changes in basal area. Depth to groundwater (e.g., maximum depth to the water table for each year) and rate of groundwater decline will be measured near (see above) the established riparian habitat monitoring locations for a comparison of riparian habitat structure and other variables to ground-water pumping.

ii. Least Bell's Vireo and Southwestern Willow Flycatcher Microhabitat

Study sites will include those area occupied (or previously) occupied by both LBVI and SWFL to capture vegetation community characteristics of their nesting habitat.

- Soil moisture monitors may be placed within 50 meters of current occupied and recently extirpated southwestern willow flycatcher habitat to determine soil saturation during the breeding period.

c. <u>Estuarine Monitoring</u>

MCBCP is currently funding estuarine studies to evaluate the condition of the estuary; the California Regional Water Quality Control Board (RWQCB) is in partnership with MCBCP to determine any improvements that are necessary for future management and ecosystem function. This monitoring will be incorporated into the AMP and its new proposed model to redefine the relationship between the southern California steelhead migration and proposed actions.

d. <u>Lower SMR AMP Model</u>

MCBCP will develop a Lower SMR AMP Model with updated scientific information and better methods to simulate pumping impacts on habitat to replace the existing Lower SMR Model. The relationship between project operations and the habitat that supports various species in the Lower SMR Basin will be described by the Lower SMR AMP Model[3]. The AMP Model would establish the 12-month pumping and diversion schedule that minimizes or avoids negative impacts to habitat while meeting the water demand requirements; and which is the basis for establishing the operational requirements outlined in the annual FOP. Initial improvements to the AMP Model include the following:

i. The AMP Model will be developed with a refined stress period based on an updated conceptual model that incorporates data from the 2014 and 2015 stream-aquifer interaction studies.

ii. The AMP Model will refine the relationship between surface flow and groundwater levels, at mutually agreed upon reference sites, which are used to assess arroyo toad habitat between March and June.

iii. The AMP Model will refine the relationship between surface flow and groundwater levels and estuarine parameters to redefine the relationship between the southern California steelhead migration and proposed actions.

[3] The AMP Model will be developed from the existing Lower SMR Model that was originally developed to quantify water supply and assess impacts from project operations. The Lower SMR Model is based on the USGS Three-Dimensional MODFLOW code that assesses the occurrence and movement of groundwater in the Lower SMR Basin. While the existing model is based on simulating conditions based on hydrological data only, the AMP Model will incorporate both hydrological and biological datasets to assess operations so they stay within environmental, physical, and legal constraints.

iv. The improved model will be calibrated to streamflow, groundwater, and soil moisture observations consistent with arroyo toad sampling sites located between the estuary and the diversion weir.

v. The AMP Model will replace the current 3-foot depth to groundwater standard for estimating impacts to arroyo toad breeding habitat. Future simulations will account for actual surface flow based on observations and measurements by MCBCP.

vi. Stream channel geometry and refined elevation data will be incorporated in the improved AMP Model to account for changes in stream geomorphology so errors in model simulations from migrating channels may be reduced.

vii. A refinement of the existing 200-foot by 200-foot model grid may be used to better simulate geomorphology and the stream-aquifer interaction.

<u>Operational Conservation Measures Named in the Section 7 Consultation with the USFWS</u>

A synoposis of the Section 7 Consultation SCMs has been provided below. For details on each SCM, refer to USFWS 2016.

Arroyo Toad

2. MCBCP will manage water operations so as not to cause more than a 50-year average annual reduction of 12 percent[4] in the occurrence of surface water, between the new weir and the Lower Ysidora Narrows (arroyo toad survey blocks 2 through 11), for four continuous months during the arroyo toad breeding season.[5]
3. MCBCP will manage water operations so as not to cause more than a 15 percent[6] reduction in the occurrence of water in arroyo toad survey blocks 4 through 8, based on a 50-year balanced hydrologic period.
4. MCBCP will update the arroyo toad monitoring program to strengthen MCBCP's ability to monitor arroyo toad breeding success in the Lower SMR and inform CUP operations. MCBCP will increase the proportion of survey blocks on the Lower SMR that are monitored on an annual basis, consistent with the current survey design (Brehme *et al*. 2006).
5. MCBCP will monitor real-time surface flow on the SMR below the weir to increase understanding of the relationship between observed surface flow, modeled surface flow, and arroyo toad breeding activities. This information will be used to refine the surface flow modeling effort and provided to

[4] Refers to the 11.6 percent reduction in the number of flowing cells (groundwater table within 3 feet of surface) modeled when CUP operations (model CUP RPM-7 50-year) are compared to Recent Management conditions.

[5] The occurrence of surface water between survey block 2 through 11 is based on a 50-year balanced hydrologic condition as simulated by the LSMR Groundwater Model in 2015. Variance from the threshold value will occur during both drier and wetter hydrologic conditions and as average streamflow to MCBCP varies from the 1952-2001 balanced hydrology.

[6] Refers to the 14.6 percent impact to survey blocks 4-8 as referenced in Enclosure 2 of the supplemental package sent to the USFWS on January 28, 2016. This analysis is based on observed 2005-2014 modeling results. Presence of water (groundwater within 3 feet of surface or presence of flow on surface) occurred 90.7 percent of the time under Recent Management (baseline) conditions; CUP project simulated conditions over the same balanced hydrologic period indicated surface flow occurred 76.1 percent of the time. Variance from the threshold value will occur during both drier and wetter hydrologic conditions and as average streamflow to MCBCP varies from the 1952-2001 balanced hydrology.

AMP participants to inform future CUP management of diversions and groundwater pumping that may affect arroyo toad breeding.

6. To the extent practicable, MCBCP will avoid water management actions during the arroyo toad breeding season that may lead to rapid or substantial changes in SMR surface flow that may adversely affect arroyo toad breeding. Where MCBCP based management actions may result in a sudden decline or increase in surface baseflows outside normal streamflow variability during the arroyo toad breeding season, these actions will be coordinated through the AMP to ensure that they are implemented in a manner that minimizes adverse impacts to all arroyo toad life stages.

7. Non-native, introduced predators and competitors represent a major threat to arroyo toad survival and reproduction (Service 1999). MCBCP will manage arroyo toad habitat as defined in the Riparian BO and as determined through further discussion with the USFWS.[7] Management actions will include control of exotic invasive wetland species (e.g., bullfrogs, crayfish, exotic reptiles, amphibians, and fishes) on the SMR from Stuart Mesa Road to the upstream property boundary of MCBCP and control of beavers on MCBCP property. The arroyo toad monitoring and management program will continue to be evaluated and updated during the future INRMP conference(s) between MCBCP and USFWS.

8. To offset unavoidable impacts to arroyo toads and their habitat caused by future CUP operations (e.g., the reduction in surface water breeding habitat and riparian foraging and sheltering habitat), MCBCP will implement the following conservation actions:

   a. MCBCP will partially offset permanent impacts to arroyo toad riparian foraging and sheltering habitat by deducting 225 acres[8] of accrued credits from their Riparian BO Habitat Ledger.
   b. MCBCP will contribute to the funding of the conservation of the Open Space Management Zone (OSMZ) within the upper SMR watershed. The OSMZ contains an estimated 37.81 acres of open water habitat suitable for arroyo toad breeding and 393.3 acres of riparian habitats suitable for arroyo toad foraging and sheltering.[9] [10]
   c. Prior to project construction, MCBCP will offset permanent impacts to arroyo toads by placing at least $2,316,000[11] in a fund (arroyo toad conservation fund) for the purpose of conserving and

[7] The Riparian BO sets minimum standards for arroyo toad management, including control of introduced predators and competitors. Where possible, MCBCP will enhance these measures as mutually agreed to during the INRMP conference.

[8] This deduction of 225 acres matches our estimate of impacts to riparian habitat at a 1:1 ratio (see "Effects of the Action" section). In addition, MCBCP determined that this is 50 percent of the total 450 acres of habitat conservation appropriate to offset project impacts (based on a 2:1 ratio of offset to impact).

[9] This arroyo toad foraging and sheltering habitat is composed of 278.05 acres of mixed riparian woodland and scrubland, and 115.25 acres of oak woodland. While arroyo toad breeding has been observed within the OSMZ, information is inadequate to determine the extent of arroyo toad occupation within the OSMZ.

[10] MCBCP will use 104.4 acres of riparian credits earned from conservation of the OSMZ to offset impacts from operation of the CUP. These 104.4 acres are equivalent to 23.2 percent of the total 450 acres of habitat conservation provided to offset project impacts. MCBCP anticipates that the remainder of the riparian credits available from conservation of the OSMZ will be used to offset future training-related impacts; the use of these remaining credits is not addressed by this consultation.

[11] The amount of project funds provided to the arroyo toad conservation fund was derived from off-setting 26.8 percent of projected operational impacts (project impacts estimated at 225 acres will be offset at a 2:1 ratio, for a total of 450 acres of habitat conservation); therefore, 26.8 percent is the equivalent to off-setting 120.625 acres of the total 450 acres. MCBCP has determined funding per acre of impact based on Appendix 1 of the Riparian BO, section 11.5.5 (Alternative Mitigation Measures). The $12,000 per acre in 1994 dollars provided in the Riparian BO

managing at-risk properties that contain significant arroyo toad breeding populations and their associated breeding habitat. This site may additionally support vireo and gnatcatcher breeding and dispersal habitat. The fund will be held by a USFWS-approved entity qualified to hold funds for conservation purposes, and the use of these funds will be subject to an agreement reviewed and approved by MCBCP, USFWS, and fund holder.

Least Bell's Vireo

9. MCBCP will continue basewide surveys for vireos on MCBCP as defined in the Riparian BO[12] and the INRMP conference with the USFWS.
10. To offset unavoidable impacts to vireos and their habitat caused by future CUP operations (e.g., the reduction in riparian breeding, foraging and sheltering habitat), MCBCP will implement the following conservation actions:
    a. MCBCP will partially offset permanent impacts to vireo riparian breeding, foraging and sheltering habitat by deducting 225 acres of accrued credits from their Riparian BO Habitat Ledger.[13]
    b. MCBCP will contribute to the funding of the conservation of the OSMZ within the upper SMR watershed. The OSMZ is estimated to contain 278.05 acres mixed riparian woodland and scrubland habitat suitable for vireo breeding, foraging and sheltering.

Southwestern Willow Flycatcher

11. MCBCP will continue basewide surveys for flycatchers on MCBCP as defined in the Riparian BO[14] and the INRMP conference with the USFWS.
12. MCBCP will fund a habitat enhancement study that is intended support flycatcher breeding requirements and offset anticipated CUP operation impacts. In coordination with the USFWS and flycatcher experts, MCBCP will develop methods and procedures to improve and maintain hydric soil conditions in areas within or adjacent to flycatcher breeding territories.
    a. Initial efforts to improve and maintain locally hydric soil conditions will include the installation of a low volume, shallow groundwater irrigation pumping well in each of three sites on the Lower SMR. Initial conceptual design of this well consists of a four inch PVC well with a DC power pump and small solar panel designed to pump 5-10 gallons per minute. The pump will be used to irrigate the riparian habitat within or adjacent to any flycatcher territory occupied in the previous year. Pumps will be operated from mid-April through the end of August.
    b. Prior to the implementation of the proposed design discussed above, alternatives to the proposed design will be discussed by MCBCP ES and USFWS, with input from flycatcher experts. Any

extrapolated forward to 2015 dollars is $19,200 per acre; 120.625 acres multiplied by $19,200 per acre is $2,316,000.

[12] MCBCP currently conducts vireo surveys on an annual basis and will continue this approach unless an alternate approach is developed in coordination with the USFWS.

[13] This 225-acre Riparian BO Habitat Ledger deduction is the same deduction as that mentioned in CM 9, not in addition to the previous deduction. Arroyo toads and vireos co-occur on the lower SMR, so the same deduction will apply to both species.

[14] MCBCP currently conducts flycatcher surveys on an annual basis and will continue this approach unless an alternate approach is developed in coordination with the USFWS.

alternative design adopted will have the same goal of promoting soil moisture and vegetation conditions that support breeding flycatchers.

c. Initial placement of the pumping wells will be based on discussion and agreement between MCBCP ES and USFWS, with input from flycatcher experts. The pumping wells will be placed in a manner to create soil moisture conditions that promote vegetation which supports breeding flycatchers. Relocation of the pumps within or between years will only occur through joint agreement between MCBCP ES and USFWS, with input from flycatcher experts.
d. Flycatcher territory and nest monitoring and associated vegetation monitoring will be used to assess the effect of the pumping wells on vegetation structure and composition and flycatcher territorial establishment and nesting success. Monitoring activities related to this effort will be coordinated in advance by MCBCP ES, USFWS, and flycatcher experts conducting the monitoring.
e. These habitat enhancement activities will be implemented prior to the beginning of CUP operations, but no later than the first flycatcher breeding season after CUP construction starts. Pumping to saturate soils will continue for a minimum of 5 consecutive years, with annual reporting and analysis of the effects of pumping on soil moisture, vegetation response, and flycatcher territorial and breeding response in the area affected. At the end of the 5-year period, a final report will be provided to USFWS, and the findings will be discussed by MCBCP ES, USFWS, and flycatcher experts prior to beginning of the next flycatcher breeding season.
f. If the methods described above are determined to have a measurable benefit in supporting flycatcher territory establishment and breeding success, then MCBCP will incorporate these efforts into their long-term management of flycatchers on MCBCP, in the INRMP. Final design of the flycatcher habitat enhancement project will be coordinated between MCBCP and USFWS.

<u>Operational Terms and Conditions Named in the Section 7 Consultation with the USFWS</u>

13. MCBCP has committed to implement all conservation measures for CUP operations as listed in the project description of USFWS 2016. If there is any uncertainty regarding the measures listed, MCBCP will coordinate with the USFWS to interpret and implement the conservation measures in a manner consistent with the effects analysis of this biological opinion or reinitiate consultation if the measures cannot be implemented as anticipated. MCBCP will continue to coordinate with the USFWS on the CUP AMP development, implementation, and modifications on at least an annual basis.

14. MCBCP will provide an annual report to the USFWS on the preceding year's observed annual surface flows on the Lower SMR to ensure compliance with incidental take triggers set for arroyo toads. Details of the report and reporting requirements can be found in USFWS 2016.

15. MCBCP will develop and implement the REHMP in coordination with the USFWS, and will use the REHMP to measure changes to native riparian vegetation on the Lower SMR and ensure compliance with incidental take triggers set for arroyo toads and vireos. Details of the REHMP can be found in SCM 2.b. and in USFWS 2016.

16. The frequency of REHMP monitoring after the initiation of CUP operations will be determined during the INMRP conference between MCBCP and the USFWS prior to 2020; the USFWS initially recommends REHMP monitoring be conducted at least once every 3 years. REHMP monitoring will be conducted consistently at a time when vegetative cover is maximal and disturbance to nesting birds will be minimal (e.g., late July – August). To account for natural variation in vegetative cover in response to hydrological cycles, measured cover values will be averaged across the most recent three REHMP monitoring efforts for comparison to 2017-2019 baseline conditions. Any future changes to the monitoring protocol or intensity will be coordinated with the USFWS prior to being

implemented to ensure consistency of comparisons to baseline conditions. After completion of any given REHMP monitoring effort, MCBCP will provide a report to the USFWS on the monitoring results. This report will: (1) provide information regarding native riparian vegetation cover in a manner comparable to information provided within the Pre-CUP baseline study; (2) compare recent observed riparian vegetation conditions to Pre-CUP baseline conditions; (3) indicate whether any observed decline in vegetation cover at any height class or vegetation category exceeds triggers set for incidental take of arroyo toads and vireos. This report will be provided to the USFWS by January of the year following the monitoring year. After providing this report, MCBCP and the USFWS will discuss this report within 60 days of submittal to determine whether the incidental take trigger is being approached or has been exceeded, and what additional measures should be implemented to ensure compliance with established triggers.

17. MCBCP will continue to conduct arroyo toad monitoring in a manner consistent with recent monitoring efforts, but will increase annual survey effort within the Lower SMR as described in SCM 2.a. Any future changes to the monitoring protocol or intensity will be coordinated with the USFWS prior to being implemented to ensure consistency of comparisons to baseline conditions. An annual report of survey results will be provided to the USFWS by January of the year following the monitoring year. After providing this report, MCBCP and the USFWS will discuss this report within 60 days of submittal to determine whether the incidental take trigger is being approached or has been exceeded, and what additional measures should be implemented to ensure compliance with established triggers.

18. MCBCP will continue to conduct vireo monitoring in a manner consistent with recent monitoring efforts. Any future changes to the monitoring protocol or intensity will be coordinated with the USFWS prior to being implemented to ensure consistency of comparisons to baseline conditions. An annual report of survey results will be provided to the USFWS by January of the year following the monitoring year. After providing this report, MCBCP and the USFWS will discuss this report within 60 days of submittal to determine whether the incidental take trigger is being approached or has been exceeded, and what additional measures should be implemented to ensure compliance with established triggers.

<u>Operational Reasonable and Prudent Measures/Terms and Conditions Named in the Section 7 Consultation with NOAA Fisheries</u>

19. MCBCP will ensure that the operation of the O'Neill Diversion weir does not preclude a properly functioning migration corridor for adult and juvenile steelhead in the Santa Margarita River from the O'Neill Diversion weir downstream to the Pacific Ocean.

    a. For the purpose of ensuring that flow criteria are met as described and provided for in the proposed action, MCBCP shall share all data with NOAA Fisheries as a result of continuously monitoring instantaneous river discharge in the Santa Margarita River immediately upstream of the O'Neill Diversion weir. MCB Camp Pendleton shall produce hydrographs during the steelhead migration season (December 1-May 31) for flows measured above 150 cfs upstream of the O'Neill Diversion weir for the duration of the proposed action. These hydrographs can be included with yearly monitoring report.

20. MCB Camp Pendleton will implement a steelhead capture and relocation protocol before dewatering efforts that is protective of adult and juvenile steelhead including parr.

    a. To minimize the adverse effects on the species from maintenance events (removal of sediment in the action area to ensure proper function of the weir and dewatering activities), MCBCP shall provide a Surface Water Diversion Plan and Sediment Maintenance Plan to NOAA Fisheries prior to implementing the proposed action. The Surface Water Diversion Plan shall include equipment proposed to be used for capturing and relocating steelhead, as part of the incidental take described above in NOAA 2016, when those actions will take place, how will steelhead be transported, and a description of the habitat where steelhead will be relocated. MCB Camp Pendleton must receive NOAA Fisheries agreement for the final Surface Water Diversion Plan and Sediment Maintenance Plan prior to implementing the Surface Water Diversion Plan and Sediment Maintenance Plan.

b. Juvenile steelhead that are unintentionally captured, collected, or trapped within the O'Neill Diversion weir (including within any fish collection device), or found, including individuals that are stranded, in the Santa Margarita River upstream or downstream of the O'Neill Diversion weir, shall be digitally photographed, measured to the nearest mm (FL), and examined for evidence of smolting (absence of parr marks, external silvering and blackened fin margins, large head, slender body and long caudal peduncle). The date and time of the capture shall be recorded and referenced to the digital photograph and measured length. Juvenile steelhead showing characteristics that are intermediate to parr and smolt (e.g., no evidence of parr marks and external silvering or blackened fin margins) will be classified as presmolt. Parr shall be released into a suitable instream area of the Santa Margarita River or adjoining tributaries upstream of the O'Neill Diversion weir. Presmolt and smolt steelhead shall be released into the Santa Margarita River immediately downstream of the O'Neill Diversion weir. If the characteristic or condition of the freshwater migration corridor throughout the Santa Margarita River downstream of the O'Neill Diversion weir is not conducive to allowing volitional migration of steelhead from the O'Neill Diversion weir to the estuary or ocean, steelhead shall be placed in an aerated container of river water and immediately transported by vehicle downstream and then released into the estuary near the mouth of the Santa Margarita River.

c. MCB Camp Pendleton shall contact NOAA Fisheries immediately if one or more steelhead are found dead or injured. The purposes of the contact shall be to review the activities resulting in take, to determine if additional protective measures are required, and to discuss handling procedures for injured or dead steelhead.

21. MCB Camp Pendleton will implement an adaptive-management plan for the purpose of effectively addressing and resolving uncertainties related to implementation of the proposed action. Details of the terms and conditions of the AMP and NMFS review schedule are found in NOAA 2016.

22. MCB Camp Pendleton will report to NMFS the activities associated with minimizing and monitoring the effects of the proposed action, and with monitoring steelhead migrants.

    a. MCB Camp Pendleton shall document evidence demonstrating compliance with term and conditions 1(a) of NOAA 2016, and submit this information to NMFS for review no later than June 30th of each year for the duration of implementing the proposed action. These annual reports shall detail the findings from the operations, monitoring and maintenance of the O'Neill Diversion Facility (including the diversion weir) for each year of operation. Each report will be provided for NMFS to review and provide guidance if necessary on one or more recommended actions to ensure operation of the diversion and weir lead to minimized adverse effects, avoiding any lapse in collecting continuous data.

    b. The data that will be collected as required by term and condition 2(a) and 2(b) of NOAA 2016 shall be recorded on standardized data sheets, along with information about river flow and water temperature, and then entered and saved into an electronic spreadsheet (Microsoft Office Excel). The electronic spreadsheet will be transmitted to an electronic address of NMFS no later than June 30th of each year for the life of the proposed action. Specific details of various aspects of the data collection, including schedules and the specific information to be collected, and how it will be reported on the electronic spreadsheet, shall be developed by MCB Camp Pendleton in cooperation with and agreement from NOAA Fisheries prior to collecting data as required by term and condition 2(a) and 2(b) of NOAA 2016.

c. MCBCP shall notify NOAA Fisheries of a problem encountered with achieving compliance with any of the Reasonable and Prudent Measures and Terms and Conditions in NOAA 2016 through electronic correspondence. Such notification shall be made to NMFS within a reasonable period of time, but in no case later than 48 hours after MCBCP's discovery of any such problem. Electronic correspondence for compliance issues shall also be documented through official correspondence to NMFS, which may require more than 48 hours for MCBCP to generate.

General Construction Conservation Measures

General Construction Measures Named in the Section 7 Consultation with the USFWS

23. All mechanized clearing and grading, vehicle traffic, equipment staging, and the deposition of soil will be confined to the footprints defined in this EIS/EIR. Construction site boundaries will be clearly delineated by flagging, stakes, survey lath, or snow fencing, as practical.

24. Contractors would be provided with digital files and hardcopy maps showing the project footprints that were used for the environmental analyses in this EIS/EIR and would be informed that construction activity must be confined within those limits. Digital files and hardcopy maps would also include the locations of federally listed species, sensitive habitats (including vernal pools), jurisdictional waters of the U.S. and cultural resources. Any work that is proposed outside those corridors would be subject to review by MCBCP ES and DET Fallbrook's Conservation Program Manager to determine if potential impacts would occur to environmental resources. Prior to the project being implemented, MCBCP ES will inform USFWS of significant changes to the project that may affect federally listed species and reinitiate consultation if necessary.

25. Project design would incorporate correct use of grading and drainage control to minimize erosion during the construction period, and procedures to ensure that slopes and backfilled areas do not erode when construction is completed. To prevent erosion and soil loss, excavation and grading during the rainy season (November 1 to May 1) would be minimized. Where it is impractical to avoid grading during the rainy season, erosion and sedimentation BMPs would be installed and maintained immediately downslope of work areas until work is completed and graded areas have been re-contoured, physically stabilized, and planted. Erosion and sedimentation BMPs would be monitored during construction to ensure stabilization of the site.

26. Project design will avoid direct and indirect impacts to riparian habitats, jurisdictional waters, and other sensitive wetlands (e.g., vernal pools) to the greatest extent feasible. The limits of sensitive wetlands will be clearly marked in the field with markers or exclusion fencing, and these restricted areas will be monitored by the project biologist during construction phases to ensure that these areas are not being directly or indirectly impacted by project activities.

27. Vernal pools have not been identified to occur within or immediately adjacent to the project footprint. If any previously undocumented and/or un-surveyed vernal pools are encountered before or during construction, these pools will be staked and protected from disturbance during pipeline construction unless and until the absence of listed species of fairy shrimp is confirmed by a USFWS-approved biologist using an approved methodology.

28. Final design of the O'Neill Headgate and Ditch improvements will include escape design elements for amphibians and mammals, as described in the Final Revised Biological Assessment dated September 2015 and other supplementary information provided during this consultation.

29. The proposed project would have a total area of greater than 1 acre (0.4 hectare) of soil disturbance and therefore, would be required to obtain coverage under the California Construction General Permit (CGP) for stormwater: SWRCB Order No. 2009-0009-DWQ (National Pollutant Discharge Elimination System [NPDES] No. CAS 000002) (SWRCB 2009a). Coverage under the CGP would be established for both traditional construction sites as well as Linear Utility Projects. Linear Utility Project activities include, but are not limited to, those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits; substructures; pipelines; towers; poles; cables; wires; connectors; switching, regulating, and transforming equipment). Soil disturbance includes, but is not limited to, clearing, grading, grubbing, excavation, demolition, stockpiling, trenching, laydown areas, and construction of access roads. The project would comply with the provisions described below:

    a. The contractor would complete a risk determination and prepare a draft Stormwater Pollution Prevention Plan (SWPPP) in accordance with the risk level requirements in the CGP. The draft SWPPP and risk determination would be submitted to the FEAD or FPUD, as applicable, for review at least 60 days prior to initiation of any soil disturbance. The risk determination and SWPPP would be prepared, stamped, and revised by a Qualified SWPPP Developer (licensed engineer, hydrologist, or other qualified professional identified in the permit).
    b. The contractor would obtain coverage under the CGP by uploading an NOI, approved SWPPP, risk determination, site map, and other supporting documentation to the California Stormwater Multi-Application and Report Tracking System (SMARTS) website. The FEAD or FPUD, as applicable, would review, certify, and submit the NOI to the SWRCB. The contractor would submit a hard copy of the certification statement from SMARTS, together with a check for the permit fee, to the San Diego RWQCB, allowing 7-14 days for fee processing. A Waste Discharge Identification (WDID) number must be received from SMARTS prior to initiation of any soil disturbance.
    c. The project would comply with all provisions described in the CGP and strictly follow the SWPPP. The SWPPP would be maintained at the project site and updated as necessary to track modifications, Best Management Practice (BMP) location and implementation, training, etc. The certification statement would be included in the on-site SWPPP.
    d. On-site stormwater compliance would be the responsibility of the contractor’s Qualified SWPPP Practitioner (certified professional identified in the CGP). The Qualified SWPPP Practitioner would be responsible for all required inspections, sampling, recordkeeping, and corrective actions. The contractor would upload all required documentation to the SMARTS website and notify the FEAD or FPUD, as applicable, that documents are ready for review, certification, and submittal.
    e. Annually by 1 August, or upon completion of construction, whichever comes first, the contractor would upload a draft Annual Report, including records of all inspection, sampling, and corrective actions to the SMARTS website. The FEAD or FPUD, as applicable, would review, certify, and submit the Annual Report to the SWRCB.
    f. Upon completion of construction, the contractor would upload the Notice of Termination (NOT) and supporting documentation to the SMARTS website. The FEAD or FPUD, as applicable, would review, certify, and submit the NOT to the SWRCB. In order to terminate coverage, the project must meet permanent stabilization requirements specified within the CGP. The Annual Report and NOT must be accepted by the SWRCB before the contractor would be released from the contract.

30. In conjunction with the SWPPP, construction-related dust will be minimized by reducing vehicle speeds and traffic in newly cleared areas and covering or lightly spraying exposed soil piles with water when weather conditions warrant. Concrete discharge will not be allowed to reach surrounding water bodies or pools unless specifically authorized in a Clean Water Act (CWA) discharge permit.
31. The project site-specific excavation, grading, and filling plans, SWPPP, and BMPs for portions of the project within Det. Fallbrook will be reviewed by the Det. Fallbrook Environmental Programs and Services Office (EPSO). The plans and BMPs will be approved by the EPSO, and any recommendations made by the EPSO will be incorporated into the project plans to ensure that soil loss and erosion at Det. Fallbrook are minimized. Within the community of Fallbrook, erosion control measure will include any additional requirements of the applicable jurisdiction. Provisions for both temporary and permanent erosion and sediment controls will be implemented in accordance with the SWPPP prepared and designed specifically for the construction sites.
32. Erosion and sedimentation controls will be monitored and maintained during construction and until disturbed areas are stabilized and not susceptible to further erosion, as approved by MCBCP ES.
33. An Operations Manual and a Facility Response Plan would be prepared according to federal regulations and USMC requirements to minimize potential adverse impacts on water quality that would result from operations and potential spill events. In addition, the contractor would implement a Spill Prevention and Response Procedures Program to prevent spills and minimize potential adverse impacts. On MCBCP, fueling of equipment would be conducted in accordance with applicable Range Regulations as well as with the MCBCP Spill Prevention, Control and Countermeasures Plan.
34. Fueling and lubrication of equipment during all phases of construction would be allowed only in designated staging areas specified on the construction maps or on construction right-of-way and would not occur within 100 ft (30 m) of drainages. Portable fuel tanks would be secured in moving vehicles to prevent spills. Emergency provisions would be in place at all crossings before the onset of construction to prevent accidental spills from contaminating downstream habitats.
35. Heavy equipment and construction activities would be restricted to existing roads and disturbed areas to the maximum extent practicable. Staging areas would be located in disturbed habitats and would be delineated on the grading plans. Vehicle operation and laydown areas would be defined by staking and flagging between stakes to prevent operations outside these areas.
36. Construction work at night would be avoided to the greatest extent possible. Where it cannot be avoided, nighttime construction lighting would be shielded so that light dispersal into adjacent native habitats is significantly reduced. Other methods of reducing light pollution (e.g., dusk-to-dawn sensor activation, motion-sensitive activation, low-lumen or limited-spectrum lighting) would also be applied as possible. Permanent outdoor lighting installed at proposed facilities would also be shielded (or use other methods of reducing light pollution; e.g., motion-sensitive activation) to maximally reduce light pollution into adjacent native plant communities.
37. To control the spread of weeds that may degrade native plant communities on MCBCP and/or DET Fallbrook, all construction equipment and vehicles would be thoroughly power-washed before entering MCBCP and/or DET Fallbrook. On MCBCP, the project biologist would identify weed species that become established at the various project sites and report all new weed species invasions to MCBCP ES.
38. All in-stream construction or dredging would incorporate equipment decontamination before construction activities begin to prevent the potential spread of non-native aquatic species.
39. Construction workers would be prohibited from bringing domestic pets to construction sites to ensure that domestic pets do not disturb or depredate wildlife in adjacent habitats.

40. The project site would be kept as clean as possible to avoid attracting predators. All food-related trash would be placed in sealed bins or removed from the site regularly.
41. All construction and maintenance-related debris would be disposed of properly and would not be discarded on site. The site would be restored to as near the original biological condition as possible once the project is completed. If MCBCP's or DET Fallbrook's USEPA hazardous waste generator identification number is utilized on the manifest for hazardous waste disposal, then the manifest would come through the responsible installation Hazardous Waste Branch office for signature.
42. Construction workers would use portable chemical toilets, with secondary containment basins to prevent spillage, during construction. Chemical toilets would not be placed within 100 ft (30 m) of riparian habitat except on existing roads.
43. Conservation measures specified herein for construction activities would also apply during operations to non-emergency maintenance or repair activities that necessitate heavy equipment operation, excavation, or vegetation removal. Such activities would be coordinated with MCBCP ES on MCBCP, with natural and cultural resource managers on DET Fallbrook, or with CDFW on non-federal land, as applicable.
44. An Emergency Response Plan would be prepared to specify measures to be taken in emergencies that pose an immediate threat to public safety or property. The plan would identify points of contact and appropriate notification and monitoring protocols in the event of potential damage to sensitive natural or cultural resources.
45. The contractor would prepare an Environmental Protection Plan (EPP) to address areas within the project footprint where environmental impacts may be encountered from active or closed Installation Restoration (IR), or Resource Conservation and Recovery Act (RCRA) sites, including munitions. For portions of the project within MCBCP, the EPP would be submitted for approval by the Naval Facilities Engineering Command Southwest (NAVFAC SW) Contracting Officer prior to the start of any construction activity. The EPP would include measures the contractor would take to prevent or control release of contaminants to air, land, and water during the construction activities. The EPP would address solid and sanitary waste management, recycling project waste and demolition debris, air pollution controls on equipment and operations, application of paints and coatings, contractor parking and laydown, equipment fueling, hazardous material use, hazardous waste storage and disposal, and procedures to follow in the event that site contamination is discovered. For portions of the project within DET Fallbrook, the EPP would be submitted to the Naval Weapons Station Seal Beach Environmental Program Services Office (EPSO) for review and approval. Any recommendations or requirements made by the EPSO would be incorporated into the EPP and implemented to ensure there are no hazardous materials or hazardous materials impacts at MCBCP and DET Fallbrook.
46. The project site-specific excavation, grading, and filling plans, SWPPP, and BMPs for portions of the project within DET Fallbrook would be reviewed by the Naval Weapons Station Seal Beach EPSO. The plans and BMPs would be approved by the EPSO and any recommendations made by the Environmental Program Services would be incorporated into the project plans to ensure that soil loss and erosion at DET Fallbrook are minimized. Within the community of Fallbrook, erosion control measure would also include any additional requirements of the applicable jurisdiction. Provisions for both temporary and permanent erosion and sediment controls would be implemented in accordance with the SWPPP prepared and designed specifically for the construction sites.

<u>Geological Resources</u>

47. Before construction begins, a project-specific geotechnical study would be conducted that would provide seismic design parameters in accordance with the Uniform Building Code and the California Building Code; specify requirements for trench excavation and pipeline construction to prevent

collapse during construction; and slope stability parameters and foundation setbacks. The geotechnical study would include the following:

a. The geotechnical report would include an evaluation of the suitability of excavated materials as trench backfill, and recommendations for screening, compaction, and filling procedures to ensure stability of the pipe bedding and cover. The geotechnical report would also evaluate the engineering characteristics of the soils in the area where the retaining walls and concrete slab apron for the inflatable weir diversion structure would be constructed and provide recommendations for slope excavation and compaction to ensure foundation stability. During the geotechnical study, soil corrosive potential would also be evaluated, and recommendations would be provided for concrete and metal component design to provide corrosion resistance as needed, and ensure slope/surface stability.
b. Design and construction procedures would use recommendations from the geotechnical study based on site specific information regarding groundwater depth and soil characteristics to minimize differential settlement in specific areas determined to be subject to liquefaction.
c. The overall project siting would conform to existing topography to minimize slope cut and fill; levees and berms would be properly designed and constructed to ensure constructed slope stability, and subsurface filling would be done in accordance with the geotechnical report recommendations for stability. These procedures would be utilized to ensure that there would be no significant impacts with respect to slope stability and landslides with implementation of the project.
d. Prior to installation of geotechnical borings, active IR and RCRA sites would be identified within or near the proposed project footprints to mitigate and/or avoid environmental impacts.

48. All new MCBCP facilities would be designed to comply with the NAVFAC P-355 Seismic Design Manual and the criteria identified. All new FPUD facilities would be constructed in accordance with FPUD design standards and any excavations in County roads or right-of-ways would be coordinated with the County and meet County of San Diego requirements.

<u>Water Resources</u>

49. For project components that would, or would be likely to, involve groundwater extraction (dewatering) at construction sites, foundation dewatering, or groundwater extraction associated with a remediation/cleanup project, MCBCP ES, DET Fallbrook’s Conservation Program Manager, or FPUD, as applicable, would be contacted for guidance. Disposal options for groundwater may include the following:

a. Discharges of uncontaminated groundwater to land would comply with the San Diego Basin Plan Conditional Waiver No. 2-“Low Threat” Discharges to Land found in San Diego RWQCB Resolution No. R9-2007-0104 (San Diego RWQCB 2007). Land applied water may not discharge to Clean Water Act (CWA) jurisdictional surface waters.
b. Discharges to the sanitary sewer system would be requested through the MCBCP ES, DET Fallbrook’s Conservation Program Manager, or FPUD, as applicable.
c. If options (a) and (b) are not feasible, discharges to storm drains or surface waters (including seasonally dry channels) would obtain coverage under the San Diego General Groundwater Permit, San Diego RWQCB Order No. R9-2008-0002 (NPDES No. CAG919002) (San Diego RWQCB 2008). Sampling and/or treatment may be required and would be the responsibility of the contractor performing the work. Application for permit coverage must be submitted to the FEAD or FPUD, as applicable, at least 60 days prior to the planned commencement of the discharge. The FEAD or FPUD, as applicable, would review and certify the application, and the

contractor would then submit the application and permit fee to the San Diego RWQCB. A WDID number must be received from the San Diego RWQCB prior to initiation of dewatering. A NOT must be accepted by the San Diego RWQCB before the contractor would be released from the contract.

50. Discharges of uncontaminated groundwater to land from well replacements and/or well development would comply with the San Diego Basin Plan Conditional Waiver No. 2-"Low Threat" Discharges to Land found in San Diego RWQCB Resolution No. R9-2007-0104 (San Diego RWQCB 2007). Land applied water may not discharge to CWA jurisdictional surface waters. MCBCP ES would be contacted for guidance.

51. For discharges of potable water resulting from hydrostatic testing, repair, or maintenance of potable water pipelines, tanks, or vessels associated with drinking water purveyance and storage, MCBCP ES, DET Fallbrook's Conservation Program Manager, or FPUD, as applicable, would be contacted for guidance. Disposal options for discharged potable water may include the following:

    a. Discharges to land would comply with the San Diego Basin Plan Conditional Waiver No. 2-"Low Threat" Discharges to Land found in San Diego RWQCB Resolution No. R9-2007-0104 (San Diego RWQCB 2007). Land applied water may not discharge to CWA jurisdictional surface waters.
    b. Discharges to the sanitary sewer system would be requested through the MCBCP ES, DET Fallbrook's Conservation Program Manager, or FPUD, as applicable.
    c. If options (a) and (b) are not feasible, discharges to storm drains or surface waters (including seasonally dry channels) would obtain coverage under the San Diego RWQCB Order No. R9-2010-0003 (NPDES No. CAG679001) (San Diego RWQCB 2010).

52. Discharges of uncontaminated slurries or drilling muds (i.e., from vertical and horizontal directional drilling) to land would comply with *San Diego Basin Plan Conditional Waiver No. 9-Discharges of Slurries to Land* found in San Diego RWQCB Resolution No. R9-2007-0104 (San Diego RWQCB 2007). MCBCP ES, DET Fallbrook Public Works, or FPUD, as applicable, would be contacted for further guidance.

53. Concreting operations would be conducted to ensure discharge water, including washout, associated with these operations does not reach surrounding water bodies or pools unless specifically authorized in a CWA discharge permit.

54. Projects on MCBCP and DET Fallbrook with a footprint of 5,000 ft^2 or greater would implement Low Impact Development (LID) features in accordance with the *Department of Defense Unified Facilities Criteria Low Impact Development* (Unified Facilities Criteria [UFC] 3-210-10) (2010) and Section 438 of the Energy Independence and Security Act (2007). A comprehensive set of stormwater planning, design, and construction elements would be used to maintain or restore predevelopment hydrology of the site with regard to volume, rate, and duration of flow, pollutant loading, and temperature for the 95^{th} percentile, 24-hour storm. LID strategies are described in detail in UFC 3-210-10, Chapter 2. These strategies address the long-term post construction (operational) phase where enduring water quality benefits are provided by low impact design, source controls, and treatment controls. Depending on site conditions, purpose, and surrounding landscape, strategies would include, but not be limited to, the following:

    a. Integrating detention basins, biofiltration cells, vegetated swales, infiltration strips, or other similar earth-based vegetated system for accepting and conveying runoff associated with new paved surfaces and other permanent impervious features. Designs should consider, but not be limited to, increasing the size of local flood control sites serving the project areas or including detention/retention systems in designs for parking areas or other sites.

b. Optimizing the use of suitable pervious materials for hardscaped surfaces (e.g., porous pavements, gravel walkways, grass pavers, etc.).
c. Maximizing soft-bottom drainage that is amenable to vegetative planting and natural treatment of runoff.
d. Integrating natural rock or similar material for protection against scour and sediment transport at discharge points and on stream banks of soft-bottom drainages.
e. Integrating meandering pathways within soft-bottom watercourses for increased residence time and improved vegetated runoff treatment.
f. Incorporating low-flow pathways for new hardscaped impervious drainages (e.g., concrete channels) to concentrate dry-weather flows along the thalweg (i.e., lowest point of flow), minimize vegetative growth, and reduce long-term maintenance.
g. Enhancing stormwater infiltration in areas of poor soil permeability by incorporating buried recharge conveyance components (e.g., buried roof downspouts, subdrains for vegetated areas).
h. Selecting and designing project-related access routes to minimize impacts to receiving waters, in particular the discharge of identified pollutants to an already impaired water body.
i. Designing projects located within the 100-year flood zone to minimize the risk of property loss, injury, or death from flooding events.

Biological Resources Measures Named in the Section 7 Consultation with the USFWS

Temporary Impact Restoration and Permanent Impact Compensation

55. After final design of the project, the design contractor will provide geographic information system (GIS) shapefiles, including the project footprint and amount/type of vegetation impacted (including both temporary and permanent), to MCBCP ES. MCBCP will provide the USFWS with summary tables showing amount/type of vegetation impacted (including both temporary and permanent) based on final project designs.

56. After construction impacts to vegetation, the construction contractor will provide GIS shapefiles, including the project footprint and amount/type of vegetation impacted (including both temporary and permanent), to MCBCP ES. MCBCP will provide the USFWS with summary tables showing amount/type of vegetation impacted (including both temporary and permanent) based on actual project impacts.

57. Temporary impacts to riparian vegetation, arroyo-toad occupied upland vegetation[15], gnatcatcher-occupied coastal sage scrub (CSS) and Stephens' kangaroo rat (SKR) habitat from project construction will be restored onsite following impact.

Riparian Restoration

a. Temporary impacts to riparian vegetation will be restored consistent with the Biological Opinion for Programmatic Activities and Conservation Plans in Riparian and Estuarine/Beach Ecosystems on Marine Corps Base, Camp Pendleton (Riparian BO). [16]

[15] Restoration applies only to native upland vegetation occupied by arroyo toads (e.g., CSS, oak woodlands, native grasslands). This measure does not apply to non-native grasslands or previously disturbed habitats.

Restoration of Upland Habitats Occupied by Arroyo Toad, Gnatcatcher and SKR

a. For restoration of temporarily impacted upland arroyo toad, gnatcatcher and SKR habitat, a Work Plan will be developed and approved by MCBCP ES and Det. Fallbrook's CPM prior to restoration implementation. The plan will include the proposed restoration locations (including GIS shapefiles with the submittal), methods that will be used to restore habitat, and pre-restoration site photos (see CM-58f).
b. Restoration will consist of targeted application of herbicide for 3 years at each temporary restoration location, with a list of target species provided to the contractor by MCBCP ES and Det. Fallbrook's CPM.
c. To successfully restore the area to native vegetation, the topsoil in these areas will be salvaged during construction, stockpiled, and then reapplied as the surface horizon where applicable. Where feasible, topsoil may be taken from permanently impacted areas and reapplied to the surface horizon of temporarily impacted areas.
d. Where applicable (e.g., in large disturbed areas), hydroseed with an appropriate native seed mix may be applied to assist with restoration.
e. The contractor will provide photos at 20 point locations to assess the progress of restoration. Photos shall be taken prior to construction, prior to restoration, and after the completion of restoration (i.e., after 3 years of targeted herbicide application).
f. A Final Report will be developed and approved by MCBCP ES and Det. Fallbrook's CPM after the completion of restoration and provided to the USFWS. The report will include the restoration locations (including GIS shapefiles with the submittal), methods that were employed to restore habitat, restoration site photos, and a subjective assessment of restoration success.

58. In addition to restoration of temporarily impacted riparian habitat, MCBCP will compensate for temporary impacts to riparian habitat that extend over one riparian bird breeding season (March 15 to August 31) in compliance with the Riparian BO. The amount of compensation is dependent upon the temporary effect period of the Riparian BO (e.g., temporary effects that are greater than one breeding season, but are less than two breeding seasons, require 25 percent compensation). MCBCP will offset these extended temporary impacts by deducting the appropriate amount of accrued credits from their Riparian BO Habitat Ledger.[17]

59. Final designs for construction will minimize the removal of riparian habitat. Any reduction of permanent impacts to riparian habitat achieved as a result of further minimizing the project footprint will proportionately reduce the amount of compensation required. Permanent impacts to occupied riparian habitat related to construction will be offset in accordance with formulas specified in the

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[16] Per U.S. Army Corps of Engineers (USACE) requirements, impacts to jurisdictional wetlands and other waters of the U.S. will require mitigation, with the development of a Mitigation and Monitoring Plan. A copy of the final Mitigation and Monitoring Plan will be submitted to USFWS upon completion and approval by the USACE; USFWS will review this plan to determine whether it also offsets impacts to federally listed species.

[17] The "Riparian BO Habitat Ledger" is an accounting of riparian habitat improvement credits accrued by systematic removal of giant reed (*Arundo donax*) on MCBCP. While the Riparian BO specifies acreage ratios of giant reed that will be removed to offset project impacts to riparian habitat on MCBCP, the Marine Corps has proactively removed giant reed ahead of project impacts to create an immediate benefit to riparian species. In proactively removing giant reed, the Marine Corps has built up riparian enhancement "credits" that can be deducted for future project impacts. The Marine Corps tracks these credits and project impact "debits" and reports the balance to USFWS as the "Riparian BO Habitat Ledger" as part of the annual Riparian BO reporting requirement.

Riparian BO (typically at a 2:1 ratio). MCBCP will offset these permanent impacts by deducting the appropriate amount of accrued credits from their Riparian BO Habitat Ledger.

60. Final designs for construction will minimize the removal of CSS that has the potential to support gnatcatchers. Any reduction of permanent impacts to gnatcatcher-occupied CSS achieved as a result of further minimizing the project footprint will proportionately reduce the amount of conservation MCBCP will commit to offset impacts. Permanent impacts to gnatcatcher-occupied CSS will be offset at a 2:1 ratio. MCBCP will implement one of two alternative strategies to offset permanent impacts to occupied CSS:
    a. CSS credit purchase at the Buena Creek Conservation Bank or other USFWS-approved CSS bank off of MCBCP.
    b. CSS restoration at the Lima CSS Restoration Area[18] on MCBCP.

61. Final designs for construction will minimize impacts to upland habitats that have the potential to support arroyo toads. Any reduction of permanent impacts to upland habitats occupied by arroyo toads achieved as a result of further minimizing the project footprint will proportionately reduce the amount of conservation MCBCP will commit to offset impacts. MCBCP will offset the permanent impacts to upland arroyo toad habitat by deducting the appropriate amount of accrued credits (at a ratio of 0.5:1) from their Riparian BO Habitat Ledger.

Primary Project Biologist

62. A primary project biologist would oversee avoidance and minimization measures specified within these conservation measures. Different project biologists may be designated for specific measures listed based on the qualifications necessary to satisfy the specific measure. If multiple project biologists are required, their activities would be coordinated through one primary project biologist. The primary project biologist would have sufficient training and experience to identify all of the federally listed species and their habitats that are likely to be encountered within or near the project footprint. The project biologist(s) would have experience and training necessary to conduct tasks described in BO for this project. Required experience for the project biologist(s) will include but is not limited to the following:
    a. The project biologist will have experience in wetland biology necessary to fulfill the requirements of the Clean Water Act Sections 401 and 404 if applicable.
    b. The project biologist will be knowledgeable of and able to identify weed species listed in the California Invasive Plant Inventory to assist with weed control and restoration activities.
    c. The project biologist for measures associated with arroyo toads (ARTOs) will have at least 2 years of independent experience conducting arroyo toad surveys and have demonstrated experience in handling arroyo toads.
    d. The project biologist for measures associated with the flycatcher will be a trained ornithologist with at least 40 hours of observation in the field with the target species and documented experience locating and monitoring nests of the target species.
    e. The project biologist for measures associated with SKR will have at least 10 years of experience trapping both SKR and Dulzura kangaroo rat (*Dipodomys simulans*; DKR). At a minimum, the project biologist will have at least 40 sessions of supervised SKR trapping across multiple areas,

[18] The Lima CSS Restoration Area occurs within a portion of the Lima Training Area on MCBCP. The USFWS-approved restoration plan for this area was the subject of a previous informal consultation (FWS-MCBCP-12B0197-12I0337).

including areas where both SKR and DKR co-occur, with a demonstrated ability to distinguish identifying features of these two species; supervised handling and identification of at least 20 SKR and 20 DKR during trapping sessions; demonstrated ability to identify appropriate SKR habitat, develop appropriate trap-placement designs, set and bait traps, and safely extract and handle all species that may be captured.

63. For construction on MCBCP and DET Fallbrook, a contractor education program would be conducted by the primary project biologist with oversight by MCBCP ES personnel and the Conservation Program Manager on DET Fallbrook. It would be conducted during all project phases and cover the potential presence of listed species; the requirements and boundaries of the project; the importance of complying with avoidance, minimization, and compensation measures; and problem reporting and resolution methods. MCBCP and DET Fallbrook would ensure the placement of signs indicating the necessity for all activities to be strictly confined to the project site.
64. The primary project biologist would monitor all construction activities to ensure compliance with compensation measures and would keep the FEAD Construction Manager and MCBCP ES and DET Fallbrook, as applicable, informed of construction activities that may threaten significant biological resources, particularly sensitive species and their habitats.
65. The primary project biologist would provide electronic versions of monthly biological monitoring reports to MCBCP ES and DET Fallbrook. All observed or suspected (e.g., due to unauthorized impacts to occupied habitat) injury or mortality of federally-listed species will be reported electronically to MCBCP ES and/or the Det. Fallbrook CPM within 24 hours of the initial observation.
66. The primary project biologist would have the ability to halt construction activities, if necessary, to avoid unanticipated impacts to sensitive resources. If it is necessary to halt construction activities, the project biologist would contact MCBCP ES and DET Fallbrook immediately to discuss appropriate actions. As needed, MCBCP ES and DET Fallbrook staff would confer with the USFWS to ensure the proper implementation of species and habitat protection measures. The project biologist would provide a brief written report of the incident within 24 hours of the action to the FEAD Construction Manager and MCBCP ES and/or DET Fallbrook, as applicable.

Seasonal Restrictions

67. All vegetation clearing required by the proposed project would occur outside of the nesting season for avian species (February 15 to August 31); i.e., vegetation clearing will occur from September 1 to February 14.
68. Grading during the rainy season (November 1 to May 1) will be minimized. Where it is impractical to avoid grading during the rainy season, erosion and sedimentation BMPs will be installed and maintained immediately downslope of work areas until work is completed and graded areas have been re-contoured, physically stabilized, and planted.

Arroyo Toad Year-Round Measures

All construction activities within arroyo toad breeding and upland habitats will apply the following measures year round:

69. The ARTO project biologist will monitor all construction activities in and adjacent to occupied ARTO riparian and aestivation habitat to ensure compliance with all relevant conservation measures and will keep MCBCP ES informed of construction activities that may threaten arroyo toads. The project biologist will ensure that incidental disturbance is minimized and limited to activities essential to the project in accordance with this biological opinion.

70. The ARTO biologist would also be on call and available as needed at other times in the event that an ARTO is encountered during project activities. The ARTO biologist would be present onsite full-time for the 3 days following any measurable rainfall event (i.e., 0.05 inch or greater) or other appropriate climatic conditions (e.g., high relative humidity and moderate temperatures) that are likely to elicit above-ground ARTO movement.
71. The ARTO biologist will monitor for arroyo toads within both breeding and aestivation habitat during excavation.
72. Any ARTOs found within the project footprint would be captured and released by the ARTO biologist to the closest area of suitable habitat outside the project footprint but in the same watershed. The ARTO biologist will immediately notify MCBCP ES regarding any arroyo toads relocated; MCBCP ES will report any ARTO relocation to USFWS within 2 working days.
73. Dirt/sand piles left overnight would be covered with tarps or plastic with the edges sealed with sandbags, bricks, or boards to prevent ARTOs from burrowing into the dirt. Holes or trenches would be covered with material such as plywood or solid metal grates with the edges sealed with sandbags, bricks, or boards sufficient to prevent wildlife from falling into holes or trenches. If toads are observed in or adjacent to the project work site, work would stop immediately and MCBCP ES notified.
74. The ARTO biologist will be present at the end of the day to ensure that the excavations are properly covered to prevent toads from entering any open pits and trenches.
75. The ARTO biologist will be present each morning before construction activities begin and during removal of excavation unit covers and soil stockpile tarp, to ensure that arroyo toads have not entered the project site. In the event soil piles have not been covered properly, the biologist will sift through the top 8 inches of soil to ensure arroyo toads are not present.
76. All nighttime construction activities would be prohibited in and/or adjacent to occupied ARTO habitat. In addition, to the greatest extent possible, access to the project construction site would occur via preexisting access routes. Project-related vehicle traffic would be limited to daylight hours, as ARTO movement across roadways occurs primarily during nighttime hours.
77. Ingress and egress of construction equipment and personnel would be kept to a minimum and would use a single access point to the site where possible.
78. Dust control measures (i.e., water truck spraying) will be conducted in a manner to avoid attracting arroyo toads into project activity areas. All road watering activities will be restricted to only the areas in need of compaction (e.g., hard pack areas of roads and work areas) and not over-spray in adjacent areas. This watering will be conducted with a hose. Watering into the edges of the site will be minimized as much as possible. Water trucks will be limited to 5 miles per hour, and no other vehicles will follow the water truck for at least 5 minutes after spraying to minimize mortality of arroyo toads that may be attracted to the sprayed area.
79. If pipelines are constructed above ground in occupied ARTO habitat, they would be raised to allow toad passage under the pipes.

Arroyo Toad Breeding Season Measures

All construction activities within arroyo toad breeding habitats during the breeding season for arroyo toad (March 15 to August 15) will apply the following measures:

80. Temporary silt fencing would be installed around the perimeter of all work areas within occupied ARTO breeding habitat with the ARTO biologist present.

a. The silt fencing would be installed at least 14 days prior to construction to allow enough time for ARTO surveys to be completed during optimal weather conditions. MCBCP ES would provide requirements for the toad fencing to the contractor.
b. All fencing materials (i.e., mesh, stakes) would be removed following construction.
c. If construction within a designated area extends between two arroyo toad breeding seasons (e.g., construction of the new weir structure), fencing will remain in place and maintained through the non-breeding season until construction in this area is completed. Where removal of fencing may be warranted due to extended periods of inactivity, the arroyo toad biologist will discuss with MCBCP ES. MCBCP ES will discuss with USFWS, and they will jointly determine the appropriate course of action.
d. Where fencing may not be warranted due to climatic conditions, topography, or other factors, the arroyo toad biologist will discuss with MCBCP ES. MCBCP ES will discuss with USFWS, and they will jointly determine the appropriate course of action.

81. After exclusionary fencing has been installed within work areas located in occupied ARTO breeding habitat, but prior to initiation of construction, at least 3 nighttime surveys for ARTOs would be conducted within the fenced area by the ARTO biologist. These surveys would be conducted during appropriate climatic conditions and during the appropriate hours (i.e., evenings, nights, and mornings) to maximize the likelihood of encountering ARTOs. If climatic conditions are not highly suitable for ARTO activity, ARTO habitat in the project footprint would be watered to encourage aestivating toads to surface. All ARTOs found within the project area would be captured and translocated by the project biologist to the nearest suitable riparian habitat. Upon completion of these surveys and prior to initiation of construction activities, the project biologist would report the capture and release locations of all ARTOs found and relocated during this initial survey to MCBCP ES, who in turn would submit it to the USFWS.
82. After the initiation of construction, the arroyo toad biologist will be present each morning before construction activities begin to check the integrity of the arroyo toad fence and locate and remove any arroyo toads that may have entered the area. The arroyo toad biologist will be present at the end of the day to check the integrity of the arroyo toad fence.
83. The ARTO biologist would survey the area inside the fence just prior to ground disturbing activities.
84. If arroyo toad egg masses or larvae are found within permanent or temporary impact areas during construction (e.g., in the open water habitat in the Santa Margarita River), the ARTO biologist will discuss with MCBCP ES. MCBCP ES will discuss and jointly determine appropriate additional measures with USFWS, such as translocation or other conservation measures. If relocation of egg masses is deemed appropriate, the project biologist will report the original and new locations of all egg masses/larvae found and relocated to MCBCP ES, who will submit this report to USFWS.

Least Bell's Vireo

85. Construction at the Lower SMR Crossing[19] will only occur during the non-breeding season for the vireo (i.e., construction will occur from September 1 to March 14).

[19] The Lower SMR Crossing refers to the new collection system pipeline that will be installed across the SMR in the Chappo Sub-Basin; this pipeline will be installed within the footprint of an existing dirt road crossing the SMR just downstream from MCAS Camp Pendleton.

86. To the maximum extent possible, construction and other project-related activities that occur within 250 feet of occupied vireo habitat will take place outside the vireo breeding season (March 15 to August 31).

Southwestern Willow Flycatcher

87. Construction at the Lower SMR crossing will only occur during the non-breeding season for the flycatcher (i.e., construction will occur from September 1 to March 14).
88. For portions of the project footprint other than the Lower SMR crossing, construction activities will not occur within 250 feet of occupied flycatcher habitat during the breeding season (May 1 to August 31). Occupation by flycatchers will be based on the following:
    a. Any areas mapped as territorial flycatcher habitat in either of the preceding 2 calendar years will be considered occupied flycatcher habitat.
    b. In addition to 89a. described above, if construction will occur within or adjacent to any suitable flycatcher habitat[20] from June 8 to August 31, then current flycatcher occupation will be determined based on basewide flycatcher surveys being conducted in the same calendar year or project-specific surveys.
        i. To determine current flycatcher occupation, MCBCP ES will provide the primary project biologist with two reports showing the current mapped flycatcher locations and breeding status from ongoing annual basewide flycatcher surveys:
            - A report on June 7, 7 days after the end of the 1st flycatcher survey period (May 15-31).[21]
            - A report on July 1, 7 days after the end of the 2nd flycatcher survey period (June 01-24).
    c. If annual basewide flycatcher survey information is not available, project-specific flycatcher surveys will be conducted in addition to 89a. described above. All activities that occur within 250 feet of riparian habitat during the breeding season will apply the following measures:
        ii. The flycatcher biologist will conduct pre-construction surveys for active flycatcher nests in all riparian habitat within 250 feet of the construction/maintenance footprint. Pre-construction surveys will consist of three surveys spaced evenly in time over the 2 weeks immediately prior to construction activities.
        iii. During ongoing construction during the breeding season in riparian habitat, the flycatcher biologist will conduct weekly surveys (prior to 11:00 a.m.) within the previously identified occupied habitat to determine the status of nesting flycatchers.
        iv. The flycatcher biologist will provide an electronic report of nest survey results to MCBCP ES within 7 days of completing the survey; MCBCP ES will forward this report to USFWS.
        v. The primary project biologist will use criteria and information as defined above to ensure that construction avoids flycatcher breeding locations as required during the breeding season.

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[20] Suitable flycatcher habitat is defined as any areas mapped as territorial flycatcher habitat in any of the preceding five calendar years.

[21] The 1st survey period encompasses the period when either breeding flycatchers or migrants can be encountered; the 2nd survey period encompasses the period when only breeding individuals are present. On MCBCP, breeding flycatchers can occur as early as May 1, so surveys are typically initiated on or before May 1.

Coastal California Gnatcatcher

89. To the maximum extent possible, construction and other project-related activities that occur within 250 feet of occupied gnatcatcher habitat will take place outside the gnatcatcher breeding season (February 15 to August 31).

Stephens' Kangaroo Rat

90. Final designs for the project and construction schedule in potential SKR habitat will be reviewed and approved by MCBCP ES and the Det. Fallbrook CPM before construction activities are initiated. Pipeline construction in suitable and occupied SKR habitat will avoid and minimize potential impacts to SKR and its habitat to the maximum extent practicable.

91. Since small mammal populations are not static temporally or spatially, all survey data, including the most current SKR survey data for MCBCP and Det. Fallbrook, will be compiled and used in identifying areas to be potentially avoided during construction activities.

92. Within 4 weeks prior to initiation of construction activities at any particular location and before exclusionary fencing is erected, the project biologist will conduct a preliminary SKR survey within 50 feet of the project footprint in all areas likely to be occupied by SKR. The project biologist will:

    a. Mark all active and potentially active kangaroo rat burrows within or adjacent to the area that will be affected by construction activities and create a 15-foot buffer around the burrow to encompass the entire underground portion of the burrow. Burrow locations and other kangaroo rat sign will be mapped and provided to MCBCP ES, the Det. Fallbrook CPM, and USFWS prior to initiation of construction activities.
    b. Conduct 3 nights of trapping at each location where kangaroo rat burrows or other sign are located within the proposed project footprint or an adjacent 50-foot buffer on either side of the project footprint. Trapping will be used to distinguish between SKR and the closely related DKR. DNA samples may be requested by the Det. Fallbrook CPM for genetic confirmation of species identifications. Locations of SKR caught during trapping will be mapped and provided to MCBCP ES, the Det. Fallbrook CPM, and USFWS prior to initiation of construction activities. A table will be included showing the anticipated permanent and temporary impacts to kangaroo rat burrowing and foraging habitat22 based on final project designs. If project impacts exceed those anticipated in this biological opinion, MCBCP will reinitiate consultation.

93. Prior to construction in or near SKR-occupied areas, exclusionary fencing will be installed and maintained along portions of the project where SKR occur within 100 feet of the bi-directional pipeline footprint. Fencing will extend for at least 100 feet along the construction footprint boundary in each direction from the location of any SKR location mapped within 100 feet of the footprint. Fencing will minimize the likelihood that SKR will enter the project footprint and be crushed or trapped during project construction. The need for exclusionary fencing will be determined on a case by case basis at the discretion of MCBCP ES and the Det. Fallbrook CPM in coordination with the project biologist.

94. SKR trapping and relocation in advance of project activities may be conducted in limited instances where it is determined that any SKR trapped may be safely relocated outside the project footprint

[22] SKR burrowing and foraging habitat is defined as a 165-foot buffer around SKR burrow complexes and/or locations where SKR were trapped, unless otherwise excluded by topography or other physical features (e.g., paved road).

(i.e., outside of the exclusionary fence) within a portion of its likely home range. The need for trapping and relocation will be determined on a case by case basis at the discretion of MCBCP ES and the Det. Fallbrook CPM in coordination with the project biologist. MCBCP ES will report any attempt to trap and relocate SKR to USFWS within 2 working days.

95. The project biologist will be on site during construction site fencing, trenching, and other construction-related activities with the potential to impact SKR. Any SKR found incidentally during construction activities that can be safely captured by the project biologist will be relocated to suitable habitat outside of the project footprint. Any incidental relocation of SKR by the project biologist will be reported to MCBCP ES and the Det. Fallbrook CPM; MCBCP ES will report any SKR relocation to USFWS within 2 working days.

96. The destruction of potential SKR burrows that show signs of current use or occupancy and patches of occupied habitat will be avoided to the maximum extent feasible. To the extent feasible, a 15-foot buffer around SKR burrows will also be avoided to maintain the integrity of underground burrow systems. The status of burrows occurring within construction areas will be determined by the project biologist. All burrows and patches of occupied habitat to be avoided will be flagged by the project biologist before the initiation of construction activities and indicated on project maps provided to the contractor.

97. Stockpiled soils will be covered with plastic or other material deemed suitable by the project biologist, and the edges will be held in place by sandbags at the end of each work day. The project biologist will inspect covered stockpiles daily for gaps or sign that small mammals, including SKR, have accessed the soils underneath and will be present when these covers are removed. If burrows characteristic of SKR are found, the burrows will be excavated and any SKR found will be relocated by the project biologist to suitable habitat adjacent to the project footprint.

98. Open trenches will be covered or ramped (e.g., soil slope for easy egress) each evening at the completion of work. Trench covers will consist of rigid boards or plates that cover all openings into the exposed trench. The project biologist will be present when the boards or plates are removed and will relocate any SKR that may have entered the trench during the night to suitable habitat adjacent to the project footprint.

99. All nighttime construction activities will be prohibited in and/or adjacent to areas occupied by SKR. This includes transportation to and from the project site when the route passes through or adjacent to occupied SKR habitat.

100. No construction activities within occupied SKR habitat will occur during rainy periods when burrows may be more susceptible to collapse and degradation from vehicular and foot traffic.

101. The project biologist will inspect the construction area each morning before the start of activities and monitor subsequent construction activities in potential SKR habitat. Torpid or injured animals (unable to flee) may be temporarily held and transported to an ES and USFWS-approved location for care and/or rehabilitation. Recovered animals will be returned to an ES and USFWS-approved release site.

102. All road watering activities will be restricted to only the areas in need of compaction (e.g., hard pack areas of roads and work areas) and not over-spray in adjacent grasslands. This watering will be conducted with a hose. Watering into the edges of the site (weeded/grassy/vegetated areas) will be minimized as much as possible. Water trucks will be limited to 5 miles per hour, and no other vehicles will follow the water truck for at least 5 minutes after spraying to minimize mortality of SKR that may be attracted to the sprayed area.

San Diego and Riverside Fairy Shrimp

103. Any previously undocumented and/or unsurveyed vernal pools encountered during construction would be staked and protected from disturbance during pipeline construction unless and until the absence of listed species of fairy shrimp is confirmed by a qualified (USFWS-permitted) biologist using an approved methodology.

Construction Terms and Conditions Named in the Section 7 Consultation with the USFWS

104. At least 14 days prior to initiating any portion of CUP construction activities that will directly impact habitat that supports listed species or has a high potential to support listed species, MCBCP will submit to the USFWS (via email or mail) a figure showing the impact area based on final project designs relative to the impact area depicted in the BA. The figure will include vegetation mapping and all federally listed species observations from basewide and project-specific surveys (identified to the year and source of the survey) and a table showing the final permanent and temporary impacts by habitat type. If the project is implemented in phases (e.g., weir construction and O'Neill Ditch upgrade, new wells and collection pipeline, bi-directional pipeline, etc.) and submittals are made for each phase, the table showing the permanent and temporary impacts by habitat type will provide information for the current phase submitted, each previous phase submitted, and the cumulative impacts to date.

105. MCBCP has committed to implement all CUP construction conservation measures listed in the project description of USFWS 2016. If there is any uncertainty regarding the measures listed, the Marine Corp will coordinate with the USFWS to interpret and implement the conservation measures in a manner consistent with the effects analysis of this biological opinion or reinitiate consultation if the measures cannot be implemented as anticipated.

106. MCBCP will provide annual reports on the status of CUP construction until all CUP construction is completed.

107. Prior to initiating construction activities in suitable arroyo toad riparian and upland vegetation, MCBCP will provide to the USFWS (via email or mail) the results of the pre-construction arroyo toad surveys, including the number of arroyo toads captured and relocated for the project phase (as described above) being implemented, the cumulative number of arroyo toads captured and relocated as a result of completed phases of the project, the project-specific and cumulative number of individuals killed or injured during capture and relocation efforts, and a map indicating where arroyo toads were captured and released relative to the project area. The purpose of this notification is to ensure that the impacts to arroyo toad from CUP construction do not exceed the exempted amount of take based on number of individuals captured within the project footprint.

108. Within 30 days of completing construction activities for a particular phase (as described above) of the project, MCBCP will notify the USFWS (via email or mail) of any arroyo toads that were captured and relocated during construction activities. This notification will include the number of arroyo toads captured and relocated in association with the particular phase of CUP construction being addressed, the cumulative arroyo toads captured and relocated as a result of all completed phases of CUP construction, the phase-specific and cumulative number of individuals killed or injured during capture and relocation efforts, the phase-specific and cumulative number of individuals killed or injured as a result of construction activities, and a map indicating where arroyo toads were captured and released relative to the footprint of that construction phase. The purpose of this notification is to ensure that the impacts to arroyo toad from CUP construction do not exceed the exempted amount of take based on number of individuals captured and relocated, number of individuals killed or injured during capture and relocation, or number of individuals killed or injured as a result of construction activities.

109. Within 30 days of completing removal of arroyo toad riparian and upland vegetation for a particular phase (as described above) of CUP construction, MCBCP will notify the USFWS (via email or mail) of the total amount of arroyo toad riparian and upland habitat removed in association with CUP construction activities for a particular phase and the cumulative amount of riparian and upland vegetation removed as a result of all phases completed to date. The purpose of this notification is to ensure that the impacts to arroyo toad from CUP construction do not exceed the exempted amount or extent of take based on impacts to arroyo toad habitat.

110. If death or injury of any arroyo toad is observed in association with capture and relocation activities or construction activities within the footprint for any phase of CUP construction, MCBCP will notify the USFWS within 1 business day and submit a written report (via email or mail) describing the incident within 2 business days so that the activities resulting in take can be reviewed to determine if additional protective measures are required.

111. Prior to initiating construction activities for any particular phase of the CUP, MCBCP will review the latest annual basewide survey data to verify that no more than 10 vireo territories (total) will be substantially impacted (i.e., more than 20 percent of a pair's territory will be impacted) by CUP construction and that no more than 31 vireo territories overlap with any portion of the CUP construction footprint. Prior to initiating activities for any particular phase of construction, MCBCP will provide to the USFWS a map (via email or mail) showing the most recent distribution of vireos relative to the footprint for that phase, an estimate of the number of vireo territories that overlap with the project footprint and will be substantially impacted by that phase, and the cumulative total of vireo territories that overlap with and are substantially impacted by all phases of CUP construction initiated to date. The purpose of this notification is to ensure that impacts to vireos from CUP construction do not exceed the exempted amount of take based on the number of vireo territories in the project footprint.

112. Within 30 days of completing removal of vireo habitat for a particular phase (as described above) of CUP construction, MCBCP will notify the USFWS (via email or mail) of the total amount of vireo habitat removed in association with CUP construction activities for a particular phase and the cumulative amount of vireo habitat removed as a result of all phases completed to date. The purpose of this notification is to ensure that the impacts to vireo from CUP construction do not exceed the exempted amount or extent of take based on impacts to vireo habitat.

113. Prior to initiating construction activities for any particular phase of the CUP, MCBCP will review the latest annual basewide survey data to verify that no more than two gnatcatcher territories (total) will be substantially impacted (i.e., more than 20 percent of a pair's territory will be impacted) by CUP construction and that no more than nine gnatcatcher territories overlap with any portion of the CUP construction footprint. Prior to initiating activities for any particular phase of construction, MCBCP will provide to the USFWS a map (via email or mail) showing the most recent distribution of gnatcatchers relative to the footprint for that phase, an estimate of the number of gnatcatcher territories that overlap with the project footprint and will be substantially impacted by that phase, and the cumulative total of gnatcatcher territories that overlap with and are substantially impacted by all phases of CUP construction initiated to date. The purpose of this notification is to ensure that impacts to gnatcatchers from CUP construction do not exceed the exempted amount of take based on the number of gnatcatcher territories in the project footprint.

114. Within 30 days of completing removal of CSS for a particular phase (as described above) of CUP construction, MCBCP will notify the USFWS (via email or mail) of the total amount of CSS removed in association with CUP construction activities for a particular phase and the cumulative amount of CSS removed as a result of all phases completed to date. The purpose of this notification is to ensure that the impacts to gnatcatchers from CUP construction do not exceed the exempted amount or extent of take based on impacts to gnatcatcher habitat.

115. Prior to initiating CUP construction activities for the bi-directional pipeline within SKR habitat, MCBCP will provide to the USFWS (via email or mail) the results of the pre-construction SKR surveys, including the number of SKR captured and relocated, the number of individuals killed or injured during capture and relocation efforts, and a map indicating where SKR were captured and released relative to the project area. The purpose of this notification is to ensure that the impacts to SKR from CUP construction do not exceed the exempted amount of take based on the estimated number of SKR in the project footprint.

116. Within 30 days of completing construction activities for the bi-directional pipeline within SKR habitat, MCBCP will notify the USFWS (via email or mail) of any SKR that were captured and relocated during construction activities. This notification will include the number of SKR captured and relocated, the number of SKR killed or injured during capture and relocation efforts, and a map indicating where SKR were captured and released relative construction footprint. The purpose of this notification is to ensure that the impacts to SKR from CUP construction do not exceed the exempted amount of take based on number of individuals captured and relocated, number of individuals killed or injured during capture and relocation, or number of individuals killed or injured as a result of construction activities.

117. Within 30 days of completing impacts to SKR habitat for construction of the bi-directional pipeline, MCBCP will notify the USFWS (via email or mail) of the total amount of SKR habitat impacted in association with CUP construction activities. The purpose of this notification is to ensure that the impacts to SKR from CUP construction do not exceed the exempted amount or extent of take based on impacts to SKR habitat.

118. If death or injury of SKR is observed in association with capture and relocation activities or construction activities for the bi-directional pipeline, MCBCP will notify the USFWS within 1 business day and submit a written report (via email or mail) describing the incident within 2 business days so that the activities resulting in take can be reviewed to determine if additional protective measures are required.

<u>Construction Reasonable and Prudent Measures/Terms and Conditions Named in the Section 7 Consultation with NMFS</u>

119. MCBCP shall direct the design team to prepare feasibility-level designs and produce design-package submittals for NMFS' review and comment as described in NOAA 2016.

120. MCBCP shall submit a draft schedule for the design and project implementation to NMFS within 120 days after issuance of the final biological opinion. The schedule shall indicate target time frames for each stage of the design process and deliverables to NMFS for all submittals required under each reasonable and prudent measure. In addition, the draft schedule shall identify approximate time frames to achieve major milestones in the construction and facility start-up phase. The construction and start-up schedule may be revised by agreement between MCBCP and NMFS during the design process as more information is developed. NMFS anticipates that design, construction, and facility startup could conceivably occur within 3 years after commencement of the formal design process. However, the ultimate deadline for implementation and operations is on or before April 1, 2019, when construction authority expires under the Omnibus Public Land Management Act of 2009 (Title IX, Section 9108).

<u>Cultural Resources</u>

121. Should buried cultural resources and/or human remains be encountered during any construction activities on MCBCP or DET Fallbrook, the discovery would be treated according to procedures outlined in the MCBCP Integrated Cultural Resource Management Plan (ICRMP) or DET Fallbrook ICRMP, respectively. These procedures are also specified in 36 CFR § 800.13, the implementing regulations of the NHPA, while Native American Graves Protection and Repatriation Act would be

applied if any human remains are identified as having Native American decent. Should buried cultural resources and/or human remains be encountered during construction activities on non-DOD lands, the discovery would be treated according to procedures outlined in the County of San Diego guidelines for determining significance of cultural resources pursuant to CEQA (County of San Diego 2007a), and PRC Section 5097.98 for human remains. In addition, any required cultural monitoring, development, and or review of a monitoring plan would be consistent with the Section 106 consultation.

Air Quality

122. Fugitive dust control measures would be implemented to reduce emissions of particulate matter (less than or equal to 10 microns in diameter [PM_{10}] and particulate matter less than or equal to 2.5 microns in diameter [$PM_{2.5}$]) to the extent possible. These measures include watering unpaved roads and actively graded surfaces up to three times daily, as well as reducing speeds on unpaved roads to 15 miles per hour (mph) (24 kilometers per hour [kph]), suspending grading activities if wind speeds exceed 25 mph (40 kph), and replacing ground cover in graded areas as soon as possible. Watering would be done lightly to avoid the accumulation of surface water.

123. Construction specifications for the construction work that will implement BMPs to minimize air emissions from equipment and vehicles would develop would be developed. The specification will include requirements for minimizing construction-related trips, minimizing idling, and proper equipment maintenance and inspection.

Hazardous Wastes and Materials

124. If construction would occur within or near an IR Program Site on MCBCP, all project activities in the IR site and the surrounding area would require approval of MCBCP ES. ES would notify the MCBCP's FFA Team, which consists of MCBCP, DON, USEPA, Cal EPA DTSC, and San Diego RWQCB.

125. The contractor would prepare a Soil Management Plan to address potential soil impacts from IR Program, RCRA, or munitions sites identified within, or near the proposed project footprint. The procedures described in the Soil Management Plan would be followed for installation of the pipeline. Under direction of MCBCP ES, the contractor would prepare a Soil Management Plan for handling, testing, and disposing of the soils. The procedures described in the Soil Management Plan would be followed for installation of the pipeline. The contractor would coordinate with MCBCP ES to determine appropriate disposition for the soil based on the analytical results; this would ensure that all potentially contaminated soil would be disposed of in accordance with applicable federal, state, and local regulations and MCBCP requirements. Appropriate health and safety measures would be followed and all requirements of USACE Manual EM 385-1-1 *Safety and Health Requirements* and Title 29 CFR (Labor) § 1910 *Occupational Safety and Health Standards Subpart H Hazardous Materials Section 120 Hazardous Waste Operations and Emergency Response* would be met.Ale

126. If pipeline construction activities encounter potentially contaminated soil (i.e., discolored and or odorous) at DET Fallbrook or within the community of Fallbrook, the soil would be managed in accordance with all applicable federal, state, County of San Diego, and federal requirements, as well as any additional requirements specific to the applicable jurisdiction.

127. It is likely that the proposed project footprint may encounter contaminated groundwater from active IR or underground storage tank sites. If pipeline construction activities encounter potentially contaminated groundwater, the water would be managed in accordance with all applicable federal, state, County of San Diego, and federal requirements, as well as any additional requirements specific to the applicable jurisdiction.

128. Groundwater is known to be contaminated at various IR locations throughout MCBCP. If dewatering operations are taking place within a suspected groundwater contaminant plume, the action proponent or their contractor would coordinate with MCBCP ES (i.e., Stormwater Branch, Wastewater Branch, and IR Branch) to ensure that all reporting requirements and regulatory approvals are obtained. Potentially contaminated groundwater encountered during construction activities on MCBCP would be tested and handled in accordance with the direction of MCBCP ES. MCBCP ES would review and approve a proposed sampling plan. Arrangements would be made with the MCBCP Facilities Maintenance Department for acceptability of the water for discharge into the sanitary sewer based on the results of the laboratory analysis, volume, and accessibility to a sewer manhole. Appropriate health and safety measures would be followed and all requirements of USACE Manual EM 385-1-1 *Safety and Health Requirements* and Title 29 CFR (Labor) § 1910 *Occupational Safety and Health Standards Subpart H Hazardous Materials Section 120 Hazardous Waste Operations and Emergency Response* would be met.

129. It is likely that monitoring wells would be encountered during construction. If monitoring wells are encountered during construction activities, they would not to be damaged or destroyed, and the IR Branch would be alerted. Reconstruction/renovation of destroyed or damaged wells would be the responsibility of the project proponent.

130. A Hazardous Materials Business Plan would be prepared in accordance with County of San Diego guidelines to describe how the construction worker would manage their hazardous materials during construction.

131. An Oil Spill Response Plan (OSRP) would be prepared and reviewed and approved by appropriate federal, state, and local agencies. The OSRP is required under state and federal regulations (Senate Bill 2040 and 40 CFR § 300, the *National Oil and Hazardous Substances Pollution Contingency Plan*). The OSRP provides a list of emergency service providers. For project components on MCBCP, the procedures outlined in the *Oil and Hazardous Substance Integrated Contingency Plan Amended April 2011* would be followed. For project components on non-federal land, FPUD would comply with requirements of CDFW, Office of Spill Prevention and Response.

<u>Utilities</u>

132. During project design, pipeline alignments and construction footprints would be selected to avoid or minimize disruption of existing utilities. The location of underground utilities would be verified prior to excavation to further avoid impacts. Also, the design of new electrical transformers and panels that would be needed to supply power to the wells would be coordinated closely with MCBCP and San Diego Gas & Electric (SDG&E) to minimize or eliminate any temporary disruption of power supplies during construction and start-up.

133. For any wells located within the project footprint, the contractor would contact MCBCP ES to determine if the well is active or abandoned.

134. Newly constructed or repaired wells that are not in service for more than three months would be sampled for bacteriological quality prior to use in accordance with the American Water Works Association C654-03 (CCR Title 22 §64583).

135. The contractor would coordinate well closure and application review with MCBCP ES.

136. The project proponent or contractor would submit an amended drinking water permit to modify, add to, or change the source of supply or method of treatment of, or change in the distribution system as authorized by a valid existing permit in accordance with California Health and Safety Code §116550.

137. The existing MCBCP Domestic Water Permit for the Southern Water System would be amended to include the four new wells and any associated changes to the existing water system. Appropriate

permits for water well drilling would be obtained from the San Diego County Department of Environmental Health and water wells would be constructed in accordance with the California Water Well Standards utilizing a C-57 Contractor.

138. The contractor would ensure potable water pipeline separation and installation standards are followed as outlined in CCR Title 22, § 64572.
139. To avoid cross contamination of potable water lines to be installed adjacent to sanitary sewer lines, the contractor would coordinate installation and inspection of newly installed backflow control devices and air gaps with the Facilities Maintenance Department in accordance with CCR Title 17.
140. The contractor would ensure that new potable water pipelines installed or that have been taken out of service for repairs (de-pressurized) would be disinfected and sampled for bacteriological quality prior to use, in accordance with the American Water Works Association Standard C651-05. Water samples would be required to be negative for coliform bacteria prior to the main (s) being placed in service in accordance with CCR Title 22, §64580.
141. The water source of a public water system would be required to have the capacity to meet the system's maximum day demand regularly, in accordance with CCR Title 22 §64554. A Source Capacity Planning Study may be required if there is difficulty with the water system's source capacity or proposed expansion by the DPH.

2.3.2 Alternative 2

Alternative 2 is similar to Alternative 1 in terms of diversion system upgrades, groundwater recharge, and groundwater production (see Table 2.3-1); but includes the direct diversion and use of surface water. Project components associated with Alternative 2 are depicted in Figure 2.3-4. Alternative 2 includes the following components described under Alternative 1 (see Section 2.3.1 for details on each of the following components):

- Replacement of Existing Sheet Pile Diversion with Inflatable Weir Diversion Structure,
- Improvements to O'Neill Ditch and Headgate,
- Improvements to Recharge Ponds 1-7,
- Groundwater Production Wells and Associated Collection System Infrastructure,
- The OSMZ, and
- SCADA system.

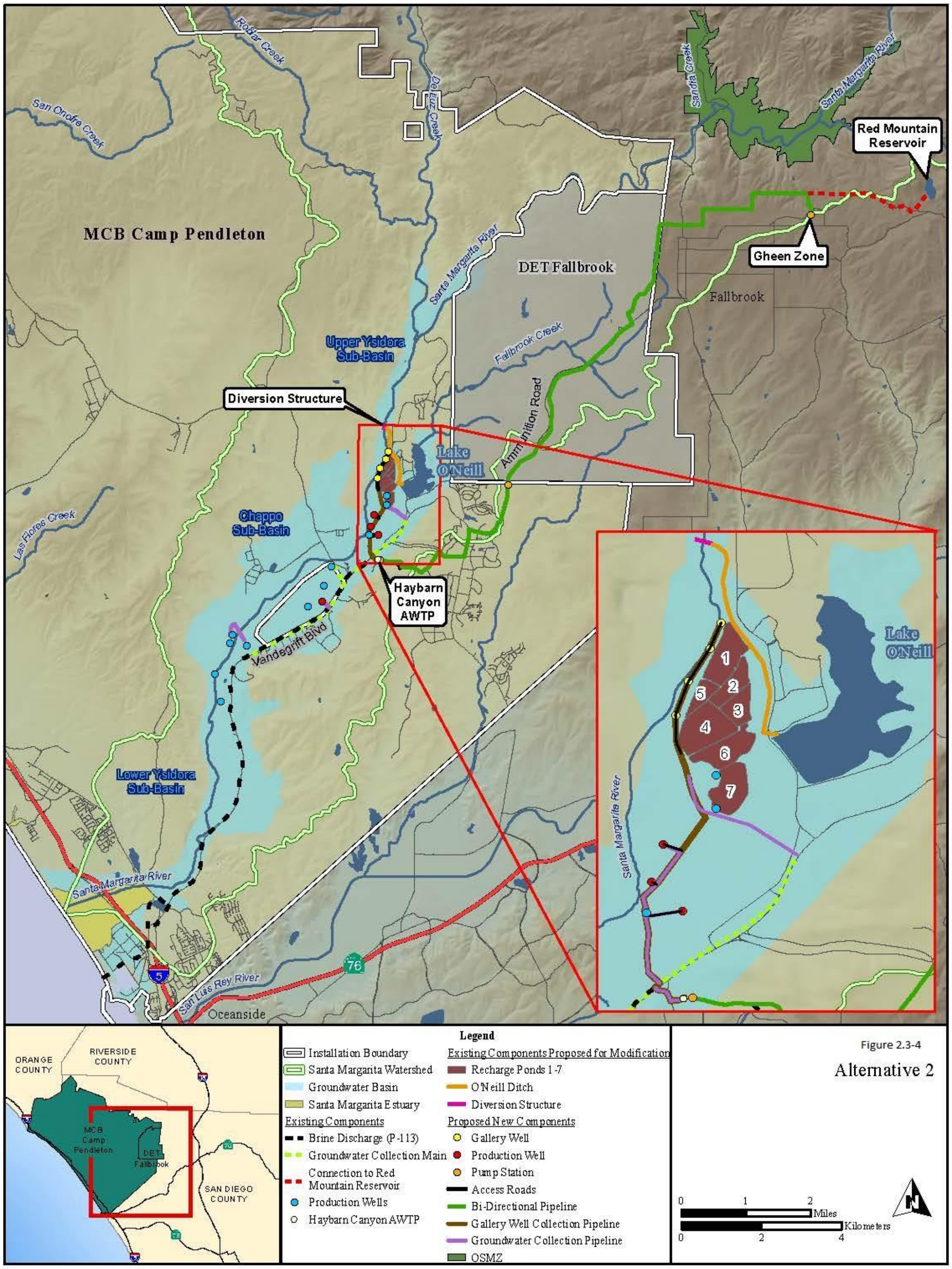


Figure 2.3-4. Alternative 2

Alternative 2 differs from Alternative 1 in that the existing Haybarn Canyon AWTP would be expanded to treat all groundwater produced under the project. Additionally, a new surface water treatment facility located adjacent to the Haybarn Canyon AWTP would treat surface water diverted from four new gallery wells installed between the recharge ponds and SMR. Treated water would be delivered to FPUD via a bi-directional pipeline.

Under Alternative 2, an AMP/FOP would be developed and an annual FOP would be published, as described under Alternative 1. However, environmental constraints on the operation and management of groundwater production would differ under Alternative 2: maintenance of groundwater levels within their historical range would not be included, but no aquifer compaction and no seawater intrusion constraints would be included under Alternative 2.

2.3.2.1 Improvements to Existing Facilities

Expand Haybarn Canyon AWTP and Add a Surface Water Treatment Facility

Groundwater from MCB Camp Pendleton's existing wells and SMR CUP's four new production wells would be treated at an expanded Haybarn Canyon AWTP. The expansion of MCB Camp Pendleton's existing Haybarn Canyon AWTP (P-113) would occur to handle the increased Alternative 2 flow volumes. The existing Haybarn Canyon AWTP's groundwater water quality treatment goals would continue to be met under this expansion (a description of the existing Haybarn Canyon AWTP and treatment goals is provided in Section 1.6.1.1).

The gallery wells would produce surface water that would be treated at the proposed new surface water treatment facility located adjacent to the existing Haybarn Canyon AWTP. The surface water treatment facility would be designed to treat surface water with organics removal and membrane filtration to comply with the surface water treatment rule. The surface water treatment process would include micro/ultra-filtration for the removal of suspended solids, *Giardia*, *Cryptosporidium*, and the reduction of turbidity. Waste streams from micro/ultra-filtration membrane backwash would undergo backwash recovery to allow suspended solids to settle out in recovery tanks. Water from the recovery tanks would be reintroduced to the treatment process. All solid wastes from backwash recovery would be treated and disposed of in accordance with MCO 5090.2A, Chapter 17 and in compliance with all state and federal regulations and respective permits regarding waste disposal. This includes all relevant Waste Discharge Requirements from the SWRCB and San Diego RWQCB and Solid Waste Facility Permits issued by the County of San Diego as the local enforcement agency.

The treated surface water would then be blended with the treated groundwater to reach a product TDS of approximately 325 mg/L and distributed to MCB Camp Pendleton and FPUD. A clearwell main lift pumping plant would be constructed at Haybarn Canyon to deliver the treated water to the Reservoir Ridge storage tanks.

Under SMR CUP, an additional average daily brine discharge of 3.5 cfs would be produced and discharged to the Pacific Ocean via the existing Oceanside Ocean Outfall. The additional brine would be conveyed to the Oceanside Ocean Outfall via the existing brine discharge pipeline constructed for MCB Camp Pendleton's P-113 project, which is connected to the Oceanside Ocean Outfall via P-113's connection to the Oceanside Ocean Outfall Pump Station. Under P-113, this connection provides for secondary emergency brine discharge; however, under Alternative 2 of this project, all additional brine would utilize this connection. The brine discharge would be covered under either an amendment to FPUD's existing NPDES Permit (CA0108031) to the Oceanside Ocean Outfall or an amendment to MCB

Camp Pendleton's NPDES Permit (CA0109347). The existing FPUD NPDES Permit currently has a permitted average annual discharge of 2.4 MGD.

2.3.2.2 Proposed New Facilities

Gallery Wells and Associated Collection System Infrastructure

Four gallery wells would be installed adjacent to the SMR along the west side of Recharge Ponds 1, 4, and 5 (see Figure 2-4). Gallery wells are generally shallow wells comprised of a vertical reinforced concrete shaft or caisson that extends from the well head through the subsurface sediment (i.e., sands and gravels) comprising the streambed. Beneath the streambed, the caisson would be connected to a series of lateral pipelines projected under the river channel bottom to collect and filter surface water from the SMR. Water extracted from the gallery wells would be transported to the proposed new surface water treatment facility located adjacent to the existing Haybarn Canyon AWTP (see Section 2.3.2.2 for details).

Construction

Each gallery well would require ground disturbance of approximately 324 ft^2 (30 m^2) (18 ft by 18 ft [6 m by 6 m]). The wells would be placed between the SMR channel and Recharge Ponds 1, 4, and 5. The wells would extend into the aquifer with the depth being determined during the feasibility study. The lateral pipelines would be installed by horizontal directional drilling through the main well shaft.

Access to the gallery wells would be provided by existing roads and a new graded dirt road located between the SMR and to Ponds 1, 4, and 5 (Figure 2-4). The new road would be 12 ft (4 m) wide and may be covered with gravel. The road would be bordered on both sides by a 20-ft (6-m) wide buffer that would be used to accommodate 18-in (46-cm) diameter power poles and overhead power lines. The power pole centerline would be approximately 4 ft (1.2 m) off the road edge with poles located approximately every 100 ft (30 m). Conveyance pipelines would be installed in trenches leading from the proposed new gallery wells to Haybarn Canyon. The pipelines would be installed along the existing road corridor to minimize new ground disturbance.

Operation

The gallery wells would be operated based on AMP/FOP guidelines and procedures as described in Section 2.3.1.4, *Special Conservation Measures*. The gallery wells would capture water in the streambed sediments, which is closely tied to the streamflow in the SMR during the wet season. This would induce additional streambed recharge during high flow storm events in most wet years, and some dry years, to optimize the storage capacity of the streambed sediments. The four gallery wells would have the capacity to extract a combined maximum of 18 cfs of surface water (only during the winter months of very wet years).

Typical annual operational activities associated with pipeline systems would include painting aboveground storage tanks, monitoring pressure, repairing occasional pipe breaks, exercising valves, and corrosion monitoring. Pumps and motors have life spans of about 20 to 30 years, depending on water quality. Typical operational activities would include occasional replacement of parts and other minor repairs.

Water Conveyance/Distribution System, including Bi-Directional Pipeline from Reservoir Ridge to the Gheen Zone

The pipeline system from the Haybarn Canyon AWTP to the Gheen Zone in Fallbrook would have two main turnouts to provide water directly to the users. The first turnout would be at Reservoir Ridge on MCB Camp Pendleton. The second turnout on the pipeline system would be in the community of Fallbrook. At the Gheen Zone, the pipeline would be connected to an existing pipeline to Red Mountain Reservoir, which has a connection to the SDCWA Aqueduct.

Construction

The first segment of pipeline would run upslope to the east from the Haybarn Canyon AWTP to Reservoir Ridge, where MCB Camp Pendleton maintains five reservoirs located approximately 500 ft (152 m) higher than Haybarn Canyon. A primary pumping station would be constructed in Haybarn Canyon near the AWTP. It would be capable of lifting up to 35 cfs of the treated water to Reservoir Ridge. The primary pumping station would have a permanent disturbance footprint of approximately 1,000 ft^2. Elevation for the clearwell is assumed near the ground surface elevation (115 ft [35 m] above sea level).

The pipeline from the Haybarn Canyon AWTP to Reservoir Ridge would be 42 in (107 cm) in diameter; approximately 3,000 ft (914 m) of welded steel pipe would be installed in a Type 1 flexible pipe trench, with at least 2 ft (0.6 m), and on average 4 ft (1.2 m) of cover over the pipe. From Reservoir Ridge, treated water would be delivered to MCB Camp Pendleton's existing storage and distribution facilities. Water would be distributed to MCB Camp Pendleton's southern area distribution system (at approximate elevation of 540 ft [165 m]) via existing pipelines.

Excess water produced beyond MCB Camp Pendleton's demand would be conveyed to FPUD through a bi-directional pipeline extending to the Gheen Zone, which would be connected via existing pipelines to the Red Mountain Reservoir, an existing 1,300 AF treated water reservoir located at an elevation of 1,137 ft (347 m) near the community of Fallbrook. Delivery to FPUD would be via a 42-in (107-cm) welded steel pipeline, a distance of approximately 11 mi (18 km). The total length of the pipeline from Haybarn Canyon to the Fallbrook service area boundary would be 44,198 ft (13,472 m) of which 17,000 ft (5,181 m) would be located on MCB Camp Pendleton and 27,198 ft (8, 290 m) on DET Fallbrook.

The proposed bi-directional pipeline would leave Reservoir Ridge following an access road east to the intersection with A Street. At A Street, the pipe alignment would turn north. At the intersection of A Street and Rattlesnake Canyon Road, the pipe alignment would turn east. At the intersection of Rattlesnake Canyon Road and Vandegrift Boulevard, the pipe alignment would turn north again. At the intersection of Rattlesnake Canyon Road and Fallbrook Road (called Ammunition Road on DET Fallbrook), the pipe would turn east again, continuing on Ammunition Road and crossing Fallbrook Creek. At the Fallbrook Creek crossing, the bi-directional pipeline would either (1) span the channel, supported by piers or be suspended from a new utility I-beam, or (2) be installed beneath the stream channel through trenchless construction.

Near the intersection of Towe Road and Ammunition Road, the pipe would turn north on Towe Road. At the first intersection, the pipe would turn east and then north at the next intersection following the curved access road around until it intersects Sparrow Road. The pipe alignment would then turn northeasterly paralleling Sparrow Road and continue this direction onto a dirt access road that follows the Fallbrook and DET Fallbrook fence line. At the termination point of Dougherty Street on the fence line, the pipe alignment would turn east onto Dougherty Street. This pipeline would then continue along the same alignment to the Knoll Park-Gheen Zone tank site, as described under Alternative 2. An existing FPUD pipeline would provide a connection from the Knoll Park-Gheen Zone tank site to the Red Mountain Reservoir.

Two booster pumping stations may be required for water conveyance to Red Mountain Reservoir. The first booster pumping station would be located near the guard station on the MCB Camp Pendleton side of the boundary between MCB Camp Pendleton and DET Fallbrook (elevation 385 ft [117 m]). Existing electrical power lines that are located along the fence line would be used for powering the pumping station. The pumping station would boost water under pressure from the headquarter mains zone (elevation 540 ft [165 m]) to Fallbrook's Gheen Zone (elevation 1,037 ft [316 m]).

The second booster pumping station would be incorporated at the site of the Gheen Zone in the community of Fallbrook. This pumping station would boost water under pressure to Fallbrook's Red Mountain Reservoir (elevation 1,137 ft [347 m]).

Operations

The rate of potable water pumped from Haybarn Canyon to the FPUD would vary based on hydrologic conditions. Maximum pumping would occur during the winter months of very wet years while minimum pumping would occur during drier conditions. During the driest years, treated project water would not be delivered to FPUD. The bi-directional pipeline between FPUD and MCB Camp Pendleton would allow imported water to be delivered to MCB Camp Pendleton from the SDCWA Aqueduct during drought periods when groundwater is insufficient to meet demands or during emergency situations.

Flow metering would occur downstream of the pumps at the Haybarn Canyon AWTP, where meters would measure the total product water made available under Alternative 2; and at the Reservoir Ridge tank, where meters would measure the flow going to FPUD. Alternately, for bypass flow, the meters would measure flow conveyed to MCB Camp Pendleton from FPUD.

Typical annual operational activities associated with pipeline systems would include painting aboveground storage tanks, monitoring pressure, repairing occasional pipe breaks, exercising valves, and corrosion monitoring. Pumps and motors have life spans of about 20 to 30 years, depending on water quality. Typical operational activities would include occasional replacement of parts and other minor repairs.

2.3.2.3 General Construction Methods

Alternative 2 would utilize the same general construction methods described under Alternative 1 (see Section 2.3.1.3).

2.3.2.4 Special Conservation Measures

Implementation of Alternative 2 would incorporate the same SCMs identified under Alternative 1 (see Section 2.3.1.4) as part of project development to avoid or minimize any potential environmental impacts.

2.3.3 No-Action Alternative

Under the No-Action Alternative, both MCB Camp Pendleton and FPUD would obtain all of their potable water demands from existing water supplies, with an increased reliance on imported water. MCB Camp Pendleton would continue to use its existing diversion, recharge, storage, and recovery system to meet its water demands. FPUD would rely solely on imported water purchased from the SDCWA. If the No-Action Alternative is chosen and the water rights are not perfected, other water development projects upstream of MCB Camp Pendleton could occur that would result in a reduction of water supply available to meet existing and future water demand.

Existing and future water demands on MCB Camp Pendleton would be met through the use of existing facilities or from the development of more expensive alternative water supplies, such as ocean desalination or construction of a new pipeline to an off-base water purveyor and purchase of imported water. Without access to an alternative water supply through the bi-directional pipeline, groundwater level declines during extended drought periods could not be mitigated nor could MCB Camp Pendleton demands be met during emergency conditions.

Without implementation of a "physical solution," the ongoing *United States v. Fallbrook Public Utility District et al.* litigation likely would not be settled. Although other alternatives may exist, they are not feasible or prudent. Failure to reach a physical solution may propel the parties into active litigation prone to lead to a court judgment not likely satisfactory to either party. Although the No-Action Alternative would not meet the purpose of and need for the Proposed Action, it is included to serve as the baseline against which impacts of the alternatives can be compared.

Under the No-Action Alternative, FPUD has no direct water supply benefit from the OSMZ property and no remaining justification for maintaining this property as open space. Without implementation of SMR CUP, the OSMZ could revert to the original condemnees and be developed, in which case there could be adverse impacts on wildlife, water quality, aesthetics, and other environmental values at the site and downstream. Under this alternative, the potential development of water resources by condemnees could result in a reduction of available water supply to downstream users.

2.4 Alternatives Considered and Eliminated from Detailed Study

During formulation of each potential alternative, many related projects were considered and reviewed in an effort to minimize any identified constraints. For instance, construction of new recharge ponds, conveyance facilities, and a diversion weir apart from the existing diversion facilities was considered, but was eliminated from further consideration due to geologic conditions and groundwater contamination restrictions within the study area. An additional diversion point on the SMR to an off-stream reservoir was also considered, but was eliminated due to lack of adequate benefits and environmental restrictions.

Several alternatives were initially considered in the following documents:

- Santa Margarita Project, San Diego County, California, Draft Supplemental Environmental Statement (Reclamation 1984). Refer to Section 2.2 for description of document.
- Santa Margarita River Recharge and Recovery Enhancement Program: Permit 15000 Feasibility Study for Marine Corps Base Camp Pendleton (Stetson 2001). Refer to Section 2.2 for description of document.
- Draft Recycle and Reuse Study: Conjunctive Use Project for the Lower Santa Margarita River Basin. Supplemental Study to Santa Margarita River Recharge and Recovery Enhancement Project - Permit 15000 Feasibility Study for Marine Corps Base Camp Pendleton (Stetson 2002). Refer to Section 2.2 for description of document.
- Santa Margarita River Conjunctive Use Project Pre-Feasibility Plan Formulation Study (Reclamation et al. 2005). Refer to Section 2.2 for description of document.
- Decision Regarding Alternatives for Further Study Santa Margarita Conjunctive Use Project (Reclamation 2006a). This memorandum described an inter-agency agreement on a Proposed

Action and two action alternatives recommended to be carried forward for economic and environmental feasibility analysis.

2.4.1 Two Direct Diversion Weirs, Separate AWTPs for MCB Camp Pendleton and FPUD, Cross-Base Pipeline, and Recharge of Unpolished Effluent in Lower Ysidora Basin

This alternative (Alternative 2 from the *Decision Regarding Alternatives for Further Study Santa Margarita Conjunctive Use Project*) is similar to Alternative 1 in this EIS/EIR in that it includes replacement of the existing sheet pile diversion weir on the SMR with an inflatable weir diversion structure, improvements to O'Neill Ditch and headgate (capacity increased from 60 to 200 cfs), improvements to five existing recharge ponds, new groundwater production wells, a separate FPUD WTP, and an OSMZ.

However, the key differences with Alternative 1 are that a cross-base bi-directional pipeline would connect MCB Camp Pendleton with an appropriate water authority in Orange County instead of a pipeline between MCB Camp Pendleton and FPUD, a perforated recharge pipeline in the Lower Ysidora basin would be used to recharge groundwater with tertiary treated wastewater effluent, and a separate diversion weir would be constructed for the FPUD. The second diversion weir would be installed on the SMR downstream of the Sandia Creek Road crossing. Water pooled behind the diversion would be pumped and lifted following an existing, abandoned pipeline alignment to Red Mountain Reservoir. FPUD would convert Red Mountain Reservoir to raw water deliveries from the aqueduct. All water would be treated to DPH surface water treatment standards. Filtration would be added adjacent to the current ultraviolet treatment plant below the reservoir.

The cross-base pipeline component of this alternative was eliminated from further consideration because a pipeline connecting to a water authority in Orange County would not provide access to the SDCWA where MCB Camp Pendleton has existing entitlements to imported water. The separate FPUD diversion weir component of this alternative was eliminated from further consideration because seasonal availability of water (winter) does not coincide with peak demand (summer) and there is no groundwater basin for storage at the site, making this component unable to meet FPUD's needs. Otherwise, the improvements to the diversion weir and ditch and increased number of production wells are similar to modifications being carried forward under the action alternatives.

2.4.2 Diversion Weir, Ditch Improvements, Recharge ponds, and an Off-Stream Reservoir

This alternative (Alternative 4 from the *2001 Permit 15000 Feasibility Study)* would include replacement of the existing sheet pile diversion weir on the SMR with an inflatable weir diversion structure, new sluice gates at the river diversion, and relocation of the existing headgate. Also included would be enlargement and concrete lining of the O'Neill Ditch from 60 to 200 cfs, construction of two new recharge ponds with flow control and continuous flow measuring capability, and development of six additional supply wells. Four of the wells would be located within the Upper Ysidora Sub-basin (PW-1, PW-2, PW-3, and PW-6) and two would be located within the Chappo Sub-basin (PW-4 and PW-5).

This alternative included construction of an off-stream reservoir, pump station, and pipeline to convey surplus river diversions from the groundwater recharge pond system to a proposed reservoir site. Development of an off-stream reservoir would provide MCB Camp Pendleton with the flexibility to capture flows that would have spilled from the recharge ponds and would provide 4,800 af of storage capacity. A 40 cfs capacity pump station located in Recharge Pond 6 would lift excess water to the off-stream storage reservoir to be located approximately 2 mi (3 km) east of the recharge ponds on DET

Fallbrook. The reservoir would consist of two earth embankment dams and three smaller earthen levees. The surface area of the reservoir would be approximately 55 acres (22 hectares).

Water pumped directly from the recharge pond would be conveyed in a 36-in (91-cm) buried steel pipeline extending generally east along the southern boundary of DET Fallbrook. The pump station would lift water approximately 360 ft (110 m) in elevation through 12,000 ft (3,657 m) of pipeline to the off-stream storage reservoir. Water would be released from the reservoir during prolonged dry periods to augment groundwater levels in the Lower Santa Margarita basin. Stored water would be returned to Recharge Pond 6 by gravity through a pipeline connecting the outlet works of the dam to the same pipeline that would be used to pump water up to the reservoir. This alternative would provide seasonal storage, increase the annual amount of water available for diversion by 21,000 AF, provide water for drought relief during extended dry periods, and increase the annual groundwater production by 6,000 AFY.

The alternative was eliminated from further consideration because additional storage volume has already been achieved through completed improvements to Lake O'Neill and construction of Recharge ponds 6 and 7 (refer to Section 1.6.1.2). Otherwise, the improvements to the diversion weir and ditch and increased number of production wells are similar to modifications being carried forward under the action alternatives.

2.4.3 Aquifer Storage and Production Wells

This alternative (Alternative 5 from the *2001 Permit 15000 Feasibility Study)* included the construction of aquifer storage and production wells for the purpose of injecting water directly into the aquifers. Under this alternative, surface water would be diverted from the stream, filtered, and then injected into the aquifer for recovery at a later date.

This alternative was eliminated from further consideration because the high transmissivity of the groundwater basin and the shallow depth to groundwater limits any advantages that could be gained with development of aquifer storage and production wells, when compared to development of additional groundwater recharge ponds.

2.4.4 Recharge and Recovery of Stormwater in the Upper Basin

This alternative (Alternative 6 from the *2001 Permit 15000 Feasibility Study)* included construction of groundwater recharge basins in the upper Santa Margarita basin in the vicinity of the cities of Murrieta and Temecula. Floodwater from Murrieta Creek and its tributaries would be diverted to recharge ponds and recovered from the groundwater system at a later date. This alternative was originally considered because of the large amount of available storage in the upper Santa Margarita basin and the USACE flood study of Murrieta Creek. The groundwater aquifers in the upper basin contain available storage due to the large amount of development and resultant extensive groundwater withdrawals that have occurred over the last 30 years.

This alternative was eliminated from further investigation because the geologic restrictions in the upper basin would inhibit substantial quantities of water from infiltrating into the aquifers. The deep Pauba aquifer that has a large potential for groundwater storage is isolated from the surface by a 30- to 60-ft (9- to 18 m) clay layer, restricting recharge to the deeper aquifer. In addition, the flood control project proposed by the USACE did not provide for long-term (more than one day) storage of water for recharge purposes. Furthermore, the only potential site for groundwater recharge and storage in the upper basin is located in Pauba Valley. This site was found to be infeasible for development of recharge facilities due to the likelihood of adverse environmental impacts, nearby existing and future urban development, and incompatibility with the USACE project.

2.4.5 Enlargement of Lake O'Neill

This alternative (Alternative 7 from the *2001 Permit 15000 Feasibility Study)* consisted of enlarging Lake O'Neill for the purpose of storing high flow events for later release to the recharge ponds. Lake O'Neill is currently used for both water supply and recreational purposes. This alternative would require realignment of the SMR road and removal or relocation of adjacent recreational facilities. Diversions to the enlarged lake would require realignment of the O'Neill Ditch and/or installation of high volume-low lift pumps.

This alternative was eliminated from further consideration due to (1) the likely adverse impacts on existing recreational facilities, and (2) nearby physical constraints. It would not be physically possible to raise the dam on Lake O'Neill without inundating valuable facilities nor economically feasible to deepen the reservoir (Reclamation *et al.* 2005). Review of the soils surrounding Lake O'Neill also suggests that some form of barrier would be required to minimize leakage into the adjacent permeable Visalia, Tujunga, Greenfield, and Cieneba Series soils.

2.4.6 In-Stream Reservoir Sites

2.4.6.1 Fallbrook and De Luz Dams

The Santa Margarita Project or Two-Dam Project (as previously described in Section 1.4) consisted of the 36,500-af Fallbrook Dam and Reservoir, the 142,950-af De Luz Dam and Reservoir, the Fallbrook pumping plants and conveyance line, the cross-base aqueduct and pumping plants, recreation and fishing facilities, and wildlife conservation and enhancement management areas. The average project yield ranged from 10,400 AFY under initial conditions to 11,500 AFY under year 2020 conditions. These dams were studied in detail, as documented in the *Santa Margarita Project, San Diego County, California, Draft Supplemental Environmental Statement* (Reclamation 1984).

This alternative was eliminated from further consideration because the project was not considered to be feasible because the USFWS issued a BO with a determination that the project would jeopardize the existence of threatened and endangered species and due to high costs.

2.4.6.2 Consideration of Additional In-Stream Sites

This alternative (Alternative 8 from the *2001 Permit 15000 Feasibility Study)* included construction of on-stream reservoirs at additional sites for the purpose of diverting large flood events from the SMR. Similar to the Reclamation's Two-Dam Project discussed above, this alternative would capture large flood events on the SMR and release these flows at a controlled rate to recharge groundwater basins on MCB Camp Pendleton.

This alternative was eliminated from further consideration due to (1) the high environmental costs associated with the project (based on findings for the similar project analyzed in *Santa Margarita Project, San Diego County, California, Draft Supplemental Environmental Statement* [Reclamation 1984]), which included the potential adverse impact on beach sand replacement and adverse impacts on federally-listed species such as the California least tern (CLTE) and LBVI; and (2) because additional storage volume has already been achieved through completed improvements to Lake O'Neill and construction of Recharge Ponds 6 and 7 (refer to Section 1.6.1.2).

2.4.7 Brackish Water Desalination

The only local source of brackish water is in the Lower Ysidora Sub-basin, which extends to a narrows in the bedrock near the estuary and mouth of the SMR. This alternative considered desalinating brackish groundwater to support the physical solution between the two parties. Groundwater pumping in excess of the Lower Ysidora Sub-basin water supply yield could result in reverse gradients and the potential of seawater intrusion. This alternative was determined not to be feasible due to limited water supply and was eliminated from further consideration (Reclamation 2005).

2.4.8 In-Stream Check Structures

Some of the pre-feasibility alternatives involved construction of in-stream check structures along the SMR downstream from Basilone Road. The check structures would increase recharge to the Chappo Sub-basin. These structures would be constructed in lieu of re-constructing Ponds 6 and 7. The check structures would be designed to be temporary in nature and would be washed out every three to five years during high flow events. During low-flow periods, sediment would accumulate upstream of the structures. The temporary nature of the structures would allow flood flows to remove the barriers and transport fine materials downstream of the Chappo Sub-basin. Fine materials, if allowed to accumulate for extended periods of time upstream of the structures, could seal the ponding areas and reduce recharge rates. This project component was eliminated from further consideration because Recharge Ponds 6 and 7 have been constructed.

2.5 SUMMARY OF ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Environmental impacts on the following resources are evaluated in this EIS/EIR: geological resources, water resources, biological resources, cultural resources, air quality, hazardous materials and wastes, and utilities. Table 2.5-1 provides a summary of potential environmental impacts by resource area. A detailed impact analysis for each of these resources is provided in Chapter four and cumulative impact analysis is provided in Chapter five.

Several additional resources were evaluated: traffic, noise, socioeconomics and environmental justice, land use and recreation, and visual resources. However, because the proposed action alternatives would be unlikely to have any significant impact on these resources, it was determined that further evaluation in the EIS/EIR was not required. A list of these resources as well as the rationale for eliminating them from full analysis is presented at the beginning of Chapter three of this EIS/EIR.

2.6 PREFERRED ALTERNATIVE

Based on the analysis presented in this EIS/EIR, Reclamation, USMC, and FPUD have identified Alternative 1 as the Preferred Alternative, the least environmentally damaging and practicable alternative, and the environmentally superior alternative.

Table 2.6-1. Summary of Potential Environmental Consequences and Proposed Mitigation Measures by Resource Area

Alternative 1	Alternative 2	No-Action Alternative
Geological Resources		
Through implementation of Special Conservation Measures (SCMs) and the AMP/FOP, significant impacts would not occur; therefore, no additional mitigation measures will be implemented.	Same as Alternative 1.	Without an alternate source of water or reduced demand during sustained dry years, groundwater pumping could exceed safe yield and, therefore, aquifer subsidence is possible. Otherwise, adverse impacts are not anticipated.
Water Resources		
Through implementation of SCMs and the AMP/FOP, significant impacts would not occur; therefore, no additional mitigation measures will be implemented.	Potential impacts to groundwater resources in the Upper Ysidora Sub-basin would occur with implementation of Alternative 2. The following mitigation measure to monitor and reduce impacts to groundwater resources to below a level of significance will be implemented: The AMP/FOP under Alternative 2 would be modified to include the maintenance of groundwater levels within historical range constraint (*Note:* this measure is included in the AMP/FOP as described under Alternative 1). Groundwater levels would be monitored by a series of telemetered groundwater monitoring wells and pumping would be reduced or shut off if the groundwater level drops to within historic levels and remain reduced until the average monthly groundwater levels recover to above historic levels.	Impacts to groundwater could occur if an increase in pumping were to occur during sustained dry years. However, completion of the P-1045 pipeline, which will allow for water transfers between MCB Camp Pendleton's North and South water systems, may help to alleviate this concern during periods of extended drought.
Biological Resources		
Facilities construction would have direct and indirect impacts due to vegetation removal and disturbance of individuals resulting in the disruption of feeding or reproduction, energetic costs, and predation risks. In most respects, these impacts would be less than significant because they would be temporary and minimized with the implementation of SCMs that are part of the project. Established conservation measures for special status wildlife species would be followed to lessen construction-related disturbance and loss of habitat. Additional mitigation measures, as provided for in the USFWS AND NOAA Fisheries BO, and the USACE permit, involving site-specific avoidance, minimization, and/or restoration would be implemented to lessen construction impacts to levels that would be less than significant.	Construction impacts and mitigation measures are similar to Alternative 1. The project's use of water in the Lower SMR may reduce streamflow and groundwater levels relative to historic averages; the inclusion of the gallery wells would result in additional reductions in SMR flow. This could indirectly impact riparian habitat through flow-mediated changes in the distribution and duration of seasonal aquatic habitats, as well as reduced productivity of groundwater-dependent riparian vegetation and would have the potential for impacts on riparian habitats and associated special status species, including impacts on least Bell's vireo, southwestern willow flycatcher, arroyo toad, Ridgway's rail, California least tern,	Without an alternate source of water or reduced demand during sustained dry years, groundwater depletion and its indirect effects on riparian habitat and associated species are anticipated.

Table 2.6-1. Summary of Potential Environmental Consequences and Proposed Mitigation Measures by Resource Area

Alternative 1	Alternative 2	No-Action Alternative
The project's use of water in the Lower SMR may reduce streamflow and groundwater levels relative to historic averages. This could indirectly impact riparian habitat through flow-mediated changes in the distribution and duration of seasonal aquatic habitats, as well as reduced productivity of groundwater-dependent riparian vegetation and would have the potential for impacts on riparian habitats and associated special status species, including impacts on least Bell's vireo, southwestern willow flycatcher, arroyo toad, and southern California steelhead. However, potential impacts to these species would not be significant with successful implementation of the AMP/FOP and the terms and conditions of the USFWS and NOAA Fisheries BOs. Furthermore, terms and conditions of the USFWS BO that establish the OSMZ and in-lieu fee program offset potential impacts to federally-listed species by providing additional protected habitat. Impacts from discharging the dilute brine to the Pacific Ocean from the existing Oceanside Ocean Outfall would be minor and any secondary effects on organisms in the runoff areas from the pipe would be negligible.	southern California steelhead, and Belding's savannah sparrow. However, potential impacts to these species would not be significant with successful implementation of the AMP/FOP and the terms and conditions of the USFWS and NOAA Fisheries BOs. Impacts from discharging the dilute brine to the Pacific Ocean from the existing Oceanside Ocean Outfall would be minor and any secondary effects on organisms in the runoff areas from the pipe would be negligible.	
Cultural Resources		
Through implementation of SCMs, significant impacts would not occur; therefore, no additional mitigation measures will be implemented.	Same as Alternative 1.	No impacts would occur.
Air Quality		
Through implementation of SCMs, significant impacts would not occur; therefore, no additional mitigation measures will be implemented.	Same as Alternative 1.	No impacts would occur.
Hazardous Materials and Wastes		
The proposed new wells have been sited so that groundwater pumping would not impact the mapped plumes associated with Installation Restoration Program sites. Through implementation of SCMs and the AMP/FOP, significant impacts would not occur; therefore, no additional mitigation measures will be implemented.	Same as Alternative 1.	No impacts would occur.
Utilities		

Table 2.6-1. Summary of Potential Environmental Consequences and Proposed Mitigation Measures by Resource Area

Alternative 1	Alternative 2	No-Action Alternative
Through implementation of SCMs and the AMP/FOP, significant impacts would not occur; therefore, no additional mitigation measures will be implemented.	Same as Alternative 1.	No significant impacts would occur; any future projects to develop potable water for MCB Camp Pendleton would be subject to the NEPA and/or CEQA process, as appropriate.

CHAPTER 3
AFFECTED ENVIRONMENT

This chapter describes the existing environmental conditions in and around MCB Camp Pendleton, DET Fallbrook, and the FPUD service area for resources potentially affected by implementation of Alternatives 1 and 2 as described in Chapter two. Information presented in this chapter represents existing conditions against which the alternatives are evaluated (in Chapter four) to identify potential impacts. A region of influence (ROI) is defined for each resource presented. The ROI is a geographic area in which potential environmental effects would occur with regard to a particular resource.

In compliance with NEPA and CEQA, the description of the affected environment focuses only on those resources potentially subject to impacts. In addition, the level of analysis should be commensurate with the anticipated level of impact. Accordingly, the discussion of the affected environment (and associated environmental analyses) focuses on geological resources, water resources, biological resources, cultural resources, air quality, hazardous materials and wastes, and utilities within the defined ROI for each resource. Conversely, the following resource areas were evaluated but not carried forward for detailed analysis in this EIS/EIR because the action alternatives would have only negligible effects on these resources.

***Traffic*.** Increases in traffic volumes due to implementation of the Proposed Action would constitute a negligible portion of the total existing traffic volumes in the project area. However, the design-build contractor would be responsible for developing a traffic study to assess the impacts to traffic associated with construction of pipeline alignments along Vandegrift Boulevard and Ammunition Road. Impacts to traffic along these roads would be minimized by avoiding construction in the road pavement and shoulder except for locations where the pipeline would cross a major road (five times for each alternative). At major road crossings, construction activities would occur at times when traffic congestion would be minimal (i.e., at nighttime). Construction by FPUD will be conducted in lower traffic roads to the extent possible and where crossing major roads is necessary, traffic control measures will be implemented to reduce impacts. Operation of various components and facilities of the project would be limited to vehicle traffic associated with periodic maintenance, which would be intermittent and would represent a negligible increase in traffic in the project area. Construction trips would be distributed throughout each day and would only intermittently affect individual routes or intersections during any given phase of construction. Excavation activities and placement of pipe across roadways would occur during non-peak traffic periods.

***Noise*.** Construction activities would require the use of heavy equipment for site preparation and development that would result in temporarily increased noise levels within the immediate area; however, noise levels would be typical of standard construction activities and would cease upon completion of proposed construction activities. Operation of various components and facilities of the project would generate instantaneous noise levels between 60 and 70 decibels (dB); however, due to the attenuation of noise with distance from the noise source, noise levels from both construction and operation of the Proposed Action would be reduced to ambient levels before reaching the nearest sensitive noise receptor.

Socioeconomics and Environmental Justice. Proposed construction activities would provide minor short-term economic benefit to the region but such effects would not be significant given the small size of the development and the relatively large size and diversity of the local economy. Implementation of the Proposed Action would not appreciably change the economic character or stability of the surrounding area. Accordingly, socioeconomic impacts of the Proposed Action would be beneficial but not significant.

EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations* requires that "each Federal Agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health effects of its programs, policies, and activities on minority populations and low income populations." There are no minority or low-income populations adjacent to the project area that would be impacted by the Proposed Action. Therefore, impacts related to EO 12898 would not occur.

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, states that each federal agency must, to the extent permitted by law and appropriate and consistent with the agency's mission: (a) make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and (b) ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks. The Proposed Action would not substantially affect human health or the environment and, thus, would not create disproportionate risks to children. During the construction phases of the Proposed Action, standard measures to promote work site safety and discourage unauthorized public access (e.g., signs and fencing) would be implemented, thereby minimizing any risks to children or other local residents. In addition, there are no schools, day care facilities, or other known aggregations of children located in close proximity to the affected project areas. Therefore, impacts related to EO 13045 would not occur.

Land Use and Recreation. Implementation of the Proposed Action would not introduce a new land use and would be compatible with all MCB Camp Pendleton, DET Fallbrook, and the community of Fallbrook planning policies and surrounding land uses. Much of the project would occur over existing roads and previously disturbed areas. The improvements to the diversion structure, O'Neill Ditch, and recharge ponds would be consistent with current uses and pipelines would be installed alongside existing pipelines or roadways. Groundwater wells would result in a permanent footprint, but would be consistent with current land uses in the existing well basin. The FPUD WTP under Alternative 1 would be constructed in a previously disturbed area of the existing FPUD wastewater treatment plant, and the expansion of the AWTP under Alternative 2 would be constructed in a previously disturbed area of Haybarn Canyon. The proposed project would not change the nature of land use at the project sites or surrounding training facilities and would be compatible with and, therefore, not impact the respective missions of MCB Camp Pendleton and DET Fallbrook.

Construction would not have any permanent effect on public access to, or commercial or recreational use of public lands. MCB Camp Pendleton and DET Fallbrook as a whole are restricted from public access and project areas are not authorized for commercial use.

In the community of Fallbrook, the OSMZ is intended to be preserved with implementation of the Proposed Action. However, under the No-Action Alternative, the OSMZ would likely be sold by FPUD to the previous landowners, their heirs, or others which would potentially result in change in land use and passive recreational use no longer being available in the OSMZ.

Therefore, no significant impacts related to land use or recreational access would occur with implementation of the Proposed Action and potentially significant impacts would occur under the No-Action Alternative.

Visual Resources. Implementation of the Proposed Action would have a negligible effect on visual resources since the major project components would occur in an area where the visual environment is already characteristic of a military installation and the various components and facilities of the project would be consistent with current land use in the project area. Minor landscape modifications would occur during construction activities; however, disturbed areas would be revegetated as appropriate and allowed to return to their natural state.

3.1 GEOLOGICAL RESOURCES

3.1.1 Definition of Resources

Geological resources are defined as the topography, geology, and soils of a given area. Topography is typically described with respect to the elevation, slope, aspect, and surface features found within a given area. Long-term geological, seismic, erosional, and depositional processes typically influence the topographic relief of an area. The geology of an area includes bedrock materials, mineral deposits, soils, and fossil remains. The principal geologic factors influencing the stability of structures are soil stability and seismic properties. Soil refers to unconsolidated earthen materials overlying bedrock or other parent material.

3.1.2 Regulatory Setting

Public health and safety in regard to earthquake-related hazards are addressed by the Alquist-Priolo Earthquake Fault Zoning Act (California PRC §§ 2621-2630; 1972 amended 1994) and State Seismic Hazards Mapping Act (California PRC §§ 2690-2699, 1990); and the California Building Code (California Seismic Safety Commission 2005). The Alquist-Priolo Act prohibits the construction of structures for human occupancy within 50 ft (15 m) of an active earthquake fault, as indicated maps issued by the State Geologist of regulatory zones (known as Earthquake Fault Zones) around the surface traces of active faults (California Public Resources Code 2007). The State Seismic Hazards Mapping Act addresses other earthquake-related hazards, including liquefaction and seismically induced landslides. The State Geologist is in the process of providing a complete set of statewide seismic hazard maps that identify areas susceptible to strong ground shaking, landslides, and/or liquefaction, or other ground failure and seismic hazards caused by earthquakes. Through a national program, the United States is divided into four seismic hazard zones (Zones 1 through 4) based on the likelihood of strong ground shaking. The National Seismic Zone Map is published by the International Code Council in the California Building Code (California Seismic Safety Commission 2005). Although not required, geotechnical investigations are typically performed as part of project design. Construction plans are reviewed for conformance with provisions of the Alquist-Priolo Act, the State Seismic Hazards Mapping Act, and the California Building Code.

Soil erosion at MCB Camp Pendleton is minimized through implementation of terms and conditions of applicable BOs, including the Riparian/Estuarine BO (USFWS 1995a), and by implementation of the measures contained in the *MCB Camp Pendleton Soil Erosion Management Practice Handbook* (MCB Camp Pendleton 2000) and the Integrated Natural Resources Management Plan (INRMP) (MCB Camp Pendleton 2011). Current soil erosion control programs at MCB Camp Pendleton include road maintenance, grading, culvert maintenance and installation, water runoff control, traffic control in erosion damaged areas, and mulching areas with a protective cover of organic material such as wood chips and vegetation. In addition, the INRMP includes measures that minimize the potential for soil erosion from wildfires (MCB Camp Pendleton 2011). At DET Fallbrook, soil erosion is controlled through the use of site-specific excavation, grading, and filling plans, and SWPPPs and BMPs that are reviewed by the Naval Weapons Station Seal Beach EPSO to ensure that soil loss and erosion are minimized (DET Fallbrook 2009a). Construction within the community of Fallbrook is subject to County of San Diego erosion and seismic regulations.

3.1.3 Region of Influence

The ROI for geological resources includes the terrestrial topography, geology (including geologic hazards), and soils of the southeastern portion of MCB Camp Pendleton, DET Fallbrook, and the community of Fallbrook. The ROI does not contain a significant amount of mineral resources and no active or abandoned mines are located within the ROI (USMC 1997a,b); therefore, mineral resources are not addressed further in this section.

3.1.4 Existing Conditions

3.1.4.1 Topography

MCB Camp Pendleton, DET Fallbrook, and the community of Fallbrook are located within the Peninsular Ranges Geomorphic Province, which is generally considered to have two separate topographic regions. Northwest-trending mountain ranges, foothills, and intervening valleys are found in the inland, eastern, and central portion of the province. The western region is a coastal plain where cliffs rise from the coast into a plain composed of marine and nonmarine terraces (MCB Camp Pendleton 2011). Basilone Road, which bisects MCB Camp Pendleton approximately northwest-southeast, is considered the dividing line between the two topographic regions. Thus, the community of Fallbrook and DET Fallbrook are located in the eastern, inland portion of the province, while MCB Camp Pendleton extends across both.

The coastal cliffs at MCB Camp Pendleton rise from sea level to 100 ft (30 m) msl (MCB Camp Pendleton 1997). From the cliffs, the plain slopes upward at an inclination of 5% or less, to a maximum elevation of about 200 ft (61 m) msl (MCB Camp Pendleton 1997). The width of the plain ranges from 0.25 mi to 2.25 mi (0.40 km to 3.60 km). The coastal plain adjoins the San Onofre Hills, which rise steeply to a maximum elevation of 1,725 ft (526 m) msl, and give way to the Santa Margarita Mountains (maximum elevation 3,000 ft [914 m] msl). MCB Camp Pendleton also includes an area of gently rolling hills and level topography between the San Onofre Hills and the Santa Margarita Mountains. The topography of DET Fallbrook, the community of Fallbrook, and eastern MCB Camp Pendleton is steep and moderately to highly dissected with stream canyons. Aside from the narrow coastal strip, the majority of the land area at MCB Camp Pendleton exceeds a 15% slope (MCB Camp Pendleton 2011).

Natural erosive processes acting on the steep topography of MCB Camp Pendleton, DET Fallbrook, and the community of Fallbrook have cut southwest-trending stream valleys through the generally northwest-trending hills and mountains. Each stream contains its own valley fill deposits, as well as an alluvial fan deposit at its mouth at the coastline. The San Onofre Hills are dissected by the major stream systems of the area, including the SMR. The SMR forms a broad alluvial plain as it nears its end point at the Pacific Ocean, forming a level area of land between the steep surrounding hills. The SMR valley plain is the second-largest area of level land on MCB Camp Pendleton, after the coastal plain.

3.1.4.2 Geology

The landforms of MCB Camp Pendleton, DET Fallbrook, and the community of Fallbrook are due to the underlying geology. The inland, higher-elevation areas generally consist of granitic and metamorphic rocks composed of interlocking crystals. The coastal plain consists mostly of marine and non-marine sedimentary rocks formed from silt, sands, and larger fragments of other rocks that have been compacted and cemented together; these sedimentary rocks are less resistant to erosion than the crystalline rock types found in the highlands.

Geologic units underlying the ROI on MCB Camp Pendleton, DET Fallbrook, and the community of Fallbrook are described briefly below. The Santa Margarita Mountains within the community of Fallbrook, DET Fallbrook, and inland MCB Camp Pendleton include granitic (granodiorite, tonalite, and gabbro) and metamorphosed volcanic and sedimentary rocks which have become recrystallized through the action of intense heat and pressure (California Geological Survey [CGS] and USGS 2007). The area between the Santa Margarita Mountains and the San Onofre Hills consists primarily of two sedimentary formations: the Silverado Formation (sandstone and claystone) and the Santiago Formation (marine sandstone with siltstone layers) (CGS and USGS 2007).

Stream channels at MCB Camp Pendleton, DET Fallbrook, and the community of Fallbrook are underlain by unconsolidated active alluvial (water-laid) deposits. The SMR channel contains active floodplain deposits of mostly unconsolidated sand and gravel (CGS and USGS 2007). Older (i.e., not part of an active stream channel), moderately well consolidated alluvial deposits are found on the slopes above the active streams; these materials are moderately well consolidated and include a mixture of sand, silt, and gravel (CGS and USGS 2007).

Landslides

Landslides occur on MCB Camp Pendleton as a result of the steep slopes, soil type, and climate (DON 2003). There is potential for landslides in the Santiago Formation (DON 2003, CGS and USGS 2007), if slopes are steepened or undercut during construction.

Subsidence

Subsidence is defined as the downward movement of the ground surface that occurs when there is a loss of supporting materials or forces below. Drawdown of the water table during an extended drought, or with the introduction of new withdrawal wells, can cause subsidence as support provided by the historical volume of underlying groundwater is lost. Subsidence can cause differential settling of soils in the affected area, and damage to infrastructure located there.

Seismicity and Seismic Hazards

Like all of southern California, the project area lies within a seismically active region. Figure 3-1 shows the locations of regional and local fault zones. The CGS defines an active fault as one for which there is evidence of surface displacement within the last 11,000 years, and a potentially active fault as one for which there is evidence of surface displacement within the last 1.6 million to 11,000 years (CGS 2007). This definition is used as the basis for establishing Earthquake Fault Zones as mandated by the Alquist-Priolo Act (CGS 2007). The purpose of this legislation is to prevent unwise urban development and certain types of habitable structures from being placed across land showing evidence of active faults. There are no active faults within MCB Camp Pendleton, DET Fallbrook, or the community of Fallbrook (CGS 2007; USGS 2006a). Several of the faults and fault zones in the region surrounding the project area are considered to be active by the CGS. Table 3.1-1 lists the active regional faults closest to the project area.

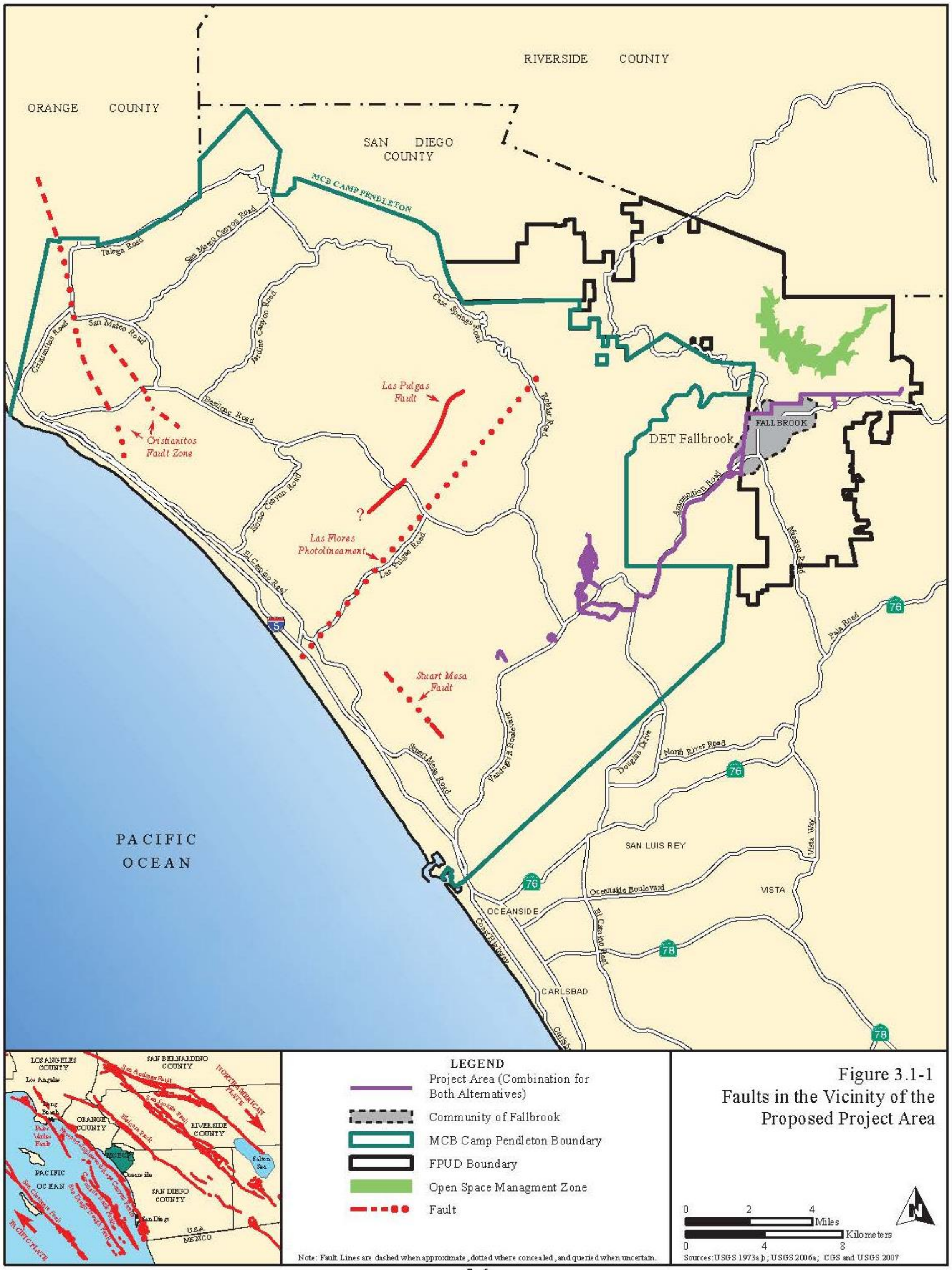


Figure 3.1-1. Faults in the Vicinity of the Proposed Project Area

Table 3.1-1. Major Active Faults in the Vicinity of the Proposed Project Area

Fault Name	Direction Relative to Project Site	Probable Magnitudes	Approximate Distance from Fault to Project Area (in miles)	
			MCB Camp Pendleton (Haybarn Canyon AWTP)	Community of Fallbrook
Whittier-Elsinore Fault	Northeast	6.5-7.5	12	8
Offshore Zone of Deformation[1]	Southwest	6.0-7.2	11	16
Rose Canyon Fault Zone	South	6.0-7.2	17	17
Newport-Inglewood Fault	Northwest	6.0-7.2	28	33

Note: [1] Also called the Newport-Inglewood–Rose Canyon Fault Zone.
MCB = Marine Corps Base; AWTP = Advanced Water Treatment Plant.
Sources: USGS 2006a, Southern California Earthquake Data Center 2012.

Ground acceleration. Ground acceleration is an estimation of the peak bedrock or ground motion associated with a specific earthquake event. It is expressed in terms of “g” forces, where “g” equals the acceleration due to gravity. Acceleration can be measured directly from seismic events or calculated from magnitude and fault distance data. The maximum estimated peak ground acceleration in the ROI would likely be produced by an earthquake event on the Offshore Zone of Deformation (GeoLogic Associates 2003, 2006).

Liquefaction. Liquefaction occurs when the intense shaking motion generated by an earthquake causes soils to lose shear strength temporarily and behave like liquid rather than solid material. Liquefaction can cause differential soil settlement, and thus damage buildings and other structures located in areas where it occurs. For liquefaction to affect structures on the ground surface, underlying soils generally must be granular, loose to medium dense, and saturated with water relatively near the surface. There are nonconsolidated to poorly consolidated sands and gravels in the low-lying areas and along the beaches in the ROI; portions of these areas may have a moderate potential for liquefaction. The remainder of the ROI consists of older, consolidated, and lithified materials in dry, upland areas, so liquefaction potential elsewhere is considered to be low.

3.1.4.3 Soils

Soils at MCB Camp Pendleton, DET Fallbrook, and the community of Fallbrook formed as a result of weathering and transport of the underlying parent material. Weathered granites, marine sandstone, metamorphosed sedimentary rocks, and alluvial material are the parent material for soils in the project area (U.S. Department of Agriculture [USDA] 1973).

Soil erodibility and shrink-swell potential are the major soil properties of concern when considering construction activities. Table 3.1-2 lists the major soil series and their properties for the proposed project component locations. Although there are 21 soil types throughout the project area as a whole, many of the proposed project components would be sited in areas where the same soil types occur. As shown in Table 3.1-2, the USDA characterizes the majority of the soil types within the ROI as being extremely erodible and several soil series are categorized as having severe shrink-swell potential.

Table 3.1-2. Major Soil Types/Properties and Project Components

Soil Type	Erodibility	Shrink/Swell Potential	Project Components
Tujunga Series	Severe	Slight	• Inflatable weir and O'Neill Ditch 1, 2 • Production Wells 1, 2 • Gallery wells 2 • Portions of Bi-directional pipeline 1, 2 • Haybarn Canyon 1, 2
Greenfield Series	Severe	Slight to severe	• Production wells 1, 2 • Portions of Bi-directional pipeline 1, 2
Visalia Series	Severe	Slight to moderate	• Production wells 1, 2 • Portions of Bi-directional pipeline 1, 2 • FPUD WTP 1
Las Flores Series	Severe	Severe	• Portions of Bi-directional pipeline 1, 2
Linne Series	Severe	Moderate	• Production wells 1, 2 • Portions of Bi-directional pipeline 1, 2 • Haybarn Canyon 1, 2
Fallbrook Series	Severe	Moderate	• Portions of Bi-directional pipeline 1, 2
Cieneba Series	Severe	Low	• Portions of Bi-directional pipeline 1, 2
Placentia Series	Low to moderate	Severe	• Portions of Bi-directional pipeline 1, 2
Vista Series	Moderate	Moderate to severe	• Portions of Bi-directional pipeline 1, 2 • FPUD WTP 1
Greenfield Series	Severe	Slight to moderate	• Production wells P, 1, 2 • Portions of Bi-directional pipeline 1, 2
Ramona Series	Low to moderate	Moderate	• Portions of Bi-directional pipeline 1, 2

Notes: 1 = Alternative 1; 2 = Alternative 2.
FPUD = Fallbrook Public Utility District; WTP = Water Treatment Plant.
Source: USDA 1973.

3.2 WATER RESOURCES

3.2.1 Definition of Resources

Water resources include surface water resources, groundwater resources, hydrology, water quality, and floodplains. Surface water includes lakes, ponds, rivers, streams, impoundments, and wetlands within a defined area or watershed. Groundwater is water that is located below the ground surface and is stored and flows through subsurface aquifers. An aquifer is an underground layer of water-bearing permeable rock or unconsolidated materials (gravel, sand, or silt) from which groundwater can be usefully extracted or pumped using a water well. Hydrology is the science that deals with water, its properties, circulation, and distribution, on and under the surface of the earth and in the atmosphere, from the moment of precipitation until it returns to the atmosphere through evapotranspiration or is discharged into the ocean. Water quality describes the chemical and physical composition of water as affected by natural conditions and human activities. Floodplains are relatively flat areas adjacent to rivers, streams, watercourses, bays, or other bodies of water subject to inundations during flood events. A 100-year floodplain is an area that is subject to a 1% chance of flooding in any particular year, or, on average, once every 100 years.

3.2.2 Regulatory Setting

The primary legal and regulatory drivers that apply to the action alternatives are federal and state water quality laws and regulations addressing different aspects of water quality.

3.2.2.1 Federal Laws

Over the years, applicable federal laws have been enacted and the supporting regulations adopted to control water quality and to establish the requirements for adequate planning, implementation, management, and enforcement, including penalties for non-compliance. These include the CWA which addresses the quality of surface waters and the Safe Drinking Water Act which applies to water supplies delivered for public use.

<u>Clean Water Act</u>

The CWA of 1972 is the primary federal law that protects the nation’s waters, including lakes, rivers, and coastal areas. The primary objective of the CWA is to restore and maintain the integrity of the nation’s waters. In most states, including California, most responsibilities under the CWA are delegated to the states. In California, the CWA responsibilities lie with the SWRCB and nine RWQCB. The San Diego RWQCB oversees the SMR watershed and therefore all planning and regulatory activities relating to surface water in the watershed. The San Diego RWQCB regulates the discharge of stormwater, groundwater, and potable water to the SMR through the issuance of NPDES permits, which are based on applicable federal standards and policies, including the Basin Plan (San Diego RWQCB 1994), and regulations promulgated by the USEPA, as well as applicable state laws and regulations as described in the following section. NPDES effluent discharge standards for treated effluent discharged into the SMR Estuary are also governed by the Water Quality Control Plan, Ocean Waters of California (California Ocean Plan) (SWRCB 2009b), and the Water Quality Control Plan for Enclosed Bays and Estuaries (Bays and Estuaries Plan) (SWRCB 1998).

Stemming from the CWA, in October 2004, the DOD issued UFC on LID (UFC 3-210-10). The DOD-issued guidance on LID was later updated on 15 November 2010. This is a stormwater management strategy designed to maintain the hydrologic functions of a site and mitigate the adverse impacts of stormwater runoff from DOD construction projects. All DOD construction projects are required to be compliant with these LID criteria. Following UFC 3-210-10, Section 438 of the Energy Independence and Security Act of 2007 (42 USC § 17094) has also been implemented by the DOD. This goes further with stricter stormwater runoff requirements for federal development projects. Section 438 requires federal agencies to develop facilities having a footprint that exceeds 5,000 ft^2 (465 m^2) in a manner that maintains or restores the pre-development site hydrology to the maximum extent technically feasible. Agencies can accomplish pre-development hydrology in two ways: (1) managing on-site the total volume of rainfall from the 95th percentile storm, or (2) managing on-site the total volume of rainfall based on a site-specific hydrologic analysis through various engineering techniques (e.g., detention basin or retention pond).

Safe Drinking Water Act

The principal federal law pertaining to drinking water quality is the Safe Drinking Water Act, established in 1974 and subsequently amended, to protect the quality of drinking water in the United States. This law focuses on all waters actually or potentially designated for drinking use, whether from surface or groundwater sources. The USEPA set Primary Drinking Water Standards to protect the public health by limiting the levels of contaminants in drinking water. Contaminants regulated in the standards include a comprehensive list of microorganisms, disinfectants, inorganic and organic chemicals, and radionuclides (40 CFR § 141). Primary regulations require mandatory enforcement. Secondary drinking water standards are not federally enforceable but rather are intended as guidelines for states to control contaminants in drinking water that may affect the aesthetic qualities and, therefore, the public's acceptance of drinking water (40 CFR § 143). Also under the Safe Drinking Water Act, new water supplies sources and facilities, such as wells and treatment plants, require permitting by the state agency, in this case the DPH.

EO 11988, *Floodplain Management*

EO 11988 directs all federal agencies to refrain from conducting, supporting, or allowing any activity that would significantly encroach into a floodplain, or impact floodplain resources, unless it is the only practicable alternative. If the lead agency finds that the only practicable alternative requires siting in a floodplain, the agency shall either design or modify its action to minimize harm to or within the floodplain and circulate a notice explaining why the action is proposed to be located in a floodplain.

EO 13547, *Stewardship of the Ocean, Our Coasts, and the Great Lakes*

EO 13547 establishes a national policy to ensure the protection, maintenance, and restoration of the health of ocean, coastal, and Great Lakes ecosystems and resources; enhance the sustainability of ocean and coastal economies; preserve our maritime heritage; support sustainable uses and access; provide for adaptive management to enhance our understanding of and capacity to respond to climate change and ocean acidification; and coordinate with our national security and foreign policy interests. This order also provides for the development of regional coastal and marine spatial plans that build upon and improve existing federal, state, tribal, local, and regional decision making and planning processes.

3.2.2.2 State and Local Laws, Guidelines, and Regulations

Porter-Cologne Act

California's primary statute governing water quality and water pollution issues is the Porter-Cologne Water Quality Control Act of 1970 (Porter-Cologne Act) with numerous amendments and additions since initial adoption. The Act is contained in Division 7 Water Quality, Section 13000 *et seq.*, of the California Water Code.

The Porter-Cologne Act grants the SWRCB and nine RWQCBs broad powers to protect water quality and is the primary vehicle for implementation of California's responsibilities under the federal CWA. The Porter-Cologne Act grants the SWRCB and the RWQCBs authority and responsibility to adopt plans and policies, to regulate discharges to surface and groundwater (groundwater is not covered by the CWA), to regulate waste disposal sites, and to require cleanup of discharges of hazardous materials and other pollutants. The Porter-Cologne Act also establishes reporting requirements for unintended discharges of any hazardous substance, sewage, or oil/petroleum product.

Water Quality Control Plan for the San Diego Basin

The Water Quality Control Plan for the San Diego Basin (Basin Plan) is a water quality policy and guidance document developed by the San Diego RWQCB to set effluent discharge limitations for NPDES and other waste discharge permits. The Basin Plan, which is periodically updated, with its most recent major update in 2016, describes beneficial uses and defines water quality objectives for surface and groundwater within the San Diego region.

The Basin Plan identifies the beneficial uses surface waters and groundwater in the project area (refer to Section 3.2.3.4 for specific beneficial uses). In order to maintain these beneficial uses, the San Diego RWQCB sets quality objectives for surface waters and groundwater with in the region. These objectives are used by the San Diego RWQCB to establish and update the implementation section of the Basin Plan. The implementation section addresses a wide range of regulatory actions the RWQCB can take (e.g., issuing discharge permits for wastewater treatment plants and other various non-permitted plants, and adopting Total Maximum Daily Loads [TMDLs]) and programs that can be implemented to maintain or restore the water quality to meet the objectives.

The project area falls within the Santa Margarita Hydrologic Unit (HU 902.00) that contains several Hydrologic Areas (HA) with the HA of interest being the Ysidora HA (2.10). The Ysidora HA is further divided into Hydrologic Sub-Areas (HSAs). The HSAs of the Ysidora HA include: Upper Ysidora HSA (2.1.3), Chappo HSA (2.1.2), and the Lower Ysidora HSA (2.1.1) (San Diego RWQCB 1994). Each of these HSAs has an underlying groundwater sub-basin (as described in Section 3.2) with the same designated name. Water quality objectives for surface water and groundwater within the project area are presented in Table 3.2-1. For compliance with the water quality objectives, the concentrations listed in Table 3.2-1 are not to be exceeded more than 10% of the time.

Table 3.2-1. Basin Plan Water Quality Objectives for Ysidora Hydrologic Area

Constituent	Surface Water[1]	Groundwater[1]
Boron	0.75 mg/L	0.75 mg/L
Chloride	300 mg/L	300 mg/L
Color	20 color units	20 color units
Fluoride	1.0 mg/L	1.0 mg/L
Iron	0.3 mg/L	0.3 mg/L
Manganese	0.05 mg/L	0.05 mg/L
Methylene blue active substances	0.5 mg/L	0.5 mg/L
Nitrate	None	10 mg/L as Nitrate
Phosphorus & Nitrogen [2]	-	None
Percent Sodium	60	60
Sulfate	300 mg/L	300 mg/L
TDS	750 mg/L	750 mg/L
Turbidity	20 NTU	20 NTU

Notes: [1] Concentrations not to be exceeded more than 10% of the time during any one year period.
[2] A discussion of nitrogen and phosphorus water quality objectives is provided above under *Water Quality Control Plan for the San Diego Basin*.
mg/L = milligrams per liter; TDS = Total Dissolved Solids; NTU = National Turbidity Unit.
Source: San Diego RWQCB 1994.

In addition, there are nitrogen and phosphorus water quality objectives established for surface waters in the Ysidora HA. The objectives stipulate that concentrations of nitrogen and phosphorus, by themselves or in combination with other nutrients, shall be maintained at levels below those which stimulate algae and emergent plant growth. Threshold phosphorus concentrations shall not exceed 0.05 mg/L in any stream at the point where it enters any standing body of water or 0.025 mg/L in any standing body of water (San Diego RWQCB 1994).

To prevent public nuisances in streams and other flowing waters, a desired total phosphorus goal is 0.1 mg/L. These values are not to be exceeded more than 10% of the time unless studies of the specific water body in question clearly show that water quality objective changes are permissible and changes are approved by the San Diego RWQCB. Analogous threshold values have not been set for nitrogen compounds; however, natural ratios of nitrogen to phosphorus are to be determined by surveillance and monitoring, and upheld. If data are lacking, a ratio of nitrogen to phosphorus equaling 10:1 shall be used (San Diego RWQCB 1994).

The Basin Plan provides an alternative method for compliance with the limits on nitrogen and phosphorus based on the discharge of recycled water (i.e., treated effluent) to watercourses downstream of lakes or reservoirs used for municipal water supply. Under this method, the San Diego RWQCB may prescribe different limits on nutrients based on Best Available Technology for nutrient removal that are economically feasible, subject to the development and implementation of a watercourse monitoring plan and other potential conditions (San Diego RWQCB 1994). If such a method of compliance was sought, the AMP/FOP would be adapted to meet the watercourse monitoring plan requirements established by the San Diego RWQCB.

State General Construction Permit

The project is required to apply for coverage under SWRCB Order No. 2009-0009-DWQ: National Pollution Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Disturbance Activities (General Permit) (SWRCB 2009a). As outlined in SCMs listed in Section 2.3.1.4, the FEAD/Contractor must file an NOI with the SWRCB to obtain coverage under the General Permit, pay an annual fee, and prepare and implement a site-specific SWPPP which describes the pollution prevention measures and BMPs that would be implemented to minimize pollution as well as monitoring, record-keeping, and other procedures that would be maintained. The San Diego RWQCB is the agency that inspects the site and enforces the SWPPP. For construction projects on non-federal land disturbing less than 1 acre (0.4 hectare), there are separate requirements included under the San Diego Municipal Stormwater Permit without the requirement for filing with the SWRCB or preparing a formal SWPPP.

Groundwater Dewatering NPDES Permit

Project excavations which intercept groundwater and require groundwater dewatering would comply with SWRCB Order No. R9-2008-0002: *General Waste Discharge Requirements for Discharges from Groundwater Extraction and Similar Discharges to Surface Waters within the San Diego Region except for San Diego Bay* (SWRCB 2008). As outlined in SCMs listed in Section 2.3.1.4, the FEAD/Contractor must submit a NOI, project map, and initial sampling report to the San Diego RWQCB in order to obtain permission to dewater construction excavations and discharge to a municipal storm drain, surface waters, or dry channels. Discharges must comply with discharge and receiving water limits. For small discharges, the permit may be avoided if the Facilities Maintenance Department Wastewater Supervisor allows the discharge into the sanitary sewer. A waiver may be obtained, with assistance from the MCB Camp

Pendleton ES, DET Fallbrook Public Works, or FPUD, as applicable, for short-term construction dewatering operations where there is no discharge to CWA jurisdictional surface waters.

California Ocean Plan

Section 13170.2 of the California Water Code directs the SWRCB to formulate and adopt a water quality control plan for ocean waters of California. The SWRCB first adopted this plan, known as the California Ocean Plan, in 1972. The California Water Code also requires a review of the California Ocean Plan at least every 3 years to guarantee that current standards are adequate and are not allowing degradation to indigenous marine species or posing a threat to human health. The amendments to the California Ocean Plan are reviewed and approved by the USEPA under the CWA.

The SWRCB amended the California Ocean Plan in September 2009. The California Ocean Plan establishes water quality objectives for California's ocean waters and provides the basis for regulation of wastes discharged into the State's coastal waters. The plan applies to point and nonpoint source discharges. Both the SWRCB and the six coastal RWQCBs implement and interpret the California Ocean Plan.

The California Ocean Plan identifies the applicable beneficial uses of marine waters. These beneficial uses include preservation and enhancement of designated Areas of Special Biological Significance, rare and endangered species, marine habitat, fish migration, fish spawning, shellfish harvesting, recreation, commercial and sport fishing, mariculture, industrial water supply, aesthetic enjoyment, and navigation. The California Ocean Plan establishes a set of narrative and numerical water quality objectives to protect beneficial uses. These objectives are based on bacterial, physical, chemical, and biological characteristics as well as radioactivity. The water quality objectives in Table A and Table B of the California Ocean Plan apply to all receiving waters under the jurisdiction of the plan and are established for the protection of aquatic life and for the protection of human health from both carcinogens and noncarcinogens (SWRCB 2009b). Within these tables there are 21 objectives for protecting aquatic life, 20 for protecting human health from noncarcinogens, and 42 for protecting human health from exposure to carcinogens (SWRCB 2009b).

The California Ocean Plan includes an implementation program for achieving water quality objectives by setting effluent or brine discharge limitations for the protection of marine waters. When a discharge permit is written or modified, such as for the brine discharge, the water quality objectives for the receiving water are converted into effluent limitations that apply to discharges into State ocean waters. These effluent limitations are established on a discharge-specific basis depending on the initial dilution calculated for each outfall and the objectives within the plan. Implementation provisions are also established for bacterial assessment and remedial action requirements. These provisions provide a basis for determining the occurrence and extent of any impairment of beneficial uses due to bacterial contamination and for providing remedial actions necessary to minimize or eliminate any future impairment of a beneficial use.

NPDES Ocean Discharge Permit

Discharge via an existing ocean outfall (e.g., City of Oceanside Ocean Outfall) would require an amendment to the applicable existing discharge permit. As an example of permit limitations, select permit limits for the combined effluent were taken from the City of Oceanside's NPDES Ocean Discharge Permit and are presented in Table 3.2-2.

Table 3.2-2. 2005 Oceanside Permit (Order No. R9-2011-0016) Requirements for Ammonia and Metals[1]

Constituent	Units	Oceanside Permit Limits 6-Month Median	Daily Maximum	Instantaneous Maximum
Arsenic	mg/L	0.42	2.4	6.4
Cadmium	µg/L	83	330	830
Chromium (hexavalent)	µg/L	170	660	1,660
Copper	µg/L	85	830	2,300
Lead	µg/L	170	660	1,660
Mercury	µg/L	3.3	13	33
Nickel	mg/L	0.41	1.7	4.1
Selenium	mg/L	1.2	5.0	12
Silver	µg/L	24	140	360
Zinc	mg/L	1.0	6.0	16
Ammonia as N	mg/L	50	200	500

Note: [1] The permit also includes limitations for major constituents (carbonaceous biological oxygen demand, TSDs, oil and grease, settleable solids, turbidity, pH, toxicity) and for other toxic compounds (organics, radioactivity, cyanide, total chlorine residual).

mg/L = milligrams per liter; TSD = total dissolved solid.

Source: San Diego RWQCB 2005.

3.2.3 Region of Influence

The ROI for water resources includes those areas that contain surface water or groundwater features that may be impacted by the action alternatives. The study area includes the southern portion of MCB Camp Pendleton, DET Fallbrook, and the FPUD service area. The surface water rivers/creeks located in the ROI for the action alternatives are the SMR, Fallbrook Creek, De Luz Creek, and Sandia Creek (refer to Figure 3.2-1). The ROI also includes surface water bodies such as the SMR Estuary, Lake O'Neill, and the recharge ponds adjacent to Lake O'Neill. Because the implementation of the action alternatives would potentially affect coastal waters, the ROI also extends to coastal waters subject to the CWA. Groundwater resources that may be influenced with implementation of the action alternatives are the Upper Ysidora, Chappo, and Lower Ysidora groundwater sub-basins.

3.2.4 Existing Conditions

This section provides background information describing the existing condition of surface water resources, groundwater resources, hydrology, water quality, and floodplains in the ROI.

3.2.4.1 Surface Water Resources

Santa Margarita River Watershed

The SMR watershed (Figure 3.2-1) flows southwesterly to the Pacific Ocean, draining the Palomar and Santa Ana mountains. The SMR watershed encompasses 744 mi^2 (1,927 km^2) within San Diego and Riverside counties, and is divided by a coastal range of mountains. The upper portion of the watershed is located in Riverside County and drained by Temecula and Murrieta creeks. Downstream of the confluence of Temecula and Murrieta creeks, the SMR flows southwesterly to the Pacific Ocean, draining the lower portion of the watershed. The lower basin is located in lands serviced by FPUD, Rancho California Water District, or owned by DET Fallbrook and MCB Camp Pendleton. Approximately 10% of the SMR watershed is on MCB Camp Pendleton and DET Fallbrook. Major tributaries in the lower basin are De Luz, Sandia, Rainbow, and Fallbrook creeks.

Santa Margarita River

The SMR flows 29 mi (47 km) southwesterly from the confluence of Murrieta and Temecula creeks to the Pacific Ocean. The SMR is the least disturbed and longest free-flowing, undammed river in coastal southern California (County of San Diego 2005). Principal tributaries to the SMR lower basin include De Luz, Sandia, Rainbow, and Fallbrook creeks. Flow in the SMR is highly variable depending on the time of year and the hydrologic conditions of the preceding seasons.

Santa Margarita River Estuary

The SMR Estuary is a coastal lagoon at the mouth of the SMR that is typically subject to tidal influence from the Pacific Ocean but can become separated from the ocean by a sand berm. The configuration of the lower estuary near the mouth area can change from one year to another with the shifting sand berm. The area of tidal influence extends from the ocean to slightly above the Stuart Mesa Road bridge that crosses the SMR. The main riverine channel of the estuary is approximately 7,000 ft (2,134 m) long with a width ranging from 125 to 1,400 ft (38 to 427 m). The SMR Estuary extends to the upstream limit of the tidal marine circulation and occupies 190 acres (77 hectares) comprising several different types of coastal wetlands differentiated by the degree of inundation and salinity.

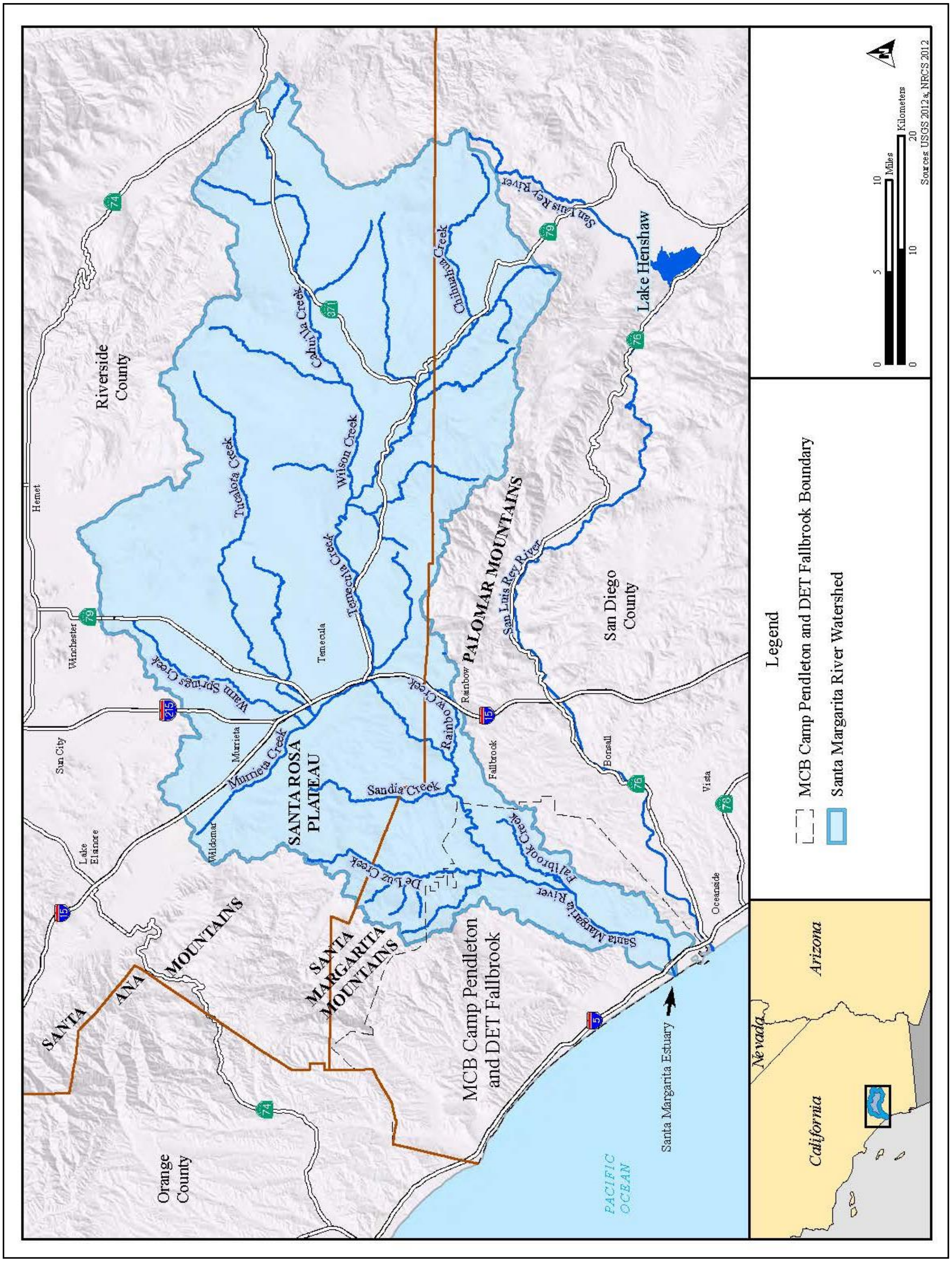


Figure 3.2-1. Santa Margarita River Watershed

Existing Diversion Facilities

Facilities currently exist on the SMR within MCB Camp Pendleton to divert surface water from the river. The existing diversion system consists of a steel sheet pile diversion weir constructed across the SMR that diverts water through O'Neill Ditch (an earthen channel) to a series of seven interconnected groundwater recharge ponds and to Lake O'Neill (Figure 3.2-2). The water that is diverted into Lake O'Neill and the recharge ponds is used to recharge the groundwater basin. A series of control structures and measuring devices allows MCB Camp Pendleton personnel to manage, control, and measure the diversion to each of the different facilities. The current maximum diversion capacity of the sheet pile weir and O'Neill ditch is 60 cfs.

Lake O'Neill

Lake O'Neill is located off of Santa Margarita Road approximately 9 mi (15 km) from the Main Gate, and is used primarily for water storage (i.e., groundwater recharge) purposes and secondarily for recreational purposes by USMC personnel and other authorized users. Lake O'Neill is a manmade reservoir formed by an earthen dam located on Fallbrook Creek, a tributary to the SMR. The lake is filled primarily from SMR diversions conveyed to the lake through O'Neill Ditch (Figure 3.2-2).

Diversions from O'Neill Ditch to the lake occur through a turnout structure and pipe located at the lower end of O'Neill Ditch. Adjacent to the turnout pipe that fills the lake is an overflow outlet that returns reservoir spills to a ditch that eventually percolates into the ground or drains back to the river. Lake water is also returned to the river through an outlet pipe located in the southern corner of the lake (Reclamation *et al.* 2005).

MCB Camp Pendleton completed dredging of the open water portion of Lake O'Neill (Phase I) in 2012. Phase II will include additional dredging and installation of maintenance facilities to improve the usable storage of the lake. This two-phase process will return Lake O'Neill to its original storage capacity of approximately 1,680 AF.

Recharge ponds

Water that is diverted from the SMR via the existing diversion structure is conveyed to either Lake O'Neill or to seven interconnected groundwater recharge ponds (Figure 3.2-2). The groundwater recharge pond system was constructed between 1955 and 1962, and SMR diversions to the recharge ponds were first recorded in October 1960. The total surface area of the seven-pond system is approximately 74 acres (30 hectares), and the capacity of the ponds is estimated to be approximately 371 AF (MCB Camp Pendleton 2012a). Ponds 4, 5, 6, and 7 were recently rehabilitated in late 2011 during Phase 1 dredging of Lake O'Neill.

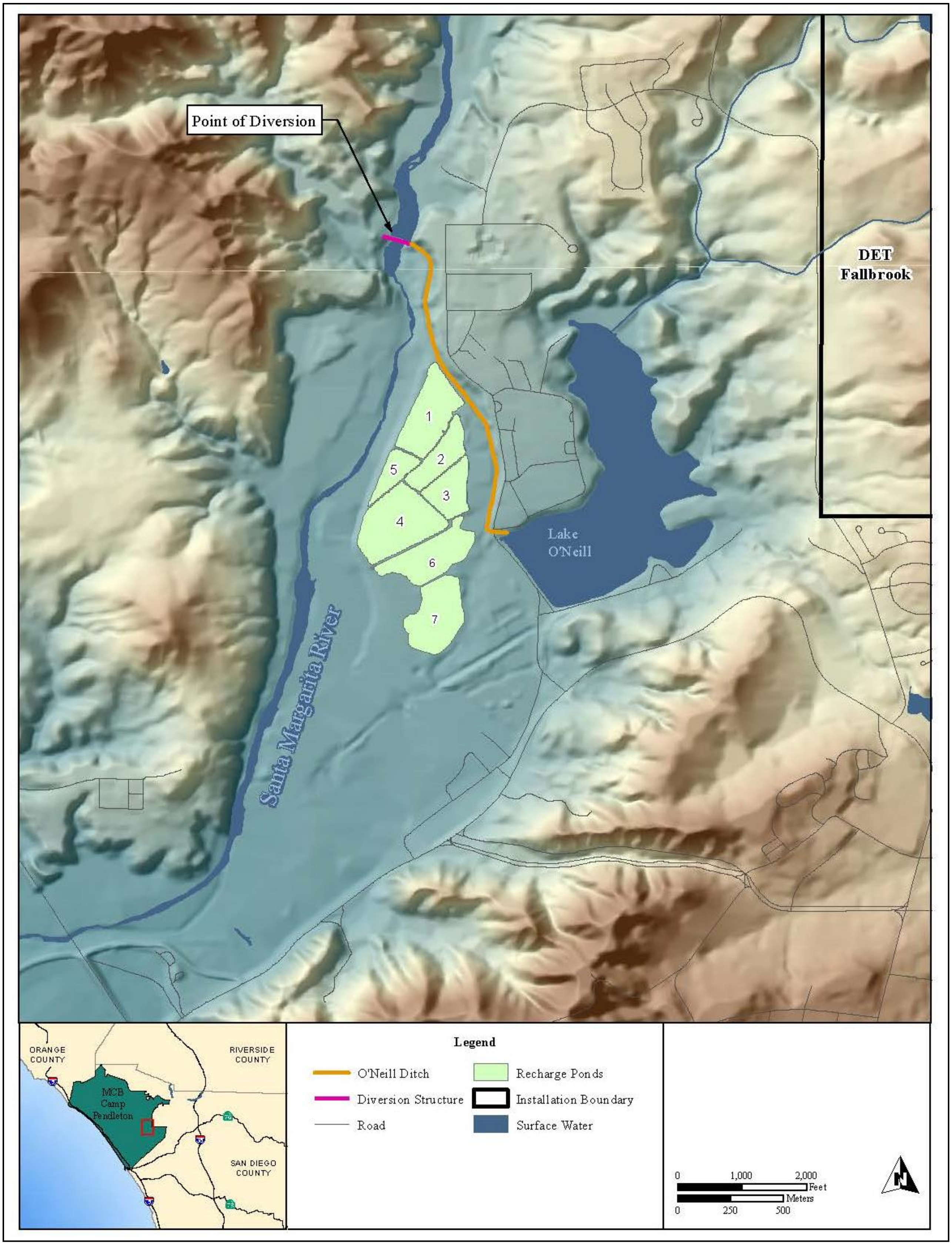


Figure 3.2-2. Lake O'Neill, O'Neill Ditch, and Recharge ponds

Under the current recharge pond operations, water is diverted from O'Neill Ditch into the recharge pond system through a single corrugated metal pipe at the head of Pond 1. When the water level in Pond 1 rises to the pond's outlet pipe invert elevations, flow passes (i.e., spills) from Pond 1 into either Pond 2 or 5. The pipe invert elevations from Pond 1 to Pond 2 are slightly lower (12-15 in [31-38 cm]) than the pipe invert elevations from Pond 1 to Pond 5; therefore, water first spills from Pond 1 into Pond 2 before spilling into Pond 5. Water filling above the invert elevation of the outlet pipes from Pond 2 spills into Pond 3, and water filling above the outlet pipes from Pond 3 spills into Pond 4. Similarly, water filling above the invert elevation of the outlet pipes from Pond 5 spills into Pond 4. Water is also designed to spill from Pond 3 and 4 to Pond 6, then subsequently to Pond 7. At the lower end of Pond 4 (the last pond currently being used in the system), two corrugated metal pipes return overflows from Pond 4 to the floodplain. Since 1983, Pond 4 has filled four times, spilling twice to the floodplain in March of 1983 and again in February of 2005 (MCB Camp Pendleton 2008a).

<u>Wetlands</u>

Wetlands coverage and values are discussed in detail in Section 3.3, *Biological Resources*.

3.2.4.2 Groundwater Resources

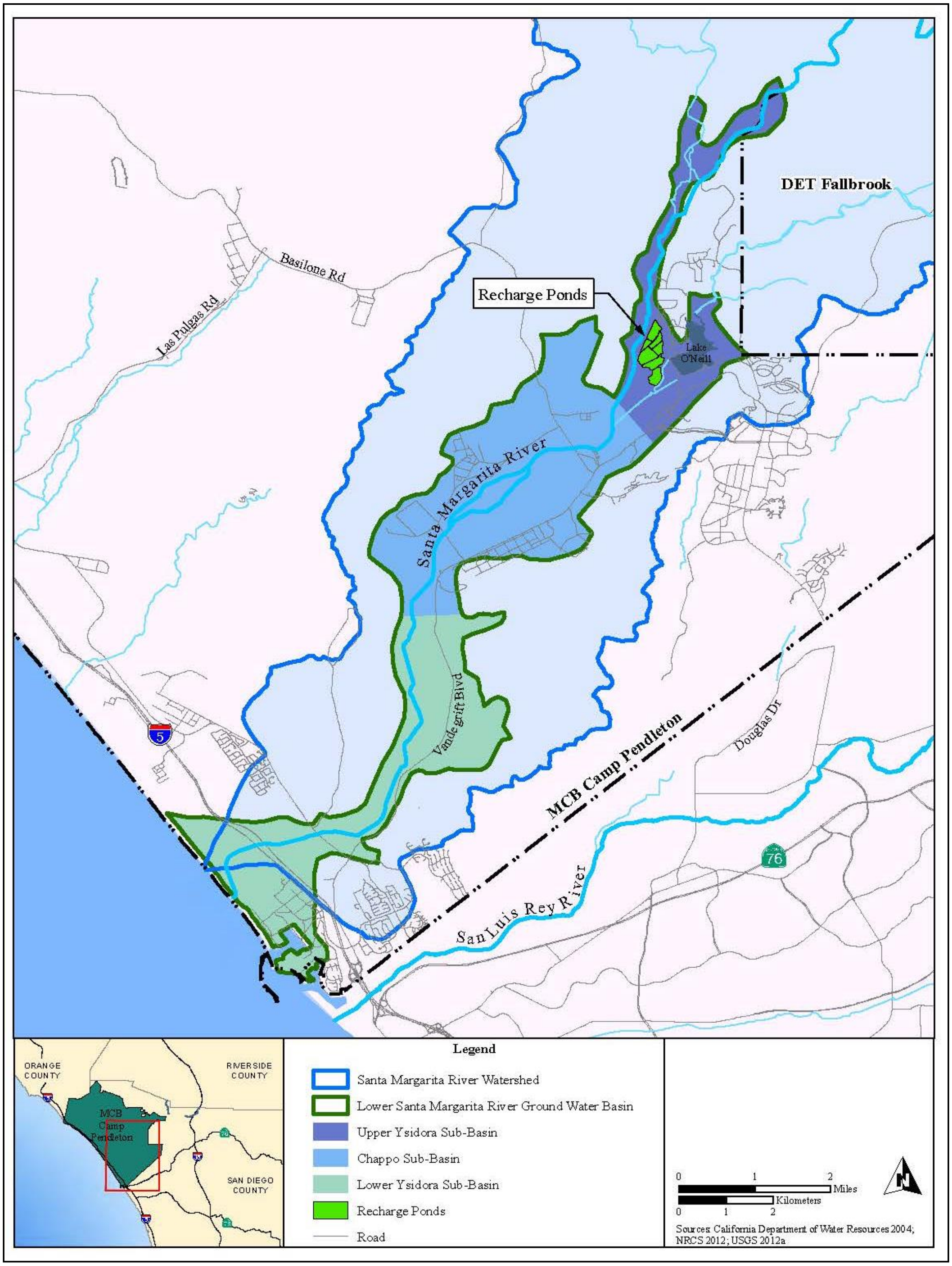
Groundwater within the ROI is found in the alluvial basin located downstream from the confluence of the SMR and De Luz Creek and, to a lesser extent, in the shallow alluvium upstream of that confluence. The alluvial basin located downstream from the confluence of the SMR and De Luz Creek is further divided into three separate sub-basins: the Upper Ysidora, Chappo, and Lower Ysidora sub-basins (Figure 3.2-3). The Upper Ysidora Sub-basin is the farthest upstream of the three sub-basins; the sub-basin's aquifer is characterized by coarse sediments, consisting mostly of sands and gravels. The Chappo Sub-basin, located down-gradient from the Upper Ysidora Sub-basin, consists of sands, gravels, and clays, and is the largest of the three sub-basins. The farthest downstream sub-basin, the Lower Ysidora, consists mostly of sands and clays, and is the least productive in terms of groundwater production of the three sub-basins. The three sub-basins range from less than 0.5 mi (0.8 km) wide (Upper and Lower Ysidora sub-basins) to more than 2 mi (3 km) wide (Chappo Sub-basin).

3.2.4.3 Hydrology

<u>Santa Margarita River Watershed</u>

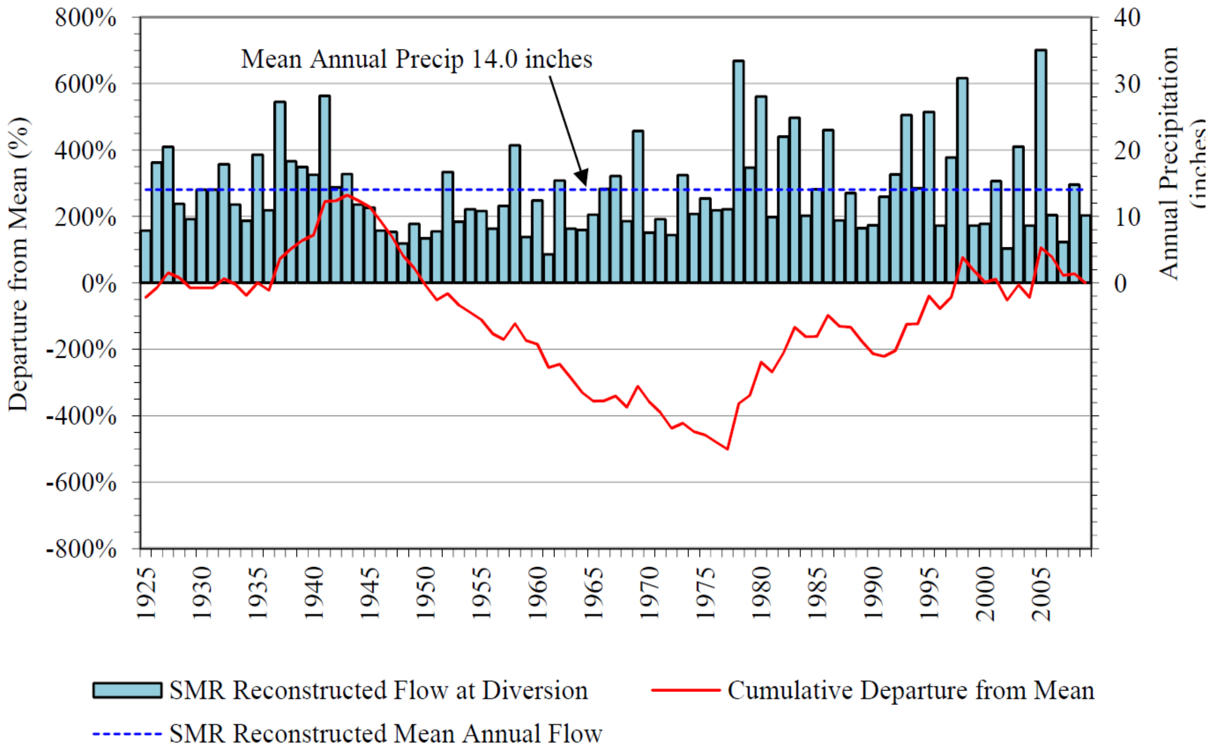
The SMR watershed has a typical Mediterranean climate with hot dry summers and mild wet winters. The SMR watershed receives an average of 16 in (41 cm) of precipitation per year. Average precipitation totals vary throughout the watershed due to variations in elevation and the influence of the Pacific Ocean. Annual precipitation averages approximately 11 in (28 cm) per year near the coast, and mountainous areas located further inland receive over 40 in (102 cm) of precipitation per year. The majority of precipitation falls as rainfall; however, snowfall may occur in the higher mountain ranges located in the upper reaches of the watershed.

More than 90% of the annual precipitation occurs between November and April. From year to year, total precipitation varies greatly and the watershed has experienced both extended wet and dry periods. Annual precipitation at Lake O'Neill has ranged from approximately 4 in to 35 in (10 cm to 89 cm), averaging approximately 14 in (36 cm) (Reclamation *et al.* 2012). **Figure 3.2-4** shows the long-term precipitation trends at the Lake O'Neill weather station. The cumulative departure from mean curve (red line) shows the hydrologic trend, where a downward slope indicates that the trend is to dry conditions and an upward slope indicates that the trend is to wet conditions. A severe 7-year drought occurred from WY 1959 through WY 1965 in which the average annual precipitation at Lake O'Neill was 9.3 in (23.6 cm).



SouSource: Stetson

Figure 3.2-3. Lower Santa Margarita Groundwater Basin



Source: Reclamation et al. 2012.

Figure 3.2-4. Annual Precipitation and Cumulative Departure from the Mean at Lake O'Neill

Flow in the SMR watershed is greatest during the winter months in response to winter rains, and declines during the summer months in response to minimal precipitation. Streamflow generally follows the long-term hydrologic trends of precipitation, including extended wet and dry cycles. On an annual basis, streamflow in the watershed can vary over many orders of magnitude. For example, at the USGS gauge at Ysidora, streamflow during the 7-year drought of WY 1959-1965 was 0 AFY for all years; however, in very wet years, annual streamflow greater than 200,000 AFY has been recorded at that gauge (Figure 3.2-5).

Climate change is expected to result in more extreme winter storms with flashier flood hazards and increased peak runoff resulting in greater discharges to the ocean (California Department of Water Resources 2009a). Although individual winter storms may be flashier, some studies estimate up to a 4% reduction in annual precipitation in southern California over the next 50 years (Cayan 2009).

Santa Margarita River

Channel Characteristics

According to 1997 aerial photography, the active SMR channel in a 1.5 mi (2.4 km) stretch of the river near the diversion structure indicates the channel width to be approximately 200 ft (61 m) (Reclamation 2004b). The active channel is approximately 280 ft (85 m) wide just upstream of the diversion structure (Reclamation 2004b).

A "bankfull channel" has also been characterized for the SMR in the vicinity of the diversion structure. This bankfull channel includes the active channel and the vegetated areas of the active floodplain between

Figure 3.2-5. USGS Streamflow Gauge Locations in the Lower Santa Margarita River Watershed

the valley walls. The majority of sediment that is transported by the river is moved in this area. Flood flows may overtop the walls of this bankfull channel and spread into the floodplain. During storm events equivalent to or greater than the 10-year storm event (as occurred in 1993, 1998, and 2005), the majority of vegetation in the bankfull channel was washed out (Reclamation 2004b).

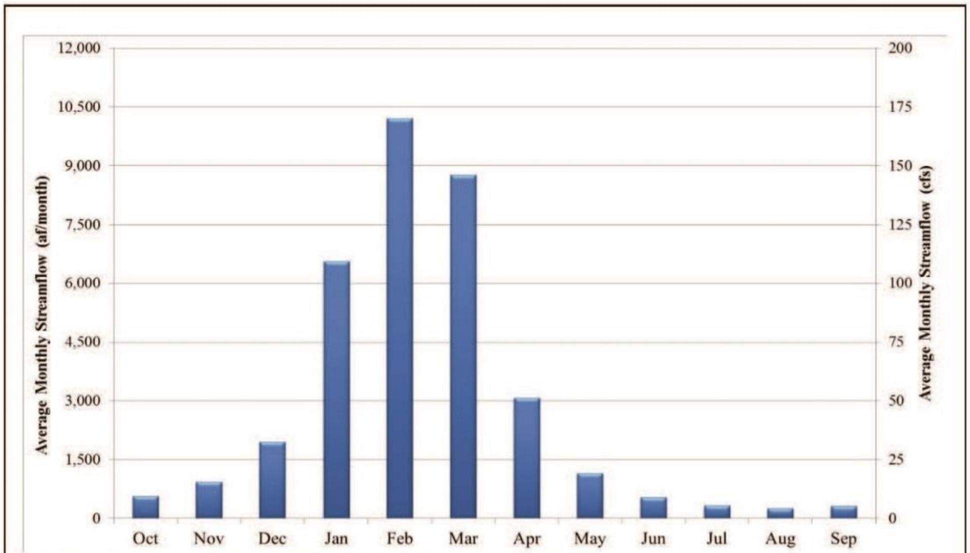
Surface Flow

Flow in the SMR is typical of rivers located in the arid southwestern United States, where the majority of precipitation occurs during the winter. The USGS Ysidora discharge gauge is located on the SMR and is the closest gauge to the diversion structure. The Ysidora gauge has been operated since 1923 (USGS), but this gauge has been relocated several times and is currently located approximately 2.3 mi (3.7 km) downstream of the diversion structure. The locations of the current Ysidora gauge and other USGS gauges in the Lower SMR are shown in Figure 3.2-5. The only significant additional flow that enters the SMR between the diversion structure and the Ysidora gauge is from Fallbrook Creek.

The Lower SMR flows continuously following winter-time storm events and above normal hydrologic conditions. During other conditions, the SMR flows only at natural restrictions in the groundwater basin where rising groundwater contributes to surface flow. These intermittent flow locations occur in the Lower SMR Basin at the narrows between the Upper Ysidora and Chappo sub-basins (USGS gauge at Ysidora), the Chappo and Lower Ysidora sub-basins, and at the Lower Ysidora Narrows. Although the Ysidora gauge typically measures flow throughout most years, large reaches of the SMR contain no streamflow during the dry season.

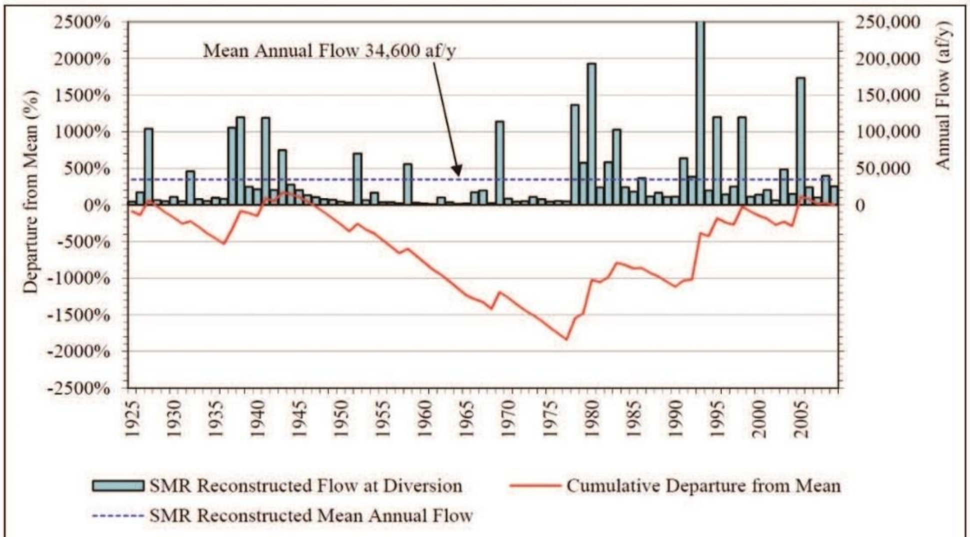
Flow within the SMR is subject to large seasonal and annual fluctuations, with approximately 81% of the annual flow occurring between January and April (**Figure 3.2-6).** Gauged data is available from WY 1980 to present for the current location of the USGS Ysidora gauge. However, a longer 85-year (WY 1925-2009) record of SMR flow was reconstructed at the location of the diversion structure through a more detailed analysis based on streamflow records from multiple gauges throughout the SMR watershed, including the Ysidora gauge (Reclamation *et al.* 2012). Based on this analysis, the annual flow for the WY 1925 to 2009 period ranged from 1,200 AFY (in WY 1961) to 254,800 AFY (in WY 1993) and average annual flow was 34,600 AFY (**Figure 3.2-7**) (Reclamation *et al.* 2012).

Figure 3.2-7 also shows the cumulative departure from mean curve for the reconstructed flow at the diversion structure from WY 1925-2009. The figure demonstrates similar long-term trends shown in the precipitation graph in Figure 3.2-4. The cumulative departure from mean curve (red line) shows the hydrologic trend, where a downward slope indicates that the trend is to dry conditions and an upward slope indicates that the trend is to wet conditions. The dashed blue line shows the average annual flow of 34,600 for the period. The historical record is characterized by drier conditions during the first half of the record (an average of 24,000 AFY for WY 1925-1967) and wetter conditions during the latter half (an average of 45,000 AFY for WY 1968-2009). The SMR is subject to extended periods of dry conditions; during the 7-year drought from WY 1959-1965, flow at the diversion structure averaged 3,300 AFY, only 10% of the historical average. The last three decades have been a relatively wet period, with annual flows averaging 51,000 AFY for the period from WY 1980-2009.



Note: Annual streamflow data reconstructed as described in Reclamation et al. 2012.
Source: Reclamation *et al.* 2012.

Figure 3.2-6 Monthly Streamflow at the SMR Diversion Structure



Note: Annual streamflow data reconstructed as described in Reclamation et al. 2012.
Source: Reclamation *et al.* 2012.

Figure 3.2-7 Annual Streamflow and Cumulative Departure from the Mean at the SMR Diversion Structure

Figure 3.2-6. Monthly Streamflow at the SMR Diversion Structure

Figure 3.2-7. Annual Streamflow and Cumulative Departure from the Mean at the SMR Diversion Structure

Table 3.2-3 shows the distribution of SMR flows at the diversion structure based on hydrologic conditions during the 85-year period of record. The four categories of hydrologic condition (i.e., Very Wet, Above Normal, Below Normal, and Very Dry) were developed using statistical analysis and graphical interpretation of slope breaks; the median winter-time streamflow (12,800 AF) represents the break between Above Normal and Below Normal hydrologic conditions (Reclamation *et al.* 2012). The determinations are based on winter-time streamflow during October through April.

Table 3.2-3. Delineation of Hydrologic Condition Based on Wintertime Streamflow for Water Years 1925-2009

Hydrologic Condition	Range of Wintertime Streamflow [AF]	Range of Wintertime Streamflow Percent Time Exceedance [%]
Very Wet	> 55,600	1 to 19
Above Normal	12,800 to 55,600	20 to 50
Below Normal	5,000 to 12,799	51 to 75
Very Dry	< 5,000	76 to 100

Notes: Wintertime streamflow calculated as the total October through April SMR streamflow at the point of diversion. The median wintertime streamflow (12,800 AF) represents the break between Above Normal and Below Normal hydrologic conditions.
Source: Reclamation *et al.* 2012.

Table 3.2-4 shows information for the exceedance intervals and percent exceedances for annual flow rates at the diversion structure along the SMR. The probability that an annual streamflow volume would be exceeded for a given year is called the exceedance interval. For example, based on Table 3.2-4, the median (50%) annual flow (14,400 AF) represents a minimum volume that is expected to be exceeded one year out of every two years (1 divided by 50%). Streamflow during the other half of the years is statistically expected to be less than 14,400 AF (Reclamation *et al.* 2012).

Table 3.2-4. Exceedance Intervals and Annual Streamflow in the Santa Margarita River at the Point of Diversion for Water Years 1925-2009

Percent Time Exceedance (%)	Exceedance Interval	Annual Streamflow at Point of Diversion (AFY)
4	1 in 25 years	157,200
5	1 in 20 years	131,600
7	1 in 15 years	119,800
10	1 in 10 years	116,000
11	1 in 9 years	109,300
13	1 in 8 years	104,500
14	1 in 7 years	94,900
17	1 in 6 years	68,100
20	1 in 5 years	57,100
25	1 in 4 years	39,100
33	1 in 3 years	24,200
50	1 in 2 years	14,400
75	1 in 1.3 years	5,900
100	Every year	1,200

Notes: AFY = acre-feet per year.
Source: Reclamation *et al.* 2012.

Measured average daily flow for the USGS Ysidora gauge ranged from 0 cfs to just over 22,000 cfs for the period between 1981-2011 (USGS 2012b). The instantaneous peak flow rate for the 85-year period of record for the Ysidora gauge is approximately 44,000 cfs in 1993 (USGS 2012b). The estimated instantaneous peak flood frequencies at the Ysidora gauge are shown in Table 3.2-5.

Table 3.2-5. Instantaneous Peak Flood Frequency at Ysidora Gauge

Return Period (years)	Frequency	Flow (cfs)
2	50%	1,000
5	20%	8,000
10	10%	17,000
20	5%	26,000
50	2%	37,500
100	1%	46,000

Notes: cfs = cubic feet per second.
Source: USACE 2000, Reclamation 2004b.

Sediment Transport

Approximately 95% of the sediment transport (i.e., both bedload and suspended load) in the SMR is estimated to occur during the 10-year, or greater, storm event; and over 99% of the sediment transport occurs in the 5-year, or greater, storm event (Reclamation 2004b). An average annual sediment load of 36,000 to 51,000 tons per year is estimated to pass the I-5 crossing of the SMR each year (Reclamation 2004b).

While the vast majority of sediment generated in the watershed is thought to occur and be transported downstream under these large, infrequent storm events, Reclamation (2004b) also notes that limited quantities of sediment may be routinely carried on a somewhat continuous basis by water diverted through the diversion channel to Lake O'Neill and the recharge ponds. This condition occurs because sediment from smaller storm events is deposited upstream of the weir and then a channel is scoured through this sediment down to the diversion gate opening, which is at a lower elevation than the weir. Sediment can then be mobilized in the vicinity of the diversion channel at lower flows due to the gradient created between the diversion gate and the river channel when the majority of river flow is diverted rather than released downstream.

SMR Estuary

Historically, the estuary has been mostly connected to the Pacific Ocean via a narrow opening and has been infrequently separated from the ocean by a sand berm (NAVFAC SW 2003). The estuary is considered closed and not subject to tidal fluctuations when a sand berm forms at its mouth to the ocean. During closure of the estuary, water levels are not influenced by ocean tides. Tidal action, wave action, coastal sand movement, and river flows contribute to the formation or absence of a sand bar at the mouth. After periods of extended closure, the blocking sand berm can be breached by ocean swells or by high river discharges (NAVFAC SW 2003).

The USGS began monitoring water levels in the estuary starting in October 1988. Prior to that, aerial photographic evidence was reviewed to show the closure status of the estuary (NAVFAC SW 2003). Notably, available photographs show the estuary was closed in February 1963, December 1976, and April 1987. Corresponding hydrologic streamflow data from the 1958 to 1965 period suggests the estuary remained closed for an extended period due to lack of high stormflow events that could breach the sand berm at the mouth. Similarly, dry hydrologic conditions in the mid-1970s and late 1980s would also suggest that the estuary remained closed for extended periods during drier than normal periods. The duration of these estuary closures is not known, but since these dates occur during extended dry periods of below-average precipitation and streamflow, it is possible that the sandbar closures persisted for years.

The water levels of the SMR Estuary along with SMR flow measured by the USGS over the last 23 years are shown in Figure 3.2-8. The estuary has been closed several times for up to several months over this recent period. The closed condition is indicated by periods when the difference between the minimum and maximum estuary water level is minimal because tidal fluctuations no longer impact water surface elevations within the estuary.

The dynamic nature of the open/closed state of the estuarine mouth closely corresponds to wave climate and the upstream hydrologic (NAVFAC SW 2003). Based on review of the historical data, the estuary has been closed more often during dry periods and less frequently during above normal hydrologic conditions.

Groundwater Hydrology

Hydrogeology

The Lower SMR Basin contains three interconnected alluvial groundwater sub-basins: the Upper Ysidora, Chappo, and Lower Ysidora (MCB Camp Pendleton and DON 2004). These sub-basins are characterized by large alluvial sand and gravel deposits overlaying an impervious rock layer. Within these three sub-basins, the primary water-bearing units are the Upper and Lower Alluvium. The Lower Alluvium (Ql) is a narrow channel that extends throughout most of the basin. It is well defined and uniform, consisting of sand and gravel, with localized boulders along the axis of a deep channel that is cut into the La Jolla formation. The Upper Alluvium (Qu) is a shallower channel that is much broader. It is highly variable in composition but consists predominantly of sandy silt with some discontinuous, thin clay layers. The overall thickness of the Upper and Lower Alluvium ranges from 150 to 200 ft (46 to 61 m) (California Department of Water Resources 2004).

Groundwater Recharge and Production

Groundwater in the SMR Basin is recharged primarily via a combination of the direct infiltration of rainfall and SMR seepage. In addition, MCB Camp Pendleton diverts surface water from the SMR into Lake O'Neill and the recharge ponds, whereupon it infiltrates into the alluvial upper aquifer.

MCB Camp Pendleton depends almost exclusively on groundwater to meet its residential, military, and agricultural needs. Twelve wells within the SMR Basin provide MCB Camp Pendleton with an average production rate of 3,350 gallons per minute based on calendar years 2007-2010. The annual safe yield of the Lower SMR Basin is estimated at 7,640 AFY (MCB Camp Pendleton 2011). Until 2011, MCB Camp Pendleton has used approximately 1,500 AFY of groundwater from the Lower Ysidora Sub-basin to irrigate agricultural lands leased to contracting agricultural businesses. However, groundwater is no longer being pumped from the Lower Ysidora Sub-basin.

Upper Ysidora Sub-basin. There are five groundwater wells in the Upper Ysidora Sub-basin that are assumed to pump a combined annual volume of approximately 4,400 AFY (Stetson 2012a).

Depth to groundwater in the central part of the Upper Ysidora Sub-basin ranges between 4 and 10 ft (1.2 and 3 m) during wet years, and between 4 and 12 ft (1.2 and 4 m) during dry years (MCB Camp Pendleton and DON 2004). Figure 3.2-9 shows the historical water levels at four wells within the Upper Ysidora Sub-basin. The two "indicator" wells shown on the figure are the well locations utilized by the groundwater model (Reclamation 2007b; Stetson 2012a) to assess the changes in water levels due to

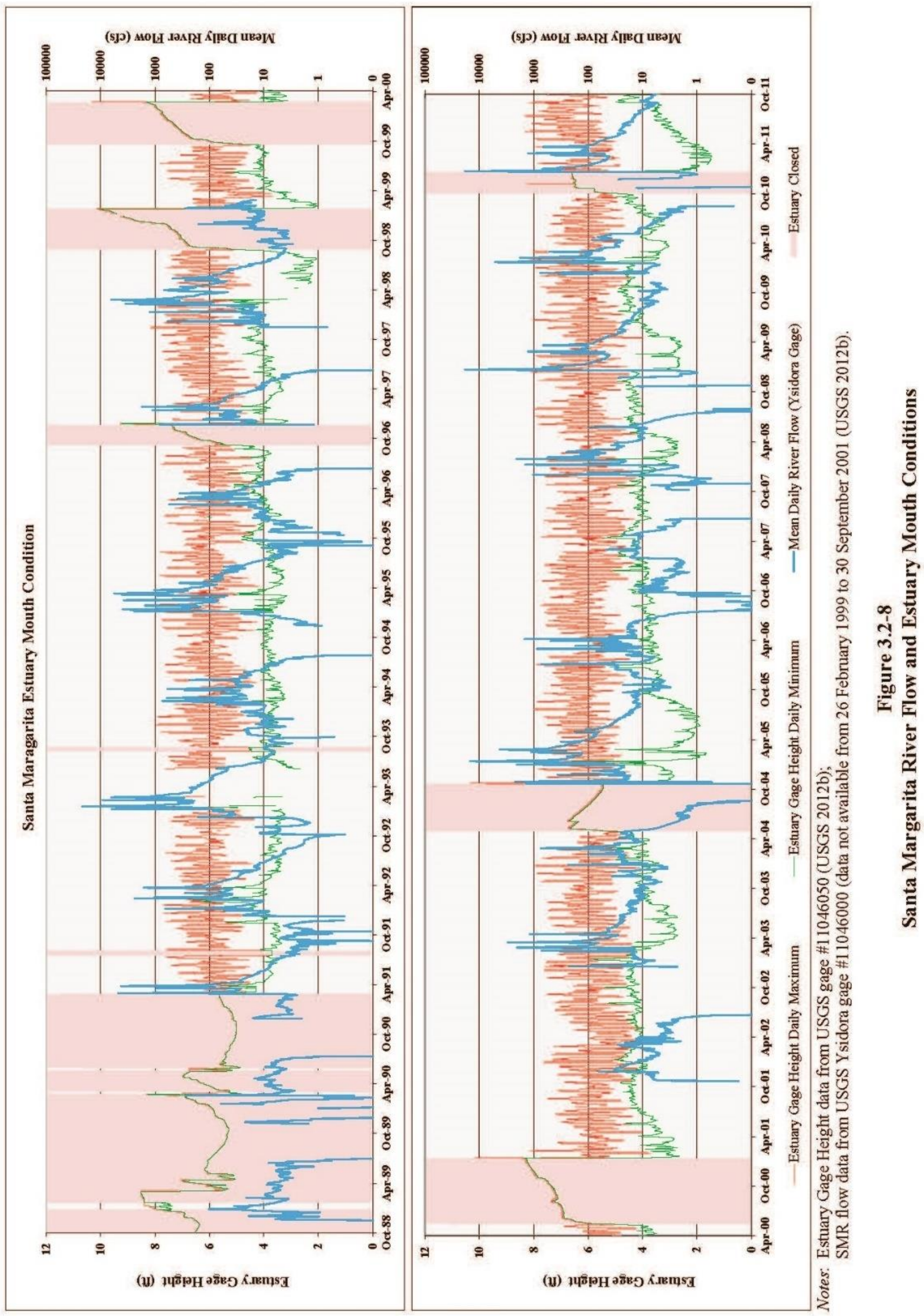


Figure 3.2-8. Santa Margarita River Flow and Estuary Mouth Conditions

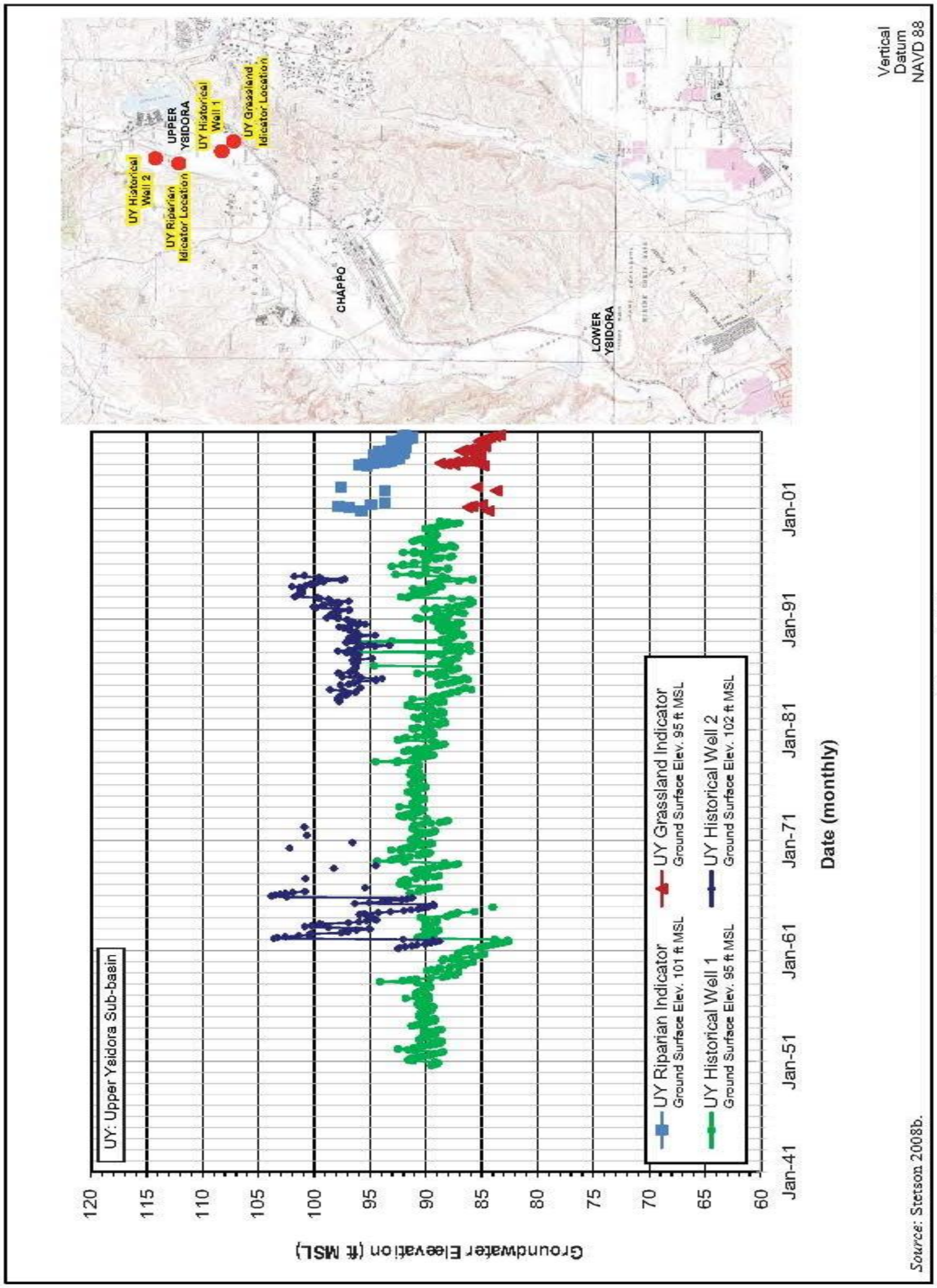


Figure 3.2-9. Groundwater Elevations in the Upper Ysidora Sub-basin

project alternatives. The other two wells are provided to show historical water levels in the sub-basin. The use of "indicator" wells is further discussed in Appendix B.

Chappo Sub-basin. There are seven groundwater wells in the Chappo Sub-basin that are assumed to pump a combined annual volume of approximately 3,000 AFY (Stetson 2012a). This production is used to meet MCB Camp Pendleton water supply requirements and agricultural needs.

Depth to groundwater in the Chappo Sub-basin ranges between 4 and 12 ft (1.2 and 4 m) in wet years, and between 8 to 25 ft (2 to 8 m) during dry years (MCB Camp Pendleton and DON 2004). Figure 3.2-10 shows the historical water levels at two "indicator" wells within the Chappo Sub-basin. The two "indicator" wells shown on the figure are the well locations utilized in the groundwater model (Reclamation 2007b; Stetson 2012a) to assess the changes in water levels due to project alternatives.

Lower Ysidora Sub-basin. At present, there are no potable groundwater wells operating in the Lower Ysidora Sub-basin. Historically (i.e., during the 1980-2004 model calibration period), four wells within this sub-basin supplied water at an average rate of 1,120 AFY with a range of 570 to 1,500 AFY.

Figure 3.2-11 shows the historical water levels at two "indicator" wells within the Lower Ysidora Sub-basin. The two "indicator" wells shown on the figure are the well locations utilized in the groundwater model (Reclamation 2007b; Stetson 2012a) to assess the changes in water levels due to project alternatives.

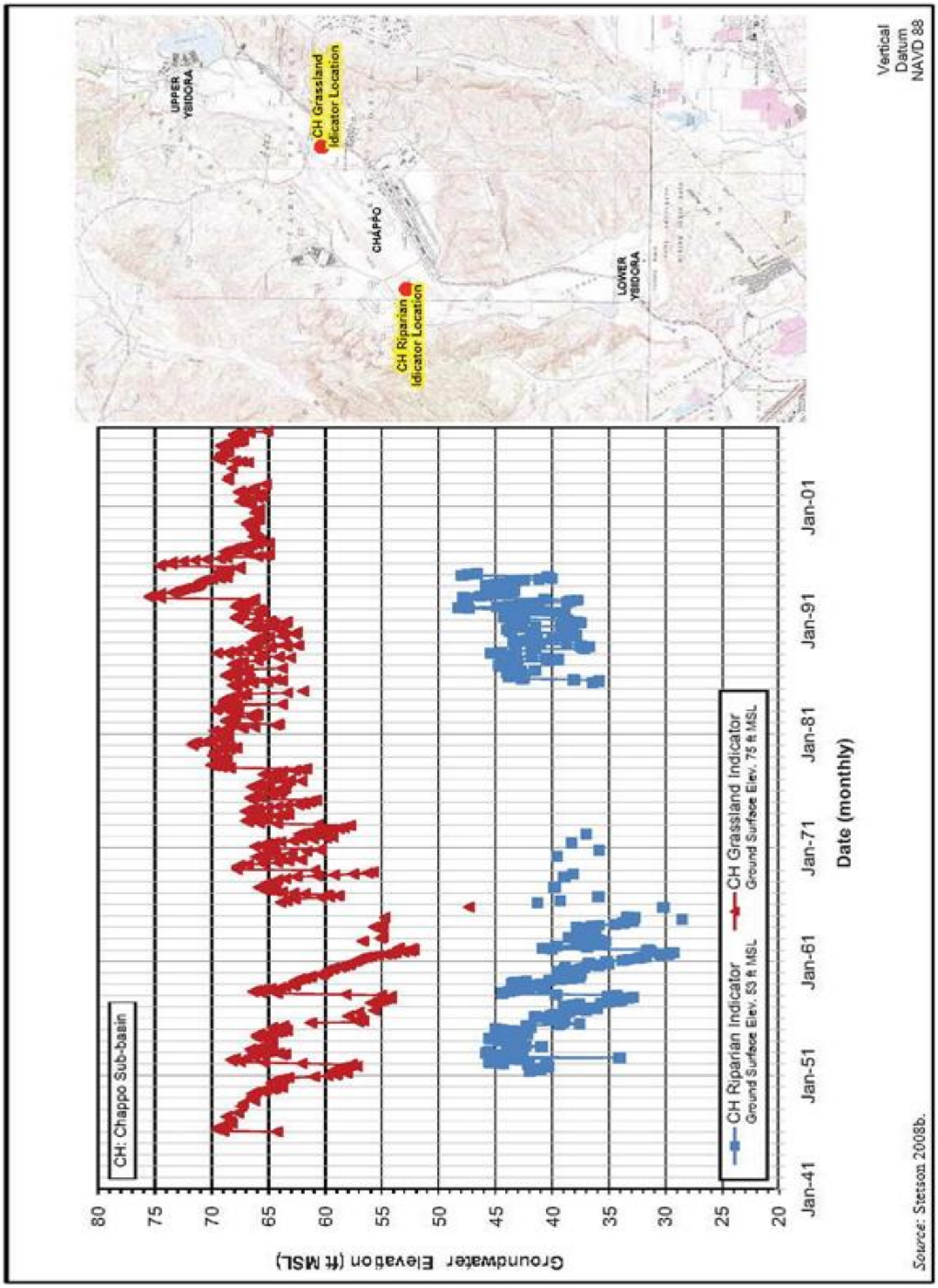
<u>Surface Water and Groundwater Model</u>

A surface water and groundwater model (Lower SMR Model) has been used to compare potential effects of the action alternatives to the existing condition. The Lower SMR Model for the SMR CUP was developed using the USGS MODFLOW surface and groundwater finite difference model, to simulate groundwater flow in the Lower SMR Basin (refer to Appendix B). A 50-year simulation period was developed for the Model to describe physical and environmental characteristics during varying hydrologic conditions that are typical in the SMR watershed. The 50-year simulation period utilizes historical hydrologic data (i.e., 1952 through 2001) that encompasses the range of varying hydrologic conditions within the watershed. This period contains water years designated as Extremely Dry/Very Dry, Below Normal, Above Normal, and Very Wet (Extremely Dry occurs during consecutive Very Dry years). During the 50-year period, Extremely Dry/Very Dry conditions occurred for 12 years (24%), Below Normal conditions for 14 years (28%), Above Normal conditions for 15 years (30%), and Very Wet conditions for 9 years (18%) (Reclamation 2007b). Comparison of physical parameters, such as groundwater levels and streamflow quantities, during each of these five different hydrologic conditions allows for assessment of potential impacts between no-project and project alternatives. A detailed description of the Model is provided in Appendix B.

A Baseline model run was prepared to provide a comparison of existing operations (Baseline) to Alternatives 1 and 2 under identical hydrologic conditions. MCB Camp Pendleton would continue to meet its future potable water demand through the operation of existing diversion, recharge, storage, and recovery facilities. Therefore, the Baseline model run relies only on existing infrastructure to meet potable groundwater requirements on MCB Camp Pendleton.

In addition, multiple models were developed during the NMFS and USFWS Section 7 consultations to ascertain the effects of the action on the Lower SMR:

<u>Historical Model Run</u>: The Historical model run includes conditions with less streamflow prior to CWRMA releases, historical groundwater production for camp supply and agriculture use, and the existing diversion structure with historical Lake O'Neill and recharge pond operations. The Historical



Source: Stetson 2008b.

Figure 3.2-10. Groundwater Elevations in the Chappo Sub-basin

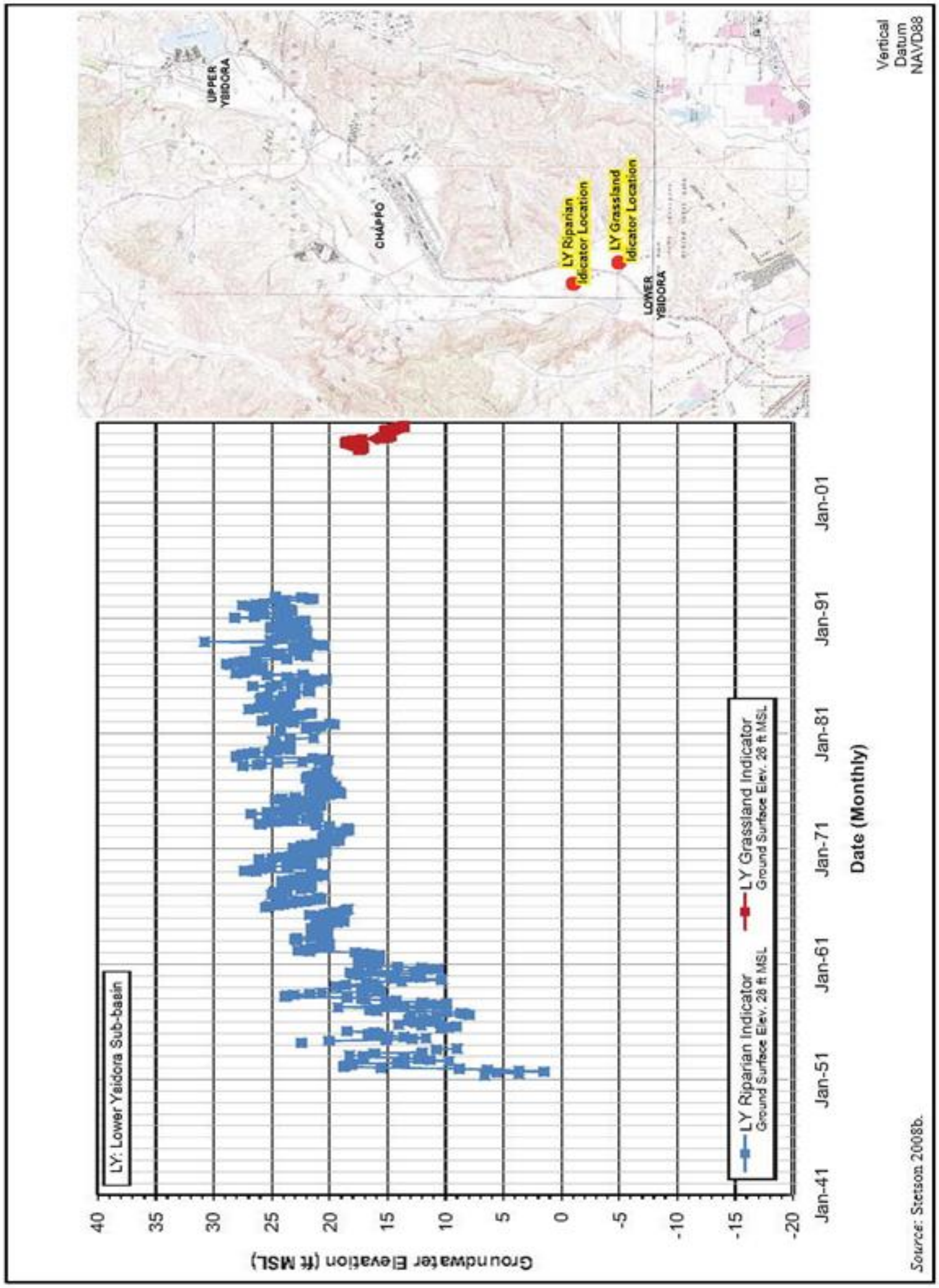


Figure 3.2-11. Groundwater Elevations in the Lower Ysidora Sub-basin

model run also includes an average annual wastewater release of 1,400 AFY that either recharged at the oxidation ponds or discharged to the stream; this was discontinued in the early 2000s. This Historical model run simulates the changes in Base's water demand, agricultural land use, infrastructure, and management practices from WY 1952 through WY 2001.

Recent Management Model Run: The Recent Management model run incorporates the current operation of production wells and infrastructure using the 12-year period from WY 2003 through WY 2014. CWRMA releases with the existing Lake O'Neill and recharge ponds are simulated under Recent Management conditions. This model run was established to evaluate the hydrologic conditions over a 50-year balanced model period with continued management practices and the Base's water demand that exists today.

The simulated surface water and groundwater conditions for each model run are described below and used to assess impacts in Chapter 4. The Historical model run simulates actual conditions that occurred between 1952 and 2001, while the Recent model run simulates conditions that would have existed during the same 50 years if CWRMA, pumping, and other recent water management operations were in effect. Both model runs are useful for assessing impacts in the future under project conditions since they may provide a range in what may occur due to variability in well location, pumping volumes, and other water management techniques that change over time. Also, the Historical model run corresponds to the Base's robust collection of ARTO data (i.e., MCB Camp Pendleton began an extensive annual ARTO monitoring program at this time).

CUP RPM-7 Model Run (50-year): The CUP model run includes CWRMA releases and improvements in infrastructure to the diversion weir, headgate and ditch, ponds, and Lake O'Neill. The groundwater production meets both the Base's future water demand and the water delivery requirement to FPUD. This model run included an AMP that satisfied the riparian groundwater level constraint during dry conditions. Improvements to the diversion weir, headgate, and ditch result in an increase in diversion capacity from 60 cfs to 200 cfs. Recharge ponds 6 and 7, which were not previously operational, have been rehabilitated for use under the CUP to increase recharge capacity in the Upper Ysidora Sub-basin. Other improvements include additional wells to allow CPEN to pump additional groundwater during Very Wet hydrologic conditions to meet the water delivery requirements to FPUD so pumping may be curtailed during drier conditions to reduce the impact on the environment. Additionally, from consultation with the NOAA National Marine Fisheries Service (NMFS), diversion operations were modified to maximize opportunities for upstream and downstream migration of steelhead, and to preserve the natural shape of the receding limb of the storm hydrograph.

Observed 2005-2014 Model Run: Observation-based analysis utilizes USGS ARTO data from 2005 to 2014, observed streamflow at the Ysidora (USGS) gauge, and Model Simulations to predict the presence of water in these segments. Additional model run (not a new model) that added a new parameter-observed data, modified from the existing basin-wide surface and groundwater model (LSMR). The use of observed data by the scientists at USGS (arroyo toad biologists (ARTO) and hydrology specialists (HYDRO)) allows for validation of the 10-year model and the ability to measure impacts under Project conditions through the AMP. Validated against 20 transects within 4 USGS ARTO survey blocks[23].

[23] Arroyo toad survey block designations are based on Brehme *et al.* 2003. "Blocks" constitute consecutive 1.5 kilometer reaches of the SMR, which are further sub-divided into six 250 meter "sites." The Lower SMR contains

Model matched observed data in nearly all cases (99%). Stream-aquifer interaction investigation (on-going) was relied upon to tie Survey blocks 4 through 7 to flow at the Ysidora Gauge (Survey block 8). USGS ARTO data show a correlation exists between streamflow at Ysidora and flow at downstream segments.

Santa Margarita River Flow Conditions

The simulated annual water budget for the Historical model runs is shown in Table 3.2-6. While SMR Inflow to the model averaged 35,800 AFY and varied from 3,200 AFY to 130,600 AFY, SMR Outflow from the Model boundary averaged 33,900 AFY, varying from 1,200 AFY during Extremely Dry/Very Dry years to 134,900 AFY during Very Wet years. The Historical model is based on monthly stress periods and accounted for all tributary inflow and surface runoffs above the ROI. The inflow to the model is less under the Historical model because CWRMA flows of up to 4,000 AFY were not released.

Table 3.2-6. Annual Water Budget for the Historical Model Simulation (AFY)

Average Yield for Hydrologic Condition	All Years	Extremely Dry and Very Dry	Below Normal	Above Normal	Very Wet
Inflow					
SMR Inflow	35,800	3,200	9,200	29,900	130,600
Subsurface Underflow	700	800	700	700	600
Lake O'Neill Spill and Release	2,100	1,400	1,500	1,700	4,600
Fallbrook Creek	1,400	1,300	1,400	1,400	1,500
Minor Tributary Drainages	2,400	1,600	1,500	2,400	4,900
Areal Precipitation	700	500	400	700	1,800
Total	43,100	8,800	14,700	36,800	144,000
Outflow					
SMR Outflow	33,900	1,200	5,800	27,400	134,900
Subsurface Underflow	0	0	0	0	100
Groundwater Pumping	5,900	6,100	6,100	5,800	5,400
Evapotranspiration	2,800	1,900	2,800	3,100	3,400
Diversions to Lake O'Neill	500	700	600	500	300
Total	43,100	9,900	15,300	36,800	144,100

Notes: [1] Extremely Dry/Very Dry subsurface underflow is positive, but less than 50 AFY.

Values are rounded to the nearest 100 AFY, which may result in a summation rounding error; AFY = acre-feet per year; SMR = Santa Margarita River.

Table 3.2-6 presents the simulated annual water budget for Recent Management conditions. While SMR Inflow to the model averaged 38,300 AFY and varied from 5,500 AFY to 132,900 AFY, SMR Outflow

10 survey blocks extending from the existing weir down to Stuart Mesa Road. For reference, survey block 2 starting coordinates are 33.24221° North, 117.38260° West, and survey block 10 ending coordinates are 33.34098° North, 117.33170° West (Brehme *et al.* 2003). The Lower SMR (LSMR) Model simulates 284 stream cells along the main stem of the Santa Margarita River to represent toad survey blocks 2 through 11 (analysis extends slightly above the weir); however, the ARTO statistics are based on only 220 stream cells due to unfavorable habitat or poor model calibration. Due to unfavorable habitat identified by USGS Biologists, 27 cells were not analyzed in the statistics (ARTO survey blocks 2A through part of 3A). Additionally, 37 stream cells simulated dry conditions (DTW > 3') during VW conditions and were therefore excluded from the statistical analysis (all of USGS ARTO survey blocks 4F, 7F, 8A, 8B, and 11D; part of survey blocks 3A, 4E, 5A, 5D, 7E, 8C, 11C, and 11E).

from the Model boundary averaged 29,700 AFY, varying from 600 AFY during Extremely Dry/Very Dry years to 132,900 AFY during Very Wet years. The Model is based on monthly stress periods and accounted for all tributary inflow and surface runoffs above the ROI. These inflow values were held constant for each model simulation so Alternative 1 and 2 operational effects could be compared to the Recent Management simulation (described in greater detail in Appendix B).

Table 3.2-7. Annual Water Budget for the Recent Management Model Simulation (AFY)

Average Yield for Hydrologic Condition	All Years	Extremely Dry and Very Dry	Below Normal	Above Normal	Very Wet
Inflow					
SMR Inflow	38,300	5,500	11,600	32,800	132,900
Subsurface Underflow	600	600	600	600	600
Lake O'Neill Spill and Release	1,100	900	1,100	1,100	1,100
Fallbrook Creek	1,200	100	400	1,400	3,800
Minor Tributary Drainages	2,400	1,600	1,500	2,400	4,900
Areal Precipitation	800	500	400	700	1,600
Total	**44,400**	**9,200**	**15,600**	**39,000**	**144,900**
Outflow					
SMR Outflow	33,600	600	5,100	27,100	132,900
Subsurface Underflow	0	0[1]	0	0	0
Groundwater Pumping	6,600	6,900	6,700	6,500	6,300
Evapotranspiration	2,700	1,700	2,800	3,200	3,400
Diversions to Lake O'Neill	1,400	1,300	1,400	1,500	1,500
Total	**44,300**	**10,500**	**16,000**	**38,300**	**144,100**

Notes: [1] Extremely Dry/Very Dry subsurface underflow is positive, but less than 50 AFY.
Values are rounded to the nearest 100 AFY, which may result in a summation rounding error; AFY = acre-feet per year; SMR = Santa Margarita River.
"Areal Precipitation" is the effective recharge to the groundwater basin after evaporative losses are subtracted from total precipitation.
Source: Stetson 2012a.

Under the Recent Management model, diversions from the SMR at the diversion weir are least during Extremely Dry hydrologic conditions and are greatest during Very Wet conditions as shown in Table 3.2-8. Average annual diversions from the SMR at the diversion weir are 5,600 AFY, ranging from 2,400AFY during Extremely Dry/Very Dry conditions to 7,200 AFY during Very Wet hydrologic conditions. Annual diversions at the diversion weir would be managed to meet MCB Camp Pendleton's future groundwater pumping demand.

The Model is used to describe streamflow at the Ysidora gauge as well as streamflow out of the model boundary (Table 3.2-8). The Model simulates surface flow between the Upper Ysidora and Chappo sub-basins and provided representative surface flow at the Ysidora gauge during the 50-year baseline conditions. Similarly, SMR Outflow from the Model's downstream boundary simulates surface flow at a location approximately 0.5 mi (0.8 km) upstream of the estuary. Historical records identify the original USGS Ysidora gauge location to be coincident with the Model's downstream boundary between 1923 and 1927. Review of these historical streamflow data indicated that flows occurred during the winter rainy season and were zero during the summer months, which is similar to flows simulated in the Recent Management Model for drier than normal conditions.

If Recent Management techniques were applied to the historical hydrology between WY 1952 and WY 2001, diversions from the SMR at the diversion weir would have increased as shown in Table 3.2-8. Average annual diversions from the SMR at the diversion weir would have been 5,600 AFY, ranging from 2,400 AFY during Extremely Dry/Very Dry conditions to 7,200 AFY during Very Wet hydrologic conditions.

Table 3.2-8. Average Annual Surface Water Diversion at the Diversion Weir for the Recent Management Model Simulation (AFY)

Location/Diversion	All Years	Extremely Dry and Very Dry	Below Normal	Above Normal	Very Wet
SMR Inflow	38,300	5,500	11,600	32,800	132,900
Diversion to Recharge ponds	4,200	1,100	4,300	5,600	5,700
Diversion to Lake O'Neill	1,400	1,300	1,400	1,500	1,500
Total	**5,600**	**2,400**	**5,700**	**7,100**	**7,200**

Notes: AFY = acre-feet per year; SMR = Santa Margarita River.
Source: Stetson 2012a.

The Model is used to describe streamflow at the Ysidora gage as well as streamflow out of the model boundary (Table 3-9). The Model simulates surface flow between the Upper Ysidora and Chappo sub-basins and provided representative surface flow at the Ysidora gage during the 50-year Recent Management conditions. Similarly, SMR Outflow from the Model's downstream boundary simulates surface flow at a location approximately 0.5 mi (0.8 km) upstream of the estuary. Historical records identify the original USGS Ysidora gage location to be coincident with the Model's downstream boundary between 1923 and 1927. Review of these historical streamflow data indicated that flows occurred during the winter rainy season and were zero during the summer months, which is similar to flows simulated in the Recent Management Model for drier than normal conditions.

Table 3.2-9. Average Annual SMR Flow for the Historical Model Simulation (AFY)

Hydrologic Condition	At the Ysidora Gage	Model Downstream Boundary[1]
All Years	36,000	33,900
Extremely Dry and Very Dry	2,700	1,200
Below Normal	8,400	5,800
Above Normal	29,500	27,400
Very Wet	134,400	134,900

Notes: [1] Flow out of the model's downstream boundary is approximately 0.85 mi upstream of Stuart Mesa Bridge.
AFY = acre-feet per year.

The Recent Management model run shows that flows out of the model's downstream boundary would have decreased when compared to historical conditions (Table 3.2-9). The decrease in outflow between historical and recent management conditions is likely due to an increase in groundwater pumping.

Table 3.2-10. Average Annual SMR Flow for the Recent Management Simulation (AFY)

Hydrologic Condition	At the Ysidora Gauge	Model Downstream Boundary[1]
All Years	36,000	33,600
Extremely Dry and Very Dry	2,000	600
Below Normal	8,200	5,100
Above Normal	30,300	27,100
Very Wet	134,000	132,900

Notes: [1] Flow out of the model's downstream boundary is approximately 0.85 mi upstream of Stuart Mesa Bridge.
AFY = acre-feet per year.
Source: Stetson 2012a.

Groundwater

The average annual groundwater pumping under the Recent Management model run is 6,600 AFY, ranging from 6,300 AFY during Very Wet hydrologic conditions to 6,900 AFY during Extremely Dry/Very Dry conditions (Table 3.2-10).

Table 3.2-11. Average Annual Groundwater Pumping for the Recent Management Model Simulation (AFY)

Hydrologic Condition	Upper Ysidora Pumping	Chappo Pumping	Lower Ysidora Pumping	Total Pumping
All Years	2,500	2,900	1,300	6,600
Extremely Dry and Very Dry	2,500	2,900	1,500	6,900
Below Normal	2,500	2,900	1,300	6,700
Above Normal	2,400	2,900	1,200	6,500
Very Wet	2,300	2,700	1,300	6,300

Note: These statistics are based on WY from October through September. Total pumping allocation of 8,800 AFY during Below Normal, Above Normal, and Very Wet years occurs from May through the following April. Annual pumping rates rounded to nearest 100 AFY.
Total Pumping may be different than that shown in previous tables due to rounding.
Source: Stetson 2012a.

Groundwater recharge occurs at Recharge Ponds 1-5, as well as through streambed infiltration in each of the sub-basins. Groundwater recharge is managed to optimize groundwater levels through the use of all five recharge ponds. Table 3.2-11 summarizes recharge pond and streambed infiltration under each of the hydrologic conditions. Streambed infiltration to the groundwater aquifer decreases during wetter than normal hydrologic conditions due to the optimized performance of the recharge ponds and reduced winter-time demand.

Table 3.2-12. Average Annual Groundwater Recharge for the Recent Management Model Simulation (AFY)

Hydrologic Condition	Groundwater Recharge at Ponds 1-5	Streambed Infiltration	Total Recharge
All Years	4,200	4,100	8,200
Extremely Dry and Very Dry	1100	5,300	6,400
Below Normal	4,200	4,000	8,200
Above Normal	5,600	3,600	9,200
Very Wet	5,700	3,200	8,900

Note: Annual recharge rates rounded to nearest 100 AFY.

Evapotranspiration represents the amount of groundwater used by riparian vegetation within the modeled area of the Lower SMR basin; while the water requirements of other types of vegetation are met by direct precipitation. The Model's simulated evapotranspiration reflects the natural seasonal variation (greatest riparian vegetation demand in the summer months and lowest evapotranspiration rates in the winter months). The simulated evapotranspiration is dependent upon of the SMR inflow and decreases during dry conditions when water is not available to meet the needs of vegetation and increases during wet conditions. Evapotranspiration is directly related to groundwater levels in the three sub-basins, which depends on annual recharge from the SMR and the level of groundwater pumping. For Example, decreased streamflow and recharge during Extremely Dry and Very Dry conditions shows about 60% less evapotranspiration than during Very Wet conditions (Table 3.2-6).

3.2.4.4 Water Quality

The project area lies within the jurisdiction of the State of California San Diego RWQCB. Water quality standards for surface water and groundwater within project area are contained in the Water Quality Control Plan for the San Diego Basin (Basin Plan) (San Diego RWQCB 1994). The Basin Plan designates beneficial uses for water bodies and establishes water quality objectives, prohibitions, and other implementation measures.

Santa Margarita River

The following beneficial uses have been established for surface waters of the SMR located downstream of the confluence with De Luz Creek, Fallbrook Creek, and Lake O'Neill (San Diego RWQCB 1994):

- Municipal and Domestic Supply;
- Agricultural Supply;
- Industrial Service Supply;
- Industrial Process Supply;
- Contact Water Recreation;
- Non-contact Water Recreation;
- Warm Freshwater Habitat;
- Cold Freshwater Habitat;
- Wildlife Habitat; and
- Rare, Threatened, or Endangered Species.

The water quality in the SMR varies with sampling location, season, and hydrologic conditions (i.e., baseflow vs. storm runoff). Water quality data for the SMR at Fallbrook Sump and O'Neill Diversion Structure is provided in Table 3.2-12 and includes the individual ions and cations that contribute to TDS, total hardness, and pH. TDS is a general parameter used to measure water mineral content, which is the sum of all dissolved cations and anions. TDS concentrations in the SMR measured at Fallbrook Sump ranged from 405 to 991 mg/L, with an average of 860 mg/L (Table 3.2-12) for the period of record between 1998 and 2001 (California Department of Water Resources 2009b). Further downstream at the point of the O'Neill Diversion Structure, TDS concentrations ranged from 365 to 920 mg/L, with an average of 786 mg/L (Table 3-15) for the period of record from 1991 to 1993 and 1997 to 2003 (Reclamation 2008b).

Table 3.2-13. Surface Water Quality in the Santa Margarita River

Parameter	Units[1]	SMR near Fallbrook[2]			SMR at O'Neill Diversion Structure[3]		
		Avg.	Max.	Min.	Avg.	Max.	Min.
Total Hardness	mg/L (ppm)	437	525	190	459	545	413
Calcium	mg/L (ppm)	98	118	44	97	122	76
Magnesium	mg/L (ppm)	47	56	20	41	48	28
Sodium	mg/L (ppm)	111	124	75	107.6	119	92
Potassium	mg/L (ppm)	3.9	6.7	2.5	7.1	31	3.8
Alkalinity	mg/L (ppm)	171	198	108	191	195	188
Fluoride	mg/L (ppm)	0.29	0.4	0.2	0.47	0.59	0.3
pH	pH units	8.1	8.2	7.8	8.1	8.6	7.1
Total Dissolved Solids	mg/L (ppm)	860	991	405	786	920	365
Boron	µg/L (ppb)	0.16	0.2	0.1	0.09	0.25	0.05
Sulfate	mg/L (ppm)	252	315	95	199	250	130
Chloride	mg/L (ppm)	182	221	79	172	220	91
Nitrate as Nitrogen	mg/L (ppm)	2.3	4.3	1.6	2.8	4.2	1.2

Notes: [1] parts per million (ppm); micrograms per liter (µg/L); milligrams per liter (mg/L); parts per billion (ppb).

[2] Time period of data from 1998 to 2001 (California Department of Water Resources 2009).

[3] Time period of data from 1991 to 1993 and 1997 to 2003 (Reclamation 2008b).

SMR = Santa Margarita River.

The Lower SMR was included on the 2010 CWA Section 303(d) list for not supporting the Contact Water Recreation (due to enterococcus, fecal coliform, and phosphorous) and Warm Freshwater Habitat (due total Nitrogen as N) beneficial uses (SWRCB 2010). The potential sources of these pollutants have been identified as natural sources, unknown nonpoint source, and urban runoff/storm sewers. The Lower SMR is designated as "Category 5a," which means a TMDL study is required, but not yet completed. The TMDLs for these pollutants are scheduled to be completed in 2021 (SWRCB 2010).

Santa Margarita River Estuary

The SMR begins to subtly change from a braided river channel into the broad SMR Estuary as it nears the Pacific Ocean. The estuary serves as a mixing ground between fresh and salt water and water quality is sensitive to changes in both the level of tidal influence and influx of fresh water. The following beneficial uses have been established for SMR Estuary (San Diego RWQCB 1994; USFWS 1995a):

- Limited Seasonal Hunting;
- Preservation of Biological Habitats of Special Significance;
- Estuarine Habitat (Potential Beneficial Use);
- Marine Habitat;
- Warm Freshwater Habitat;

- Coastal Marsh Habitat;
- Salt Flats; and
- Rare, Threatened, or Endangered Species.

The water quality within the SMR Estuary depends on tidal circulation from the ocean. Tidal inflows bring in saline water with high dissolved oxygen concentrations and an abundance of nutrients; ebb tides flush out oxygen deficient water along with suspended silt, organic material, and chemical pollutants (NAVFAC SW 2003). This tidal flushing maintains a regular cyclic water exchange between the estuary and the ocean. Consequently, moderate water quality can be expected, particularly within areas where tidal influence is more discernible (NAVFAC SW 2003).

When the estuary is closed due to the formation of a sand berm and there is little inflow from the SMR, the entire estuary becomes a closed water system and acts as a pond with little or no water circulation occurring (NAVFAC SW 2003). During these closed periods there is potential for algae blooms, resulting in poor water quality due to deprived dissolved oxygen and altered pH level. Poor water quality throughout the estuary is to be expected and can be detrimental to the estuarine wetland environments. During low to moderate SMR flows when the estuary is closed, the estuary acts as a reservoir and traps all floating debris, fluvial sediment, and pollutants carried by inflows. The water quality in the estuary will not be improved until the sand bar is breached and estuary opens and is again under tidal influence (NAVFAC SW 2003).

The SMR Estuary was first included on the 1986 CWA Section 303(d) list and continues to be listed for not supporting the Estuarine Habitat beneficial use due to eutrophication (SWRCB 2010). The potential source of pollutants leading to eutrophication have been identified as nonpoint source, nurseries, point source, and urban runoff/storm sewers. The SMR Estuary is designated as “Category 5a,” which means a TMDL study is required, but not yet completed. The TMDL for eutrophication is scheduled to be completed in 2019 (SWRCB 2010).

A water quality monitoring study was conducted in the estuary between 3 February 2010 and 8 February 2011 in support of developing model for the development of a TMDL for eutrophication. Data summarized in the study is provided in Table 3.2-13. The study found that the estuary showed strong seasonal variations in water quality conditions resulting from decreasing freshwater flow, summertime heating, longer daylight hours, and a reduction in tidal flow with berm formation at the mouth (Space and Naval Warfare Systems Center Pacific [SSC Pacific] 2012). These effects were particularly strong when the mouth closed completely in October 2010, with the lagoon becoming considerably warmer and saltier due to reduced freshwater flow and generally smaller daily variations in summer/fall than observed in winter/spring. The observed seasonal changes generally were much greater than the spatial variations observed between the lower and upper lagoon (SSC Pacific 2012). The study also found that main influence of ocean water exchange was observed up to about the Railroad Bridge. The main influence of the freshwater river was observed down to about half way between the Railroad Bridge and the Stuart Mesa Bridge. In between the two locations is a transition region where mixing of fresh and saltwater is most intense (SSC Pacific 2012).

Table 3.2-14. Average Nitrogen, Phosphorous, Suspended Solids and Chlorophyll-a Concentrations in the SMR Estuary

Sample Period	Total Nitrogen (mg/L)		Total Phosphorus (mg/L)		Total Suspended Solids (mg/L)		Chlorophyll-a (µg/L)	
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
March 2007	3.88	4.47	0.13	0.23	4.00	7.68	5.42	8.52
October 2007	0.52	0.43	0.03	1.06	8.35	4.14	1.21	0.96
March 2008	5.25	0.80	0.22	0.13	119.84	20.05	28.94	18.93
October 2008	1.75	0.68	0.10	0.43	6.77	3.54	3.71	3.91
March 2010	1.18	1.58	0.12	0.13	10.16	7.64	3.03	3.83
October 2010	0.70	0.68	0.26	0.35	26.45	25.84	13.14	8.37

Notes: Results are based on an average of samples during period; mg/L = milligrams per liter.
Source: SSC Pacific 2012.

<u>Pacific Ocean</u>

The point of discharge of brine for the action alternatives would be the coastal waters of the Pacific Ocean from the existing Oceanside Ocean Outfall. The following beneficial uses have been established for Pacific Ocean along the San Diego Basin (San Diego RWQCB 1994):

- Industrial Service Supply;
- Navigation;
- Contact Water Recreation;
- Non-contact Water Recreation;
- Commercial and Sport Fishing;
- Preservation of Biological Habitats of Special Significance;
- Wildlife Habitat; and
- Rare, Threatened, or Endangered Species
- Marine Habitat;
- Aquaculture;
- Migration of Aquatic Organisms;
- Spawning, Reproduction, and/or Early Development; and
- Shellfish Harvesting.

Water quality at the Oceanside Ocean Outfall is typical of ocean waters in the tidal zone or deeper waters of the region.

Temperature

Water temperatures in the oceanic waters near San Clemente, California measured from 1965-2006 ranged from approximately 53 to 77 degrees Fahrenheit (°F), and salinities in the same area and during the same time frame ranged from 28.0 to 34.3 practical salinity units (Scripps Institution of Oceanography 2008). Higher water temperatures and slightly higher salinities occur in summer and fall than in winter and spring, particularly due to seasonal differences in evaporation, heating, freshwater inputs to the area, and upwelling. Upwelling occurs in the area on regular and irregular bases, with regular seasonal occurrences highest in the spring months (March-June) (LaDochy and Patzel 2007).

Turbidity

Water clarity (Secchi depths) in near shore coastal areas average 12 ft (4 m) (Prasad et al. 2005), and is highly influenced by oceanographic conditions. Seasonal decreases in water clarity may accompany Pacific Decadal Oscillation events, which lead to decreased upwelling and productivity, warmer sea surface temperatures, and increased sea level heights. All of the aforementioned conditions can result in stream run-off, which increases turbidity, and are typically single-event, short-term conditions. Decreased water clarity also occurs during prolonged periods of upwelling (typically occurring in the spring months) that increase plankton biomass markedly (LaDochy and Patzel 2007). Due to protection from wave action by the jetty and the lack of freshwater inflow to the Oceanside Harbor, the main sources of turbidity in the entrance channel are fine sediments brought in by tidal circulation and stirred up by vessel traffic.

Dissolved Oxygen

Dissolved oxygen is the amount (expressed as a concentration) of oxygen present in seawater, which is important to the health of biological communities. Levels of dissolved oxygen that are too high (actual values vary depending on water temperature) can be extremely dangerous to aquatic life, and often result in fish kills or massive plankton blooms. Dissolved oxygen concentrations in offshore southern California waters typically range from 5.3 to 11.01 mg/L (Southern California Coastal Ocean Observing System 2008). Dissolved oxygen concentrations in the area decrease with depth, although differences are minimal in shallow, near shore areas.

Contaminants

Because water quality parameters have not been measured within the immediate vicinity of the project area, water quality conditions are characterized using existing information from adjacent areas. Water quality measurements for bacteria have been recorded weekly since 1999 at Camp Del Mar, which is located in the southern tip of the MCB Camp Pendleton. During 9 years of sampling, only on one occasion were levels of any of the water quality parameters measured in excess of the maximum allowable levels (< 1,000 organisms/100 milliliters [mL] for Total Coliforms, < 400 organisms/100 mL for Fecal Coliforms, and < 104 organisms/100 mL for Enterococci). Thus, water quality is generally good near the project area and complies with regulatory requirements for standard bacteria counts.

<u>Groundwater Quality</u>

The following beneficial uses have been established for groundwater in the Ysidora Hydrologic Area 2.10 (the Upper Ysidora, Chappo, and Lower Ysidora sub-basins lie within this area) (San Diego RWQCB 1994):

- Municipal and Domestic Supply;
- Agricultural Supply;
- Industrial Service Supply; and
- Industrial Process Supply.

Table 3.2-14 shows the range and average of groundwater quality data collected from 14 drinking water wells in the Lower SMR Basin from 2008 to 2011 with Basin Plan Objectives. Groundwater in the Ysidora HA frequently exceeds Basin Plan Objectives for iron, manganese, and TDS. Groundwater in the

SMR Basin is naturally high in TDS due to naturally occurring constituents in local geologic formations (County of San Diego 2005). Prior to completion of the new Southern Region Tertiary Treatment Plant (SRTTP), wastewater discharges from MCB Camp Pendleton also contributed to high TDS concentrations in the groundwater basin (County of San Diego 2005). Recharge of surface water with high TDS also contribute to elevated TDS in groundwater. High TDS surface water results from upstream development and natural occurring constituents contributed by the geology of the watershed (County of San Diego 2005). Within the Ysidora HA, TDS concentrations tend to range from less than 600 mg/L in the upstream portion of the groundwater basin to over 1,500 mg/L in the downstream portion (County of San Diego 2005).

3.2.4.5 Floodplains

Floodplains are relatively flat areas adjacent to a river, stream, watercourse, bay, or other body of water subject to inundation during a flood event. The area comprising the 100-year delineated floodplain zone has a 1% chance of being flooded every year. To minimize the risk of damage associated with these areas, EO 11988 was issued to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practical alternative.

Table 3.2-15. Groundwater Quality Results for Production Wells from 2008 to 2011

Analyte	Basin Plan Objective[1]	Measured[2]		
		Minimum	Maximum	Average
Bicarbonate Alkalinity as $CaCO_3$ (mg/L)	NA	169	320	224
Boron (mg/L)	0.75	ND	0.24	0.13
Calcium (mg/L)	NA	71	100	92
Chloride (mg/L)	300	130	190	160
Color (color units)	20	ND	15	5
Fluoride (mg/L)	1.0	0.3	0.5	0.4
Iron (mg/L)	0.3	ND	1.0	0.097
Magnesium (mg/L)	NA	24	45	37
Manganese (mg/L)	0.05	ND	0.63	0.25
Methylene blue active substances (mg/L)	0.5	ND	0.07	0.002
Nitrate-N (mg/L)	10	ND	5.1	0.59
pH (standard units)	NA	7.5	8.0	7.8
Specific Conductance (µmhos/cm)	NA	1100	1400	1260
Sulfate (mg/L)	300	120	260	207
Total Dissolved Solids (mg/L)	750	660	908	790
Total Hardness (mg/L)	NA	280	430	384
Turbidity (NTU)	20	0	9	2

Notes: Not Applicable (NA): No Basin Plan Objective established for this parameter; non-detect (ND); Nephelometric Turbidity Unit (NTU); calcium carbonate ($CaCO_3$).
[1] Ysidora Hydrologic Area Groundwater Quality Objectives.
[2] Data is from the following wells on MCB Camp Pendleton: 2202, 2301, 2393, 2602, 2603, 2673, 3924, 23063, 23073, 26018, 26071, 26072, 330923, and 330925.
Sources: San Diego RWQCB 1994; MCB Camp Pendleton 2012b.

Over the last 50 years, several damaging floods have occurred within the boundaries of MCB Camp Pendleton. Of particular note, the storms of 1978, 1980, 1992-1993, and 1998 caused major damage to structures, roads, railroads, Sewage Treatment Plant (STP) 3, MCAS Camp Pendleton, and other facilities in the Lower SMR Basin (MCB Camp Pendleton and DON 2004). This area is now protected from physical damage due to the construction of a levee which was completed 1998.

3.3 Biological Resources

3.3.1 Definition of Resources

Biological resources include native and naturalized plants and animals, and the habitats in which they occur.

3.3.2 Regulatory Setting

3.3.2.1 Federal Statutes and Executive Orders

Bald and Golden Eagle Protection Act (16 USC § 668)

This act protects bald and golden eagles from being pursued, hunted, collected, molested, or otherwise disturbed.

P.L. 86-797, Fish and Wildlife Conservation on Military Reservations (Sikes Act), as amended by P.L. 90-465, Sikes Act Improvement Act.

These laws apply to all DON commands and personnel and cover USMC and USN installations and facilities that contain land and water areas suitable for conservation and management of fish and wildlife resources. Fish and wildlife management should be integrated with other natural resource activities into a balanced multiple-use program. The Sikes Act Improvement Act requires that an INRMP be prepared in cooperation with state and federal fish and wildlife conservation agencies and that members of the public and advocacy groups have an opportunity to review and comment on the INRMP during its preparation. During preparation of the INRMP, the USFWS and CDFW provided guidance and recommendations on structure and format of the document, regional conservation programs, and state and federal habitat and species conservation requirements. In accordance with the Sikes Act Improvement Act and with approval of the USFWS and CDFW, MCB Camp Pendleton completed a 5-year update to its previous INRMP in 2011 (MCB Camp Pendleton 2011) and is currently updating this 2011 INRMP; and DET Fallbrook is updated their INRMP in 2016. The USFWS, NOAA, and CDFW will continue to provide comments, recommendations, and input on the status of regional natural resource programs, surveys, and species during the INRMP review process.

Migratory Bird Treaty Act of 1972 (16 USC §§ 703-719) and Executive Order 13186

MCB Camp Pendleton and DET Fallbrook conduct operations in compliance with, and support of, the Migratory Bird Treaty Act and EO 13186. This act protects all migratory birds, with the exception of the English sparrow (*Passer domesticus*), rock dove (*Columbia livia*), and European starling (*Sturnus vulgaris*). The Migratory Bird Treaty Act affirms and implements the United States' commitment to international conventions for the protection of shared migratory bird resources. EO 13186 directs federal agencies to avoid or minimize the negative impact of their actions on migratory birds, and to take active steps to protect birds and their habitat. Pursuant to EO 13186, the Secretary of the Defense and USFWS finalized an MOU on 31 July 2006 on migratory bird conservation as it relates to non-military readiness activities (which are addressed in a separate MOU) on DOD installations. Among the key provisions of the MOU are a) to encourage the incorporation of migratory bird management objectives into DOD planning documents, including INRMPs and NEPA analyses; and b) prior to starting any activity that is likely to affect populations of migratory birds: (1) Identify the migratory bird species likely to occur in the area of the Proposed Action and determine if any species of concern could be affected by the activity; (2) assess and document the effect of the proposed action on species of concern (USFWS 2008a); and (3) proactively address migratory bird conservation, and initiate appropriate actions to avoid or minimize the take of migratory birds.

CWA (33 USC §§ 1251-1387)

CWA protects the physical, chemical, and biological properties of the nation's waters (waters of the U.S.), including all navigable waters, their tributaries, and Section 404 jurisdictional wetlands. Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the U.S. by prohibiting such discharges without a permit from the USACE. Ancillary to the 404 permit, a Section 401 Water Quality Certification from the RWQCB is also required. For projects with *de minimis* effects, a Nationwide Permit can be issued as defined under the USACE's regulations (33 CFR §§ 320-330); otherwise an Individual Permit is required. For construction or the placement of structures in navigable waters, a permit under Section 10 of the Rivers and Harbors Act is also required. Where applicable, e.g., construction of a pier that requires dredge and fill, the USACE uses a combined process for authorizations under both Section 10 and 404. Section 404(b)(1) prohibits the discharge of fill material into wetlands unless there is no practicable alternative.

Section 402 of the CWA established the NPDES, under which the state of California regulates the discharge of non-point source pollution. Under the state's General Permit for Storm Water Discharges Associated with Construction Activity (99-08-DWQ), construction projects disturbing more than 1 acre (0.4 hectare) are required to implement BMPs as incorporated into a SWPPP, which must be submitted to and approved by the RWQCB.

Magnuson-Stevens Fishery Conservation and Management Act (16 USC § 1801, *et seq.*)

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act (PL 104-267), mandates that the Secretary of Commerce establish guidelines, by regulation, to assist the Fishery Management Councils in the description and identification of essential fish habitat in Fishery Management Plans, including adverse impacts on such habitat. Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies to consult with NMFS prior to undertaking any actions that may adversely affect essential fish habitat. The Magnuson-Stevens Fishery Conservation and Management Act defines essential fish habitat as "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity." "Waters" includes aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include historic areas where appropriate. "Substrates" include sediment, hard bottom, structures underlying the waters, and associated biological communities. "Necessary" means the habitat required to support a sustainable fishery and a healthy ecosystem.

EO 11990, *Protection of Wetlands*

This EO requires that governmental agencies, in carrying out their responsibilities, provide leadership and "take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands." Each agency is to consider factors relevant to a proposed project's effect on the survival and quality of the wetlands by maintenance of natural systems, including conservation and long-term productivity of existing flora and fauna, species and habitat diversity and stability, hydrologic utility, fish, and wildlife. If no practical alternative can be demonstrated, agencies are required to provide for early public review of any plans or proposals for new construction in wetlands.

EO 13112, *Invasive Species*

This EO calls on federal agencies to work towards preventing and controlling the introduction and spread of invasive species. Non-native flora and fauna can cause substantial change to ecosystems, upset the ecological balance, and have the potential to cause economic harm.

<u>ESA of 1973, as amended (16 USC §§ 1531-1544)</u>

The ESA requires federal agencies to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. The law also prohibits any action that causes an unauthorized "taking" of any listed species of endangered fish or wildlife. Likewise, import, export, interstate, and foreign commerce of listed species are all generally prohibited. Under Section 7 of the ESA, federal lead agencies are required to consult with the USFWS or NMFS, depending on which is the responsible agency for the species in question, on any proposed action that may affect a listed species or its critical habitat. For a major construction project such as the SMR CUP, the lead agency prepares a Biological Assessment (BA) of the effects of the action and submits it to the responsible agency. If the lead agency finds that the action is not likely to adversely affect the species in question and the responsible agency concurs in writing, consultation is concluded, nominally within 30 days. If the action is likely to adversely affect the species in question, formal Section 7 consultation ensues, leading to a BO, nominally within 135 days. In the BO, the responsible agency sets forth non-discretionary (required) Reasonable and Prudent Measures and Terms and Conditions to minimize and/or compensate for take, as well as discretionary (recommended) conservation measures. For the SMR CUP, separate BAs were submitted (1) to USFWS addressing all listed species that may be affected except the SCS; and (2) to NMFS addressing the SCS.

The ESA applies to non-federal actions on non-federal or private lands as well, with different procedures for compliance. The non-federal entity must determine whether the action is likely to result in incidental take as defined under the ESA. If so, it must apply for a Section 10 Incidental Take Permit and consult with the responsible federal agency to develop a Habitat Conservation Plan that minimizes or effectively compensates for the action's adverse effects. For the SMR CUP, these provisions do not apply because there would be no takes of federally listed species on non-federal land, and the federal action proponents assume ESA responsibilities on federal lands.

Completion of all required ESA consultations is required prior to issuance of the ROD.

3.3.2.2 California Statutes

<u>California ESA (Fish and Game Code 2050, *et seq.*)</u>

The California ESA generally parallels the main provisions of the federal ESA and is administered by the CDFW. Federal actions on federal lands are not subject to regulation under the California ESA. Otherwise, the Act prohibits unauthorized take of a state-listed species, and a state lead agency is required to consult with CDFW to ensure that any action it undertakes is not likely to jeopardize the continued existence of any species listed endangered or threatened under the California ESA, or result in destruction or adverse modification of essential habitat. Many species are listed under both the federal and state ESA, and in such cases, the federal ESA takes precedence.

3.3.3 Region of Influence

The ROI, used synonymously with "action area," is the area within which the action alternatives are reasonably likely to have direct or indirect effects on biological resources. The ROIs for each alternative overlap in some areas, but differ in others, depending on similarities and differences with regard to proposed construction and operational actions, as summarized under existing conditions for each alternative (refer to Chapter 2 for more detail).

The ROI for Alternative 1 includes the SMR and surrounding 100-year floodplain, downstream to the estuary and river mouth, where biological resources may be affected by the proposed conjunctive use of surface water and groundwater. The ROI also includes areas affected by the construction and operation of the inflatable diversion weir, O'Neill Ditch; production wells and associated pipelines/access roads, the FPUD WTP, and the bi-directional pipeline between MCB Camp Pendleton and the community of Fallbrook.

The ROI for Alternative 2 is essentially the same as for Alternative 1, but includes the gallery wells and associated pipelines/access roads.

3.3.4 Existing Conditions

Separate subsections are provided for the description of vegetation and wildlife, aquatic habitats and species, and special status species, the latter including threatened and endangered species and other species of concern. Where applicable in each subsection, the differences between alternatives are identified.

3.3.4.1 Vegetation and Wildlife

<u>Vegetation</u>

Overview

A general overview of the vegetation for the construction of the Proposed Action is referenced in Appendix C and Figure 3.3-1. The maps were created using general vegetation data from MCB Camp Pendleton and DET Fallbrook installation-wide vegetation surveys; all impacts in the Community of Fallbrook occur within the developed road, so plant community information from the County of San Diego was not needed.

Most of the ROI for construction impacts is within disturbed or developed habitat; for operational impacts, most of the ROI is undeveloped land that supports significant areas of native or naturalized (non-native, but established and capable of persisting indefinitely) vegetation.

Vegetation within the operational impact ROI is predominantly grassland on open flats and valley bottoms away from water courses; CSS on dry, open coastal slopes; chaparral and oak woodland on more mesic slopes away from the immediate coast; riparian scrub/woodland and freshwater marshes along water courses; and an extensive salt marsh in the SMR Estuary. A narrow strip of coastal dune vegetation occurs on the immediate coastline. Aquatic habitats in the ROI include the SMR and other surface water bodies which are of critical importance to fish and wildlife in the region.

Plant Communities in Construction Areas

For both Alternatives, plant communities were mapped within the potential construction areas (both permanent and temporary impact areas) and throughout a 50-ft to 100-ft (15-m to 31-m) corridor surrounding the project pipeline alignments. Plant community descriptions, plant community acreages by permanent and temporary impacts, and plant community figures are included in Appendix C-1.

In the Alternative 1 footprint (to provide a more accurate depiction for the Section 7 consultation with the USFWS), plant communities on MCB Camp Pendleton and DET Fallbrook have been mapped utilizing the installation's vegetation mapping preferences; for consistency, vegetation types were categorized from both installations into those following MCB Camp Pendleton's Riparian Biological Opinion (USFWS 1995a). When reviewing permanent impacts from construction, just less than half of the 11 acres of permanent construction occurs in developed/disturbed areas with the remaining occurring in native habitats. For the estimated 130 acres of temporary impacts, approximately 70 acres of impacts are in disturbed and developed areas (Table 3.3-2).

For the Alternative 2 footprint, plant communities have been mapped according to the classification developed by Holland (1986). Holland's system includes lists of dominant and characteristic species found in each community. Oberbauer (1996; Oberbauer et al. 2008) developed a slightly expanded version of Holland's system for use in San Diego County, and Oberbauer's additions to the basic system have been incorporated here where applicable. Plant communities were mapped within the potential construction areas and throughout a 50-ft to 100-ft (15-m to 30-m) corridor surrounding the project pipeline alignments, at a scale of 1:4,800 (1 in [2.5 cm] equals 400 ft [122 m]) using a relatively high-resolution digital aerial photograph from April 2010 (Appendix C-1).

Plant communities found within the construction project footprint for the Alternative 1 include (refer to Appendix C-2 for detailed description of each type):

Riparian Communities

- Southern Riparian Woodland
- Southern Riparian
- Open Water/Open
- Freshwater
- Mixed Woodland
- Sycamore
- Grass-forb Mix
- Mixed Willow-Exotic/ Exotic-Other

Upland Scrub Communities

- Diegan Coastal Sage

Upland Grassland/ Herbaceous Communities

- Non-native Grassland
- Non-native Vegetation
- Purple Needlegrass

Upland Woodland Communities

- Eucalyptus Woodland
- Coast Live Oak Woodland

Disturbed/Developed

- Disturbed/Developed

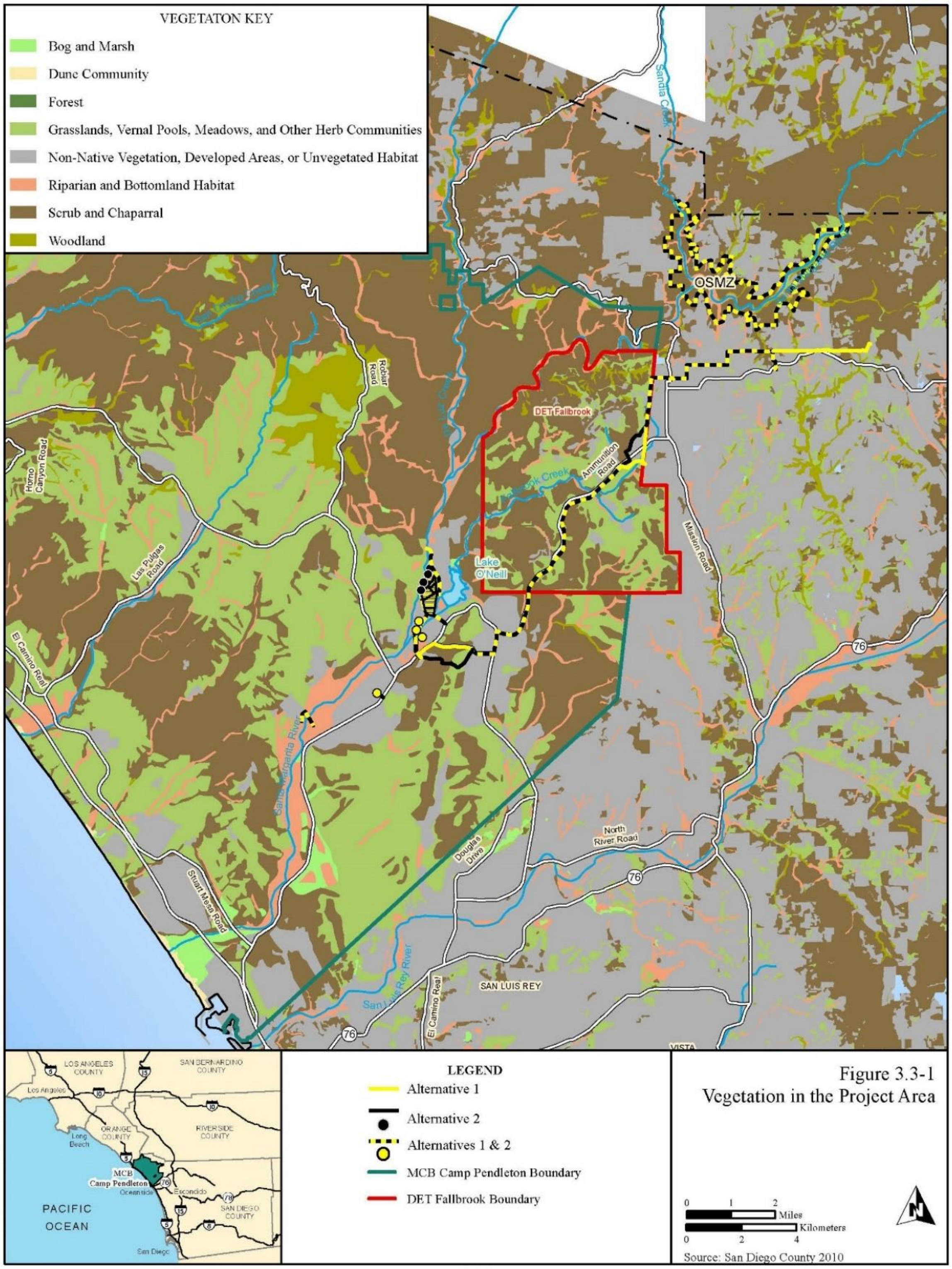


Figure 3.3-1. Vegetation in the Project Area

Table 3.3-2 summarizes plant community types for the areas subject to construction. This table consolidates the information on plant communities into broader categories of vegetation (refer to Table 4.3-6 and Appendix C-1 for figures and a more detailed breakdown).

Vegetation in Proposed OSMZ

Plant communities were analyzed within the proposed OSMZ using GIS plant community data (County of San Diego 2010). Plant communities for the OSMZ were mapped according to the classification developed by Holland (1986). The OSMZ is owned by FPUD and is at the site of a formerly proposed dam and reservoir located north of Fallbrook. Table 3.3-1 shows the plant communities and acreages within the OSMZ portion of the action area. A botanical survey report for the OSMZ is provided in Appendix C.

Table 3.3-1. Vegetation Communities within the OSMZ Portion of SMR CUP Action Area

Plant Community Type	Area (Acres)
Upland Scrub	833.00
Riparian	393.3
Grassland/Herb	54.33
Bottomland	38.11
Upland Woodland	111.94
Disturbed/Developed	85.03
Total	**1,382.63**

Table 3.3-2. Plant Communities Subject to Temporary and Permanent Construction Impacts

Plant Community Type	Acreages within the Project Areas											
	Diversion Weir	O'Neill Ditch	Production Wells, Conveyance Pipelines, and Permanent Access Roads	Temporary Construction Lay-down Area	Bi-directional Pipeline[1] and Booster Pump Stations			FPUD WTP	TOTAL			Project Total
	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	DET Fallbrook	Non-DOD	Non-DOD	MCB Camp Pendleton	DET Fallbrook	Non-DOD	
Permanent Impacts												
Upland Scrub	0.23	0.03	0.00	0.00	0.17	0.00	0.00	0.00	0.43	0.00	0.00	**0.43**
Riparian	1.33	2.16	1.71	0.00	0.00	0.00	0.00	0.00	5.20	0.00	0.00	**5.20**
Grassland/Herb	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Upland Woodland	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	**0.05**
Disturbed/Developed	0.04	0.06	0.23	0.00	0.08	0.00	0.21	5.09	0.41	0.00	5.30	**5.71**
Total	***1.60***	***2.29***	***1.94***	***0.00***	***0.25***	***0.00***	***0.21***	***5.09***	***6.08***	***0.00***	***5.30***	***11.38***
Temporary Impacts												
Upland Scrub	0.20	1.47	0.22	0.00	7.27	16.16	0.00	0.00	9.16	16.16	0.00	**25.32**
Riparian	1.18	8.30	11.49	0.01	0.75	0.61	0.00	0.00	21.72	0.61	0.00	**22.34**
Grassland/Herb	0.00	0.00	0.13	0.83	3.21	5.75	0.00	0.00	4.17	5.75	0.00	**9.91**
Upland Woodland	0.00	0.22	0.13	0.00	0.92	1.07	0.00	0.00	1.27	1.07	0.00	**2.34**
Disturbed/Developed	0.05	1.59	4.73	0.11	14.59	3.22	43.96	2.15	21.07	3.22	46.11	**70.41**
Total	***1.43***	***11.58***	***16.69***	***0.95***	***26.74***	***26.81***	***43.96***	***2.15***	***57.39***	***26.81***	***46.11***	***130.31***

[1]For temporary impacts to the Bi-directional Pipeline, it is estimated that construction will require 50 feet out of the 100 foot wide footprint in straight segments, plus additional width when the pipeline turns corners; therefore, 60% of the overall vegetation impacts to the 100 foot corridor was used as an acreage impact. Appendix C figures depict 100%, rather than 60%, for illustration purposes.

Notes: FPUD = Fallbrook Public Utility District; WTP = Water Treatment Plant; MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station Seal Beach, Detachment Fallbrook; DOD = Department of Defense

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Wildlife

Wildlife Species on MCB Camp Pendleton

A diverse assemblage of mammals, birds, reptiles, amphibians, fish, and invertebrates occur within MCB Camp Pendleton. In addition to hundreds of invertebrates, MCB Camp Pendleton has documented the presence of more than 50 mammalian, 30 reptilian, 10 amphibian, 300 bird, and 60 fish species (MCB Camp Pendleton 2011). Many wildlife species on MCB Camp Pendleton can be found throughout the year. Other wildlife species visit MCB Camp Pendleton seasonally, such as migratory birds. Federally-listed wildlife species are discussed in more detail in Section 4.3. Some species, especially among the special-status species, are limited in distribution to a single habitat (e.g., riparian habitat, CSS, or vernal pools). Most, however, are generalists and will utilize multiple habitats for shelter and foraging. All of the base's reptiles and amphibians, most of the mammals, and a small percentage of the birds, are year-round residents. The remainder is seasonal residents, wide-ranging migrants, or transient visitors. Nearly all of the bird species are protected under the Migratory Bird Treaty Act and are given special consideration under EO 13186, *Migratory Bird Conservation*.

The project area overlaps a number of plant communities resulting in a diverse assemblage of wildlife species within or adjacent to the project area. The most abundant plant communities within the project area are CSS, riparian habitat, and grassland communities (refer to Table 3.3-2).

Riparian and estuarine habitats adjacent to the project area include the portions of the SMR downstream from the proposed new diversion structure to the estuary and river mouth. Typical riparian species found throughout this portion of the SMR include LBVI (*Vireo bellii pusillus*), yellow-breasted chat (*Icteria virens*), yellow warbler (*Dendroica petechia*), common yellowthroat *(Geothlypis trichas*), lesser goldfinch (*Carduelis psaltria*), red-winged blackbird (*Agelaius phoeniceus*), spotted towhee (*Pipilo maculatus*), bushtits (*Psaltriparus minimus*), yellow-rumped warbler (*Dendroica coronata*), song sparrow (*Melospiza melodia*), egrets (*Egretta* spp.), herons (*Ardea* spp.), black-crowned night heron (*Nycticorax nycticorax*), ARTO (*Anaxyrus californicus*), California (western) toad (*Anaxyrus boreas halophilus*), Baja California treefrog (*Pseudacris hypochondriaca hypochondriaca*), dusky-footed woodrat (*Neotoma fuscipes*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), western spotted skunk (*Spilogale gracilus*), Virginia opossum (*Didelphis virginiana*), coyote (*Canis latrans*), and bobcat (*Lynx rufus*) (MCB Camp Pendleton 2011; Lynn and Kus 2011).

Programs provided for the LBVI and the SWFL as part of the base's Riparian Ecosystem Conservation Plan (MCB Camp Pendleton 2011) and the associated Riparian/Estuarine BO (USFWS 1995a) benefit other riparian wildlife species, in general. Project-specific impacts are required to be mitigated in accordance with the Conservation Plan and Riparian/Estuarine BO to maintain the overall quality of riparian habitat and the health of riparian ecosystems on the base. Base-wide management practices include conservation awareness and education programs, programmatic instructions to avoid and minimize impacts from training activity and other base operations on riparian vegetation/habitat, and exotic vegetation control (MCB Camp Pendleton 2011).

Typical estuarine species include western snowy plover (SNPL) (*Charadrius nivosus nivosus*), CLTE (*Sternula antillarum browni*), California brown pelican (*Pelecanus occidentalis*), Ridgway's rail (RIRA) (*Rallus obsoletus*), Belding's savannah sparrow (BSSP) (*Passerculus sandwichensis beldingi*, a state-listed endangered species), egrets, herons, tidewater goby (TWG) (*Eucyclogobius newberryi*), gulls (*Larus* spp.), and terns (*Sterna* spp.). All of these species benefit from management activities and programs provided for the RIRA and other estuarine and beach species under the base's Estuarine and Beach Ecosystem Conservation Plan. Current base-wide management practices that directly or indirectly benefit estuarine species include but are not limited to restoration efforts in estuarine/beach areas that are temporarily disturbed from non-routine maintenance and construction activities, exotic vegetation removal/control, and monitoring stream water quality, flood regimes, and storm event frequency to determine and manage the potential effect on beach and estuarine habitats. Additionally, the base's management program provides programmatic instructions to users of the base that limit activities during breeding seasons and in sensitive resource areas. These programmatic instructions include the requirement for vehicles to remain on existing roads and trails in the vicinity of coastal marshes/lagoons during breeding season, prohibiting foot traffic in all coastal marshes during breeding season and prohibiting foot traffic all year long in the SMR Estuary and the mouth of Cocklebur Canyon (MCB Camp Pendleton 2011).

Most mammals with the potential to occur in the project area are not frequently observed but mammal signs, including tracks or scat, are more common. Tracks (commonly observed along dirt roads on MCB Camp Pendleton) or mammals commonly observed include mule deer (*Odocoileus hemionus*), raccoon, Virginia opossum, striped skunk, bobcat, coyote, desert cottontail (*Sylvilagus audubonii*), California ground squirrel (*Spermophilus beecheyi*), pocket gopher (*Thomomys bottae*), and deer mouse (*Peromyscus maniculatus*). Dusky-footed woodrat nests are common in native vegetation on MCB Camp Pendleton. Long-tailed weasels (*Mustela frenata*) also occur on MCB Camp Pendleton and have the potential to occur in the action area.

In a bat survey conducted by the San Diego Natural History Museum on MCB Camp Pendleton in 2010, the following 10 species were mist netted or found through echolocation along the SMR: Mexican free-tailed bat (*Tadarida brasiliensis*), big brown bat (*Epesicus fuscus*), Yuma myotis (*Myotis yumanensis*), California myotis (*Myotis californicus*), western mastiff bat (*Eumops perotis*), western red bat (*Lasiurus blossevillii*), hoary bat (*Lasiurus cinereus*), western yellow bat (*Lasiurus xanthinus*), pocketed free-tailed bats (*Nyctionmops femorrosaccus*), and canyon bat (*Parastrellus hesperus*) (Stokes 2012. Bats are removed from buildings by the base game wardens. The bat species on base all follow water courses and frequent the Lake O'Neill area (MCB Camp Pendleton 2011).

Common birds likely to occur in or near the project area in CSS include the CAGN, bushtit, wrentit (*Chamaea fasciata*), California towhee (*Pipilo crissalis*), spotted towhee, Anna's hummingbird (*Calypte anna*), California thrasher (*Aphelocoma californica*), house wren (*Troglodytes aedon*), mourning dove (*Zenaida macroura*), and black phoebe (*Sayornis nigricans*) (MCB Camp Pendleton 2011).

Common birds likely to occur in non-native grassland within the project area include the western meadowlark (*Sturnella neglecta*), house finch (*Carpodacus mexicanus*), red-tailed hawk (*Buteo jamaicensis*), turkey vulture (*Cathartes aura*), and American kestrel (*Falco sparverius*) (MCB Camp Pendleton 2011). Several birds were observed during site visits for plant community and rare plant surveys including greater roadrunner (*Geococcyx californianus*), lazuli bunting (*Passerina amoena*), and yellow-headed blackbird (*Xanthocephalus xanthocephalus*). Loggerhead shrike (*Lanius ludovicianus*) is likely to occur in the grasslands in the ROI.

Several species of terrestrial reptiles and amphibians can be found throughout the project area. Common lizards likely within the project area include the western fence lizard (*Sceloporus occidentalis*) and San Diego alligator lizard (*Elgaria multicarinata webbii*). Snakes likely within the project area include the San Diego gopher snake (*Pituophis catenifer annectens*), California kingsnake (*Lampropelitis getula californiae*), red coachwhip (red racer) (*Coluber* [*Masticophis*] *flagellum piceus*), two-striped garter snake (*Thamnophis hammondii*), and southern Pacific rattlesnake (*Crotalus oreganus helleri*). Baja California treefrog, western toad, western spadefoot toad (*Spea hammondii*), Pacific (western) pond turtle

(*Actinemys marmorata*), and the non-native American bullfrog (*Lithobates catesbeianus* [*Rana catesbeiana*]) are also likely within the project area (MCB Camp Pendleton 2011; California Herps 2013). Nine species of aquatic reptiles and amphibians reside in the estuary alone. The federally-listed ARTO is found along the SMR (Section 3.3.4.3).

Reptiles observed during site visits for plant community and rare plant surveys include several lizards such as common western side-blotched lizard (*Uta stansburiana elegans*), San Diego alligator lizard, western fence lizard, coastal whiptail (*Aspidoscelis tigris stejnegeri*), and orange-throated whiptail (*Aspidoscelis hyperythra beldingi*), and Blainville's horned lizard (*Phynosoma blainvillei*), as well as several snakes including red diamond rattlesnake *(Crotalus ruber*), southern Pacific rattlesnake, and California striped racer (*Coluber* [=*Masticophus*] *lateralis lateralis*). Amphibians observed during surveys include Baja California treefrog, western spadefoot toad, and western toad.

Wildlife Species on DET Fallbrook

The SMR forms the northwestern boundary between DET Fallbrook and MCB Camp Pendleton. The river provides continuity of habitat between the upper and lower reaches of the river and extends into the OSMZ. Typical species found in this riparian corridor are similar to those found along the riparian portions of the Lower SMR, and include LBVI, yellow warbler, common yellowthroat, red-winged blackbird, ARTO, western toad, Baja California treefrog, dusky-footed woodrat, raccoon, and striped skunk.

The DET Fallbrook portion of the project area follows Ammunition Road and an adjacent dirt road. Typical habitats along the road include grassland, CSS, riparian, and chaparral. Tracks commonly observed adjacent to this road on DET Fallbrook include mule deer, raccoon, Virginia opossum, bobcat, coyote, desert cottontail, and California ground squirrel. Other mammals known to occur are brush rabbit (*Sylvilagus bachmani*), California mouse (*Peromyscus californicus*), California pocket mouse (*Chaetodipus californicus*), deer mouse, Dulzura kangaroo rat (*Dipdomys simulans*), pocket gopher, and woodrat. Common species occurring in CSS include CAGN, California towhee, California thrasher, spotted towhee, bushtit, lesser goldfinch, and house finch. Other species likely to occur are raccoon and striped skunk (DON 2008). The endangered Stephens' kangaroo rat (SKR) (*Dipodomys stephensi*) occurs in open grassland areas on portions of DET Fallbrook, and have been observed in the project area.

A total of 54 bird species are known to occur in the project area within DET Fallbrook. These species include Anna's hummingbird, black phoebe, Cassin's kingbird (*Tyranus vociferans*), California quail (*Callipepla californica*), California towhee, common raven (*Corvus corax*), house finch, red-tailed hawk, song sparrow, spotted towhee, turkey vulture, western meadowlark, western scrub jay, and wrentit (DON 2008).

Reptile species observed within the project area on DET Fallbrook include California kingsnake, San Diego gopher snake, and western fence lizard (DON 2008).

Fish and Wildlife Species on the OSMZ

A wildlife survey was conducted in the OSMZ from mid-June to mid-July 2008. Approximately 11 insect, 4 fish, 3 amphibian, 6 reptile, 63 bird, and 8 mammal species were observed during site visits. Federally-listed and sensitive species observed include LBVI, ARTO, yellow warbler, yellow-breasted chat, and arroyo chub (Gila orcutti). Additional birds were observed during the OSMZ wildlife surveys (refer to Appendix C-2 for the report and more detailed information). Several mammals were observed during wildlife surveys in the OSMZ including coyote, bobcat, desert cottontail, California ground squirrel, long-tailed weasel, western spotted skunk, pocket gopher, and big-eared woodrat (Neotoma macrotis). For a complete list of potential and observed fauna in the OSMZ refer to Appendix C-2.

Migratory Birds

Nearly all of the bird species in the ROI are migratory birds as defined and protected from unauthorized take under the Migratory Bird Treaty Act. EO 13186 (*Migratory Bird Conservation*) provided additional direction to federal agencies regarding migratory bird conservation, and on 31 July 2006, the DOD and USFWS signed an MOU outlining actions to be taken in support of migratory bird conservation on DOD installations as they relate to non-military readiness activities. Military readiness activities (e.g., training) are addressed in a separate MOU. These actions include addressing the effects of proposed actions on migratory bird populations, especially regional species of conservation or management concern as identified by USFWS (USFWS 2008a, 2011a).

Migratory bird species of regional concern that are known to occur in the ROI include, but are not limited to, the following based on review of MCB Camp Pendleton species lists (MCB Camp Pendleton 2011) and species habitat affinities.

- Shorebirds that occur in the SMR Estuary and on area beaches include long-billed curlew (*Numenius americanus*), whimbrel, marbled godwit, short-billed dowitcher (*Limnodromus griseus*), and black skimmer (*Rynchops niger*).
- Riparian species which occur along the SMR include yellow warbler and yellow-breasted chat.
- Allen’s hummingbird (*Selasphorus sasin*) which is a breeding resident of CSS.
- San Diego cactus wren (*Campylorhynchus brunneicapillus sandiegensis*) is relatively uncommon and occurs in CSS where coastal cholla and/or prickly pear (*Opuntia* spp.) are abundant. On MCB Camp Pendleton and DET Fallbrook, the only occurrences are outside the project ROI.
- Loggerhead shrike which occurs in open grasslands.

Wildlife Corridors

The SMR and its surrounding floodplain and bordering uplands comprise the core of one of the South Coast’s “Missing Linkages,” providing a corridor for fish and wildlife to move between the interior Palomar Mountains and the coastal Santa Ana/Santa Margarita Mountains and surrounding lowlands on MCB Camp Pendleton (South Coast Wildlands 2008). The location of the OSMZ provides a significant continuity of natural vegetation and aquatic and upland habitats for fish and wildlife along the SMR. In a regional context, the OSMZ is part of the “Santa Ana/Palomar Mountains Linkage,” one of several linkages identified as essential to sustaining a network of interconnected wildlands in the South Coast Ecoregion (South Coast Wildlands 2008). Luke *et al.* (2004) specifically identified the area of the proposed OSMZ as a key part of a 4-mi (6-km) wide, 16-mi (26-km) long linkage design that would enhance the ability of fish and wildlife to move between the interior mountainous regions of San Diego and Riverside counties and the more coastal Santa Ana/Santa Margarita mountains and lowlands of MCB Camp Pendleton.

3.3.4.2 Basilone Complex Wildfires

In May 2014, three separate incidents (San Mateo Wildfire, Las Pulgas Wildfire, Tomahawk Wildfire), coined the Basilone Complex, burned approximately 22,199 acres including 16,921 acres on MCB Camp Pendleton and 5,241 acres on the Fallbrook Naval Weapons Station (DET Fallbrook) (**Figure 3.3-2**). In addition to military installation lands, the Tomahawk Fire burned approximately 37 acres of land within

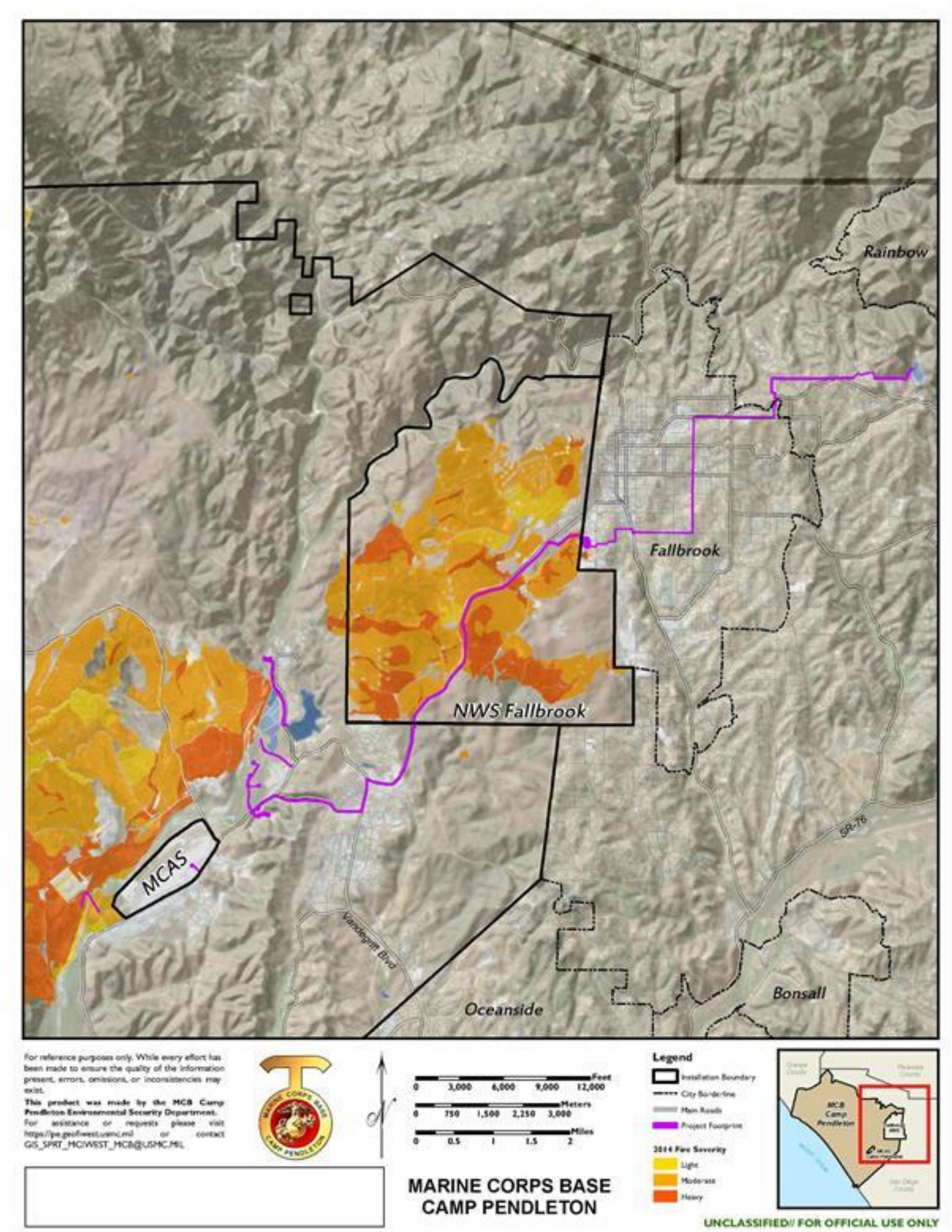

Figure 3.3-2. Basilone Complex Wildfires

the unincorporated area of Fallbrook. Three primary drainages were affected by the fires including San Mateo Creek, Las Flores Creek and the Santa Margarita River (USFS 2014).

Over 1,600 acres of riparian woodland and scrub habitat was impacted by the fires, with the Santa Margarita River comprising over 50% of the riparian areas affected. Burn severity was mixed, with the canopy cover of most trees left intact, and only the understory burned. Due to the short duration of the fire within the riparian zone mortality of larger trees is expected to be minimal. Thus, natural revegetation should occur quickly if beneficial conditions exist (i.e., significant rainfall over the next few years). While sycamore, willow, and cottonwood trees may experience crown mortality, all are capable of resprouting vigorously from the roots and remaining limbs. Understory vegetation recovery time within the riparian zone is expected to be relatively short (USFS 2014).

Of the 22,199 total acres burned within the Basilone Complex, over 12,800 acres of coastal sage scrub (CSS) habitat was burned, accounting for almost 60 % of the native vegetation impacted. Almost 15% of the total amount of coastal sage scrub habitat on Camp Pendleton and over 65% on the Fallbrook Naval Weapons Station was burned. CSS habitat recovery will potentially take 5 to 10 years, which could have a significant impact on the availability of suitable coastal California gnatcatcher habitat (USFS 2014).

3.3.4.3 Aquatic Habitats and Species

Aquatic habitats in the project ROI occur within the lower and middle reaches of the SMR watershed. Marine areas include the Pacific Ocean where the sea meets the SMR. These habitats support a large diversity of fishes, invertebrates, amphibians, reptiles, waterfowl, and plants. Threatened or endangered aquatic species known to currently or historically reside in the project area are discussed under Section 3.3.4.3, *Special Status Species*. The information presented was gathered from various sources, including the MCB Camp Pendleton INRMP (MCB Camp Pendleton 2011) and several reports compiled for MCB Camp Pendleton examining specific species found on the base.

<u>Santa Margarita River and Tributaries</u>

The SMR and its tributaries provide nearly continuous corridors of riparian and freshwater aquatic habitat from the interior mountains to the estuary. The middle reach of the SMR extends from upstream of where the SMR is joined by Sandia Creek to approximately the confluence with De Luz Creek. As described by White (2002), the middle reach of the river has a moderate gradient and consists of alternating straight and meandering sections with diverse substrate and flow conditions. The lower reach, from approximately the confluence with De Luz Creek to the estuary, has a broad floodplain with extensive riparian/wetland habitats, and a broad, sandy bed through which the channel meanders.

Fish known to occur in Sandia Creek include the native arroyo chub, a CDFW species of special concern, and the introduced largemouth bass (*Micropterus salmoides*), mosquitofish (*Gambusia afinis*), and green sunfish (*Lepomis cyanellus*). Sandia Creek is also potential habitat for armored three-spine stickleback (*Gasterosteus aculeatus*), a U.S. Forest Service sensitive species, and the federally endangered SCS.

Fallbrook Creek is a tributary to the lower reach of the SMR which originates in the community of Fallbrook. The creek supports a riparian scrub and woodland habitat across DET Fallbrook and onto MCB Camp Pendleton, where it flows into Lake O'Neill, approximately 8.5 mi (13.7 km) inland from the Pacific Ocean. Water levels in the lake are managed for water supply, but support incidental recreation.

Typically, streams with a mixture of coarse gravel, cobbles and boulders contain greater diversity of benthic invertebrates due to the greater variety of niche space for a range of organisms (Munn et al. 2009). However, the habitat structure of the Lower SMR is considered less than ideal, consisting of sand and fine deposits that are frequently disturbed as a result of natural bedload transport processes and a lack of extensive overhanging vegetation (NAVFAC SW 2011a). As indicated in bioassessments conducted in 2011 as part of MCB Camp Pendleton's Municipal Stormwater Program, the two sites investigated on the lower were each dominated by a single species of mayfly (*Centroptilum sp*. and *Tricorythodes sp*.) (NAVFAC SW 2012).

Surveys conducted 4 days per month during spring through summer over a 5-year period at the Lake O'Neill outflow canal provide a fairly accurate picture of species that reside in the lake itself (MCB Camp Pendleton 2007a). Over 99% of the species collected from the outfall canal were non-native. No native fish species were collected. Commonly found non-native fish include mosquitofish, common carp (*Cyprinus carpio*), and green sunfish. The one notable native animal species captured in surveys was the Pacific pond turtle. Non-native aquatic reptiles and amphibians included the spiny softshell turtle (*Apalone spinifera*), red-eared slider turtle (*Trachemys scripta*), and American bullfrog. As this lake is man-made, the presence of non-native species is not unexpected. The lake is periodically stocked with game fish, such as bluegill (*Lepomis macrochirus*), largemouth bass, and black crappie (*Pomoxis nigromaculatus*). Non-native species captured in the SMR are transferred to Lake O'Neill (MCB Camp Pendleton 2007a).

Downstream of the diversion, the dominant vegetation communities in the floodplain of the Lower SMR are southern arroyo willow riparian forest and southern willow scrub. The introduction of non-native species has caused problems for the ecosystem as a whole, and efforts to remove those which are detrimental to sensitive native species are ongoing (MCB Camp Pendleton 2007a).

Santa Margarita River Estuary

In addition to large expanses of tidal open water and mudflat, the SMR Estuary supports salt marsh, brackish marsh/willow swamp, salt flats, and coastal sand dunes. These habitats support approximately 148 plant, 9 reptile and amphibian, 24 fish, 184 bird, and 17 mammal species, as well as several federal and state-listed species including the California brown pelican, CLTE, SNPL, TWG, RIRA, and BSSP. This estuary is the largest on MCB Camp Pendleton and supports several different microhabitats and diverse assemblages of organisms, including freshwater and marine species. The estuary is supplied with salt water by the neighboring Pacific Ocean, and salinity varies seasonally and sometimes daily as a result of episodic rainfall.

The regularity and extent of tidal flushing, the magnitude and frequency of freshwater runoff, sedimentation rates, soil types, salinity and nutrient relations, and human disturbance all influence the structure of the coastal wetland system of the estuary. Tidal flushing occurs when the estuary mouth is open to the ocean and the incoming and outgoing tides provide a connection between the estuary and the ocean. Incoming tides bring in water of uniform salinity, moderate temperature, high dissolved oxygen content, and nutrients and small organisms such as plankton. Outgoing tides remove water of more variable temperature, salinity, dissolved oxygen and nutrient levels, as well as wastes and chemical pollutants (USFWS 1981). A strong correlation exists between the regularity of tidal flushing and the diversity and abundance of the flora and fauna present in coastal wetland habitats. Interruption of tidal flushing naturally occurs to varying degrees in southern California coastal lagoons like the SMR Estuary due to seasonal low flows in streams and littoral sand transport which results in a shallow sill or berm at the mouth (Lafferty 2005). Complete closure at the mouth can have drastic effects and reduce the overall wildlife value of these coastal wetlands (USFWS 1981). Changes to estuarine conditions due to a reduction of tidal flushing can reduce the abundance and diversity of invertebrate species (USFWS 1981). Fish, bird, and mammal populations are adversely affected by the reduced abundance and diversity of invertebrate species within an estuary or lagoon because of their importance as a food source. In addition, when mouth closures prevent tidal flushing, fish such as striped mullet (*Mugil cephalus*), anchovy, and topsmelt (*Atherinops affinis*) are prevented from entering the estuary or lagoon. These species are important prey items for CLTE and other birds. Mouth closures also prevent mudflat exposure during low tide conditions, precluding the use of these prime foraging areas for resident and migratory shorebirds, including SNPL.

Aquatic invertebrates are an integral link in the estuarine food chain. In addition to being an important food source for other animals, they help to aerate the sediments and recycle sediment bound nutrients (USFWS 1981). A variety of native and non-native marine invertebrate species inhabit the SMR and the SMR Estuary, including crabs, shrimp, snails, clams, and worms. Commonly found native invertebrate species include the California horn snail (*Cerithidea californica*), swimming crab (*Portunus xantusi*), and jack-knife clam (*Tagelus californianus*). Non-native invertebrate species include crayfish (*Procambarus clarkii*) and shrimp of the genus *Palaemon* (MCB Camp Pendleton 2007a).

Native freshwater or anadromous fish known to occur historically in the SMR and estuary include the partially armored three-spine stickleback, Pacific lamprey (*Lampetra tridentata*), SCS, TWG, and the arroyo chub. SCS and TWG are federally protected (refer to Section 3.3.4.3). Of the native fish species listed above, only the arroyo chub was documented in recent surveys conducted during non-native species removal. Other freshwater or anadromous fish species found in the SMR or estuary include non-natives such as the mosquitofish and the yellowfin goby (*Acanthogobius flavimanus*) (MCB Camp Pendleton 2007a). Fishes associated primarily with marine or estuarine conditions that occur in the SMR Estuary include California killifish (*Fundulus parvipinnis*), Pacific halibut (*Hippoglossus stenolepis*), diamond turbot (*Hypsopsetta guttulata*), topsmelt, bay pipefish (*Syngnathus leptorhynchus*), longjaw mudsucker (*Gillichthys mirabilis*), arrow goby (*Clevelandia ios*), cheekspot goby (*Ilypnus gilberti*), and staghorn sculpin (*Leptocottus armatus*) (USGS 2007; Lafferty 2012). The SMR Estuary likely provides nursery habitat for Pacific halibut and other marine species (Allen *et al.* 2006).

Management of estuarine and beach ecosystems is covered by the MCB Camp Pendleton Estuarine and Beach Conservation Plan. The introduction of non-native species has caused problems for the ecosystem as a whole, and efforts to remove those which are detrimental to sensitive native species are ongoing (MCB Camp Pendleton 2007a). The estuarine/beach conservation program is designed to sustain and enhance MCB Camp Pendleton's natural resources along its coastline, with an emphasis on nesting areas, coastal lagoons, and the SMR Estuary. The plan designates specific management zones along the coastline. Within these established zones, management activities focus on maintaining wetland values of coastal lagoons, protecting and maintaining CLTE and SNPL nesting areas, and maximizing the probability of metapopulation persistence within the lagoon complex for TWG (MCB Camp Pendleton 2011).

<u>CWA Jurisdictional Wetlands and Other Waters of the U.S.</u>

Wetlands and other waters of the U.S. are subject to the regulatory jurisdiction of the USACE under Section 404 of the CWA (33 CFR §§ 320-330). Under Section 404 of the CWA, wetlands are defined as areas that are "inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." Wetlands are recognized as a special aquatic site under the Section 404(b)(1) guidelines, and a "no net loss" policy continues to guide federal regulatory actions affecting wetlands under Section 404. Other CWA jurisdictional waters of the U.S. include navigable waters, relatively permanent tributaries to navigable waters, and smaller tributaries subject to a determination of "significant nexus" between tributary flows and the functions and properties of the downstream jurisdictional water.

Wetlands and other waters of the U.S. in the project area were initially delineated in 2005/2006 (Reclamation 2006b), delineation was updated in January 2014 (Reclamation *et al.* 2014), and verified/updated based on design in May 2016 using new methodology outlined in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (USACE 2008). Table 3.3-3 summarizes the results of the delineation.

Table 3.3-3. Jurisdictional Wetlands and other Waters of the U.S. Temporary vs Permanent

Wetland/Waters of the U.S.	Temporary Impact Area (acres)	Permanent Impact Area (acres)
Wetlands (acres)		
Palustrine Emergent	0.189	0.376
Palustrine Forested	2.049	0.849
Palustrine Scrub-Shrub	0	0
Total Wetlands	**2.238**	**1.225**
Other Waters of the U.S. (feet/acres)		
Riverine Lower Perennial[1]	0.297	0.384
Riverine Upper Perennial[2]	0.551	0
Riverine Intermittent	0	0
Total Other Waters of the U.S.	**3.086**	**1.609**

Notes: [1]Santa Margarita River.
[2]Fallbrook Creek.
MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station Seal Beach, Detachment Fallbrook; DOD = Department of Defense.
Source: Reclamation *et al.* 2013.

Wetlands in areas of proposed construction belong to the palustrine system, which includes all non-tidal wetlands dominated by trees, shrubs, and persistent emergents (herbaceous plants) (Cowardin *et al.* 1979). A total of 10.26 acres (4.15 hectare) of jurisdictional palustrine wetlands were delineated and mapped within the project footprints of Alternatives 1 and 2, including the following types:

- Palustrine emergent wetlands comprise patches of herbaceous wetland vegetation totaling 0.35 acre (0.14 hectare).
- Palustrine scrub-shrub wetlands comprise patches of willow- and mule-fat dominated riparian scrub totaling 0.46 acre (0.19 hectare).
- Palustrine forested wetlands comprise 9.45 acres (3.82 hectare) of willow-dominated riparian forest.

Other waters of the U.S. in proposed construction areas belong to the riverine system, which includes all non-estuarine aquatic habitats contained within a channel, with the exception of vegetated wetlands (Cowardin *et al.* 1979). Subsystems of the riverine system that are represented in the project area including the following:

- The lower perennial subsystem is characterized by low gradient, slow water velocity, and a well-developed floodplain (Cowardin *et al.* 1979). A total of 2,786 linear ft, comprising approximately 2.36 acres (0.96 hectare) of riverine lower perennial habitat was mapped within the project area, all of which was the SMR.

- The upper perennial subsystem is characterized by the high gradient, fast water velocity, and very little floodplain development (Cowardin *et al.* 1979). Some water flows throughout the year. The substrate consists of rock, cobbles, or gravel with occasional patches of sand. A total of 427 linear feet, comprising approximately 0.14 acre (0.06 hectare) of riverine upper perennial habitat was mapped within the project area, all of which was Fallbrook Creek.
- The intermittent subsystem consists of channelized habitats that contain flowing water for only part of the year. When water is not flowing, it may remain in isolated pools or surface water may be absent (Cowardin *et al.* 1979). Ephemeral streams and O'Neill Ditch were included in the intermittent category for purposes of the Cowardin classification, although the O'Neil ditch is not likely considered jurisdictional (final determination will be completed during the permitting process). A total of 8,509 linear feet comprising approximately 2.79 acres (1.13 hectare) of riverine intermittent habitat was mapped within the action area; O'Neill Ditch comprised 5,188 linear feet (approximately 2.33 acre [0.94 hectare]) of this riverine intermittent habitat.

MCB Camp Pendleton in coordination with NWS Det Fallbrook is proposing to restore approximately 300 linear feet of channel and riparian habitat in Fallbrook Creek to offset any permanent impacts to jurisdictional Waters of the U.S. Additional details can be found in Appendix C.

3.3.4.4 Special Status Species

This section addresses federally and state-listed threatened and endangered species, as well as other species of concern recognized by the USFWS and CDFW.

Federally-Listed Threatened and Endangered Species

Based on the review of MCB Camp Pendleton's and DET Fallbrook's INRMPs (DET Fallbrook 2006; MCB Camp Pendleton 2011), current GIS information, site conditions, and field surveys conducted in the ROI for the CUP and other projects, the potential occurrence of federally-listed threatened and endangered species in the ROI is summarized in Table 3.3-4. Those species known or reasonably likely to occur are discussed in more detail below.

Table 3.3-4. Federally and State-Listed Threatened and Endangered Species Potentially Occurring in the Project ROI

Common Name	Scientific Name	Status1	Habitat2	Occurrence in Action area 2
Plants				
San Diego button-celery	Eryngium aristulatum var. parishii	FE, SE	Vernal pools	Not known or likely to occur due to lack of habitat.
spreading navarretia	Navarretia fossalis	FT	Vernal pools	Not known or likely to occur due to lack of habitat.
thread-leaved brodiaea	Brodiaea filifolia	FT, SE	Grasslands	Not known or likely to occur due to lack of habitat.
Invertebrates				
Riverside fairy	Streptocephalus	FE	Vernal pools	Not known or likely to occur

Table 3.3-4. Federally and State-Listed Threatened and Endangered Species Potentially Occurring in the Project ROI

Common Name	Scientific Name	Status1	Habitat2	Occurrence in Action area 2
shrimp	woottoni			due to lack of habitat.
San Diego fairy shrimp	Branchinecta sandiegonensis	FE	Vernal pools	Not known or likely to occur due to lack of habitat.
quino checkerspot butterfly	Euphydryas editha quino	FE	Grassland, coastal sage scrub (CSS)	Never found on MCB Camp Pendleton despite many surveys; no known or suspected occurrence elsewhere in ROI.
Fish				
southern California steelhead	Oncorhynchus mykiss	FE	Large streams	MCB Camp Pendleton: Historic occurrence in SMR; presumed to occur based on the capture of juvenile trout with non hatchery origin in the SMR in 2009

Table 3.3-4. Federally and State-Listed Threatened and Endangered Species Potentially Occurring in the Project ROI

Common Name	Scientific Name	Status1	Habitat2	Occurrence in Action area 2
tidewater goby	Eucyclogobius newberryi	FE	Estuaries/coastal brackish lagoons	MCB Camp Pendleton: Historically occurred in the SMR Estuary, but no recent occurrence in the ROI.
Amphibians				
arroyo toad	*Anaxyrus californicus*	FE	Rivers, major streams, surrounding uplands	MCB Camp Pendleton: Occurs in SMR and Sandia Creek.
California red-legged frog	*Rana aurora draytonii*	FT	Creeks and ponds	No occurrence in the ROI. Historic occurrence in the watershed, but presumed extirpated from San Diego County (SDNHM 2009a).
Birds				
Belding's Savannah Sparrow	*Passerculus sandwichensis beldingi*	SE	Coastal salt marshes	MCB Camp Pendleton: Occurs in SMR Estuary.
California least tern	*Sternula antillarum browni*	FE, SE	Beaches, shorelines, open waters, salt flats, coastal dunes, and estuary sand bars	MCB Camp Pendleton: SMR Estuary, beach sections F and G, Lake O'Neill, and marine waters.
western snowy plover	*Charadrius nivosus nivosus*	FT	Beaches, shorelines, salt flats, coastal dunes, and estuary sand bars	MCB Camp Pendleton: SMR Estuary; beach sections F, G, and H.
Ridgway's rail	*Rallus obsoletus*	FE, SE	Coastal fresh and salt water marshes	MCB Camp Pendleton: One or two pairs resident in SMR Estuary.
least Bell's vireo	*Vireo bellii pusillus*	FE, SE	Willow dominated riparian, some nesting occurs in upland scrub adjacent to streams	MCB Camp Pendleton and Det Fallbrook: Riparian scrub and woodland habitats.
southwestern willow flycatcher	*Empidonax trailli extimus*	FE, SE	Willow dominated riparian	ROI: transients occur in riparian scrub and riparian woodland habitats. MCB Camp Pendleton: breeding occurs in riparian woodlands in the SMR.
western yellow-billed cuckoo	*Coccyzus americanus*	FP, SE	Cottonwood and willow dominated woodlands, need moisture.	ROI: Transient occurrence on MCB Camp Pendleton; no known or suspected breeding occurrence in the ROI.
willow flycatchers	*Empidonax traillii brewsteri, Empidonax traillii adastus*	ST	Willow dominated riparian	ROI: Transient occurrence; no known or suspected breeding occurrence in the ROI.
coastal California gnatcatcher	*Polioptila californica californica*	FT	Coastal Sage Scrub (CSS)	CSS on MCB Camp Pendleton and DET Fallbrook.
Mammals				
Pacific pocket	*Perognathus*	FE	Sandy substrates in	Not known or likely to occur

Table 3.3-4. Federally and State-Listed Threatened and Endangered Species Potentially Occurring in the Project ROI

Common Name	Scientific Name	Status1	Habitat2	Occurrence in Action area 2
mouse	*longimembris pacificus*		coastal strand, coastal dunes, river alluvium and coastal sage scrub habitats within approximately 4 km of the ocean.	within in ROI.
Stephens' kangaroo rat	*Dipodomys stephensi*	FE, ST	Sparse CSS & open grassland	Det Fallbrook: CSS and grassland. No known to occur on MCB Camp Pendleton.

Notes: [1]FE = Federally Endangered, FT = Federally Threatened, FP= Federally Proposed, SE = State Endangered, ST = State Threatened
[2]Primary sources are MCB Camp Pendleton (2011, 2012a) and DET Fallbrook (2006, 2012).

Southern California Steelhead

SCS exhibit one of the most complex suites of life history traits of any salmonid species. Individuals may exhibit anadromy (meaning they migrate as juveniles from fresh water to the ocean, and then return to spawn in fresh water) or freshwater residency (meaning they reside their entire life in fresh water). Resident forms are usually referred to as "rainbow" or "redband" trout, while anadromous life forms are termed "steelhead." Few detailed studies have been conducted regarding the relationship between resident and anadromous SCS and as a result, the relationship between these two life forms is poorly understood. SCS typically migrate to marine waters after spending two years in fresh water. They then reside in marine waters for typically 2 or 3 years prior to returning to streams to spawn as 4- or 5-year-olds. Unlike other Pacific salmon, SCS are iteroparous-capable of spawning more than once before they die. However, it is rare for SCS to spawn more than twice before dying, and most that do so are female. SCS adults typically spawn between December and June (NOAA Fisheries 1997). Depending on water temperature, SCS eggs may incubate in "redds" (nesting gravels) for 1.5 to 4 months before hatching as "alevins" (a larval life stage dependent on food stored in a yolk sac). Following yolk sac absorption, young juveniles, or "fry", emerge from the gravel and begin actively feeding. Juveniles rear in fresh water from 1 to 4 years, and then migrate to the ocean as "smolts" (NOAA Fisheries 1997).

Basic habitat requirements for SCS are adequate spawning gravel and areas of perennial flow or intermittent flow associated with pools of sufficient depth to avoid lethal temperatures. Shallower pools can be kept below lethal levels if intersected by subsurface flow or if they occur in the vicinity of cold water seeps or springs. Fish in shallower pools likely have higher mortality due to predation by birds and snakes. Deep pools able to thermally stratify likely provide the best in-river rearing potential in the absence of predatory fish.

Based on a study of SCS in Santa Barbara County (Stoecker 2002), a minimum water depth of 7 in (18 cm) is considered necessary for successful migration of adult SCS; however, the distance traveled through shallow water should be considered, with long stretches potentially impeding upstream movement. The maximum jump speed of SCS has been reported as 12 ft/second. In order to jump upstream of a barrier, the pool depth at the base of the barrier would need to be at least 1.25 times the height of the barrier. For example, a 4-ft (1.2 m) barrier would need to have a minimum of a 5-ft (1.5-m) deep pool at its base to be passable (Stoecker 2002).

The southern California evolutionarily significant unit (ESU) of the SCS was federally-listed as an endangered species by NMFS on 18 August 1997 (NOAA Fisheries 1997) and by the USFWS on 17 June 1998 (USFWS 1998a). This ESU included streams from the Santa Maria River in San Luis Obispo County, California (inclusive) to and including Malibu Creek in Los Angeles County. On 19 December 2000, NMFS issued a proposed rule to extend the current range of listed SCS to include the population of SCS found in San Mateo Creek located in northern San Diego County (NOAA Fisheries 2000a). To assist in the determination of a ruling, the CDFW prepared a report for NMFS on SCS in San Mateo Creek (CDFW 2000). On 1 May 2002, the NMFSissued a final rule to extend the southern-most range of SCS from its current southern boundary of Malibu Creek to the U.S./Mexico border (NOAA Fisheries 2002). Critical habitat was designated for the original ESU of SCS on 16 February 2000 (NOAA Fisheries 2000b). As the result of a court approved consent decree, NOAA Fisheries issued a final rule effective 30 April 2002 that removed critical habitat designations for 19 salmon and steelhead ESUs including SCS (NOAA Fisheries 2003). On 2 September 2005, the NOAA Fisheries published a final rule designation of critical habitat for the steelhead in California (NOAA Fisheries 2005a). Critical habitat was not proposed for designation on MCB Camp Pendleton because base lands are subject to a qualifying INRMP prepared under Section 101 of the Sikes Act (16 USC 670a) (NOAA Fisheries 2005a). On 5 January 2006, NOAA Fisheries concluded that the SCS distinct population segment (DPS) is in danger of extinction throughout all or a significant portion of its range, and listed the SCS DPS as an endangered species. The SCS DPS includes all naturally spawned populations of SCS below natural and manmade impassable barriers in streams from the Santa Maria River, San Luis Obispo County (inclusive) to the U.S.-Mexico Border. This DPS does not include any artificially propagated SCS stocks that reside within the historical geographic range of the DPS (NOAA Fisheries 2006).

Major factors affecting SCS populations are urbanization and other watershed disturbances, blocked access to headwater spawning and rearing areas, and partial and total dewatering of streams by water diversions and groundwater pumping (McEwan and Jackson 1996). Additionally, increased soil erosion, loss of riparian vegetation, water pollution, and introduced predators and competitors are affecting the SCS population.

SCS (those occurring south of San Francisco Bay) were formerly found in coastal drainages as far south as the Santo Domingo River in northern Baja California and were present in streams and rivers of Los Angeles, Orange, and San Diego Counties (McEwan and Jackson 1996). In 1946, Hubbs reported SCS making runs in San Mateo, San Onofre, and San Juan creeks and in the San Diego, San Luis Rey, and Tijuana rivers of Orange and San Diego Counties (McEwan and Jackson 1996). SCS presence was documented in San Onofre Creek through the early 1950s (Boughton *et al.* 2005; Lang *et al.* 1998). Presently, the species distribution extends south to at least San Mateo Creek on MCB Camp Pendleton. SCS was thought to be extirpated from much of its historic range in southern California; in fact, the San Mateo Creek population had previously been classified by some researchers as extinct (Nehlsen *et al.* 1999). In 1997, the first reoccurrence of a juvenile SCS was observed in San Mateo Creek, indicating a colonization event by a supposedly extinct population (NOAA Fisheries 2005b). The colonization persisted as of 2001, although estimated numbers appeared to be declining at that time (Boughton *et al.* 2005). Results of genetic analysis determined that the small population inhabiting the San Mateo Creek was the result of two spawning pairs (NOAA Fisheries 2005b). With the exception of the recent SCS observations in San Mateo Creek and Topanga Creek, where occurrence is sporadic and in extremely low numbers, SCS are almost completely extirpated from coastal watersheds south of Malibu Creek.

There is limited documentation regarding the population of steelhead in the SMR, with early sightings being purely anecdotal. Interviews with citizens of Orange and San Diego counties were conducted and revealed rough eyewitness accounts (in most cases unpublished) of SCS in the SMR from the 1900s (Sleeper 2002; Titus *et al.* 2003; Swift *et al.* 1993). In May 1939, the University of Michigan collected what was identified as a juvenile steelhead/rainbow trout from the lower river for its zoological museum collection (Swift *et al.* 1993). As late as 1958, there were stated observations of steelhead near the mouth of the SMR (USFWS 1998a). It is believed that adult steelhead may have ascended the SMR into the 1970s (Higgins 1991).

The CDFW has planted hatchery rainbow trout in portions of the SMR as recently as 1984, but Higgins (1991) saw no evidence of a naturalized population resulting from these plants. De Luz Creek, a tributary to the SMR, has also received CDFW plants of hatchery rainbow trout. A comprehensive survey of the SMR drainage was conducted over a 3-year period, from the fall of 1997 through the spring of 2000, with the objective of exhaustively establishing the extent of the distribution of native and exotic fish species. SCS were not reported among the eleven species of fish (two native species and nine introduced species) found within the SMR (Warburton *et al.* 2000). Surveys conducted in 2001 did not reveal any juveniles during a spot check of the best occurring habitat in the SMR or associated tributaries (Boughton *et al.* 2005). It has been theorized that flow conditions in the SMR have been sufficient to support populations since at least the 1980s, with the exception of several individual dry years, but this species has not populated the river (USFWS 1998a).

Recently, NOAA Fisheries reported that a tissue sample obtained from a trout captured in the SMR during the spring of 2009 was identified through genetic testing to be of wild steelhead ancestry with no indication of hatchery origin (NOAA Fisheries 2010). Although genetic testing of the tissue sample positively identified the captured trout to be of wild steelhead ancestry, an otolith sample was not taken which would have confirmed whether the fish was an offspring of wild native resident trout or wild steelhead which had migrated upstream (Kalish 1990; Volk *et al.* 2000).

Potential SCS habitat has been identified in several attempts to classify areas that may be appropriate for re-colonization or re-introduction, and several areas at or near MCB Camp Pendleton have been evaluated. San Mateo Creek is presumed to contain habitat for SCS passage between upstream spawning and rearing areas (off-MCB Camp Pendleton) and the ocean. Although currently unoccupied, there are areas of potential SCS habitat on MCB Camp Pendleton. The largest areas of unoccupied potential SCS habitat in MCB Camp Pendleton occur within the middle fork of San Onofre Creek and mid to upper reaches of the San Mateo Creek north-east of the fork nearest to the coastline (Lang *et al.* 1998; Boughton and Goslin 2006). The largest amount of high quality potential spawning habitat (presence of spawning gravel) on base occurs in the San Mateo Creek between Range 313A and the Telega Road crossing (Lang *et al.* 1998). Small amounts of potential habitat also occur on Roblar Creek (a SMR tributary) and the upper SMR in the reach between Fallbrook and Temecula; if occupied by SCS, these areas would potentially act as a migration corridor to habitat off base (Lang *et al.* 1998; Boughton *et al.* 2006; Warburton *et al.* 2000). All of the potential habitat on base is located in basins categorized as having unreliable migration opportunities, and therefore is not of the highest value in terms of potential long-term SCS habitat (Boughton *et al.* 2006). Although critical habitat designations have varied though the years for the southern populations, the rivers and creeks on MCB Camp Pendleton have not been included. Through management, monitoring, and protection measures ditacted by the INRMP and Estuarine and Beach Conservation Plan and Riparian/Estuarine BO (USFWS 1995a), riparian habitat and the streams have minimal disturbance on MCB Camp Pendleton. Regardless, staff at MCB Camp Pendleton observe practices to minimize disturbance to SCS if observed.

Considering past occurrences and the habitat present in the action area, the likelihood of occurrence of SCS in the SMR is very low. Accounts of a small population in the San Mateo Creek are limited to one small area that is not located in or near the action area. In general, potential habitat for re-colonization at sites on MCB Camp Pendleton, although identified, is patchy and changes with shifting environmental conditions.

SCS have recently been documented in the San Luis Rey River, the mouth of which is within 1 mi (1.6 km) of the mouth of the SMR. The final Recovery Plan for the SCS identifies both the SMR and the San Luis Rey River as Core 1 Areas, meaning highest priority for immediate actions to promote population recovery in those streams (NOAA Fisheries 2012).

The occurrence of SCS in close proximity to the SMR, and the apparent lack of strong fidelity by SCS to their natal streams supports the likelihood that SCS adults might attempt to enter the SMR under favorable conditions. A recent study that included site surveys and surface water modeling of the Lower SMR found that conditions supporting the potential for SCS migration occur in above average and very wet hydrologic conditions (Reclamation *et al.* 2012). This study determined that a minimum of 166 cfs was required to support upstream migration by adult SCS. However, the riprap located on the downstream side of the existing sheet pile weir does not support an adequate pool depth to allow SCS to jump over the existing weir (Reclamation e*t al.* 2012).

Tidewater Goby

The TWG was federally-listed as endangered on 4 February 1994 (USFWS 1994a). A recovery plan has been prepared describing the conservation needs of the species, including the protection of populations in the coastal lagoons of MCB Camp Pendleton (USFWS 2005a). All streams supporting TWG on MCB Camp Pendleton are recognized as essential but have been exempted from critical habitat designation due to the protection to the species, which is provided through the INRMP and the Estuarine and Beach Conservation Plan and Riparian/Estuarine BO (USFWS 1995a, 2008b; MCB Camp Pendleton 2011). MCB Camp Pendleton’s conservation goal for TWG is to maintain quality habitat through conservation, silt removal, control of exotic predatory fish species, research, and monitoring.

TWG are small (usually less than 2 in [5 cm] long) fish, which live and reproduce in coastal lagoons. TWG are benthic (living on the bottom substrate) and inhabit shallow waters (less than 3 ft [1 m] deep) that are slow moving to still but not stagnant (Irwin and Soltz 1984). The coastal lagoons where these fish reside are typically closed off from the ocean by sand bars during summer. The substrate is generally sand, mud, and gravel with abundant emergent and submerged vegetation (Moyle 1976). In addition to living in coastal lagoons, these fish have been documented moving upstream, in one case more than 5 mi (8 km) (Irwin and Soltz 1984). TWG regularly range up into freshwater in summer and fall as sub-adults and adults, although there is little evidence of reproduction in upper areas. Threats to this species include loss of estuarine habitat, degradation in water quality, and predation by non-native fish species.

Unlike other goby species in California, TWG do not exhibit a marine life history phase (Swift *et al.* 1989). This limits the frequency of genetic exchange between populations and lowers the potential for recolonization of a habitat once a population has been lost. Recolonization, however, has been documented to occur at distances up to 12 mi (19 km) from a source population (Lafferty *et al.* 1996). Flood events may function as agents of dispersal by washing gobies out of lagoons into coastal current patterns (Lafferty *et al.* 1999).

This species formerly inhabited lower stream reaches and coastal lagoons from Del Norte County to San Diego County (Lee *et al.* 1980). Of the 13 historic sites in Orange and San Diego counties, only 8 populations of TWG remained as of 2000, all within MCB Camp Pendleton (USFWS 2000a). TWG populations at MCB Camp Pendleton fluctuate seasonally. Localized extirpations and recolonization events may occur between lagoons on MCB Camp Pendleton (MCB Camp Pendleton 2011). Within southern California, the San Mateo, San Onofre, and Las Flores creeks are considered by the USFWS the largest and most persistent populations of TWG in the region, potentially serving as important source populations for dispersal into ephemeral estuaries and streams in the area (MCB Camp Pendleton 2011). TWG are also found within the lower reaches of Hidden, Aliso, French, and Cocklebur creeks. All of these creeks have brackish lagoons, which are infrequently breached by floods and closed to ocean tidal influence by sand berms most of the time.

TWG were last collected in the SMR in 2000 and have apparently been extirpated, not having been detected in 25 subsequent surveys conducted in the SMR Estuary from June 2002 through November 2013 (USFWS 2005a; Lafferty 2013). A plausible explanation for the elimination and continued absence of TWG from the SMR is the abundance of predatory fish species coupled with the prevailing open condition of the estuary in recent years, and also the lack of a persistent sand bar at Santa Margarita probably precludes the long-term persistence of tidewater gobies at this site (Lafferty 2013). As a result, the brackish-estuarine zone that could otherwise be inhabited by TWG in the SMR is less subject to the extreme conditions that occur in seasonally closed, small lagoons, and thus more accessible and hospitable to marine predators than are the other MCB Camp Pendleton lagoons. Predatory marine-estuarine species have regularly been documented in surveys of potential TWG habitat in the SMR, to a much greater extent than in the lagoons inhabited by TWG (Lafferty 2010). Introduced predatory centrarchids (sunfish) that are established upstream can also move down into the estuary when conditions allow (USFWS 2005a). Hence, although recolonization of the SMR by TWG flushed from nearby populations during storms is possible (USFWS 2005a), predation could still prevent the reestablishment of the species in the SMR. At present, the SMR Estuary is considered potential but unoccupied habitat for the species.

Arroyo Toad

The ARTO is a small toad, light-olive green or grey to tan on the back, with dark-spotted, warty skin. The underside is white or buff and without dark blotches or spots. A light colored, V-shaped stripe crosses the head and eyelids, and the anterior portion of the oval parotoid glands (just behind the eyes) are pale (MCB Camp Pendleton 2011). ARTOs require shallow, slow moving streams for breeding and early development, and use the surrounding riparian habitat, especially marginal zones above and between stream channels for foraging, resting, aestivation, and dispersal up- and downstream. During the non-breeding season, generally late fall and winter (Sweet 1992), they disperse more widely into adjacent uplands, but also remain in the riparian habitat. Reproduction is dependent on availability of shallow, still, or low flow pools in which breeding, egg laying, and larval development occur. These habitat requirements are largely determined by natural hydrological cycles and scouring events. Breeding and larval development within MCB Camp Pendleton typically occur between March and July, depending upon weather conditions. Female ARTO produce a single egg clutch each year. Following fertilization, toad larvae (tadpoles) hatch after 12 to 20 days and develop in breeding pools for the next 65 to 85 days. Newly metamorphosed toads may remain near their natal pools for a few weeks to several months before dispersing into aestivation habitat for the winter months. As with most amphibians, ARTO survivorship during the development stage is reportedly very low.

The ARTO currently occupies an estimated 25% of its previous habitat within the United States. Contributing factors in this decline include extensive habitat loss, human modification to water regimes, and introduction of non-native predators. Specific threats to ARTO populations include alteration of natural hydrology, increased siltation and decreased water quality due to increased upstream development in urban areas (e.g., Fallbrook) (USGS 2006b).

The ARTO was listed as federally endangered on 16 December 1994 (USFWS 1994b). A recovery plan is available for this species (USFWS 1999). Final critical habitat was designated in 2005. All lands owned or controlled by MCB Camp Pendleton are excluded from critical habitat designation under Section 4(b)(2) of the ESA for economic reasons and Section 4(a)(3) of the ESA due to the effectiveness of the INRMP in providing for the conservation of this species (USFWS 2005b; MCB Camp Pendleton 2011).

Historically, ARTO inhabited the length of streams from central California into northwestern Baja California, Mexico. MCB Camp Pendleton may represent some of the largest remaining coastal ARTO populations and the only one occurring on an undammed major river system within southern California (MCB Camp Pendleton 2011). ARTO occur in the SMR and its tributaries, De Luz and Roblar creeks; in San Onofre Creek and its tributary, Jardine Canyon; and San Mateo Creek and its tributaries Cristianitos and Talega Creeks. Of these occupied drainages, the lower portion of Santa Margarita River contains some of the best quality arroyo toad habitat on Base. The seasonally predictable surface water in the lower portion of the Santa Margarita River makes this location a crucial source for arroyo toad recruitment, particularly in years when other Base drainages are dry during the ARTO breeding season (USGS 2013a).

ARTO occur in the Proposed Action Area along the SMR from the vicinity of the Stuart Mesa Bridge to the upstream limits of the Proposed Action Area in the OSMZ, in both Sandia Creek and the main stem of the SMR and including the DET Fallbrook border along the SMR. Areas east and west of the river on MCB Camp Pendleton are within a buffer area of suitable habitat (See Figures in Appendix B) that may be used for foraging, burrowing, and dispersal. Habitat for ARTO in project construction areas occurs at the location of the diversion weir, O'Neill Ditch, recharge ponds, and portions of the production and gallery wells and associated conveyance pipeline/access roads (Appendix B).

In 2002, a focused ARTO survey was done along the lower portion of the SMR which revealed ARTO occurring almost continuously proceeding upstream from about 600 ft (183 m) east (inland) of the Stuart Mesa Bridge upriver to the vicinity of the MCAS Camp Pendleton (the limit of the survey), with the exception of a 1.6-mi (2.6-km) stretch of dense vegetation in the narrows downstream of Ysidora (Konecny 2002). However, ARTO historically have occurred in that area (MCB Camp Pendleton 2011). Breeding season surveys conducted annually from 1996-2000 and 2003-2011 (Turschak *et al.* 2008; Brehme *et al.* 2012) have consistently found ARTO where surface water is present along the river, from the Stuart Mesa Bridge to the community of Fallbrook limits. The downstream limit of ARTO distribution along the river is approximately at the Stuart Mesa Bridge (MCB Camp Pendleton 2011), presumably because of tidal marine influence and increasing salinity below that point.

USGS has conducted annual monitoring on MCB Camp Pendleton since 2003 and developed a multi-year trend analysis using a spatial and temporal monitoring approach that tracks the presence of arroyo toad breeding populations by documenting the presence of eggs and tadpoles. Arroyo toad breeding on-set varies locally (i.e, within the varying watersheds) between years based on hydroperiods and temperature. This multi-year trend analysis shows that longer term population dynamics are highly variable across years with greater variability (three times greater) in the ephemeral watersheds (San Onofre and San Mateo), than the Santa Margarita River.

In May 2014, a total of 892 acres of arroyo toad occupied riparian habitat on the Santa Margarita River burned within the Pulgas Fire (part of the Basilone Fire Complex). The majority of these areas burned at a low to moderate soil burn severity (USFS 2014), thus potentially not having direct mortality to burrowed adult arroyo toads, although this is unknown.

California Least Tern

The CLTE is the smallest North American tern. They are white with gray back and wings, a black crown, white forehead, and a slightly forked tail. Habitat preferences are seacoasts, beaches, bays, estuaries, lagoons, lakes, and banks of rivers and lakes. CLTE are late winter through late summer residents in the area. On MCB Camp Pendleton, nesting area protection measures are implemented beginning 1 March and ending 15 September (MCB Camp Pendleton 2011), which overlaps but may not coincide exactly with tern presence and breeding. The terns are inshore foragers and surface-feeding fish eaters and are opportunistic in their search for prey, eating fish that are small enough to catch, including anchovies and smelt (*Atherinops* spp.). There is some indication that piers, docks, sea walls, and other artificial structures along the shoreline may attract CLTE, as these structures act as artificial reefs for juvenile schooling fish, which terns feed upon. CLTE frequently forage in the open waters of the ocean (NAVFAC SW 1999).

The USFWS designated CLTE as endangered in June 1970 (USFWS 1970). No critical habitat has been designated for this species and the recovery plan has been revised several times (USFWS 1980, 1985a).

Fewer than 700 pairs remained in 1973 along the coast from San Francisco south to San Diego (National Audubon Society 1994); however, populations have been increasing range-wide and as of 2006 there were 6,897 breeding pairs (Conkle 2006). Tern populations have increased on MCB Camp Pendleton due to focused management strategies and specific management practices for protecting CLTE and its breeding habitat. Programmatic instruction, habitat protection and enhancement measures outlined in the Estuarine and Beach Ecosystem Conservation Plan guide the management of breeding habitat and foraging areas. Threats are largely attributable to loss of nesting and foraging habitat (e.g., from construction of the Pacific Coast Highway, beach homes, and other shoreline development) and disturbance to breeding colonies, including dredging, filling, water pollution, and domestic and wild animals (MCB Camp Pendleton 2011).

CLTE were first documented nesting on the base in 1969, and has been documented continuously since then. In cooperation with the U.S. Department of the Interior (USDI), the base set aside a portion of the beach near the mouth of the SMR as a tern nesting area. On MCB Camp Pendleton, CLTE also nest on the salt flats of the SMR Estuary. There were approximately 150 total pairs of CLTE documented in all known locations on the base in 1969. There were 1,422 pairs documented in 2007, with the largest colony adjacent to the SMR. This colony had 91% of nests found on MCB Camp Pendleton (Foster 2008a). Statewide, MCB Camp Pendleton continues to have the largest nesting colony, which in 2007 represented 22% of California's nesting pairs and 14 to 16% of the season's fledglings (Foster 2008a). There were 1,526 nests documented in 2011 (the number of pairs ranged from 1,014-1,510), with the largest colony adjacent to the SMR. Statewide, MCB Camp Pendleton continues to have the largest nesting colony, which in 2011 represented 24% of California's nesting pairs and 9 to 10% of the season's fledglings (Marschalek 2012; Schuetz *et al.* 2012). In 2012, it was estimated that 1,231 pairs laid 2,153 eggs in 1,245 nests (Fournier *et al.* 2013a). In 2013, it was estimated that 1,199 pairs laid 2,062 eggs in 1,242 nests resulting in an average clutch size of 1.67 eggs (Fournier *et al.* 2014a).

On MCB Camp Pendleton, CLTE nesting sites are located on the beaches at the mouths of the SMR (Blue Beach), French and Aliso creeks (White Beach), and at the mouth of Las Flores Creek (Red Beach), as well as on the salt flats of the SMR Estuary (MCB Camp Pendleton 2011). Programmatic instructions for avoidance and minimization of impacts to the species and its habitat, especially during breeding season, are provided in the Estuarine and Beach Conservation Plan and Base Order P3500.1M (*Range and Training Regulations*). Protected nesting areas at the mouth of the SMR are shown on Threatened and Endangered Species figures in Appendix C-1. It should be noted that individual nest sites also occur outside of this area.

At the SMR Estuary nesting grounds, periodic floods create a somewhat unstable habitat. About 12.2 acres (4.9 hectares) are available for nesting on the north side of the beach at the mouth of the estuary. At this nest site, about 195.5 acres (79.1 hectares) of salt flats are present, but only about 38.3 acres (15.5 hectares) are suitable for nesting (Foster 2008a). There is no fencing, but passage of training vehicles and human foot traffic is tightly regulated in accordance with the Riparian/Estuarine BO (USFWS 1995a). Monitoring grids are also present, and efforts to control ice plant are ongoing. During nesting season, the nearby ocean waters and estuary are used for foraging (MCB Camp Pendleton 2011).

The exclusion fencing for least tern and snowy plover nest protection at MCB Camp Pendleton has been successful in reducing human intrusion and predator access to a portion of the nesting habitat. However, many nests occur outside of the fenced area, and predation continues to be a significant source of mortality to chicks (Foster 2008a). Tidal and storm-related flooding, which can wash over nests that are too close to the water, also influence nesting success. CLTE may shift nesting locations in response to changes in flooding or substrate, but from the time the eggs have been laid until fledging occurs, the eggs and nestlings are vulnerable to such events.

Snowy Plover

The SNPL is a small shorebird (length 6 in [15 cm]), pale in color, with a thin dark bill, dark or grayish legs, partial breast band and a dark ear patch. Females and juveniles may be confused with piping plover (*Charadrius melodus*) but have a much thinner bill and darker legs. They typically forage above the water line of coastal beaches and lagoons, gathering invertebrates (flies, beach hoppers, etc.) from the sand surface, stranded vegetation, marine-mammal carcasses, or low foredune vegetation (USFWS 2005c). SNPL regularly run back and forth short distances between nesting sites in the foredunes, where they are well camouflaged, and foraging areas along the high-tide line or at the water's edge. The SNPL breeding season occurs from 1 March through 15 September. SNPL nest in foredunes and salt-flat habitats, and foraging occurs from the foredunes and flats down to the water's edge.

On MCB Camp Pendleton, SNPL nesting has been documented in many locations along approximately 9 mi (15 km) of coastline, from the southern part of Beach Section B (Gold Beach - south of San Onofre State Beach), to the south end of Beach Section H (Blue Beach - which spans the mouth of the SMR) (MCB Camp Pendleton 2011; Foster 2008b). The SMR Estuary, including the beach immediately north and south of the river mouth and the salt flats inside the river mouth, has supported the largest number of nests on the base (MCB Camp Pendleton 2011; Foster 2008b). Wintering and migratory SNPL also occur on MCB Camp Pendleton beaches prior to the start of breeding. Primary factors contributing to the decline and listing of the SNPL are predation, loss of habitat, and anthropogenic disturbance.

The SNPL was listed by the USFWS as threatened on 5 March 1993 (USFWS 1993a). A revised final rule designating critical habitat was published in 2012 (USFWS 2012). Citing the effectiveness of protective and conservation measures implemented by MCB Camp Pendleton as part of its INRMP, including the Beach and Estuarine Conservation Plan and related Riparian/Estuarine BO (USFWS 1995a; MCB Camp Pendleton 2011), USFWS exempted all lands on MCB Camp Pendleton from critical habitat designation (USFWS 2012). The recovery plan for the SNPL was finalized in 2007 (USFWS 2007a).

Programmatic instructions for avoidance and minimization of impacts to the species and its habitat, especially during breeding season, are provided in the Estuarine and Beach Conservation Plan and Base Order P3500.1M (*Range and Training Regulations*). SNPL nesting on MCB Camp Pendleton beaches is monitored every year. Detected nest locations are marked for avoidance with orange carsonite "off limits" markers. Undetected/unmarked nests are still protected and would be avoided under the ESA. Additional management details and survey information for SNPL are contained in the MCB Camp Pendleton INRMP (MCB Camp Pendleton 2011).

Two main breeding sites exist for SNPL in San Diego County: MCB Camp Pendleton and the Silver Strand (MCB Camp Pendleton 2011). Other breeding sites include Batiquitos Lagoon, San Elijo Lagoon, Mariner's Point (Mission Bay), Sweetwater River Estuary, Chula Vista Wildlife Reserve, and the Tijuana River mouth (MCB Camp Pendleton 2011). Within San Diego County from 1994 to 1997, 72 to 87% of SNPL nests were located on federal properties (MCB Camp Pendleton 2011).

MCB Camp Pendleton is one of the most important SNPL breeding sites in southern California. Since 1994, MCB Camp Pendleton has been performing yearly surveys on the base for SNPL. Nesting locations occur from the SMR salt flats and foredune habitat and are widely dispersed northward as far as San Onofre State Beach (MCB Camp Pendleton 2011). The nesting population on MCB Camp Pendleton rose dramatically from 43 nests in 1994 to 212 nests in 2004; the nesting population has since declined to 124 nests in 2007 (Foster 2006, 2008b; MCB Camp Pendleton 2011). The number of fledgling per nest increased from 0.4 during 1994-1998 (Collier and Powell 2000) to more than 0.6 in 2003 and 2004 (Foster 2006), although there has been a decrease since 2004, with 0.3-0.4 fledgling per nest in 2007 (Foster 2008b). In 2012, it was estimated that a minimum of 94 pairs laid 931 eggs in 396 nests (Fournier *et al.* 2013b). In 2013, it was estimated that a minimum of 71 pairs laid 771 eggs in 289 nests resulting in an average clutch size of 2.67 eggs. (Fournier *et al.* 2014b).

Most beaches on MCB Camp Pendleton are utilized by wintering and migratory SNPL. As described by MCB Camp Pendleton wildlife biologists (MCB Camp Pendleton 2007b), during the winter, SNPL aggregate in large groups at the north end of Del Mar beach, at the mouth of the SMR, at Cocklebur pond, and small groups have been seen at Red Beach. They also utilize areas between the crest of the beach and the foredunes for foraging at low tide. SNPL start marking out territories and making nest scrapes in January and has laid eggs as early as February 22. If their scrapes are disturbed they will move to another location and try again.

Ridgway's Rail (RIRA), formally Light Footed Clapper Rail (LFCR)

The RIRA was federally-listed as endangered in October 1970 and the first final revision of the recovery plan was approved in 1985 (USFWS 1985b). There is no designated critical habitat for the RIRA. The favored habitat for this non-migratory species is cordgrass (*Spartinia foliosa*) (USFWS 1985b). Habitat can also include vegetation varying from salt marshes with cordgrass and pickleweed (*Salicornia virginica*) to freshwater marshes dominated by cattails (*Typha* spp.) and bulrushes with occasional intermixed willows (*Salix* spp.) (MCB Camp Pendleton 2011).

The RIRA was extirpated from most of the coastal salt marsh habitats it formerly occupied owing to the destruction and degradation of its habitats. Annual surveys have been conducted in potential RIRA habitat in California since 1980 and these provide the best data on population size, habitat occupancy, and long-term trends (Zembal *et al.* 2011). Its population in California reached an apparent minimum of 163 pairs, with RIRAs found in only eight marshes, in 1989 (Zembal *et al.* 2011). Since then, the population has generally increased, although with marked fluctuations, with 441 pairs in 21 marshes detected during the most recent census in 2011. This is attributed to the successful protection and management of the state's remaining coastal salt marshes (Zembal *et al.* 2011).

The SMR Estuary has been surveyed almost every year since 1980, and other potential locations on MCB Camp Pendleton, including San Mateo Creek, Las Flores Creek, and Cocklebur Lagoon, have also been surveyed in most years (Zembal *et al.* 2011). An independent survey of additional areas covering all potentially suitable habitat on MCB Camp Pendleton was conducted in 2011 by HDR and Konecny Biological Services (2011). The SMR Estuary is the only location on MCB Camp Pendleton where RIRA have been documented. Annual surveys show at least one pair of birds present in the estuary near the SMR mouth during most years, with a second pair of birds documented in brackish or freshwater marsh areas further upstream between the railroad tracks and Stuart Mesa Road (Zembal *et al.* 2011; HDR and Konecny Biological Services 2011). During July 2009, a female RIRA with three chicks was observed in the estuary (MCB Camp Pendleton 2009b). In 2013, within the SMR Estuary, surveys indicated two territories. Elsewhere on Base, a RIRA was detected during 2013 surveys in the San Onofre lagoon. For the Basewide Water Infrastructure project (MILCON P-1046), the biological monitors observed two RIRA detections within the SMR estuary in March 2015 (ROICC pers. comm.).

MCB Camp Pendleton protects the RIRA and its habitat through the Estuarine and Beach Conservation Plan and other measures implemented as a result of the Riparian/Estuarine BO (MCB Camp Pendleton 2011).

Least Bell's Vireo

The LBVI is a small migratory songbird that arrives at MCB Camp Pendleton as early as mid-March and leaves for its wintering grounds in Baja California in August. The breeding season is from 15 March through 31 August. LBVI primarily inhabits dense willow-dominated riparian habitats with lush understory vegetation. LBVI forage and nest primarily in willows. The decline of LBVI was mainly due to loss of riparian habitat and nest parasitism by cowbirds (USFWS 1998b).

The USFWS listed the LBVI as an endangered species on 2 May 1986 (USFWS 1986). A draft recovery plan is available for this species (USFWS 1998b). Critical habitat for LBVI was designated in six southern California counties on 2 February 1994 (USFWS 1994c). MCB Camp Pendleton was excluded from this designation due to a MOU with the USFWS in response to the ongoing management of LBVI and riparian habitat on base. Management for LBVI is currently addressed in the INRMP (MCB Camp Pendleton 2011), including the Riparian Habitat Conservation Plan and Riparian BO (USFWS 1995a). A significant portion of critical habitat Location E (SMR) is located within the OSMZ (USFWS 1994c).

Survey data from 1978 to 2011 indicate that LBVI dramatically increased in abundance across MCB Camp Pendleton through 1998, after which numbers have trended up or down from year to year without a consistent long-term pattern. Lynn and Kus (2011) note that the MCB Camp Pendleton LBVI population benefitted greatly from the base's management practices, especially the protection and restoration of riparian habitat and cowbird control, but in recent years has tended to increase or decrease in parallel with statewide trends.

On MCB Camp Pendleton, base-wide survey data for LBVI show the abundance of LBVI in riparian habitat along the SMR (Figures 4-2 through 4-5) (MCB Camp Pendleton 2012c). The SMR has consistently supported more than half of the total LBVI population on MCB Camp Pendleton over the years (Lynn and Kus 2011). Recently on MCB Camp Pendleton, the largest population of LBVI was recorded in 2010. In 2010, the number of documented vireo territories exceeded the highest recorded number of vireo territories over the past 15 years. In 2010, the base population comprised 1,068 territorial males, 71% of which were confirmed as paired, and 60 transients (Lynn and Kus 2010). As of 2011, the base population comprised a minimum of 784 territorial males, 57% of which were confirmed as paired, and 19 transients. This represents a fairly sharp decrease from the total of 1,068 territorial males observed in 2010, but is still larger than the numbers observed from 2006 through 2008 (Lynn and Kus 2011). In 2012, the base population comprised a minimum of 636 territorial male vireos, 69% of which were confirmed as paired, and 40 transients (Lynn and Kus 2012). In 2013, 724 least Bell's vireo territories were documented (males), which is an increase of 14% from 2012 to 2013; of the 724 male territories, 77% were confirmed as paired with a female (Lynn and Kus 2013). In 2014, the base population comprised a minimum of 634 territorial male vireos, 69% of which were confirmed as paired and 37 transients (Lynn and Kus 2014). In 2014, the wildfires burned in the middle of the LBVI breeding season: Lynn and Kus (2014) report that 83 male vireos that were initially detected prior to the fire within the burn perimeter either perished or were displaced by the wildfire (these males were not reflected in the overall territory count of 634 for 2010). The 2011 and 2012 LBVI surveys may be incomplete, since the survey start was delayed in those years; for analysis purposes, the 2010 LBVI data set will be used for it has the largest population recorded on Base, and the 2014 data set for it is the most recent (albeit impacted from the May 2014 wildfire).

DET Fallbrook conducts installation-wide LBVI surveys every five years (Ryan Lockwood pers. comm.). The most recent installation-wide survey information is from 2008 and 2013, which was used for the effects analysis in Chapter 4. 17 LBVI territories were located within the installation in 2008, and 43 LBVI territories within the installation in 2013. In the 2008 survey period, LBVI were detected in three general areas: one pair along Fallbrook Creek, three pairs around Depot Lake, and 17 pairs along or adjacent to the Santa Margarita River; no transient males were detected in 2008 (Tierra Data 2013). In 2013, a total of 41 pairs (with 36 on the Santa Margarita River) of least Bell's vireos were detected during the survey period, in addition to seven transients, two lone males, and four birds of unknown sex (ICF 2014).

The OSMZ also contains a productive riparian habitat surrounding Sandia Creek. As noted previously, the 100-year floodplain of the river encompasses 223 acres (90 hectares) of riparian habitat that is considered suitable for SWFL, and also appears to be suitable for LBVI breeding, foraging, and dispersal. Another 37 acres (15 hectares) of riparian habitat occurs along Sandia Creek within the OSMZ. Seven nesting pairs of LBVI were found in surveys of the OSMZ during 2008 (Appendix C-2).

USFS (2014) notes that potential direct and short term impacts from the May 2014 Basilone Complex Wildfires to LBVI include loss of vegetation cover and associated nesting and foraging habitat within suitable and occupied habitat. USFS (2014) estimated that the Basilone Complex fires impacted approximately 75 LBVI territories on the Santa Margarita River, 20 territories on Las Flores Creek, 12 territories on San Mateo Creek, and 10 territories on Fallbrook Creek within the DET Fallbrook (Ryan Lockwood pers. com) (note: the estimates are based upon multiple years of LBVI data, and not necessarily what was occupied in 2014 just prior to the wildfires). Overall habitat suitability for this species should recover within two to three years of the fires and largely dependent upon future rainfall amounts (USFS 2014).

Southwestern Willow Flycatcher

The SWFL is one of three subspecies of willow flycatcher, and the only one that nests on MCB Camp Pendleton. Other subspecies of willow flycatcher are listed as endangered by the state of California and can occur as transients on MCB Camp Pendleton (Howell and Kus 2009). The SWFL is a neotropical migrant which nests in riparian scrub and woodland habitats. It arrives at MCB Camp Pendleton for the breeding season as early as 15 March and may be present through 31 August (MCB Camp Pendleton 2011). Its breeding range extends from southern California, east to western Texas, north to extreme southern Utah and Nevada, and south to extreme northern Baja California, Mexico. This flycatcher inhabits riparian areas along rivers, streams, and other wetlands. It nests in native, mixed and non-native vegetation (i.e. Tamarisk) depending on the site. Low elevation to mid-elevation sites vary widely in structure, with average canopy ranging from 13 to 98 ft (4 to 30 m). Patch structure is generally characterized by trees of different size classes, although some sites are dominated by monotypic willow stands (Finch and Stoleson 2000).

Nesting SWFLs prefer willow and mulefat thickets and invariably nest near surface water or saturated soil, which increases the production of flying insects, the primary food for SWFL. Threats to the species are habitat loss, human disturbance, and nest parasitism by cowbirds (MCB Camp Pendleton 2011). The species is also threatened by random fluctuations and inbreeding effects in small, localized breeding populations (USFWS 2011).

The SWFL was federally-listed as an endangered species by the USFWS on 27 February 1995 (USFWS 1995b). A final rule designating critical habitat was issued on 03 January 2013 (USFWS 2013). In the final rule, lands owned by MCB Camp Pendleton and DET Fallbrook were exempted from the designation because these areas are managed through each base's INRMP and the MCB Camp Pendleton Riparian Conservation Plan (DET Fallbrook 2006, MCB Camp Pendleton 2011, USFWS 1995a). However, critical habitat is still designated along the SMR floodplain upstream from the DET Fallbrook boundary to the county line, including approximately 223 acres (90 hectares) within the proposed OSMZ. As described by USFWS in the Final Rule designating critical habitat this segment upstream from MCB Camp Pendleton maintains a diversity of riparian vegetation used by dispersing and migrating SWFL and the ability to develop breeding habitat for population growth or discovery of undetected territories. A recovery plan is available for this species (USFWS 2002).

The total population of SWFL is relatively small, consisting of approximately 70 pairs at the time the species was listed, and numbers have not appreciably increased since that time (USFWS 2005e; Howell and Kus 2009).

Within the ROI, habitat suitable for SWFL is found along the riparian corridor of the SMR from the upstream boundary of the OSMZ, downstream across the common boundary of DET Fallbrook and MCB Camp Pendleton, and continuing downstream to approximately the Stuart Mesa Road Bridge. Riparian habitat surrounding Lake O'Neill and continuing up Fallbrook Creek to the boundary with DET Fallbrook is also suitable and has been included in breeding season surveys.

Survey data for SWFL reveal SWFL individual and nest locations in riparian habitat along the middle part of the SMR, including the river floodplain from the airfield to Pueblitos Canyon and adjacent riparian habitat within the ROI (MCB Camp Pendleton 2012c; Howell and Kus 2009, 2011). The SMR supports the majority of recent breeding by SWFL on MCB Camp Pendleton, with population estimates on MCB Camp Pendleton of 16, 13, 13, 17, and 9 from 2010 to 2014, respectively. The recent MCB Camp Pendleton population has a skewed sex ratio, with 2 to 3 breeding males forming polygynous bonds with multiple females (Howell and Kus 2014). SWFL immigration/emigration between MCB Camp Pendleton and locations on the San Luis Rey River, has been documented (Howell and Kus 2011), suggesting the mixing and interdependence of these two populations. Transient willow flycatchers have been observed in previous years, though not in 2011, along several other creeks on MCB Camp Pendleton, but these birds have been considered members of the other non-federally-listed subspecies (Howell and Kus 2009).

By 2008, a noticeable decline in the SWFL population on MCB Camp Pendleton was evident; there has been a statewide decline which has affected other breeding locations as well over the last few years (Howell and Kus 2009, 2011, 2014). Prior to 2014 and the Basilone Complex Wildfires, 2011 documented as the smallest number of birds detected since systematic surveys began in 2000, consisting of only 6 breeding male and female SWFLs, and one bird of unknown sex. In addition in 2011, a single territorial male was observed at San Mateo Creek (Howell and Kus 2011). In 2012, the resident SWFL population on MCB Camp Pendleton consisted of four males (one territory was established at Lake

O'Neill on Fallbrook Creek and one territory at the Sierra percolation ponds near San Mateo Creek (i.e., the Sierra Training Area percolation ponds), eight females, and one non-territorial floater of unknown sex (Howell and Kus 2009, 2012). In 2013, the resident SWFL population consisted of 3 males, 10 females, and four non-territorial floaters of unknown sex (an increase from the 2011 and 2012 populations); 11 territories were established, consisting of 10 pairs (two polygynous groups consisting of two males each pairing with five different females), and one male of unknown status (Howell and Kus 2013). In 2013, 15 of the 17 SWFL were found on the SMR, with one territorial male detected at Pilgrim Creek, and one floater of unknown sex at Fallbrook Creek (Howell and Kus 2013).

In 2014, the resident flycatcher population on Base consisted of three male and six females. Six breeding territories were established: five territories at the SMR consisting of two polygynous groups and one monogamous pair; and one additional female breeding territory (without a male detected) was found on in Pilgrim Creek. From 2013 to 2014, the resident SWFL population on MCB Camp Pendleton decreased by 47%. Three Camp Pendleton natal birds emigrated to Bonsall on the San Luis Rey River in 2014 (Howell and Kus 2014). Howell and Kus (2014) state that the population of SWFL on MCB Camp Pendleton during the 2014 breeding season was affected by two extreme events: wildfire and prolonged drought. In May 2014, the Basilone Complex Wildfires occurred during the time when resident flycatchers were arriving and selecting breeding territories and transient flycatchers were migrating through the Base on the way to their breeding sites. During Burned Area Emergency Response (BAER) investigations, USFS (2014) noted that the wildfires affected SWFL-occupied habitat in the Santa Margarita River just west or downstream of Marine Corps Air Station (MCAS); a discussion with USGS personnel revealed that there were at least 2 breeding territories within the perimeter of the burn footprint when the fires occurred in mid-May, and in 2013 (in the same area that was burnt) there were four breeding pairs (USFS 2014). Howell and Kus (2014) state that the decline of SWFL on MCB Camp Pendleton in 2014 was probably both directly related to the loss of breeding habitat from the wildfires and the continuing drought, which prompts flycatchers that typically would have bred on Base to move to nearby locations off Base in search of suitable habitat.

In 2015, the resident flycatcher population on Base consisted of one male and four females (Howell and Kus 2015). Four breeding territories were established on the SMR, consisting of four pairs (one polygynous group consisting of one male pairing with four different females). The resident population of SWFL in 2015 (five individuals) declined by 44% from 2014 (nine individuals) and was the smallest documented since monitoring began in 2000.

SWFL have not been observed on DET Fallbrook during their installation-wide surveys or other surveys (e.g., project specific). SWFL was not observed in the OSMZ during the 2008 surveys (Appendix C-2). In the spring 2015, MCB Camp Pendleton biologists conducted protocol SWFL surveys on a small segment of the OSMZ, with one transient flycatcher found and no breeding individuals; MCB Camp Pendleton will propose to conduct protocol SWFL surveys in other portions of the OSMZ in the future. This segment maintains a diversity of riparian vegetation used by dispersing and migrating SWFL and has the ability to develop breeding habitat for population growth or discovery of undetected territories; the SMR floodplain is designated critical habitat and Sandia Creek appears to support suitable habitat as well.

California Gnatcatcher

CAGN are small gray songbirds that are obligate, permanent residents of CSS vegetation, but they will make limited use of adjacent habitats outside of the breeding season. The breeding season extends from 15 February through 31 August, with peak nesting activities occurring from mid-March through May, as identified by the USFWS Carlsbad office. The USFWS designated CAGN as threatened in March 1993

(USFWS 1993b). Currently there is no recovery plan for CAGN. Since the time of listing, MCB Camp Pendleton has developed several conservation management programs and policies to protect CAGN.

Critical habitat was designated in 2000 (USFWS 2000b), but was remanded for reconsideration based on litigation. The USFWS re-proposed critical habitat on 24 April 2003 (USFWS 2003). On 19 December 2007, the USFWS designated revised final critical habitat for CAGN. All lands on MCB Camp Pendleton and DET Fallbrook were exempted from final critical habitat (USFWS 2007b). MCB Camp Pendleton and DET Fallbrook are currently working cooperatively with USFWS to provided conservation and protection for uplands habitat throughout both bases, and have incorporated CAGN into their respective INRMPs.

On MCB Camp Pendleton, surveys in 2010 detected approximately 268 occupied sites by CAGN, including 47 territorial males, 173 pairs, and 48 family groups. An additional 56 transient individuals were identified as well, but were not recorded as occupied sites that would receive specific Base management. The 2010 surveys recorded the second lowest number of CAGN locations since 1989 with a decrease from the 668 observed in 2006 to 268; this combined with a similar decline in CAGN numbers between the 1998 (n=604) and 2003 (n=311). The completed habitat assessment and refinement effort showed that approximately 21,257 acres of suitable breeding CAGN habitat occurred on Base in 2010 (TetraTech 2011). Surveys on MCB Camp Pendleton in 2014 detected approximately 436 occupied sites by CAGN, including 122 territorial males, 283 pairs, and 31 family groups. An additional 53 transient individuals were identified as well, but were not recorded as occupied sites. The study in 2010 ended with an estimated 21,257 acres of suitable habitat and the 2014 study ended with 15,725 acres of suitable CAGN habitat, with the significant decline attributable primarily to the 2014 Basilone Complex Fire (Tetra Tech 2014) (note: the n=436 population size includes those territories that were evident prior to the May 2014 wildfires, but may have had individuals lost or displaced).

On MCB Camp Pendleton, the large decrease in observations from 2006 to 2010 may be most attributable to the loss of significant amounts of CSS habitat due to wildfire (from 2006 to 2010), unknown effects of weather, and the natural fluctuations that are the ecology of this species (Tetra Tech 2011). Furthermore, despite wildfires occurring in 2014, there was an increase of the CAGN population on MCB Camp Pendleton from 2010 to 2014 (surveys prior to the May 2014 fires earlier in the season captured some territories that may be been lost). Survey efforts are evidence that this population is subject to rather dramatic fluctuations.

On Detachment Fallbrook, installation-wide surveys are scheduled to occur every five years. Surveys began in 2009; a total of 126 pairs, six single females, 24 single males, and 132 juveniles were detected during the 2009 installation-wide survey effort (Garcia and Associates, and Cadre Environmental 2010). An installation-wide survey was conducted in 2014 with survey point information used in the effects analysis.

Although CAGN were not observed in the OSMZ during 2008 surveys, apparently suitable CSS habitat exists within the OSMZ (Zych 2015). MCB Camp Pendleton will propose to conduct protocol CAGN surveys in suitable habitat within the OSMZ in the future.

In May of 2014, over 12,800 acres of coastal sage scrub habitat was burned within the Basilone Complex fires, including 9,300 acres on Camp Pendleton and over 3,500 acres on Fallbrook Naval Weapons Station, which is over 65% of the total sage scrub habitat present on the DET Fallbrook (USFS 2014). The wildfires occurred in the middle of the CAGN breeding season and the 2014 MCB Camp Pendleton Basewide survey effort; habitat suitability mapping was refined after the fires and an estimated 3,241 acres of suitable CAGN habitat was burned in May 2014 and removed from the habitat suitability model on MCB Camp Pendleton (Tetra Tech 2014). Direct and short term impacts to this species from the wildfires include loss of vegetation cover and associated nesting and foraging habitat. It is expected that populations of this species within the burn areas will be reduced for several years. Overall habitat suitability for this species should recover within 10 years of the fires and is dependent upon several factors including natural vegetation recovery, fire return interval, seasonal precipitation and possible type conversion (USFS 2014).

Stephens' Kangaroo Rat

The SKR is a member of a family of burrowing rodents characterized by cheek pouches, long tails, and comparatively long rear legs. SKR occur in three distinct geographic regions: western Riverside County, western San Diego County, and central San Diego County (USFWS 1997b). The western San Diego County distribution extends into lands of MCB Camp Pendleton. SKR inhabit grassland, CSS, and chaparral habitats where vegetative cover is less than 30% and bare ground is abundant (Thomas 1975; O'Farrell and Uptain 1987, 1989; O'Farrell 1997; USFWS 1993c). The species prefers open habitats with patches of bare ground, habitats that are not typically inhabited by other kangaroo rat species. Dense grasses, herbaceous cover, and some non-native species (*Bromus diandrus*) can exclude SKR. SKR has been documented across a variety of soil types, but it is generally less common in clay or rocky soils due to difficulty burrowing through those substrates (USFWS 1997b). The USFWS listed SKR as endangered in 1988 (USFWS 1988). Critical habitat has not been designated.

In 2005, MCB Camp Pendleton began a robust monitoring program for SKR, designed to track yearly trends in the total area occupied by SKR on base through a multi-tiered, habitat-based, adaptive monitoring program. Not only are known SKR populations monitored, but effort is put into discovering new SKR within potentially suitable habitat outside of the known occupied boundaries; for example in 2011-2012, USGS (2013b) put 17% of their effort towards surveying in trapping in the Discovery Areas on Base (those areas named suitable SKR habitat but are not known to be currently occupied). On MCB Camp Pendleton, within the SKR monitoring area, in is estimated that SKR occupied 187 hectares in 2011-2012 and 194 hectares in 2012-13, which is the highest estimate since monitoring began in 2005 (USGS 2013b). The largest groups of SKR at MCB Camp Pendleton occur within the vicinity of the 25 Area Combat Town, Range 407 (adjacent to the Zulu Impact Area), and within the 409 Impact Area. Habitat conditions within portions of these areas appear to be maintained through frequent training exercises that keep the habitat open and prevent the establishment of large stands of exotic grasses (*Bromus* spp., *Avena* spp.), and exotic perennials such as sweet fennel (*Foeniculum vulgare*). SKR are not known to occur within the project footprint on MCB Camp Pendleton.

In May of 2014, approximately 1,006 acres of valley/foothill grassland and 16 acres of non-native grassland burned on from the Tomahawk Fire (USFS 2014), with much overlap with the project footprint (Figure 3.3-1). Due to the May 2014 wildfires and extended drought (from 2011-2015), grassland habitat within the project footprint has potentially become more open and suitable for SKR. Therefore, in 2015, project specific surveys for SKR were conducted within the project footprint on DET Fallbrook, and a small portion of the footprint on MCB Camp Pendleton which is closest to the Juliett SKR population.

SKR has been documented in and around DET Fallbrook. As of 2001 to 2002, occupied SKR habitat was found approximately 0.4 mi (0.6 km) from Ammunition Road, on either side of the road. Previous (1990-1992) field studies had indicated a broader distribution of SKR on DET Fallbrook, including occupied habitat along Ammunition Road in the southern portion of the Action Area. These earlier studies were conducted after a drought cycle when grasses and ground cover were sparse and conditions favorable to SKR were more prevalent (DON 2008a). A trapping survey conducted in all areas of potentially suitable habitat bordering Ammunition Road, which overlaps with the project footprint, in 2004 did not find SKR (DON 2008a). However, during project specific SKR trapping survey in 2015, SKR was trapped along Ammunition Road in Det Fallbrook within the project footprint. SKR were trapped at three locations yielding five unique SKR captures; these locations are new sites for this species, suggesting that this species may have expanded its range at DET Fallbrook since the previous trapping survey along Ammunition Road in 2004. The Tomahawk Fire in May 2014 burned large expanses of scrub habitat on DET Fallbrook, which eliminated or greatly reduced shrub cover and at least temporarily converted former scrub stands to open grassland or denuded habitats apparently highly suitable for SKR. This habitat alteration also resulted in expansive areas with little or no ground cover, which would facilitate easy cross-country travel by kangaroo rats (Montgomery 2015).

State-Listed Threatened and Endangered Species

The aforementioned federally-listed species are also listed as threatened or endangered, or recognized as species of special concern by the CDFW. One state-listed endangered species which is not federally listed occurs in the action area and is discussed below.

Belding's Savannah Sparrow

The BSSP is a non-migratory subspecies of the savannah sparrow that is endemic to the coast of southern California and northern Baja California. It is a 5.5 in- (14 cm-) long bird, similar to other subspecies of savannah sparrows but it is darker and heavily streaked on the back, breast, and sides. BSSP were listed by the State of California as endangered on 10 January 1974 (MCB Camp Pendleton 2011). No recovery plan or goals have been established for BSSP (Zembal and Hoffman 2002).

The primary habitat of BSSP is tidal marsh, but they are also found in diked, non-tidal marsh areas (USFWS 1998c). BSSP reside year-round in coastal salt marshes from Goleta Slough in Santa Barbara County to northern Baja California. Nesting occurs primarily in dense pickleweed (*Salicornia pacifica*) at the higher elevations of the salt marshes, above the reach of the highest spring tide. BSSP nest from January to August. Statewide, the greatest numbers of BSSP occur in marshes with full tidal flushing as this promotes vigorous growth of pickleweed and prevents habitat from being flooded for prolonged periods – as can occur in non-tidal marshes (Zembal and Hoffman 2010).

A partial statewide survey was conducted in 1973, and the first statewide survey was made in 1977. Since 1986, statewide surveys have been undertaken at 5-year intervals. The latest statewide count was coordinated by CDFW in 2010. The 2010 census resulted in a population estimate of 3,372 pairs of BSSP in 29 marshes. This reflects an increase in the total state population in each 5-year survey since 1991 (Zembal and Hoffman 2010).

The SMR Estuary currently supports the only BSSP population on MCB Camp Pendleton (Zembal and Hoffman 2010). The BSSP population on MCB Camp Pendleton can be quite variable from year to year (MCB Camp Pendleton 2011). The number of territories in the 5-year surveys has ranged from a low of 100 in 2010 which, due to limited access, was estimated by observation from the edge of I-5, to a high of 185 counted in 1996 (Zembal and Hoffman 2010). A deterioration of habitat quality and reduction in numbers of BSSP has been correlated with periods of estuary closure leading to the submergence and destruction of what used to be lush BSSP habitat along the estuary edge (Zembal *et al.* 2006). May 2010 observations suggested that sedimentation had caused a loss of deep water habitat in the estuary, and that 30% of BSSP habitat had been degraded by upland weeds (Zembal and Hoffman 2010).

While BSSP as a state listed species is not covered by NEPA, it does benefit from management activities and programs provided for the RIRA and other estuarine and beach species under MCB Camp

Pendleton's Estuarine and Beach Ecosystem Conservation Plan. Current base-wide management practices that directly or indirectly benefit BSSP include, but are not limited to, restoration efforts in estuarine/beach areas that are temporarily disturbed from non-routine maintenance and construction activities, exotic vegetation removal/control, and monitoring stream water quality, flood regimes, and storm event frequency to determine and manage the potential effect on beach and estuarine habitats. Additionally, MCB Camp Pendleton's management program provides programmatic instructions to users of MCB Camp Pendleton that limit activities during breeding seasons and in sensitive resource areas. These programmatic instructions include the requirement for vehicles to remain on existing roads and trails in the vicinity of coastal marshes/lagoons during breeding season, prohibiting foot traffic in all coastal marshes during breeding season and prohibiting foot traffic all year long in the SMR Estuary and the mouth of Cocklebur Canyon. MCB Camp Pendleton grants access to statewide surveyors for BSSP surveys (MCB Camp Pendleton 2011).

Other Special Status Species: Plants

Other special concern plant species, while not state or federally-listed as threatened or endangered, are species that are recognized by the California Native Plant Society (CNPS) as rare or sensitive in California. Six special status plant species potentially occur in the ROI, many of which are found within the OSMZ. Table 3.3-5 summarizes data on the occurrence of these species in the ROI, based on previous data and surveys (see **Figure 3.3-2** and Appendices C).

Occurrences of special status plants in the OSMZ are discussed in the corresponding report in Appendix C-2. Chaparral sand verbena occurs on open sandy soils, mostly inland, and was discovered on MCB Camp Pendleton for the first time in 2008 during project surveys of the recharge pond areas; it is mapped in Figure 3.3-2. Orcutt's brodiaea was also found in project surveys in 2008, above Haybarn Canyon approaching Rattlesnake Canyon Road along the Alternative 2 pipeline alignment; most of that area was subsequently developed (Figure 3.3-2), and the current status of Orcutt's brodiaea is unknown. The California Rare Plant Rank (CRPR) 1B.1 listing indicates that CNPS considers these three species to be seriously endangered in California.

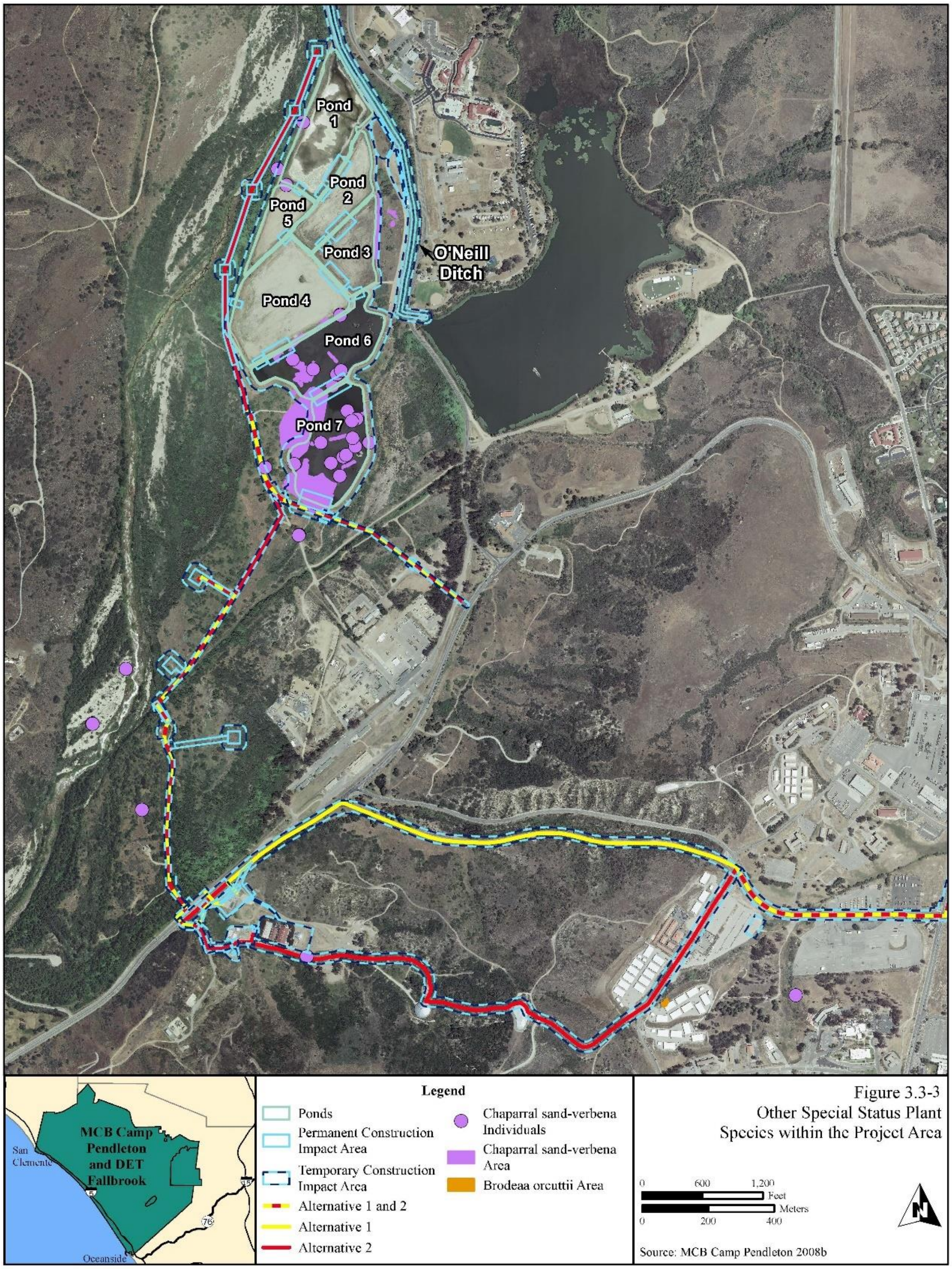

Figure 3.3-3. Other Special Status Plant Species within the Project Area

Table 3.3-5. Special Status Plant Species Known or Likely to Occur in the Project ROI

Common Name	Scientific Name	CRPR[1]	Occurrence
Known to Occur			***Occurrence in ROI***
Chaparral sand-verbena	*Abronia villosa* var. *aurita*	1B.1	Conveyance pipeline2, OSMZ3
Engelmann oak	*Quercus engelmannii*	4.2	OSMZ3
Fish's milkwort	*Polygala cornuta* var. *fishiae*	4.3	OSMZ3
Ocellated Humboldt lily	*Lilium humboldtii* var. *ocellatum*	4.2	OSMZ3
Orcutt's brodiaea	*Brodiaea orcuttii*	1B.1	Bi-directional pipeline2
Rainbow manzanita	*Arctostaphylos rainbowensis*	1B.1	Bi-directional pipeline4, OSMZ3
San Miguel savory	*Clinopodium mimuloides*	4.2	Previously documented in OSMZ3
Potential to Occur			***Habitat***
South coast saltscale	*Atriplex pacifica*	1B.2	Sandy riparian
Lewis' evening-primrose	*Camissoniopsis lewisii*	3	CSS, grasslands, sandy or clay soil
Payson's jewel-flower	*Caulanthus simulans*	4.2	CSS, chaparral
Smooth tarplant	*Centromadia pungens* ssp. *laevis*	1B.1	Riparian, grasslands
Orcutt's pincushion	*Chaenactis glabriuscula* var. *orcuttiana*	1B.1	Sandy riparian
Paniculate tarplant	*Deinandra paniculata*	4.2	CSS, grassland
Southern California black walnut	*Juglans californica*	4.2	Riparian, CSS, chaparral
Robinson's pepper-grass	*Lepidium virginicum* var. *robinsonii*	4.3	CSS, chaparral
White rabbit-tobacco	*Pseudognaphalium leucocephalum*	2B.2	Riparian, CSS, chaparral
Nuttall's scrub oak	*Quercus dumosa*	1B.1	CSS, chaparral
Parry's tetracoccus	*Tetracoccus dioicus*	1B.2	CSS, chaparral

Notes: [1] California Rare Plant Ranks (CRPR) created by the California Native Plant Society (CNPS):
1B - Plants rare, threatened, or endangered in California and elsewhere
2B - Plants rare, threatened, or endangered in California, but more common elsewhere
3 - Plants about which more information is needed – a review list
4 - Plants of limited distribution – a watch list

CNPS Threat Ranks
.1 - Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
.2 - Moderately threatened in California (20-80% occurrences threatened)
.3 - Not very threatened in California (<20% of occurrences threatened or no current threats known)

[2]See Figure 3.3-2 for location
[3]Refer to Appendix C-2 for locations.
[4]Potential habitat in SMC adjacent to pipeline route in Fallbrook, see Appendix C-1, Figure C1-5.

Source: CDFW 2013, CNPS 2013.

Other Special Status Species: Wildlife

Other special concern wildlife species, while not state or federally-listed as threatened or endangered, are species that are recognized as rare or sensitive in California. Twenty-six special status wildlife species potentially occur in the ROI. Table 3.3-6 summarizes data on the occurrence of these species in the ROI, based on previous data and surveys (see Appendices C-2).

Table 3.3-6. Non-Listed Special Status Wildlife Species Known or Likely to Occur in the Project ROI

Common Name	Scientific Name	Status	Occurrence
Invertebrate			
Hermes copper	*Lycaena hermes*	SSC	Chaparral, coastal sage scrub and woodland
Fish			
Arroyo chub	*Gila orcutti*	SSC	SMR
Amphibian			
Coast range newt	*Taricha torosa torosa*	SSC	Streams and adjacent riparian
Western spadefoot toad	*Spea hammondii*	SSC	Temporary ponds
Reptile			
Belding's orange-throated whiptail	*Aspidoscelis hyperythrus beldingi*	SSC	Coastal sage scrub
Coast patch-nosed snake	*Salvadora hexalepis virgultea*	SSC	Coastal sage scrub and chaparral
Red diamond rattlesnake	*Crotalus ruber*	SSC	Coastal sage scrub
Blainville's horned lizard	*Phrynosoma blainvillei*	SSC	Sandy wash and coastal sage scrub
Silvery legless lizard	*Anniella pulchra pulchra*	SSC	Unknown but possible in upland areas
Two-striped garter snake	*Thamnophis hammondii*	SSC	SMR and other streams in ROI
Pacific (western) pond turtle	*Actinemys marmorata*	SSC	SMR and other streams in ROI

Continued on next page

Table 3.3-7. Non-Listed Special Status Wildlife Species Known or Likely to Occur in the Project ROI (cont.)

Common Name	Scientific Name	Status	Occurrence
Bird			
San Diego cactus wren	*Campylorhynchus brunneicapillus sandiegensis*	SSC	Cactus-dominated sage scrub on MCB Camp Pendleton and DET Fallbrook (occurrences mostly outside of ROI)
Cooper's hawk	*Accipiter cooperi*	WL	Riparian and oak woodland
Loggerhead shrike	*Lanius ludovicianus*	SSC	Open scrub and grassland
Bell's sage sparrow	*Amphispiza belli belli*	WL	Coastal sage scrub and chaparral
Burrowing owl	*Athene cunicularia*	SSC	Grassland and other open areas
Southern California rufous-crowned sparrow	*Aimophila ruficeps canescens*	WL	Chaparral
Yellow-headed blackbird	*Xanthocephalus anthocephalus*	SSC	Marshes, observed on MCB Camp Pendleton
Yellow warbler	*Dendroica petechia brewsteri*	SSC	SMR and Fallbrook Creek, OSMZ
Yellow-breasted chat	*Icteria virens*	SSC	Dense riparian habitats in the SMR and Fallbrook Creek, OSMZ
Mammal			
Northwestern San Diego pocket mouse	*Chaetodipus fallax fallax*	SSC	Coastal sage scrub
Dulzura pocket mouse	*Chaetodipus californicus femoralis*	SSC	Grassland, coastal sage scrub
Ramona grasshopper mouse	*Onochomys torridus ramona*	SSC	Possible in OSMZ
San Diego desert woodrat	*Neotoma lepida intermedia*	SSC	Coastal sage scrub with cactus
Pallid bat	*Antrozous pallidus*	SSC	Riparian
Spotted bat	*Euderma maculatum*	SSC	Riparian and grassland
Western mastiff bat	*Eumops perotis californicus*	SSC	Riparian
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SSC	Riparian
Big free-tailed bat	*Nyctinomops macrotis*	SSC	Rugged and rocky habitats
American badger	*Taxidea taxus*	SSC	Grassland

Notes: SSC = CDFW Species of Special Concern, WL = CDFW Watch List.

Sources: Unitt 2004; County of San Diego 2009; Riverside County 2009; San Diego Natural History Museum 2009; CDFW 2011; MCB Camp Pendleton 2011; CDFW 2013; Survey Reports (Appendix C).

3.4 CULTURAL RESOURCES

3.4.1 Definition of Resources

Cultural resources include prehistoric and historic resources. Prehistoric resources are physical properties or Traditional Cultural Properties (TCP) associated with human activities that predate written records and are generally identified as archaeological sites; however, they may continue to have significance to tribes and other cultures. Prehistoric resources can include village sites, specialized camps, lithic scatters, shell scatters, milling features, petroglyphs, rock features, and burials. Historic resources include those that postdate the advent of written records in a region.

Other common terms with distinct archaeological connotations are used throughout this section. For example, a "complex" is defined as a consistently recurring assemblage of artifacts or traits that may be indicative of a specific set of activities or common cultural tradition. A "stage" is a complex development unit encompassing a broad span of time and widespread cultural unity. A "tradition" is defined as the temporal range of a specific culture.

3.4.2 Regulatory Setting

Cultural resources are subject to review under both federal and state laws and regulations. Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, empowers the Advisory Council on Historic Preservation to comment on federally initiated, licensed, or permitted projects affecting historic properties or cultural resources listed or eligible for inclusion on the NRHP. Only those cultural resources determined to be significant (i.e., eligible for the NRHP) or those that remain undetermined for significance (if unevaluated) are protected under the NHPA. Under the NHPA ineligible cultural resources are not considered when assessing the possible effects of a federal action.

The significance of archaeological and architectural resources is usually determined by using specific criteria (listed in 36 CFR § 60.4) including: association with an important event, association with a famous individual, embodiment of the characteristics of a period, or the ability to contribute to scientific research. Significant archaeological, architectural, and traditional cultural resources include those that are eligible or recommended as eligible for inclusion in the NRHP. Under most circumstances, cultural resources must be at least 50 years old to be considered eligible for listing. However, more recently built structures, such as Cold War-era resources, may warrant protection if they manifest "exceptional significance." Traditional cultural resources can be evaluated for NRHP eligibility as well. However, even if a traditional cultural resource is determined to be ineligible for the NRHP, it may still be significant to any Native American tribe. In this case, such resources may be protected under the Native American Graves Protection and Repatriation Act, and EO 13007 addressing sacred Indian sites. The significance of a Native American traditional cultural resource is determined by consulting with the appropriate Native American tribes.

3.4.3 Region of Influence

The cultural resources ROI (hereinafter referred to in this section as Area of Potential Effect [APE], for compliance with SHPO standards) encompasses all areas that may be subject to direct physical disturbance from project implementation, including construction of conveyance pipeline corridors and facility sites or indirect effects from the construction that may inadvertently spillover to adjacent areas. For conveyance pipelines, a 100-ft (30-m) wide corridor along the pipeline route is included in the APE. For facility sites, the APE is the footprint of the project component.

3.4.4 Existing Conditions

3.4.4.1 Regional Setting

Archaeologists, beginning with Malcolm Rogers in the 1930s and 1940s, have applied several chronological schemes to the coast of southern California, particularly San Diego County, partly based on perceived changes in chipped stone artifact techno-typology. It is suggested that many of the defined assemblages are probably part of outdated and inaccurately assigned typologies that need to be reevaluated and tested from multiple perspectives, especially through advances in rigorous functional studies. Such a reevaluation is important, because many of the current typologies that help define archaeological assemblages are both obscuring important behavioral patterning and creating some where none may exist. Hence, a description of the major chipped stone artifacts associated with each of the three traditional chronological periods for coastal San Diego County is given below, and include the San Dieguito, La Jolla, and Late Prehistoric periods. While it is recognized that distinct nomenclatures and subdivisions are used by different archaeologists for these time periods, and various subdivisions are utilized within each specific period, researchers tend to focus on the three major periods rather than their subdivisions, since they are interested in illuminating the general pattern.

<u>San Dieguito/Paleoindian Period (11,500 Before Present [B.P.] – 8500/7500 B.P.)</u>

The San Dieguito Period encompasses human occupation of the San Diego area prior to 7500 B.P. Defining characteristics of the San Dieguito artifact assemblage include distinct scrapers, bifacial knives, and crescent shaped eccentrics. The artifact assemblage is thought to represent a heavy emphasis on hunting of game. The San Dieguito time frame is equivalent to the Paleoindian Period (11,500 B.P.-8500/7500 B.P.) as defined by Byrd (1996).

<u>La Jolla/Archaic Period (8500/7500 B.P. – 1300/800 B.P.)</u>

The La Jolla Period, followed by a hiatus/transition, encompasses a time frame of approximately 7500 B.P.-1300 B.P., equating roughly with the Archaic Period, which ranges between 8500/7500 B.P.-1300/800 B.P. (Byrd 1996). The La Jolla period is thought to represent an emphasis on littoral resources, as indicated by dense shell midden sites. The tool assemblage is defined by simple stone cobble tools and an increased emphasis on ground stone implements. Meighan (1954) and True (1958, 1966, 1970) label the inland manifestation of the La Jolla time period as the Pauma Complex of the Milling Stone Substratum, while Warren (1968) refers to the entire complex as the Encinitas Period. Chipped stone artifacts associated with the La Jolla Period are similar in many ways to San Dieguito type tools, but are considered less sophisticated.

<u>Late Prehistoric (1300/800 B.P. - 200 B.P.)</u>

The time period from the end of the La Jolla to the beginning of the historic period is typically assigned a range of dates from 1300/800-200 B.P., which Byrd (1996) refers to as the Late Prehistoric Period. The Prehistoric Period is often broken down into various subdivisions: Yuman Culture I-III for the San Diego County coast (Rogers 1939, 1945); San Luis Rey-Luiseno for the north interior; Cuyamaca-Diegueno for the south interior (Meighan 1954); and Yuman and Shoshonean periods (Warren 1968). The Late Prehistoric Period is thought to include the introduction of the bow and arrow, use of pottery, and a theorized emphasis on inland plant resources. Although there is ample evidence of large coastal sites dating to the Late Prehistoric Period, the majority of the sites used to define this period have come from inland contexts.

Historical Chronology, Contexts, and Cultural Landscapes at Camp Pendleton and Beyond

The first words written about the Camp Pendleton area were by members of the Portolá expedition, which marched from San Diego to Monterey in 1769 as they secured Alta California for the Spanish empire. Since that time, this region of closely spaced coastal plain, river valleys, and mountains has seen remarkable changes brought about by people of Native American, Spanish, Mexican, and Euro-American heritage. From Spanish mission rancho and *estáncia*; to the Mexican and then American rancho; and finally to American Marine Base, each has resulted in human activities that left unmistakable traces on the cultural landscape of Camp Pendleton (Table 3.4-1). Agricultural and ranching pursuits have been foremost in the activities of the last two centuries, but the Camp Pendleton area has also been an important coastal transportation corridor and, lastly, one of the most important military bases in the western United States. Camp Pendleton has been the scene of some of the most dramatic events and historical processes to occur in southern California, often typifying state and region-wide patterns. These have included:

- Early Spanish exploration.
- The efforts of Spanish colonial mission institutions to extend their control over the Luiseño and Juaneño Indian inhabitants and develop an economic base for the mission.
- The first ranching and farming enterprises in the region.
- The efforts of the local Luiseño and Juaneño Indians to cope with the Spanish intrusion through accommodation, resistance, and persistence.
- The transformation of a mission property into the largest Mexican period rancho in California.
- The scene of the struggle for political and military control during the final days of Mexico's hold on California.

Table 3.4-1. MCB Camp Pendleton Historical Chronology

Period	Dates (A.D.)	Major Events
Spanish	1769-1820	• July 20-22, 1769: Portolá Expedition • Nov. 1, 1776: Mission San Juan Capistrano founded • Sept. 1, 1779: First baptisms recorded from *Huisme* at Mission San Juan Capistrano • June 13, 1798: Mission San Luis Rey founded
Mexican	1821-1847	• 1823: Las Flores *estancia* founded • Aug. 17, 1833: Mexican Secularization Act • ca. 1833-1834: Las Flores Pueblo granted • April 21-23, 1838: "Battle" of Las Flores • May 10, 1841: Rancho Santa Margarita granted • Oct. 8, 1844: Las Flores Pueblo purchased by Pico
American	1848-1941	• Jan. 3, 1848: Kearny's Army of the West visit • Feb. 25, 1864: Juan Forster receives rancho title • 1872-1873: Pico vs. Foster claims case • Feb. 22, 1882: Forster Family sells rancho to James Flood and Richard O'Neill • 1941: Rancho divided into Santa Margarita (Floods) and San Onofre/San Mateo (O'Neill's)
USMC	1942-Present	• 1942: Camp Pendleton established

Notes: A.D. = Anno Domini; USMC = U.S. Marine Corps.

Source: Becker *et al.* 2012.

- The object of a legal battle for control of rancho lands following the American conquest of California, exemplifying the decline of the Californio culture.
- The continuation and changes of California's ranching tradition into the twentieth century.
- The development of transportation corridors along the California coast.
- The establishment and operation of one of the most important military bases in the western United States.

MCB Camp Pendleton

Over 85 years of archaeological investigations along the southern California coast have yielded evidence for a long sequence of prehistoric occupation (Moratto 1984). This sequence is well-documented both north and south of the project area, and extends from the early Holocene into the ethnohistoric period (Hines and Rivers 1991; Meighan 1954; True 1958; Vanderpot *et al.* 1993; Warren 1964). Concerning the project area, there was little systematic research conducted until the 1960s. Since then around 700 sites, spanning prehistoric, ethnohistoric, and historic time periods have been documented within the project area.

The majority of the field investigations performed were cultural resource surveys. As of 2012, over 100 surveys have been conducted beginning in 1948 with McCown's (1964) survey of the De Luz area. In addition, Malcolm Rogers recorded at least one site, SDI-1074, as part of his wide-ranging "surveys" in southern California (Singer *et al.* 1993). Recent surveys of significantly large size include Apple and Cleland (1994), Byrd (1999), Byrd and Andrews (2004), Cheever and Collett (2000, 2001), Doolittle *et al.* (2002), Harvey (2003), Reddy (1998a, 1998b, 1999), Reddy and Pallette (2003), and Schroth (1995).

A series of Phase II projects (i.e., test excavations) have also been carried out in the project APE, particularly on MCB Camp Pendleton, since the 1970s with a majority of projects completed in recent years. Archaeological excavation on MCB Camp Pendleton reveals a long and complex sequence of occupation that includes use of the valley floors, ridge tops, coastal terraces, and inland highlands. Data recovery projects (i.e., mitigation) in the project APE have been more limited, with around 13 extensive excavations. These sites represent occupations spanning from the late Paleoindian/early Archaic (ca. 8500 B.P.) to the historic period.

3.4.4.2 Project Setting

Cultural resources within the APE were identified through records searches and cultural resource surveys and presented in a technical report prepared by Becker *et al.* (2012). The cultural resource surveys were conducted from 21-30 January 2009 and on 21 March 2012 and included portions of the APE within MCB Camp Pendleton and the community of Fallbrook. A cultural resources survey report was prepared and submitted to the California SHPO. The California SHPO provided a letter to the USMC (refer to Appendix E) concurring that a finding of no adverse effect is appropriate pursuant to 36 CFR Part 800.5(b) (California Office of Historic Preservation 2013).

The following areas were surveyed: (1) O'Neill Ditch and Headgate; (2) 1,200 acres (486 hectares) of the production well basin; (3) portions of the bi-directional pipeline from MCB Camp Pendleton to Fallbrook; and (4) the Gheen Zone within the community of Fallbrook. The rest of the project APE was identified as having adequate previous survey coverage (e.g., the portion of the bi-directional pipeline located within DET Fallbrook).

MCB Camp Pendleton

The following cultural resources have been identified within the project APE for both action alternatives at MCB Camp Pendleton.

O'Neill Ditch

The northern section of the present-day O'Neill Ditch maintains a similar alignment as the original main ditch, but the original irrigation system is no longer intact. It is likely that the 1883 main ditch has been modified over time, especially when considering the impacts of the 1916 Flood and the utilization of the area by the Marine Corps at Camp Pendleton in the early 1940s. The Recharge Basin was constructed by the military as part of Camp Pendleton between 1949 and 1968, significantly altering the natural landscape (USGS 1949, 1968). Originally, Richard O'Neill derived water from the SMR through an undocumented headgate, and the main ditch conveyed water to the reservoir behind the dam. A secondary diversion ditch transported the water from the reservoir to the Santa Margarita Ranch and beyond for irrigating agriculture. The existing O'Neill Ditch delivers water from the diversion structure on the SMR to five existing groundwater recharge (recharge) ponds or Lake O'Neill, depending on the time of year, available water supply, and required demand.

The period of significance for the 1883 O'Neill Ditch is between 1883 and 1938, when the Flood family acquired the Santa Margarita Ranch from the O'Neill's. After 1937, there appears to have been substantial changes to the ditch system. The USMC became responsible for the area in the early 1940s. The addition of the Recharge Basin between 1949 and 1968 has impacted the area and altered the function of the main ditch. While a similar alignment may remain, it is not definitively the work of Richard O'Neill. It is more likely a ditch has been reconstructed in a similar alignment by the military in support of the Recharge Basin. During the 2009 survey, three historic culverts were identified and recorded in the ditch (SMR-CUP 1 through 3), along with the ditch itself (SMR-CUP 4) (Table 3.4-2); these sites were determined to be NRHP ineligible.

Table 3.4-2. Archaeological Sites within the O'Neill Ditch APE

Site (SDI-)	In or Out of the APE	Survey Results	Description	NRHP Eligibility Status
SMR-CUP 1	In	Newly Identified	Historic Culvert	Ineligible
SMR-CUP 2	In	Newly Identified	Historic Culvert	Ineligible
SMR-CUP 3	In	Newly Identified	Historic Culvert	Ineligible
SMR-CUP 4	In	Newly Identified	Historic Ditch	Ineligible

Notes: APE = area of potential effect; NRHP = National Register of Historic Places.

Source: Becker *et al.* 2012; California Office of Historic Preservation 2013.

Production Wells Basin

Table 3.4-3 provides a description of the survey results and relocation efforts for each of the sites identified within 1,200 acres (486 hectares) of the greater production wells basin. One historic site, SDI-13941H, was determined to be ineligible for listing on the NRHP, and appears to be destroyed, and as such does not technically require further action. One site, SDI-13982, was tested in 1996 and determined to not be a site. Ten of the sites could not be resurveyed due to access constraints or poor ground visibility. The APE associated with proposed project components encompasses only a small portion of the greater production well basin. As indicated in Table 3.4-3, none of the sites (except for SDI-13982, which was determined not to be a site) are located within the project APE.

<u>DET Fallbrook</u>

The following cultural resources have been identified within the project APE for both action alternatives at DET Fallbrook.

Ammunition Road

A record search provided by Naval Weapons Station Seal Beach shows that the APE on DET Fallbrook (which is 100 ft [30 m] wide along or near Ammunition Road) crosses through three known sites and is within 164 ft (50 m) of one additional site (Table 3.4-4). SDI-10158, a bedrock milling site with eight loci is an NRHP eligible site, but the portion that the APE passes through was recorded as disturbed through grading activities (Becker *et al.* 2012). SDI-14005H, Segment C was part of the old Southern California Railroad, but this segment was determined to be ineligible for the NRHP (Becker *et al.* 2012). SDI-14381, a prehistoric artifact scatter, was also determined as an NRHP ineligible site (Becker *et al.* 2012).

Table 3.4-3. Archaeological Sites within the Greater Production Wells Basin APE

Site (SDI-)	In or Out of the APE	Survey Results	Description	NRHP Eligibility Status
4421	Out	Not Surveyed	Bedrock Milling Site	Eligible
10157	Out	Not Surveyed	Shell Scatter	Ineligible
10156/ 12599H	Out	Same as Original Recording	Village of *Topomai* and Historic Ranch House	Eligible
12570	Out	Not Surveyed	Lithic Scatter	Ineligible
12571	Out	Not Relocated	Artifact Scatter	Ineligible
12577	Out	Not Surveyed	Artifact Scatter	Eligible
12628	Out	Not Surveyed	Artifact Scatter	Eligible
13938	Out	Artifacts Not Relocated	Artifact Scatter	Eligible
13941H	Out	Not Relocated; Site Potentially Destroyed or Displaced	Historic Water Trough	Ineligible
13942H	Out	Not Relocated	Historic Scatter	Ineligible
13981H	Out	Same as Original Recording	Historic Lake O'Neill Dam	Ineligible
13984	Out	Associated Artifacts Not Relocated	Bedrock Milling Site	Ineligible
13985	Out	Same as Original Recording	Bedrock Milling Site	Eligible
13982	In	N/A	Tested in 1996; Determined not a Site	N/A
13987	Out	Not Surveyed	Artifact Scatter	Ineligible
13990	Out	Not Surveyed	Artifact Scatter	Ineligible
13991	Out	Not Surveyed	Artifact Scatter	Eligible
13996H	Out	Same as Original Recording	Historic Scatter	Ineligible
14060	Out	Not Surveyed	Artifact Scatter	Ineligible
15126	Out	Not Surveyed	Artifact Scatter	Ineligible

Notes: APE = area of potential effect; NRHP = National Register of Historic Places; N/A = Not Applicable.

Source: Becker *et al.* 2012; California Office of Historic Preservation 2013.

Table 3.4-4. Archaeological Sites Within or Near the APE on DET Fallbrook

Site (SDI-)	Size (m)	In or Out of APE	Description	NRHP Eligibility Status
10158	1,000 x 275	In	Prehistoric Bedrock milling site with 8 loci and artifacts	Disturbed portion of eligible site
14005H	linear	In	Segment C of the Southern California Railroad	Ineligible
14381	150 x 60	In	Prehistoric artifact scatter	Ineligible
14375	20 x 10	Out	Prehistoric artifact scatter	Indeterminate

Notes: APE = area of potential effect; NRHP = National Register of Historic Places.

Source: Becker *et al.* 2012; California Office of Historic Preservation 2013.

<u>Community of Fallbrook</u>

The following cultural resources have been identified within the project APE for both action alternatives in the community of Fallbrook.

Knoll Park-Gheen Zone Tank Site

The Martin Reservoir is a Depression-era reservoir located within the Knoll Park-Gheen Zone tank site. The Martin Reservoir was constructed with Public Works Administration (PWA) funding as part of the FPUD San Luis Rey River Development Project. The Martin Reservoir is a poured-concrete structure with an approximate height of 13 ft (4 m) and a diameter of 120 ft (37 m). The reservoir has a cover supported by wooden truss framing, and was constructed for the FPUD between February and June 1939.

The reservoir was first recorded as a cultural resource in March 2001, and mistakenly referred to as the Gheen Reservoir. The reservoir was reevaluated for its possible eligibility to the NRHP in 2009 (Becker *et al.* 2012). Although the Martin Reservoir was constructed as a part of a national program through the PWA, an association with the PWA is not enough to make the structure eligible. California SHPO concurred with the determination that the Martin Reservoir is ineligible under Criterion A, B, C, and D of the NRHP (Becker *et al.* 2012; California Office of Historic Preservation 2013). The Martin Reservoir was also evaluated for its possible eligibility to the California Register of Historic Resources (CRHR) under the four criteria and is recommended not eligible on a state or local level to the CRHR based on the following:

- As a PWA constructed structure, it is less likely to be architecturally significant;
- The reservoir is not associated with an important historical person, and is neither the best example of a PWA project nor an example of an important engineering structure designed by a master architect; and
- There is not significant potential for data recovery.

Although the construction of the San Luis River Water Development Project was an important development in the history of Fallbrook, it was not the first reservoir for the area. While the San Luis Rey River Development Project was historically significant, it does not rise to the level of significance necessary for inclusion on either the NRHP or the CRHR. Therefore, it is recommended that the Martin Reservoir be considered as ineligible for the NRHP and the CRHR.

3.5 AIR QUALITY

3.5.1 Definition of Resources

Air quality in a given location is defined by pollutant concentrations in the atmosphere and is generally expressed in units of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). One aspect of significance is a pollutant's concentration in comparison to a national and/or state ambient air quality standard. These standards represent the maximum allowable atmospheric concentrations that may occur and still protect public health and welfare with a reasonable margin of safety. The national standards, established by the USEPA, are termed the National Ambient Air Quality Standards (NAAQS). The NAAQS represent maximum acceptable concentrations that generally may not be exceeded more than once per year, except the annual standards, which may never be exceeded. State standards, established by the California Air Resources Board (CARB), are termed the California Ambient Air Quality Standards (CAAQS). The CAAQS are equal to or more stringent than the NAAQS and include pollutants for which national standards do not exist (CARB 2012a). Table 3.5-1 presents the applicable NAAQS and CAAQS for the project area.

The main pollutants of concern considered in this air quality analysis include volatile organic compounds (VOCs), ozone (O_3), carbon monoxide (CO), nitrogen oxides (NO_x), PM_{10}, and $PM_{2.5}$. Although VOCs and NO_x (other than nitrogen dioxide [NO_2]) have no established ambient standards, they are important as precursors to O_3 formation.

3.5.2 Regulatory Setting

The Federal Clean Air Act (CAA) of 1969 and its subsequent amendments establish air quality regulations and the NAAQS and delegate the enforcement of these standards to the states. The CARB enforces air pollution regulations and sets guidelines to attain and maintain the NAAQS and CAAQS within the state of California. These guidelines are found in the California State Implementation Plan (SIP). The CAA Amendments of 1990 established new federal non-attainment classifications, new emission control requirements, and new compliance dates for nonattainment areas. The requirements and compliance dates are based on the severity of the non-attainment classification. The following section provides a summary of the federal, state, and local air quality rules and regulations that apply to the project area.

Table 3.5-1. California and National Ambient Air Quality Standards

Pollutant	Averaging Time	CAAQS	NAAQS[a]	
			Primary[b, c]	Secondary[b, d]
O_3	1-hour	0.09 ppm ($180\ \mu g/m^3$)	—	Same as primary
	8-hour	0.070 ppm ($137\ \mu g/m^3$)	0.075 ppm ($147\ \mu g/m^3$)	Same as primary
CO	1-hour	20 ppm ($23\ mg/m^3$)	35 ppm ($40\ mg/m^3$)	—
	8-hour	9 ppm ($10\ mg/m^3$)	9 ppm ($10\ mg/m^3$)	—
NO_2	1-hour	0.18 ppm ($339\ \mu g/m^3$)	0.10 ppm ($188\ \mu g/m^3$)	—
	Annual	0.030 ppm ($57\ \mu g/m^3$)	0.053 ppm ($100\ \mu g/m^3$)	Same as primary
SO_2	1-hour	0.25 ppm ($655\ \mu g/m^3$)	0.075 ppm ($196\ \mu g/m^3$)	—

Pollutant	Averaging Time	CAAQS	NAAQS[a]	
			Primary[b, c]	Secondary[b, d]
	3-hour	—	—	0.5 ppm (1,300 µg/m^3)
	24-hour	0.04 ppm (105 µg/m^3)	0.14 ppm (365 µg/m^3)	
PM_{10}	24-hour	50 µg/m^3	150 µg/m^3	Same as primary
	Annual	20 µg/m^3	—	Same as primary
$PM_{2.5}$	24-hour	—	35 µg/m^3	Same as primary
	Annual	12 µg/m^3	12 µg/m^3	15 µg/m^3
Lead	30-day average	1.5 µg/m^3	—	—
	Rolling 3-month average	—	0.15 µg/m^3	Same as primary
	Calendar Quarter	—	1.5 µg/m^3	Same as primary
Sulfates	24-hour	25 µg/m^3	No National Standards	
Hydrogen Sulfide	1-hour	0.03 ppm (42 µg/m^3)		
Vinyl Chloride	24-hour	0.01 ppm (26 µg/m^3)		
Visibility Reducing Particles	8-hour	See footnote [e]		

Notes: [a] Standards other than the 1-hour O_3, 24-hour PM_{10}, 24-hour $PM_{2.5}$, and those based on annual averages are not to be exceeded more than once a year.
[b] Concentrations are expressed first in units in which they were promulgated. Equivalent units are given in parenthesis.
[c] Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. They must be attained no later than 3 years after a state's implementation plan is approved by the USEPA.
[d] Secondary Standards: The levels necessary to protect the public from any known or anticipated adverse effects of a pollutant.
[e] In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 %. Measurement in accordance with CARB Method V.
ppm = parts per million; mg/m^3 = milligrams per cubic meter; µg/m^3 = micrograms per cubic meter.
Source: CARB 2013

3.5.2.1 Federal Requirements

Section 176(c) of the 1990 CAA Amendments contains the General Conformity Rule (40 CFR §§ 51.850-860 and 40 CFR §§ 93.150-160). The General Conformity Rule requires any federal agency responsible for an action in a non-attainment or maintenance area to determine that the action conforms to the applicable SIP. This means that federally supported or funded activities will not (1) cause or contribute to any new air quality standard violation, (2) increase the frequency or severity of any existing standard violation, or (3) delay the timely attainment of any standard, interim emission reduction, or other milestone. The rule allows for approximately 30 exemptions that are assumed to conform to an applicable SIP. Emissions of attainment pollutants are exempt from conformity analyses. Actions would conform to a SIP if their annual direct and indirect emissions remain less than the applicable *de minimis* thresholds. Formal conformity determinations are required for any actions that exceed these thresholds. Based on the present attainment status of the San Diego Air Basin (SDAB) (see Section 3.5.4), the project would conform to the most recent USEPA-approved SIP if its annual construction or operational emissions do not exceed 100 tons of NO_x, VOCs, or CO.

3.5.2.2 State Requirements

The California CAA of 1988, as amended in 1992, outlines a program to attain the CAAQS for O_3, NO_2, sulfur dioxide (SO_2), particulate matter, and CO by the earliest practical date. Since the CAAQS are more stringent than the NAAQS, emissions reductions beyond what would be required to show attainment for the NAAQS would be needed to show compliance with the CAAQS. CARB delegates the authority to regulate stationary source emissions to local air quality management districts. The CARB requires these agencies to develop their own strategies for achieving compliance with the NAAQS and CAAQS, but maintains regulatory authority over these strategies, as well as all mobile source emissions throughout the state. As discussed below, the San Diego County Air Pollution Control District (SDCAPCD) is the local agency responsible for enforcement of air quality regulations in the project region.

3.5.2.3 Local Regulations

The SDCAPCD is responsible for regulating stationary sources of air emissions in the SDAB. The SDCAPCD Rules and Regulations (SDCAPCD 2012) establish emission limitations and control requirements for stationary sources, based on their source type and magnitude.

The SDCAPCD and the San Diego Association of Governments are responsible for developing and implementing the clean air plan for attainment and maintenance of the ambient air quality standards in the SDAB. The San Diego County Regional Air Quality Strategy (RAQS) was initially adopted in 1991, and is updated on a triennial basis. This plan includes all feasible control measures that can be implemented for the reduction of O_3 precursor emissions. To be consistent with the RAQS, a project must conform to emission growth factors outlined in this plan. Control measures for stationary sources proposed in the RAQS and adopted by the SDCAPCD are incorporated into the SDCAPCD Rules and Regulations.

The SDCAPCD has also developed the air basin's input to the SIP, which is required under the federal CAA for areas that are out of attainment of air quality standards. The SIP includes the SDCAPCD's plans and control measures for attaining the O_3 NAAQS. The SIP is also updated on a triennial basis. The CARB adopted its 2007 *State Strategy for California's 2007 State Implementation Plan* on 27 September 2007. The State Strategy was submitted to the USEPA on 16 November 2007 for their review and approval, and was approved in 2011. As part of that State Strategy, the SDCAPCD developed its *Eight-Hour Ozone Attainment Plan for San Diego County* (SDCAPCD 2007), which provides plans for attaining and maintaining the 8-hour O_3 NAAQS.

3.5.3 Region of Influence

Identifying the ROI for air quality requires knowledge of the types of pollutants being emitted, pollutant emission rates, topography, and meteorological conditions. The ROI for inert pollutants (pollutants other than O_3 and its precursors) is generally limited to a few miles downwind from a source. The ROI for photochemical pollutants, such as O_3, can extend much farther downwind than for inert pollutants. O_3 is a secondary pollutant formed in the atmosphere by photochemical reactions of previously emitted pollutants, or precursors. Ozone precursors are mainly VOCs and NO_x. In the presence of solar radiation, the maximum effect of VOCs and NO_x emissions on O_3 levels usually occurs several hours after they are emitted and many miles from the source. Therefore, the ROI for air quality analysis is defined as the entire SDAB, which encompasses all of San Diego County.

3.5.4 Existing Conditions

3.5.4.1 Climate and Meteorology

The climate of the project region is classified as Mediterranean, characterized by dry summers and wet winters. The major influences on the regional climate are the Eastern Pacific high-pressure system, topography, and the moderating effects of the Pacific Ocean. Seasonal variations in the position and strength of the high-pressure system are a key factor in area weather changes.

The Eastern Pacific High is a persistent anticyclone that attains its greatest strength and most northerly position during summer, when it is centered west of northern California. In this position, the High effectively shelters southern California from the effects of polar storm systems. As winter approaches, the Eastern Pacific High weakens and shifts to the south, allowing polar storm systems to pass through the region. Subsiding air associated with the High warms the upper levels of the atmosphere and produces an elevated temperature inversion (temperature increases with height) along the west coast. The base of this temperature inversion is generally from 1,000 to 3,000 ft (305 to 914 m) above msl during the summer. The subsidence inversion acts like a lid on the lower atmosphere and traps air pollutants near the surface of the earth by limiting vertical dispersion. Mountain ranges in eastern San Diego County constrain the horizontal movement of air and also inhibit the ventilation of air pollutants out of the region. These two factors, combined with the emission sources of over three million people, help to create the high pollutant conditions sometimes experienced in San Diego County.

Precipitation

Precipitation within the project area occurs as rainfall. However, snowfalls do occur on rare occasions in the highest elevations of the Santa Margarita Mountains in the interior regions of MCB Camp Pendleton. Over 90% of the total annual precipitation in the project area occurs from November through April. Annual average precipitation increases from about 10 in (25 cm) per year along the coast to as much as 25 in (64 cm) in the highest mountain peaks of MCB Camp Pendleton. The annual average rainfall at Camp Pendleton is 11.8 in (30.0 cm). Although most of the regional precipitation in the project area is produced by winter storm systems from the North Pacific, summer rainfall can occur in the area. This precipitation usually occurs from tropical moisture that moves into the region from Mexico. Thunderstorms and rain showers from these tropical air masses are infrequent and usually occur in the interior mountain and desert regions of southern California.

Temperature

Due to the moderating effect of the Pacific Ocean and lower elevation, temperatures are less extreme along the coastal sections of MCB Camp Pendleton compared to more inland locations. Maximum temperatures during the summer months average in the mid-70s (ºF) along the coast to the low 90s in the interior regions of MCB Camp Pendleton. Minimum summer temperatures average in the low 60s over most of the project area. Maximum temperatures during winter months average in the mid-60s across most of MCB Camp Pendleton. Minimum winter temperatures range from the mid-40s along the coast to the low 30s in the interior regions of MCB Camp Pendleton.

Prevailing Winds

Concurrent with the presence of the Eastern Pacific High west of California, a thermal low pressure system persists in the interior desert region due to intense insolation. The resulting pressure gradient between these two systems produces a southwest to west onshore air flow at MCB Camp Pendleton for most of the year. Sea breezes usually occur during the daytime and disperse air pollutants toward the interior regions. During the evening hours and colder months of the year, sea breezes are often replaced by land breezes that blow in the opposite direction towards the offshore areas. These weak offshore flows may continue until daytime heating reverses the flow back onshore.

During the colder months, the Eastern Pacific High can combine with high pressure over the continent to produce extended periods of light winds and low-level inversion conditions in the region. These atmospheric conditions can produce adverse air quality. Excessive build-up of high pressure over the continent can produce a “Santa Ana” condition, characterized by warm, dry, northeast winds. Santa Ana winds help to ventilate the air basin of locally generated emissions. However, Santa Ana conditions can also transport air pollutants from the Los Angeles metropolitan area into the project region. When stagnant atmospheric conditions occur during a weak Santa Ana, local emissions combined with pollutants transported from the Los Angeles area can lead to significant O_3 impacts in the project region.

Marine air trapped below the base of the subsidence inversion is often condensed into fog and stratus clouds by the cool Pacific Ocean. This is a typical weather condition of coastal San Diego County during the warmer months of the year. Marine stratus usually forms offshore and moves into the coastal plains and valleys during the evening hour; when the land heats up the following morning, the clouds burn off to the immediate coastline and reform the following evening.

3.5.4.2 Regional and Local Air Pollutant Sources

An emission rate represents the mass of a pollutant released into the atmosphere by a given source over a specified period of time. Emission rates can vary considerably depending on type of source, time of day, and schedule of operation. The SDCAPCD periodically updates emissions for the entire SDAB for purposes of forecasting future emissions, analyzing emission control measures, and for use in regional air quality modeling. The largest regional sources of air emissions are on-road vehicles. The year 2010 inventory estimated that on-road vehicles emitted 30% of the VOCs, 57% of the NO_x, and 61% of the CO emissions within the SDAB (CARB 2012b). Other large sources of VOCs are use of surface coatings and solvents. Combustion sources produce both primary fine particulate matter and fine particulate precursor pollutants, such as NO_x, which react in the atmosphere to produce secondary fine particulates. Coarser particles mainly occur from soil-disturbing activities, such as construction, mining, agriculture, and vehicular road dust.

3.5.4.3 Baseline Air Quality

Representative air quality data for MCB Camp Pendleton for the period 2007-2011 are shown in Table 3.5-2. The USEPA designates all areas of the U.S. as having air quality better than or equal to (attainment) or worse than (nonattainment) the NAAQS. The criteria for nonattainment designations vary by pollutant. An area is in nonattainment for O_3 if its NAAQS has been exceeded more than three discontinuous times in 3 years and an area is generally in nonattainment for any other pollutant if its NAAQS has been exceeded more than once per year. Former nonattainment areas that have attained the NAAQS are designated as maintenance areas. The SDAB is in basic nonattainment for the federal O_3 standard, is considered a maintenance area for the CO standard, and is in attainment of the federal NO_x, sulfur oxides (SO_x), PM_{10} and $PM_{2.5}$ standards. The SDAB is in nonattainment of the O_3, PM_{10}, and $PM_{2.5}$ CAAQS (CARB 2012c, USEPA 2012a).

O3 concentrations are generally the highest during the summer months and coincide with the period of maximum insolation. Maximum O3 concentrations tend to be regionally distributed, since precursor emissions become homogeneously dispersed in the atmosphere. Inert pollutants, such as CO, tend to have the highest concentrations during the colder months of the year, when light winds and nighttime/early morning surface-based temperature inversions inhibit atmospheric dispersion. Maximum inert pollutant concentrations are usually found near an emission source.

Table 3.5-2. Representative Air Quality Data for MCB Camp Pendleton (2007-2011)

Air Quality Indicator	2007	2008	2009	2010	2011
Ozone (O_3) [(1)]					
Peak 1-hour value (ppm)	0.083	0.104	0.090	0.092	0.085
Days above state standard (0.09 ppm)[(3)]	0	1	0	0	0
Peak 8-hour value (ppm)	0.074	0.076	0.076	0.078	0.071
Days above federal standard (0.08 ppm)[(2, 7)]	0	2	1	1	0
Days above state standard (0.070 ppm) [(3)]	4	3	5	1	2
Carbon monoxide (CO) [(4)]					
Peak 8-hour value (ppm)	3.01	2.60	2.77	2.14	2.44
Days above federal standard (9 ppm)	0	0	0	0	0
Days above state standard (9.0 ppm)	0	0	0	0	0
Particulate matter less than or equal to 10 microns in diameter (PM_{10}) [(4)]					
Peak 24-hour value ($\mu g/m^3$) [(6)]	111	59	60	40	49
Days above state standard (50 $\mu g/m^3$)[(3)]	4	4	0	0	0
Annual Average value (ppm)	31.2	29.3	29.4	23.4	24.0
Particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$) [(1,4)]					
Peak 24-hour value ($\mu g/m^3$) [(6)]	69.6	34.2	29.5	27.3	27.4
Days above federal standard (65 $\mu g/m^3$) [(5)]	1	0	0	0	0
Annual Average value (ppm)	12.7	13.7	11.7	10.4	10.8
Sulfur Dioxide (SO_2) [(4)]					
Peak 24-hour value (ppm)	0.006	0.007	0.006	0.002	0.003
Days above federal standard (0.14 ppm)	0	0	0	0	0
Days above state standard (0.04 ppm)	0	0	0	0	0
Annual Average value (ppm)	0.002	0.003	0.001	0.000	0.000
Nitrogen Dioxide (NO_2) [(1)]					
Peak 1-hour value (ppm)	0.068	0.089	0.068	0.081	0.066
Days above state standard (0.18 ppm)	0	0	0	0	0
Annual Average value (ppm)	0.010	0.010	0.010	0.008	0.007

Notes: (1) Data from the MCB Camp Pendleton Monitoring Station.
(2) The federal O_3 standard was revised downward in 2008 from 0.08 to 0.075 ppm.
(3) SDAB is in nonattainment for the state PM_{10}, $PM_{2.5}$, and O_3 standards.
(4) Data from the downtown San Diego Monitoring Station.
(5) The federal $PM_{2.5}$ standard was revised downward in 2007 from 65 to 35 $\mu g/m^3$.
(6) High measured value occurred during southern California fire event in 2007.
(7) The federal eight-hour ozone standard was previously defined as 0.08 ppm (1 significant digit). Measurements are rounded up or down to determine compliance with the standard; therefore a measurement of 0.084 ppm is rounded to 0.08 ppm. The 8-hour ozone ambient air quality standards are met at an ambient air quality monitoring site when the average of the annual fourth-highest daily maximum 8-hour average ozone concentration is less than or equal to the standard.
ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter.
Source: CARB 2012d.

3.5.4.4 Existing Emission Sources

Emission sources associated with the existing use of MCB Camp Pendleton include civilian and military personal vehicles, commercial and military vehicles, aircraft engines, tactical support equipment, small stationary sources, and ongoing construction activities. Existing sources of emissions associated with potable water conveyance include indirect emissions associated with pumping required to provide water to MCB Camp Pendleton from the SDCWA.

3.5.4.5 Greenhouse Gas Emissions

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere by absorbing infrared radiation. Without this natural greenhouse effect, the average surface temperature of the Earth would be about 60°F colder (U.S. Global Change Research Program 2009). Scientific evidence indicates a trend of increasing global temperature over the past century due to an increase in GHG emissions from human activities. The climate change associated with this global warming is predicted to produce environmental, economic, and social consequences across the globe.

GHG emissions occur from natural processes and human activities. Water vapor is the most important and abundant GHG in the atmosphere. However, human activities produce only a very small amount of the total atmospheric water vapor. The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). The main source of GHGs from human activities is the combustion of fossil fuels, including crude oil and coal. Examples of GHGs created and emitted primarily through human activities include fluorinated gases (hydrofluorocarbons and perfluorocarbons) and sulfur hexafluoride. The six GHGs mentioned above are regulated by the State of California.

Each GHG is assigned a global warming potential (GWP). The GWP is the ability of a gas or aerosol to trap heat in the atmosphere. The GWP rating system is standardized to CO_2, which has a value of one. For example, CH_4 has a GWP of 21, which means that it has a global warming effect 21 times greater than CO_2 on an equal-mass basis (Intergovernmental Panel on Climate Change 2007). To simplify GHG analyses, total GHG emissions from a source are often expressed as a CO_2 equivalent (CO_2e). The CO_2e is calculated by multiplying the emissions of each GHG by its GWP and adding the results together to produce a single, combined emission rate representing all GHGs. While CH_4 and N_2O have much higher GWPs than CO_2, CO_2 is emitted in such higher quantities that it is the overwhelming contributor to CO_2e from both natural processes and human activities.

Recent observed changes due to global warming include rising temperatures, shrinking glaciers and sea ice, thawing permafrost, a lengthened growing season, and shifts in plant and animal ranges. International, national, and state organizations independently confirm these findings (Intergovernmental Panel on Climate Change 2007, U.S. Global Change Research Program 2009, California Energy Commission 2009).

The most recent *California Climate Change Scenarios Assessment* predicts that temperatures in California will increase between 3° to 10.5° Fahrenheit by 2100, based upon low and high GHG emission scenarios (California Energy Commission 2009). Predictions of long-term negative environmental impacts due to global warming include sea level rise, changing weather patterns with increases in the severity of storms and droughts, changes to local and regional ecosystems including the potential loss of species, and a substantial reduction in winter snow pack. In California, predictions of these effects include exacerbation of air quality problems, a reduction in municipal water supply from the Sierra snowpack, a rise in sea level that would displace coastal businesses and residences, an increase in wild fires, damage to marine and terrestrial ecosystems, and an increase in the incidence of infectious diseases, asthma, and other human health problems (California Energy Commission 2009).

Federal agencies on a national scale address emissions of GHGs by reporting and meeting reductions mandated in federal laws, EOs, and agency policies. The most recent of these are EOs 13423 and 13514 and the *USEPA Final Mandatory Reporting of Greenhouse Gases Rule*. Several states have promulgated laws as a means of reducing statewide levels of GHG emissions. In particular, the California Global Warming Solutions Act of 2006 (AB32) directs the State of California to reduce statewide GHG emissions to 1990 levels by the year 2020. Groups of states also have formed regionally-based collectives (such as the Western Climate Initiative) to jointly address GHG pollutants.

In an effort to reduce energy consumption, reduce dependence on petroleum, and increase the use of renewable energy resources in accordance with the goals set by EOs and the Energy Policy Act of 2005, the USMC and DOD have implemented a number of renewable energy projects. The types of projects currently in operation within the southwest region include thermal and photovoltaic solar systems, geothermal power plants, and wind generators. The military also purchases one-half of the biodiesel fuel sold in California and continues to promote and install new renewable energy projects within the southwest region.

On 1 August 2016, the CEQ finalized guidance on how federal agencies should evaluate the effects of climate change and GHG emissions for NEPA documentation (CEQ 2016). The CEQ does not propose a reference point as an indicator of a level of GHG emissions that may significantly affect the quality of the human environment. In the analysis of the direct effects of an action alternative, the CEQ proposes that it would be appropriate to (1) quantify cumulative emissions over the life of the project; (2) discuss measures to reduce GHG emissions, including consideration of reasonable alternatives; and (3) qualitatively discuss the link between such GHG emissions and climate change.

On 10 November 2010, the DOD issued a desk reference for implementation of the USEPA's Final Rule for Mandatory Reporting of GHG's. This guide is designed to assist installations in GHG reporting and compliance (DOD 2010). MCB Camp Pendleton is not subject to the reporting requirements under the *USEPA's Final Rule for Mandatory Reporting of GHG's* or the *CARB*'s *Regulation for the Mandatory Reporting of GHG Emissions* since there are no stationary source emissions that exceed the applicable reporting thresholds.

The potential effects of proposed GHG emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Therefore, the impact of project-induced GHG emissions to global climate change is discussed in the context of cumulative impacts in Section 5.4.5 of this EIS/EIR.

3.6 Hazardous Materials and Wastes

3.6.1 Definition of Resources

Hazardous materials addressed in this EIS/EIR are chemical substances that pose a substantial hazard to human health or the environment. For purposes of this EIS/EIR, a hazardous material is any item or agent (biological, chemical, or physical) which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. In general, these materials pose hazards because of their quantity, concentration, physical, chemical, or infectious characteristics. Hazardous materials are characterized by their ignitability, corrosiveness, reactivity, and toxicity.

A hazardous waste may be a solid, liquid, semi-solid, or contained gaseous material that alone or in combination may: (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness; or (2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed. The USMC and DON are required to comply with all federal, state, County of San Diego, and DOD requirements for hazardous waste management. FPUD is required to comply with federal, state, and County of San Diego requirements.

3.6.2 Regulatory Setting

Hazardous materials and waste management in the ROI are regulated by the federal government, the state of California, and the County of San Diego. The RCRA of 1976, CFR Title 40, §§ 260-265 and CFR Title 49, §§ 172, 173, and 178 regulate the current handling and disposal of hazardous wastes. The CWA of

1977 restores and maintains the chemical, physical, and biological integrity of water resources. California Health and Safety Code Division 20, Chapter 5 *et seq.* establishes hazardous waste management laws for the protection of human health and the environment. Title 22 of the CCR (Division 4.5 Health Standards for the Management of Hazardous Waste) regulates the management of hazardous waste and the transfer, treatment, storage and disposal of hazardous waste. County of San Diego Ordinance Title 6, Division 8, Chapter 11 also regulates the management of hazardous materials by requiring the preparation of a Hazardous Materials Business Plan for facilities where hazardous materials and wastes are stored and handled (County of San Diego Code of Regulatory Ordinances 2007). Businesses in the County of San Diego must apply to the County of San Diego Department of Environmental Health for a Unified Program Facility Permit if they generate hazardous waste, and also undergo regular inspection by the Department of Environmental Health (County of San Diego 2009).

At DET Fallbrook, hazardous materials and hazardous wastes are managed in accordance with applicable federal, state and County of San Diego regulations, and with the requirements of Naval Operations Instruction (OPNAVINST) 5090.1C, *Navy Environmental and Natural Resources Program Manual* (30 October 2007). The Naval Weapons Station Seal Beach EPSO also must review and approve all new project construction and operational plans in the design phase (DET Fallbrook 2009b). Any recommendations or requirements made by the EPSO are incorporated into the plans and implemented to ensure there are no hazardous materials or hazardous materials impacts at DET Fallbrook.

The CERCLA (1980) Superfund and Amendments and Reorganization Act (1986) regulate the "Superfund" program for investigation and cleanup of past hazardous materials spills, releases and disposal, including those at military facilities. The National Oil and Hazardous Substances Pollution Contingency Plan, codified in 40 CFR, implements CERCLA. The Defense Environmental Restoration Program, codified in 10 USC 2701-2709 and 2810, gave the DOD IR Program a statutory basis. The Navy/Marine Corps implements the Defense Environmental Restoration Program subject to and in a manner consistent with CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NAVFAC 1997). Site investigation and cleanup, both on and off military property, are also regulated by the DTSC and the San Diego RWQCB. The laws and specifications referenced above have been established to protect human health and the environment from potential impacts.

Region of Influence

The ROI for hazardous materials and wastes includes the portions of MCB Camp Pendleton, DET Fallbrook, and FPUD where hazardous materials, hazardous wastes, or areas of known contamination exist at or in the vicinity of the action alternative sites.

3.6.3 Existing Conditions

3.6.3.1 Hazardous Materials and Waste Management

<u>MCB Camp Pendleton</u>

MCB Camp Pendleton has an Integrated Contingency Plan that addresses storage of hazardous materials and hazardous wastes within base facilities; additionally, all base facilities have facility-specific Business Site Plans that identify hazardous waste and materials storage areas (MCB Camp Pendleton 2003b). All hazardous wastes generated at MCB Camp Pendleton are packaged and stored according to federal, state and MCB Camp Pendleton requirements. Hazardous waste management at MCB Camp Pendleton adheres to RCRA regulations and is guided by MCO P5090.2, *Environmental Compliance Manual and Protection Plan* and the 5090.7 *Hazardous Waste Management Base Order*.

Hazardous waste is placed in proper containers, appropriately labeled by the generating unit, and then disposed within the limits of the allowable accumulation period of 60 days. A Uniform Hazardous Waste Manifest is prepared and the manifest and waste are brought to Building 22165, Hazardous Waste Branch, for signature on the way out of MCB Camp Pendleton for disposal. Hazardous wastes are then transported off base to an appropriate hazardous waste disposal facility.

DET Fallbrook

DET Fallbrook manages hazardous materials and hazardous wastes in accordance with applicable federal, state, and County of San Diego regulations, and with the requirements of OPNAVINST 5090.1C, *Navy Environmental and Natural Resources Program Manual* (30 October 2007).

FPUD

No hazardous materials or hazardous wastes are present within FPUD in the project footprint for the action alternatives; however, some hazardous materials are used in the wastewater treatment plant adjacent to the proposed FPUD WTP.

3.6.3.2 Installation Restoration Sites

MCB Camp Pendleton

The purpose of the DON/USMC IR Program is to identify, investigate, assess, characterize, and cleanup or control releases of hazardous substances; and to reduce the risk to human health and the environment from past waste disposal operations and hazardous material spills associated with DON/USMC activities in a cost-effective manner. The goal of the IR Program is to move all sites in the IR Program to the "No Further Action" category. To ensure that construction activities do not interfere with the cleanup process, proposed project requirements and actions in the vicinity of IR program sites require coordination and approval of MCB Camp Pendleton's FFA Team, which consists of MCB Camp Pendleton, DON, USEPA, DTSC, and San Diego RWQCB.

The IR Program at MCB Camp Pendleton includes 80 sites grouped into five Operable Units (OUs) based on similarities, such as types of environmental issues, selected cleanup methods, and/or physical location. As of 2010, RODs have been signed for OU-1 through -4, and for three of the sites in OU-5. IR Program activities are ongoing for two OU-3, two OU-4 sites, and eight OU-5 IR Sites, as well as six other sites that are being addressed individually, without incorporation into an OU (MCB Camp Pendleton 2010a). IR Sites 1111 (closed), 1119, and the 22/23 Area Groundwater Site are in the groundwater production basin in the vicinity of project components (Figure 3.6-1).

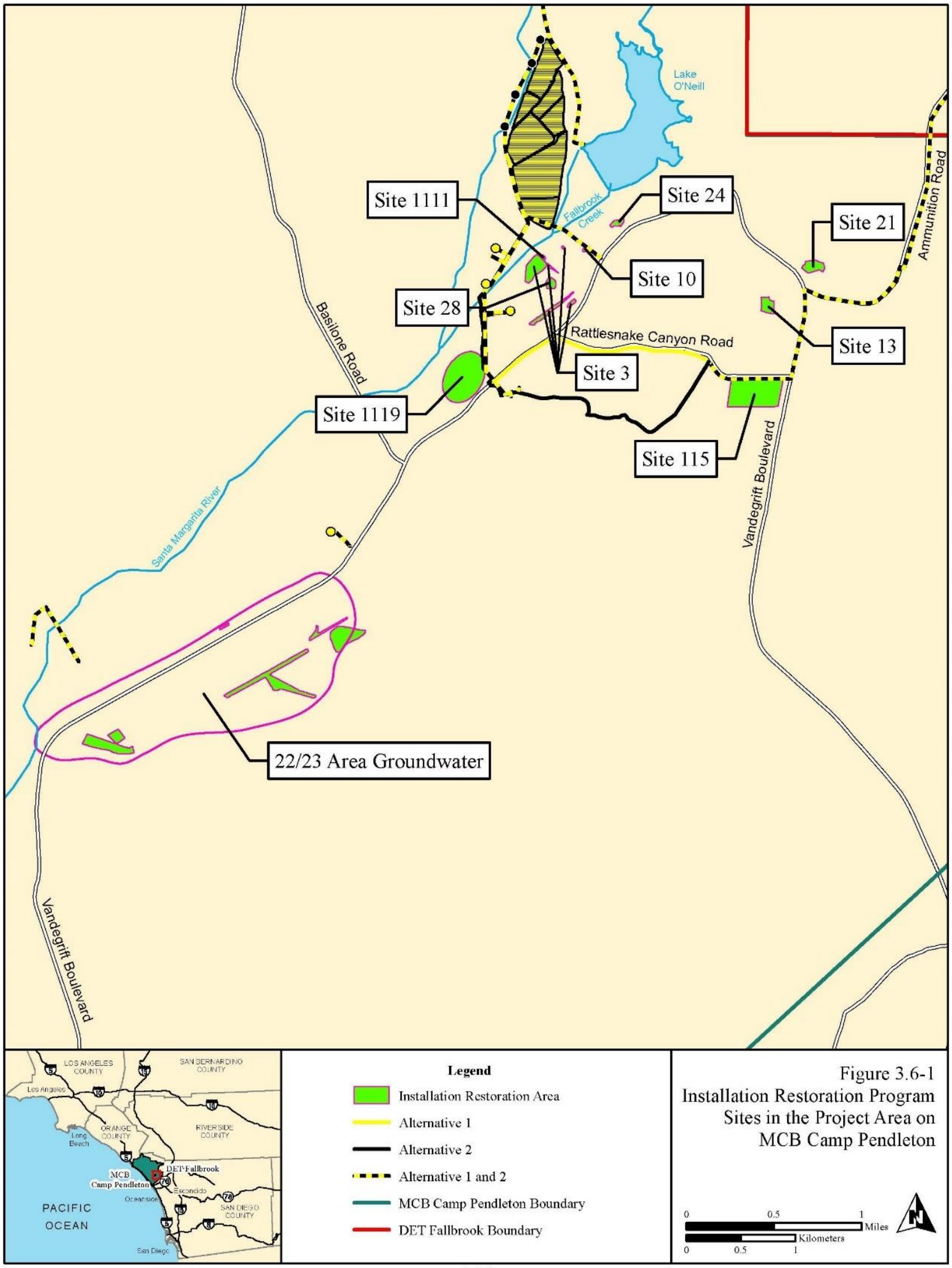

Figure 3.6-1. Installation Restoration Program Sites in the Project Area on MCB Camp Pendleton

IR Site 1111 is located in the 26 Area, about 500 ft (150 m) northwest of Building 2636 (SWRCB 2012). Several proposed new production wells would be located in the down-gradient or cross gradient direction from Site 1111 (Figure 3.6-1). Contaminants in the soil included VOCs, semi-VOCs, pesticides, and metals; groundwater was impacted by VOCs and metals. Between 2006 and 2008, soil with contaminant concentrations above screening levels; various solid and liquid wastes; and contaminated were removed and transported to an off-site location for appropriate disposal (NAVFAC SW 2011b). Groundwater monitoring wells were installed and a quarterly groundwater monitoring program began in June 2008 to assess whether contaminants (VOCs and metals) were migrating down-gradient (NAVFAC SW 2011b, SWRCB 2012). Based on the results, the remediation achieved all of the criteria established for soil and protection of groundwater at IR Site 1111. The site has been closed (ROD dated April 2013) because the concentrations of chemicals of concern in soil and burn ash were no longer a potential risk to human health and the environment, and the potential for a continuing source of groundwater contamination was eliminated (NAVFAC SW 2011b).

Active IR Site 1119 is located in the 26 Area of MCB Camp Pendleton and consists of the groundwater impacted by VOCs (SWRCB 2012). VOCs concentrations above the maximum contaminant level (MCL) were detected during the development process of well 26016, resulting in its abandonment as a water supply well. Well 26018 was constructed and tested negative for VOCs before its completion in 2008. After limited production in 2008 and 2009, VOCs were detected in the groundwater at levels below the MCL in early 2009. The VOCs detected in the wells 26016 and 26018 were trichloroethylene, cis-1,2-dichloroethene, and trichloropropane (NAVFAC SW 2010). Well 26018 is available as a production well, but it is presently not in use. Site 1119 is currently under investigation to determine source location and extent of contaminate groundwater by NAVFAC.

The active IR site known as the 22/23 Area Groundwater site consists of contaminated groundwater near the southern boundary of the base, along both sides of Vandegrift Boulevard (Figure 3.6-1). Facilities within this area include various industrial warehouses, office buildings, an airfield, and air station complex. The term “22/23 Area Groundwater” is used to denote the groundwater underlying this industrial operations area, which includes approximately 425 acres (172 hectares) (NAVFAC SW 2011c). This site consists only of the contaminated groundwater, not the overlying soils. The 22/23 Area site soils were analyzed and evaluated previously. The remedial actions and No Further Action decisions for the soil are documented in the RODs for OUs 1, 2, 3, and 5 (NAVFAC SW 2011c). There are five areas, or plumes, of groundwater contamination in the 22/23 Area Groundwater. The groundwater contamination consists of the following VOCs: trichloroethene, cis-1,2-dichloroethene, 1,1-DCE, and vinyl chloride above Federal and California MCLs, and 1,2,3-trichloropropane and 1,4-dioxane above California Notification Levels and Response Levels (NAVFAC SW 2011c). The source of these VOCs is from past releases of solvents to the ground during industrial operations. The DON provided several alternatives for proposed cleanup for contaminated groundwater at as the 22/23 Area Groundwater site in 2011 (NAVFAC SW 2011c). The DON recommended a combination of alternatives that include an alternative water supply (new well), source area treatment via in situ technologies, land use control, and long-term monitoring; the ROD is pending (NAVFAC SW 2011c). The 22/23 Area Groundwater site is located outside, and down-gradient of, the boundary of the aquifer that would be influenced by groundwater pumping from either existing or proposed new wells.

DET Fallbrook

There are eight active IR sites at DET Fallbrook. Most of the IR sites at DET Fallbrook are ranked as low risk and are scheduled for further study and (if necessary) cleanup in the coming years. In 2006, a Military Munitions Response Program Preliminary Assessment was completed for DET Fallbrook that recommended seven sites for further study. Four of the Military Munitions Response Program sites overlay IR sites that were already identified. DET Fallbrook IR Site 29, *Incinerator Landfill*, and IR Site 32, *Paint Shop Disposal Area*, are located on the east side of Ammunition Road, in the vicinity of the bi-directional pipeline route that is a component of Alternative 1 (Commander Navy Installations Command [CNIC] 2012).

IR Site 29, located near Building 316, is the site of an incinerator that was used to burn refuse from the mid-1940s to 1970. When the incinerator operation ceased, refuse was put into a landfill located adjacent to the incinerator. The landfill, approximately 4,500 ft^2 (420 m^2) in size and 7 ft (2 m) in depth, was used to dispose of approximate 1,000 cy of refuse, including empty paint cans and used rags that contained solvents. The landfill was covered with soil following its closure. A Site Inspection began in January 2012 (CNIC 2012).

IR Site 32, *Paint Shop Disposal Area*, is comprised of approximately 0.5 acre (0.2 hectare) located in the extreme eastern portion of DET Fallbrook, south of the Ammunition Road entrance gate in a developed portion of the base. A Site Inspection was completed in May 2010. Some metals concentrations exceed screening values; however, these levels may be naturally occurring in the Fallbrook area. A background study is underway to determine naturally occurring metals concentrations in the local area (CNIC 2012).

3.6.3.3 CERCLA Sites and Cal EPA GeoTracker Database Sites

There are no federal Superfund cleanup (i.e., CERCLA) sites in the community of Fallbrook (USEPA 2012b). GeoTracker is a database and GIS developed by the SWRCB that provides online access to environmental data. The database contains regulatory data about leaking underground fuel tanks, DOD, Spills-Leaks-Investigations-Cleanups, and Landfill sites. GeoTracker also includes data for non-underground storage tank cleanup cases, in addition to leaking underground fuel tank cases (SWRCB 2015). GeoTracker does not list any sites within, or adjacent to, the ROI of the bi-directional pipeline in the community of Fallbrook (SWRCB 2015).

3.7 UTILITIES

3.7.1 Definition of Resource

This section discusses the utilities available in the project area, including potable water supply, solid waste collection and disposal, electrical power, and natural gas system.

3.7.2 Regulatory Setting

There are no federal or state laws or regulations that are applicable to utilities on MCB Camp Pendleton or DET Fallbrook. The California Public Utilities Commission regulates privately owned electric, natural gas, telecommunications, and water companies in the state of California. The California Public Utilities Commission serves the public interest by protecting consumers and ensuring the provision of safe, reliable utility service and infrastructure at reasonable rates, with a commitment to environmental enhancement and a healthy California economy.

3.7.3 Region of Influence

The ROI for utilities includes the southern portion of MCB Camp Pendleton in which project components would be constructed and operated, and adjacent project-related areas. Utilities outside the boundaries of MCB Camp Pendleton that may be affected as a result of implementation of the action alternatives include portions of areas serviced by FPUD. This area corresponds to the geographic area in which construction and operation of facilities associated with the action alternatives would occur and existing utilities would potentially be affected. Utilities would not be impacted within DET Fallbrook under the action alternatives; therefore, DET Fallbrook is not discussed further in this section.

3.7.4 Existing Conditions

3.7.4.1 Potable Water Supply

MCB Camp Pendleton

The majority of development within MCB Camp Pendleton is located in the southern portion of the base and is served by the Camp Pendleton South Water System (South System). The South System derives its supply exclusively from groundwater. Approximately 90% of this groundwater is developed within the Lower SMR Basin. SMR CUP would involve further development of surface water and groundwater resources within the SMR Basin.

The South System includes 1 Advanced Water Treatment Plant, 2 iron and manganese removal plants, 1 chlorination station, 15 production wells, 16 booster pump stations, 27 reservoirs, and 16 pressure zones. Of the 15 wells, 3 are located in the Las Flores Creek watershed and the remaining 12 wells are within the Lower SMR Basin. 12 of the 15 wells are utilized; three wells are inactive. The South System also includes water transmission and distribution pipelines in some of the same corridors in which the project pipelines would be constructed

MCB Camp Pendleton’s current potable water needs in the southern portion of the base are met through existing groundwater production wells. However, to meet future demands, MCB Camp Pendleton has two primary sources of increased potable water supply available: (1) purchasing imported water from MWD through the SDCWA, and/or (2) constructing facilities within the Ysidora Basin to capture additional surface runoff during high flow that currently flows out to the Pacific Ocean. This water could be stored or “banked” in the existing groundwater recharge basins during wet years and used to augment water supplies during dry years, potentially avoiding future reliance on imported or other sources for MCB Camp Pendleton.

FPUD

FPUD currently imports water from the Colorado River and the State Water Project (i.e., water delivered from northern California rivers). FPUD also has groundwater wells that produce in the range of up to 70-260 AFY, but these wells are not used every year. Based on records published by the SMR Watermaster’s office, FPUD purchased 11,760 af of water from the SDCWA in 2010. Almost half of the water is used for agricultural purposes. All of the potable water distributed by FPUD is treated at the Lake Skinner Filtration plant, located just east of the City of Temecula.

Climate change is expected cause snowpack reductions over the next 50 years in the Colorado River Basin (Reclamation 2012b) and Sierra Nevada (California Department of Water Resources 2009a), which would increase competition for decreased quantities of available imported water.

3.7.4.2 Solid Waste Collection and Disposal

MCB Camp Pendleton

The solid waste produced on MCB Camp Pendleton is collected by a contractor and disposed of on MCB Camp Pendleton at the Las Pulgas Landfill (Area 43). MCB Camp Pendleton contracts for disposal of biosolids off-base. The first phase of a seven phase expansion program was completed for both landfills in November 1999. With completion of Phase 7, the Las Pulgas landfill is not expected to reach capacity until 2047 (MCB Camp Pendleton 2010b). This estimate is based on the Las Pulgas landfill accepting 400 tons of waste per day (i.e., the maximum permitted allowance) 5 days a week (MCB Camp Pendleton 2010b). The Qualified Recycling Program is managed by the Facilities Maintenance Department and handles paper, scrap metal, appliances, waste oil, solvents, rubber, canvas, and steel.

Other materials (i.e., non-contaminated soil, concrete, and asphalt) not classified as hazardous waste is either disposed of at the 3-Mile Pit site or recycled. The 3-Mile Pit site is located off Basilone Road approximately 3 mi (5 km) north of the junction with Vandegrift Boulevard. 3-Mile Pit is currently in the process of closure and expected to be closed by March 2014.

3.7.4.3 Electrical Power

MCB Camp Pendleton

The electrical power provided to MCB Camp Pendleton is purchased from SDG&E. Power is distributed to MCB Camp Pendleton via two major power lines, which run from Oceanside north to the San Mateo Substation and from Fallbrook onto MCB Camp Pendleton. SDG&E has three 69-kilovolt (kV) to 12-kV substations and six 12 kV-4.16 kV substations on MCB Camp Pendleton that provide electric power (MCB Camp Pendleton 2003c). The 69-kV to 12-kV, 50-megavolt amp Haybarn substation located near the junction of Basilone Road and Vandegrift Boulevard, is the largest among the substations. This substation is supplied 69 kV from a branch of the Oceanside line and 69 kV from the Fallbrook alternative feed line. The substation distributes power to 14 developed areas at 12 kV through six 400-amp overhead feeders that consume approximately 110,000,000 kilowatt hours (kWH), or 60% of the total MCB Camp Pendleton annual power consumption (MCB Camp Pendleton 2003c). There are approximately 23 4-kV substations and 175 transformers with various sizes connected to these feeders.

The MCB Camp Pendleton electrical system consists of mostly aboveground lines, with a limited number of underground lines that serve several areas on base, including the Headquarters Area, SMR circuits, Areas 22, 24, 25, 32, 33, Wire Mountain, and the Naval Hospital. MCB Camp Pendleton is currently in the project planning stages to add approximately 70 megawatts (MW) to the Haybarn Canyon substation. Several SDG&E high voltage regional power lines (approximately 138 kV) also traverse MCB Camp Pendleton. SDG&E has obtained easements from MCB Camp Pendleton for these transmission lines and others throughout MCB Camp Pendleton. In addition, SDG&E has acquired an easement of a 200-ft (61-m) right-of-way and installed power lines adjacent to the north and northeastern MCB Camp Pendleton boundaries.

FPUD

SDG&E provides electrical power to FPUD facilities and consumers within the FPUD service area.

3.7.4.4 Natural Gas Systems

MCB Camp Pendleton

Three regional pipelines run through MCB Camp Pendleton, which transport natural gas and petroleum products from the refineries in Long Beach to the distribution center in Mission Valley, San Diego. The Southern California Gas Company pipeline is approximately 12 in (30 cm) in diameter and runs through MCB Camp Pendleton along the coastline, following the railroad easement.

The other two pipelines, 16 in and 10 in (41 cm and 25 cm) in diameter, are operated by Kinder Morgan (also known as San Diego Pipeline Company) for the delivery of petroleum product. One of the two petroleum pipelines is currently not in use, but it is not considered abandoned. The pipelines run parallel to each other entering MCB Camp Pendleton in the Talega Area, following Basilone Road, and exiting

MCB Camp Pendleton southwest of Chappo. MCB Camp Pendleton purchases liquefied natural gas from SDG&E and the gas is distributed throughout MCB Camp Pendleton via various gas mains.

Liquefied petroleum gas and heating fuel oil are purchased from sources in the San Diego area and obtained from tanker trucks, which deliver to holding facilities throughout MCB Camp Pendleton.

FPUD

SDG&E provides natural gas service to FPUD facilities and consumers within the FPUD service area.

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CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

Consistent with the discussion of the affected environment (Chapter 3), this chapter has been divided into seven resource areas to provide a comparative framework for evaluating the impacts of the action alternatives (including No-Action Alternative) on individual resources. Each resource area identifies the potential impacts that could be expected as a result of implementation of the action alternatives. Where impacts have been identified, appropriate mitigation measures have been proposed to reduce impacts to below a level of significance.

4.1 GEOLOGICAL RESOURCES

4.1.1 Approach to Analysis

In general, the action alternatives may cause impacts to geological resources if the project caused major changes to surface topography or subsurface integrity; which could result in the project area becoming more susceptible to geological hazards (landslides, subsidence, seismic hazards); or result in substantial change to soil stability.

4.1.2 Alternative 1

4.1.2.1 Construction

Topography

Construction activities such as grading and excavation would have the potential to alter topography. The majority of the earthwork required for this project consists of excavating below ground to lay pipelines. Most of the project components would be situated where topographic slope is gentle relative to the surrounding area because pipeline alignments have been selected that follow low-lying areas and established roadways or existing pipeline alignments where slopes have already been moderated to facilitate vehicle traffic or previous projects. Construction of production wells, pump stations, and the FPUD WTP would require minimal earthwork to provide level surfaces, as these components are located in already level or previously graded areas. Through implementation of SCMs listed in Section 2.3.1.4, natural surface drainages and preconstruction vegetation patterns would be reestablished following construction. Therefore, the impacts to topography due to earthwork associated with the construction under Alternative 1 would be less than significant.

Geology

Landslides

As indicated under SCMs listed in Section 2.3.1.4, a project-specific geotechnical study would be conducted that would evaluate the engineering characteristics of the soils to be excavated, and make recommendations for slope excavation; retaining wall locations; and fill material suitability, screening, compaction, and placement that would ensure that the earthwork does not affect natural slope stability or create an unstable surface for construction. The project design phase would also include specifications for routing stormwater runoff to ensure that the earthwork does not cause erosion that would affect slope stability.

Because topography would not be substantially altered, and all subsurface filling would be done in accordance with geotechnical recommendations for stability, there would be no significant impact regarding slope stability and landslides as a result of implementation of Alternative 1.

Subsidence

Dewatering during construction and pumping associated with well development would be short term and involve small quantities of groundwater (relative to the aquifer). Therefore, no significant impacts would occur due to subsidence associated with construction activities under Alternative 1.

Seismicity and Seismic Hazards

The types of construction activities proposed (below-grade excavation, trenching to depths of less than 10 ft [3 m] below the surface, backfilling, grading, well drilling and installation, sloped canyon wall excavations within a limited area, site leveling, and concrete slab construction) are not of the type that would potentially make the ROI more sensitive to the effects of seismic activity (i.e., blasting or large-scale slope modification).

Ground Acceleration. As indicated under SCMs listed in Section 2.3.1.4, the geotechnical study would identify the expected severity of ground shaking for all project component locations, and provide seismic design parameters in accordance with the Uniform Building Code and the California Building Code. The geotechnical study would also specify requirements for trench excavation for pipeline construction to prevent collapse during construction, slope stability parameters for excavations, and retaining walls, and foundation setbacks. All new MCB Camp Pendleton facilities would be designed to comply with the NAVFAC P-355 Seismic Design Manual and the criteria identified in the most recent design specifications of the Structural Engineering Association of America.

All new FPUD facilities would be constructed in accordance with applicable County of San Diego seismic regulations.

Liquefaction. Using site-specific information about soil characteristics and depth to groundwater, the geotechnical study would also provide recommendations for design and construction procedures to minimize differential settlement in specific areas determined to be subject to liquefaction.

Therefore, construction of Alternative 1 would not cause significant impacts as a result of seismically-induced ground movement.

<u>Soils</u>

Construction activities such as grading and trenching would directly impact soils. Disturbed soils may experience changes to soil structure, loss of soil productivity, and water infiltration or holding capacities. Soil permeability could either be increased or decreased by construction activities, resulting in more or less water infiltration, because of the disruption of the existing soil structure or compaction from vehicle use. Direct effects would be confined to the construction and staging areas. Changes in soil permeability may locally increase surface water runoff, increase or decrease water loss via evaporation, or improve or reduce vegetation growth and transpiration. Disturbed soils would also be subject to indirect impacts through wind and water erosion, and increased sediment load and/or sedimentation in ephemeral drainages.

However, through the implementation of SCMs listed in Section 2.3.1.4, impacts to soils, erosion, and sedimentation would be minimized. The project design would incorporate the use of grading and drainage control to minimize erosion during the construction period, and procedures to ensure that slopes and backfilled areas do not erode when construction is completed. To prevent erosion and soil loss, excavation and grading would be scheduled to avoid the rainy season to the maximum extent practical. Construction activities would be completed in compliance with the geotechnical recommendations incorporated into project design and the CGP. As part of the CGP, a SWPPP would incorporate erosion control measures as recommended in the site-specific geotechnical study for proposed construction activities. In addition, as outlined in the *California RWQCB Erosion and Sediment Control Field Manual* (RWQCB 1999), the *MCB Camp Pendleton Soil Erosion Management Practice Handbook* (MCB Camp Pendleton 2000), the *Stormwater Best Management Handbook* (California Stormwater Quality Association 2009), and the INRMP (MCB Camp Pendleton 2011), BMPs would be implemented on MCB Camp Pendleton before, and during, the rainy season to maximize the effectiveness of erosion and sediment control measures.

At DET Fallbrook and within the community of Fallbrook, erosion control measures would also include any additional requirements of the applicable jurisdiction. Provisions for both temporary and permanent erosion and sediment controls would be implemented in accordance with the SWPPP prepared and designed specifically for the construction sites. Once implemented, these control measures would be monitored and maintained to ensure their effectiveness. With implementation of BMPs, compliance with established plans and policies, and incorporation of standard erosion control measures into project design and construction, no significant impacts to soils would occur under Alternative 1.

Following construction, soils would be stabilized and re-vegetated with native plants, as appropriate, to minimize post-construction erosion. Therefore, no significant impacts to soils would occur with implementation of Alternative 1.

Through application of the above referenced plans and procedures, there would be no significant construction impacts to geological resources with implementation of Alternative 1.

4.1.2.2 Operations

Topography

During operations, no further alterations of surface topography would take place, aside from minor excavation that may be required for maintenance of facilities or pipelines. Should excavation be required, SCMs would be followed and the surface would be re-graded to previous contours and stabilized with vegetation to prevent erosion from undermining the excavated area. Therefore, no significant impacts to topography would occur as a result of operational activities under Alternative 1.

Geology

Landslides and Seismicity and Seismic Hazards

The types of proposed operations (water diversion, transfer, storage in recharge ponds; water treatment; and pipeline maintenance) are not of the type that would increase the potential for landslides or make the ROI more sensitive to the effects of seismic activity (e.g., blasting, mining, or high-pressure subsurface liquid injection). The project facilities and components would be designed and constructed according to the requirements of the project-specific geotechnical study, and the building codes and engineering criteria described above. These design criteria would ensure that the completed facilities would not present slope or seismic hazards. Therefore, no significant impacts relative to landslides or seismicity and seismic hazards would occur as a result of operational activities under Alternative 1.

Subsidence

Groundwater pumping that is not managed has the potential to cause subsidence through aquifer compaction in the Chappo and Lower Ysidora basins if groundwater levels drop below saturated clay layers. Geological cross sections prepared for the Permit 15000 Feasibility Study (Stetson 2001) identified clay layers underlying the Ysidora aquifers that would be susceptible to subsidence. However, the surface water and groundwater model developed for the project established constraints on groundwater pumping so as not to draw the water table below these clay layers (Reclamation 2007b). Through implementation of the AMP/FOP, groundwater levels would be monitored during operations and these constraints would be implemented to maintain the groundwater level above the known clay layers susceptible to compaction (Stetson 2001; Reclamation 2009). Maintaining the groundwater level above these established levels through groundwater level monitoring would prevent compaction of the aquifer due to groundwater withdrawal (Reclamation 2007b; Reclamation 2009). Therefore, no significant impacts would occur due to subsidence and differential settlement associated with operational activities under Alternative 1.

Soils

The proposed facilities would incorporate standard erosion control measures to minimize potential erosion from the sites during post-construction activities (i.e., operations and maintenance). These erosion control measures and sediment control actions (e.g., planting native vegetation, installing appropriately sized storm water drainage infrastructure) would be designed and constructed on a site-specific basis at each location to minimize erosion potential at each location. As a result of continued compliance with established plans and policies and continued implementation of erosion control measures, potential impacts associated with operations and maintenance of the proposed facilities would not be significant.

Through the design and engineering controls described above, there would be no significant operational impacts to geological resources with implementation of Alternative 1.

4.1.2.3 Mitigation Measures

Through implementation of SCMs listed in Section 2.3.1.4 and the AMP/FOP, Alternative 1 would not result in significant impacts to geological resources; therefore, no additional mitigation measures are proposed.

4.1.3 Alternative 2

4.1.3.1 Construction

Construction impacts to geological resources under Alternative 2 would be similar to those discussed under Alternative 1. Construction of the gallery wells would result in the same types of impacts addressed under Alternative 1. The Haybarn Canyon AWTP would be constructed in a previously disturbed and graded area, with minimal additional disturbance. The design, engineering, construction methods, and SCMs to ensure slope and seismic stability and minimize erosion would be the same under Alternative 2 as discussed under Alternative 1. Therefore, construction impacts associated with Alternative 2 would be the same as those discussed under Alternative 1, and no significant impacts to geological resources would occur.

4.1.3.2 Operations

Operational activities associated with water storage and recharge, groundwater production, and water conveyance under Alternative 2 would be similar those discussed under Alternative 1. Operations associated with the gallery wells and water treatment at the expanded Haybarn Canyon AWTP and adjacent new surface water treatment facility would be similar those for production wells and FPUD WTP, respectively.

Project facilities and components would be designed, and constructed according to the requirements of the project-specific geotechnical study, and all applicable building codes and engineering criteria as under Alternative 1. Groundwater production would be managed to avoid subsidence through implementation of the AMP/FOP, as described under Alternative 1. Therefore, operational impacts associated with Alternative 2 would be the same as those discussed under Alternative 1, and no significant impacts to geological resources would occur.

4.1.3.3 Mitigation Measures

Through implementation of SCMs referenced in Section 2.3.2.4 and the AMP/FOP, Alternative 2 would not result in significant impacts to geological resources; therefore, no additional mitigation measures are proposed.

4.1.4 No-Action Alternative

Under the No-Action Alternative, the proposed conveyance pipeline and facilities would not be constructed and no ground-disturbing activities would occur. There would be no excavation, backfill, or grading required to lay pipelines or prepare sites for structural foundations. There would be no changes to slope or surface stability, no increases in soil loss or erosion, or no changes to the effects of earthquakes. Baseline conditions (as described in Section 3.1, *Geological Resources*) would remain unchanged.

Without implementation of the Proposed Action, MCB Camp Pendleton would not have access to imported water via the bi-directional pipeline during drought or drier than normal conditions. Therefore, MCB Camp Pendleton would need to rely on increased groundwater pumping, which has the potential to cause subsidence in the Chappo and Upper Ysidora sub-basins. The Baseline Model simulation run indicates that groundwater levels would be drawn down below the top of highest clay layer in the Chappo Sub-basin. Dewatering of clays may result in permanent loss of aquifer storage and minor amounts of subsidence. Therefore, significant impacts to geological resources may occur with implementation of the No-Action Alternative.

4.2 WATER RESOURCES

4.2.1 Approach to Analysis

The action alternatives are analyzed in this section relative to potential impacts to water resources including surface water and groundwater. The impact analysis for the action alternatives includes, as applicable, discussion for individual project components and/or groups of project components that would potentially impact water resources. The impact analysis discussion is conducted for four separate water resource categories:

- Surface Water Resources,
- Groundwater Resources,
- Water Quality, and
- Floodplains.

For each of the four water resource categories, the impact analysis is further broken down by construction (short-term impacts) and operations (long-term impacts).

A surface water and groundwater model (Model) is utilized to assess potential impacts to surface water and groundwater resources and compare impacts from each alternative to the Baseline Model simulation (refer to Section 3.2.4.3 and Appendix B for further explanation of the Model). The Model calculates the surface water and groundwater fluctuation occurring under the existing and proposed diversion, recharge, and pumping rates for the same hydrologic conditions over a 50-year model period.

Analysis of specific environmental parameters may be assessed from the Model's groundwater budget and groundwater level hydrographs shown in Appendix B. VOC migration occurs when groundwater production wells are placed near known contaminate plumes. Aquifer compaction may occur when groundwater levels drop below the highest clay layer in the aquifer. Impacts to riparian habitat may occur when groundwater levels near the SMR drop below the root extinction depth of riparian vegetation. Lastly, seawater intrusion may occur when subsurface outflow from the Model at the Ysidora Narrows becomes a negative number. Each of these physical and environmental factors was reviewed throughout the development of the Baseline and two project alternative model runs.

4.2.2 Alternative 1

4.2.2.1 Surface Water Resources

<u>Construction</u>

Santa Margarita River Flow Conditions

Construction of the replacement diversion structure and excavation activities within the O'Neill Ditch and headgate would occur during the dry portions of the year when flow in the SMR is naturally low. Any surface flow would be temporarily diverted around the weir construction and returned to the river channel immediately downstream of the construction area. Flow diversion to O'Neill Ditch would not occur during construction activities for the weir or ditch. Therefore, there would be no significant impacts on SMR flow.

Construction activities related to installation of the production wells would not occur within the SMR channel. Following installation, groundwater pumping would be required in order to fully develop the wells. The well development process would include pumping the wells to remove fine-grained material introduced into the filter pack during well construction. Well development increases the rate of movement of water into the well and stabilizes the aquifer formation surrounding the well. Groundwater pumping for well development would be temporary, and would therefore have no significant impacts on SMR flow. Impacts from groundwater pumping for potable water use is analyzed under *Operations* (see below).

Sediment Load in the Santa Margarita River

Approximately 1,000 cy of depositional material would be removed from the SMR on the upstream side of the weir, adjacent to the diversion headgate during replacement of the diversion structure. This area would only be excavated from the banks and no equipment would enter the river channel. Current operations of the existing sheet pile diversion periodically require similar sediment removal behind the sheet pile weir and in front of the headwall and headgate. The estimated 1,000 cy is a small portion of the 84,000 to 102,000 cy estimated to be currently trapped behind the existing sheet pile weir (Reclamation 2004b). No other components would impact sediment load in the SMR during construction activities associated with Alternative 1. Therefore, there would be no significant impacts to sediment load within the SMR downstream of the diversion structure, due to the removal of this sediment.

Operations

SMR Flow Conditions

The proposed improvements to existing diversion and recharge facilities and increased groundwater production under Alternative 1 have the potential to impact SMR flow during operational activities. Operations under Alternative 1 would be designed to increase the sustained basin yield of the Lower SMR Basin by increasing diversion and recharge of surface water during Above Normal and Very Wet hydrologic conditions and curtailing groundwater pumping during dry hydrologic conditions. The rates of diversion, recharge, and groundwater pumping under Alternative 1 would be managed through application of the AMP/FOP. The operations guided by the AMP/FOP would optimize groundwater production while meeting the following project environmental constraints: (1) maintenance of groundwater levels within historical range, (2) no aquifer compaction, and (3) no seawater intrusion.

The Alternative 1 Model (Stetson 2012b) simulates project impacts for an expected range of hydrologic conditions while following the environmental constraints that would be applied through the AMP/FOP. The data from the Alternative 1 Model simulation (Stetson 2012b) are compared against the Recent Management simulation (Stetson 2012a) in the following sections to determine the potential range of effects under Alternative 1. The overall annual water budget for the Alternative 1 Model simulation is provided in Table 4.2-1 (refer to Table 3.2-6 for the Recent Management simulation annual water budget).

Table 4.2-1. Annual Water Budget for the Alternative 1 Model Simulation (AFY)

Average Yield for Hydrologic Condition	**All Years**	**Extremely Dry and Very Dry**	**Below Normal**	**Above Normal**	**Very Wet**
Inflow					
SMR Inflow	38,300	5,500	11,600	32,800	132,900
Subsurface Underflow	600	600	600	600	600
Lake O'Neill Spill and Release	1,100	1,100	1,100	1,100	1,200
Fallbrook Creek	1,200	100	400	1,400	3,800
Minor Tributary Drainages	2,400	1,600	1,500	2,400	4,900
Areal Precipitation	800	600	500	700	1,600
Total	**44,500**	**9,500**	**15,700**	**39,000**	**145,000**
Outflow					
SMR Outflow	29,800	500	2,500	21,500	125,000
Subsurface Underflow	100	0	100	100	100
Groundwater Pumping	10,700	6,300	9,700	12,800	14,700
Evapotranspiration	2,500	1,700	2,300	2,800	3,200
Diversions to Lake O'Neill	1,600	1,500	1,500	1,600	1,600
Total	**44,600**	**10,000**	**16,100**	**38,800**	**144,700**
Net Simulated Change in Storage	**-100**	**-500**	**-300**	**+200**	**+300**

Note: Values are rounded to the nearest 100 AF, which may result in a simulation rounding error.

Source: Stetson 2012b.

Annual and Seasonal Flow. Under Alternative 1 operations, SMR flow would continue to show a large range of seasonal and annual variability based hydrologic condition (Table 4.2-1). SMR annual inflow to the Model averaged 38,300 AFY and varied from 5,500 AFY to 132,900 AFY for various hydrologic conditions; SMR Outflow from the Model boundary averaged 29,800 AFY, varying from 500 AFY during Extremely Dry/Very Dry years to 125,000 AFY during Very Wet years (Table 4.2-1).

Surface water diversions at the inflatable weir would be managed to allow for water supply requirements to be met while protecting groundwater resources and responding to environmental concerns. Table 4.2-2 summarizes the Alternative 1 average annual surface water diversion from the SMR and provides a comparison to Recent Management conditions. The increased diversion capacity under Alternative 1 would result in average annual diversion rates from the SMR to increase from 7,500 AFY (Recent Management Model) to 10,000 AFY (Stetson 2012a,b). Changes in surface diversions under Alternative 1, as compared to the Recent Management, would be least during Extremely Dry/Very Dry hydrologic conditions (+500AFY) and greatest during Very Wet conditions (+8,500AFY) when flow is greatest in the SMR (Table 4.2-2).

Table 4.2-2. Average Annual Surface Water Diversion at the Inflatable Weir for the Alternative 1 Model Simulation (AFY)

Location/Diversion	All Years	Extremely Dry and Very Dry	Below Normal	Above Normal	Very Wet
SMR Inflow	38,300	5,500	11,600	32,800	132,900
Diversion to Recharge Ponds	7,500	1,300	5,500	10,300	14,100
Diversion to Lake O'Neill	1,600	1,500	1,500	1,600	1,600
Total Diversion	**9,000**	**2,900**	**7,000**	**11,900**	**15,700**
Change from Recent Management	*+3,400 (+62%)*	*+500 (+20%)*	*+1,300 (23%)*	*+4,800 (+67%)*	*+8,500 (+119%)*

Notes: SMR = Santa Margarita River.
Values are rounded to the nearest 100 AF, which may result in a simulation rounding error.
Source: Stetson 2012a,b.

Operations associated with the new and existing production wells would include additional groundwater pumping that would also induce increased recharge directly from the SMR (refer to Section 4.2.2.2, *Groundwater Resources*, for a more detailed description of pumping rates). Table 4.2-3 shows the change in average annual surface flow under Alternative 1 that would be expected to occur at the Ysidora gauge and at the downstream boundary of the Model near the SMR Estuary. Figure 4.2-1 shows the average monthly streamflow at the downstream boundary of the Model for the various hydrologic conditions under Alternative 1 and the Recent Management (a more detailed comparison of average monthly conditions is provided in Appendix B).

Operations under Alternative 1 would be guided through implementation of the AMP/FOP. The hydrologic condition would be identified each year on May 1 based on the previous winter's runoff, and the AMP/FOP would be updated to provide diversion and pumping schedules for the upcoming year. The AMP/FOP would include real-time monitoring of various physical and environmental parameters that would trigger modifications to diversion, recharge, and pumping rates to protect resources in the SMR and riparian habitats. By design, the AMP/FOP would also be modified to account for long term changes in climate patterns such as flashier winter storms, reduction in annual precipitation, and/or cyclical climate patterns (e.g., long term dry or wet periods).

Table 4.2-3. Change in Average Annual SMR Flow for the Alternative 1 Model Simulation (AFY)

Hydrologic Condition	Ysidora Gauge			Model Downstream Boundary[1]		
	Recent Management	Alternative 1	Change	Recent Management	Alternative 1	Change
All Years	36,000	32,000	--4,000 (-11%)	33,600	29,800	-3,800 (-11%)
Extremely Dry/ Very Dry	2,000	1,100	-900 (-45%)	600	500	-100 (-12%)
Below Normal	8,200	4,800	-3,400 (-41%)	5,100	2,500	-2,600 (-52%)
Above Normal	30,300	24,900	-5,400 (-18%)	27,100	21,500	-5,600 (-21%)
Very Wet	134,000	127,300	-6,600 (-5%)	132,900	125,100	-7,700 (-6%)

Note: [1] Flow out of the model's downstream boundary is approximately 0.85 mi upstream of Stuart Mesa Bridge.

Sources: Stetson 2012a,b.

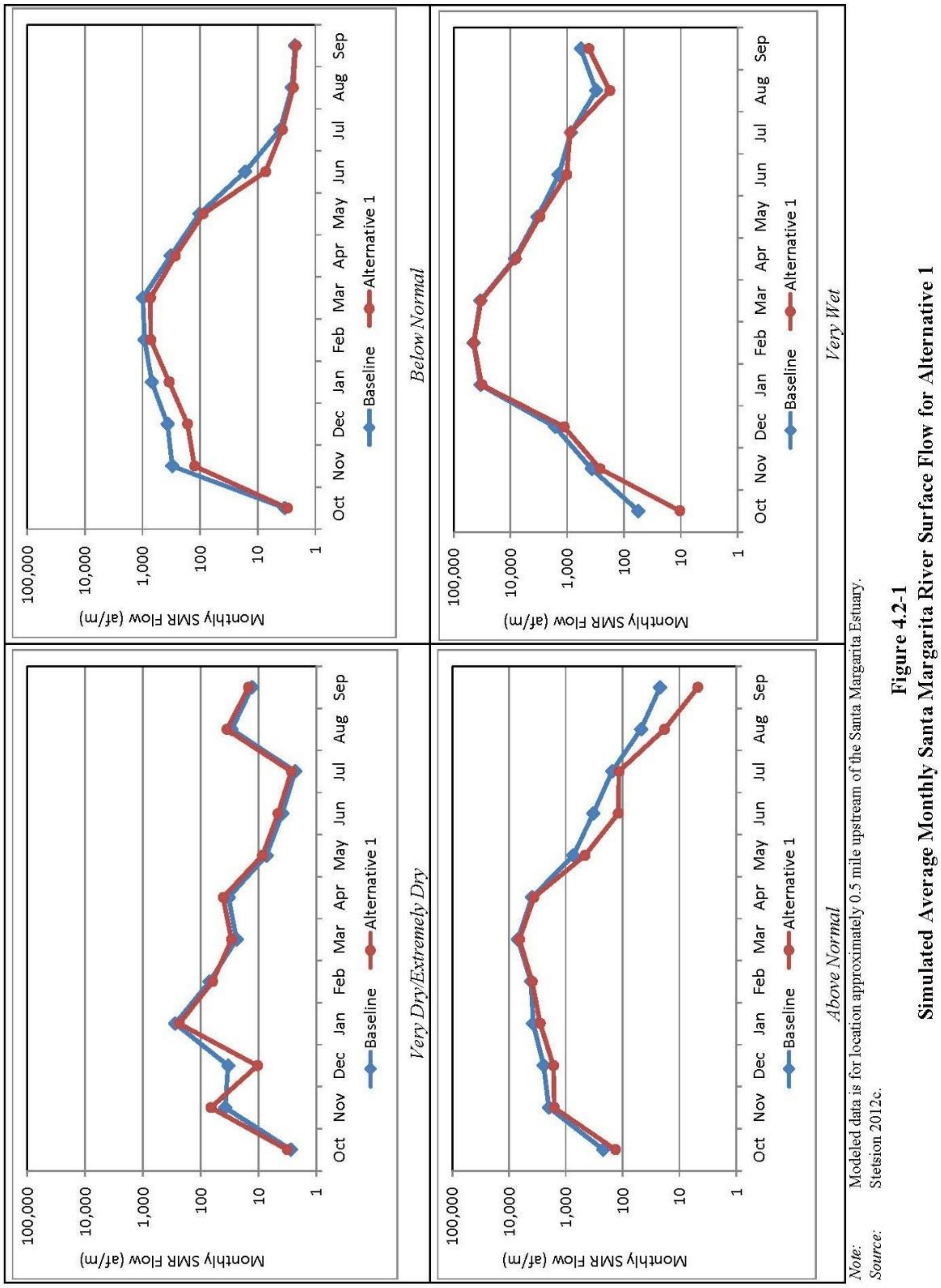

Figure 4.2-1. Simulated Average Monthly Santa Margarita River Surface Flow for Alternative 1

Overall, operations under Alternative 1 would result in additional diversion and groundwater pumping from the Lower SMR Basin, as compared to the Recent Management. However, the greatest diversion/pumping rates and subsequent reduction in surface flow would occur when the most amount of water is flowing in the SMR during Very Wet years (Tables 4.2-2 and 4.2-3). High runoff during these Very Wet years would otherwise discharge to the Pacific Ocean. By design of operations under Alternative 1, MCB Camp Pendleton's water demand would be supplemented by imported water supplies during Extremely Dry/Very Dry hydrologic conditions, allowing for substantially less diversion and groundwater pumping. This would have a net result of maintaining the same annual surface flow, as compared to the Recent Management simulation (Table 4.2-3) while riparian areas and associated resources are most sensitive during Extremely Dry/Very Dry hydrologic conditions.

As previously discussed in Chapter 3, streamflow during the dry season occurs due to rising groundwater at natural constrictions (e.g., the Narrows) in the Lower SMR Basin. In between these locations, the SMR may be intermittent, depending on hydrologic conditions. Surface flows would be similarly intermittent during the dry season under Alternative 1 operations.

Operations under Alternative 1 include the implementation of an AMP/FOP which would be constrained by streamflow, groundwater levels, and biological resources. These parameters would be monitored and variation outside their natural variability would result in changes in diversions and groundwater pumping. Therefore, the change in surface flow would be within the natural variability of the SMR watershed and there would no significant impacts to surface flow in the SMR.

Peak Flow. Alternative 1 would result in reduced peak surface flows in the SMR downstream from the diversion structure. With a maximum diversion of 200 cfs, as compared to the existing maximum diversion of 60 cfs, up to 140 cfs of additional surface flow could be diverted. This increase in diversion capacity would typically be utilized only in Above Normal and Very Wet years and during the hours/days (depending on magnitude of storm) following a storm event. Given proposed versus existing diversions, a reasonable assumption is that the occurrence of flows above 60 cfs would diminish as flows ranging from 200 cfs to 60 cfs would potentially be captured by diversions during the receding limb of the hydrograph.

Reductions to instantaneous peak streamflow during storm events associated with the increased diversions under Alternative 1 are provided in Table 4.2-4. Under the proposed operations, the diversion of up to 200 cfs would occur during storm events smaller than the 5-year event (8,000 cfs). Assuming the maximum potential diversion of 200 cfs under Alternative 1 did occur, the 2-year flood event (1,000 cfs) would be reduced by an additional 14% above Recent Management conditions, but for the 5-year and greater flood events, reductions would be less than 1.8%. Although a 14% reduction in the magnitude of the 2-year event may temporarily reduce the size of the bankfull channel, the larger events (5-year and greater) are typically responsible for affecting channel geomorphology, and peak flows would be only slightly reduced during these large events with a diversion increase of 140 cfs. Potential Impacts to habitat along the SMR resulting from this change in river geomorphology downstream of the diversion structure are discussed in Section 4.3, *Biological Resources*.

Under operations of Alternative 1, average annual increases in surface flow diversions from the SMR would be primarily due to the increased diversion capacity at the inflatable weir. The increased diversion capacity would be capable of maximizing diversions when surface flows are high during Above Normal and Very Wet years. Therefore, there would be no significant impacts to peak flow in the SMR. As discussed below, replacement of the existing sheet pile weir and Alternative 1 operations would likely result in improved sediment transport through the SMR to the Pacific Ocean.

Table 4.2-4. Flood Flow Frequency at Ysidora Gauge

Return Period (years)	Frequency	Instantaneous Peak Streamflow (cfs)	Maximum Reduction in Peak Streamflow[1]	
			60 cfs Diversion	200 cfs Diversion
2	50%	1,000	6%	20%
5	20%	8,000	0.7%	2.5%
10	10%	17,000	0.4%	1.2%
20	5%	26,000	0.2%	0.8%
50	2%	37,500	0.2%	0.5%
100	1%	46,000	0.1%	0.4%

Note: [1] This assumes that maximum diversion would occur during peak flow (i.e., 1,000 cfs would be reduced to 800 cfs for the 2-year event under Alternative 1).
cfs = cubic feet per second.
Sources: USACE 2000; Reclamation 2004b.

Sediment Load in the Santa Margarita River

The existing sheet pile diversion structure allows for the accumulation of sediment behind the structure. To maintain operation of the structure, sediment is periodically excavated and hauled to an off-site location. The inflatable weir diversion structure is designed to be self-cleaning, thereby minimizing operational and maintenance costs associated with the removal of sediment that currently builds up behind the existing structure. This would also reduce the transport of sediment into the O'Neill Ditch, the recharge ponds, and Lake O'Neill. Operations personnel would lower/deflate the 46-ft (14-m) gate section of the new diversion structure during smaller flood events (i.e., the 2- to 5-year events) and both gates during the first 12 to 24 hours of any significant flood flow (i.e., greater than the 10-year event), for the purpose of flushing accumulated sediments and debris downstream. Because approximately 95% of the sediment transport in the SMR is estimated to occur during the 10-year or greater flood event (Reclamation 2004b), the designed self-cleaning nature of the proposed structure would aid in maintaining the natural flushing that is currently prevented from occurring due to the existing structure's design.

An estimated 84,000 to 102,000 cy of sediment is currently trapped behind the existing sheet pile weir and this represents approximately 2 to 4 times the estimated average annual sediment load of 36,000 to 51,000 tons per year that passes the I-5 crossing (Reclamation 2004b). Under the proposed operations of the inflatable weir, this trapped sediment would be flushed out when the gates are lowered during a 10-year or greater flood event. As a result of this self-cleaning nature, less sediment would remain trapped behind the weir and additional sediment would be carried downstream as compared to existing conditions. It is therefore likely that the amount of sediment released during subsequent flushing events would be less than the amount released during the initial flushing. The additional sediment load in the river would return sediment transport to a more "natural" condition.

Sediment transport models indicate that this sediment would initially deposit in the approximately 1-mi (1.6-km) reach just downstream of the weir where the floodplain widens substantially and the river bed is prone to deposition (Reclamation 2004b). The model also predicts that the reaches further downstream are degradational and that the sediment would be gradually transported to the mouth of the SMR, but may cause temporary aggradation near the mouth until completely flushed out (Reclamation 2004b). For existing conditions, the modeled sedimentation patterns downstream of the diversion structure suggest aggradation of up to 2 ft (0.6 m), and degradation of up to 5 ft (1.5 m) for most flood conditions.

Therefore, operational impacts from this initial temporary sediment pulse would be within the range of existing sedimentation conditions downstream of the weir.

As recommended in *Hydraulic and Sediment Considerations for Proposed Modifications to O'Neill Diversion Weir on SMR* (Reclamation 2004b), an operation plan based on analysis of river hydraulics and sediment loads would be prepared to provide guidance on operation of the diversion structure to minimize downstream impacts from sediment transport. The replacement structure would be beneficial by returning sediment transport in the SMR to more natural conditions. Therefore, there would be no significant impacts to sediment load within the SMR downstream of the diversion structure.

SMR Estuary

As discussed in Section 3.2.4.3, SMR flow plays a role in keeping the SMR Estuary open to tidal influence while peak flows support the reopening of the estuary after extended periods of being closed. Historical data indicate that the estuary closed during drier hydrologic cycles and opened following winter-time high flows. Photographic evidence indicates the estuary was closed during Extremely Dry/Very Dry and Below Normal hydrologic years that occurred during the 1960s, 1970s, and 1980s; and estuary gauge data show that the estuary was closed most often during drier than normal hydrologic conditions of the late 1980s, late 1990s, and in to the 2000s. Although no direct correlation may be made between streamflow rates and the status of the estuary closure, historical evidence indicates estuary closure tends to occur when SMR flow is low during drier than normal hydrologic conditions. As discussed above under *SMR Flow Conditions*, SMR CUP would result in reduction to SMR flow; however, this would not result in an overall shift of hydrologic condition going from wetter to drier. Therefore, closure of the estuary under Alternative 1 operations would be expected to continue to occur periodically during Below Normal and Extremely Dry/Very Dry hydrologic conditions at an occurrence rate similar to that which took place during existing conditions over the past 60 years.

After extended periods of closure, (i.e., greater than a few weeks), the SMR Estuary historically remained closed until the next stormwater runoff event occurred as indicated by the SMR flow hydrograph (refer to Figure 3.2-8). These increased flows typically occur as a result of the first significant winter rain event(s). Under Alternative 1 operations, the diversion from the SMR would remove only a small percentage of peak stormwater runoff (refer to Table 4.2-4). The peak streamflow rate from the 2-year storm event on this portion of the SMR is estimated to be 1,000 cfs (USACE 2000). Even with the maximum diversion rate of 200 cfs, this would only reduce the 2-year flood event peak discharge to 800 cfs, which historical data indicates would be adequate to breach the sand berm at the mouth of the SMR Estuary (refer to Figure 3.2-8). The typical early winter storm flows under Alternative 1 would be sufficient to breach a sand berm at the mouth of the estuary during closed conditions.

Therefore, operations under Alternative 1 would be expected to have minimal, if any, effects on the frequency or duration of estuary closure beyond historical occurrence and as such, impacts to the SMR Estuary would not be significant.

4.2.2.2 Groundwater Resources

Construction

General Construction Impacts to Groundwater Resources

Construction activities associated with pipeline trenching and excavation for facility foundations would typically remain above the groundwater table. However, if groundwater is encountered, dewatering wells or sumps may be used to lower the water table a few feet below the impacted construction area. This lowering of the water table would be temporary and water levels affected by construction dewatering would return to normal levels when construction is completed. Therefore, no significant impacts to groundwater levels would occur during general construction activities.

Production Wells and Collection System

Groundwater pumping for well development would temporarily lower groundwater levels surrounding the well, but groundwater levels would recover soon after well development pumping has ceased. Therefore, no significant impacts to groundwater levels would occur during well development. Impacts from groundwater pumping for potable water use is analyzed under *Operations* (see below).

Operations

The improvements to existing diversion and recharge facilities and increased groundwater production associated with the existing and four new proposed groundwater production wells have the potential to impact groundwater resources during operational activities. As discussed in Section 4.2.2.1, *Surface Water Resources*, Alternative 1 operations would include the implantation of an AMP/FOP and sustained basin yield would be increased. Operation of the 16 groundwater production wells (12 existing and 4 new wells) would be managed though an AMP/FOP that is constrained by (1) maintenance of water levels within historical range, (2) no aquifer compaction, and (3) no seawater intrusion. In addition to the 16 production wells, 6 observation wells that monitor groundwater levels in riparian and grassland areas of the three sub-basins would be used to manage production locations and rates.

Based on the environmental constraints and operational parameters, the Alternative 1 Model simulation shows a 4,100 AFY increase in sustained basin yield above Recent Management basin yield (Stetson 2012a,b). Groundwater pumping would be curtailed during drier hydrologic conditions by relying on an annual average of 500 AFY of imported water to meet MCB Camp Pendleton's potable water demand. In addition, Alternative 1 groundwater pumping would be managed to minimize pumping near the riparian corridor and shifting pumping to grassland areas during drier periods to reduce the potential for adverse impacts to groundwater resources.

Operational activities under Alternative 1 would be based on hydrologic conditions, where the AMP/FOP would prescribe pumping rates ranging from a maximum during Very Wet years to substantial reductions in groundwater production during Extremely Dry/Very Dry years (Table 4.2-5). The change from Recent Management for Extremely Dry/Very Dry hydrologic conditions (-600 AFY) reflects the curtailment in pumping rates during consecutive drier than normal water years.

Table 4.2-5. Average Annual Groundwater Pumping for the Alternative 1 Model Simulation (AFY)

Hydrologic Condition	Upper Ysidora Pumping	Chappo Pumping	Total Pumping	Change from Recent Management
All Years	6,600	4,100	10,700	+ 4,100 (+62%)
Extremely Dry and Very Dry	3,900	2,400	6,300	-600 (-9%)
Below Normal	6,200	3,500	9,700	+3,000 (45%)
Above Normal	7,900	4,800	12,800	+6,300 (+97%)
Very Wet	8,400	6,300	14,700	+8,400 (+132%)

Note: Annual recharge rates rounded to nearest 100 AFY.

Sources: Stetson 2012a,b.

The increase in pumping during wet years would coincide with increased total diversion/recharge (Table 4.2-6). When compared to Recent Management conditions, the change in recharge under Alternative 1 would be least during Extremely Dry/Very Dry years and greatest during Very Wet years when diversions capture runoff from high flow events to replace storage lost during drier than normal years. The minimal change in diversion/recharge during Extremely Dry/Very Dry conditions under Alternative 1 (0 AFY) would occur due to reductions in project related diversions and groundwater pumping which have been designed to meet environmental constraints. This would support the minimal change in streamflow at the Ysidora gauge and downstream model boundary (-100 AFY) as previously discussed in the Section 4.2.2.1, *Surface Water Resources*. In summary, the increased average annual groundwater production (4,100 AFY) under Alternative 1 would be balanced with increased average annual groundwater recharge (3,800 AFY) (Stetson 2012a,b), resulting in an increase to the sustained basin yield and no long term effects on the Ysidora Groundwater Basin.

Table 4.2-6. Average Annual Groundwater Recharge for the Alternative 1 Model Simulation (AFY)

Hydrologic Condition	Groundwater Recharge at Ponds 1-7	Streambed Infiltration	Total Recharge	Change From Recent Management
All Years	7,500	4,500	12,000	+3,800 (+46)
Extremely Dry and Very Dry	1,400	5,100	6,500	0 (0%)
Below Normal	5,500	5,300	10,800	+2,600 (+320%)
Above Normal	10,200	4,500	14,700	+5,500 (+68%)
Very Wet	14,100	2,500	16,600	+7,600 (+85%)

Note: Annual recharge rates rounded to nearest 100 AFY.

Sources: Stetson 2012a, b.

The groundwater available for pumping fluctuates seasonally and varies by hydrologic condition. Pumping would be reduced during dry years to prevent seawater intrusion and protect riparian habitat by maintaining minimum groundwater levels. During consecutive drier than normal water years, pumping rates would be further reduced, with restricted groundwater production continuing until wetter hydrologic conditions occur. Specifically, through the application of the AMP/FOP under Alternative 1, groundwater pumping would be curtailed when the average monthly groundwater levels drops to within 3 ft (1 m) of the historical minimum along the riparian corridor. Pumping would be further reduced or shut off if the groundwater level drops to within 0.5 ft (0.2 m) of the historic minimum. Pumping rates would remain reduced until the average monthly groundwater levels returned to 0.5 ft (0.2 m) above the historical minimum (Stetson 2009). The pumping rates for Extremely Dry/Very Dry hydrologic conditions provided in Tables 4.2-1 and 4.2-5 reflect the curtailment in pumping rates during consecutive drier than normal water years.

Based on the Alternative 1 Model simulation results presented in Appendix B, depth to groundwater would be greatest during Extremely Dry/Very Dry conditions and somewhat less during wetter than normal hydrologic conditions. Application of the AMP/FOP would include the monitoring and constraints mentioned above, therefore maintaining groundwater levels above historical groundwater lows. Decreased water levels would be temporary and seasonal, and would be created to allow for additional storage capacity within the aquifer to maximize recharge capacity during the wet season. The Alternative 1 Model simulation also indicates that groundwater levels would not increase significantly above historic baseline levels due to increased recharge rates. For this project, the effect of lowered groundwater levels may result in reduced pumping efficiency or production from other MCB Camp

Pendleton supply wells. However, through application of the AMP/FOP, the wells throughout the groundwater basin would be managed to optimize pumping rates and to groundwater level declines.

Aquifer compaction through over-pumping could also impact groundwater resources by resulting in permanent reduction in aquifer storage volume. However, as discussed in Section 4.1.2.2, *Surface Water Resources*, groundwater pumping would be managed through the AMP/FOP to prevent subsidence through aquifer compaction by maintaining groundwater levels above saturated clay layers. Therefore, no subsidence and subsequent loss of aquifer storage volume would occur.

The Model also simulates subsurface underflow and evapotranspiration. Subsurface underflow out of the downstream Model boundary indicates the potential for seawater intrusion. A neutral or positive value for subsurface underflow indicates that a groundwater gradient toward the ocean is maintained while a negative value would indicate landward migration of saltwater into the freshwater aquifer could occur. Subsurface underflow out of the Model was positive (+100 AFY) for both the Alternative 1 and the Recent Management simulations (Tables 3.2-6 and 4.2-1), indicating that no saltwater intrusion would be expected to occur.

Modeled evapotranspiration indicates the consumptive use of groundwater by riparian phreatophytes and can be used as an indicator of potential impacts to riparian habitat and the riverine environment. A substantial decline in annual evapotranspiration could be indirectly related to a stressed riverine environment. Evapotranspiration under Recent Management conditions averaged 2,500 AFY (Table 3.2-6) and decreased by 100 AFY (Table 4.2-1) for Alternative 1. This would not be considered a significant decline in annual evapotranspiration. Due to the Proposed Action operations management which includes reductions in both diversions and pumping during drier than normal conditions, evapotranspiration would remain equal at 1,700 AFY during Extremely Dry/Very Dry hydrologic conditions when compared to the Recent Management during Extremely Dry/Very Dry hydrologic conditions when compared to the Recent Management (Tables 3.2-6 and 4.2-1, respectively). An increase in evapotranspiration is directly related to an increase in groundwater levels that support riparian vegetation and surface water flow throughout the Upper Ysidora, Chappo, and Lower Ysidora sub-basins.

Therefore, with implementation of the constraints through the AMP/FOP discussed above, there would be no significant impacts to groundwater resources with under Alternative 1 operations. Potential impacts to the riparian corridor and phreatophytes in Ysidora Basin associated with reductions in groundwater levels are discussed in Section 4.3, *Biological Resources*.

4.2.2.3 Water Quality

<u>Surface Water</u>

Construction

Construction activities associated with the Alternative 1 may result in the generation of pollutants including sediment and other construction-related constituents (such as nutrients, trace metals, oil and grease, miscellaneous waste, and other toxic chemicals). Without controls, the pollutants could potentially enter receiving waters. Because the combination of construction activities associated with the project would disturb more than 1 acre (0.4 hectare) of land, Alternative 1 would be subject to the requirements of the SWRCB CGP as described under SCMs in Section 2.3.1.4, *Special Conservation Measures*.

The construction contract would require that the construction contractor prepare and implement a SWPPP and implement all applicable BMPs in accordance with the CGP from initiation through completion of construction activities. Appropriate construction BMPs would be implemented in accordance with the

CGP that meet requirements for Best Available Technology and Best Conventional Pollutant Control Technology to reduce or eliminate pollutants from entering the receiving waters. These BMPs generally fall into four main categories: erosion control, soil stabilization, sediment control, and non-stormwater management. Implementation of a SWPPP and BMPs would minimize the potential for pollutants to enter receiving waters during construction.

If trenching associated with pipeline construction encounters groundwater in portions of the pipeline alignment, dewatering would be required. Dewatering activities would be temporary and localized, and the measures indicated in Section 2.3.1.4, *Special Conservation Measures*, would be followed, including the compliance with *General Waste Discharge Requirements for Discharges from Groundwater Extraction*, if necessary.

The replacement of the diversion structure would require temporary diversion of surface water around the construction site and additional dewatering, as described in Section 2.3.1.1. Dewatering effluent from within the SMR channel would be considered "surface water" and would therefore not be subject to regulations for groundwater dewatering discharges. Pumped dewatering effluent that is free from all visible contaminants would be returned to the SMR downstream of the construction area. Pumped water that contains turbidity above ambient pre-project conditions in the SMR would be treated to remove sediment prior to being re-introduced downstream. Options for treatment include baffle systems, anionic polymers systems, dewatering bags, or off-stream tanks for either treatment (settling) or disposal. Chemical coagulants would not be used to aid the settling of dewatering effluent. Once the dewater effluent reaches ambient pre-project conditions, it would be returned to the SMR downstream of the construction area.

Approximately 6,000 cy of material would be removed from O'Neill Ditch and would be placed in Ponds 6 and/or 7 for dewatering. Through previous projects and consultations with the USACE, Ponds 1-7 were determined to be non-jurisdictional. Therefore, the materials from O'Neill Ditch would not be placed in any surface water body deemed "waters of the U.S." Water from the material would be allowed to percolate into the groundwater basin, thus, a Section 404 permit would not be required.

Trenchless construction (e.g., bore-and-jack or horizontal directional drilling) would occur in areas with sensitive water resources and wetlands such as the SMR and associated floodplain, Lake O'Neill overflow outlet, and Fallbrook Creek. A hydrogeologic evaluation would be prepared to investigate geologic formations, groundwater depths, and the distance and depth of drilling prior to trenchless construction. Trenchless construction methods such as horizontal directional drilling that result in discharge of uncontaminated slurries or drilling muds would follow SCMs indicated in Section 2.3.1.4, *Special Conservation Measures*, including the compliance with *San Diego Basin Plan Conditional Waiver No. 9-Discharges of Slurries to Land*, if necessary. Installing the pipeline beneath the SMR, Lake O'Neill overflow outlet, and Fallbrook Creek would avoid direct impacts to the creek beds and associated downstream water quality.

Therefore, through implementation of SCMs, no significant impacts to surface water quality would occur during construction activities associated with Alternative 1.

Operations

New facilities that result in the increase in stormwater runoff have the potential to affect surface water quality. Components associated with Alternative 1 do not involve the construction of large buildings or other large impervious areas such as parking lots and would therefore, contribute little additional stormwater runoff and/or pollutants to surface waters. However, all new facilities on MCB Camp

Pendleton and DET Fallbrook would incorporate the concept of LID as described in Section 2.3.1.4, *Special Conservation Measures*. Therefore, increased stormwater runoff would be minimized and there would be no significant impacts to surface water quality associated with stormwater runoff.

Pipeline and well maintenance operations that result in discharge of water would follow SCMs indicated in Section 2.3.1.4, *Special Conservation Measures*. Potential water quality impacts associated with diversion/recharge/pumping operations and brine discharge are discussed below according to their potential to impact the surface and ocean water bodies within the ROI: *SMR, SMR Estuary, and the Pacific Ocean*.

SMR. The replacement inflatable diversion structure would increase the instantaneous diversion capacity from the SMR to O'Neill Ditch from 60 cfs to 200 cfs. However, the diversion structure would act as a weir, similar to the existing sheet pile weir, and serve only as a point of potential hydraulic control. This physical structure would not directly alter the water quality of flows in the SMR. Operational activities associated with the O'Neill Ditch and headgate only involve the conveyance of water diverted from SMR to the recharge ponds and Lake O'Neill and would not affect water quality.

The impact of reduced surface flows during Below Normal hydrologic conditions to water quality and beneficial uses are unknown. Reduced surface flows may have negative or positive effects on dissolved oxygen, nutrients, and water temperature depending on the contribution of rising groundwater on ambient conditions. Implementation of a water quality monitoring program as part of the AMP/FOP would monitor for changes in SMR water quality during all hydrologic conditions.

Reduction in surface flow could also potentially reduce the SMR's capacity to absorb or dilute potential spills or other contaminated discharges. However, MCB Camp Pendleton would continue to follow a base-wide Spill Prevention and Response Procedures Program to prevent spills and minimize potential adverse impacts and would comply with all San Diego RWQCB and SWRCB requirements for discharges. In addition, SCMs (Section 2.3.1.4) require implementation of the same protective and restoration measures for non-emergency accidents as would apply to construction. As discussed in Section 4.1.2.2, *Surface Water Resources*, SMR flow would be within the range of natural variability and would therefore, not be subject to greater adverse impacts due to accidental spills and discharges, as compared to the Recent Management. Given the unpredictable location of accidents, their low probability in any particular place, and the relatively small-scale, temporary effects that are most likely to occur, these types of accidents would have minimal impacts on water quality.

The inclusion of the OSMZ under Alternative 1 is intended to result in continued benefit to water quality in the SMR by preventing additional construction, long-term development activities, and conversion to agricultural land use in this area that could lead to increased impairment to water quality in the SMR. The OSMZ would also continue to act as buffer between the river and surrounding agricultural and developed lands, removing nutrients and other pollutants from stormwater runoff. In addition, protection of this land would prevent development of riparian rites and increased withdrawals upstream of the project.

Therefore, there would be no significant impacts to SMR water quality from project operations and SMR water quality would continue to benefit from inclusion of the OSMZ with implementation of Alternative 1.

SMR Estuary. As described above, there would be no significant impacts SMR water quality which flows into the estuary. When the SMR Estuary is in a "closed" state, the water quality in the estuary can degrade over time, resulting in potential impairment to designated beneficial uses in the estuary. However, as discussed in Section 4.2.2.1, *Surface Water Resources*, operations under Alternative 1 would not be expected to alter the frequency or duration of estuary closure beyond historical occurrence. Therefore, operations under Alternative 1 would not contribute to significant impacts to water quality in the SMR Estuary.

Pacific Ocean. Under Alternative 1, the treatment of groundwater at the FPUD WTP would create a waste stream, consisting of RO and ion exchange brine. The maximum brine discharge would be approximately 1 cfs with an estimated TDS concentration of 5,816 mg/L that would be discharged to the Pacific Ocean via the existing Oceanside Ocean Outfall. A TDS concentration of 5,816 mg/L is slightly greater than 10% of ocean salinity. The additional brine from the FPUD WTP would be blended with the existing FPUD flows discharged under FPUD's Oceanside Ocean Outfall NPDES Permit and would meet the permit requirements for their permitted discharge flows.

FPUD has an NPDES Permit (CA0108031) that was renewed in August of 2012, which allows for an average annual discharge of up to 2.4 MGD effluent from the Oceanside Ocean Outfall. The brine discharge under Alternative 1 would be conveyed through the existing Fallbrook Outfall Pipeline, discharged under FPUD's Oceanside Ocean Outfall NPDES Permit, and would meet the permit requirements for permitted discharge flows. The City of Oceanside also has an NPDES Permit (CA0107433) to discharge via the Oceanside Ocean Outfall. The City of Oceanside discharge includes portions from other local cities or sanitation districts, MCB Camp Pendleton, and Biogen Idec Pharmaceuticals Corporation. The City of Oceanside permit includes the discharge of brine from a brackish groundwater desalination facility, which is similar to the proposed FPUD WTP brine, and allows for an average annual discharge of up to 22.9 MGD of combined effluent and brine.

The brine from the FPUD WTP would be blended with the existing flows discharged under the FPUD and Oceanside Ocean Outfall NPDES Permits and would not substantially alter the characteristics of these permitted discharge flows. The FPUD NPDES permit would need to be amended to allow for the inclusion of the brine from the project. The brine discharge from the FPUD WTP is not expected to impact the ability of FPUD to meet NPDES permit requirements. Therefore, no significant operational impacts to ocean water quality would occur with implementation of Alternative 1.

Treatment of MCB Camp Pendleton's potable water would occur at the existing Haybarn Canyon AWTP (P-113); brine discharge from the existing Haybarn Canyon AWTP was covered under NEPA in the P-113 EA, which found no significant impacts from brine discharge to the Pacific Ocean (USMC 2010).

<u>Groundwater</u>

Construction

Under Alternative 1, construction activities would include surface water quality protection measures that would also serve to protect groundwater quality. By adhering to the provisions of the CGP and implementing a SWPPP and BMPs associated with addressing site- and activity-specific water resource protection needs, there would be a reduction in stormwater pollutant loading potential and thus a reduction in pollution loading potential to the underlying groundwater. Therefore, there would be no impacts to groundwater quality due to construction activities associated with Alternative 1.

Operations

Increased groundwater recharge and extraction would have the potential to impact groundwater quality during operational activities. However, the water quality of recharge waters under Alternative 1 would be the same as the water quality of waters being recharged under existing conditions, with the primary difference being an increase in recharge volume.

As described in Section 3.2.3.4, the TDS in the SMR measured at various upstream locations near or upstream of the diversion point shows a wide range of TDS from as low as 365 mg/L to as high as 935 mg/L (refer to Table 3.2-11). The average value estimated at the point of diversion is 786 mg/L, slightly above the Basin Plan objective of 750 mg/L. As noted in Section 3.2.4.4 and Table 3.2-13, TDS concentration in the Ysidora Basin ranged from approximately 660 mg/L to over 900 mg/L and averaged 790 mg/L. Therefore, the TDS of water recharged from the SMR would be relatively similar to, or slightly better than, the underlying groundwater quality using TDS as the primary indicator of mineral quality.

Also, as indicated in Section 3.2.4.4, nitrate-N concentrations in the SMR can range from 1.2 mg/L to 4.2 mg/L with an average value of approximately 2.8 mg/L (refer to Table 3.2-11). These values are well below the 10 mg/L Basin Plan objective for groundwater nitrate, and similar to the range found in existing wells in the Ysidora Basin (Table 3.2-13).

Therefore, because the recharged SMR water would be of similar or better water quality than the underlying groundwater, the recharge of these waters to the groundwater aquifer would improve or have no significant adverse impacts on groundwater quality.

4.2.2.4 Floodplains

Construction

As mentioned above, construction of the replacement diversion structure would occur during the dry portions of the year, and therefore, construction activities are not expected to have any effect on flow conditions in the SMR during periods when potential flood flows are likely to occur. No other components would impact flood flows during construction activities associated with Alternative 1. Therefore, there would be no significant impacts on frequency of flood flows, the flood flow regime, or extent of flooding in the SMR.

Operations

The frequency and magnitude of flood flows in the SMR are driven by the hydrology of the up-gradient watershed. Both gates of the inflatable weir would be lowered/deflated during any significant flood flow (i.e., greater than the 10-year event), thereby reducing water surface elevations in the vicinity and upstream of the weir in comparison to existing conditions. In addition, the flushing of sediment currently trapped behind the weir would allow for increased conveyance in the channel upstream of the weir and also contribute to reduced water surface elevations in comparison to existing conditions. Overall, this would reduce flooding in this area as compared to the existing condition. Through implementation of LID, as described in Section 2.3.1.4, *Special Conservation Measures*, Alternative 1 would result in a minimal increase in stormwater runoff. Therefore, there would be no significant impacts on frequency of flood flows, the flood flow regime, or extent of flooding in the SMR.

4.2.2.5 Mitigation Measures

Through implementation of SCMs listed in Section 2.3.1.4 and the AMP/FOP, Alternative 1 would not result in significant impacts to water resources; therefore, no additional mitigation measures are proposed.

4.2.3 Alternative 2

4.2.3.1 Surface Water Resources

Construction

Under Alternative 2, impacts to surface water resources associated with construction activities would be the same as those described under Alternative 1. In addition, the gallery wells would be constructed adjacent to the SMR channel during the dry season. Following installation of the gallery wells, pumping would be required to develop the wells, which would result in drawdown of surface water within the SMR. However, pumping would be temporary and SMR surface flow would quickly return to normal; therefore, no significant impacts would occur.

Operations

SMR Flow Conditions

Under Alternative 2, impacts to surface water resources associated with operation of the diversion structure and production wells would be similar to those described under Alternative 1. However, the operation of four new gallery wells under Alternative 2 would increase direct diversion from the SMR, capturing excess surface flow above the 200 cfs capacity of the improved diversion weir and O'Neill Ditch. The operations would include an AMP/FOP that would optimize groundwater production while meeting the following project environmental constraints: (1) no aquifer compaction, and (2) no seawater intrusion.

The data from the Alternative 2 Model simulation (Stetson 2012d) are compared against the Recent Management Model simulation (Stetson 2012a) in the following sections to determine the potential range of effects under Alternative 2. The overall annual water budget for the Alternative 2 Model simulation is provided in Table 4.2-7 (refer to Table 3.2-6 for the Recent Management Model simulation annual water budget).

Table 4.2-7. Annual Water Budget for Alternative 2 Model Simulation (AFY)

Average Yield for Hydrologic Condition	All Years	Extremely Dry and Very Dry	Below Normal	Above Normal	Very Wet
Inflow					
SMR Inflow	38,600	6,200	12,000	32,900	132,900
Subsurface Underflow	600	600	600	600	600
Lake O'Neill Spill and Release	1,500	700	1,400	1,700	2,100
Fallbrook Creek	1,200	100	400	1,400	3800
Minor Tributary Drainages	2,400	1,600	1,500	2,400	4,900
Areal Precipitation	800	600	500	700	1,600
Total	**45,100**	**9,800**	**16,400**	**39,700**	**145,900**
Outflow					
SMR Outflow	28,000	1,300	1,800	18,600	120,100
Subsurface Underflow	100	0	100	100	100
Groundwater Pumping	9,900	5,000	8,500	13,100	13,200
Gallery Well Pumping	3,000	700	1,700	4,500	5,300
Evapotranspiration	2,400	2,200	2,200	2,500	3,100
Diversions to Lake O'Neill	1,900	900	1,800	2,300	2,700
Total	**45,300**	**10,100**	**16,700**	**40,600**	**144,500**

Note: Values are rounded to the nearest 100 af; SMR = Santa Margarita River.

Source: Stetson 2012d.

Annual and Seasonal Flow. SMR annual inflow to the Model averaged 38,600 AFY and varied from 6,200 AFY to 132,900 AFY for various hydrologic conditions; SMR Outflow from the Model boundary averaged 28,000 AFY, varying from 1,300 AFY during Extremely Dry/Very Dry years to 120,100 AFY during Very Wet years (Table 4.2-7).

Table 4.2-8 summarizes the Alternative 2 average annual surface water diversion from the SMR and provides a comparison to Recent Management conditions. The increased diversion capacity under Alternative 2 would result in average annual diversion rates from the SMR to increase from 7,500 AFY (Recent Management Model) to 11,800 AFY (Stetson 2012a,c). Changes in surface diversions under Alternative 2, as compared to the Recent Management, would be least during Extremely Dry/Very Dry hydrologic conditions (+700 AFY) and greatest during Very Wet conditions (+9,600 AFY) when flow is greatest in the SMR (Table 4.2-8).

Table 4.2-8. Average Annual Surface Water Diversion at the Inflatable Weir and Gallery Wells for the Alternative 2 Model Simulation (AFY)

Location/Diversion	All Years	Extremely Dry and Very Dry	Below Normal	Above Normal	Very Wet
SMR Inflow	38,600	6,200	12,000	32,900	132,900
Diversion to Recharge ponds	6,900	1,900	5,200	8,700	13,200
Diversion to Lake O'Neill	1,900	900	1,800	2,300	2,700
Gallery Wells	3,000	700	1,700	4,500	5,300
Total Diversion	**11,800**	**3,500**	**8,700**	**15,500**	**21,200**
Change from Recent Management	**+4,300 (+57%)**	**+700 (+25%)**	**+2,100 (+32%)**	**+5,800 (+60%)**	**+9,600 (+83%)**

Note: SMR = Santa Margarita River.

Source: Stetson 2012 a,d.

Table 4.2-9 shows the change in average annual surface flow under Alternative 2 that would be expected to occur at the Ysidora gauge and at the downstream boundary of the Model near the SMR Estuary. Figure 4.2-2 shows the average monthly streamflow at the downstream boundary of the Model for the various hydrologic conditions under Alternative 2 and the Recent Management (a more detailed comparison of average monthly conditions is provided in Appendix B).

In addition to the increased diversion and groundwater pumping (as discussed under Alternative 1) direct diversion from gallery wells during the wet season would capture water in the streambed sediments that is closely tied to the streamflow available in the SMR. Average annual diversions to the gallery wells would be 3,000 AFY, ranging from 700 AFY during Extremely Dry/Very Dry conditions to 5,300 AFY during Very Wet conditions (Table 4.2-9).

Table 4.2-9. Change in Average Annual SMR Flow for the Alternative 2 Model Simulation (AFY)

Hydrologic Condition	Ysidora Gauge			Model Downstream Boundary[1]		
	Recent Management	Alternative 2	Change	Recent Management	Alternative 2	Change
All Years	34,500	29,300	-5,200 (-15%)	32,000	28,000	-4,000 (-13%)
Extremely Dry/ Very Dry	1,100	1,600	+500 (+45%)	500	1,300	+800 (+160%)
Below Normal	6,700	3,500	-3,200 (-48%)	3,800	1,800	-2,000 (-53%)
Above Normal	28,600	20,500	-8,100 (-28%)	24,800	18,600	-6,200 (-25%)
Very Wet	132,000	121,200	-10,800 -8%)	130,000	120,100	-9,900 (-8%)

Note: [1] Flow out of the model's downstream boundary is approximately 0.85 mi upstream of Stuart Mesa Bridge

Sources: Stetson 2012a,d.

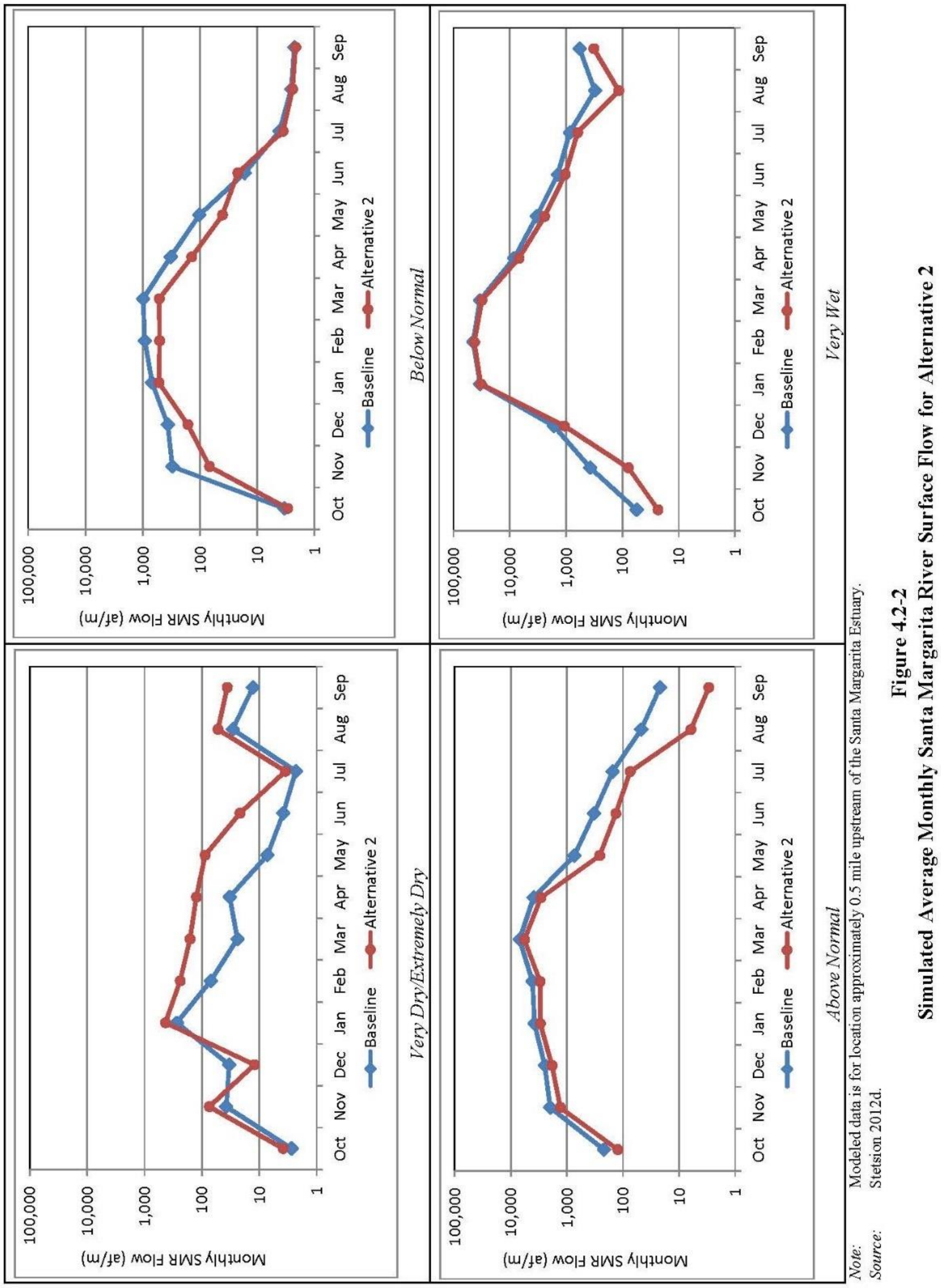

Figure 4.2-2. Simulated Average Monthly Sa**nta Margarita River Surface Flow for Alternative 2**

Operations under Alternative 2 would be guided through implementation of the AMP/FOP, as described under Alternative 1. Overall, operations under Alternative 1 would result in additional diversion and gallery well/groundwater pumping from the Lower SMR Basin, as compared to the Recent Management. However, the greatest diversion/pumping rates and subsequent reduction in surface flow would occur when the most amount of water is flowing in the SMR during Very Wet years (Tables 4.2-8 and 4.2-9). By design of operations under Alternative 2, MCB Camp Pendleton's water demand would be supplemented by imported water supplies during Extremely Dry/Very Dry hydrologic conditions, allowing for substantially less diversion and groundwater pumping. This would have a net result of increasing annual surface flow, as compared to the Recent Management simulation (Table 4.2-9) while riparian areas and associated resources are most sensitive during Extremely Dry/Very Dry hydrologic conditions.

The operations under the AMP/FOP would be constrained by streamflow and biological resources. These parameters would be monitored and variation outside their natural variability would result in changes in diversions and groundwater pumping. Therefore, the change in surface flow would be within the natural variability of the SMR watershed and there would no significant impacts to surface flow in the SMR.

Peak Flow. Alternative 2 operations would result in maximum surface diversion of 200 cfs at the inflatable weir and an additional 18 cfs at the four gallery wells; total surface diversion would increase from 60 cfs to a maximum of 218 cfs during Very Wet years. Impacts to the SMR peak flow would be less during drier hydrologic conditions because all four gallery wells would not be operated simultaneously. Therefore, impacts to peak flow under Alternative 2 would be similar to those discussed under Alternative 1 and there would be no significant impacts to SMR peak flow.

Sediment Load in the SMR

Impacts to sediment load under Alternative 2 would be the same as discussed under Alternative 1; therefore, there would be no significant impacts to sediment load within the SMR downstream of the diversion structure.

Santa Margarita River Estuary

Impacts to the SMR Estuary under Alternative 2 would be similar to those discussed under Alternative 1; therefore, operations under Alternative 2 would not be expected to alter the frequency or duration of estuary closure beyond historical occurrence and there would be no significant impacts to the SMR Estuary.

4.2.3.2 Groundwater Resources

Construction

Under Alternative 2, impacts to groundwater resources associated with construction activities would be the same as those described under Alternative 1, and no significant impacts would occur.

Operations

Under Alternative 2, impacts to groundwater resources associated with operation of the diversion structure and production wells would be similar as described under Alternative 1. In addition, the operation of gallery wells under Alternative 2 would increase direct diversion from the SMR and have the potential to impact groundwater levels. As discussed in Section 4.2.3.1, *Surface Water Resources*, Alternative 2 operations would include an AMP/FOP that would optimize groundwater production while meeting the following project environmental constraints: (1) no aquifer compaction, and (2) no seawater intrusion (*Note:* the maintenance of groundwater levels within historical range constraint would not be included under Alternative 2).

Groundwater and gallery well pumping rates are provided in Table 4.2-10. Based on the environmental constraints and operational parameters, the Alternatives 2 Model simulation shows a 4,400 AFY increase in sustained basin yield above Recent Management basin yield (Stetson 2012a,d). Groundwater pumping would be curtailed during drier hydrologic conditions by relying on an annual average of 1,100 AFY of imported water to meet MCB Camp Pendleton's potable water demand. The change from Recent Management for Extremely Dry/Very Dry hydrologic conditions (-1,700 AFY) reflects the curtailment in pumping rates during consecutive drier than normal water years.

Table 4.2-10. Average Annual Groundwater and Gallery Well Pumping for the Alternative 2 Model Simulation (AFY)

Hydrologic Condition	Upper Ysidora Pumping	Chappo Pumping	Gallery Well Pumping	Total Pumping	Change from Recent Management
All Years	6,600	3,200	3,000	12,800	+4,400 (+52%)
Extremely Dry and Very Dry	3,500	1,500	700	5,700	-1,700 (-23%)
Below Normal	5,900	2,600	1,700	10,200	+1,500 (+17%)
Above Normal	8,700	4,400	4,500	17,600	+9,000 (+105%)
Very Wet	8,600	4,500	5,300	18,400	+9,700 (+111%)

Note: Annual recharge rates rounded to nearest 100 AFY.

Sources: Stetson 2012 a,d.

The increase in groundwater and gallery pumping during wet years would coincide with increased total diversion/recharge (Table 4.2-11). When compared to Recent Management conditions, there would be no change to average annual recharge during Extremely Dry/Very Dry years, with the greatest recharge during Very Wet years when diversions and gallery well pumping capture runoff from high flow events to replace storage lost during drier than normal years. The minimal impact during the driest years under Alternative 2 would occur due to reductions in project related diversions and groundwater/gallery well pumping which have been designed to meet environmental constraints. This would support the slight increase in streamflow at the Ysidora gauge and downstream model boundary (800 AFY) as previously discussed in the Section 4.2.3.1, *Surface Water Resources*. In summary, the increased average annual groundwater production (4,400 AFY) under Alternative 2 would be balanced with increased average annual groundwater recharge (4,400 AFY) (Stetson 2012 a,c), resulting in an increase to the sustained basin yield and no long term effects on the water availability in the Ysidora Groundwater Basin.

The groundwater available for pumping fluctuates seasonally and varies by hydrologic condition. Pumping would be reduced during dry years to prevent seawater intrusion. The increase in production during Above Normal and Very Wet years is due to the gallery wells which primarily operate when winter-time flows in the SMR are high and, therefore, would not drawdown groundwater levels during summer months or dry years. The individual pumping rates of each gallery well would be approximately 4.5 cfs. Because the available streamflow fluctuates from month-to-month and year-to-year, gallery well pumping rates would be adjusted based on the adaptive management plan and available water resources. The gallery wells are not operated during the driest hydrologic conditions that exist during Extremely Dry conditions.

Table 4.2-11. Average Annual Groundwater Recharge for the Alternative 2 Model Simulation (AFY)

Hydrologic Condition	Groundwater Recharge at Ponds 1-7	Streambed Infiltration	Total Recharge	Change from Recent Management
All Years	7,400	7,100	14,500	+4,400 (+44%)
Extremely Dry and Very Dry	2,300	4,700	7,000	0 (0%)
Below Normal	5,500	6,700	12,200	+2,500 (+26%)
Above Normal	9,200	8,900	18,100	+6,400 (+55%)
Very Wet	14,200	8,300	22,500	+10,100 (+81%)

Note: Annual recharge rates rounded to nearest 100 AFY.
Sources: Stetson 2012a,d.

Based on the groundwater modeling simulation results presented in Appendix B, groundwater levels would consistently drop below Recent Management conditions and drop below measured historical-low groundwater levels in the Upper Ysidora Sub-basin approximately 4 out of every 10 years with implementation of Alternative 2 (Stetson 2012d). If groundwater levels drop below historical-low levels as a result of Alternative 2, there is the potential for significant impacts to occur to groundwater resources and associated riparian areas. However, with the implementation of Mitigation Measure #1 presented in Section 4.2.3.5, the AMP/FOP would be modified to include the maintenance of groundwater levels within historical range constraint to mitigate these impacts (similar to Alternative 1). Groundwater levels would decrease during periods of increased pumping, but would be monitored and pumping rates would be modified as described under Mitigation Measure #1, to prevent groundwater levels from dropping below historical levels.

Impacts to aquifer storage and seawater intrusion would be managed under Alternative 2 through implementation of the AMP/FOP, as described under Alternative 1. Therefore, no subsidence and subsequent loss of aquifer storage volume would occur. Subsurface underflow out of the Model was positive (+100 AFY) for the Alternative 1 simulation (Table 4.2-7), indicating that no saltwater intrusion would be expected to occur.

Evapotranspiration under Recent Management conditions averaged 2,500 AFY (Table 3.2-6) and decreased by 100 AFY (Table 4.2-7) for Alternative 2. This would not be considered a significant decline in annual evapotranspiration. Due to Alternative 2 operations management which includes reductions in both diversions and pumping during drier than normal conditions, evapotranspiration would increase from 1,300 AFY to 2,200 AFY during Extremely Dry/Very Dry hydrologic conditions when compared to the Recent Management (Tables 3.2-6 and 4.2-7, respectively). An increase in evapotranspiration is directly related to an increase in groundwater levels that support riparian vegetation and surface water flow throughout the Upper Ysidora, Chappo, and Lower Ysidora sub-basins.

Therefore, with implementation of Mitigation Measure #1 (Section 4.2.3.5), there would be no significant impacts to groundwater resources with under Alternative 2.

4.2.3.3 Water Quality

<u>Surface Water</u>

Construction

Under Alternative 2, impacts to surface water quality associated with construction activities would be the same as under Alternative 1, and no significant impacts to surface water quality would occur with implementation of SCMs under Alternative 2 construction activities.

Operations

Under Alternative 2, impacts to surface water quality in the SMR and SMR estuary associated with operational activities would be similar to those described under Alternative 1 with implementation SCMs; therefore, no significant impacts to surface water quality would occur. Water quality impacts to the Pacific Ocean are discussed below.

Pacific Ocean. The brine discharge from the expanded AWTP at Haybarn Canyon would consist of RO and ion exchange brine with an estimated average TDS concentration of 6,000 mg/L. The brine would be discharged to the Pacific Ocean via the existing Oceanside Ocean Outfall. The brine discharge would be covered under either an amendment to FPUD's existing NPDES Permit (CA0108031) to the Oceanside Ocean Outfall (the same as under Alternative 1) or an amendment to MCB Camp Pendleton's NPDES Permit (CA0109347). In either case, the brine discharge would be blended with existing discharge and is not expected to impact the ability of the FPUD/MCB Camp Pendleton to meet NPDES permit requirements. Therefore, no significant operational impacts to ocean water quality would occur with implementation of Alternative 2.

<u>Groundwater Quality</u>

Construction

Under Alternative 2, impacts to groundwater quality associated with construction activities would be the same as under Alternative 1, and no significant impacts to groundwater quality would occur with implementation of SCMs under Alternative 2 construction activities.

Operations

Under Alternative 2, impacts to surface water quality associated with operations would be the same as under Alternative 1. The implementation of the gallery wells would result in similar effects to groundwater as the increased recharge and groundwater production. Therefore, because the recharged SMR water would be of similar or better water quality than the underlying groundwater, the recharge of these waters to the groundwater aquifer would have no significant impacts on groundwater quality.

4.2.3.4 Floodplains

<u>Construction</u>

Under Alternative 2, impacts to flood flows, the flood flow regime, or extent of flooding in the SMR would be the same as under Alternative 1, and there would be no significant impacts on flooding in the SMR.

<u>Operations</u>

Under Alternative 2, impacts to flooding in the SMR associated with operations of the diversion weir would be the same as under Alternative 1. Therefore, replacement of the diversion weir would not increase the flooding potential and no significant impacts would occur. The lateral pipelines extending from the gallery wells under the SMR would be located below the scouring depth of the river, and therefore would not be impacted by flooding.

4.2.3.5 Mitigation Measures

There would be potentially significant impacts to groundwater resources in the Upper Ysidora Sub-basin as a result of operations under Alternative 2. In addition to the implementation of SCMs listed in Section 2.3.1.4 and the AMP/FOP, the following mitigation measure will be implemented to monitor and reduce impacts to groundwater resources to below a level of significance:

1. The AMP/FOP under Alternative 2 would be modified to include the maintenance of groundwater levels within historical range constraint (*Note:* this measure is included in the AMP/FOP as described under Alternative 1). Specifically, groundwater levels would be monitored by a series of telemetered groundwater monitoring wells and pumping would be curtailed when the average monthly groundwater level drops to within 3 ft (1 m) of the historical minimum along the riparian corridor. Pumping would be further reduced or shut off if the groundwater level drops to within 0.5 ft (0.2 m) of the historic minimum. Pumping rates would remain reduced until the average monthly groundwater levels returned to 0.5 ft (0.2 m) above the historical minimum (Stetson 2009).

4.2.4 No-Action Alternative

Under the No-Action Alternative, the proposed facilities would not be constructed and no ground-disturbing activities would occur. Excess quantities of potentially usable runoff in the river during wetter years would continue to flow downstream toward the estuary and the Pacific Ocean without providing beneficial use. Adverse impacts to listed species habitat below the diversion structure on the SMR due to operations would not occur. FPUD would continue to meet all of its current potable water demands from imported water purchased from SDCWA and, in order to meet increases in future water demands, increased purchases of imported water, or purchases of water from other unidentified sources would be needed.

MCB Camp Pendleton would continue to use its existing diversion, recharge, storage, and recovery system to meet its water demands. Future increases in water demands on-base would not be met without possible impacts to the environment or development of an alternative water supply, such as ocean desalination or by construction of a new pipeline to an off-base water purveyor and the initiation of routine purchases of imported water as discussed further under Section 4.7, *Utilities*. Without development of an alternative water supply, the Recent Management Model scenario (Stetson 2012a) indicates that the aquifer could be over-pumped during dry hydrologic conditions resulting in groundwater levels dropping below historic lows in the Chappo Sub-basin. Therefore, with increased dependence on groundwater supply within the Ysidora Basin, significant impacts to water resources in Lower SMR Basin are possible under the No-Action Alternative.

4.3 BIOLOGICAL RESOURCES

4.3.1 Approach to Analysis

Determination of the significance of potential impacts to biological resources is based on (1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource, (2) the proportion of the resource that would be affected relative to its occurrence in the region, (3) the sensitivity of the resource to proposed activities, and (4) the duration of ecological ramifications. Impacts to biological resources are considered significant if species or habitats of concern would be adversely affected over relatively large areas or disturbances would result in a population-level change in the abundance or distribution of a special status species. In this analysis, an impact identified as significant (or potentially significant) should be considered so under both NEPA and CEQA.

Direct impacts are associated with ground-disturbing activities resulting from construction of the facilities (e.g. direct mortality of species or removal of vegetation and habitat by grading). Direct impacts may be either temporary (reversible) or permanent (irreversible). Most direct impacts are confined to the construction footprint.

Indirect impacts are caused by or result from project-related activities, but occur later in time and are reasonably certain to occur. Indirect impacts are diffuse, resource-specific, and less amenable to quantification or mapping than direct impacts, but still need to be considered. Indirect impacts typically extend beyond the immediate construction footprint(s). Important indirect impacts to consider include those of noise caused by construction and operational effects (e.g., water withdrawal from the Lower SMR Basin and the subsequent impacts on riparian and estuarine habitats).

Potential project impacts are described as temporary or permanent based on their anticipated longevity. Project impacts are evaluated based upon an understanding of project site configuration and components, construction methods and equipment that would be used, and how the site would be used after it is developed. All project impacts are described as they would occur after the SCMs described in Section 2.3.1.8 are implemented. Following construction, revegetation of temporarily disturbed areas harboring federally-listed California gnatcatcher and Stephens' kangaroo rat would occur in accordance with SCMs.

4.3.2 Alternative 1

This section presents an analysis of potential direct, indirect, temporary, and permanent impacts of Alternative 1 on each subcategory of biological resources. Potential beneficial as well as adverse effects are considered.

4.3.2.1 Summary of Impacts

Facilities construction would have both direct and indirect impacts due to disturbance, displacement, and an increased risk of mortality to individuals. These impacts differ by resource and/or species as discussed in subsequent sections. Although substantial areas would be temporarily impacted by construction, with restoration as proposed, areas of permanent impact would be limited to the footprints of the facilities themselves, including the inflatable weir diversion structure; lining of diversion ditch; production wells; access roads to the wells and power poles along the access roads; and the FPUD WTP and pump stations. Pipeline corridors would be restored following construction, but could be subject to future disturbance for maintenance and repairs. All construction within the FPUD portion of the project would be constructed within previously disturbed areas. No construction would occur in the OSMZ and beneficial impacts would occur due to the protection and management of the OSMZ.

Under Alternative 1, the combined withdrawal of surface water and groundwater from the Lower SMR may reduce streamflow and groundwater levels relative to historic averages and/or the current environmental Recent Management. Model results suggest that in comparison with the Recent Management scenario, the project's use of water in the Lower SMR under Alternative 1 would have minor, if any, long-term indirect effects on riparian and estuarine habitats. However, model results suggest that in comparison with the Recent Management scenario, the project's use of water in the Lower SMR under the Proposed Action would have direct effects on occupied arroyo toad, least Bell's vireo, and southwestern willow flycatcher breeding habitat. The proposed AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, would enable negative effects on riparian habitat and listed species habitat (arroyo toad and riparian bird species) to be detected and minimized through modification of operations. SMR Estuary conditions are expected to be within their natural range of variability, but with the implementation of the AMP/FOP, it is expected that consideration would be given to modifying operations (e.g., to allow decreased diversion of river flows to facilitate ARTO breeding season) when it would help avoid worsening conditions in the SMR.

4.3.2.2 Vegetation and Wildlife

Construction

Table 4.3-1 quantifies the potential permanent and temporary impacts of construction on different types of plant communities. Table 4.3-1 summarizes plant community types for the areas subject to construction in Alternative 1 assuming a 50-ft (15-m) perimeter around proposed permanent structures; and 50-ft to 100-ft (15-m to 31-m) wide buffer around the conveyance pipeline and bi-directional pipeline corridor, respectively (note that additional width (approximately 25 feet) is required at greater than 45 degree turns within the bi-directional pipeline corridor for equipment maneuverability; and that construction in the Community of Fallbrook will be exclusively in the road-way). A more detailed breakdown of the impacts on individual plant communities is provided in Appendix C-1. Table 4.3-2 quantifies potential permanent and temporary impacts of construction to federally-listed species' and state-listed species' habitats; the resource effects analysis model that was used for this analysis can be found in Appendix C-3.

Table 4.3-1. Potential Permanent and Temporary Impacts to Listed Species within the SMR CUP Construction Footprint for Alternative 1

Species	Acreages within the Project Areas											Project Total
	Diversion Weir	O'Neill Ditch	Production Wells, Conveyance Pipelines, and Permanent Access Roads	Temporary Construction Lay-down Area	Bi-directional Pipeline[1] and Booster Pump Stations			FPUD WTP	TOTAL			
	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	DET Fallbrook	Non-DOD	Non-DOD	MCB Camp Pendleton	DET Fallbrook	Non-DOD	
Arroyo Toad (Breeding)												
Permanent	1.33	2.14	1.71	0.00	0.00	0.00	0.00	0.00	5.18	0.00	0.00	5.18
Temporary	1.18	8.00	11.36	0.00	0.00	0.00	0.00	0.00	20.54	0.00	0.00	20.54
Arroyo Toad (Aestivation- Upland Only)												
Permanent	0.22	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.26
Temporary	0.16	1.48	0.01	0.00	0.00	0.00	0.00	0.00	1.65	0.00	0.00	1.65
Least Bell's Vireo												
Permanent	0.70	0.62	0.88	0.00	0.00	0.00	0.00	0.00	2.20	0.00	0.00	5.20
Temporary	0.64	3.28	7.11	0.01	0.66	0.26	0.00	0.00	11.70	0.26	0.00	21.98
California Gnatcatcher												
Permanent	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
Temporary	0.00	0.07	0.00	0.00	4.01	11.17	0.00	0.00	4.08	11.17	0.00	15.25
Stephens' Kangaroo Rat												
Permanent	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Temporary	0.00	0.00	0.00	0.00	0.00	1.29	0.00	0.00	0.00	1.29	0.00	1.29

[1]For temporary impacts to the Bi-directional Pipeline, it is estimated that construction will require 50 feet out of the 100 foot wide footprint in straight segments, plus additional width when the pipeline turns corners; therefore, 60% of the overall vegetation impacts to the 100 foot corridor was used as an acreage impact. Appendix B figures depict 100%, rather than 60%, for illustration purposes.

Notes: FPUD = Fallbrook Public Utility District; WTP = Water Treatment Plant; MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station Seal Beach, Detachment Fallbrook; DOD = Department of Defense.

Permanent impacts are associated with facility construction that would eliminate existing vegetation. Vegetation is assumed to be temporarily removed from the pipeline construction corridor. As such, if dewatering of the trench itself proved to be necessary for construction, there would be no additional impact on vegetation. No long-term effects on drainage or soil moisture that could otherwise affect vegetation are anticipated.

All riparian habitat on MCB Camp Pendleton, wetland impacts, ARTO aestivation habitat, CAGN occupied habitat, and SKR occupied habitat would be mitigated in accordance with the SCMs listed under *Biological Resources* in Section 2.3.1.4. The majority of impacts to plant communities would affect disturbed/developed habitat (including agricultural land) and non-native grassland, with small areas of native plant communities impacted (refer to Appendix C-1 for a detailed breakdown). Monitoring and other protective measures listed in Section 2.3.1.4 under *Biological Resources* would reduce but not eliminate impacts on wildlife. In particular, wildlife habitats would be substantially disturbed during construction, and most resident wildlife would be displaced or subject to injury or mortality if remaining on-site during construction. Displaced wildlife would incur energetic costs and predation risks as a result of moving away from construction into other areas. Suitable habitat nearby is likely to already be occupied by members of the same species, forcing resident individuals to either share resources or move into habitats of poorer quality.

Apart from disturbance and mortality to wildlife, habitat conditions in affected areas would be altered for one to several years. Some opportunistic, wide-ranging predators (e.g., coyotes, turkey vultures), as well as consumers that feed on herbaceous plants (or seeds) or on the insects that are attracted to areas of new growth, may increase foraging in the disturbed areas, particularly as ground and vegetation disturbance increases the availability of food resources. The cover of woody vegetation, however, would be diminished for at least several years. Following construction and during operation of the project, herbicides may be used where necessary to control noxious weeds. Adherence to SCMs along with protective measures that are part of the INRMP (DET Fallbrook 2006; MCB Camp Pendleton 2011), assures that there would be no negative effect on listed species due to herbicide use. Given the proposed restoration measures, these wildlife habitat impacts (both positive and negative) would be temporary and are not considered significant.

With the avoidance of breeding-season vegetation clearance and active nests of migratory birds in CSS, riparian, and wetland habitats, followed by the restoration of native vegetation (except in new facility locations), construction impacts on migratory bird populations would be minimized. Although the removal of vegetation outside the breeding season would reduce the immediate impacts that would have otherwise occurred to breeding individuals in that location, the loss of acreage would affect migrants that subsequently return to the area. Individuals would be forced to compete for territories in new locations, and would be likely to incur increased energetic costs and reduced survivorship or breeding opportunities. With the relatively small acreage of permanent impact to these habitats, significant impacts to migratory bird populations are not likely to occur. Federally-listed species are discussed further in Section 4.3.2.4.

Operations

Operational impacts would include the potential for periodic disturbance of pipeline corridors due to maintenance and repairs. Such impacts would be temporary and most likely of very limited spatial scale and would be subject to the same conservation measures listed above under *Construction*. Therefore, operations associated with maintenance and repairs are not likely to adversely affect listed species or their habitats.

Operations would be established based on meeting certain physical and environmental constraints that include: (1) maintenance of water levels within historical range (i.e., as named in MCB Camp Pendleton's Riparian/Estuary BO (USFWS 1995a), (2) no aquifer compaction, and (3) no seawater intrusion. The ability to meet these constraints is based on the adaptive management of surface and groundwater resources consistent with hydrologic conditions.

Operational effects discussed above and in detail in Section 4.2.2 that may affect listed species and habitats include:

- Operations would be designed to increase the sustained basin yield of the Lower SMR Basin by increasing diversion and recharge of surface water during Below Normal, Above Normal and Very Wet hydrologic conditions and curtailing groundwater pumping during dry hydrologic conditions. During Very Wet years, surface water diversions would be increased when runoff would otherwise be discharged into the Pacific Ocean.
- Under operations, SMR flow would continue to show a large range of seasonal and annual variability based on hydrologic conditions.
- Operations include the implementation of an AMP/FOP which would be constrained by streamflow, groundwater levels, and biological resources.
- The proposed action would have a diversion of a maximum of 200 cfs, as compared to the existing maximum diversion of 60 cfs. However, because most of the sediment in the riverbed is moved during the larger storms, the effects on sediment distribution and channel geomorphology, if any, would likely be small.
- Sediment trapped behind the inflatable weir would be flushed (via lowering the gates of the weir) during 10-year or greater flood events, thus returning the SMR to a more "natural" condition.
- Since existing conditions do not provide access to imported water supplies, minimum annual groundwater pumping rates are 6,300 AFY under Recent Management conditions, as compared to 4,600 AFY under the Proposed Action operations.
- Operations would be expected to have minimal, if any, effects on the frequency or duration of estuary closure beyond historical occurrence, and as such, impacts to the SMR Estuary would not be significant.
- Groundwater levels beneath the grassland areas, where vegetation does not rely on groundwater, would tend to be lower during all hydrologic conditions under Alternative 1 operations.
- The Riparian/Estuarine BO (USFWS 1995a) indicates that groundwater pumping 15 feet below ground surface has been used as the upper limit of willow riparian root zone depth, beyond which plants are unable to utilize groundwater. The AMP/FOP would be developed to improve the relationship between the 15-foot depth to water and health of the riparian vegetation to prevent changes to the environment that are not within natural conditions, and modeling demonstrates that Alternative 1 would be an improvement over Recent Management conditions (refer to Appendix C-4 for a detailed description).
- Relative to the Recent Management, surface diversions in combination with groundwater withdrawals would increase the yearly minimum depth to groundwater along the riparian corridor during most years in the Upper Ysidora Riparian Indicator Cell. However, modeling demonstrates this would not have a long-term impact to riparian vegetation (see Section 5.3.4 and Appendix F for a detailed description).

- Reduced surface flows may have negative or positive effects on dissolved oxygen, nutrients, and water temperature depending on the contribution of rising groundwater on ambient conditions; the AMP/FOP would implement a water quality monitoring program.

4.3.3 Riparian Habitat

4.3.3.1 Construction

Riparian habitat areas are often biologically distinct from the surrounding habitat matrix (i.e. lusher, riverine vegetation) and can be utilized by a wide range of plant and animal species. Construction impacts on riparian habitats include temporary and permanent impacts associated with the direct removal of riparian vegetation as a result of construction activities. The impacts of construction activities to Riparian Habitat from the Proposed Action are addressed in Table 3.3-2.

4.3.3.2 Operations

Although surface water flows influence the establishment of riparian habitat communities, many riparian plants depend upon groundwater resources for continued sustenance (Busch *et al.* 1992,). Mature riparian trees and shrubs are typically associated with water tables < 3 m deep (Stromberg *et al.* 1996) and water table declines can potentially lead to reduced plant growth and eventual mortality. Declines in water tables may also change the distribution and abundance of riverine plant species, thus altering riparian habitat community composition. However, groundwater resources typically fluctuate over time as a result of natural processes, and many riparian plant species are physiologically adapted to handle fluctuating levels. Climatic factors such as precipitation and temperature also influence plant response to water table decline and therefore play a role in determining impacts on riparian habitats. Other factors that affect riparian habitat community response to water table decline include the magnitude, rate, and duration of water decline, as well as the morphological condition of vegetation communities and availability of other water sources (Shafroth *et al.* 2000).

The LSMR Model was used to assess future impacts to riparian vegetation by comparing annual evapotranspiration between the Historical, Recent Management and CUP Model Runs. Simulated evapotranspiration in the models is related to plant species, density, and root depth; such that water availability for riparian vegetation decreases as groundwater levels decline, resulting in less simulated evapotranspiration. Because the groundwater levels in the CUP Model run were restricted to those levels that occurred historically, the magnitude of groundwater pumping was restricted such that historical distributions of riparian vegetation would be maintained in the future under project conditions. However, a variation in water availability is expected to occur from one year to another as reflected by the difference in evapotranspiration between the model runs. Comparison of the CUP Model to the Recent Management Run shows that average annual water use by riparian vegetation may decrease 300 AFY from 2,700 AFY to 2,400 AFY. The reduction in evapotranspiration may result in either plants becoming more stressed, or plant die off, occurring during different periods than what would occur naturally.

In order to maintain the riparian plant communities within a natural variability that has occurred historically, a series of control sites will be established to relate the groundwater levels to plant community health. Riparian groundwater monitoring wells will be monitored to assure groundwater levels will not deviate from historical minimum and that they will stay within a natural range of wetting and drying from one hydrologic condition to another. When groundwater levels reach within 3 feet of their historical minimum, a series of adaptive conservation measures will be triggered to assure plant are not stressed beyond their historical range. Using groundwater levels as a trigger and the three foot buffer to historical minima as a threshold value will provide water operators time to adjust the FOP.

Continued monitoring of the groundwater levels and riparian vegetation at key control sites, agreed to by the stakeholders, will allow for assessment of potential impacts to other species that rely on the health of the riparian vegetation. Relationships between the quality of riparian vegetation and the occupancy rate of bird species has not yet been established in the Santa Margarita River. Other hydrologic and biologic factors (e.g. surface water availability, willow recruitment) will be recorded so that the relationship between water availability and the health of riparian vegetation can be established and applied to other species that may rely on the vegetation for survival.

To monitor potential changes to riparian habitat, and ultimately its impact on federally-listed species, MCB Camp Pendleton will enhance the current Riparian Ecosystem Health Monitoring program (SCM 2). MCB Camp Pendleton's Riparian Ecosystem Health Monitoring program developed a rigorous approach to monitor riparian health with a Riparian Habitat Monitoring Plan (HMP) in 2007 to determine if the lower SMR riparian areas are recovering post extensive Arundo and Tamarisk removal. Data sets were collected in 2009 and in 2012 and shows that the riparian system is moving towards meeting the Primary Success standards; this data reveals that it takes approximately 5 years to meet these standards. Another data set will be collected in spring of 2016 and is expected to show full recovery of the riparian system, unless the large Basilone Complex wildfire of May 2014 has impaired this recovery.

Additional parameters collected under MCB Camp Pendleton's on-going Riparian Ecosystem Health Monitoring program would be incorporated into the AMP to strengthen, and to actively improve and empirically manage, the effect of the project on environmental resources. The AMP will incorporate parameters from the MCB Camp Pendleton Riparian/Estuarine Biological Opinion consistent with managing groundwater levels and withdrawals to minimize loss and degradation of habitat quality, to the extent practicable (BO; USFWS 1995a). Additionally, MCB Camp Pendleton will utilize information from project P527B (Removal of Wastewater Plants from the SMR) which assessed the relationship between groundwater levels and plant health with the Riparian Monitoring and Modeling Sewage Effluent Compliance Projects on MCB Camp Pendleton (SDSU 2007). Noteworthy conclusions from the study are named below:

- The study was based on six years of xylem potential measurements that indicate groundwater is an important control on the moisture stress of vegetation. Among many conclusions, the study found the change in groundwater levels is more important than the absolute depth to groundwater (page XXI). Furthermore, the effect of groundwater depth was found to be dependent on the local site conditions and the characteristics of the tree. Riparian willows are characterized by a root system that is capable of growing rapidly to seek out water and nutrients, and to adjust to changes in their availability due to groundwater variability.
- Riparian willows adjust their rooting systems to fluctuations in the depth of groundwater. When the water table rises, the willow root system generates more roots above the water table and when the water table falls, the willow root system grows downward to follow the water. Studies of willow species have shown that willows can keep pace with declines of up to 2 cm per day (0.79 inches per day, 2.0 feet per month). This demonstrates the willows ability to survive a large cumulative drop in water table by staying in touch with receding water levels due to keeping up with the rate of decline of the water table.
- Willows resilience and ability to survive high variation in groundwater by a variety of physiological and morphological adjustments allow the willows to go through cycles of impairment or decline and recovery.

MCBCP 2007 found that willows resilience and ability to survive high variation in groundwater by a variety of physiological and morphological adjustments allow the willows to go through cycles of impairment or decline and recovery. The AMP enhanced Riparian Ecosystem Health Monitoring program will continually monitor groundwater levels, and their rate of change, for the purpose of evaluating conditions for the riparian woodlands. Further information that may be collected in the enhanced Riparian Ecosystem Health Monitoring program would add to the development of the AMP: vertical distribution of foliage, abundance of seedlings (i.e., recruitment), stem diameter, soil moisture, and changes in basal area. Depth to groundwater (e.g., maximum depth to the water table for each year) and rate of groundwater decline will be measured near the established riparian habitat monitoring locations (that correspond to federally-listed bird species) for a comparison of riparian habitat structure and other variables to ground-water pumping. In addition, MCB Camp Pendleton will be collecting least Bell's vireo and southwestern willow flycatcher microhabitat data to determine changes in nesting habitat. Merging the information into the AMP will provide a better understanding concerning the overall ecosystem health and specific microhabitat changes to listed species habitat. MCB Camp Pendleton will use the information to make informed decisions (to adapt) on future ground-water pumping and water diversion operations.

Based on the projected average decline of 10.2 percent in evapotranspiration rates, we anticipate a proportional loss of riparian vegetation cover and that the carrying capacity for federally-listed species on the Lower SMR will proportionately decline by about 10.2 percent over time.

4.3.3.3 Aquatic Habitats and Species

<u>Construction</u>

Construction impacts on aquatic habitats and species include direct impacts at construction sites and indirect impacts downstream of or subsequent to construction. To the extent that the construction cannot avoid aquatic habitats, impacts would occur at the diversion structure on the SMR, elsewhere along the SMR, and in various other locations along the bi-directional and conveyance pipelines. These impacts include the temporary disruption of sediment and surface flows, as well as the localized degradation of water quality by increased concentrations of suspended sediments, all of which would be likely to cause the displacement of, and injury or mortality to, resident aquatic species, including both the nektonic (free-swimming) and benthic (bottom-dwelling) communities.

Potential impacts on the SMR and other streams subject to construction (Lake O'Neill is not likely considered jurisdictional) overflow outlet and Fallbrook Creek), and their resident species have been minimized, though not completely avoided, by limiting in-water construction to the dry season and requiring all crossings constructed as cut and cover to be completed within 24 hours (with the two exceptions in Fallbrook Creek as noted in section 2.3.1.3. Construction during the dry season reduces the potential for incidental damage to a larger area by erosion and sedimentation. There would still be surface and/or shallow groundwater flows through the construction area, which would have to be temporarily pumped or diverted around areas of excavation and structure placement. Trenchless construction would avoid surface impacts within sensitive aquatic habitats, but would result in some disturbance at access pits located adjacent to these habitats. Any resident aquatic species in the immediate areas of construction would still be negatively impacted, but this would be a very small portion of the population that inhabits the river. Since the areas affected are relatively small and downstream flows and connectivity between up- and downstream aquatic habitats would be maintained, the impact on aquatic habitat and resident aquatic species is considered less than significant.

Construction in upland and riparian habitats would expose soils to erosion which could lead to sedimentation in waterbodies downslope. However, implementation of the 24 hour rule and site-specific

SWPPP incorporating BMPs for erosion and sediment control would minimize these types of impacts, such that they would not be considered significant.

Table 4.3-2. Impacts to Jurisdictional Wetlands and other Waters of the U.S. Under Alternative 1

<table>
<tr><th colspan="2" rowspan="2">Wetland/Waters of the U.S.</th><th colspan="2">MCB Camp Pendleton</th></tr>
<tr><th>Temporary</th><th>Permanent</th></tr>
<tr><td colspan="4">Wetlands (acres)</td></tr>
<tr><td colspan="2">Palustrine Emergent</td><td>0.189</td><td>0.376</td></tr>
<tr><td colspan="2">Palustrine Forested</td><td>2.049</td><td>0.849</td></tr>
<tr><td colspan="2">Palustrine Scrub-Shrub</td><td>0</td><td>0</td></tr>
<tr><td colspan="2">Total Wetlands</td><td>2.238</td><td>1.225</td></tr>
<tr><td colspan="4">Other Waters of the U.S. (acres)</td></tr>
<tr><td>Riverine Lower Perennial</td><td>Santa Margarita River</td><td>0.297</td><td>0.384</td></tr>
<tr><td>Riverine Upper Perennial</td><td>Fallbrook Creek</td><td>0.551</td><td>0</td></tr>
<tr><td rowspan="2">Riverine Intermittent</td><td rowspan="2">Other</td><td>0</td><td>0</td></tr>
<tr><td></td><td></td></tr>
<tr><td colspan="2">Total Other Waters of the U.S.</td><td>3.086</td><td>1.609</td></tr>
</table>

Source: Anchor QEA 2016, Reclamation *et al.* 2013.

Impacts to jurisdictional wetlands and other waters of the U.S. greater than 0.5 acre (0.2 hectare) would require an individual permit from the USACE. Unavoidable impacts to wetlands and other waters of the U.S. may require mitigation, which is accounted for under the USFWS and NOAA FISHERIES BOs, in addition MCB Camp Pendleton in cooperation with NWS Det Fallbrook is proposing to restore approximately 300 linear feet of Fallbrook Creek. Preparation and approval of a detailed mitigation plan would be required in conjunction with the permit application. If the unavoidable impacts to jurisdictional waters support federally listed species, then input from USFWS would also be required. The mitigation plan would describe on-site, off-site, and as needed, off-base mitigation. For all habitat restoration that is proposed, this plan would include details regarding site preparation (e.g., grading), planting specifications, and irrigation design, as well as maintenance and monitoring procedures. The plan would also outline success criteria and remedial measures should the mitigation effort fall short of the success criteria, and a strategy for long-term mitigation site management. A portion of the mitigation obligations may be satisfied by participating in a fee-based mitigation program (e.g., a wetland mitigation bank) in which case, long-term management for such mitigation would be covered under the terms of the formal banking agreement.

<u>Operations</u>

As discussed above, operation of the new inflatable weir diversion structure in conjunction with the groundwater production wells would increase the amount of water that is currently being removed from the SMR. The project design maximizes the use of peak flow events during wetter than normal conditions and reduces project operations during drier hydrologic conditions to minimize impact on the environment. Comparison of groundwater levels and streamflow during Extremely Dry/Very Dry conditions actually show an improvement under Alternative 1 when compared to Recent Management conditions. However, under other conditions, streamflow would be diminished under Alternative 1 relative to Recent Management (Table 4.2-3). Project impacts to streamflow would occur during the winter months when flows are higher, and virtually never during the dry summer months. In comparison to Recent Management, the effects of Alternative 1 on streamflow would be most pronounced during below normal to above normal rainfall conditions, and during storms with a recurrence interval of 2 years or less (i.e., the bankfull condition). As described in Reclamation 2004b, the typical winter flows at the point of diversion are 100-166 cfs, and could be fully captured under Alternative 1, whereas only 60 cfs can be captured under existing/Recent Management conditions. At such times, the extent and duration of seasonal aquatic habitats is expected to be diminished under Alternative 1 relative to Recent Management.

Alternative 1 would capture only about 1% or less of the flow of the large-magnitude storms that transport most of the sediment down the SMR (Table 4.2-4; Reclamation 2004b). As such, Alternative 1 is expected to have little or no impact on the major natural flood events that shape channel geomorphology, scour existing vegetation, and provide new sites for vegetation establishment. The proportion of regular seasonal high flows captured would be larger (Table 4.2-4), and could affect in-channel sediment transport and microhabitats (e.g., formation of points and bars) during "normal" periods. If flows during the wet season were reduced, the extent, duration, quality, and connectivity of aquatic habitats downstream could also be reduced. Lower flows may be associated with reduced oxygenation and increased temperatures, which would typically be detrimental to native freshwater species. Stagnant pooling water may increase as a result of decreased water flow that would normally flush the low lying areas.

Use of the recharge ponds would involve regular filling and (passive) draining, and the occasional removal of accumulated sediments. Owing to the manner of operation and the relatively coarse, well-drained nature of the substrate, the recharge ponds are not expected to provide habitat for aquatic species. Aquatic organisms, organic matter, and nutrients may be transported from the SMR into the recharge ponds and Lake O'Neill via the O'Neill Ditch, but are unlikely to survive for long. The loss of organic matter, nutrients, and primary and secondary aquatic production are unavoidable adverse indirect effects of diverting water from the river that exists today under Recent Management conditions.

Tidal flushing is critical to the maintenance of estuarine habitats and species (MCB Camp Pendleton 2011). Closure is associated with deteriorating water quality, which causes mortality to aquatic species, reduced biodiversity in the nektonic and benthic communities, and diminished estuary productivity. As discussed in Section 4.2.2.1, it is unlikely that the frequency or duration of closure at the mouth of the SMR Estuary would increase under Alternative 1. This estuary closure in the SMR, as for other lagoon-type estuaries in southern California, appears to be primarily controlled by the interaction of long-shore sand transport with annual patterns of drought and flooding (Lafferty 2005). Given that under Alternative 1 existing dry season low flows would be maintained and the first heavy flows of the rainy season would not be diverted, the pattern of openings and closures evident in Figure 3.2-8 is likely to continue. Freshwater inflows in combination with tidal circulation through the mouth of the estuary would typically be sufficient to retard the formation of a sand-barrier berm across the mouth. Accordingly, negative impacts on estuarine productivity are not expected. With the implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, it is expected that consideration would be given to modifying operations when it would help avoid worsening conditions in the estuary. For example, if the mouth of the estuary were to remain closed for a prolonged period, diversions could be reduced to facilitate the natural breeching of the berm and reestablish tidal flushing.

Impacts from discharging the dilute brine to the Pacific Ocean from the existing Oceanside Ocean Outfall would be minor and probably undetectable. Assuming the discharge conforms to the requirements of the NPDES permit as required, the impact on water quality and any secondary effects on organisms in the runoff areas from the pipe would be negligible.

Effects of proposed water use on the extent and duration of ponding are also of interest because of insect production that includes mosquitoes which can act as disease vectors. It would be expected that reduced flows and/or lowered water tables would generally reduce ponding and associated insect production. Although it is also possible that some areas that would otherwise be connected by surface flow would become isolated, these areas would be along the river channel where predatory species that can easily move between puddles (e.g., backswimmers that eat mosquito larvae) would remain abundant. Hence, no effect on mosquito production is anticipated.

4.3.3.4 Special Status Species

Federally-Listed Threatened and Endangered Species

Impacts to federally-listed threatened and endangered species are summarized in Table 4.3-4. Individual species' accounts follow below. Consistent with the ESA, impacts on federally-listed species are described as "effects," and conclusions are reached as to whether the action would have no effect; may affect, but is not likely to adversely affect any individuals of the species in question; or may affect and is likely to adversely affect one or more individuals of the species in question, resulting in "take" as defined under the ESA. The ESA conclusory statements are followed by NEPA/CEQA conclusions on the significance of the impact.

The ESA conclusions determine the level of consultation required: no effect requires no consultation; may affect, not likely to adversely affect requires an informal consultation and concurrence from USFWS or NOAA Fisheries, depending on which agency has jurisdiction; and may affect, likely to adversely affect requires formal consultation resulting in a BO which contains the necessary terms and conditions, as well as conservation recommendations, to allow take without jeopardizing the continuing existence of the species. The lead agencies have prepared separate BAs and are consulting with USFWS and NOAA Fisheries regarding potential adverse effects. Following consultation, specific mitigation measures outlined in the Biological Opinion will be included in this final EIS/EIR.

Table 4.3-3. Summary of Potential Effects on Listed Species with Implementation of Alternative 1

Species	Effects on Habitat	Effects on Individuals and Potential Take
SCS	Only migration habitat occurs in the action area. Construction will not occur during conditions that support SCS migration. Final design and operation will support migration opportunities. Water withdrawals would cause little if any reduction in the high flows that have the greatest potential to support steelhead migration in the SMR downstream of the weir. The incorporation of a fish screen on the diversion and design and operations measures to enhance fish passage at the weir would improve conditions for steelhead passage through the study area.	Likely to adversely affect. Potential adverse effects would be minimized through the AMP/FOP and through final design and operation of the diversion weir.
TWG	TWG does not presently occur and the action would have minor if any effects on unoccupied potential habitat in the estuary. If TWG were to occur in the future, potential effects of operations would be addressed under the AMP/FOP.	Not likely to adversely affect TWG.
ARTO	Temporary disturbance of up to 20.54 acres of ARTO occupied riparian habitat and an additional 1.65 acres of upland aestivation habitat on MCB Camp Pendleton. Permanent disturbance of up to 5.18 acres of riparian and freshwater breeding habitat and an additional 0.26 acres of upland aestivation habitat on MCB Camp Pendleton. For operations, reduced SMR surface flows could reduce shallow run and pool habitat for breeding and reduce scouring floods that regenerate and maintain open sandbar habitats. Potential localized habitat disturbance due to accidents, repairs, and maintenance.	Likely to adversely affect. Potential displacement of and mortality to individual toads during construction. Potential annual or long-term reductions of habitat for juveniles and adults, which would affect the SMR population through operations. Potential adverse effects would be minimized through the AMP/FOP and compensation SCMs.
CLTE	Reduced inflow to SMR Estuary could affect tidal flushing and lagoon foraging and nesting habitat.	With implementation of the AMP/FOP, not likely to adversely affect tidal flushing, foraging or nesting habitat. No effect to CLTE is anticipated.
SNPL	Estuary-shoreline foraging and nesting conditions for plovers could be directly or indirectly affected by changes in SMR inflows.	With implementation of the AMP/FOP, not likely to adversely affect tidal flushing, foraging or nesting habitat. No effect to SNPL is anticipated.
RIRA	Reduced inflow to estuary could affect tidal flushing and productivity of salt marsh habitat.	With implementation of the AMP/FOP, not likely to adversely affect tidal flushing and estuary productivity. No effect to RIRA is anticipated.

Table 4.3-3. Summary of Potential Effects on Listed Species with Implementation of Alternative 1

Species	Effects on Habitat	Effects on Individuals and Potential Take
LBVI	Construction would temporarily affect approximately 27.18 acres of LBVI occupied riparian habitat (21.72 acres on MCB Camp Pendleton and 0.26 acres on DET Fallbrook) and permanent disturbance of up to 5.20 acres of LBVI occupied riparian habitat on MCB Camp Pendleton. Potential localized habitat disturbance due to accidents, repairs, and maintenance. For operations, there are potential changes in riparian vegetation due to reductions in the magnitude, lateral extent, and duration of surface flows in the SMR.	Likely to adversely affect. Impacts to LBVI in the vicinity of the construction sites would be minimized to less than significant through the implementation of the SCMs listed under Biological Resources in Section 2.3.1.4., Riparian vegetation clearing occurring outside the breeding season.All temporary impacts to LBVI occupied riparian habitat would be restored through natural succession. With implementation of the AMP/FOP and compensation SCMs, operational impacts to LBVI habitat will be minimized.
SWFL	Impacts to riparian habitat (5.20 acres) along the SMR but no impacts to occupied SWFL breeding habitat are anticipated. Temporary disturbance of 22.34 acres of riparian habitat on both MCB Pendleton and DET Fallbrook. For operations, there are potential changes in riparian vegetation due to reductions in the magnitude, lateral extent, and duration of surface flows in the SMR.	Likely to adversely affect. No effect to SWFL breeding habitat is anticipated through construction, with all riparian habitats being removed outside the breeding season. With implementation of the AMP/FOP and compensation SCMs, operational impacts to SWFL habitat will be minimized.
CAGN	Temporary disturbance of up to 15.25 acres of CAGN occupied CSS habitat (4.08 acres on MCB Camp Pendleton and 11.17 acres on DET Fallbrook) and permanent removal of up to 0.01 acre of CAGN occupied CSS habitat on MCB Camp Pendleton. Potential localized habitat disturbance due to accidents, repairs, and maintenance.	Likely to adversely affect. Impacts to CAGN in the vicinity of the construction sites would be minimized to less than significant through the implementation of the SCMs listed under Biological Resources in Section 2.3.1.4, with CSS vegetation clearing occurring outside the breeding season. All temporary impacts to CAGN occupied CSS habitat would be restored in place.
SKR	Temporary disturbance of up to 1.29 acres of SKR occupied habitat all on Det Fallbrook; no permanent removal of SKR occupied habitat. Potential localized habitat disturbance due to accidents, repairs, and maintenance.	Likely to adversely affect. Take of individuals is expected during construction, but will be minimized through SCMs. All temporary impacts to SKR occupied habitat would be restored in place.
SDFS/RFS	No potential temporary or permanent disturbance would occur to fairy shrimp occupied vernal pools.	No effect. No take of individuals is expected.
BSSP (state listed)	Reduced inflow to SMR Estuary could diminish tidal flushing and flood salt marsh habitat used for nesting and foraging.	With implementation of the AMP/FOP, not likely to adversely affect tidal flushing and estuary productivity. No effect to BSSP is anticipated.

Table 4.3-3. Summary of Potential Effects on Listed Species with Implementation of Alternative 1

Species	Effects on Habitat	Effects on Individuals and Potential Take

Notes: CAGN = Coastal California Gnatcatcher; CSS = coastal sage scrub; MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station Seal Beach, Detachment Fallbrook; DOD = Department of Defense; LBVI = Least Bell's Vireo; SMR = Santa Margarita River; AMP/FOP = Adaptive Management Plan; FOP = system operation plan; SWFL = Southwestern Willow Flycatcher; RIRA = Ridgway's Rail; CLTE = California least term; SNPL = Western Snowy Plover; ARTO = Arroyo toad; SDFS = San Diego fairy shrimp; RFS = Riverside fairy shrimp; SCS = southern California steelhead; TWG = Tidewater Goby; BSSP = Belding's Savannah Sparrow; SKR = Stephens' Kangaroo Rat.

Southern California Steelhead

SCS habitat in the Lower SMR downstream of the weir is limited to migration habitat (Reclamation *et al.* 2012); there is no suitable spawning or juvenile rearing habitat in this reach of the river. However, some habitat that appears suitable for spawning occurs upstream of the action area in De Luz and Roblar Creeks. Normal marine salinities typically exist in the SMR Estuary, and transitional brackish habitat suitable for smolts migrating to the ocean appears to be of very limited extent, existing only at the upper end of the estuary (inland from I-5 to approximately Stuart Mesa Road); however studies to date indicate the potential is there but not currently suitable due to lack of food and temperature fluctuations (Reclamation et al. 2012).

Construction. Construction of the proposed action will permanently increase the footprint of structures within the Santa Margarita River floodplain with permanent removal of streambed material to accommodate the creation of larger concrete portions of the O'Neill Ditch intake structure, the weir, and the fish-passage facility. These changes will result in a larger permanently impacted area extending further into the existing channel bank. The proposed increased footprint of the culverts, control building, along with the rock/sand trap (trash rack) proposed downstream of the culverts will reduce the amount of natural channel material contributing to the streambed and overall streambank stability upstream of the weir (NOAA 2016).

Permanent removal of riparian and aquatic vegetation and removal of sediment and debris from the stream channel will alter channel morphology and hydraulic conditions that support fish movement (NMFS 2004; NOAA 2016). Although, as noted in the operational section below, the proposed weir structure will improve passage conditions for SCS.

Considerable design changes in coordination with NOAA Fisheries resulted in a substantially enlarged footprint; however, the revised design and operation schedule greatly reduces the potential impacts to SCS and will cost an estimated three million to construct, plus considerable annual long term operation and maintenance costs. For this reason MCB Camp Pendleton considers all impacts associated with improvements at the diversion structure completely compensated.

Construction of the proposed action will require manipulation of channel features and will require MCBCP to temporarily redirect the flow of the Santa Margarita River (*i.e.*, first realignment of the river) for approximately two months during the dry season to minimize instream disturbance effects on water quality in the action area. However, methods for diverting flow (*e.g.*, coffer dams or temporary diversion channels and piping) during construction will utilize the wide channel by diverting flows to one side of the river while work occurs on the opposite side. For permeable sand materials, well points or sumps will be used to further lower the water table a few feet below the impacted constructed area (MCBCP 2014).

Because construction of the inflatable diversion weir would occur during the dry season, when conditions for SCS are unsuitable along the Lower SMR due to high temperatures and the reduced extent of surface water, SCS would not be present in the vicinity at that time. Sediments would be disturbed during construction, but such changes would be temporary as the sediments are redistributed during the following rainy season. Therefore, individual SCS would not be impacted by construction.

Temporarily impacted areas will be restored on-site in accordance with MCB Camp Pendleton's Riparian Biological Opinion (USFWS 1995a).

NOAA 2016 anticipates temporary changes to instream flow within and downstream of the project site during dewatering prior to construction; these fluctuations in flow are anticipated to be small, gradual, and short-term due to the proposed work window. Based on the general description provided in MCBCP

2014, NOAA 2016 assumes that construction of the inflatable weir structure should not measurably change the magnitude and extent of anticipated temporary effects due to flow diversion, with the dewatering process temporarily reducing about 50 percent of available aquatic habitat in the construction area. Given the overall scope of temporary riparian and instream activities, conditions during the dry season (e.g., little to no flowing water), and the use of the proposed site-specific storm water pollution prevention plan (SWPPP) incorporating best management practices (BMPs) for erosion and sediment control, including replacement of vegetation in disturbed areas, NOAA 2016 does not anticipate turbidity and downstream sedimentation rates that would measurably degrade available habitat for steelhead in the action area.

Operations. Operation of Alternative 1 is likely to adversely effect SCS (NOAA 2016), which would result in incidental take of the species. Alternative 1 is expected to continue reducing the magnitude and duration of winter and spring river discharge in the action area downstream of the point of diversion. Effects of the diversion operations are most pronounced during relatively low flows (i.e., owing to the capacity of the diversion, 200 cfs), which occur frequently in the SMR watershed. The report prepared by Reclamation *et al.* (2012) identified minimum flow conditions necessary to allow upstream migration of adult SCS between the SMR Estuary and diversion weir. These conditions typically only occur during Above Normal and Very Wet years. The annual maximum and average duration of storm events exceeding minimum SCS passage conditions is presented in Table 4.3-5.

Under Alternative 1, duration of flows necessary to allow upstream (and downstream) migration of SCS would be reduced slightly, however there would be negligible reduction during periods when migration is most likely to occur (i.e., during long duration events in wet years). A full description of operational effects can be found in NOAA 2016. Alternative 1 approximates the historical falling limb of the hydrograph for the lower Santa Margarita River to minimize adverse effects on migrating adult and juvenile steelhead. NOAA 2016 cites that there is no elimination of available migration opportunities in addition to having no severe disruption of migratory behavior of both adult and juvenile steelhead relative to those that occurred before the current MCBCP surface-water diversion and groundwater pumping activity. The proposed action will result in the greatest magnitude of effects in reducing streamflow during below normal (rainfall) years. However, below normal water years for this watershed appear to provide extremely limited migration opportunities, where the magnitude and duration of elevated flows rarely meet the minimum depth requirements for safe passage in the action area (NOAA 2016).

The proposed action, chiefly the expected interaction of groundwater-withdrawal effects on the amount and extent of surface water, is expected to have minimal reduction in the amount and extent of rearing habitat for endangered steelhead in the lower SMR (NOAA 2016). Based on the surface-flow analysis, which incorporated effects from groundwater pumping. Suitable living space for juvenile steelhead is expected to be extremely limited in SMR, lacking continuous connectivity from the POD to the estuary (NOAA 2016). NOAA 2016 states that further reductions in surface or groundwater flows from Alternative 1 is inconsequential to suitable juvenile rearing habitat.

The proposed new weir has been designed to improve passage conditions for SCS, as compared to the existing sheet pile weir. Upstream migration of adult SCS would be improved through partially lowering of the shorter weir gate and directing flow to a plunge pool that would allow adult steelhead to negotiate over the weir and continue upstream during the December through May migration season. Downstream migration of both adult and juvenile SCS would be improved through the incorporation of a fish screen to prevent entrainment in the diversion structure during the December through May migration season. A fish by-pass line would be associated with the fish screen that would allow fish entrained into the intake to be returned downstream on the SMR and continue their migration downstream to the ocean. As a result, it is unlikely that individual SCS would be deterred from migration or injured in the process.

Table 4.3-4. Maximum and Average Duration of Storm Events Exceeding Minimum SCS Passage Conditions Under Alternative 1

	Recent Management Conditions	**Alternative 1**
***Annual Maximum Event Duration*[1]**	***Occurrence (years)***	***Occurrence (years)***
1-day	5 of 13	6 of 13
3-day	4 of 13	3 of 13
5-day	2 of 13	2 of 13
10-day or more	2 of 13	2 of 13
Average Duration (days)	***(days)***	***(days)***
Wet Years[2]	14.8	13.8
Dry Years[3]	1.3	0.5
All Years	6.2	5.9

Notes: [1]There is only one annual maximum duration event for each of the 13 years during the analysis period.

[2]Wet years account for 4 of the 13 years during the analysis period.

[3]Dry years account for 4 of the 13 years during the analysis period.

Source: Reclamation *et al.* 2012.

Conclusion. Making the precautionary assumption that SCS are present in the SMR and likely to migrate through the action area, Alternative 1 may adversely affect the passage of adults or juveniles in the SMR between the Pacific Ocean and inflatable weir and at the inflatable weir and O'Neill Ditch. The action is not likely to jeopardize the continued existence of the endangered SCS. The proposed action may result in incidental take of SCS. Alternative 1 would not have a significant impact on SCS. MCB Camp Pendleton is consulting with NOAA Fisheries and the results of the consultation would be implemented.

Alternative 1 may affect and is likely to adversely affect SCS habitat due to the construction of the diversion weir; a larger construction footprint is needed for the diversion structur, which will permanently impact SCS migration habitats. However, individual SCS will not be likely affected during construction since it will occur during low flow of the SMR.

Depending on the nature of hydrologic modifications to the river system with operations, Alternative 1 may affect and is likely to adversely affect SCS migration in the SMR downstream of the proposed diversion.

NOAA anticipates the need for MCB Camp Pendleton to capture and relocate individuals during maintenance events, including planned and unexpected repair events. These injuries and losses are not expected to continually suppress population abundance for the Santa Margarita River steelhead population.

Tidewater Goby

Construction. TWG does not occur in areas subject to or indirectly affected by construction and hence would not be affected by construction; the southernmost construction site in the Proposed Action footprint is over 8 kilometers upstream from the Santa Margarita estuary, where TWG historically occurred.

TWG have not been present within the SMR Estuary since 2000. Using BMPs during construction as named in Section 2.3.2.1 will greatly reduce sedimentation from construction reaching the SMR estuary, if TWG do recolonize the SMR estuary.

Operations. Operational activities associated with the new inflatable diversion weir and increased groundwater pumping will have minimal, if any, effects on the water quality that flows in the SMR estuary and on the duration of estuary closure beyond historical occurrence. With the implementation of the AMP/FOP, operations could be modified if conditions warrant, for example to increase river flows in order to facilitate natural breaching of the berm at the mouth. As a result, the action would not affect the possibility of recolonization by TWG. If the species did re-enter and/or be rediscovered in the SMR, the AMP/FOP would enable consideration of the effects of operations on TWG along with other estuarine species in consultation with USFWS.

Conclusion. TWG does not occur at present, although there is a possibility of future occurrence. Given the low likelihood of any adverse effect on potential TWG habitat, coupled with the implementation of the AMP/FOP, Alternative 1 may affect, but is not likely to adversely affect, TWG. No significant impact would occur.

Arroyo Toad

Construction. Based on the acreage of immediate construction impacts, i.e., work areas, plus reasonable buffer distances for incidental disturbance (see Appendix C-3) there are approximately 25.72 acres (10.41 hectares) of ARTO occupied riparian, freshwater, and open water habitat (i.e., breeding habitat) subject to direct effects by temporary and permanent construction in the Alternative 1 area on MCB Camp Pendleton. In addition, there are approximately 1.91 acres (0.77 hectares) of suitable ARTO aestivation (i.e., sometimes referred to as “upland” habitat) habitat on MCB Camp Pendleton that may incur direct effects by temporary and permanent construction in the Alternative 1 area on MCB Camp Pendleton. This habitat is located in the area of the inflatable weir diversion, O’Neill Ditch, production wells, conveyance pipelines, HDD drilling locations, and permanent access roads to the pipelines. It is recognized that ARTOs from a larger area, extending throughout the floodplain and to an unknown degree into adjacent uplands, may move through the Action Area and thereby be affected. The area of potential indirect effects is substantially larger as noted below under *Operations*.

Construction would permanently affect approximately 5.18 acres (2.10 hectares) of ARTO occupied riparian habitat, which will be mitigated in accordance with MCB Camp Pendleton’s Riparian/Estuarine BO (USFWS 1995a; see SCM-9 in Section 2.3.2.1). The analysis names approximately 2.14 acres of freshwater and riparian habitat at the Lake O’Neill ditch as being permanently impacted by the Proposed Action; although ARTO would not deposit egg strings within the Lake O’Neill ditch, the habitat is still considered breeding habitat for it is riparian habitat that toads may forage in or traverse. Construction would temporarily affect approximately 20.54 acres (8.31 hectares) of ARTO occupied riparian habitat on MCB Camp Pendleton, which will be restored following SCM-58 in Section 2.3.2.1.

Construction would permanently affect approximately 0.26 acres (0.11 hectares) of ARTO upland aestivation habitat, which will be compensated for in accordance with SCM-9 in Section 2.3. Construction would temporarily affect approximately 1.65 acres (0.67 hectares) of ARTO upland aestivation habitat on MCB Camp Pendleton, which will be restored following SCM-58 in Section 2.3; this acreage is reflected in Table 5-10.

Potential direct effects to ARTO individuals could occur within the proposed construction areas. During construction in ARTO habitat, ARTO that reside in or attempt to move through the project area would be at risk of injury or mortality from foot and vehicle traffic and earth-moving activities. ARTO behavior (foraging, breeding, and movement to and from riparian and adjacent aestivation habitats) may also be disrupted. Injury or mortality of tadpoles or eggs and instream disturbance of algal mats, sand bars, or sandy banks used by ARTO would be minimal since HDD drilling would be implemented at the Santa

Margarita River crossing thus avoiding the instream channel. Instream construction of the weir diversion structure would take approximately 2 months during the dry season, but within the construction footprint at this location, low-flow stream channels are not present directly above or below the weir to elicit ARTO breeding.

Arroyo toad density estimates were used in MCB Camp Pendleton's Basewide Utilities Infrastructure Biological Opinion (Basewide Utilities Infrastructure BO [USFWS 2010]) to help analyze the effects of the action on the arroyo toad. A similar analysis can be made using the same density estimates for the Santa Margarita watershed that was used in USFWS 2010, 0.72 arroyo toads/acre in upland (i.e., named aestivation habitat in this BA) habitat and 4.6 arroyo toads/acre in riparian (i.e., breeding) habitat. Therefore, Alternative 1 may result in 1.91 acres (0.77 hectares) of impacts (both permanent and temporary) to aestivation habitat within the Santa Margarita watershed, which could result in impacts to 1 arroyo toad. Alternative 1 may result in 25.72 acres (10.41 hectares; both permanent and temporary) of impacts to arroyo toad riparian breeding habitat within the Santa Margarita watershed, which could result in impacts to 118 arroyo toads; a total of 119 adult arroyo toads (rounded up to 120) may be may be located within the CUP construction footprint. Note that this estimate excludes metamorphs, which could significantly increase the number of arroyo toads impacted by construction from Alternative 1. However, the minimal footprint needed at the weir and at the HDD drilling locations will be surveyed by the biological monitor prior to construction impacts, thus reducing potential impacts to metamorphs.

Effects to ARTO would be minimized through implementation of the SCMs listed in Section 2.3.2.1. Based on relatively limited areas of effect and implementation of these measures, the potential for an adverse effect on individual ARTO would be minimized. Nevertheless, a few individuals may unavoidably be injured or killed during construction activities, although this would not affect population numbers or distribution on MCB Camp Pendleton. USFWS 2016 estimates that if 75 percent (or 90 individuals) of the 120 arroyo toads in the project footprint are successfully removed, then an estimated 25 percent (or 30 individuals) of the arroyo toads within the impact area will remain. USFWS (2016) assumes that all arroyo toads remaining in the impact area will be killed or injured, but few, if any, will be seen.

Operations. Depending on the nature of hydrologic modifications to the river system with operations, Alternative 1 may affect and is likely to adversely affect breeding ARTO habitat and the population in the SMR downstream of the proposed diversion (refer to Appendix C-4 for a more detailed description of the expected impacts to ARTO from the operation of Alternative 1). The operation of the inflatable diversion weir would include its lowering during peak flood events in order to allow sediment that has accumulated behind the weir to be flushed downstream. After the weir is lowered, as the pulse of sediment moves downstream, and as water velocities drop, coarser sediments would be left at the margins of the floodplain where waters have receded or tend to accumulate in areas of deep, slow-moving water. A renewed sediment supply for the lower part of the river would allow more natural geomorphic adjustments in channels, bars, and floodplain vegetation to occur, which would be beneficial to the ARTO in the long term.

However, the greatest impact on ARTO populations would be the increase of diversions and groundwater pumping to increase the sustained basin yield of the Lower SMR Basin. Diversion and recharge of surface water would be increased during Above Normal and Very Wet hydrologic conditions and curtailing groundwater pumping during dry hydrologic conditions; as a result, the Proposed Action would result in reduced surface flows in the SMR downstream from the inflatable weir except during Extremely Dry/Very Dry hydrologic conditions. Water withdrawals from the SMR would reduce flows, probably reducing the extent and seasonal persistence of shallow pools and slow-flowing areas favored by ARTO. Since water diversions would occur during the breeding period for ARTO on MCB Camp Pendleton (15 March to 15 August), changes in surface water flow could prevent reproduction or survival of individuals.

Since the number of ARTO individuals impacted is impossible to predict, the LSMR Model (see Section C-4) results were used to calculate the areal extent of impacted stream due to project conditions. With the Proposed Project (CUP Model run), an 11.6 % overall impact to the stream corridor is predicted over 50-years on modelled pumping and diversions. The decline in mean annual surface flow will mean less breeding habitat available for arroyo toads, with a proportional decline in egg laying and production of juvenile arroyo toads on the Lower SMR, all of which will contribute to a reduction in the future arroyo toad population on the Lower SMR. While arroyo toads can tolerate and persist in a wide range of riparian habitat conditions, Alternative 1 operations are anticipated to result in a decrease in quantity and quality of the available riparian habitat, a reduction of the invertebrate food prey base available, and increased exposure of arroyo toads to depredation, which will also contribute to a decrease in the arroyo toad population along the Lower SMR (USFWS 2016).To calculate impact acreage on arroyo toad habitat from operations, the evapotranspiration (ET) area outside of the low flow channel was evaluated based on analysis developed for the LSMR Model's evapotranspiration calculations. The model simulates phreatophyte ET that relies on groundwater and does not account for the water demand met by precipitation (e.g. grasses and shrubs that rely on precipitation). The datasets for the model included infrared and aerial photographs from 1980, 1982, 1989, and 1993; and Camp Pendleton's 1997 riparian vegetation survey. The phreatophyte ET was calculated by the model using a maximum potential ET rate, plant extinction depths, and groundwater levels; ET is estimated to decrease by 10.2%. Using recent aerial imagery, and basing the analysis on current vegetation conditions and developed areas within the Lower SMR floodplain, USFWS 2016 determined that about 2,223 acres of riparian habitat (including 135.70 acres of open water wetland habitat calculated in the MCBCP 2015) occurs between the location of the new weir and Stuart Mesa Road. Using density estimates from BUI (as used in the construction impacts analysis; 4.6 toads/acre), it is estimated that over 10,000 ARTO (juveniles, subadults, adults; 4.6 ARTO/acre x 2,223 acres= 10,226 ARTO) may occur in the lower reach of the SMR that is likely to be affected by Alternative 1. A 10.2 percent reduction in overall riparian vegetation cover over time is equivalent to about 225 acres (10.2% of 2,223 acres = 226.75) of impacts.

Following review of the September 2015 Biological Assessment (BA), a request was made by the USFWS to investigate impact to water resources in Survey Blocks 4 through 7 due to the critical nature of these reaches to support ARTO habitat (as defined during annual ARTO monitoring as containing dense populations of ARTO). Therefore, the Lower Santa Margarita River (LSMR) Model was refined that increased the predictive accuracy by relying on observed hydrological and biological datasets. In order to establish accountability and provide a physical relationship between historical and CUP operational data in the future, the investigative area was expanded to include Segment 8 which contains the long-term USGS stream gauge at Ysidora (see Appendix C-5). The results from the 10-year model were correlated with the 50-year model to assess the impact at survey blocks 4 to 8 during the balanced hydrologic period, showing a 14.6% decline in mean annual surface flow. Impacts occur during Below Normal and some Above Normal Hydrologic conditions due to a shift in the occurrence interval.

Effects to ARTO would be minimized through implementation of the SCMs listed in Section 2.3.2.1, including those based upon the modelled 11.6 % overall impact to the overall stream corridor and 14.6% decline in Survey Blocks 4 to 8 as predicted over 50-years on modelled pumping and diversions. USFWS 2016 states that successful arroyo toad breeding on the Lower SMR may not occur as extensively as it has in the recent past, but breeding should still occur on a regular basis. The overall arroyo toad population should continue to remain viable, though at a reduced level. USFWS 2016 suggests that with continued implementation of conservation measures, the arroyo toad population on the Lower SMR should be resilient to further declines or potential extirpation.

The Marine Corps is offsetting these impacts by deducting credits from the Riparian Bank, preserving the OSMZ, and contributing to the ARTO in-lieu fee program. 225 acres of riparian habitat on MCBCP has been restored by removing non-native invasive plant species consistent with the Riparian BO (coined the Riparian Bank; CM 9). This has increased the baseline of available breeding, feeding, and sheltering habitat for arroyo toad populations on MCBCP, making them more resilient to future operational impacts.

Preservation of habitat in the OSMZ could have long-term beneficial effects on ARTO that may, to some extent, offset potential adverse effects on the population in the Lower SMR. The 1398 acre OSMZ parcel is comprised of 115.25 acres of oak woodland, 37.81 acres of non-vegetated floodway, and 278.05 acres of riparian habitat for a total of 431.11 acres of riparian habitat significant to arroyo toad. These three habitat types surrounding the SMR support ARTO aestivating and foraging habitat. Conservation of the entire OSMZ watershed (upland areas) benefits MCBCP's arroyo toad population, since the OSMZ is directly upstream the Base along the SMR. Both the riparian and upland areas in the OSMZ act as a natural filter from the surrounding agricultural and urban areas, which attenuates pesticides and increased nutrients from those areas.

Preservation and management of riparian habitat for the ARTO in-lieu fee program (SCM 9 in Section 2.3.1.4) will offset potential adverse effects on the population in the Lower SMR. Since conservation of the OSMZ may not fully offset impacts to arroyo toad breeding habitat caused by CUP operations, the Marine Corps will also fund an "in lieu fee" with $2,316,000[24] that will be used to conserve additional property off of MCBCP that contains open water arroyo toad breeding habitat (CM-73.C). The in-lieu-fee cost was derived from off-setting 26.8% of projected operational impacts (project impacts equal 225 acres at a 2:1 ratio, for a total of 450 acres); therefore, 26.8% is the equivalent to off-setting 120.625 acres of the total impact. Cost of impact per acre was loosely based from Appendix 1 of the Riparian BO (USFWS 1995a) section 11.5.5 Alternative Mitigation Measures at $12,000 per acre (in 1994 dollars extrapolated forward for 2015 rate of inflation is $19,200). Although specific properties to be conserved have not been identified, USFWS 2016 expects that this fund will be used to conserve properties that have a significant amount of occupied open water arroyo toad breeding habitat within the southern California coastal region (i.e., within San Diego or Orange Counties), which may be threatened by the of loss or degradation of this habitat.

Conclusion. Alternative 1 may affect and is likely to adversely affect a small number of ARTO due to construction-related risks of injury or mortality which cannot be completely eliminated; a total of 119 adult arroyo toads may be may be located within the CUP construction Project Footprint, in addition to potential metamorphs. With the implementation of SCMs for temporary and permanent disturbance of riparian and aestivation habitat, minor short-term and negligible long-term adverse effects to individual toads would occur from construction. These impacts represent a fraction of the available arroyo toad habitat within the affected populations and are largely temporary. USFWS (2016) concludes that the restored areas after construction will be reoccupied by ARTO shortly following restoration efforts, that the permanent loss of habitat only represents a fraction of the thousands of acres of occupied ARTO

[24] This is 26.8% of 2:1 ratio of deductions to impacts.

habitat on MCB Camp Pendleton and rangewide, and that the potential loss of ARTO due to construction is not anticipated to increase the extinction risk of the Lower SMR population of ARTO.

Depending on the nature of hydrologic modifications to the river system with operations, Alternative 1 may affect and is likely to adversely affect breeding arroyo toad habitat and the population in the SMR downstream of the proposed diversion. The decrease in water flow to the lower reaches of the SMR over a 50-year modelled period could have adverse effects slow-flowing areas that arroyo toads use for egg deposition and breeding support habitat, thereby affecting the population size on MCB Camp Pendleton. Using hydrologic modelling, it is estimated that over a 50-year period, surface flow in the SMR below the weir will decrease by 11.6% and ET by 10.2%. In addition, in Survey Blocks 4-8, surface flow in the SMR will decrease by 14.6%. Factors that influence the quantity of impacted stream-supported habitat include soil moisture, soil composition, and depth to water. The AMP/FOP would implement a hydrologic and soil moisture monitoring program, in combination with an arroyo toad monitoring program, to develop the relationship between groundwater levels and arroyo toad habitat along the SMR corridor. Impacts to arroyo toad will be minimized with conditions named in the AMP/FOP and SCMs in Section 2.3.2.1.

Restoring 225 acres of riparian habitat on MCBCP has increased the baseline of available breeding, feeding, and sheltering habitat for arroyo toad populations on MCBCP, making them more resilient to future operational impacts. Preservation of habitat in the OSMZ could have long-term beneficial effects on ARTO that may, to some extent, offset potential adverse effects on the population in the Lower SMR. Preservation and management of riparian habitat for the ARTO in-lieu fee program (SCM 9 in Section 2.3.1.4) will offset potential adverse effects on the population in the Lower SMR. USFWS (2016) anticipates a reduction in the overall population of arroyo toads on the Lower SMR due to future operations, however the SCMs will limit reduction in surface flows due to future CUP operations so that they are no greater than modeled as part of this consultation. This measure will maintain flows sufficient to ensure regular breeding and a stable population of arroyo toads on the Lower SMR. USFWS 2016 opinion is that Alternative 1 will not appreciably reduce the numbers, reproduction, or distribution of arroyo toads on MCBCP or rangewide or significantly impact recovery of the species.

California Least Tern

Construction. Under Alternative 1, no construction activities would occur in or near the SMR Estuary. Therefore, no effects to CLTE are expected from construction; the southernmost construction site in the Proposed Action footprint is over eight kilometers upstream from the Santa Margarita Estuary, where California least tern occur.

Operations. Operational activities associated with the new inflatable diversion weir and increased groundwater pumping will have minimal, if any, effects on the water quality that flows in the SMR estuary and on the duration of estuary closure beyond historical occurrence. Operational activities would result in brine discharge into the Pacific Ocean from the Oceanside Ocean Outfall. This is not expected to have any effect on water quality or marine communities, or to alter foraging conditions for CLTE.

CLTE forage in the SMR Estuary, but more frequently in the ocean, and nest on the margins of the estuary. Although Alternative 1 would result in reduced surface flows in the SMR downstream from the inflatable weir except during Extremely Dry/Very Dry hydrologic conditions, it is unlikely that this would affect tidal flushing; therefore, the availability of beach habitat for roosting and nesting on the margins of the estuary will not be diminished. Circumstances leading to closure and subsequent breaching at the mouth of the lagoon are largely controlled by large-scale seasonal and inter-annual patterns of drought and rainfall, such that any added effect of the project would be very small. With the implementation of the

AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, it is expected that consideration would be given to modifying operations (e.g., to allow increased river flows to facilitate natural breaching of a berm at the mouth) when it would help avoid worsening conditions in the estuary.

Conclusion. With the implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, CLTE nesting habitat and foraging conditions would be maintained in the SMR estuary. As such, Alternative 1 may affect, but is not likely to adversely affect the CLTE. Therefore, Alternative 1 would not have a significant impact on the CLTE.

Snowy Plover

Construction. Under Alternative 1, no construction activities would occur in vicinity of SNPL habitat. Therefore, no effects to SNPL are expected due to construction; the southernmost construction site in the footprint is over 8 kilometers upstream from the Santa Margarita Estuary, where western snowy plover occur.

Operations. Operational activities associated with the new inflatable diversion weir and increased groundwater pumping will have minimal, if any, effects on the water quality that flows in the SMR estuary and on the duration of estuary closure beyond historical occurrence. Operational activities would result in brine discharge into the Pacific Ocean from the Oceanside Ocean Outfall. This is not expected to have any effect on water quality or marine communities, or to alter foraging conditions for the SNPL.

SNPL are present nesting and foraging on the flats and shorelines of the SMR Estuary. Although the Proposed Action would result in reduced surface flows in the SMR downstream from the inflatable weir except during Extremely Dry/Very Dry hydrologic conditions, it is unlikely that this would affect tidal flushing; therefore, the availability of beach habitat for roosting and nesting above the high tide line or the abundance of invertebrate prey species would not be diminished.

Circumstances leading to closure and subsequent breaching at the mouth of the lagoon are largely controlled by large-scale seasonal and inter-annual patterns of drought and rainfall, such that any added effect of the project would be very small. Berm formation and estuary closure usually occur during the dry summer-fall months and are unlikely during the spring when SNPL are nesting. With the implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, it is expected that consideration would be given to modifying operations (e.g., to allow increased river flows to facilitate natural breaching of a berm at the mouth) when it would help avoid worsening conditions in the estuary.

Conclusion. The action would have no direct effects on individual SNPL, and with the implementation of the AMP/FOP, it is very unlikely that there would be any negative impact to the estuarine and beach habitat used for nesting and foraging. Thus, the action may affect, but is not likely to adversely affect the SNPL. Therefore, Alternative 1 may affect, but is not likely to adversely affect the SNPL.

Ridgway's Rail, formally Light Footed Clapper Rail

Construction. Under Alternative 1, no construction activities would occur in or near the SMR Estuary. Therefore, no effects to RIRA are expected due to construction activities; the southernmost construction site in the project footprint is over 8 kilometers upstream from the Santa Margarita Estuary, where Ridgway's rail occur.

Operations. Operational activities associated with the new inflatable diversion weir and increased groundwater pumping will have minimal, if any, effects on the water quality that flows in the SMR estuary and on the duration of estuary closure beyond historical occurrence. Operational activities would result in brine discharge into the Pacific Ocean from the Oceanside Ocean Outfall. This is not expected to have any effect on water quality or marine communities, or to alter foraging conditions for the RIRA.

RIRA are present nesting and foraging within the coastal marsh habitats of the SMR Estuary, anywhere from the SMR rivermouth to the areas further upstream west of Stuart Mesa Road. Although the Proposed Action would result in reduced surface flows in the SMR downstream from the inflatable weir, it is unlikely that this would affect streamflow or habitat near the estuary; therefore, the availability of marsh habitat for the RIRA or the abundance of prey species (arthropods, clams, mussels, etc.) would not be diminished.

Circumstances leading to closure and subsequent breaching at the mouth of the lagoon are largely controlled by large-scale seasonal and inter-annual patterns of drought and rainfall, such that any added effect of the project would be very small. With the implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, it is expected that consideration would be given to modifying operations (e.g., to allow increased river flows to facilitate natural breaching of a berm at the mouth) when it would help avoid worsening conditions in the estuary.

Conclusion. Alternative 1 would have no direct effects on individual RIRA, and with the implementation of the AMP/FOP, it is very unlikely that there would be any negative impact to the estuarine and coastal salt and freshwater marsh habitat used for nesting and foraging. Thus, the action may affect, but is not likely to adversely affect the RIRA.

Least Bell's Vireo

Construction. Using 2010 and 2014 MCB Camp Pendleton base-wide survey data and 2008 and 2013 DET Fallbrook installation-wide survey data an average of 87 LBVI territories overlap the area of potential direct impact (500 ft buffer/ROI) for Alternative 1 (see Appendix C for the Effects Analysis; MCBCP 2015,) (*Note*: the LBVI territory calculation is modeled after the LBVI effects analysis in the Basewide Utilities Infrastructure BO [USFWS 2010] using a territory size of 1.9 acres [0.8 hectare], which is the LBVI territory size documented in a similar habitat and environmental conditions).

The principal permanent construction effect of the Alternative 1 would be the loss of LBVI habitat. Construction would permanently affect approximately 5.20 acres (2.10 hectares) of riparian habitat occupied by LBVI, all of which occurs on MCB Camp Pendleton at the diversion weir, O'Neill Ditch, production wells, conveyance pipelines, HDD drilling locations, and permanent access roads. Construction would temporarily affect approximately 21.98 acres (8.89 hectares) of LBVI-occupied riparian habitat (21.72 acres [8.79 hectares] on MCB Camp Pendleton and 0.26 acres [0.11 hectares] on DET Fallbrook). The majority of these temporary impacts would occur in the location along O'Neill Ditch, the production wells, and conveyance pipelines. Small areas of riparian habitat also occur along the bi-directional pipeline corridor on MCB Camp Pendleton and DET Fallbrook. Direct impacts to LBVI-occupied riparian habitat would be compensated in accordance with MCB Camp Pendleton's Riparian/Estuarine BO (USFWS 1995a) (refer to SCM 32 in Section 2.3.1.4).

A total of 27 LBVI territories all on MCB Camp Pendleton would potentially be directly impacted (see Appendix C-1); with 10 (9.5 rounded up) LBVI territories having >20% of the territory impacted by construction, thus rising to a level of "take" (i.e., adverse impact) since the impact will substantially increase the risk of mortality or interfere with vireo breeding activity. LBVI within construction footprint areas would experience a direct loss of foraging/nesting habitat, whereas birds within the construction buffer distance could have breeding and/or foraging behavior disrupted, with attendant effects on reproduction, energetics, or predation risk. Temporarily impacted habitat will be restored and is likely to be re-occupied by vireos within 2 to 7 years after restoration.

To minimize impacts to LBVI, construction would take place outside the breeding season to the maximum extent practicable. Construction at the diversion weir must take place during the LBVI breeding season; since this is when flow is lowest in the SMR. To determine how many LBVI may be significantly impacted by construction at the weir, the number of LBVI territories from 2010 and 2014 that overlap within 250 ft. of construction was noted (Figure XX); 250 feet is the distance assumed where LBVI would be significantly impacted (e.g., breeding or foraging behavior would be disrupted); versus 251-500 feet where LBVI would be subjected to indirect effects that are less than significant. It is estimated that a maximum of six LBVI territories (six territories were present in 2010; three territories in 2014) around the weir may be significantly impacted during construction during the breeding season. Overall, the USFWS Biological Opinion (BO) estimates that a disturbance of vireos related to CUP construction is likely to reduce reproduction up to eight LBVI pairs over the 3-year duration of construction, but this limited reduction in reproduction will only have a minor effect on vireos in the action area and range wide (USFWS 2016).

Operations. Riparian habitat along the SMR has consistently supported breeding LBVI (MCB Camp Pendleton 2011); the riparian habitat downstream of the weir location supports approximately 50% of the MCB Camp Pendleton population (Lynn and Kus 2011; MCB Camp Pendleton 2012a,b). Multiple factors for watershed management can affect riparian habitat, but research has not been conducted specifically for LBVI habitat use in Southern California, as it relates to either groundwater pumping or water diversion. The CUP Model indicates that there will be a reduction in evapotranspiration from riparian vegetation when compared to recent management conditions as described in Section 3.2.4.3. The impact to LBVI habitat due to lower groundwater levels and the subsequent reduction in evapotranspiration by riparian vegetation was modelled for the USFWS Section 7 Consultation 3.2.4.3. These impacts would be minimized through successful implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*. The AMP/FOP would implement riparian vegetation monitoring to help measure impacts to LBVI nesting and foraging habitat, and minimize effects to nesting pairs or reproduction.

Due to the modelled reduction in evapotranspiration of 10.2% of riparian habitat below the diversion structure, it is assumed that the general decline in the quantity and quality of the riparian habitat will be dispersed across the entire Lower SMR and occur over an extended period of time. Over time, individual vireos will adjust their territory boundaries according to the amount and configuration of suitable habitat; habitat thinning and loss of understory may require that vireos expand their territories to encompass required foraging and nesting resources. Some vireos may be forced to abandon their territories in favor of more suitable habitat. Vireos that successfully establish territories in habitat elsewhere are expected to experience reduced productivity (e.g., delayed initiation or prevention of nest building, fewer nesting attempts per season, and/or overall reduction in reproductive output) due to reduced availability of foraging and breeding habitat and increased territorial interactions. If displaced birds cannot find suitable habitat to forage and shelter in, it is anticipated they will be more vulnerable to predation and otherwise may die or be injured (USFWS 2016).

Based on the projected average decline of 10.2 percent in evapotranspiration rates, the USFWS 2016 predicts a proportional loss of riparian vegetation cover and that the carrying capacity for LBVI on the Lower SMR will proportionately decline by about 10.2 percent over time. Using this decline in carrying capacity, and the average of 438 vireo territories on the Lower SMR, a loss of up to 45 LBVI territories over time on the Lower SMR as a result of future CUP operations is expected.To partially offset projected operational impacts to vireos, the Marine Corps will deduct 225 credits from the Riparian BO Habitat Ledger (CM-9). Credits used from Riparian BO Habitat Ledger represent riparian habitat that has already been restored or enhanced through removal of non-native invasive plant species per the Riparian BO (USFWS 1995a) and the INRMP; and will be maintained or will fully recover to high-quality habitat.

Preservation and management of riparian habitat in the OSMZ could have long-term beneficial effects on LBVI habitat which may, to some extent, offset effects on the LBVI population in the Lower SMR. The Marine Corps estimates that the OSMZ contains 393.3 acres of riparian habitat suitable for vireo breeding, feeding, and sheltering. The Marine Corps will contribute funds necessary to conserve 105 acres of open water and riparian habitat in the OSMZ.

Preservation and management of riparian habitat for the ARTO in-lieu fee program (SCM 9 in Section 2.3.1.4) may also have long-term beneficial effects on LBVI habitat, if habitat that is chosen for ARTO conservation also harbors LBVI, which is highly likely.

Conclusion. The Proposed Action may affect and is likely to adversely affect LBVI due to construction-related removal of occupied habitat and indirect effects (construction during the breeding season), which cannot be completely eliminated. Vegetation clearing will occur outside of the breeding season per avoidance and minimization measures; therefore, potential direct effects to individual nests are unlikely to occur. For significant impacts, a total of 10 LBVI territories may be located within the CUP construction Project Footprint and are estimated to have greater than 20% of the territory impacted, thus resulting in a substantial, albeit short-term impact. In addition, there is a likliehood of eight LBVI pairs over the 3-year construction duration to have a reduction in reproduction. Approximately 87 LBVI territories may be located within 500-feet of the construction footprint and be subjected to indirect effects that are less than substantial. With the implementation of SCMs for temporary and permanent disturbance of LBVI-occupied riparian habitat, minor short-term and negligible long-term adverse effects to individual vireos would occur from construction. These impacts represent a fraction of the available least Bell's vireo habitat within the affected populations and are largely temporary.

Using the modelled decline of 10.2% of evaportranspiration in the riparian system below the diversion structure, USFWS 2016 estimates that there may be a loss of up to 45 LBVI territories on the Lower SMR as a result of future CUP operations. The AMP/FOP would implement a riparian habitat monitoring program in combination with the LBVI monitoring program, in coordination with those stakeholders with extensive knowledge of the least Bell's vireo population dynamics within the Santa Margarita River. Impacts to vireo will be minimized with avoidance, minimization, and compensation measures named in the AMP/FOP and SCMs in Section 2.3.1.4, *Special Conservation Measures*. USFWS 2016 supposes that impacts due to CUP operations are likely to reduce the overall vireo population on the Lower SMR; however, this population will remain stable due to the Marine Corps high level of management through the Riparian BO and INRMP. In addition, the OSMZ will provide high quality LBVI habitat, as well as the in-lieu fee program potentially.

Southwestern Willow Flycatcher

Construction. There are no recent SWFL territories within the areas of potential permanent and temporary impact for Alternative 1 on MCB Camp Pendleton and DET Fallbrook Figure 4.3-1).

Given the long-term absence of SWFL from potential construction areas, combined with the implementation of SCMs listed in Section 2.3.1.4, construction-related disturbance to SWFL nesting behavior is unlikely. In addition, vegetation clearing during the breeding season would not occur and disturbance to riparian habitat in the SMR would be minimized per avoidance and minimization measures; therefore, potential direct effects are unlikely to occur. The principal direct effect of the Alternative 1 would be the loss of potential (future) SWFL foraging and breeding habitat. Construction would permanently affect approximately 5.20 acres (2.10 hectares) and temporarily affect 22.34 acres (9.04 hectares) of riparian habitat on both MCB Camp Pendleton and DET Fallbrook (Table 3.3-2).

To determine the number of southwestern willow flycatcher adjacent to the project footprint where breeding and/or foraging behavior of SWFL could potentially be disrupted (i.e., within the construction buffer distance), the following calculation modeled after the LBVI effects analysis in the BUI BO (Basewide Utilities Infrastructure BO [USFWS 2010]) was used: the number of SWFL territories (territory boundaries are defined in the Annual Reports issued by USGS; Howell 2014) that overlap with the maximum CUP Project Footprint (the 500 ft. buffer/ROI) was counted. Using this calculation, it is estimated that the maximum CUP Project footprint overlaps with one flycatcher polygynous territory on MCB Camp Pendleton; the 2011 territory is approximately 480 feet and the 2014 territory is approximately 270 feet away from the proposed project footprint (Table 3.3-4). The maximum number of nests from the 2010-2014 dataset notes that there were seven nests attempted in this polygynous territory (in 2013). The majority of this occupied habitat burned in the May 2014 wildfire; however, MCB Camp Pendleton began a habitat restoration project within this area in 2015. Due to the May 2014 wildfire and recent (2012-2014) drought, the SWFL may be expanding/changing their territory boundaries (as noted in 2014 when the territory expanded). Although SWFL have high site fidelity, when construction is projected to start in 4-6 years, breeding SWFL may potentially move closer to the SMR/project footprint.

Potential interference with foraging or movements by SWFLs in this location is of concern because the SWFL breeding population and area of occupied habitat on MCB Camp Pendleton is very small. Disturbance to individuals in this small population could cause them to abandon the area, and the numbers are so low as to limit future breeding opportunities among remaining individuals. Therefore, to minimize indirect impacts to SWFL during construction, construction adjacent to current occupied SWFL habitat would take place outside of the southwestern willow flycatcher breeding season (SCM-XX; SCM-88). In addition, in other portions of the construction footprint that are adjacent to riparian habitat, the project biological monitor will receive a report with current SWFL breeding survey information (or if that's not available, a biological monitor would conduct pre-construction surveys focusing on southwestern willow flycatcher) to note any SWFL adjacent to the project footprint (SCM-89). If territorial SWFL are confirmed within 250 feet (76 m) of the construction footprint during the breeding season (May 15 to August 31), then construction activities would be halted until MCB Camp Pendleton could confer with the Service.

Operations. Riparian habitat along the Lower SMR is the only location on MCB Camp Pendleton that currently supports breeding SWFL; although in 2012, territories (one at each locale with no confirmed breeding) were established at Lake O'Neill on Fallbrook Creek and at the Sierra percolation ponds (Howell and Kus 2012); in 2013, one additional territory was established at Pilgrim Creek with no confirmed breeding (Howell and Kus 2013); and in 2014, one nesting female was detected at Pilgrim Creek (Howell and Kus 2014).

SWFL nest building generally occurs mid-May to mid-July (USGS 2010b), with the SMR typically drying up downstream of Basilone Bridge by July. SWFL breed in dense riparian habitats where surface water is present or soil moisture is high enough to maintain vegetation structure (USGS 2010b), and often rely on aquatic insects for a food source. However, hydrologic conditions in the Southwest are typically variable, with water availability at a site fluctuating over the course of a breeding season or from year to year (USGS 2010b). Due to the modelled reduction in evapotranspiration of 10.2% of riparian habitat below the diversion structure, it is assumed that the general decline in the quantity and quality of the riparian habitat will be dispersed across the entire Lower SMR and occur over an extended period of time. Over time, for the reasons mentioned above for the LBVI, individual SWFL may adjust their territory boundaries or abandon their territories within this degraded riparian habitat (USFWS 2016). Based on the projected average decline of 10.2 percent in evapotranspiration rates, USFWS 2016 predicts a proportional loss of riparian vegetation cover and that the carrying capacity for SWFL on the Lower SMR will proportionately decline by about 10.2 percent over time. Using this decline in carrying capacity, and the average of 10 flycatcher territories on the Lower SMR, a loss of up to two SWFL territories over time on the Lower SMR as a result of future CUP operations is expected. However, these impacts would be minimized through successful implementation of the AMP/FOP, as described in Section 2.3.1.4, Special Conservation Measures and the addition of three groundwater pumps on the Lower SMR to create artificial seeps that are expected to promote conditions favorable for flycatcher breeding, feeding, and sheltering.

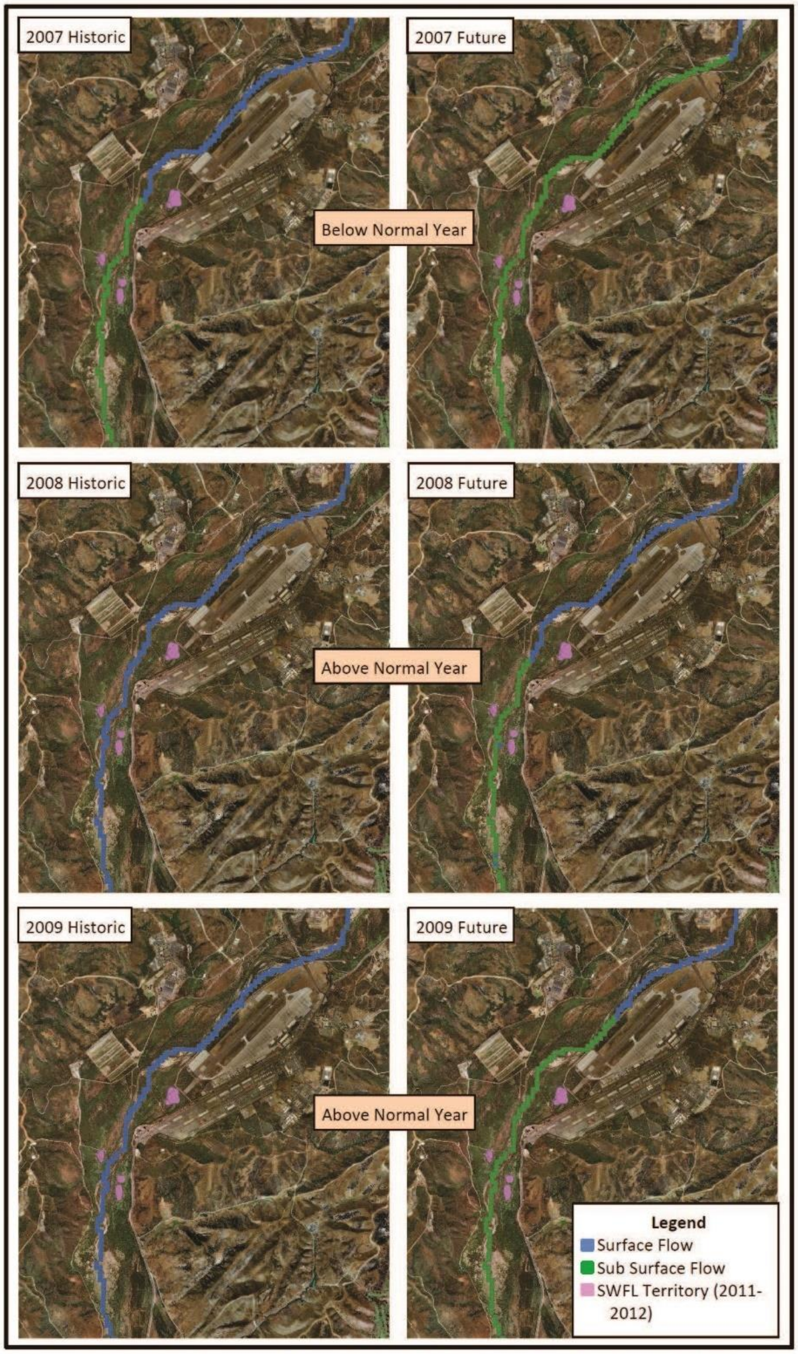

Figure 4.3-1. Historic versus Future Flow Conditions using the Lower SMR Model in Relation to SWFL Breeding Locations

Figure 4.3-1. Historic vs, Future Flow Conditions Using the Lower SMR Model in Relation to SWFL Breeding Locations

As noted in SCM-13, MCB Camp Pendleton proposes to enhance southwestern willow flycatcher habitat by creating saturated soil adjacent to extant SWFL breeding populations by installing three low volume, shallow groundwater irrigation pumping wells. Updated information from the annual SWFL monitoring and Riparian Ecosystem Health Monitoring program will be used to ascertain the effectiveness of soil saturation. With the creation of these seeps, USFWS (20160 anticipates that the loss of the two flycatcher territories will be avoided. In addition, placement of the seeps will provide useful information for managing flycatchers on MCBCP and throughout the Coastal California Recovery Unit (USFWS 2016).Preservation and management of riparian habitat in the OSMZ could have long-term beneficial effects on the SWFL critical habitat. However, the SWFL does not currently nest in the OSMZ, and its future use of that location depends on expanding numbers from other locations, a function of the overall recovery of the population.

Preservation and management of riparian habitat for the ARTO in-lieu fee program (SCM 9 in Section 2.3.1.4) may also have long-term beneficial effects on SWFL habitat, if habitat that is chosen for ARTO conservation also harbors SWFL.

Conclusion. Alternative 1 may affect and is not likely to adversely affect southwestern willow flycatcher due to construction-related project activities: occupied SWFL habitat is not being impacted directly by the project and indirect effects are negligible due to construction activities avoiding known SWFL occupied habitat during the breeding season. Vegetation clearing will occur outside of the breeding season per avoidance and minimization measures; therefore, potential direct effects to individual nests (if SWFL happen to nest outside of their current known territories) are unlikely to occur. Approximately one SWFL polygynous territory may be located within 500-feet of the construction footprint and be subjected to indirect effects; therefore, breeding season restrictions have been imposed upon construction this is area to avoid any impacts. With the implementation of the SCMs, the effects to individual flycatchers from construction are minor.

Depending on the nature of hydrologic modifications to the river system with operations, Alternative 1 may affect, likely to adversely affect southwestern willow flycatcher in the SMR downstream of the proposed diversion. However, even with a modelled decline of 10.2% of evaportranspiration in the riparian system below the diversion structure, USFWS (2016) states that Alternative 1 is not expected to reduce the numbers, reproduction, or distribution of flycatchers on the Base, or impact recovery of the species.

The AMP/FOP would implement a riparian habitat monitoring program in combination with the SWFL monitoring program, in coordination with those stakeholders with extensive knowledge of the southwestern willow flycatcher population dynamics within the Santa Margarita River. In addition, MCB Camp Pendleton will implement measuring soil moisture of SWFL occupied habitat in the AMP/FOP, and set up artificial seeps to enhance currently occupied SWFL habitat. With the SWFL seeps, soil moisture shall remain high enough to support the current vegetation structure and provide foraging that supports nesting SWFL. In addition, the OSMZ will provide critical high quality SWFL habitat, albeit currently unoccupied. Through successful implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, habitat would be regularly monitored and if the riparian habitat value where the SWFL breed is reduced, operations would be re-evaluated, which may include re-initiation of consultation with the USFWS. No long-term effects on the SWFL population on MCB Camp Pendleton are anticipated.

California Gnatcatcher

Construction. Using 2010 and 2014 MCB Camp Pendleton base-wide survey data and 2009 and 2014 DET Fallbrook installation-wide survey data an average of 15.5 CAGN territories overlap the area of potential direct impact (500 ft buffer/ROI) for Alternative 1 (see Appendix C for the Effects Analysis; MCBCP 2015,) (*Note*: the CAGN territory calculation is modeled after the CAGN effects analysis in the Basewide Utilities Infrastructure BO [USFWS 2010] using a territory size of 5.70 acres [2.30 hectares], which is the gnatcatcher territory size documented in a similar habitat and environmental conditions).

The permanent effect of construction under Alternative 1 on CSS would be the loss of approximately 0.42 acre (0.17 hectare) of CAGN unoccupied CSS habitat on MCB Camp Pendleton near the diversion weir, O'Neill ditch, and at pump station locations along the bi-directional pipeline route (see Table 4.3-1). A small 0.01 acre (<0.01 hectare) area of occupied CAGN habitat at the O'Neill ditch could be permanently impacted on MCB Camp Pendleton.

Construction would temporarily affect approximately 15.25 acres of CAGN occupied CSS habitat (4.08 acres on MCB Camp Pendleton and 11.17 acres on DET Fallbrook). A total of six (5.5 rounded up) CAGN territories all on MCB Camp Pendleton and DET Fallbrook would potentially be directly impacted (see Appendix C-1); with two CAGN territories having >20% of the territory impacted by construction, thus rising to a level of "take" (i.e., adverse impact) since the impact will substantially increase the risk of mortality or interfere with gnatcatcher breeding activity. The area of actual effect could potentially be smaller than the acreages described above. This is because the majority of the occupied temporary impact area (15.18 acres [6.14 hectares]) occurs along the bi-directional pipeline, which would only involve temporary impacts inside a 50-ft (15-m) wide corridor located within the larger 100-ft (30-m) wide buffer corridor used for acreage calculations. An analysis of the wider 100-ft (30-m) buffer areas has been provided to allow the flexibility of placing the pipeline anywhere within the buffer area to meet site-specific construction needs and minimize effects. Individual CAGN may be displaced to adjacent habitat, especially along the pipeline corridors. In addition, construction is predicted to start 4-6 years after the May 2014 wildfires; the coastal sage scrub habitat in the burned territories that are predicted to be impacted may or may not have recovered by the time of construction start and thus not necessarily occupied by CAGN at time of construction CSS vegetation removal.

Apart from vegetation removal, temporary direct effects would include the potential disturbance of CAGN during construction due to noise, traffic, and human occupancy in the project vicinity. Noise and indirect effects may extend into adjacent habitat occupied by CAGN. Individuals could be displaced to adjacent areas, and may experience energetic costs or increased risk of predation as a result; either of which may affect subsequent survival and reproduction. The USFWS Biological Opinion (BO) estimates that a disturbance of gnatcatchers related to CUP construction is likely to reduce reproduction for two CAGN pairs over the 3-year duration of construction, but this limited reduction in reproduction will only have a minor effect on gnatcatchers in the action area and range wide (USFWS 2016).

Effects to CAGN would be minimized through implementation of the SCMs listed under *Biological Resources* in Section 2.3.1.4.

The action area is already subject to noise and traffic due to training and existing roads. Noise, lighting, vehicles, and human occupancy associated with the proposed project would temporarily increase the amount and duration of noise and human activity, but this effect would be short-term and localized and would not be expected to negatively affect CAGN on a regional scale. Areas of temporarily disturbed CSS habitat would be restored per the SCMs.

Operations. The operational effects include both diversion of water at the weir and ground-water pumping and their associated impacts to individuals and habitat. The combination of these operations will decrease the surface flow in the Santa Margarita River and may potentially impact native habitat around the well locations, where ground-water is being pumped out of the watershed. CAGN habitat is located outside of the floodplain of the SMR, and should not be impacted by operations. 9 out of 16 wells (including both operational and proposed) are located within riparian habitat. The upland well locations are located within grassland habitat near the Santa Margarita River on MCBCP; the closest CAGN territory to a groundwater well is 611-ft to the southeast. Since CAGN occupy over 0.11 miles from groundwater pumping wells, direct and indirect effects from operations of the Project Action are not predicted to impact CAGN-occupied coastal sage scrub.

Conclusion. Alternative 1 may affect and is likely to adversely affect CAGN due to construction-related removal of occupied habitat, albeit temporary, which cannot be completely eliminated. Vegetation clearing will occur outside of the breeding season per avoidance and minimization measures; therefore, potential direct effects to individual nests are unlikely to occur. A total of two CAGN territories within the CUP construction Project Footprint is estimated to have greater than 20% of the territory impacted, thus resulting in a substantial, albeit short-term impact. In addition, approximately 16 (15.5 rounded up) CAGN territories may be located within 500-feet of the construction footprint and be subjected to indirect effects, with the likliehood of two CAGN pairs over the 3-year construction duration to have a reduction in reproduction. With the implementation of SCMs for temporary and permanent disturbance of CAGN-occupied coastal sage scrub habitat, minor short-term and negligible long-term adverse effects to individual gnatcatchers would occur from construction. These impacts represent a fraction of the available gnatcatcher habitat within the affected populations and are predominantly temporary. Therefore, no effect on the overall distribution or abundance of the species (i.e., no long-term effects on the CAGN population) on MCB Camp Pendleton or DET Fallbrook is anticipated.

Stephens' Kangaroo Rat

Construction. SKR surveying was conducted within the Alternative 1 project footprint, and within 300 feet from the footprint in appropriate habitat, in October and November 2015. Four locations of SKR were trapped during the survey effort: one within the footprint, and three within the 300 ft. buffer (Montgomery 2015).

With project construction of Alternative 1, there is a total potential effect to approximately 1.29 acres of SKR occupied habitat; all effects are temporary from the construction of the Bi-directional Pipeline and located on Detachment Fallbrook (refer to Appendix C). An impact of 1.29 acres represents about 1 percent of the 2007 estimate, and about 0.3 percent of the 2001-2002 estimate of population on Detachment Fallbrook; USFWS 2016 states that because only a fraction of the population will be impacted, displacement of SKR in the project footprint is not anticipated to have a long-term effect on the SKR population on Det. Fallbrook. A territory is considered significantly impacted if greater than 20% will be impacted. (*Note*: to estimate significant impacts, a 50-meter buffer was created around each positive SKR trap location during the 2015 effort. The 50-meter buffer represents an estimate of SKR "typical movements", where the individual typically moves short distances within its home territory). In total, two of the four territories of SKR have significant impacts.

The area of actual effect could potentially be smaller than the acreages described above. This is because the occupied temporary impact area occurs along the bi-directional pipeline, which would only involve temporary impacts inside a 50-ft (15-m) wide corridor located within the larger 100-ft (30-m) wide buffer corridor used for acreage calculations. An analysis of the wider 100-ft (30-m) buffer areas has been provided to allow the flexibility of placing the pipeline anywhere within the buffer area to meet site-specific construction needs and minimize effects.

Individual SKR will be trapped out of the project footprint, and may be displaced to adjacent habitat, especially along the pipeline corridors. With implementation of the proposed conservation measures, USFWS 2016 predicts that death or injury of up to two SKR with home ranges overlapping the bi-directional pipeline construction footprint will be avoided with siting the pipeline away from habitat and installing exclusionary fencing.

Operations. As described for other federally-listed species, the operational effects include both diversion of water at the weir and ground-water pumping and their associated impacts to individuals and habitat. The combination of these operations will decrease the surface flow in the Santa Margarita River and may potentially impact native habitat around the well locations, where ground-water is being pumped out of the watershed. SKR habitat is located outside of the floodplain of the SMR, and should not be impacted by operations. 9 out of 16 wells (including both operational and proposed) are located within riparian habitat. The upland well locations are located within grassland habitat near the Santa Margarita River on MCBCP; the closest SKR population to a groundwater well is 2429.53 ft to the southeast, at 25 Area Combat Town. Since SKR occupy over 0.46 miles from groundwater pumping wells, direct and indirect effects from operations of the Project Action are not predicted to impact SKR-occupied habitat.

Conclusion. Alternative 1 may affect and is likely to adversely affect SKR due to construction-related removal of occupied habitat, albeit temporary, which cannot be completely eliminatedA total of two SKR territories within the CUP construction Project Footprint is estimated to have greater than 20% of the territory impacted, thus resulting in a substantial, albeit short-term impact. Although, USFWS 2016 believes that these SKR will be relocated with exclusionary trapping and that construction activities will not lead to mortality or injury of any SKR. With the implementation of SCMs for temporary and permanent disturbance of SKR-occupied habitat, minor short-term and negligible long-term adverse effects to individual kangaroo rats would occur from construction. These impacts represent a fraction of the available SKR habitat within the affected populations and are temporary. Therefore, no effect on the overall distribution or abundance of the species (i.e., no long-term effects on the SKR population) is anticipated. In addition, USFWS 2016 expects the restored areas to be re-occupied shortly after restoration efforts.

San Diego Fairy Shrimp/Riverside Fairy Shrimp

Construction. Fairy shrimp have not been documented in Alternative 1 action areas; therefore, construction will not affect SDFS/RFS. To minimize risks to SDFS/RFS potentially occurring within the proposed construction areas, the SCMs listed under *Biological Resources* in Section 2.3.1.4 would be implemented.

Operations. Fairy shrimp have not been documented in Alternative 1 areas or ROI; therefore, no adverse operational effects to SDFS/RFS would occur.

Conclusion. Because SDFS/RFS have not been documented in the Alternative 1 action area, no potential temporary or permanent disturbance would occur. Alternative 1 would have no effect on SDFS/RFS. No significant impacts would occur.

State-Listed Threatened and Endangered Species

Belding's Savannah Sparrow

Construction. As of 2010, 100 territories of BSSP were found in the SMR Estuary. Under the Proposed Action, no construction activities would occur in or near the SMR Estuary. Therefore, no effects to BSSP are expected from construction; the southernmost construction site in the Proposed Action footprint is over 8 kilometers upstream from the Santa Margarita Estuary, where Belding's Savannah Sparrow occurs.

Operations. As discussed for RIRA, CLTE, and SNPL, it is unlikely that tidal circulation and habitat conditions in the SMR Estuary would be negatively impacted by Alternative 1. The closure and subsequent opening of the mouth of the estuary is largely controlled by large-scale conditions of climate and long shore sediment transport. Existing conditions that lead to estuary closure (seasonal low flows) and breaching of the berm by the first high flows of the rainy season would be little if at all affected by Alternative 1. With the implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, it is expected that consideration would be given to modifying operations (e.g., to allow increased river flows to facilitate natural breaching of a berm at the mouth) when it would help avoid worsening conditions in the SMR Estuary.

Conclusion. Given the persistence of the BSSP population in the SMR Estuary throughout recent history, including periods of prolonged closure that occurred prior to and during 2010, the increased possibility of closure does not pose a threat to the local population (Zembel *et al.* 2006; MCB Camp Pendleton 2011). Alternative 1 would not substantially increase the likelihood or duration of estuary closures. As such, the Alternative 1 may affect, but is not likely to adversely affect, BSSP.

Other Special Status Species – Plants

As noted in Section 3.3 there are two species of special status plants that were documented in the ROI that are likely to be impacted by Alternative 1.

Four additional special status plants are known to occur in the OSMZ: Engelmann oak, Fish's milkwort, ocellated Humboldt lily, and rainbow manzanita (RM). These species would benefit from the protection of the OSMZ under Alternative 1 (refer to Table 3.5-5 in Section 3.3).

Construction

Construction impacts would be temporary.

Operations

Operational impacts include potential re-disturbance of plants during maintenance and repairs. As for construction, these impacts would be temporary and less than significant.

Conclusion

Special status plant species would potentially be impacted by construction and operational activities. However, no significant impacts to these species local populations are expected from the implementation of Alternative 1. With the successful implementation of the SCMs and the AMP/FOP, as described in Section 2.3.1.4, impacts would be less than significant.

Other Special Status Species – Wildlife

Upland Species

Upland special status species that are present in the ROI include the species listed in Table 3.3-6 that occur in chaparral, CSS, grassland, and woodland habitats. Protection and management of habitat within the OSMZ would have beneficial impacts.

Construction. Many special status species are known or likely to occur in CSS or other upland habitats within the ROI (Table 3.3-6). Individuals of these species may be temporarily impacted by construction, but such impacts would be localized and minimized by proposed conservation measures and would not affect regional population sizes, distribution, or increase the need for future protection by listing under the state- or federal ESA. Therefore, these impacts would not be significant.

Operations. Maintenance or repairs during operational activities have the potential to re-disturb upland habitats. However, operations would not significantly impact upland special status wildlife species.

Conclusion. Upland special status wildlife species would not be significantly impacted by construction or operational activities. Protection and management of habitat within the OSMZ would have beneficial impacts.

Aquatic and Riparian Species

Aquatic and riparian special status species that are present in the ROI include the arroyo chub, coast range newt, western spadefoot toad, two-striped garter snake, western pond turtle, yellow-breasted chat, and yellow warbler.

Construction. The majority of construction impacts would be temporary, with a permanent loss of a projected 5.20 acres of riparian habitat. Individuals of these species may be temporarily impacted by construction, but such impacts would be localized and minimized by proposed conservation measures and would not affect regional population sizes, distribution, or increase the need for future protection by listing under the state- or federal ESA. Therefore, these impacts are considered adverse, but less than significant.

Operations. As previously discussed in depth for federally-listed and state-listed species, effects of water withdrawals on the aquatic habitat of the SMR are potentially significant because of its regional importance to aquatic and riparian species. Operations would potentially reduce surface flow of the SMR during the toad breeding season, and modify aquatic habitat along the Lower SMR, but would not eliminate habitat for these species, all of which are widely distributed in southern California. Therefore, operational impacts are considered potentially adverse but with the successful implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, less than significant. Protection and management of aquatic habitat in the OSMZ would benefit all of the aquatic special status species, at least partially offsetting impacts further downstream.

Conclusion. Aquatic and riparian special status wildlife species would potentially be impacted by construction and operational activities. With the successful implementation of the SCMs and AMP/FOP, as described in Section 2.3.1.4, impacts would be less than significant.

4.3.3.5 Mitigation Measures

In addition to the SCMs referenced in Section 2.3.1.4, including the AMP/FOP, the following mitigation measure is proposed under Alternative 1.

Jurisdictional Wetlands and Other Waters of the U.S.

1. Unavoidable impacts to jurisdictional wetlands and other waters of the U.S. shall require mitigation that will be outlined in the Army Corps of Engineer individual permit. The development of a mitigation and monitoring plan is a requirement of CWA Sections 401 and 404 permit applications for activities that would discharge dredge or fill materials into jurisdictional waters. During the design phase of the project, the Marine Corps will choose a footprint that has the most minimal impact necessary to complete the project. The mitigation and monitoring plan should include details regarding site appropriateness, preparation (e.g., grading), recontouring, planting specifications (including seed mixes and plant palettes), and irrigation design (if determined necessary), as well as maintenance and monitoring procedures (including monitoring period and reporting). The plan should also outline yearly success criteria and remedial measures should the mitigation effort fall short of the success criteria.

4.3.4 Alternative 2

Under Alternative 2, the majority of the project components are identical to those under Alternative 1 (refer to Table 2.3-1), and in most respects, impacts associated with Alternative 2 would be the same as those discussed under Alternative 1. Where impacts are identical, previous discussions for Alternative 1 are not repeated, although conclusions are reiterated.

4.3.4.1 Summary of Impacts

The implementation of Alternative 2 in most respects would have impacts very similar to those discussed under Alternative 1, including mostly temporary impacts and permanent impacts where existing habitat is replaced by facilities. Additional impacts associated with Alternative 2 would occur due to the installation the gallery wells and associated conveyance pipelines/access roads and different plant communities would be affected along an alternate route for the bi-directional pipeline.

The project's use of water in the Lower SMR would result in potential impacts very similar to those discussed under Alternative 1 (i.e., the reduction of surface flows and groundwater levels could have a variety of impacts on riparian and aquatic species and habitats); however the inclusion of the gallery wells would result in additional reductions in SMR flow.

4.3.4.2 Vegetation and Wildlife

Construction

Tables 4.3-6 quantifies the potential permanent and temporary impacts of construction activities associated with Alternative 2 on different types of plant communities. A more detailed breakdown of potential impacts on individual plant communities is provided in Appendix C-1. Table 4.3-7 quantifies potential permanent and temporary impacts of construction to federally-listed species' and state-listed species' habitats; the resource effects analysis model that was used for this analysis can be found in Appendix C-3.

Compared to Alternative 1, Alternative 2 would have similar acreages of riparian and CSS temporary impacts and CSS permanent impacts, with greater permanent impacts on riparian and wetland vegetation (Table 4.3-6 and Table 4.3-7) and associated wildlife. All riparian habitat, wetland impacts, ARTO aestivation habitat, and CAGN occupied habitat would be mitigated in accordance with the SCMs as described under Alternative 1 (refer to SCMs listed under *Biological Resources* in Section 2.3.1.4).

Table 4.3-5. Potential Permanent and Temporary Impacts to Plant Communities and Aquatic Habitats within the Santa Margarita River Conjunctive Use Project Construction Footprint for Alternative 2

Plant Community Type		Acreages within the Project Areas (acres)												
		Recharge Ponds	Diversion Weir	O'Neill Ditch	Production Wells[1]	Construction Laydown	Gallery Wells	Bi-directional Pipeline and Booster Pump Stations			TOTAL			Project Total
		MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	DET Fallbrook	Non-DOD	MCB Camp Pendleton	DET Fallbrook	Non-DOD	
	PERMANENT IMPACTS													
Upland Scrub	Coastal Sage	-	0.23	0.03	-		-	0.11	-	-	**0.67**	-	-	**0.67**
Upland Scrub	Other	-	-	-	-		-	-	-	-	-	-	-	-
Riparian		-	1.33	2.16	1.71		4.19	-	-	-	**7.19**	-	-	**7.19**
Grassland/Herb		-	0.00	0.00	0.00		0.03	-	-	-	**1.48**	-	-	**1.48**
Upland Woodland		-	0.00	0.05	-		-	-	-	-	**0.05**	-	-	**0.05**
Disturbed/Developed		-	0.04	0.06	0.23		0.05	0.05	-	0.13	**0.22**	-	**0.21**	**0.43**
Total		***-***	***1.60***	***2.29***	***1.94***	***0.00***	***4.27***	***0.16***	***-***	***0.13***	***9.94***	***-***	***0.21***	***10.15***
	TEMPORARY IMPACTS													
Upland Scrub	Coastal Sage	0.08	0.20	1.47	0.22		-	9.07	16.87	0.01	**17.43**	**28.11**	**0.01**	**45.55**
Upland Scrub	Other	-	-	-	-		-	-	-	2.06	-	-	**3.43**	**3.43**
Riparian		3.85	1.18	8.30	11.49	0.01	2.17	0.73	1.29	0.38	**20.92**	**2.15**	**0.64**	**23.71**
Grassland/Herb		6.00	0.00	0.00	0.13	0.83	-	1.85	8.92	1.13	**16.71**	**14.86**	**1.89**	**33.46**
Upland Woodland		-	-	0.22	0.13		-	0.68	0.94	0.52	**1.35**	**1.56**	**0.87**	**3.78**
Disturbed/Developed		4.46	0.05	1.59	4.73	0.11	0.03	12.73	8.90	19.55	**31.72**	**14.84**	**32.58**	**79.14**
Total		***14.66***	***1.43***	***11.58***	***16.69***	***0.95***	***2.31***	***25.06***	***37.36***	***23.65***	***89.08***	***62.27***	***39.42***	***190.77***

[1]For temporary impacts to the Bi-directional Pipeline, it is estimated that construction will require 50 feet out of the 100 foot wide footprint in straight segments, plus additional width when the pipeline turns corners; therefore, 60% of the overall vegetation impacts to the 100 foot corridor was used as an acreage impact. Appendix C figures depict 100%, rather than 60%, for illustration purposes.

Notes:

Includes the conveyance pipelines and access roads.

MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station Seal Beach, Detachment Fallbrook; DOD = Department of Defense.

Table 4.3-6. Potential Permanent and Temporary Impacts to Listed Species within the SMR CUP Construction Footprint for Alternative 2

Species	Diversion Weir	O'Neill Ditch	Production Wells	Gallery Wells	Groundwater Collection Pipeline	Access Roads	Bi-directional Pipeline		Total		Project Total
	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	DET Fallbrook	MCB Camp Pendleton	DET Fallbrook	
Arroyo Toad (breeding)											
Permanent	1.04	-	0.23	0.89	-	3.65	-	-	5.81	-	5.81
Temporary	0.99	0.15	0.71	2.28	6.97	-	-	-	11.10	-	11.10
Arroyo Toad (aestivation – upland only)											
Permanent	0.32	0.84	0.37	-	-	0.49	-	-	2.02	-	2.02
Temporary	0.46	5.81	0.52	-	3.10	-	-	-	9.89	-	9.89
Arroyo Toad (aestivation – riparian only)											
Permanent	<0.0003	1.42	0.06	-	-	0.23	-	-	1.71	-	1.71
Temporary	<0.0016	3.75	0.45	-	1.13	-	-	-	5.33	-	5.33
Least Bell's Vireo											
Permanent	0.71	0.79	0.29	0.80	-	3.88	-	-	6.47	-	6.47
Temporary	0.53	1.80	1.15	2.10	7.72	-	0.96	1.00	14.26	1.00	15.26
Coastal California Gnatcatcher (all years)											
Permanent	-	0.01	-	-	-	-	-	-	0.01	-	0.01
Temporary	-	0.07	-	-	-	-	10.37	7.87	10.44	7.87	18.31

Notes: Values are rounded to the nearest 0.01 acre, which may result in a summation rounding error.
Habitat for listed species has not been identified in the Non-DOD portion of the Alternative 2 construction area.

As described for Alternative 1, impacts to plant communities under Alternative 2 would primarily affect disturbed/developed habitat (including agricultural land) and non-native grassland, with small areas of native plant communities impacted (refer to Appendix C-1 for a detailed breakdown). These impacts are not considered significant in light of the relatively small areas of permanent impact in comparison to the abundance of these habitats in the region. Temporary impacts, a majority of which would occur along the bi-directional pipeline corridor, would be less than significant as a result of proposed restoration/revegetation with implementation of the SCMs listed under *Biological Resources* in Section 2.3.1.4.

<u>Operations</u>

Operational impacts under Alternative 2 would be essentially the same as those discussed under Alternative 1; however, reductions in SMR flow would be greater with operations of the gallery wells under Alternative 2. Additional pumping from the gallery wells would further increase the depth to groundwater in riparian as well as adjacent upland habitats (refer to Section 4.2.3 for details). Relative to existing conditions, groundwater levels in the Ysidora Basin would drop below historic lows, with groundwater depths increasing by several feet in most years through the summer months. This would result in greater impacts to riparian areas under Alternative 2 than those discussed under Alternative 1. This impact is considered potentially significant, with considerable uncertainty as to the location, magnitude, and direction of changes.

4.3.4.3 Aquatic Habitats and Species

<u>Construction</u>

Under Alternative 2, construction impacts on aquatic habitats and species would be similar to those of Alternative 1. Table 4.3-8 summarizes the temporary and permanent impacts to jurisdictional wetlands and other waters of the U.S. at MCB Camp Pendleton, DET Fallbrook, and non-DOD land within the community of Fallbrook. Under Alternative 2, potential impacts to jurisdictional wetlands would be similar to those discussed under Alternative 1, with greater impacts to other jurisdictional waters of the U.S. under Alternative 2 (Table 4.3-8). The increase in impacts to other waters of the U.S. is primarily due to the gallery wells and the associated access road which would be located within portions of and adjacent to the SMR.

<u>Operations</u>

Operational impacts under Alternative 2 would be essentially the same as those discussed under Alternative 1; however, reductions in SMR flow would be greater with operations of the gallery wells under Alternative 2. Additional pumping from the gallery wells would further reduce flow in the SMR, and the resultant effects on aquatic habitats and species downstream to the estuary, are considered potentially significant. The gallery wells are unlikely to have much effect on the nektonic and benthic communities during seasonal high to moderate flows; however, as flow diminishes, the potential effects of the wells would be greater. Operation of the wells during low-flow conditions would diminish current speeds, reduce water depths, and allow insolation to raise water temperatures, increasing the likelihood of algal blooms and eutrophication. However, implementation of the AMP/FOP would enable such changes to be detected and harmful effects minimized. In addition, as a result of reduced surface flows, it is possible, though not certain, that the mouth of the SMR Estuary may be increasingly susceptible to closure. Insofar as existing aquatic species use of the estuary are affected by the extent of tidal flushing and the distribution of marine and brackish habitats, the impacts of water withdrawals from the SMR under Alternative 2 are considered potentially significant.

Table 4.3-7. Impacts to Jurisdictional Wetlands and other Waters of the U.S. Under Alternative 2

Wetland/Waters of the U.S.		MCB Camp Pendleton		DET Fallbrook		Non-DOD Lands	
		Temp.	Perm.	Temp.	Perm.	Temp.	Perm.
Wetlands (acres)							
Palustrine Emergent		**0.08**	**0.15**	**0.07[1]**	**-**	**-**	**-**
Palustrine Forested		**3.76**	**3.27**	**-**	**-**	**-**	**-**
Palustrine Scrub-Shrub		**-**	**-**	**-**	**-**	**-**	**-**
Total Wetlands		3.84	3.42	0.07[1]	-	-	-
Other Waters of the U.S. (feet/acres)							
Riverine Lower Perennial	*Santa Margarita River*	**911/0.75**	**1,619/1.46**	**-**	**-**	**-**	**-**
Riverine Upper Perennial	*Fallbrook Creek*	**-**	**-**	**-**	**-**	**-**	**-**
Riverine Intermittent	*O'Neill Ditch*	**-**	**5,188/2.33**	**-**	**-**	**-**	**-**
	Other	**322/0.04[1]**	**-**		**-**	**212/ 0.01[1]**	**-**
Total Waters of the U.S.		1,233/ 0.79[1]	6,807/3.79		-	212/ 0.01[1]	-

Note: [1] Only a portion of jurisdictional waters within the bi-directional pipeline buffer would be impacted.
MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station Seal Beach, Detachment Fallbrook; DOD = Department of Defense.

Source: Reclamation *et al.* 2013.

Alternative 2 would also discharge dilute brine into the Pacific Ocean via the Oceanside Ocean Outfall. Assuming requirements of the NPDES permit are met as a condition of the discharge, no significant impacts on the marine environment would occur. Special Status Species

Federally-Listed Threatened and Endangered Species

Consistent with the ESA, impacts on federally-listed species are described as "effects," and conclusions are reached as to whether the action would have no effect; may affect but is not likely to adversely affect any individuals of the species in question; or may affect and is likely to adversely affect one or more individuals of the species in question, resulting in "take" as defined under the ESA. The ESA conclusory statements are followed by NEPA conclusions on the significance of the impact.

Table 4.3-9 summarizes potential effects to federally-listed threatened and endangered species with implementation of Alternative 2.

California Gnatcatcher

Construction. As of 2010 (MCB Camp Pendleton surveys) and 2011 (DET Fallbrook surveys), eight CAGN territories overlap the area of potential direct impacts (300 ft buffer) for Alternative 2 (one on MCB Camp Pendleton and seven on DET Fallbrook). No CAGN territories are within the area of permanent impact on MCB Camp Pendleton or DET Fallbrook. (*Note*: the CAGN territory calculation is modeled after the CAGN effects analysis in the Basewide Utilities Infrastructure BO [USFWS 2010] using a territory size of 5.70 acres [2.30 hectares], which is the gnatcatcher territory size documented in a similar habitat and environmental conditions).

The permanent effect of construction under Alternative 2 would be the loss of approximately 0.01 acre (<0.01 hectare) of CAGN occupied CSS habitat.

Table 4.3-8. Summary of Potential Effects on Listed Species with Implementation of Alternative 2

Species	Effects on Habitat	Effects on Individuals and Potential Take
CAGN	Temporary disturbance of up to 18.31 acres of CAGN occupied CSS habitat (10.44 acres on MCB Camp Pendleton and 7.87 acres on DET Fallbrook) and permanent disturbance of up to 0.01 acre of CAGN occupied CSS habitat on MCB Camp Pendleton. Potential localized habitat disturbance due to accidents, repairs, and maintenance.	Impacts to CAGN in the vicinity of the construction sites would be minimized to less than significant through the implementation of the SCMs listed under Biological Resources in Section 2.3.1.4, and the presence of a Biological monitor during the breeding season and any CSS vegetation clearing. All impacts to CAGN occupied CSS habitat would be temporary impacts and would be restored in place.
LBVI	Temporary disturbance of up to 15.26 acres of mulefat scrub, southern willow scrub, southern riparian scrub, and southern riparian woodland (14.26 acres on MCB Camp Pendleton and 1.00 acres on DET Fallbrook) and permanent disturbance of up to 6.47 acres of LBVI occupied riparian habitat on MCB Camp Pendleton. Potential localized habitat disturbance due to accidents, repairs, and maintenance. Potential changes in riparian vegetation due to reductions in the magnitude, lateral extent, and duration of surface flows in the SMR.	Impacts to LBVI in the vicinity of the construction sites would be minimized to less than significant through the implementation of the SCMs listed under Biological Resources in Section 2.3.1.4, and the presence of a Biological monitor during the breeding season and any riparian vegetation clearing. With implementation of the AMP/FOP, operation is not likely to affect occupied LBVI habitat.
SWFL	Impacts to riparian habitat along the SMR but no impacts to occupied SWFL breeding habitat are anticipated.	With implementation of the AMP/FOP, not likely to affect occupied SWFL habitat. No effect to SWFL is anticipated.
RIRA	Reduced inflow to estuary could affect tidal flushing and productivity of salt marsh habitat.	With implementation of the AMP/FOP, not likely to adversely affect tidal flushing and estuary productivity. No effect to RIRA is anticipated.
CLTE	Reduced inflow to SMR Estuary could affect tidal flushing and lagoon foraging and nesting habitat.	With implementation of the AMP/FOP, not likely to adversely affect tidal flushing, foraging or nesting habitat. No effect to CLTE is anticipated.
SNPL	Estuary-shoreline foraging and nesting conditions for plovers could be directly or indirectly affected by changes in SMR inflows.	With implementation of the AMP/FOP, not likely to adversely affect tidal flushing, foraging or nesting habitat. No effect to SNPL is anticipated.

Species	Effects on Habitat	Effects on Individuals and Potential Take
ARTO	Temporary disturbance of up to 11.10 acres of riparian and freshwater breeding habitat, and an additional 15.22 acres of riparian and upland aestivation habitat on MCB Camp Pendleton. Permanent disturbance of up to 5.81 acres of riparian and freshwater breeding habitat and an additional 3.73 acres of upland and riparian aestivation habitat on MCB Camp Pendleton. Reduced SMR surface flows could reduce shallow run and pool habitat, reduce scouring floods that regenerate and maintain open sandbar habitats. Potential localized habitat disturbance due to accidents, repairs, and maintenance.	Likely to adversely affect. Potential displacement of and mortality to individual toads during construction; unquantifiable take. Potential annual or long-term reductions of habitat for juveniles and adults, which would affect the SMR population. Potential adverse effects would be minimized through the AMP/FOP.
SDFS/RFS	No potential temporary or permanent disturbance would occur.	No effect. No take of individuals is expected.
SCS	Water withdrawals would cause little if any reduction in the high flows that have the greatest potential to support steelhead migration in the SMR downstream of the weir. The incorporation of a fish screen on the diversion and design and operations measures to enhance fish passage at the weir would improve conditions for steelhead passage through the study area.	Action is not likely to adversely affect SCS.
TWG	TWG does not presently occur and the action would have minor if any effects on unoccupied potential habitat in the estuary. If TWG were to occur in the future, potential effects of operations would be addressed under the AMP/FOP.	Not likely to adversely affect TWG.
BSSP	Reduced inflow to SMR Estuary could diminish tidal flushing and flood salt marsh habitat used for nesting and foraging.	Potential adverse effects would be minimized through the AMP/FOP.
SKR	Temporary effects on potential habitat; SKR does not presently occur in the action area.	Not likely to adversely effect, no take of individuals or adverse effects on habitat are expected.

Notes: CAGN = Coastal California Gnatcatcher; CSS = coastal sage scrub; MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station Seal Beach, Detachment Fallbrook; DOD = Department of Defense; LBVI = Least Bell's Vireo; SMR = Santa Margarita River; AMP/FOP = Adaptive Management Plan; FOP = system operation plan; SWFL = Southwestern Willow Flycatcher; RIRA = Ridgway's Rail; CLTE = California least term; SNPL = Western Snowy Plover; ARTO = Arroyo toad; SDFS = San Diego fairy shrimp; RFS = Riverside fairy shrimp; SCS = southern California steelhead; TWG = Tidewater Goby; BSSP = Belding's Savannah Sparrow; SKR = Stephens' Kangaroo Rat.

Construction would temporarily affect approximately 18.31 acres (7.41 hectares) of CAGN occupied CSS habitat (10.44 acres [4.22 hectares] on MCB Camp Pendleton and 7.87 acres [3.18 hectares] on DET Fallbrook). Most of the potentially affected CSS was not overlapped by CAGN territories as of 2010 and may therefore be considered unoccupied. A total of one CAGN territory on MCB Camp Pendleton and seven CAGN territories on DET Fallbrook would potentially be directly impacted (see Appendix C-1, Figures C1-30, C1-31, and C1-32). Moreover, the area of actual effect would be much smaller than the acreages described above. This is because the majority of the impact area (18.24 acres [7.38 hectares]) occurs along the bi-directional pipeline, which would only involve temporary impacts inside a 50-ft (15-m) corridor located within the larger 100-ft (30-m) wide buffer corridor used for acreage calculations. An analysis of the wider 100-ft (30-m) buffer areas has been provided to allow the flexibility of placing the pipeline anywhere within the buffer area to meet site-specific construction needs and minimize effects. Individual CAGN may be displaced to adjacent habitat, especially along the pipeline corridors. Removal of small areas of patchy and disturbed CSS within the larger regional habitat is not likely to adversely affect CAGN.

Apart from vegetation removal, temporary direct effects would include the potential disturbance of CAGN during construction due to noise, traffic, and human occupancy in the project vicinity. Noise and indirect effects may extend into adjacent habitat occupied by CAGN. Individuals would be displaced to adjacent areas, and may experience energetic costs or increased risk of predation as a result; either of which may affect subsequent survival and reproduction.

Effects to CAGN occupied CSS would be minimized through conservation measures as described for Alternative 1; therefore, temporary direct effects due to noise or activity would not immediately affect nesting pairs or reproduction.

Operations. As described for Alternative 1, operations under Alternative 2 have the potential to re-disturb habitat and temporarily affect individuals. These effects would be minimized by protective measures and restoration of affected habitats.

Conclusion. Through the implementation of SCMs identified Section 2.3.2.4 (and any other measures identified during consultation with the USFWS relative to this species), no effect on the overall distribution or abundance of the species is anticipated from implementation of Alternative 2. Therefore, with the implementation of SCMs, there would be no significant impacts to CAGN with implementation of Alternative 2. Under ESA, implementation of Alternative 2 may affect, but is not likely to adversely affect CAGN territories due to noise and disturbance from Alternative 2.

No long-term effects on the CAGN population on MCB Camp Pendleton or DET Fallbrook are anticipated. Therefore, Alternative 1 would not have a significant impact on the CAGN.

Least Bell's Vireo

Construction. As of 2010 (MCB Camp Pendleton surveys) and 2011 (DET Fallbrook surveys), 78 LBVI territories (77 on MCB Camp Pendleton and 1 on DET Fallbrook) overlap the area of anticipated direct impact (300-ft buffer) for Alternative 1 (refer to Figures C1-30, C1-31, and C1-32 in Appendix C-1) (*Note*: the LBVI territory calculation is modeled after the LBVI effects analysis in the Basewide Utilities Infrastructure BO [USFWS 2010] using a territory size of 1.9 acres [0.8 hectare], which is the LBVI territory size documented in a similar habitat and environmental conditions).

LBVI within the construction footprint would experience a direct loss of foraging/nesting habitat, whereas birds within the construction buffer distance could have breeding and/or foraging behavior disrupted, with attendant effects on reproduction, energetics, or predation risk.

To minimize impacts to LVBI, construction would take place outside the breeding season to the maximum extent practicable. If seasonal avoidance is not feasible, a biological monitor would be present when construction is within 300 ft (90 m) of occupied CAGN habitat, and additional SCMs listed under *Biological Resources* in Section 2.3.1.4 would be implemented. The biological monitor would conduct nest surveys to determine the presence/absence of LBVI documented within 300 ft (90 m) of the construction sites. If a LBVI nest is found, a 300-ft (90-m) buffer around the nest would be established to minimize impacts to LBVI (refer to SCMs listed under *Biological Resources* in Section 2.3.1.4).

The permanent effect of Alternative 2 would be the loss of potential LBVI-occupied habitat (defined as mulefat scrub, southern willow scrub, southern riparian scrub, and southern riparian woodland). Construction would permanently affect approximately 6.47 acres (2.62 hectares) of LBVI occupied riparian habitat, all of which occurs on MCB Camp Pendleton at the diversion weir, O'Neill Ditch, production and gallery wells, and access roads.

Construction would temporarily affect approximately 15.26 acres (6.18 hectares) of LBVI-occupied riparian habitat (14.26 acres [5.77 hectares] on MCB Camp Pendleton and 1.00 acres [0.40 hectare] on DET Fallbrook). The majority of these temporary impacts would occur in the location along O'Neill Ditch, the production and gallery wells, and conveyance pipelines. As described under Alternative 1, the actual area of impact along the pipeline corridors would be much smaller than the acreages described in Table 4.3-6. Effects on LBVI would be minimized as described for Alternative 1.

Operations. Operational effects would be similar to those described under Alternative 1.

Conclusion. Through successful implementation of the AMP/FOP as described in Section 2.3.1.4, *Special Conservation Measures*, no significant impacts to LBVI are expected. Prior to implementation of Alternative 2, MCB Camp Pendleton and Reclamation, in coordination with DET Fallbrook, would consult with USFWS and the terms and conditions of the resulting BO would be implemented. No long-term effects on the LBVI population on MCB Camp Pendleton or DET Fallbrook are anticipated. Therefore, Alternative 2 would not have a significant impact on the LBVI.

Southwestern Willow Flycatcher

Construction. There have been no SWFL territories within the areas of potential permanent and temporary impact for Alternative 1 or within 300 ft (90 m) of the proposed construction areas on MCB Camp Pendleton and DET Fallbrook during any recent surveys (Appendix C). No construction would occur in OSMZ; therefore, no negative impacts would occur to the SWFL critical habitat in the OSMZ.

The principal direct effect of Alternative 2, which would occur outside of the breeding season, would be the loss of potential (future) SWFL foraging and breeding habitat. The principal permanent effect of Alternative 2 would be the loss of potential LBVI habitat. Construction would permanently affect approximately 7.19 acres (2.91 hectares) of riparian habitat, all of which occurs on MCB Camp Pendleton at the diversion weir, O'Neill Ditch, production and gallery wells, and access roads (see Table 4.3-6). Construction would temporarily affect approximately 23.07 acres (9.34 hectares) of riparian habitat (20.92 acres [8.47 hectares] on MCB Camp Pendleton and 2.15 acres [0.87 hectare] on DET Fallbrook). The majority of these temporary impacts would occur in the location along O'Neill Ditch, the production and gallery wells, and conveyance pipelines (see Table 4.3-6). As described under Alternative 1, the actual area of impact along the pipeline corridors would be much smaller than the acreages described in Table 4.3-6.

Given the long-term absence of SWFL from potential construction areas (and associated buffers), combined with the implementation of LBVI SCMs listed under *Biological Resources* in Section 2.3.1.4, construction-related disturbance to SWFL nesting behavior is unlikely. Effects on individual SWFL, if present, would be roughly similar to those on individual LBVI. However, potential interference with foraging or movements by SWFLs in this location is of greater concern because the SWFL breeding population and area of occupied habitat on MCB Camp Pendleton is very small. Disturbance to individuals in this small population could cause them to abandon the area, and the numbers are so low as to limit future breeding opportunities among remaining individuals. Since clearing during the breeding season would not occur and disturbance to riparian habitat in the SMR would be minimized per avoidance and minimization measures, potential direct effects are unlikely to occur. If breeding SWFL were found within 250 ft (76 m) of construction, the USFWS would be contacted and consultation could be re-initiated.

Operations. Operational effects would be similar to those described under Alternative 1.

Conclusion. Through successful implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, habitat would be regularly monitored and if the riparian habitat value where the SWFL breed is reduced, operations would be re-evaluated, which may include re-initiation of consultation with the USFWS. With the implementation of the AMP/FOP and avoidance, minimization, and compensation measures as determined by consultation, Alternative 2 may affect, but is not likely to adversely affect, the SWFL. Prior to implementation of Alternative 2, MCB Camp Pendleton and Reclamation, in coordination with DET Fallbrook, would consult with USFWS and the terms and conditions of the resulting BO would be implemented. Therefore, Alternative 2 would not have a significant impact on the SWFL.

Ridgway's Rail, formally Light footed Clapper Rail

Construction. Under Alternative 2, no construction activities would occur in or near the SMR Estuary. Therefore, no effects to RIRA are expected due to construction.

Operations. Operational effects would be the same as those described under Alternative 1.

Conclusion. Alternative 2 may affect, but is not likely to adversely affect, RIRA. Therefore, Alternative 2 would not have a significant impact on the RIRA. Prior to implementation of Alternative 2, MCB Camp Pendleton and Reclamation would consult with USFWS and the terms and conditions of the resulting BO would be implemented.

California Least Tern

Construction. Under Alternative 2, no construction activities would occur in or near the SMR Estuary. Therefore, no effects to CLTE are expected from construction.

Operations. Operational effects would be the same as those described under Alternative 1.

Conclusion. With the implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, CLTE nesting habitat and foraging conditions would be maintained in the SMR estuary and as such, Alternative 2 may affect, but is not likely to adversely affect, the CLTE. Therefore, Alternative 2 would not have a significant impact on the CLTE. Prior to implementation of Alternative 2, MCB Camp Pendleton and Reclamation would consult with USFWS and the terms and conditions of the resulting BO would be implemented.

Snowy Plover

Construction. Under Alternative 2, no construction activities would take place near SNPL nesting or foraging areas. Therefore, no effects to the SNPL are expected due to construction.

Operations. Operational effects would be the same as those described under Alternative 1.

Conclusion. The action would have no direct effects on individual SNPL, and with the implementation of the AMP/FOP, it is very unlikely that there would be any negative impact to the estuarine and beach habitat used for nesting and foraging. Thus the action may affect, but is not likely to adversely affect, the SNPL. Therefore, Alternative 2 would not have a significant impact on the SNPL.

Arroyo Toad

Construction. Construction impacts to ARTO under Alternative 2 would be similar to those discussed under Alternative 1; however, a greater area of ARTO habitat would be impacted during construction with the inclusion of the gallery wells and associated conveyance pipeline/access road under Alternative 2 (Appendix C-1). Based on the acreage of immediate construction impacts (i.e., work areas) plus reasonable buffer distances for incidental disturbance, as explained in Section 2.3, there are approximately 16.91 acres (6.84 hectares) of ARTO occupied riparian and freshwater and open water breeding habitat subject to direct effects by temporary and permanent construction in the Alternative 2 area on MCB Camp Pendleton. In addition, approximately 18.95 acres (7.67 hectares) of ARTO occupied riparian and upland aestivation habitat on MCB Camp Pendleton would be subject to direct effects.

Construction would permanently affect approximately, 5.81 acres (2.35 hectares) of ARTO occupied riparian breeding habitat and an additional 3.73 acres (1.51 hectare) of ARTO occupied upland and riparian aestivation habitat on MCB Camp Pendleton. Construction would temporarily affect approximately 11.10 acres (4.49 hectares) of ARTO occupied breeding riparian habitat and an additional 15.22 acres (6.16 hectares) of ARTO occupied upland and riparian aestivation habitat on MCB Camp Pendleton (see Figures C-31 and C-32 in Appendix C-1).

Effects to ARTO would be minimized through implementation of the SCMs listed under *Biological Resources* in Section 2.3.1.4. Based on relatively limited areas of effect and implementation of these measures, the potential for an adverse effect on individual ARTO would be minimized. Nevertheless, a few individuals may unavoidably be injured or killed during construction activities, although this would not affect population numbers or distribution on MCB Camp Pendleton.

Therefore, with the implementation of SCMs for temporary and permanent disturbance of riparian habitat, minor short-term and negligible long-term adverse effects would occur from construction.

Operations. Operational effects under Alternative 2 would be the similar to those discussed under Alternative 1, and implementation of recommended SCMs listed under *Operations* in Section 2.3.1.4 would decrease potential long-term impacts on ARTO.

Conclusion. Alternative 2 may affect and is likely to adversely affect ARTO due to construction-related risks of injury or mortality which cannot be completely eliminated. Through the implementation of SCMs for temporary and permanent disturbance of riparian and aestivation habitat, minor short-term and negligible long-term adverse effects to individual toads would occur from construction. Potential adverse effects during operations would be minimized through the successful implementation AMP/FOP. Potential impacts to ARTO habitat represent a small fraction of the available ARTO habitat within MCB Camp Pendleton and are largely temporary. Prior to implementation of Alternative 2, MCB Camp Pendleton and Reclamation would consult with USFWS and the terms and conditions of the resulting BO would be implemented.

Preservation of habitat in the OSMZ could have long-term beneficial effects on ARTO which may, to some extent, offset potential adverse effects on the population in the Lower SMR.

San Diego Fairy Shrimp/Riverside Fairy Shrimp

Because SDFS/RFS have not been documented in the Alternative 2 action area, no potential temporary or permanent disturbance would occur. Alternative 2 would have no effect on SDFS/RFS. To minimize risks to SDFS/RFS potentially occurring within the proposed construction areas, the SCMs listed under *Biological Resources* in Section 2.3.1.4 would be implemented. Therefore, no significant impacts would occur.

Southern California Steelhead

Construction. Construction impacts would be the same as those described under Alternative 1.

Operations. Operational effects would be the same as those described under Alternative 1.

Conclusion. Potential effects to SCS habitat and migration in the SMR would be the same as those discussed under Alternative 1. Making the precautionary assumption that SCS are present in the SMR and likely to migrate through the action area, Alternative 2 may affect, but is not likely to adversely affect, the passage of adults or juveniles in the SMR between the Pacific Ocean and inflatable weir and at the inflatable weir and O'Neill Ditch. Therefore, Alternative 2 would not have a significant impact on SCS. Prior to implementation of Alternative 2, MCB Camp Pendleton would consult with NOAA Fisheries and the results of the consultation would be implemented.

Tidewater Goby

Potential effects to TWG would be the same as those discussed under Alternative 1. Due to the current absence of this species downstream from the project area, and low likelihood of adverse effects on potential habitat that could be recolonized in the future, Alternative 2 may affect, but is not likely to adversely affect, TWG. No significant impacts would occur.

Stephens' Kangaroo Rat

Construction. SKR habitat occurs in areas that would be affected by construction of the bi-directional pipeline, but is currently unoccupied. Given the absence of SKR in these areas since the 1990s, it is very unlikely they would recolonize and occur during construction. Revegetation of disturbed areas as proposed following construction would assure no long term effect on habitat and the potential for future use by SKR.

Operations. Project operations would not affect SKR.

Conclusion. Alternative 2 would temporarily affect habitat for SKR which is currently unoccupied but could be recolonized. As such, Alternative 2 may affect, but is not likely to adversely affect, SKR. No significant impacts would occur.

State-Listed Threatened and Endangered Species

Belding's Savannah Sparrow

As in Alternative 1, Alternative 2 would not substantially increase the likelihood or duration of SMR Estuary closures and thus would not have a significant impact on BSSP.

Other Special Status Species – Plants

There are three species of special status plants documented in the ROI that could potentially be impacted by Alternative 2. However, no significant impacts to these species local populations are expected from the implementation of Alternative 2. With the successful implementation of the SCMs and the AMP/FOP, as described in Section 2.3.1.4, impacts would be less than significant.

Four additional special status plants were documented in the OSMZ: Engelmann oak, Fish's milkwort, ocellated Humboldt lily, and RM. These species would benefit from the protection of the OSMZ under Alternative 2.

Other Special Status Species –Wildlife

Upland Species

Impacts on upland wildlife species under Alternative 2 would be similar to those described under Alternative 1. Upland special status wildlife species would not be significantly impacted by construction or operational activities. Protection and management of habitat within the OSMZ would have beneficial impacts.

Aquatic and Riparian Species

Impacts on aquatic and riparian special status species that are present in the ROI would be the similar to those described under Alternative 1, with larger areas impacted by construction and operations of the gallery wells.

4.3.4.4 Mitigation Measures

In addition to the SCMs referenced in Section 2.3.2.4, including the AMP/FOP, the mitigation measure described under Alternative 1 is also proposed under Alternative 2 (refer to Section 4.3.25).

4.3.5 No-Action Alternative

Under the No-Action Alternative, SMR CUP would not be implemented and no ground-disturbing activities would occur. Consequently, there would be no construction impacts, and Recent Management conditions (as described in Section 3.4, *Biological Resources*) would remain unchanged in the short term. However, operational impacts as modeled by the Recent Management Model scenario (Stetson 2012a) may be significant due to groundwater depletion and its indirect effects on riparian habitat and associated species.

4.4 CULTURAL RESOURCES

4.4.1 Approach to Analysis

This section addresses anticipated impacts from project implementation. Project components with an APE that contain no known cultural resources are briefly identified and dismissed from further analysis, since no significant impacts would occur and that have no potential to contain cultural resources. Detailed analysis is provided for project components with known cultural resources. For the purposes of this analysis, all cultural resources within or immediately adjacent to the APE were considered potentially subject to direct impacts. All impacts to cultural resources are permanent, as these are non-renewable resources, and even though an activity may be considered short-term, destruction of an archaeological resource is permanent.

MCB Camp Pendleton uses environmental planning, project design, and redesign to avoid or minimize impacts to cultural resources. However, when avoidance is not feasible, eligible resources must receive appropriate treatment. For archaeological sites considered important for their potential to provide information, this usually involves data recovery. For buildings and structures, this involves the preparation of Historic American Building Survey/Historic American Engineering Record documentation.

4.4.2 Alternative 1

Based on record searches and archaeological surveys (Becker *et al.* 2012), no cultural resources have been identified within the APE for the following project components and therefore, no effects to cultural resources would occur:

- Replacement of Exiting Sheet Pile Diversion with Inflatable Weir Diversion Structure,
- Improvements to Recharge ponds 1-7,
- Groundwater Production Wells and Associated Collection System Infrastructure, and
- FPUD WTP.

Although no cultural resources have been identified within the APE for the above listed project components, the SCM listed under *Cultural Resources* in Section 2.3.1.4 would be implemented in the event that unknown cultural resources are encountered during construction. Therefore, with implementation of this SMC, as needed, no significant impacts to cultural resources would occur during construction of the above listed components of Alternative 1. The SCADA System would not involve construction under Alternative 1 and would therefore, not impact cultural resources. Discussed in greater detail below are the project components with known cultural resources.

4.4.2.1 MCB Camp Pendleton

Improvements to O'Neill Ditch and Headgate

A total of four cultural resources were identified within the APE for this project component. Under Alternative 1, improvements to O'Neill Ditch (SMR-CUP 4) would include the removal of three newly identified historic culverts (SMR-CUP 1-3) for replacement, along with an increase in ditch capacity.

The northern section of the present-day O'Neill Ditch maintains a similar alignment to the original main ditch, but the original irrigation system is no longer intact. It is likely that the 1883 main ditch has been modified over time. It is more likely that a ditch has been reconstructed in a similar alignment by the military in support of the Recharge Basin. As discussed in Section 3.4.4.2, the historic culverts (SMR CUP 1-3) and O'Neill Ditch (SMR-CUP 4) are ineligible for listing on the NRHP. Should buried cultural resources be encountered during construction activities, the SCM identified in Section 2.3.1.4 would be implemented. Therefore, no significant impacts would occur with implementation of this component under Alternative 1.

Other Components

No sites were identified within the APE associated with the groundwater production wells, collection system infrastructure, and bi-directional pipeline on MCB Camp Pendleton. However, for any drilling/trenching operations within the upper 15 ft (5 m) of the floodplain, which has the potential for buried deposits, monitoring is required and would be conducted by a qualified archaeologist and Native American monitor approved by the Cultural Resources Branch. Should buried cultural resources be encountered during construction activities, the SCM identified in Section 2.3.1.4 would be implemented. Therefore, no significant impacts to cultural resources would occur as a result of implementation of these components of Alternative 1.

4.4.2.2 DET Fallbrook

Water Conveyance/Distribution System, including Bi-Directional Pipeline to FPUD

Table 4.4-1 provides a summary of NRHP eligibility status and recommendations for each of the cultural resources identified within APE to the bi-directional pipeline along Ammunition Road on DET Fallbrook. There are three known cultural resources within the APE of this project component on DET Fallbrook: SDI-10158, Segment C of SDI-14005H, and -14381; while SDI-14375 would be avoided by a realignment of the pipeline. SDI-10158 is an NRHP eligible site, but the portion that the APE passes through was observed to be disturbed from previous grading activities. Segment C of SDI-14005H and SDI-14381 are both NRHP ineligible sites. Monitoring by a qualified archaeologist and Native American monitor approved by the Cultural Resources Manager for DET Fallbrook is required for SDI-10158 and -14381 during construction because the APE passes through both and for SDI-14375 due to its close proximity to the APE, as there is a potential for inadvertent discoveries. Additionally, a monitoring buffer of 100 ft (30 m) around each of these three sites is recommended. No monitoring is recommended for Segment C of SDI-14005H. Should buried cultural resources be encountered during construction activities, the SCM identified in Section 2.3.1.4 would be implemented. Therefore, no significant impacts to cultural resources would occur with implementation of this component of Alternative 1.

Table 4.4-1. Archaeological Sites Within or Near the APE on DET Fallbrook

Site (SDI-)	Description	NRHP Eligibility Status	Potential Effects	Treatment Needs
10158	Prehistoric bedrock milling site with 8 loci and artifacts	Disturbed portion of eligible site	Potentially Significant	Archaeological Monitoring
14005H	Segment C of the Southern California Railroad	Ineligible	No impacts expected	None
14381	Prehistoric artifact scatter	Ineligible	Potentially Significant	Archaeological Monitoring
14375	Prehistoric artifact scatter	Indeterminate	No impacts expected	Archaeological Monitoring

Source: Becker *et al.* 2012; California Office of Historic Preservation 2013.

4.4.2.3 Community of Fallbrook

Water Conveyance/Distribution System, including Bi-Directional Pipeline to FPUD

One cultural resource exists within this project component. The Martin Reservoir in the Gheen Zone was constructed for the FPUD as a PWA-funded project between February and June 1939, and it was evaluated for its possible eligibility to the NRHP. Although the Martin Reservoir was constructed as a part of a national program through the PWA, an association with the PWA is not enough to make the structure eligible. As discussed in Section 3.4.3.2, the Martin Reservoir is ineligible under Criteria A, B, C, and D of the NRHP. The Martin Reservoir was also evaluated for its possible eligibility to the CRHR under the four criteria and is recommended not eligible on a state or local level to the CRHR. Should buried cultural resources be encountered during construction activities, the SCM listed under *Cultural Resources* in Section 2.3.1.4 would be implemented. Therefore, no significant impacts to cultural resources would occur with implementation of this component of Alternative 1.

4.4.2.4 Mitigation Measures

Through avoidance and implementation of the SCM listed under *Cultural Resources* in Section 2.3.1.4, Alternative 1 would not result in significant impacts to cultural resources; therefore, no additional mitigation measures are proposed.

4.4.3 Alternative 2

4.4.3.1 Environmental Impacts

Under Alternative 2, project components with known cultural resources within the APE or that do not involve construction work are identical as those listed under Alternative 1. No additional cultural resources have been identified within the APE under Alternative 2 for the following project components and therefore, no effects to cultural resources would occur:

- Gallery Wells and Associated Collection System Infrastructure, and
- Expand Haybarn Canyon AWTP and Add a Surface Water Treatment Facility.

In the event that unknown cultural resources are encountered during implementation of these project components, the same procedures discussed under the Alternative 1 would be implemented to determine potential eligibility and avoidance or mitigation procedures would be followed, as appropriate. Therefore, no significant impacts to cultural resources would occur as a result of implementation of the above listed components of Alternative 2.

The project components with known cultural resources and impacts to those resources would be the same for Alternative 2 as those described under Alternative 1. As discussed under Alternative 1, monitoring is recommended for any drilling/trenching operations within the upper 15 ft (5 m) of the floodplain and for known sites along the pipeline route on DET Fallbrook (i.e., SDI-10158, -14381, and -14375). Should buried cultural resources be encountered during construction activities, the SCM listed under *Cultural Resources* in Section 2.3.1.4 would be implemented. Therefore, no significant impacts to cultural resources would occur as a result of implementation of Alternative 2.

4.4.3.2 Mitigation Measures

Through avoidance and implementation of the SCM listed under *Cultural Resources* in Section 2.3.1.4, Alternative 2 would not result in significant impacts to cultural resources; therefore, no additional mitigation measures are proposed.

4.4.4 No-Action Alternative

Under the No-Action Alternative, the proposed conveyance pipeline and facilities would not be constructed and no ground-disturbing activities would occur. Consequently, Recent Management conditions (as described in Section 3.4, *Cultural Resources*) would remain unchanged. Therefore, no impacts to cultural resources would occur with implementation of the No-Action Alternative.

4.5 AIR QUALITY

4.5.1 Approach to Analysis

Emission thresholds associated with federal CAA conformity requirements are the primary means of assessing the significance of potential air quality impacts associated with implementation of a Proposed Action under NEPA. A formal conformity determination is required for federal actions occurring in nonattainment or maintenance areas when the total direct and indirect stationary and mobile source emissions of nonattainment pollutants or their precursors exceed *de minimis* thresholds.

Significant air quality impacts would occur if implementation of any of the alternatives would directly or indirectly:

1. expose people to localized (as opposed to regional) air pollutant concentrations that violate state or federal ambient air quality standards;
2. cause a net increase in pollutant or pollutant precursor emissions that exceeds relevant emission significance thresholds (such as CAA conformity *de minimis* levels or the numerical values of major source thresholds for nonattainment pollutants); or
3. conflicts with adopted air quality management plans, policies, or programs.

Criteria to determine the significance of air quality impacts are based on federal, state, and local air pollution standards and regulations. The SDCAPCD has not established criteria for assessing the significance of air quality impacts for NEPA purposes. However, SDCAPCD Rule 20.3 defines a stationary source as "major" if annual emissions exceed 100 tons of CO, SO_x, or PM_{10}, or 100 tons of VOCs or NO_x. For purposes of this air quality analysis, project emissions within the MCB Camp Pendleton region would be potentially significant if they exceed these thresholds. This is a conservative approach, as the analysis compares emissions from both project-related stationary and mobile sources to these thresholds. Impacts would also be potentially significant within the MCB Camp Pendleton region if project emissions exceed the thresholds that trigger a conformity determination under Section 176(c) of the 1990 CAA (100 tons per year of VOC, NO_x, or CO).

Section 4.5.5 presents the Conformity Applicability Analysis for actions within the SDAB and Appendix D contains the Record of Non-Applicability for CAA Conformity.

4.5.2 Alternative 1

Potential air quality impacts associated with Alternative 1 include construction emissions and emissions associated with facility operations and maintenance activities.

4.5.2.1 Construction

Assumptions

Air quality impacts from proposed construction activities would occur from (1) combustion emissions due to the use of fossil fuel-powered equipment; and (2) fugitive dust emissions (PM_{10}) during construction activities, earth-moving activities, and the operation of equipment on bare soil.

Emission factors used to derive construction source emission rates were obtained from *Compilation of Air Pollution Emission Factors, AP-42, Volume I* (USEPA 2002), the *CARB OFFROAD Emissions Model* (CARB 2007a), and the *CARB EMFAC2007 Model* (CARB 2007b). Emissions associated with construction were assumed to occur within a 12-month period. It was assumed that fugitive dust emissions during grading would be controlled through watering active grading areas a minimum of three times daily. The analysis also assumes a reduction in PM_{10} emissions from earth-moving activities by 61% to take into consideration fugitive dust control measures based on the control efficiency for watering three times per day in the CalEEMod Model (ENVIRON 2011).

Construction scenarios for the proposed construction projects were provided in the project description and by Reclamation or were based on construction of similar projects. In addition to construction emissions from on-site equipment use and fugitive dust, emissions from construction workers commuting to and from the construction sites, and emissions associated with trucks hauling material to the construction sites were calculated using emission factors from the *CARB's EMFAC2007 model* (CARB 2007b). For the purpose of estimating emissions associated with surface disturbance, it was assumed that 2 acres (0.8

hectare) per day would be disturbed, with an emission factor of 20 pounds/acre-day based on the *URBEMIS 9.2.4 Model* (Rimpo and Associates 2007), and that watering three times daily would control fugitive dust by 61% in accordance with the CalEEMod Model assumptions. A complete description of the construction projects, equipment required for construction, estimates of workforce requirements, and haul truck travel are provided in Appendix D, along with the emission calculations for construction activities. Emissions calculations were based on the construction projects and assumptions listed in Table 4.5-1.

Estimated construction emissions are presented as maximum pounds per day (Table 4.5-2) and tons per year (Table 4.5-3). To address impacts under CEQA, emissions were compared with daily significance thresholds based on County of San Diego, Department of Planning and Land Use Significance Level Thresholds (County of San Diego 2007b). Although this guidance document provides hourly, daily, and annual significance thresholds, daily emission thresholds are the most appropriate for this project because construction would vary substantially on an hourly basis, and construction scenarios are not specific enough to address activities, or emissions, on an hourly basis. Annual emissions and their comparison with conformity *de minimis* thresholds as shown in SDCAPCD's Rules and Regulations (SDCAPCD 2012), which are appropriate for this project, were evaluated and are presented in Table 4.5-3.

The SCADA System would not require the use of any construction equipment and, therefore, would not produce any air emissions and is not analyzed further in this section.

Impacts

Estimated construction emissions as a result of implementation of Alternative 1 are shown in Table 4.5-2 (maximum pounds per day) and Table 4.5-3 (tons per year). Emissions associated with construction activities under Alternative 1 would be below the *de minimis* levels for CAA conformity; therefore, no significant impacts to air quality would occur.

Fugitive dust control measures that are considered part of Alternative 1 would be implemented as SCMs (refer to SCMs listed in Section 2.3.1.4) to reduce emissions of particulate matter (PM_{10} and $PM_{2.5}$) to the extent possible. These measures include watering unpaved roads and actively graded surfaces three times daily, as well as reducing speeds on unpaved roads to 15 mph (24 kph), suspending grading activities if wind speeds exceed 25 mph (40 kph), and replacing ground cover in graded areas as soon as possible. These measures have been taken into account in the emission calculations for Alternative 1.

4.5.2.2 Operations

Assumptions

Operations assumptions and methodology are similar to those described under *Construction Assumptions*.

Table 4.5-1. Construction Equipment Requirements for Alternative 1

Equipment	Number	Months of Construction
Replacement of Diversion Structure (Both Alternatives)		
Tractors/Loaders/Backhoes	2	2
Dump Trucks	2	
Bulldozers	1	
Crane	1	
Rough Terrain Forklifts	1	
Improvements to O'Neill Ditch and Headgate (Both Alternatives)		
Excavator	1	**3**
Tractors/Loaders/Backhoes	2	
Bulldozers	1	
Improvements to Recharge ponds 1-7 (Both Alternatives)		
Excavator	1	**3**
Tractors/Loaders/Backhoes	2	
Groundwater Production Wells and Associated Collection System (Both Alternatives)		
Drill Rig	1	**3**
Tractors/Loaders/Backhoes	2	
FPUD WTP (Alternative 1)		
Excavators	2	**6**
Backhoe	2	
Loaders	2	
Dump Trucks	2	
Crane	1	
Bobcat	1	
Compactor	1	
Compressor	1	
Wackers	1	
Paver	1	
Water Conveyance/Distribution System to Red Mountain Reservoir (Alternative 1)		
Rough Terrain Forklift	2	**3**
Excavators	4	
Trencher	1	
Compactor	2	
Backhoe	1	
Loaders	1	
Dump Trucks	1	
Crane	1	
Paver	1	

Notes: FPUD = Fallbrook Public Utility District; WTP = Water Treatment Plant.

Table 4.5-2. Alternative 1 Construction Emissions (Maximum Pounds per Day)

Component	Emissions (pounds/day)					
	CO	**VOCs**	**NO_x**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Daily significance threshold[1]	550	75	250	250	100	55
Replacement of Diversion Structure						
Heavy Construction Equipment	53.30	14.23	122.76	0.12	6.81	6.06
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Grading	-	-	-	-	15.60	3.28
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**75.78**	**16.55**	**146.83**	**0.17**	**78.89**	**15.85**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***

Component	Emissions (pounds/day)					
	CO	VOCs	NO_x	SO_x	PM_{10}	$PM_{2.5}$
Improvements to O'Neill Ditch and Headgate						
Heavy Construction Equipment	28.01	6.57	53.29	0.05	2.95	2.62
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Grading	-	-	-	-	15.60	3.28
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**50.49**	**8.89**	**77.36**	**0.10**	**75.03**	**12.41**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
Improvements to Recharge ponds 1-7						
Heavy Construction Equipment	3.98	1.12	8.94	0.01	0.54	0.48
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**26.46**	**3.44**	**33.01**	**0.06**	**57.02**	**6.99**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
Groundwater Production Wells and Associated Collection System						
Heavy Construction Equipment	20.69	5.19	40.83	0.04	2.41	2.15
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**43.17**	**7.51**	**64.9**	**0.09**	**58.89**	**8.66**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
Water Conveyance/Distribution System to Red Mountain Reservoir						
Heavy Construction Equipment	56.48	16.60	134.47	0.13	7.91	7.04
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Grading	-	-	-	-	15.60	3.28
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**78.96**	**18.92**	**158.54**	**0.18**	**79.99**	**16.83**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
FPUD WTP						
Heavy Construction Equipment	63.29	19.30	145.08	0.15	9.07	8.07
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**85.77**	**21.62**	**169.15**	**0.2**	**65.55**	**14.58**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***

Notes: [1] Daily significance thresholds are based on County of San Diego, Department of Planning and Land Use Significance Level Thresholds (County of San Diego 2007b).
CO = carbon monoxide; VOC = volatile organic compound; NO_x = nitrogen oxides; SO_x = sulfur oxides; PM_{10} = particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; FPUD = Fallbrook Public Utility District; WTP = Water Treatment Plant.

Table 4.5-3. Alternative 1 Construction Emissions (Tons per Year)

Component	Emissions (tons/year)					
	CO[2]	VOCs[1]	NO_x[1]	SO_x[2]	PM_{10}[2]	$PM_{2.5}$[2]
Annual Total						
Heavy Construction Equipment	9.69	2.78	21.83	0.02	1.30	1.16
Construction Worker Travel	1.04	0.21	2.85	0.00	0.13	0.11
Haul Trucks	1.77	0.08	0.16	0.00	0.02	0.01
Fugitive Dust – Grading	-	-	-	-	1.95	0.41
Fugitive Dust – Vehicles	-	-	-	-	6.91	0.69

Total Annual Emissions	**12.50**	**3.07**	**24.84**	**0.02**	**10.31**	**2.38**
De Minimis Threshold[3]	100	100	100	100	100	100
Exceeds De Minimis Threshold?	***No***	***No***	***No***	***No***	***No***	***No***

Notes: [1] SDAB is a moderate nonattainment area for the 8-hour O_3 NAAQS; VOCs and NOx are precursors to the formation of O_3.
[2] SDAB is considered a maintenance area for the CO NAAQS and is in attainment of the NAAQS for SOx, PM_{10}, and $PM_{2.5}$.
[3] Significance levels are developed from SDCAPCD major source thresholds (SDCAPCD 2012); *de minimis* levels are not applicable to NAAQS attainment areas (i.e., SO_2, PM_{10} and $PM_{2.5}$) but have been presented for planning purposes only.
CO = carbon monoxide; VOC = volatile organic compound; NO_x = nitrogen oxides; SO_x = sulfur oxides; PM_{10} = particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter.

Impacts

Air quality impacts from proposed operational activities would occur due to indirect emissions from energy use to power pumps, the FPUD WTP, and other support equipment. Due to the low energy use requirements for the FPUD WTP, emissions associated with operations of this component would be insignificant and were therefore not included in the operational emissions calculations. Emissions would also result from periodic maintenance required to maintain recharge ponds, and other maintenance activities.

Maximum daily and annual operational emissions were calculated based on the assumption that, on any single day, the maximum emissions would be associated with maintenance of recharge ponds. Annual operational emissions were based on the assumption that periodic maintenance activities for recharge ponds would require 30 days in any single year.

Emissions associated with operations under Alternative 1 are summarized in Tables 4.5-4 and 4.5-5. Emissions associated with operational and maintenance activities under Alternative 1 would be below the *de minimis* levels for CAA conformity; therefore, no significant impacts to air quality would occur.

4.5.2.3 Mitigation Measures

Through implementation of SCMs listed in Section 2.3.1.4, Alternative 1 would not result in significant air quality impacts; therefore, no additional mitigation measures are proposed.

Table 4.5-4. Alternative 1 Operations Emissions (Maximum Pounds per Day)

Component	**Emissions (pounds/day)**					
	CO	**VOCs**	**NO_x**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Maintenance of Recharge ponds						
Heavy Construction Equipment	3.98	1.12	8.94	0.01	0.54	0.48
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**26.46**	**3.44**	**33.01**	**0.06**	**57.02**	**6.99**
Daily significance threshold[1]	550	75	250	250	100	55
Above Threshold?	***No***	***No***	***No***	***No***	***No***	***No***

Notes: [1] Daily significance thresholds are based on County of San Diego, Department of Planning and Land Use Significance Level Thresholds (County of San Diego 2007b).
CO = carbon monoxide; VOC = volatile organic compound; NO_x = nitrogen oxides; SO_x = sulfur oxides; PM_{10} = particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter.

Table 4.5-5. Alternative 1 Operations Emissions (Tons per Year)

Component	Emissions (tons/year)					
	CO[2]	VOCs[1]	NO_x[2]	SO_x[1]	PM_{10}[2]	$PM_{2.5}$[2]
Maintenance of Recharge ponds	0.40	0.05	0.50	0.00	0.86	0.10
De Minimis Threshold[3]	100	100	100	100	100	100
Exceeds De Minimis Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
Regional Emissions Inventory – 2015, tons/year	**227,614**	**50,845**	**43,691**	**766.5**	**44,348**	**11,717**
Percent of Regional Emissions Inventory	0.00018%	0.0001%	0.0011%	0.0%	0.0019%	0.00085%

Notes: [1] SDAB is a moderate nonattainment area for the 8-hour O_3 NAAQS; VOCs and NOx are precursors to the formation of O_3.
[2] SDAB is considered a maintenance area for the CO NAAQS and is in attainment of the NAAQS for SOx, PM_{10}, and $PM_{2.5}$.
[3] Significance levels are developed from SDCAPCD major source thresholds; *de minimis* levels are not applicable to NAAQS attainment areas (i.e., SO_2, PM_{10} and $PM_{2.5}$) but have been presented for planning purposes only.
CO = carbon monoxide; VOC = volatile organic compound; NO_x = nitrogen oxides; SO_x = sulfur oxides; PM_{10} = particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter.

4.5.3 Alternative 2

4.5.3.1 Construction

<u>Assumptions</u>

Construction assumptions and construction equipment requirements would be the same for Alternative 2 as those listed for Alternative 1. Emissions calculations were based on the construction projects and assumptions listed in Table 4.5-1 (for project components that are the same as those under Alternative 1) and Table 4.5-6 (for project components that are specific to Alternative 2).

Table 4.5-6. Construction Equipment Requirements for Alternative 2

Equipment	Number	Months of Construction
Gallery Wells and Associated Collection System (Alternative 2)		
Drill Rig	1	**3**
Tractors/Loaders/Backhoes	2	
Excavator	1	
Expand Existing AWTP and New Surface WTP at Haybarn Canyon (Alternative 2)		
Excavators	2	**6**
Backhoe	2	
Loaders	2	
Dump Trucks	2	
Crane	1	
Bobcat	1	
Compactor	1	
Compressor	1	
Wackers	1	
Paver	1	
Water Conveyance/Distribution System to Gheen Zone (Alternative 2)		
Rough Terrain Forklift	2	**3**
Excavators	4	
Trencher	1	
Compactor	2	
Backhoe	1	
Loaders	1	
Dump Trucks	1	
Crane	1	
Paver	1	

Impacts

Estimated construction emissions as a result of implementation of Alternative 2 are shown in Table 4.5-7 (maximum pounds per day) and Table 4.5-8 (tons per year). Emissions associated with construction activities under Alternative 2 account for SCMs listed in Section 2.3.1.4, controlling fugitive dust, and would be below the *de minimis* levels for CAA conformity; therefore, no significant impacts to air quality would occur.

4.5.3.2 Operations

Assumptions and Impacts

Operations assumptions and impacts would be the same for Alternative 2 as those described under Alternative 1. Estimated emissions would be below the *de minimis* levels for CAA conformity; therefore, no significant impacts to air quality would occur.

4.5.3.3 Mitigation Measures

Through implementation of SCMs listed in Section 2.3.1.4, Alternative 2 would not result in significant impacts to air quality; therefore, no additional mitigation measures are proposed.

Table 4.5-7. Alternative 2 Construction Emissions (Maximum Pounds per Day)

Component	Emissions (pounds/day)					
	CO	VOCs	NO_x	SO_x	PM_{10}	$PM_{2.5}$
Daily significance threshold[1]	550	75	250	250	100	55

Component	Emissions (pounds/day)					
	CO	**VOCs**	**NO_x**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Replacement of Diversion Structure						
Heavy Construction Equipment	53.30	14.23	122.76	0.12	6.81	6.06
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Grading	-	-	-	-	15.60	3.28
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**75.78**	**16.55**	**146.83**	**0.17**	**78.89**	**15.85**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
Improvements to O'Neill Ditch and Headgate						
Heavy Construction Equipment	28.01	6.57	53.29	0.05	2.95	2.62
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Grading	-	-	-	-	15.60	3.28
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**50.49**	**8.89**	**77.36**	**0.10**	**75.03**	**12.41**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
Improvements to Recharge ponds 1-7						
Heavy Construction Equipment	3.98	1.12	8.94	0.01	0.54	0.48
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**26.46**	**3.44**	**33.01**	**0.06**	**57.02**	**6.99**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
Groundwater Production Wells and Associated Collection System						
Heavy Construction Equipment	20.69	5.19	40.83	0.04	2.41	2.15
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**43.17**	**7.51**	**64.90**	**0.09**	**58.89**	**8.66**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
Gallery Wells and Associated Collection System						
Heavy Construction Equipment	24.39	6.18	51.22	0.05	2.80	2.49
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**46.87**	**8.5**	**75.29**	**0.10**	**59.28**	**9.00**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
Expansion of Existing AWTP and New Surface Water Treatment Facility						
Heavy Construction Equipment	63.29	19.30	145.08	0.15	9.07	8.07
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Grading	-	-	-	-	15.60	3.28
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**85.77**	**21.62**	**169.15**	**0.20**	**81.15**	**17.86**
Above Significance Threshold?	*No*	*No*	*No*	*No*	*No*	*No*

Continued on next page

Table 4.5-7. Alternative 2 Construction Emissions (Maximum Pounds per Day) (cont.)

Component	Emissions (pounds/day)					
	CO	VOCs	NO_x	SO_x	PM_{10}	$PM_{2.5}$
Water Conveyance/Distribution System to Gheen Zone						
Heavy Construction Equipment	56.48	16.60	134.47	0.13	7.91	7.04
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Grading	-	-	-	-	15.60	3.28
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**78.96**	**18.92**	**158.54**	**0.18**	**79.99**	**16.83**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***

Note: [1] Daily significance thresholds based on County of San Diego, Department of Planning and Land Use Significance Level Thresholds (County of San Diego 2007b).

CO = carbon monoxide; VOC = volatile organic compound; NO_x = nitrogen oxides; SO_x = sulfur oxides; PM_{10} = particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter.

Table 4.5-8. Alternative 2 Construction Emissions (Tons per Year)

Component	Emissions (tons/year)					
	CO[2]	VOCs[1]	NO_x[1]	SO_x[2]	PM_{10}[2]	$PM_{2.5}$[2]
Annual Total						
Heavy Construction Equipment	10.64	3.02	23.83	0.02	1.41	1.26
Construction Worker Travel	1.04	0.21	2.85	0.00	0.13	0.11
Haul Trucks	1.77	0.08	0.16	0.00	0.02	0.01
Fugitive Dust – Grading	-	-	-	-	1.95	0.41
Fugitive Dust – Vehicles	-	-	-	-	6.91	0.69
Total Annual Emissions	**13.45**	**3.31**	**26.84**	**0.02**	**10.42**	**2.48**
De Minimis Threshold[3]	100	100	100	100	100	100
Exceeds De Minimis Threshold?	***No***	***No***	***No***	***No***	***No***	***No***

Notes: [1] SDAB is a moderate nonattainment area for the 8-hour O_3 NAAQS; VOCs and NOx are precursors to the formation of O_3.

[2] SDAB is considered a maintenance area for the CO NAAQS and is in attainment of the NAAQS for SOx, PM_{10}, and $PM_{2.5}$.

[3] Significance levels are developed from SDCAPCD major source thresholds (SDCAPCD 2012); *de minimis* levels are not applicable to NAAQS attainment areas (i.e., SO_2, PM_{10} and $PM_{2.5}$) but have been presented for planning purposes only.

CO = carbon monoxide; VOC = volatile organic compound; NO_x = nitrogen oxides; SO_x = sulfur oxides; PM_{10} = particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter.

4.5.4 Conformity Applicability Analysis

The estimated emissions associated with Alternatives 1 and 2 would be below the *de minimis* threshold levels for CAA conformity. Therefore, Alternatives 1 and 2 would conform to the SDAB SIP and would not trigger a conformity determination under Section 176(c) of the CAA. The USMC has prepared a Record of Non-Applicability (refer to Appendix D) for CAA conformity.

4.5.5 No-Action Alternative

Under the No-Action Alternative, SMR CUP would not be implemented and emissions from construction or operational activities would not occur. Consequently, Recent Management conditions (as described in Section 3.5, *Air Quality*) would remain unchanged. Therefore, no impacts to air quality would occur with implementation of the No-Action Alternative.

4.6 HAZARDOUS MATERIALS AND WASTES

4.6.1 Approach to Analysis

In this section, potential impacts associated with the use, storage, or disposal of hazardous materials and wastes during construction and operational activities are analyzed for the action alternatives. The potential construction and operational impacts associated with existing contamination sites within or in the vicinity of the project footprint are also analyzed along with proposed avoidance procedures. The significance of impacts associated with hazardous materials and wastes is based on the toxicity of the substance, the quantity of the substance involved, the risk of exposure, and the method of disposal. Impacts are considered significant if the storage, use, transportation, mobilization, or disposal of these substances creates a substantial increase in risk to human health or the environment or if there would be a substantial increase in risk of exposure to contaminants.

4.6.2 Alternative 1

4.6.2.1 Construction

Hazardous Materials and Waste Management

Hazardous materials associated with construction activities would include fuel and hydraulic fluid contained in heavy equipment, vehicles and vessels performing the construction tasks, and paints, coatings and sealants to be used on structures such as the FPUD WTP and inflatable weir compressor building. Excavation, construction, and pipeline assembly, and groundwater well installation are not anticipated to involve hazardous materials other than those described above. Neither the rubber-gasketed steel pipeline, nor the heat-welded HDPE pipeline requires the use of external coatings or sealants. Non-hazardous waste from construction may include short sections of HDPE and steel piping; boxes and crates used in the shipment of materials and rubble from trenching paved areas. Construction workers would use portable chemical toilets during construction. If contaminated soil or groundwater are encountered during construction activities, SCMs listed in Section 2.3.1.4 would be followed to minimize impacts from these hazardous materials.

On MCB Camp Pendleton and DET Fallbrook, the NAVFAC SW Contracting Officer would require that project design adhere to the standards and provisions included in CFR Title 40, §§ 260-265 and CFR Title 49, §§ 172, 173, and 178; Title 22 of the CCR (Division 4.5 Health Standards for the Management of Hazardous Waste); and County of San Diego Ordinance Title 6, Division 8, Chapter 11, as well as other regulations related to health and safety and emergency response. Additionally, MCB Camp Pendleton would require that hazardous waste be removed from MCB Camp Pendleton within 60 days of initial generation and that a Uniform Hazardous Waste Manifest would be prepared and brought with the waste to the Hazardous Waste Branch for signature on the way out of MCB Camp Pendleton for disposal.

Construction contractors involved with Alternative 1 would be subject to all federal, state, and County of San Diego requirements for hazardous materials and hazardous waste management, and would be required to prepare an EPP for approval by the NAVFAC SW Contracting Officer prior to the start of any construction activity on MCB Camp Pendleton and DET Fallbrook (MCB Camp Pendleton 2009a). The EPP would include measures the contractor would take to prevent or control release of contaminants to air, land, and water during construction activities. The EPP would address:

- Solid and sanitary waste management,
- Recycling project waste and demolition debris,

- Air pollution controls on equipment and operations,
- Application of paints and coatings,
- Contractor parking and laydown,
- Equipment maintenance and fueling,
- Hazardous material use,
- Hazardous waste storage and disposal, and
- Procedures if site contamination is discovered.

The construction contractor would also be required to develop a project-specific construction SWPPP or use an existing Base-wide construction SWPPP. The SWPPP would specify BMPs to prevent construction pollutants from contacting stormwater, prevent erosion, eliminate or reduce non-stormwater discharges, and perform inspections of all BMPs (SWRCB 2009a). The SWPPP would also include BMPs to minimize potential impacts related to the construction components, such as the use of sediment barriers, inlet covers, covering stockpiles, and inspecting equipment and vehicles for drips, and placing drip pans beneath vehicles and equipment (SWRCB 2009a). The SWPPP and project-specific or existing BMPs would be approved by MCB Camp Pendleton, DET Fallbrook, County of San Diego, and the SWRCB prior to initiating construction activities.

Contractors would be required to park their vehicles within staging areas designated by MCB Camp Pendleton ES, DET Fallbrook, and FPUD. No vehicle maintenance would be allowed in the staging areas. At MCB Camp Pendleton, vehicle fueling would be allowed only within fueling locations designated by MCB Camp Pendleton ES and approved by the MCB Camp Pendleton Fire Department. Contractors would also be allowed to store small amounts of fuel for small-engine powered equipment within the designated fueling location. At DET Fallbrook and within the community of Fallbrook, construction vehicle and equipment fueling would be subject to approval from the applicable jurisdiction. In the event that a spill occurs, the construction contractor would be responsible for spill response, cleanup, and regulatory reporting. As required, the applicable jurisdiction (i.e., fire department and/or San Diego RWQCB) would be contacted immediately to report any spills during construction.

Unused HDPE pipe sections would be suitable for use or recycling; the contractor's EPP would address disposition of excess/scrap HDPE material. Unused steel pipe would also be suitable for use or recycling and would be addressed by the EPP. The contractor would be required to make arrangements for recycling or disposal of other solid wastes such as packing and building scrap materials at an appropriate solid waste facility with sufficient capacity to receive the waste, as agreed to by the USMC. Construction-related earth materials (rubble from trenching paved areas and dredged materials from O'Neill Ditch) would require appropriate disposal off-Base. The contractor would be required to make arrangements for disposal of such material originating at DET Fallbrook or FPUD, per USMC agreement.

Through the implementation of SCMs listed in Section 2.3.1.4, no increase in human health risk or environmental exposure to hazardous materials or hazardous wastes would result from construction associated with Alternative 1; therefore, no significant impacts would occur due to construction activities under Alternative 1.

IR Sites

MCB Camp Pendleton

As indicated in SCMs listed in Section 2.3.1.4, the contractor would be required to coordinate with MCB Camp Pendleton's FFA team regarding placement of new groundwater production wells in relation to the location and status of MCB Camp Pendleton IR Sites 1119 and the 22/23 Area groundwater (see Figure 3.6-1). The contractor would also be required to obtain from the IR Branch/RCRA Division current information about groundwater monitoring wells for the IR sites in the groundwater production well basin, their specific surveyed locations, and IR sites' groundwater quality monitoring program results when determining locations for new groundwater production wells. The location of these wells and the potential impact to IR sites due to groundwater pumping would be assessed using the best available data in the AMP/FOP. The results and actions developed from the AMP/FOP would be used to meet the goals and requirements of each IR site. Therefore, there would be no significant impact to IR activities at MCB Camp Pendleton with installation of new production wells under Alternative 1. The effect of pumping groundwater from proposed new and existing wells in the vicinity of the IR sites is discussed in Section 4.6.2.2, *Operations*. There are no other IR sites or other types of cleanup sites within the project area at MCB Camp Pendleton; therefore, there would be no significant impacts to other IR activities or cleanup sites.

DET Fallbrook

For construction of the bi-directional pipeline, during the design phase the contractor would be required to coordinate with DET Fallbrook IR Program personnel to determine the exact boundaries of DET Fallbrook IR Sites 29 and 32; a route for the bi-directional pipeline would be surveyed within the 100-ft (30.5-m) buffer zone that avoid these two IR sites. Therefore, there would be no significant impact to IR activities at DET Fallbrook with installation of the bi-directional pipeline under Alternative 1.

CERCLA Sites and Cal EPA GeoTracker Database Sites

For construction of the bi-directional pipeline through the community of Fallbrook, no CERCLA sites or other sites identified by Cal EPA GeoTracker are located in the bi-directional pipeline ROI. Therefore, there would be no significant impact to active cleanup sites in the community of Fallbrook with installation of the bi-directional pipeline under Alternative 1.

4.6.2.2 Operations

Hazardous Materials and Waste Management

Hazardous materials associated with project operations would include paints and lubricants associated with maintaining the inflatable weir diversion structure, its compressor building, steel water conveyance pipeline, and tank components. Paints, lubricants, and fuels would be consumed during use, leaving no waste other than residue-coated containers.

Steel pipeline maintenance would consist of corrosion monitoring and occasional repairs as needed. Corrosion protection monitoring would include periodically taking electrical measurements at test stations installed on the pipe during construction in areas with potentially corrosive soils. When the pipelines are in use, possible loss of water and wastewater from the pipelines would be identified through line pressure monitoring and follow-up inspections by field technicians.

MCB Camp Pendleton

In accordance with County of San Diego requirements, Hazardous Materials Business Plans would be prepared for buildings in which hazardous materials or wastes would be present. All hazardous materials and wastes would be properly managed, segregated, labeled, and stored in accordance with all federal, state and County of San Diego regulations, and USMC requirements for hazardous materials management. Hazardous materials and hazardous waste storage areas would be inspected by the County of San Diego Department of Environmental Health.

DET Fallbrook

All hazardous materials and wastes would be properly managed, segregated, labeled, and stored in accordance with all federal, state and County of San Diego regulations, and DON requirements for hazardous materials management. Hazardous materials and hazardous waste storage areas would be inspected by the County of San Diego Department of Environmental Health.

FPUD

Hazardous materials associated with operations of the FPUD WTP would involve adding various water treatment chemicals to the water such as sodium metabisulphite ($Na_2S_2O_5$) for dechlorination prior to entry to the RO membranes; an anti-scaling agent for the RO equipment, sodium hydroxide (NaOH) for pH adjustment, and NaOCl for disinfection. While these chemicals are not hazardous when diluted in treated water, the bulk quantities and high concentrations of some chemicals used at the FPUD WTP may meet the criteria to be managed as hazardous materials.

Fuel for the FPUD WTP generator would be stored in an above ground storage tank that would comply with all federal, state, and County of San Diego requirements, and would be inspected regularly to ensure its integrity. The above ground storage tank would be equipped with a high-level indicator and alarm to prevent accidental releases during fueling operations. In accordance with County of San Diego requirements, Hazardous Materials Business Plans would be prepared for buildings in which hazardous materials or wastes would be present. All hazardous materials and wastes would be properly managed, segregated, labeled, and stored in accordance with all federal, state and County of San Diego regulations for hazardous materials management. Hazardous materials and hazardous waste storage areas would be inspected by the County of San Diego Department of Environmental Health.

The brine waste from the FPUD WTP would be discharged to the Pacific Ocean via FPUD’s connection to the Oceanside Ocean Outfall. The brine discharge would meet California Ocean Plan (SWRCB 2009a) criteria for ocean discharge. None of the brine discharge would require handling or disposal as hazardous waste. As described in Section 4.2.2.3 of this EIS/EIR, FPUD’s existing NPDES Permit (CA0108031) would be amended to include brine discharge from the project, and additional discharge is not expected to impact the ability to meet NPDES permit requirements, and discharge of the brine is not expected to impact the ability to meet NPDES permit requirements.

Implementation of the SCMs listed in Section 2.3.1.4 would ensure that there would be no increase in human health risk or environmental exposure to hazardous materials or hazardous wastes; therefore, no significant impacts would occur with operations under Alternative 1.

<u>IR Sites</u>

MCB Camp Pendleton

During the final design phase, the contractor would acquire current information from the IR Branch/RCRA Division about groundwater monitoring wells for MCB Camp Pendleton IR Site 1119 and the 22/23 Area groundwater site, their specific surveyed locations, and both IR sites' groundwater quality monitoring program results when determining location(s) for new groundwater production wells. The contractor would be required to coordinate with and obtain approval from MCB Camp Pendleton's FFA Team that the proposed locations and pumping rates for new groundwater production wells would minimize the potential for human exposure to contaminants in groundwater and would not impact IR activities at MCB Camp Pendleton IR Site 1119 or the 22/23 Area groundwater site. Available water quality, and other relevant hydrologic data, would be used by the AMP/FOP to assess whether or not impacts from project related groundwater production well locations would occur at IR sites.

Under Alternative 1, new well locations were sited, using available data and models, to avoid impacts to known contaminated groundwater sites based on information provided by MCB Camp Pendleton ES (MCB Camp Pendleton 2005), Parsons (2005, 2010), and Shaw Environmental Inc. (2005). Specifically, the proposed well locations were sited so that they were either cross-gradient or up-gradient of known plumes, including IR Site 1119 (Parsons 2012), so that groundwater pumping would not impact the mapped plumes. The groundwater level contours and gradients developed from the model simulation were reviewed at the locations of known contaminants under the proposed Alternative 1 pumping schedule. Review of these data indicated that known contaminate plumes would not be impacted by the placement of the proposed new production wells. All available VOC water quality data provided by MCB Camp Pendleton ES was referenced during model simulation. Therefore, the new production wells are not expected to pull in contaminants from the contaminated portion of the aquifer and the operation of production wells would not impact IR cleanup operations. During future operations, the AMP/FOP would monitor and assess available water quality and water level data from all known IR sites to meet the FFA goals and objectives. Based on pre-determined thresholds directly related to measured parameters, the AMP/FOP would determine whether goals are being met. If threshold levels are exceeded and management goals are not met, alternative courses of action consistent with MCB Camp Pendleton directives would be implemented. These courses of action may include, but not be limited to, shifting groundwater pumping to non-contaminated wells, well-head treatment for specific contaminants, other best management techniques, or curtailment of groundwater pumping.

4.6.2.3 Mitigation Measures

Through implementation of SCMs listed in Section 2.3.1.4, Alternative 1 would not result in significant hazardous materials and wastes impacts; therefore, no additional mitigation measures are proposed.

4.6.3 Alternative 2

4.6.3.1 Construction

Hazardous materials and wastes impacts under Alternative 2 would be similar to those discussed under Alternative 1. The construction contractor would be required to prepare and implement an EPP and SWPPP and coordinate with MCB Camp Pendleton FFA regarding placement of wells near MCB Camp Pendleton IR Site 1119 and the Area 22/23 groundwater site. The expansion of the existing AWTP and addition of a surface water treatment facility at Haybarn Canyon would involve similar hazardous materials as described for the FPUD WTP under the Alternative 1.

The contractor would comply with applicable federal, state, and County of San Diego regulations and USMC and DON requirements, as applicable. Therefore, construction impacts associated with Alternative 2 would be the same as discussed under Alternative 1, and no significant hazardous materials and wastes impacts would occur.

4.6.3.2 Operations

Hazardous Materials and Waste Management

The types of operations that would occur under Alternative 2 would be similar to those discussed under Alternative 1. In accordance with County of San Diego requirements, Hazardous Materials Business Plans would be prepared for buildings in which hazardous materials or wastes would be present. All hazardous materials and wastes would be properly managed, segregated, labeled, and stored in accordance with all federal, state and County of San Diego regulations, and USMC and DON requirements for hazardous materials management, as applicable. Hazardous materials and hazardous waste storage areas would be inspected by the County of San Diego Department of Environmental Health.

Under Alternative 2, the increase in brine discharge from the Haybarn Canyon AWTP and the disposal method would be similar to that for the FPUD WTP under Alternative 1. As described in Section 4.2.3.3 of this EIS/EIR, an existing NPDES Permit would be amended to include brine discharge from the project (either FPUD's NPDES Permit [CA0108031] or MCB Camp Pendleton's NPDES Permit [CA0109347]), and discharge of the brine is not expected to impact the ability to meet NPDES permit requirements.

Therefore, no significant operational impacts with respect to hazardous materials and wastes would occur with implementation of Alternative 2.

IR Sites

MCB Camp Pendleton

Under Alternative 2, the contractor would be required to follow the same SCMs listed in Section 2.3.1.4, as described under Alternative 1, in regards to MCB Camp Pendleton IR Site 1119 and the 22/23 Area groundwater site. In addition, the groundwater model simulated groundwater pumping from new well locations to show that pumping should not impact areas of known contaminated groundwater, as described under Alternative 1. Therefore, the new production wells are not expected to pull in contaminants from the contaminated portion of the aquifer and the operation of production wells would not impact IR cleanup operations. During future operations, the AMP/FOP would monitor and assess available water quality and water level data from all known IR sites to meet the FFA goals and objectives. Based on pre-determined thresholds directly related to measured parameters, the AMP/FOP would determine whether goals are being met. If threshold levels are exceeded and management goals are not met, alternative courses of action consistent with MCB Camp Pendleton directives would be implemented. These courses of action may include, but not be limited to, shifting groundwater pumping to non-contaminated wells, well-head treatment for specific contaminants, other best management techniques, or curtailment of groundwater pumping.

4.6.3.3 Mitigation Measures

Through implementation of SCMs listed in Section 2.3.1.4, Alternative 2 would not result in significant hazardous materials and wastes impacts; therefore, no additional mitigation measures are proposed.

4.6.4 No-Action Alternative

Under the No-Action Alternative, the proposed conveyance pipeline and facilities would not be constructed and no ground-disturbing activities would occur. No excavation would be required to lay pipelines. The hazardous materials and wastes associated with construction and operation under project implementation would not be present in the project area and there would be no potential for increase in human health risk or environmental exposure to hazardous materials or hazardous wastes. Recent Management conditions (as described in Section 3-6, *Hazardous Materials and Wastes*) would remain unchanged. Therefore, no hazardous materials and wastes impacts would occur with implementation of the No-Action Alternative.

4.7 UTILITIES

4.7.1 Approach to Analysis

Impacts to utilities are assessed according to capacity of available infrastructure and services and/or impacts or disruptions to those services for the purposes of evaluating the environmental consequences of action alternatives. The action alternatives are analyzed in this section relative to potential impacts on individual utilities. Impact analysis is broken down by construction (short-term impacts) and operations (long-term impacts). Construction impacts would occur if a component were to require the construction, expansion, or re-location of utilities infrastructure/facilities which could result in interruptions in service or exceed the existing capacity for potable water, solid waste disposal, electrical power, or natural gas systems. Operational impacts would occur if a component or combination of components exceeds the existing capacity for the above mentioned utilities.

Brine generated from the FPUD WTP or Haybarn Canyon AWTP would discharge to the ocean under an amended NPDES permit; impact analysis for this discharge is presented in Section 4.2, *Water Resources*. The action alternatives would also not require any chilled water, steam generation capacity, or natural gas.

4.7.2 Alternative 1

4.7.2.1 Construction

The following components would involve construction activities in the vicinity of existing facilities infrastructure:

- *Production Wells and Collection System.* Most of the construction of new wells and collection piping would be away from major roads and utility corridors. However, there is a limited area where the piping would be constructed in and across Vandegrift Boulevard and the area around Haybarn Canyon where there are various existing underground utilities.
- *FPUD WTP.* The FPUD WTP would be constructed in the vicinity of the existing FPUD wastewater treatment plant where there are various existing underground utilities and overhead power lines.
- *Water Conveyance/Distribution System.* Construction of the water conveyance/distribution systems pipelines would be along Vandegrift Boulevard, Rattlesnake Canyon Road, and Fallbrook Road through MCB Camp Pendleton; Ammunition Road and various dirt roads through DET Fallbrook; and various roads within the community of Fallbrook. There are various underground utilities that exist in portions of this corridor within MCB Camp Pendleton, DET Fallbrook, and Fallbrook.

As indicated in SCMs listed in Section 2.3.1.4, *Special Conservation Measures*, pipeline alignments and construction footprints would be selected during project design to avoid or minimize disruption of existing electricity, natural gas, and water utilities. The location of underground utilities would be verified prior to excavation to further avoid impacts. Also, the design of new electrical transformers and panels that would be needed to supply power to the wells would be coordinated closely with MCB Camp Pendleton and SDG&E to minimize or eliminate any temporary disruption of power supplies during construction and start-up. Therefore, through appropriate design details and construction contract provisions, no significant impacts to existing utilities would occur during construction under Alternative 1.

Potable Water Supply

Potable water supplies within the ROI would not be impacted because nonpotable water would be provided for grading and dust control activities by the construction contractor. Therefore, no impacts to potable water supply would occur during construction under Alternative 1.

Solid Waste Collection and Disposal

Solid waste (i.e., construction debris) generated by the construction of pipelines and associated facilities would be recycled or disposed of properly by the construction contractor. Solid waste would continue to be disposed at either the San Onofre or Las Pulgas landfills, which are not expected to reach their capacities until the years 2183 and 2047, respectively.

Material dredged from O'Neill Ditch would be placed in Ponds 6 and 7 for dewatering until final disposition. There is a potential for use as daily cover at the Las Pulgas landfill on MCB Camp Pendleton. Therefore, no significant impacts to solid waste collection and disposal would occur under Alternative 1 if dredged material is used as daily cover.

Although the impacts are not significant, as part of the continuing commitment of the Marine Corps to waste minimization, the construction contractor would be required to follow MCB Camp Pendleton's reuse and recycling program goals and guidelines for solid waste, and to make the fullest use practicable of recovered construction materials.

Electricity

Implementation of Alternative 1 would require the use of portable, fuel-powered generators to supply electricity for construction activities. Proposed construction activities would not require the use of MCB Camp Pendleton's or SDG&E's electrical system. Therefore, no significant impact on the electrical system in the ROI would occur as a result of construction activities under Alternative 1.

Natural Gas

Construction activities under Alternative 1 would not require the use of natural gas. Therefore, no significant impacts on the availability of natural gas sources would occur under Alternative 1.

4.7.2.2 Operations

Potable Water Supply

MCB Camp Pendleton

Implementation of Alternative 1 is estimated to yield an additional 3,500 AFY of groundwater from the Ysidora Basin (Stetson 2012a,b). A portion of this additional supply of water would help reduce MCB Camp Pendleton's anticipated future reliance on imported water. In addition, connections to off-base water supplies would provide MCB Camp Pendleton with an emergency potable water supply. Therefore, implementation of Alternative 1 would provide a beneficial impact to potable water supplies.

FPUD

Implementation of Alternative 1 is estimated to yield an additional 3,500 AFY of groundwater from the Ysidora Basin (Stetson 2012a,b). An annual average of 3,100 AFY (Stetson 2012b) of groundwater would be delivered to FPUD and treated at the FPUD WTP, providing FPUD with a local source of potable water and reducing their dependence on imported water from the SDCWA. Therefore, implementation of Alternative 1 would provide a beneficial impact to potable water supplies.

Solid Waste Collection and Disposal

MCB Camp Pendleton

During normal operations of Alternative 1, periodic maintenance dredging of the recharge ponds would occur. The material would be hauled to Las Pulgas landfill on MCB Camp Pendleton and used as daily cover. Therefore, no significant impacts to solid waste collection and disposal would occur under Alternative 1.

FPUD

At the FPUD WTP, iron and manganese solids would be pumped to sludge drying beds, allowed to dry, and then removed for disposal at a nearby landfill. This would occur periodically and the nearby landfill has sufficient capacity to handle the volume. Therefore, no significant impacts to solid waste collection and disposal would occur under Alternative 1.

Electrical Power

MCB Camp Pendleton

During normal operations of Alternative 1, electrical power would be needed for operation of the production well pumps and the MCB Camp Pendleton booster pump associated with the water conveyance/distribution system. The estimated annual average and peak (maximum hour) demands for Alternative 1 components are summarized in Table 4.7-1. The components with the large majority of the demands would be located in the general vicinity of or serviced by the existing Haybarn Canyon substation on MCB Camp Pendleton, which is undergoing expansion to nearly 70 MW of capacity (MCB Camp Pendleton 2010b). This expansion of capacity would accommodate the on-base demand for SMR CUP of 0.66 MW, as noted in Table 4.7-1. Therefore, no significant impacts on MCB Camp Pendleton's electrical system would occur as a result of implementation of Alternative 1.

Table 4.7-1. Electricity Demand Under Operation of Alternative 1

Project Component	**Annual Average Energy Consumption (MW-hour/Year)**	**Peak Hour Energy Consumption (MW)**
Production Wells and Collection System	1,770	0.19
Booster Stations at Haybarn Canyon and MCB Camp Pendleton/DET Fallbrook boundary	2,258	0.47
Subtotal - MCB Camp Pendleton Facilities	**7,013**	**0.66**
FPUD WTP	2,250	0.80
Booster Station at site of Gheen Zone/Martin Reservoir	735	0.56
Subtotal - FPUD Facilities	**2,985**	**1.36**

Notes: MW = megawatt; MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station Seal Beach, Detachment Fallbrook; FPUD = Fallbrook Public Utility District; WTP = Water Treatment Plant.

FPUD

Under Alternative 1, electrical power demand for operation of the FPUD WTP and Gheen Zone/Martin Reservoir Pump Station would be 1.36 MW, as summarized in Table 4.7-1. Power is currently provided at these sites and SDG&E has the capacity to provide power for project components (FPUD 2009). Therefore, no significant impacts on SDG&E's electrical system would occur as a result of implementation of Alternative 1.

Natural Gas Systems

Operations under Alternative 1 would not require the use of natural gas. Therefore, no significant impacts on existing natural gas sources would occur under Alternative 1.

4.7.2.3 Mitigation Measures

Through implementation of SCMs listed in Section 2.3.1.4, Alternative 1 would not result in significant impacts to utilities; therefore, no additional mitigation measures are proposed.

4.7.3 Alternative 2

Under Alternative 2, many of the components would be the same as those described under Alternative 1; therefore, impacts to utilities associated with these components would be the same as those described under Alternative 1. Impact analysis for the following components unique to Alternative 2 is provided below:

- Gallery Wells and Collection System. and
- Expanded Haybarn Canyon AWTP and New Surface Water Treatment Facility.

4.7.3.1 Construction

In addition to components already described under Alternative 1, the following components would involve construction activities in the vicinity of existing facilities infrastructure:

- *Gallery Wells and Collection System.* Most of the construction of new gallery wells and associated pipelines would be away from major roads and utility corridors. However, there is a limited area where pipelines would be constructed in and across Vandegrift Boulevard and the area around Haybarn Canyon where there are various existing underground utilities.
- *AWTP and New Surface Water Treatment Facility.* The expanded AWTP and new surface water treatment facilities at Haybarn Canyon would include construction in the area around Haybarn Canyon where there are various existing underground utilities and overhead power lines.

Through application of SCMs listed in Section 2.3.1.4, *Special Conservation Measures*, existing utilities would be avoided through appropriate design details and construction contract provisions. Therefore, no significant impacts on existing utilities would occur during construction under Alternative 2.

4.7.3.2 Operations

Potable Water Supply

MCB Camp Pendleton

Implementation of Alternative 2 is estimated to yield an additional 5,500 AFY of groundwater from the Ysidora Basin (Stetson 2012a,d). A portion of this additional supply of water would help reduce MCB Camp Pendleton's anticipated future reliance on imported water. In addition, connections to off-base water supplies would provide MCB Camp Pendleton with an emergency potable water supply. Therefore, implementation of Alternative 2 would provide a beneficial impact to potable water supplies.

FPUD

Implementation of Alternative 2 is estimated to yield an additional 3,500 AFY of groundwater from the Ysidora Basin (Stetson 2012a,d). An annual average of approximately 3,100 AFY (Stetson 2012b) of potable water would be delivered to FPUD, providing FPUD with a local source of potable water and reducing their dependence on imported water from the SDCWA. Therefore, implementation of Alternative 2 would provide a beneficial impact to potable water supplies.

Solid Waste Collection and Disposal

MCB Camp Pendleton

In addition to periodic maintenance dredging of the recharge ponds, as described under Alternative 1, solid wastes would be generated by the expanded AWTP and new surface water treatment facility. All solid wastes from backwash recovery would be treated and disposed of in accordance with MCO 5090.2A, Chapter 17 and in compliance with all state and federal regulations and respective permits regarding waste disposal. This includes all relevant Waste Discharge Requirements from the SWRCB and San Diego RWQCB and Solid Waste Facility Permits issued by the County of San Diego as the local enforcement agency. Therefore, no significant impacts to solid waste collection and disposal would occur under Alternative 2.

FPUD

No significant volumes of waste would be generated by FPUD during normal operations under Alternative 2. Therefore, no significant impacts to solid waste collection and disposal would occur under Alternative 2.

Electrical Power

MCB Camp Pendleton

Normal operations under Alternative 2 would be similar to those under Alternative 1, with the addition of gallery wells and expanded AWTP and new surface water treatment facility. The estimated annual average and peak (maximum hour) demands for Alternative 2 components are summarized in Table 4.7-2. The components with the large majority of the demands would be located in the general vicinity of or serviced by the existing Haybarn Canyon substation on MCB Camp Pendleton, which is undergoing expansion to nearly 70 MW of capacity (MCB Camp Pendleton 2010b). This expansion of capacity would accommodate the on-base demand for SMR CUP of 1.58 MW, as noted in Table 4.7-2. Therefore, no significant impacts on MCB Camp Pendleton's electrical system would occur as a result of implementation of Alternative 2.

FPUD

Under Alternative 2, electrical power demand for operation of the Gheen Zone/Martin Reservoir Pump Station would be 0.56 MW, as summarized in Table 4.7-2. Power is currently provided at this site and SDG&E has the capacity to provide power for this project component (FPUD 2009). Therefore, no significant impacts on SDG&E's electrical system would occur as a result of implementation of Alternative 2.

Natural Gas Systems

Operations under Alternative 2 would not require the use of natural gas. Therefore, no significant impacts on existing natural gas sources would occur under Alternative 2.

Table 4.7-2. Electricity Demand Under Operation of Alternative 2

Project Component	Annual Average Energy Consumption (MW-hour/Year)	Peak Hour Energy Consumption (MW)
Production Wells and Collection System	1,770	0.19
Gallery Wells and Conveyance System	271	0.12
AWTP and Treatment Train	2,250	0.80
Booster Stations at Haybarn Canyon and MCB Camp Pendleton/DET Fallbrook boundary	2,258	0.47
Subtotal - MCB Camp Pendleton Facilities	**6,549**	**1.58**
Booster Station at site of Gheen Zone/Martin Reservoir	735	0.56
Subtotal - FPUD Facilities	**735**	**0.56**

Notes: MW = megawatt; AWTP = Advanced Water Treatment Plant; MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station Seal Beach, Detachment Fallbrook.

4.7.3.3 Mitigation Measures

Through implementation of SCMs listed in Section 2.3.1.4, Alternative 2 would not result in significant impacts to utilities; therefore, no additional mitigation measures are proposed.

4.7.4 No-Action Alternative

Under the No-Action Alternative, no new construction activities would occur. Recent Management conditions (as described in Section 3.7, *Utilities*) would remain unchanged and no significant impacts to solid waste disposal, electrical power, and natural gas systems would occur.

Under the No-Action Alternative, potential impacts on potable water resources would occur since MCB Camp Pendleton and FPUD would have to become more dependent upon either SDCWA for imported water or seek other sources such as seawater desalination to meet future water demands. Imported water sources (Colorado River Water and State Project Water) are already becoming substantially less reliable as a result of reduced diversions from both the Colorado River and the Sacramento Delta due to a number of factors. Seawater desalination is also a potential supply, but has a number of potentially significant environmental impacts. Furthermore, both imported water and seawater desalination require substantially greater energy inputs per acre-foot of water delivered compared to the action alternatives. Any future potable water development projects for MCB Camp Pendleton would be subject to the NEPA and/or CEQA process, as appropriate. Therefore, no significant impacts to utilities would occur with implementation of the No-Action Alternative.

CHAPTER 5
CUMULATIVE IMPACTS

5.1 ANALYSIS OF CUMULATIVE IMPACTS

CEQ regulations implementing the procedural provisions of NEPA define cumulative effects as: "The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions." (40 CFR § 1508.7). Cumulative impacts can result from "individually minor but collectively significant actions taking place over a period of time" (40 CFR § 1508.7). The CEQ also provides guidance on cumulative impacts analysis in *Considering Cumulative Effects Under the National Environmental Policy Act* (CEQ 1997) and the *Memorandum Guidance on the Consideration of Past Actions in Cumulative Effects Analysis* (CEQ 2005). Noting that environmental impacts result from a diversity of sources and processes, this CEQ guidance observes that "no universally accepted framework for cumulative effects analysis exists," while noting that certain general principles have gained acceptance. One such principal provides that "cumulative effects analysis should be conducted within the context of resource, ecosystem, and community thresholds—levels of stress beyond which the desired condition degrades." Thus, "each resource, ecosystem, and human community must be analyzed in terms of its ability to accommodate additional effects, based on its own time and space parameters." Therefore, cumulative effects analysis normally will encompass geographic boundaries beyond the immediate area of the Proposed Action, and a timeframe including past actions and foreseeable future actions, in order to capture these additional effects. Bounding the cumulative effects analysis is a complex undertaking, appropriately limited by practical considerations. Thus, CEQ guidelines observe, "[i]t is not practical to analyze cumulative effects of an action on the universe; the list of environmental effects must focus on those that are truly meaningful."

This section presents an analysis of potential cumulative environmental impacts of the Proposed Action combined with other planned programs having a similar implementation schedule and ROI. The two action alternatives (i.e., Alternative 1 and 2) under the Proposed Action (refer to Chapter 2) would be similar in nature to each other with respect to cumulative impacts. While Alternatives 1 and 2 are not specifically called out in the following discussion, the cumulative analysis presented in this section applies to either action alternative under the Proposed Action.

Projects on MCB Camp Pendleton and some off-base areas were considered as part of this analysis. The cumulative effects ROI associated with the Proposed Action includes MCB Camp Pendleton, DET Fallbrook, the City of Oceanside, and communities associated with the SMR Basin (i.e., Fallbrook, De Luz, Rainbow, and Murrieta). Therefore, this analysis considers additional effects arising from the Proposed Action with effects of other known current and future actions within the ROI.

5.2 GEOGRAPHIC BOUNDARIES FOR CUMULATIVE IMPACT ANALYSIS

Geographic boundaries for analyses of cumulative impacts in this EIS/EIR vary for different environmental resources. For example, for air quality, the potentially affected air basin is the appropriate boundary for assessment of cumulative impacts from releases of pollutants into the atmosphere. For resources such as fish or marine mammals, impacts from Alternative 1 might combine with impacts from distant sources to affect the resource species, necessitating a wider geographic scope for the analysis. The cumulative impacts analysis focuses on those training/testing projects that directly overlap with Alternative 1 (i.e., occur in similar locations and potentially impact similar resources). As previously mentioned for the purposes of this analysis, the cumulative region includes MCB Camp Pendleton, DET Fallbrook, the City of Oceanside, and communities associated with the SMR Basin (i.e., Fallbrook, De Luz, Rainbow, and Murrieta) (refer to Section 1.5 and Figure 1-1).

5.3 Other Past, Present, and Reasonably Foreseeable Future Actions

Identifiable effects of other past, present, and reasonably foreseeable actions are analyzed and evaluated to the extent they may be additive to impacts of the Proposed Action. In general, the USMC and Reclamation need not list or analyze the effects of individual past actions; cumulative impacts analysis appropriately focuses on aggregate effects of past actions. Reasonably foreseeable future actions that may have impacts additive to the effects of the Proposed Action are also analyzed. As part of the evaluation of cumulative impacts, a review of other projects in the vicinity of the Proposed Action was conducted. Cumulative projects that could interact directly or indirectly with the Proposed Action are discussed below. Other projects on MCB Camp Pendleton, DET Fallbrook, and within FPUD that do not have the potential to interact cumulatively with the Proposed Action are not addressed in this EIS/EIR.

5.3.1 Santa Margarita River Flood Control Project (P-030)

The USMC has constructed a flood control project to protect MCB Camp Pendleton assets located within the limits of the 100-year floodplain on the SMR during a storm event of up to 100 years in magnitude. This included construction of a levee and floodwall, stormwater management system, sediment control structures, and stormwater pump stations. The EIS prepared for the action identified potential significant impacts to biological resources and the ROD was signed on 8 February 1998.

5.3.2 Southern Region Tertiary Treatment Plant and Associated Facilities

The USMC has constructed a new tertiary sewage treatment plant to replace five aging STPs (four operational, one operating as a pump station in the southern part of the base) on MCB Camp Pendleton, near the existing STP 13. Other project components under construction include the relocation of the existing Recycling Center, construction of conveyance infrastructure to transport wastewater from the old STPs 1, 2, and 3 to the new tertiary treatment plant, demolition of the old plants, and construction of a treated wastewater reclamation system and effluent conveyance that is compliant with federal, state, and local regulations. The USMC will use the tertiary treated wastewater flows for reclamation to the maximum extent practicable; excess effluent would discharge via an existing ocean outfall. The Southern Region Tertiary Treatment Plant EIS prepared for the action identified no significant environmental impacts and the ROD was signed on 17 June 2004.

5.3.3 Wastewater Conveyance System Supplemental EA (P-110)

The USMC has constructed and is currently operating and maintaining a wastewater conveyance pipeline and associated facilities at MCB Camp Pendleton. The purpose of this action is to achieve compliance with the requirements outlined in the April 2004 *Final Environmental Impact Statement for the Tertiary Treatment Plant and Associated Facilities, MCB Camp Pendleton* that stipulated the need to update the regulatory agencies once specific conveyance line/associated facilities locations and associated potential impacts were identified. Construction of wastewater conveyance pipelines and related facilities were analyzed in the aforementioned Southern Region Tertiary Treatment Plant EIS; however, modifications have occurred during the design phase of the project which necessitated additional environmental analyses. The Supplemental EA (SEA) evaluated areas to construct conveyance facilities not previously analyzed in the Southern Region Tertiary Treatment Plant EIS, as well as the addition of associated facilities such as pump stations and utilities. The SEA prepared for the action identified no significant environmental impacts and was completed in February 2007.

5.3.4 Improvements to Groundwater Production Wells and New Reservoir

The following interrelated MCB Camp Pendleton projects involve groundwater production wells, collection pipelines, iron and manganese water treatment, and a new reservoir at Haybarn Canyon.

Raw Water Transmission Pipeline and Iron/Manganese Treatment Plant Modifications (P-068)

P-068 constructed 4.2 mi (6.8 km) of raw water transmission pipeline to connect seven existing wells, which are currently connected directly into the potable water distribution system, to the original IM-1. The new pipeline runs along the north side of Vandegrift Boulevard, between the Santa Margarita Valley water supply wells and the IM-1. P-068 modified the existing treatment works to accommodate the new source of raw water by adding chemical feed pumps, piping, electrical equipment, and control equipment. Under P-069, the pipeline provides a point of connection for the new treatment plant (IM-2) and reservoir near Haybarn Canyon (see P-071 below).

Iron/Manganese Treatment Plant and Reservoir in the Santa Margarita River Basin (P-071)

P-071 constructed and made operational a second IM treatment plant (IM-2) and a new reservoir with a capacity of approximately 3.0 million gallons per day in Haybarn Canyon. The IM-2 is supplied from the existing raw water pipeline that supplies water from the wells to the existing treatment plants on MCB Camp Pendleton. The IM-2, in conjunction with the existing IM-1 on Vandegrift Boulevard, allows MCB Camp Pendleton to treat all the water from the wells at the same time. This project provides potable water that meets drinking water standards to the South Water Distribution System. Associated with the IM-2 and reservoir are connecting pipelines for the treatment plant, connecting pipelines and an access road for the reservoir, and supporting systems and facilities. The EA prepared for the action identified no significant impacts and was completed in April 2003.

5.3.5 Advanced Water Treatment Facility/Utility Corridor Project (P-113)

The purpose of the P-113 project is the reduction of (1) TDS to maximize wastewater reuse options on base, and (2) total organic carbon and total trihalomethanes to comply with the Federal Stage 2 Disinfectants and Disinfection Byproducts Rule for total trihalomethanes in drinking water. The proposed P-113 Project is also needed to ensure MCB Camp Pendleton compliance with drinking water and wastewater standards for TDS. Under this project, the USMC upgraded the existing Haybarn Canyon Drinking Water IM-2 through the addition of modular microfiltration, granular activated carbon, and RO components. Disinfection and pH adjustment are also applied to the treated water stream. Construction of the P-113 project began in 2011 and was completed in 2013.

5.3.6 Lake O’Neill Restoration, Repair, Restoration, and Operations and Maintenance

The proposed action addressed in the Lake O’Neill EA focuses on restoration, repair, construction, and operations and maintenance of infrastructure used to exercise the MCB Camp Pendleton water rights to their fullest extent. Fully exercising the water rights ensures that the USMC is able to meet the minimum needs and operate at the level required to fulfill its federally mandated mission. Specifically, the proposed action would include the following components:

- Maintenance dredging of non-wetland/non-vegetated areas of Lake O'Neill;
- Installation of a silt curtain to restrict sediment deposition to the northern portion of the lake;
- Repairs to the lake perimeter road and construction of access corridors to the lake;
- Installation and operation of a pumping and drain pipeline system;

- Repairs/improvements to O'Neill Ditch, including concrete lining and removal of flow restrictive structures;
- Restoration of Recharge Ponds 6 and 7, including storage, hauling, and disposal of dredged/excavated materials;
- Replacement of the emergency spillway structure; and
- Other lake, recharge pond, and SMR Diversion System Operations and Maintenance, such as sediment and debris clearing and bank maintenance of the O'Neill Ditch and maintenance of the lake access road.

The proposed installation of a pumping and drain pipeline system, lining O'Neill Ditch with concrete, and removing flow-restrictive structures would restore water delivery capability and reliability to the lake, reduce infiltration losses in the lower portion of the ditch, and allow the water diversion and recharge system to function as originally designed. Dredging is needed to restore and maintain the lake at its historical capacity and prevent the spread of emergent vegetation while avoiding impacts to wetlands. Installation of a silt curtain in Lake O'Neill would restrict sedimentation to the northern portion of the lake without impairing existing wetlands. Exporting material that was dredged from Lake O'Neill in 2012 and is currently stored in the Recharge Ponds 6 and 7, and restoring the recharge ponds receiving dredged material, are needed to achieve the groundwater recharge capacity of the ponds. Enlarging the existing spillway would provide capacity to handle storm events (e.g., 100-year storms) for flood control. The project also would include clearing and grubbing, preparation of staging areas, repairing the road around the lake as necessary for construction access, and incidental related work.

5.3.7 Basewide Utilities Infrastructure Improvements Project

The USMC proposes to upgrade and improve the basewide water, wastewater, electrical, communication, and natural gas systems at MCB Camp Pendleton. The purpose of the proposed action is to allow the base to efficiently meet its mission and to provide (1) new or upgraded, reliable, and compliant utility systems to support military training and operations throughout MCB Camp Pendleton and quality of life services; and (2) system redundancy that would enable the delivery of utility services during periods of scheduled, unscheduled, and emergency outages. Specifically, the proposed action would include the construction and operation, including maintenance, of utility infrastructure upgrades, expansions, and improvements to water, wastewater, electrical, communication, and natural gas systems within MCB Camp Pendleton. These improvements would include a new tertiary wastewater treatment plant and associated facilities serving the northern portion of MCB Camp Pendleton; upgrades to the base 69-kV electrical distribution systems and associated facilities, including replacement of existing 4.16kV and 12kV electrical distribution systems; upgrades to the basewide communication systems; upgrades to the basewide natural gas systems; and new water and wastewater facilities and road improvements to Range 130. The Basewide Utilities Infrastructure EIS prepared for the action identified no significant environmental impacts and the ROD was signed on 23 September 2010.

5.3.8 Basewide Water Infrastructure Project

The USMC is constructing water infrastructure improvements at MCB Camp Pendleton. The project allows MCB Camp Pendleton to efficiently meet its mission by providing improved and compliant drinking water treatment capabilities, capacity, and redundancy, and by providing more efficient water delivery in the northern region of MCB Camp Pendleton and throughout the base during periods of scheduled, unscheduled, and emergency system interruption. The project accomplishes this purpose through two separate projects designed to meet current and future needs, specifically, the construction, operation, and maintenance of potable water infrastructure upgrades. These improvements include a Northern Advanced Water Treatment plant and associated facilities, including an effluent discharge system, and connection of the MCB Camp Pendleton northern and southern water systems. The Basewide Water Infrastructure EIS prepared for the action identified significant impacts to biological resources and cultural resources; however, MCB Camp Pendleton would avoid or minimize impacts on these resources to the maximum extent practicable during project design and construction. The ROD was signed on 25 September 2012.

The infrastructure developed through the Basewide Water Infrastructure Project will be used to support this project. Groundwater produced and treated in the Northern Water System may be available for conveyance to the Southern Water System when available to mitigate pumping related impacts of the proposed project. Availability of water in the Northern Water System will be accounted for in the AMP/FOP when management objectives are being considered to avoid project related impacts. During some conditions, water supply form the Northern System may be limited due to prolonged drought or temporary and/or permanent increases in demand. The AMP/FOP is being developed to account for all potable water resources so that purpose and need of the project, including the water delivery schedule to FPUD, is maintained throughout all types of hydrologic conditions.

5.3.9 Emergency Storage Project

The SDCWA's Emergency Storage Project is designed to protect the San Diego region from potential disruptions to the water delivery system by increasing the amount of water stored locally. Under this project, new emergency water storage and pipeline connections would be installed, enabling water to continue to flow throughout the region even if the imported water supply is disrupted. The Emergency Storage Project is expected to meet the county's emergency water needs through 2030. Construction of the first components began in 2000; the last facilities will be complete in 2014.

The Emergency Storage Project is being implemented in four phases with the period of construction ranging from 2000 to 2014. EIRs were prepared for each phase and the SDCWA implemented an environmental mitigation-monitoring program to ensure environmental protection during construction. The Water Authority's mitigation monitoring program includes: avoiding and minimizing impacts to sensitive biological resources; preserving offsite mitigation lands; and compensating for impacts by restoring affected habitat.

5.3.10 Known and Unknown IR Site Remediation

MCB Camp Pendleton is currently investigating draft IR Site 1119 in the 26-Area for VOC related contamination in the groundwater aquifer. Although all known water quality and water level data from this site were used in determining locations of future groundwater well locations to support the CUP, the full extent of Site 1119 has not yet been characterized. Additionally, there may be other undiscovered IR sites on MCB Camp Pendleton that would require investigation and potential remedial action. The model and other hydrologic tools developed for the AMP/FOP would be updated and recalibrated as new data and site information becomes available. Although project related migration of VOC contamination is not expected to occur, the AMP/FOP would develop a rule-based course of action, consistent with MCB Camp Pendleton management goals, which would be implemented based on continuous monitoring of specific parameters (triggers) when pre-determined thresholds are exceeded. If these thresholds are breeched, the course of actions may include, but not be limited to, removing wells from service, installation of well-head treatment specific to known contaminants, implementation of other best management practices, or curtailment of CUP project related pumping.

One goal of MCB Camp Pendleton's adaptive management of its aquifers would be to avoid production of groundwater from areas of known contaminants whenever possible. If contaminants are detected, remedial steps for assuring public safety and environmental protection would be followed, including the courses of action previously described. Through the AMP/FOP, if public and environmental safety cannot be assured through remedial actions, groundwater pumping would be curtailed, the adaptive management process programmed in the AMP/FOP would continually review goals and objectives of stakeholders and interest parties to assure compliance with project related physical and environmental constraints as they evolve as hydrologic conditions vary in the future.

5.4 POTENTIAL CUMULATIVE IMPACTS BY ENVIRONMENTAL RESOURCE AREA

5.4.1 Geological Resources

The ROI considered in the geological resources analysis includes MCB Camp Pendleton, DET Fallbrook, and the community of Fallbrook. Construction activities such as grading and excavation under the Proposed Action and cumulative projects listed in Section 5.3 have the greatest potential to contribute to cumulative impacts on geological resources such as topography and soils. However, the Proposed Action would not involve extensive excavation or grading in any one location and trenching for pipelines would occur in some of the same corridors as other cumulative projects on MCB Camp Pendleton, DET Fallbrook, and in the community of Fallbrook. Therefore, cumulative impacts to topography would be less than significant. The Proposed Action and other projects would utilize geotechnical studies, as needed, to minimize impacts from landslides, subsidence, and seismicity. Therefore, cumulative impacts from geological hazards would be minimal.

The construction projects listed in Section 5.3 and the Proposed Action would require similar types and volumes of excavation in the ROI. The projects described in Section 5.3 have undergone separate NEPA/CEQA analysis and were found to have either no significant geological impacts or no significant geological impacts are anticipated (i.e., for projects currently undergoing NEPA analysis). Major components of some of these projects have been completed, such as P-071 (construction of the existing Haybarn Canyon IM-2) completed in 2005, and P-068 (repair of the original IM-1 located south of the Marine Corps Air Station Camp Pendleton) completed in 2006. Through use of the design, engineering, and erosion control measures listed in Section 4.1 of this EIS/EIR, no significant soil loss or erosion would occur during construction under the Proposed Action and the other cumulative projects. The geological resources impacts would be minor, and when combined with geological resources impacts from other projects, would have a negligible cumulative impact.

In regard to operations under the Proposed Action, the main impact that could contribute to potential cumulative impacts upon geologic resources would be the replacement of the natural substrate conditions in the same areas along Vandegrift Boulevard and streets in the community of Fallbrook with multiple water-filled pipelines surrounded by backfill. Pipeline corridor routes either avoid the routes of existing pipelines, or incorporate buffer zones that allow new pipelines to be placed a sufficient distance from existing lines to prevent the creation of wide areas underlain by pipelines. Impacts to topography and soils would be limited to excavation during maintenance and would be minimal. The Proposed Action and other cumulative project facilities would be designed and constructed according to the requirements of the project-specific geotechnical study, building codes, and engineering criteria. These design criteria would ensure that the completed facilities would not present slope or seismic hazards. Therefore, implementation of the Proposed Action, in conjunction with other similar actions in the ROI, would not result in significant cumulative impacts to geological resources.

5.4.2 Water Resources

The ROI for water resources includes those areas that contain surface water or groundwater features within the SMR watershed that may be impacted by the Proposed Action and the other cumulative projects. The main impacts to water resources associated with the Proposed Action that could contribute to cumulative impacts would be to surface water quality resulting from simultaneous construction activities and to surface and groundwater supplies resulting from other water development projects. The Proposed Action and other construction projects in the ROI that disturb greater than 1 acre (0.4 hectare) of land would be required to obtain and comply with the SWRCB General Permit for Construction Activities. The General Permit would require that construction contractors prepare and implement a SWPPP and implement all applicable BMPs in accordance with the General Permit from initiation through completion of construction activities as well as post construction BMPs. Implementation of a SWPPP and BMPs would further minimize the potential for pollutants to enter receiving waters during construction.

The water development projects listed in Section 5.3 and the Proposed Action would utilize water resources within the SMR Basin. In consideration of cumulative impacts to water resources, several technical studies and reports have been conducted to determine the sustainable groundwater yield for SMR CUP while minimizing environmental impacts within the Lower SMR Basin (Reclamation 2004b, 2005, 2007a,b; Reclamation *et al.* 2012; Stetson 2008a, 2012a,b,d). These studies take into account the natural variations of the hydrologic condition and changes to the hydrologic regime resulting from other projects in the ROI.

In addition, the AMP/FOP would be implemented, as described in Section 2.3.1.4, *Special Conservation Measures and Section 5.3.9 Known and Unknown IR Site Remediation*, during operations under the Proposed Action. The AMP/FOP would be used to optimize groundwater yield while protecting environmental resources and would allow for operations to be adjusted due to both the natural variations of the hydrologic condition and other changes to the hydrologic regime (i.e., from other cumulative projects in the ROI). Therefore, implementation of the Proposed Action, in conjunction with other similar actions in the ROI, would not result in significant cumulative impacts to water resources.

5.4.3 Biological Resources

Potential cumulative impacts on biological resources are considered from the standpoint of both construction and operations under the Proposed Action.

5.4.3.1 Construction

<u>Vegetation and Wildlife</u>

The Proposed Action would cause both temporary and permanent losses of vegetation and wildlife habitat through the construction of new facilities. These losses would be reduced by restoration, and offset over time by compensation. There is continuing recognition and conservation of the most valuable habitats, especially CSS and riparian habitat, on MCB Camp Pendleton and DET Fallbrook via the INRMP for each installation, as well as the installations' NEPA reviews of each new construction project. The INRMPs also provide support for and coordination with local and regional non-military planning and conservation of biological resources. Habitat protection and compensation for losses is also emphasized in the subarea plans of the County of San Diego Multiple Species Conservation Plan, which are incorporated into local and regional general plans. Overall, incremental losses of valuable vegetation and wildlife habitat have been and will continue to be reduced. Development and land use are increasingly managed to avoid losses of biodiversity. Therefore, implementation of the Proposed Action, in conjunction with other similar actions in the ROI, would not result in significant cumulative impacts to vegetation and wildlife.

Aquatic Habitats and Species

Facilities construction for the Proposed Action would have mostly temporary impacts on aquatic species and habitats associated with the river and its tributaries. Conservation measures would minimize these impacts. Other activities in the watershed would have similar temporary effects, which would also be limited through SWPPPs and Section 404 permitting requirements. The minimization of project impacts coupled with the existing regulatory framework ensures that significant cumulative impacts on aquatic habitats and species would not occur due to project construction. Therefore, implementation of the Proposed Action, in conjunction with other similar actions in the ROI, would not result in significant cumulative impacts to aquatic habitat and species.

Special Status Species

Facilities construction for the Proposed Action would have mostly temporary impacts on special status species populations and habitats. Although some displacement and mortality of individuals, coupled with a loss of habitat, would occur initially, these impacts would be reduced over time through restoration and compensation. It is not expected that construction would significantly diminish populations of these species within the ROI, and thus it would not increase the vulnerability of special status species to extinction, or increase the need for additional protection under the federal or state ESA. As for vegetation and wildlife, the MCB Camp Pendleton and DET Fallbrook INRMPs and NEPA reviews, coupled with local and regional conservation planning, also reduce and manage incremental impacts to special status species. Therefore, implementation of the Proposed Action, in conjunction with other similar actions in the ROI, would not result in significant cumulative impacts to special status species.

5.4.3.2 Operations

Operational impacts associated with the Proposed Action predominantly reflect the impacts of diminished surface flows and increased depths to groundwater in portions of the Lower SMR. These sources of impact apply to all subcategories of biological resources; hence a breakdown by subcategory is not necessary.

Since MCB Camp Pendleton and FPUD are the end-users of water in the SMR, the potential for cumulative impacts on biological resources depends on whether the incremental effects of the Proposed Action are affected by other users of the river's water or development in the watershed upstream of the ROI. In recent years, the settlement between MCB Camp Pendleton and RCWD (i.e., the CWRMA) (Reclamation 2008a) has resulted in restored low flows to the Lower SMR, which might have contributed to improved tidal flushing and apparently less frequent and shorter-duration closures of the river mouth relative to previous conditions (MCB Camp Pendleton 2009b). Continuing urbanization and loss of agricultural land in the watershed is likely to increase runoff from impervious surfaces, and reduce the net use of water. When these increases occur during normally dry summer months, they can have detrimental effects on native southern California riparian species, which are adapted to seasonal drought conditions (Turschak *et al.* 2008). Future development on MCB Camp Pendleton could increase the base's water demand, which could in turn affect the conjunctive use strategy.

The incremental effects of the Proposed Action on biological resources depend on both the supply of water from the watershed, and the demand from users in the FPUD service area and on MCB Camp Pendleton. In addition, biological resources associated with the river are likely to respond to, and be affected indirectly by, even minor changes in flow and groundwater levels. As a result, the potential for a significant cumulative impact exists. However, successful implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, would reduce this cumulative impact, as well as the project-specific impact, to less than significant. Therefore, implementation of the Proposed Action, in conjunction with other similar actions in the ROI, would not result in significant cumulative impacts to biological resources.

5.4.4 Cultural Resources

The cultural resources APE (i.e., ROI) encompasses all areas that may be subject to physical disturbance from project implementation, including construction within 100-ft (30-m) wide conveyance pipeline corridors and facility sites.

Implementation of the Proposed Action could potentially result in cumulative impacts on cultural resources. However, the cultural resources evaluation process is designed to ensure that impacts to cultural resources are avoided and that cultural resources are preserved whenever possible. Any portion of the Proposed Action with potential for significant impacts to cultural resources has undergone Section 106 review and would be mitigated, as required. Therefore, implementation of the Proposed Action, in conjunction with other similar actions in the APE, would not result in significant cumulative impacts to cultural resources.

5.4.5 Air Quality

5.4.5.1 Criteria Pollutants

The ROI considered in this air quality cumulative analysis includes the SDAB.

Direct and indirect impacts resulting from the Proposed Action, when combined with impacts from other projects identified in Section 5.3, would potentially occur during construction and operational activities within MCB Camp Pendleton and the service area of the FPUD. Proposed construction activities would produce short-term emissions that would remain below applicable NEPA and conformity emission significance thresholds. Any concurrent emissions-generating action that occurs in the vicinity of proposed construction activities would potentially contribute to the ambient impacts of these emissions. Since proposed construction would produce a nominal amount of emissions that are short-term and temporary in nature, the combination of proposed construction and future project air quality impacts would not contribute to an exceedance of an ambient air quality standard. As a result, proposed construction activities would produce less than cumulatively considerable air quality impacts. Implementation of recommended fugitive dust control measures would ensure that air emissions from proposed construction activities would produce less than significant cumulative impacts.

Operational activities associated with the Proposed Action would generate emissions that are less than those for construction activities because operational activities would only include improvements to recharge ponds 1-7. As discussed in Section 4.5.3.2, these activities would occur over a period of 30 days per year. As shown in Table 4.5-4, annual operational emissions would be below the *de minimis* thresholds for nonattainment pollutants, and would be less than 0.002 percent of the SDAB emissions inventory for all pollutants. Therefore, operational emissions would also produce less than significant cumulative air quality impacts. Therefore, implementation of the Proposed Action, in conjunction with other similar actions in the ROI, would not result in significant cumulative impacts to air quality.

5.4.5.2 Greenhouse Gases

The potential effects of proposed GHG emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Therefore, an appreciable impact on global climate change would only occur when proposed GHG emissions are combined with GHG emissions from other man-made activities on a global scale.

Currently, there are no formally adopted or published NEPA thresholds for GHG emissions. On 18 February 2010, the CEQ released draft guidance for addressing climate change in NEPA documents (CEQ 2010). The draft guidance, which has been issued for public review and comment, recommends quantification of GHG emissions, and proposes a reference point of 25,000 metric tons of CO_2e emissions. The CEQ indicates that use of 25,000 metric tons of CO_2e emissions as a reference point would provide federal agencies with a useful indicator, rather than an absolute standard of significance, for agencies to provide action-specific evaluation of GHG emissions and disclosure of potential impacts.

Formulating such thresholds is problematic, as it is difficult to determine what level of proposed emissions would substantially contribute to global climate change. In the absence of formally-adopted thresholds of significance, this EIS/EIR compares quantification of GHG emissions, and proposes 25,000 metric tons of CO_2e emissions as a starting point at which calculation and disclosure of GHG emissions may be meaningful for consideration by decision makers and the public. As shown in Table 5.4-1, CO_2e emissions would be well below the 25,000 metric tons of CO2e level proposed in the CEQ's draft guidance (see Appendix D for GHG emission data for project alternatives). Emissions were also compared to MCB Camp Pendleton's annual Recent Management GHG conditions and the United States GHG Recent Management inventory of 2010 (USEPA 2012a). Construction and operations emissions would be approximately 0.95% and 0.22% of MCB Camp Pendleton Recent Management CO_2e emissions, and approximately 0.00004% and 0.000009% of the total U.S. CO_2e emissions. Since GHG emissions would be minimal when compared with the annual MCB Camp Pendleton GHG Recent Management and the United States GHG Recent Management inventory, the proposed action would not have a significant cumulative effect on global climate change.

Although the Proposed Action would only cause negligible cumulative impacts associated with global climate change, this important topic warrants discussion of DON and USMC leadership in broad-based programs to reduce energy consumption and shift to renewable and alternative fuels, thereby reducing emissions of CO_2 and other GHGs.

EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, was adopted in October 2009 and provides early strategic guidance to federal agencies in the management of GHG emissions. The early strategy directs the agencies to increase renewable energy use to achieve general GHG emission reductions. According to the provisions of EO 13514, federal agencies are required to develop a 2008 Recent Management for scope 1 and 2 GHG emissions, and to develop a percentage reduction target for agency-wide reductions of scope 1 and 2 GHG emissions by FY 2020. As part of this effort, federal agencies are to evaluate sources of GHG emissions, and develop, implement, and annually update an integrated Strategic Sustainability Performance Plan that will prioritize agency actions based on lifecycle return on investment. The intent is to evaluate GHG emissions on a lifecycle basis and to identify feasibility of sustainability strategies on that basis. The DOD is currently developing its Strategic Sustainability Performance Plan that will guide USMC initiatives to reduce GHG emissions.

Table 5.4-1. Annual GHG Emissions – Proposed Action

Scenario/Activity	**Metric Tons per Year**[1]			
	CO_2	**CH_4**	**N_2O**	**CO_2e**
Construction				
Heavy Construction Equipment	1,934	0.25	0.41	2,066
Construction Worker Travel	223	0.02	-	224
Haul Trucks	329	0.01	-	320

TOTAL Construction	**2,486**	**0.28**	**0.41**	**2,619**
MCB Camp Pendleton 2008 Baseline GHG Emissions	-	-	-	276,877
Proposed Action Construction Emissions as a percent of MCB Camp Pendleton 2008 Baseline Emissions	-	-	-	0.95%
United States. 2006 Baseline Emissions (10^6 metric tons)[2]	-	-	-	6,821.8
Proposed Emissions as a % of U.S. Emissions	-	-	-	0.00004%
Operations				
Maintenance of Recharge ponds	122	0.01	0.06	140
TOTAL Operations	**518**	**0.04**	**0.33**	**617**
MCB Camp Pendleton 2008 Baseline GHG Emissions	-	-	-	276,877
Proposed Action Operational Emissions as a percent of MCB Camp Pendleton 2008 Baseline Emissions	-	-	-	0.22%
United States 2006 Baseline Emissions (10^6 metric tons)	-	-	-	6,821.8
Proposed Emissions as a % of U.S. Emissions	-	-	-	0.000009

Notes: [1]$CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 296)$.
CO_2 = carbon dioxide; CH_4 = methane; N_2O =nitrous oxide; CO_2e = carbon dioxide equivalent; MCB = Marine Corps Base; GHG = greenhouse gas.
Source: USEPA 2012a.

The Commandant of the Marine Corps' *Facilities Energy and Water Management Program Campaign Plan* (USMC 2009a) declares the intent to implement measures to conserve energy and to reduce greenhouse gas emissions and dependence on foreign oil. The campaign plan identifies long-term goals to reduce energy intensity and increase the percentage of renewable electrical energy consumed. This plan requires base commanders to "evaluate the effectiveness of incorporating emerging technologies" including integrated photovoltaics, cool roofs, daylighting, ground source heat pumps, heat recovery ventilation, high efficiency chillers, occupancy sensors, premium efficiency motors, radiant heating, solar water heating, and variable air volume systems.

Marine Corps Installations West has undertaken a study to evaluate and address GHG emissions, documented in the draft *Greenhouse Gas Assessment for Marine Corps Installations West* (USMC 2009b). The study provides the basis for recommended GHG management policies at Marine Corps Installations West.

5.4.6 Hazardous Materials and Wastes

The ROI considered in the hazardous materials and wastes analysis includes MCB Camp Pendleton, DET Fallbrook, and FPUD. The main impacts to hazardous materials/hazardous waste associated with the Proposed Action that could contribute to cumulative impacts would be construction of the components associated with the Proposed Action, and operation of the FPUD WTP. The construction projects listed in Section 5.3 and the Proposed Action would bring similar types and volumes of construction-related hazardous materials into the ROI. The projects described in Section 5.3 have undergone separate NEPA/CEQA analysis and were found to have either no significant hazardous materials and wastes impacts or no significant hazardous materials and wastes impacts are anticipated (i.e., for projects currently undergoing NEPA analysis). Through use of the measures listed in Section 4.6.3 of this EIS/EIR, no significant impacts associated with the use, storage, or disposal of construction-related hazardous materials or hazardous wastes would occur.

In regard to operation of the FPUD WTP, the main hazardous material or waste-related impact that could contribute to hazardous waste impacts would be the generation of large volumes of wastewater from the various treatment processes (i.e., brine discharge). None of the brine discharge would require handling or disposal as hazardous waste. The total projected brine discharge volume would be accommodated without affecting the ability of FPUD to meet its wastewater processing needs. An existing NPDES Permit would be amended to include brine discharge from the project (either FPUD's NPDES Permit [CA0108031] or MCB Camp Pendleton's NPDES Permit [CA0109347]), and additional discharge is not expected to impact the ability to meet NPDES permit requirements. Therefore, implementation of the Proposed Action, in conjunction with other similar actions in the ROI, would not result in significant cumulative impacts from the use, storage, and disposal of hazardous materials and wastes.

5.4.7 Utilities

The ROI for utilities includes the southern portion of MCB Camp Pendleton, DET Fallbrook, and the community of Fallbrook. Implementation of the Proposed Action would result in beneficial impacts to potable water supplies for MCB Camp Pendleton and FPUD, resulting in reduced reliance on imported water. Construction activities would generate manageable amounts of solid waste that would not put significant demands on MCB Camp Pendleton's waste disposal system. Increased electrical power demands under the Proposed Action operations would be accommodated by the Basewide Utilities Infrastructure Improvements Project or SDG&E. Long-term operation of the project would generate limited amounts of solid waste from maintenance dredging recharge ponds, and limited amounts of wastewater, but would not employ the use of MCB Camp Pendleton's or SDG&E's natural gas systems.

The Basewide Utilities Infrastructure Improvements Project is designed to upgrade MCB Camp Pendleton's existing utilities infrastructure and will be able to accommodate the demands from the Proposed Action or other projects within the MCB Camp Pendleton portion of the ROI where the majority of the Proposed Action's utilities demands would be located. Therefore, implementation of the Proposed Action, in conjunction with other similar actions in the ROI, would result in beneficial cumulative impacts to utilities, specifically to potable water.

5.5 CONCLUSIONS

Implementation of the Proposed Action would not result in significant cumulative impacts to any environmental resource area. The Proposed Action, as well as the other project listed in Section 5.3, would comply with established policies, regulations, and directives to ensure that project-specific impacts are minimized or avoided. Therefore, cumulative impacts from the Proposed Action, in conjunction with other past, present, and reasonably foreseeable future actions, would not be significant.

CHAPTER 6
OTHER REQUIRED CONSIDERATIONS

6.1 Growth Inducement

Section 15 126(g) of the CEQA Guidelines also requires a discussion of how the potential growth-inducing impacts of the proposed project could foster economic or population growth or the construction of new housing, either directly or indirectly. Induced growth is distinguished from the direct employment, population, or housing growth of a project. If a project has characteristics which "may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively," then these aspects of the proposed action must be discussed as well. Induced-growth is any growth that exceeds planned growth and results from new development that would not have taken place in the absence of the proposed project. For example, a project could induce growth by lowering or removing barriers to growth or by creating or allowing a use such as an industrial facility that attracts new population or economic activity. CEQA Guidelines also indicate that the topic of growth should not be assumed to be either beneficial or detrimental.

Construction of the components of the Proposed Action would result in some economic inducement associated with construction expenditures. Although the number of employees involved and the total amount of wages is unknown at this time, it is anticipated that the majority of employees would either live or reside temporarily in the immediate area. No new housing or temporary lodging would be constructed as a result of implementation of Alternative 1.

Implementation of the Proposed Action would not induce potential future growth at MCB Camp Pendleton or within the FPUD service area. The Proposed Action would improve water supply reliability and support current MCB Camp Pendleton activities by managing yield of the Lower SMR Basin. This increased water yield would not result in growth inducement but would rather reduce dependence on imported water, which is anticipated to increase in the future regardless of project implementation. Based on consideration of the effects of the construction and operation of the various components, growth inducement would not occur as a result of implementation of the Proposed Action.

6.2 Irreversible or Irretrievable Commitment of Resources

Both the NEPA, 42 USC §§ 4321-4370d, and the CEQA Guidelines, 14 CCR § 15000 *et seq.*, require an analysis of irreversible or irretrievable commitment of resources. Resources that are irreversibly or irretrievably committed to a project are those that are used on a long-term or permanent basis. This includes the use of nonrenewable resources such as wood, fuel, metal, and other natural or cultural resources. Human labor is also considered a nonrenewable resource. These resources are considered nonrenewable or irretrievable if they would be used for the Proposed Action when they could have been used for other purposes. Another issue that falls under the category of the irreversible and irretrievable commitment of resources is the unavoidable destruction of natural and cultural resources, which could limit the variety of potential uses for that particular environment.

For the construction and operation of the proposed facilities, most impacts are short-term and temporary in nature. Implementation of any of the action alternatives would constitute an irreversible or irretrievable commitment of nonrenewable or depletable resources for the materials and energy expended during construction and implementation. Expenditure of building materials, fuel for construction vehicles and equipment, and other resources would not be reversible or retrievable. Implementation of any of the action alternatives would not result in the destruction of environmental resources such that the range of potential uses of the environment would be limited. Implementation of any of the action alternatives would have short-term effects on natural resources but would not adversely affect the biodiversity in the area. In addition, although implementation of any of the action alternatives would require the use of nonrenewable and depletable resources, MCB Camp Pendleton, Reclamation, and FPUD would attempt to minimize the irreversible or irretrievable commitment of resources.

6.3 Short-term Uses and Long-term Productivity

NEPA, 42 USC §§ 4321-4370d, requires an EIS to address the short-term gains versus long-term benefits of Alternative 1 and identify where Alternative 1 forecloses future options (40 CFR § 1502.16). Impacts that narrow the range of beneficial uses of the environment are of particular concern. This refers to the possibility that choosing one development option reduces future flexibility in pursuing other options, or that giving over a parcel of land or other resource to a certain use often eliminates the possibility of other uses being performed at that site.

Implementation of the Proposed Action would result in both short-term environmental effects and long-term productivity. However, implementation of any of the alternatives would not result in any impacts that would reduce environmental productivity, permanently narrow the range of beneficial uses of the environment, or pose long-term risks to health, safety, or the general welfare of the public.

6.4 Unavoidable Adverse Effects

NEPA, 42 USC §§ 4321-4370d, and the CEQA Guidelines, 14 CCR § 15000 *et seq.*, require a description of any significant impacts resulting from implementation of a proposed action, including those that can be mitigated to a less than significant level. The environmental effects of the SMR CUP alternatives are discussed in Chapter 4 (Environmental Consequences) and Chapter 5 (Cumulative Impacts). The analysis in Chapter 4 addresses whether implementation of an alternative would result in a significant adverse impact to any of the specific environmental resource areas. When significant impacts were identified, mitigation measures were developed that could reduce impacts to a less than significant level, provided that such mitigation could feasibly be accomplished.

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CHAPTER 8
AGENCIES CONTACTED

Federal, state, and local agencies were consulted prior to and during the preparation of this EIS/EIR. Agencies were notified by publication of an NOI and NOP announcing preparation of a Draft EIS/EIR as required by NEPA and CEQA, respectively, and by public scoping meetings. The agencies' viewpoints were solicited with regard to activities within their jurisdictions. The agencies and organization contacted are listed below.

Agency	Location
Federal Agencies	
U.S. Department of the Interior, Bureau of Reclamation	Temecula, CA
U.S. Marine Corps Base, Camp Pendleton	Camp Pendleton, CA
U.S. Environmental Protection Agency	San Francisco, CA
U.S. Fish and Wildlife Service	San Diego, CA
U.S. Army Corps of Engineers	San Diego, CA
National Marine Fisheries Service	Long Beach, CA
State Agencies	
California Department of Fish and Game	San Diego, CA
California State Historical Preservation Office	Sacramento, CA
California State Water Resources Control Board	Sacramento, CA
County of San Diego Agencies	
County of San Diego Air Pollution Control District	San Diego, CA
Regional Agencies	
California Regional Water Quality Control Board	San Diego, CA
Other Local Agencies	
Fallbrook Public Utilities District	Fallbrook, CA

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CHAPTER 9
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Appendix A

Public Involvement

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under contracts for telecommunications services. Contracting officers and other DoD personnel use the information to ensure that information systems are protected; to participate in the establishment of tariffs for telecommunications services; and to establish reasonable prices for special construction by common carriers.

Affected Public: Businesses or other for-profit and not-for-profit institutions.

Annual Burden Hours: 1,428.

Number of Respondents: 424.

Responses Per Respondent: Approximately 4.

Annual Responses: 1,571.

Average Burden Per Response: 1 hour.

Frequency: On occasion.

Summary of Information Collection

The clause at DFARS 252.239–7000, Protection Against Compromising Emanations, requires that the contractor provide, upon request of the contracting officer, documentation that information technology used or provided under the contract meets appropriate information assurance requirements.

The clause at DFARS 252.239–7006, Tariff Information, requires that the contractor provide to the contracting officer: (1) Upon request, a copy of the contractor's existing tariffs; (2) before filing, a copy of any application to a Federal, State, or other regulatory agency for new rates, charges, services, or regulations relating to any tariff or any of the facilities or services to be furnished solely or primarily to the government, and, upon request, a copy of all information, material, and data developed or prepared in support of or in connection with such an application; and (3) a notification to the contracting officer of any application submitted by anyone other than the contractor that may affect the rate or conditions of services under the agreement or contract.

DFARS 239.7408 requires the contracting officer to obtain a detailed special construction proposal from a common carrier that submits a proposal or quotation that has special construction requirements related to the performance of basic telecommunications services.

Michele P. Peterson,

Executive Editor, Defense Acquisition Regulations Council.

[FR Doc. 04–24286 Filed 10–29–04; 8:45 am]

BILLING CODE 5001–08–P

DEPARTMENT OF DEFENSE

Department of the Navy

DEPARTMENT OF THE INTERIOR

Bureau of Reclamation

Notice of Intent To Prepare an Environmental Impact Statement/Environmental Impact Report for the Santa Margarita River Conjunctive Use Project, San Diego County, CA

AGENCIES: Department of the Navy, DOD. Bureau of Reclamation, DOI.

ACTION: Notice.

SUMMARY: Pursuant to Section (102)(2)(c) of the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4332 (2) (c)), as implemented by the Council on Environmental Quality Regulations (40 CFR parts 1500–1508), and the California Environmental Quality Act (CEQA) (PRC 21000 *et seq.*), as implemented by the California State CEQA Guidelines (14 CCR 15000–15387), the Department of the Navy, Marine Corps Base Camp Pendleton (MCB Camp Pendleton); the Bureau of Reclamation (Reclamation); and the Fallbrook Public Utility District (Fallbrook) intend to prepare an environmental impact statement/environmental impact report (EIS/EIR) and conduct associated public scoping meetings for the proposed Santa Margarita River Conjunctive Use Project. Three public meetings will be held to collect scoping comments. The public and agencies are invited to attend and provide comments.

DATES: All written comments must be received by January 31, 2005. Public meeting dates are as follows:

1. January 12, 2005, 6 p.m. to 8 p.m., Oceanside, CA.
2. January 13, 2005, 6 p.m. to 8 p.m., Fallbrook, CA.

ADDRESSES: Written comments or requests for inclusion on the EIS/EIR mailing list may be submitted to: Bureau of Reclamation, Southern California Area Office, Attn: Bill Rohwer, 27708 Jefferson Ave, Suite 202, Temecula, CA 92590.

Public meeting locations are as follows:

1. Oceanside—Oceanside Civic Center Library and Community Rooms, 330 North Coast Hwy, Oceanside, CA.
2. Fallbrook—Fallbrook Public Utility District, 990 East Mission Rd, Fallbrook, CA.

FOR FURTHER INFORMATION CONTACT: Bureau of Reclamation, Mr. Bill Rohwer, telephone 951–695–5310, fax 951–695–5319, or e-mail: *wrohwer@lc.usbr.gov.* Please submit requests for sign language interpretation for the hearing impaired or for other auxiliary aids at the public meetings to Mr. Rohwer by January 5, 2005.

SUPPLEMENTARY INFORMATION: The proposed conjunctive use project would be located in the lower Santa Margarita River basin on MCB Camp Pendleton, San Diego County, California. The project would upgrade an existing groundwater recharge and recovery system currently producing 7,000 acre-feet of water per year. Studies suggest that this yield could be increased to as much as 16,200 acre-feet per year. The project would improve existing diversion and percolation facilities and install new wells, an advanced potable water treatment plant, pump stations and a pipeline to Fallbrook. Potential options could involve in-stream water retention structures, reclaimed wastewater, off-stream storage, and recharge of other groundwater basins on MCB Camp Pendleton.

The purpose of the proposed project is to help meet water demands for MCB Camp Pendleton and Fallbrook, reduce regional dependency on imported water, and improve water reliability by increasing the yield of the lower Santa Margarita River basin and perfecting water rights permits that were assigned to Reclamation in 1974 pursuant to State Water Resources Control Board Order WR 73–50.

Reclamation currently holds three state-approved permits to divert and store water from the Santa Margarita River. The proposed conjunctive use project would enable permits 15000, 11357, and 8511 to be perfected, and could facilitate settlement of *United States* v. *Fallbrook Public Utility District, et al.* (No. 1247–SD–C), filed in 1951.

The permits were originally issued to Fallbrook and MCB Camp Pendleton. In 1968, Fallbrook, the U.S. Attorney General, the Secretary of the Navy, and the Secretary of the Interior signed a Memorandum of Understanding and Agreement to negotiate a physical solution predicated on the construction of a two-dam project on the Santa Margarita River. Fallbrook and MCB Camp Pendleton subsequently assigned the permits to Reclamation, which had been authorized to prepare feasibility studies for the project (Sec. 3, Pub. L. 89–561).

Reclamation completed a Feasibility Report in 1971 and a Final EIS in 1976 for a two-dam project to impound, conserve, and deliver the natural flows of the Santa Margarita River, as well as imported waters, to MCB Camp Pendleton and Fallbrook. Reclamation prepared a supplemental EIS for the project in 1984. However, Congress did not approve the project's funding. A subsequent effort to design a smaller, single dam project was also unsuccessful.

A 1994 study, with additional reports in 2001 and 2002, concluded that a groundwater recharge and extraction project (*i.e.*, conjunctive use) may result in an annual yield comparable to that of the two-dam project, at a lower cost and with fewer adverse environmental effects.

The conference report for the 2003 Omnibus Appropriations Act (Pub. L. 108–7) directed Reclamation, under the Santa Margarita feasibility authorization, to perform the studies needed to address current and future municipal, domestic, military, environmental, and other water uses from the Santa Margarita River. The 2004 Energy and Water Appropriations Act (Pub. L. 108–137) provided funding for Reclamation to study the feasibility of the Santa Margarita Conjunctive Use Project.

Through previous investigations, several areas of potential impact have been identified that apply to this proposed conjunctive use project. Potential impacts identified to date include, but are not be limited to, the following areas: Water quality/quantity (surface and groundwater), water rights, water reuse, fish passage, endangered species, estuarine habitat, riparian/wetland habitat, and sediment transport.

MCB Camp Pendleton, Reclamation, and Fallbrook have scheduled public meetings to describe the proposed project and obtain public input on the range of issues that should be studied in order to evaluate potential impacts of the proposed project. Each meeting will begin with a formal presentation about the proposed project from 6 p.m. to 6:30 p.m. followed by an informal open house from 6:30 p.m. to 8 p.m.

These meetings will assist the agencies in identifying additional alternatives or options to meet the stated purpose of the conjunctive use project and to assist in determining issues that will be analyzed in the EIS/EIR.

In response to issues developed during scoping, other alternative means of meeting the project's purpose will be explored and analyzed in the EIS/EIR, if found to be reasonable. Federal, state and local agencies, tribes, and the general public are invited to participate in the environmental review process.

Comments, including names and home addresses of respondents, will be made available for public review. Individual respondents may request their home address be withheld from public disclosure. Circumstances may exist in which we would withhold a respondent's identity from public disclosure, as allowable by law. Please prominently state at the beginning of your comment if you wish your name and/or address withheld from public disclosure. We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public disclosure in their entirety. Please note, unidentified comments will not be considered.

Dated: October 27, 2004.

J.H. Wagshul,

Commander, Judge Advocate General's Corps, U.S. Navy, Federal Register Liaison Officer.

Dated: October 27, 2004.

Robert W. Johnson,

Regional Director, Department of the Interior, Bureau of Reclamation, Lower Colorado Region.

[FR Doc. 04–24335 Filed 10–29–04; 8:45 am]

BILLING CODE 3810–FF–P

DEPARTMENT OF EDUCATION

Submission for OMB Review; Comment Request

AGENCY: Department of Education.

SUMMARY: The Leader, Information Management Case Services Team, Regulatory Information Management Services, Office of the Chief Information Officer invites comments on the submission for OMB review as required by the Paperwork Reduction Act of 1995.

DATES: Interested persons are invited to submit comments on or before December 1, 2004.

ADDRESSES: Written comments should be addressed to the Office of Information and Regulatory Affairs, Attention: Carolyn Lovett, Desk Officer, Department of Education, Office of Management and Budget, 725 17th Street, NW., Room 10235, New Executive Office Building, Washington, DC 20503 or faxed to (202) 395–6974.

SUPPLEMENTARY INFORMATION: Section 3506 of the Paperwork Reduction Act of 1995 (44 U.S.C. Chapter 35) requires that the Office of Management and Budget (OMB) provide interested Federal agencies and the public an early opportunity to comment on information collection requests. OMB may amend or waive the requirement for public consultation to the extent that public participation in the approval process would defeat the purpose of the information collection, violate State or Federal law, or substantially interfere with any agency's ability to perform its statutory obligations. The Leader, Information Management Case Services Team, Regulatory Information Management Services, Office of the Chief Information Officer, publishes that notice containing proposed information collection requests prior to submission of these requests to OMB. Each proposed information collection, grouped by office, contains the following: (1) Type of review requested, *e.g.,* new, revision, extension, existing or reinstatement; (2) Title; (3) Summary of the collection; (4) Description of the need for, and proposed use of, the information; (5) Respondents and frequency of collection; and (6) Reporting and/or Recordkeeping burden. OMB invites public comment.

Dated: October 27, 2004.

Angela C. Arrington,

Leader, Information Management Case Services Team, Regulatory Information Management Servicesc, Office of the Chief Information Officer.

Institute of Education Sciences

Type of Review: Revision.

Title: 2005 National Household Education Surveys Program (NHES: 2005).

Frequency: One time.

Affected Public: Individuals or household.

Reporting and Recordkeeping Hour Burden: Responses: 92,476. Burden Hours: 11,663.

Abstract: NHES:2005 is a survey of households using random-digit-dialing and computer-assisted telephone interviewing. Three topical surveys are to be conducted in NHES:2005: Early Childhood Program Participation (ECPP), After-School Programs and Activities (ASPA), and Adult Education and Lifelong Learning (AELL). ECPP and ASPA will provide current measures of participation in early childhood education, after-school programs, and other forms of non-parental care, as well as in-home and out-of-home activities. AELL will provide in-depth information on the participation of adults in a wide range of training and education activities.

Requests for copies of the submission for OMB review; comment request may be accessed from *http://edicsweb.ed.gov,* by selecting the ''Browse Pending Collections'' link and by clicking on link number 2630. When you access the information collection, click on ''Download Attachments'' to view. Written requests for information

SCH Number	Title / Lead Agency / City--County / Description	Document Type	Ending Date
	Documents Received on Wednesday, December 15, 2004		
	- General Plan Amendment No. 2004-05, changing the designation on 37.12 acres from Low Medium Density Residential (6 dwelling units/acre) to THSP; and - Zone Change No. 2004-06, changing on 37.12 acres from R-1 to THSP; and -Tentative Tract Map No. 31370, subdividing approximately 368 acres into 807 dwelling units, streets, community and neighborhood parks, and approximately 130 acres of natural open space.		
2004121067	Cielita Linda Residential Subdivision Vista, City of Vista--San Diego The project consists of the annexation of approximately 7.35 acres into the City of Vista and development of a 52-lot single family residential subdivision, private streets, and associated improvements on a 20.24-acre site.	**NOP**	01/13/2005
2004121068	Santa Margarita River Conjunctive Use Project Fallbrook Public Utility District Fallbrook--San Diego The proposed project would upgrade an existing groundwater recharge and recovery system to help meet water demands for Camp Pendleton and Fallbrook, reduce regional dependency on imported water, and improve water reliability. The project would improve existing diversion and percolation facilities and install new wells, an advanced potable water treatment plant, pump stations, and a pipeline to Fallbrook.	**NOP**	01/13/2005
2004121069	El Rancho Middle School Sportsfield Improvements and Lighting Anaheim, City of Anaheim--Orange Lighting and improvements of El Rancho Middle School ballfield for more efficient utilization. The proposed project would result in a Joint Use Agreement between the City of Anaheim and the Orange Unified School District. This agreement will allow the City to schedule youth sports practice activities after school operation. The project involves placing permanent athletic field lighting on the 2 existing sportsfields and providing turf repair on both fields and improvements to their irrigation system.	**Neg**	01/13/2005
2004121070	Magnolia High School Sportsfield Reconfiguration and Lighting Anaheim, City of Anaheim--Orange Reconfiguration and lighting of Magnola High School sportsfields for more efficient utilization. The proposed project would result in a Joint Use Agreement between the City of Anaheim & the Anaheim Union High School District. Project involves improving existing uses, relocating a running track elsewhere on the site, developing new field uses, and providing night lighting for extended practice uses. In addition, the existing turf and irrigation systems on the field will be replaced.	**Neg**	01/13/2005
2004121071	Miller Minor Use Permit and Grading Permit; DRC2003-00053 / PMT2003-02734 ED03-413 San Luis Obispo County Paso Robles--San Luis Obispo Request to allow grading for an access road and two building pads resulting in the total disturbance of approximately 2.5 acres (a majority of which has already been completed).	**Neg**	01/13/2005

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Directory of Public Scoping Comments

Organization	Commenter	Comment Tracking Code	Page Number
Federal Agencies			
National Oceanic and Atmospheric Administration	Rodney R. McInnis	F1	3
U.S. Environmental Protection Agency	Lisa B. Hanf	F2	5
U.S. Fish and Wildlife Service	Karen A. Goebel	F3	16
State Agencies			
California Department of Fish and Game	Donald R. Chadwick	S1	22
Native American Heritage Commission	Carol Gaubatz	S2	23
State Water Resources Control Board	Katherine Mrowka	S3	26
Local Interest Groups			
Endangered Habitats League and Conservation Biology Institute	Dan Silver and Michael D. White	L1	31
Fallbrook Land Conservancy Trails Council	Jane Comella	L2	35
Fallbrook Land Conservancy Trails Council	Joe Comella	L3	36
Fallbrook Land Conservancy Trails Council	Donna Gebhart	L4	37
Individuals			
None	Barbara Hayden	I1	38
None	Alberta Jane Parker	I2	39
None	James F. Pigg	I3	40

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802- 4213

JUL 27 2007

In response please refer to
SWR/2007/04852:SCG

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Mr. Doug McPherson
Environmental Protection Specialist
U.S. Bureau of Reclamation
27708 Jefferson Avenue, Suite 202
Temecula, California 92590

Dear Mr. McPherson:

NOAA's National Marine Fisheries Service (NMFS) is contacting you regarding the Bureau of Reclamation's (BOR) proposal to build a Conjunctive Use Project (project) in the Santa Margarita River Watershed on the Camp Pendleton Marine Corps Base in San Diego County, California. The proposed project includes replacing an existing water diversion with an inflatable "Obermeyer" type diversion structure, upgrading an existing groundwater recharge and recovery system, installing new wells, pump stations, and a pipeline between the Base and Fallbrook Public Utilities District facilities. Other potential project elements involve instream water retention structures, reclaimed wastewater, off-stream storage, and recharge of other groundwater basins on the Base. The water yield from project implementation could increase from the current 7,000 acre-foot per year to 16,200 acre-feet per year. NMFS is concerned about the potential effects of the BOR's project on the long-term recovery of endangered southern California steelhead (*Oncorhynchus mykiss*) and would like to provide the following comments.

1

The Santa Margarita River watershed lies within the Southern California Distinct Population Segment (DPS) of endangered steelhead, which ranges from the Santa Maria River to the Mexican Border (71 FR 834). This watershed is included in the Santa Catalina Gulf Coast biogeographic group, which includes nine streams located in Orange and San Diego Counties. NMFS' Steelhead Technical Recovery Team has identified this group of streams as being crucial to the viability and recovery of the southern DPS of steelhead (Boughton et al. 2006, Boughton et al. 2007). NMFS believes that this watershed was historically inhabited by steelhead, and because steelhead have recently been found in other streams near the Santa Margarita River (*i.e.*, San Juan Creek, San Mateo Creek, and the San Luis Rey River) it is possible that steelhead will attempt to enter the Santa Margarita River during the winter and spring when rainstorms and increased wet-season flows occur. Based on the available information, NMFS believes that the proposed project will have substantial effects on the timing, magnitude, duration and frequency of surface flows in the lower Santa Margarita River. The project and corresponding effects on surface flows during the wet season could impede adult steelhead attempting to migrate to and from areas upstream of the diversion. Additionally, the project and corresponding effects on

Response:

1. A study was prepared (Reclamation et al. 2012) to investigate the project impacts on steelhead migration in the Santa Margarita River. This study is referenced in the impact analysis of the EIS/EIR.

   Santa Margarita surface water flow effects are discussed in Section 4.2, *Water Resources*. Potential effects to the endangered southern California steelhead are discussed in Section 4.3, *Biological Resources* and in the Biological Assessment submitted to NOAA Fisheries.

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2

surface flows during the dry season could affect juvenile steelhead migrating to the ocean, or juvenile steelhead rearing in riverine areas near or downstream of the diversion and extraction wells. NMFS understands that there are preliminary plans for a fishway to be installed on the proposed diversion for steelhead passage, but until NMFS engineers can evaluate the final fishway design and corresponding water releases, the efficacy of any fish passage facility remains in question. 1 (cont)

As currently proposed, NMFS believes that the proposed project has the potential to impede or preclude recovery of steelhead in the Santa Margarita watershed. Because of the potential importance of this watershed for long term recovery of the endangered Southern California steelhead DPS, NMFS believes that BOR has the responsibility under Section 7(a)(1) of the Endangered Species Act to ensure that its actions in this watershed are carried out in a manner that will support the conservation and recovery of endangered steelhead. Accordingly, we request that you consult with us on the proposed project to ensure that the project is designed in a manner that will promote the conservation and recovery of steelhead in the Santa Margarita River, and the larger Southern California steelhead DPS. In this regard, we request that you provide us with information and plans for the project, including any design plans for fish passage, and planned water release regimes. 2

NMFS appreciates the opportunity to provide comments for the BOR's proposed action. Please contact Stan Glowacki at 562-980-4061 or via email at Stan.Glowacki@noaa.gov if you have any questions concerning this letter or if you require additional information.

Sincerely,

for Rodney R. McInnis
Regional Administrator

cc: Bill Barry, Camp Pendleton

Literature Cited

Boughton, D. A., P. B. Adams, E. Anderson, C. Fusaro, E. Keller, E. Kelley, L. Lentsch, J. Nielsen, K. Perry, H. Regan, J. Smith, C. Swift, L. Thompson, and F. Watson. 2006. Steelhead of the south-central/southern California coast: population characterization for recovery planning. NOAA Technical Memorandum, NOAA-TM-NMFS-SWFSC-394.

Boughton, D. A., P. B. Adams, E. Anderson, C. Fusaro, E. Keller, E. Kelley, L. Lentsch, J. Nielsen, K. Perry, H. Regan, J. Smith, C. Swift, L. Thompson, and F. Watson. 2007 Draft. Viability criteria for steelhead of the south-central and southern California coast. NOAA Technical Memorandum, NOAA-TM-NMFS-SWFSC-XXX.

Response:

2. Reclamation/DON would consult with NOAA Fisheries on southern California steelhead.

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P. 2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

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February 11, 2005

Bill Rohwer
Southern California Area Office
Bureau of Reclamation
27708 Jefferson Ave.
Suite 202
Temecula, CA 92590

Dear Mr. Rohwer:

The Environmental Protection Agency (EPA) has reviewed the Notice of Intent to prepare an environmental impact statement (EIS) for the **Santa Margarita River Conjunctive Use Project, San Diego County, CA.** Our review is pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), and Section 309 of the Clean Air Act.

Based on our review of the NOI and information provided at an October 7, 2004 briefing for regulatory agencies we are concerned that the proposed conjunctive use project may have adverse effects on the aquatic resources associated with the Santa Margarita River. EPA's concerns, as described in the enclosed detailed comments, focus on: (1) compliance with Section 404(b)(1) of the Clean Water Act, (2) the range of alternatives, (3) description of the environmental baseline, (4) study of environmental uses of the Santa Margarita River, (5) the method used to perfect water rights, (6) indirect and cumulative impacts, (7) potential impacts to special status species; and (8) general scoping comments for water supply projects.

In response to the December 13, 2004 letter from William Steele to our Regional Administrator, Wayne Nastri, inviting EPA to become a cooperating agency on this project, we respectfully decline the Bureau of Reclamation's invitation to participate as a Cooperating Agency due to resource constraints. While EPA has oversight responsibilities pursuant to the Clean Water Act (Section 404 wetlands, water quality), we do not have specific permitting authority and do not have the resources to assist in development of the action in a timely manner. EPA Region 9 encompasses the States of California, Nevada, Hawaii, and Arizona. Pursuant to Section 309 of the Clean Air Act, EPA is required to review and comment on all Environmental Impact Statements (EIS). As such, our office is involved in a high volume of environmental reviews.

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We appreciate the opportunity to provide comments on the preparation of the EIS. We appreciate the Bureau of Reclamation's interest in working with EPA. We intend to continue our participation through the review of future environmental documents pursuant to our formal responsibilities under the Clean Water Act and National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), and Section 309 of the Clean Air Act.

Please send <u>two</u> copies of the Draft Environmental Impact Statement (DEIS) to this office at the same time it is officially released for public review or filed with our Washington D.C. Office. If you have questions, please contact me or Laura Fujii, the lead reviewer for this project. Laura can be reached at 415-972-3852 or fujii.laura@epa.gov.

Sincerely,

Lisa B. Hanf
Lisa B. Hanf, Manager
Federal Activities Office
Cross Media Division

Enclosure:
EPA's Detailed Comments

Cc: Robert Hargrove, EPA
Horst Greczmiel, Council on Environmental Quality

2

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EPA DETAILED COMMENTS FOR THE NOI SANTA MARGARITA RIVER CONJUNCTIVE USE PROJECT, SAN DIEGO COUNTY, CA., FEBRUARY 11, 2005

The proposed conjunctive use project in the lower Santa Margarita River basin on Marine Corps Base Camp Pendleton (MCB Camp Pendleton) would: (1) upgrade an existing groundwater recharge and recovery system; (2) improve existing diversion and percolation facilities; (3) install new wells; (4) construct an advanced potable water treatment plant; (5) construct pump stations; and (6) construct a pipeline to Fallbrook. Potential project alternatives include in-stream water retention structures, reclaimed wastewater, off-stream storage, and recharge of other groundwater basins on MCB Camp Pendleton. The existing groundwater recharge and recovery system, which currently produces 7,000 acre-feet of water per year, could be increased to 16,200 acre-feet per year.

Compliance with Section 404(b)(1) of the Clean Water Act

1. Various components of the project will likely involve the discharge of dredged or fill material into the Santa Margarita River and/or other waters of the United States. This activity requires authorization by the Army Corps of Engineers and compliance with the substantive environmental criteria of the Federal Guidelines (Guidelines) at 40 CFR 230 promulgated under Section 404(b)(1) of the Clean Water Act. These criteria require a permitted discharge to: (1) be the least environmentally damaging practicable alternative (LEDPA); (2) avoid causing or contributing to a violation of a State water quality standard; (3) avoid jeopardizing a federally listed species or adversely modifying designated critical habitat for a federally listed species; (4) avoid causing or contributing to significant degradation of the waters of the U.S.; and (5) mitigate unavoidable impacts to waters. 1

Recommendation:

We encourage the Bureau of Reclamation (Reclamation) to integrate the requirements of Section 404 of the Clean Water Act with NEPA in the formulation of alternatives, analysis of impacts, and development of mitigation. In this regard, the draft environmental impact statement (DEIS) should include sufficient information to clearly demonstrate that the preferred alternative is also the LEDPA. The LEDPA is generally the alternative that avoids or minimizes impacts to waters of the United States (US) to the extent practicable. In developing an appropriate range of avoidance alternatives, the DEIS should factor in the potential effects of construction, operations, and maintenance activities of the different water supply system components. Potential impacts of the entire footprint of the project should be evaluated. We recommend consideration of alternatives that avoid impacts to wetlands and waters of the US.

1

2

Response:

1. Impacts to Water Resources and waters of the U.S., including compliance with Section 404 of the Clean Water Act are discussed in Section 4.2, *Water Resources* and Section 4.3, *Biological Resources.*

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Range of Alternatives

1. The potential range of alternatives to be analyzed in the DEIS is unclear. The Notice of Intent (NOI) identifies specific components to be included in the proposed project. However, the agency briefing material identifies three alternatives that include various combinations of these and other project components. A Pre-feasibility Study which analyzes 22 project alternatives and recommends three to five alternatives for further evaluation was scheduled to be completed in January 2005.

Recommendation:

We recommend Reclamation solicit additional public input on alternatives and other aspects of the proposed project after the Pre-Feasibility Study is made available for public review. The DEIS should include a summary of the Pre-Feasibility Study, describing the project alternatives eliminated from detailed analysis and the rationale their elimination. 2

2. EPA advocates an approach to water supply management and allocation which can adjust to changing conditions and help balance available water supplies, ecosystem health (e.g., in-stream beneficial uses), and user requirements. In the long-term, water supply actions should focus on sustainable management of developed supplies to meet these objectives.

Recommendations:

The range of alternatives should include alternatives that consider other water supply options (e.g., water transfers, reclaimed wastewater, enhanced conservation measures) and avoid impacts to waters of the US. Efficient use of existing water supplies should be maximized through conservation, reuse, and pollution prevention. We urge consideration of all available tools for enhancing water supply management flexibility, supply reliability, environmental conditions, and water quality. In addition to conjunctive use, these tools could include water transfers and exchanges, pricing, operational flexibility, market-based incentives for efficient water use, water acquisition, and wastewater reclamation and recycling. Alternatives considered in the DEIS should evaluate an integrated range of these tools. 3

Environmental Baseline

1. The selection of the environmental baseline is a critical step in the environmental analysis and the comparison with other action alternatives. "No action" does not equate with "no impact." Continuation of the existing management situation would constitute a discretionary commitment of resources that is, effectively, an action affecting the environment.

2

Response:

2. Chapter 2, of the EIS/EIR discusses the action alternatives, including the process used to formulate the alternatives carried forward for detailed analysis and a description of the those alternatives eliminated from detailed study and the rational for their elimination.

3. Numerous studies were prepared with the common goal of developing feasible alternatives that would enhance and optimize the productivity of the lower Santa Margarita groundwater basin. Various potential alternatives were examined in these previous studies, including local and regional projects located within and outside the Santa Margarita River basin. Factors that were considered when identifying potential project alternatives included: Chapter 2, of the EIS/EIR provided a detailed explanation of the Alternatives development process.

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Recommendations:

The alternatives analysis of the DEIS should clearly describe the environmental baseline and disclose the environmental consequences of all reasonable alternatives, including no action alternative...." in comparative form, thus sharply defining the issues and providing a clear basis for choice among options for the decision maker and the public." (40 CFR Part 1502.14). 4

The DEIS should also clearly describe existing resource conditions in the "affected environment" and the policy and institutional context for the "no action" (without project) and with project alternatives. For example, the DEIS should describe current and historical litigation, tentative agreements, and the underlying assumptions, water rights, and legal mandates (if any) of the proposed new water supply and alternatives. 5

2. To adequately evaluate potential impacts of the proposed project, it is important to determine the surface flows and subsurface water elevations sufficient to maintain and restore the riparian ecosystem of the Santa Margarita River. Restoration opportunities for the Santa Margarita River and its tributaries should not be precluded by potential project alternatives. 6

Recommendations:

A water budget for the Santa Margarita River should be developed which takes into account all surface and subsurface water resource needs, including riparian and fisheries requirements.

Surface flows sufficient to successfully reintroduce and maintain a viable fishery in the Santa Margarita River and its major tributaries should be determined and disclosed in the DEIS. The effects of the project alternatives on this restoration opportunity should be analyzed in the DEIS. We note that the draft watershed management plan prepared by the Santa Margarita Watershed Project Team includes recommendations focused on the reintroduction of native fish such as steelhead, stickleback, and lamprey to the river. 7

3

Response:

4. Chapter 3, *Affected Environment* for each resource area provides the "baseline analysis" within the region of influence (ROI) for each alternative carried forward. Chapter 4, *Environmental Consequences*, for each resource area provides the "impact analysis" for each alternative carried forward, including the No-Action Alternative.

5. Section 1.4, *Project Background* describes the legal history and current institutional framework for the Conjunctive Use Project. Chapter 3, Affected Environment also describes the current conditions as they apply to each resource area.

6. The impact analysis for subsurface and surface water flow is provided in Section 4.2, *Water Resources*. The impact analysis for riparian and fisheries habitat is provided in Section 4.3, *Biological Resources*.

7. An analysis of flows to reintroduce species has not been included. It should be noted that the lower Santa Margarita River historically did not flow year round to the estuary. The river went underground over large stretches of the braided channel in the lower Santa Margarita River basin. Improving the ability to lower the weir and bypass flows throughout the year will improve in-stream conditions.

   However, a study was prepared (Reclamation et al. 2012) to investigate the project impacts on steelhead migration in the Santa Margarita River. This study is referenced in the impact analysis of the EIS/EIR. In addition, the diversion weir is being modified and project partners will consult with NOAA Fisheries regarding the appropriate mitigation to minimize/avoid impacts to steelhead migration (i.e., fish ladder and fish screen on O'Neill Ditch) at the weir.

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Study of Environmental Uses

The NOI states that Reclamation will perform studies needed to address current and future uses of the Santa Margarita River, including environmental uses.

Recommendation:

We recommend Reclamation provide specific information on the type and scope of studies to be performed to determine the current and future uses of the Santa Margarita River in the Pre-Feasibility Study. 8

Perfecting Water Rights

One of the stated purposes of the proposed project is to perfect water rights permits that were assigned to Reclamation in 1974 pursuant to State Water Resources Control Board Order WR 73-50. However, the NOI does not state how the studies of various water uses will be used to perfect these water rights. For instance, it is unclear how the quantity of water needed to maintain current and future environmental uses of the Santa Margarita River will be factored into perfecting these water rights.

Recommendations:

The DEIS should fully disclose the process and studies to be used in perfecting water rights pursuant to WR 73-50. 9

The proposed project has the potential to increase the water withdrawals from the Santa Margarita River system. The overall water supply strategy for Camp Pendleton and Fallbrook should include explicit provisions in the DEIS for protecting the aquatic and riparian resources associated with the Santa Margarita River. 10

If flows to maintain current and future Santa Margarita River environmental uses will not be proposed, an alternative project approach may be to petition the State Water Resources Control Board for a change in use for purposes of preserving or enhancing wetlands habitat and fish and wildlife resources (e.g., California Water Code 1707). Whatever strategy is used to protect the beneficial uses of the Santa Margarita River, safeguards need to be in place for providing sufficient flows to maintain viable aquatic and riparian ecosystems along the Santa Margarita River. 11

4

Response:

8. Numerous studies have been conducted and reports written regarding use of water from the Santa Margarita River and how to best achieve the water supply improvement objectives of MCB Camp Pendleton and FPUD. These studies are identified in Section 2.2 and referenced throughout the EIS/EIR analysis.

9. The purpose has been modified as described in Section 1.3; the legal background of water rights pertaining to this project is discussed in Section 1.4.

10. Provisions for protecting aquatic and riparian resources associated with the Santa Margarita River and discussed in Section 4.3, *Biological Resources*.

11. Special Conservation Measures for providing sufficient flows for maintain viable aquatic and riparian ecosystems along the Santa Margarita River are discussed in Section 4.3, *Biological Resources*.

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Indirect and Cumulative Impacts.

Full disclosure of cumulative and indirect impacts is of specific concern. The National Environmental Policy Act (NEPA) requires evaluation of indirect impacts which are caused by the action (40 CFR Part 1508.8(b)). Indirect effects may include "growth-inducing effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems." (40 CFR Part 1508.9(b)). Induced residential, commercial, and industrial growth can adversely affect water quality, wetlands, and other natural resources.

A comprehensive analysis of the existing and reasonably foreseeable projects affecting the water budget and environment of the Santa Margarita River is needed to determine the indirect and cumulative impacts of the proposed increased diversions and project alternatives.

Recommendations: 12

The cumulative impacts analysis should address: (1) changes in sediment transport processes; (2) in-stream structures and barriers to passage by fish and other aquatic organisms; (3) changes in surface flows and subsurface water elevations (accounting for seasonal and inter-year variation); (4) water quality and quantity; and (5) potential effects of these changes on the establishment and maintenance of wetland/riparian plant communities.

Past cumulative effects may have greatly influenced "existing conditions". These historical cumulative effects, which may be perpetuated under the no action and action alternatives, should be fully disclosed and evaluated in the environmental effects and cumulative impact analyses. Existing projects that may have altered the extent of waters of the US and riparian areas or the availability of water to such areas should be included in these analyses. Examples of such projects at MCB Camp Pendleton include: (1) expansion of MCB Camp Pendleton pursuant to the Base Closure and Realignment Act (BRAC), (2) construction of the flood control levee along the Santa Margarita River, and (3) diversion of treated effluent out of the Santa Margarita Basin.

Special Status Species

The proposed project has the potential to adversely affect several special status species that occur within or downstream of the general project area in the Camp Pendleton and Fallbrook area. For instance, the federally endangered least Bell's vireo (*Vireo bellii pusillus*), southwestern willow flycatcher (*Empidonax traillii extimus*), arroyo toad (*Bufo californicus*), California least tern (*Sterna antillarum brownii*), and tidewater goby (*Eucyclogobius newberri*) are all closely associated with the Santa Margarita River.

5

Response:

12. Cumulative impacts and Growth Inducement impacts are discussed in Chapter 5 and Chapter 6, respectively.
    The Santa Margarita River Flood Control Project (P-030) and CPEN Tertiary Treatment Plant Project are included Chapter 5, Cumulative Impacts.
    BRAC has not been included for Cumulative Impact Analysis because the BRAC action did not affect resources on the Santa Margarita River.

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Recommendation:

The DEIS should include an analysis of impacts to listed species, other sensitive plant and animal species, and plant communities from all aspects of the proposed project and alternatives including construction, operation, and maintenance activities. The status of the Section 7 consultation pursuant to the Endangered Species Act should also be provided in the DEIS. 13

General Scoping Comments for Water Supply Projects

Water Quality

1. Potential impacts of the proposed alternatives on surface and groundwater quality should be fully evaluated in the DEIS. Discuss water quality currently documented for waters within the project area, including agricultural drainage and return flows. Identify conditions which impair beneficial water use, such as pesticides and salinity. Evaluate the alternatives with respect to their impacts (beneficial or adverse) on designated beneficial uses. 14

2. Identify sensitive aquatic sites such as wetlands which are present and disclose potential impacts from the proposed action. 15

3. Discuss specific monitoring programs that are in place or will be implemented to determine potential impacts on surface, groundwater, and drinking water quality and beneficial uses. Identify responses to remedy detected impacts so that adequate water quality can be guaranteed. 16

Water Pricing

1. EPA endorses a general principle that beneficiaries should pay, to the extent practicable, the costs of water supply improvements. Water pricing can reinforce fairness and recognizes the need to encourage water use efficiency and reflect the true cost of developing new supplies. Thus, water-- particularly any newly developed supplies-- should not be underpriced. The DEIS should document the full cost (including environmental and other mitigation) of providing water benefits and explain how these costs can be allocated among parties, according to explicit criteria. 17

2. It has been demonstrated over the last decade that variable pricing of water can significantly influence water demand and supply. The DEIS should include an in-depth discussion of how pricing can be used in allocation of the new water supply and management of user's demands.

Response:

13. The impact analysis for biological resources is presented in Section 4.3. Separate Biological Assessments have been prepared and will be provided to the USFWS and NOAA Fisheries. The USFWS and NOAA Fisheries will each issue a Biological Opinion for the project.

14. Water quality is discussed in Section 4.2, *Water Resources*.

15. Sensitive aquatic sites are discussed under Water Resources and Biological Resources.

16. Monitoring programs are discussed in Section 4.2, *Water Resources* and Section 4.3, *Biological Resources*.

17. A cost analysis would be prepared as part of the project feasibility study.

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3. The DEIS should provide comparative information on the costs and benefits under the various alternatives, distinguishing discrete features of an alternative (such as surface versus ground water supplies, and conveyance facilities costs) where possible. Identify the total cost, and costs allocated to water users under the various alternatives. Also provide comparative information on the costs and benefits of non-storage measures which serve water management objectives, including conservation and water acquired through transfers. With respect to environmental benefits and costs, such as environmental water, document benefits and clearly identify the magnitude and allocation (or incidence) of the costs for all alternatives, including no action. 17 (cont)

Water Conservation

1. Identify the current status of water conservation planning and practices in beneficiary areas. Identify current practices in the project area(s) for measuring surface and ground water use. Proposed project alternatives should evaluate one or more methods of measurement that will provide comprehensive and suitably accurate tracking of water use and efficiencies. 18

Groundwater

1. The DEIS should fully document groundwater conditions and describe how, when, and by whom groundwater is used throughout the project area. Include information on groundwater levels and quality, identifying any long-term changes for with-project and without-project conditions. Identify information gaps, such as lack of direct groundwater measurements. Identify any existing conjunctive use of groundwater and surface water. Where applicable, the DEIS should document the relationship between current surface supplies, the proposed project surface supply, and groundwater. 19

2. In considering conjunctive use of groundwater and surface water supplies in the project alternatives, the DEIS should describe the specific objectives, requirements, and suitable locations for conjunctive use so that potential impacts can be fully evaluated. Analyze any water quality impacts to surface or groundwater associated with a proposed conjunctive use program. Document any changes in basin water balance, including amounts of seepage and return flows, and possible effects on the quantity, timing, and quality of water available. Analyze the potential for third party impacts under a conjunctive use program and, if impacts could occur, evaluate ways of avoiding or mitigating them. 20

Biological Resources

1. The DEIS should evaluate direct, indirect, and cumulative impacts to fish and wildlife at the proposed new storage locations, in association with diversions and conveyance facilities, and in affected rivers and the Delta. This evaluation should "follow the impacts" and examine the impacts that may extend beyond the immediate location of the new storage and/or diversion facilities. Describe the potential timing and magnitude of diversions to offstream storage. What 21

7

Response:

18. FPUD and MCB Camp Pendleton have developed and implemented Urban Water Management Plans and water conservation plans, respectively. Additional documentation of water conservation efforts beyond referencing the above documents will not be completed. Regarding "comprehensive" tracking of water use and efficiencies, this is not a requirement under CEQA or NEPA for inclusion in an EIS or EIR.

19. A discussion of baseline groundwater conditions and the analysis of groundwater impacts are provided in Sections 3.2 and 4.2, respectively, and Appendix B.

20. Surface water and groundwater quality impacts are evaluated in Section 4.2. Mitigation measures are also discussed under Section 4.2. Third party impacts are evaluated in Chapter 5, *Cumulative Impacts*.

21. A discussion of fish and wildlife impacts are provided in Section 4.3, *Biological Resources*. A discussion of changes in surface flow are provided in Section 4.2 and Appendix B.

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are the effects of diversions on instream flows from the perspective of aquatic life and geo-fluvial processes? What changes in quantity, timing, and quality of instream flows might occur under the alternatives? 21 (cont)

2. The DEIS should evaluate environmental requirements which affect flows--notably the Endangered Species Act and Clean Water Act. As implemented through the State Water Resources Control Board, consider flows, temperature needs, seasonality, and other water quality components and factors of critical importance to threatened and endangered species or other sensitive beneficial uses. Identify ways in which water managed through the proposed project might be used for environmental compliance. 22

3. We also recommend the DEIS evaluate the ability of the project to restore or enhance fish and wildlife habitat and wetlands which may have been affected by water diversions and by changes in flows, timing, and water quality as a result of earlier water supply development. 23

Air Quality

1. The DEIS should provide a detailed discussion of air quality standards, ambient conditions, and potential air quality impacts, for the region. Include a description of current and proposed activities and their impacts on air quality. Cumulative and indirect impacts should be fully evaluated. For instance, development or modified use of surrounding lands (e.g., conversion to urban, different cropping patterns) could influence sources of particulate matter with a diameter of 10 micrometers and smaller (PM10). 24

2. Federal agencies are required by the Clean Air Act to assure that actions conform to an approved air quality implementation plan. If the proposed project area is in a nonattainment area, Reclamation may need to demonstrate compliance with general conformity requirements of the Clean Air Act [Section 176(c)]. General Conformity Regulations can be found in 40 CFR Parts 51 and 93 (58 Federal Register, page 63214, November 30, 1993). These regulations should be examined for applicability to the proposed actions. 25

3. EPA issued revised standards for ozone and fine particulate matter (PM2.5)(smog and soot) in July 1997. Nonattainment areas for fine particulate matter were designated in December 2004. San Diego County is designated as nonattainment for fine particulate matter and will need to implement these standards. The adverse health effects of ozone and PM2.5 are well known. The DEIS should evaluate the extent that the proposed project may release significant amounts of these pollutants. We recommend the Air Quality section of the "Affected Environment" chapter, include a description of the new ozone and PM2.5 standards, their health effects, and disclose what, if any, monitoring has been done in the project area for these pollutants. Possible sources that may contribute to high levels of ozone and PM2.5 emissions include construction equipment, mobile sources, and high volumes of diesel truck traffic. 26

Response:

22. Environmental requirements as they apply to each resource area are disused under the *Regulatory Setting* for the corresponding resource area in Chapter 3.

23. The EIS/EIR is analyzing the action alternatives and the No-Action Alternative. The impact analysis is limited to the project components of each alternative and does not include an analysis of historical water supply development. Historical water use dates back to the mid-1800's, with the major base infrastructure (diversion, canal, and reservoir) being built in the 1880's. This infrastructure has been analyzed under the cultural resource sections of this EIS/EIR. Regarding biological resources and cumulative impacts, analyzing the impacts of water development projects over a century old with no baseline for assessing those impacts and no data collection from which to compare is not required under NEPA.

24. Baseline air quality conditions are discussed in Section 3.5. Section 4.5, *Air Quality*, provides estimated emissions associated with the Proposed Action and alternatives.

25. Air Quality concerns and General Conformity Applicability requirements are addressed in Sections 3.5 and 4.5.

26. Please refer to Sections 3.5 and 4.5 for the requested information.

F2 – U.S. Environmental Protection Agency *(page 11 of 11)*

Environmental Justice

1. In keeping with Executive Order 12898, **Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations** (EO 12898), the DEIS should describe the measures taken by Reclamation to: 1) fully analyze the environmental effects of the proposed Federal action on minority or low-income populations, and 2) present opportunities for affected communities to provide input into the NEPA process. The intent and requirements of EO 12898 are clearly illustrated in the President's February 11, 1994 Memorandum for the Heads of all Departments and Agencies. 27

Response:

27. Compliance with EO 12898 is discussed under Chapter 3, *Socioeconomics and Environmental Justice* (for resources areas eliminated from detailed analysis).

F3 – U.S. Fish and Wildlife Service *and California Department of Fish & Game(page 1 of 6)*

Jan 31 05 02:42p
01/31/2005 14:13 FAX 7609180638 US FISH AND WILDLIFE 002
p.3

U.S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road
Carlsbad, California 92009
(760) 431-9440
FAX (760) 918-0638

CA Dept. of Fish & Game
South Coast Regional Office
4949 Viewridge Avenue
San Diego, California 92123
(858) 467-4201
FAX (858) 467-4299

In Reply Refer To:
FWS-FWS-MCBCP/SD-2710.3

JAN 3 1 2005

Bill Rohwer
Bureau of Reclamation
Southern California Area Office
27708 Jefferson Ave., Suite 202
Temecula, California 92590-2628

Re: Notice of Intent (NOI) to Prepare an Environmental Impact Statement/Environmental Impact Report for the Santa Margarita River Conjunctive Use Project, County of San Diego, California

Dear Mr. Rohwer:

The California Department of Fish and Game (Department) and the U.S. Fish and Wildlife Service (Service), collectively the Wildlife Agencies, have reviewed the above referenced NOI which we received on November 1, 2004. The proposed project involves upgrading an existing groundwater recharge and recovery system on Marine Corps Base Camp Pendleton (MCBCP) and installing new wells, pump stations and a pipeline between MCBCP and Fallbrook Public Utilities District (Fallbrook) facilities. Potential alternatives could involve in-stream water retention structures, reclaimed wastewater, off-stream storage, and recharge of other groundwater basins on MCBCP. Another project purpose is to perfect water rights permits that have been assigned to the Bureau of Reclamation (Bureau). The NOI indicates that the water recharge yield from project implementation could increase from the current 7,000 acre-foot per year to 16,200 acre-feet per year. We offer the following comments and recommendations to the Bureau regarding project-associated biological impacts based on our review of the NOI and our knowledge of habitat types and species within the proposed project area.

The Department is identified as a Trustee Agency pursuant to the California Environmental Quality Act (CEQA) section 15386 and is responsible for the conservation, protection, and management of the State's biological resources. The Department is also responsible, pursuant to the California Endangered Species Act, Fish and Game Code 2050 *et seq.*, for the protection of species listed by the State as endangered or threatened or identified as species of concern, and the habitats they require. Under section 5948 of the Fish and Game Code, no person shall cause or having caused, permit to exist, any artificial barrier (except a dam for the storage or diversion of water, public bridges and approaches thereto, groins, jetties, seawalls, breakwaters, bulkheads, wharves and piers permitted by law, and debris from mining operations), in any stream in this state, which will prevent the passing of fish up or down stream, or which is deleterious to fish as determined by the Fish and Game Commission, subject to review by the courts.

TAKE PRIDE IN AMERICA

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F3 – U.S. Fish and Wildlife Service *and California Department of Fish & Game(page 2 of 6)*

The Service's mission is to work "with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people." Specifically, the Service administers the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Section 7 of the Act requires Federal agencies to consult with the Service, should it be determined that their actions may affect federally listed threatened or endangered species. The Service also provides comments on public notices issued by the U.S. Army Corps of Engineers (Corps) for a Federal permit or license affecting the Nation's waters pursuant to the Clean Water Act.

The proposed project has the potential to affect State and federally listed threatened and endangered species that occur within and/or downstream of the general project areas in the Camp Pendleton and Fallbrook, including the federally endangered least Bell's vireo (*Vireo bellii pusillus*), southwestern willow flycatcher (*Empidonax traillii extimus*), arroyo toad (*Bufo californicus*), California least tern (*Sterna antillarum browni*), light-footed clapper rail (*Rallus longirostris longivipes*), Stephens' kangaroo rat (*Dipodomys stephensi*), Pacific pocket mouse (*Perognathus longimembris pacificus*), tidewater goby (*Eucyclogobius newberri*), southern steelhead (*Oncorhynchus mykiss*), Riverside fairy shrimp (*Streptocephalus woottoni*), San Diego fairy shrimp (*Branchinecta sandiegonensis*), San Diego ambrosia (*Ambrosia pumila*), San Diego button-celery (*Eryngium aristulatum* var. *parishii*) and the federally threatened coastal California gnatcatcher (*Polioptila californica californica*), thread-leaved brodiaea (*Brodiaea filifolia*) and spreading navarretia (*Navarretia fossalis*). Least Bell's vireo, southwestern willow flycatcher, California least tern, light-footed clapper rail, San Diego button-celery, and thread-leaved brodiaea are also State endangered species; Stephens' kangaroo rat is also a State threatened species; and, southern steelhead is a State species of special concern.

We are concerned about impacts to listed or other sensitive species in uplands and streams from new permanent structures. Pipelines and off-stream storage structures in upland habitats could negatively affect sensitive habitats and species during construction, operation and maintenance. Instream structures will alter sediment transport within the Santa Margarita River (SMR) system, increase barriers to fish passage and other aquatic organisms, and change hydrology by increasing diversion and/or withdrawal from the surface flows or groundwater in the project area. Given the suggestion in the NOI that water yield could be increased by over two-fold from current withdrawals, we have significant concerns about deleterious project-related changes to hydrology in the SMR or other groundwater basins, such as the San Mateo watershed, on MCBCP. For example, steelhead in the SMR are included in the Southern California Steelhead Evolutionarily Significant Unit (ESU). Adequate instream flows, unimpeded fish passage, including access to suitable spawning and rearing habitat upstream and downstream of the project is essential to the conservation and recovery of steelhead in the southern portion of this ESU.

Therefore, we recommend that the Draft Environmental Impact Statement/Environmental Impact Report (DEIS/EIR) include a full summary and evaluation of the potential impacts of water withdrawal and/or diversion on the listed species that could potentially be affected by project implementation. To facilitate the evaluation of the proposed project from the standpoint of fish and wildlife protection, we request that the DEIS/EIR contain the following specific information.

F3 – U.S. Fish and Wildlife Service *and California Department of Fish & Game(page 3 of 6)*

Jan 31 05 02:42p
01/31/2005 14:14 FAX 7609180638 US FISH AND WILDLIFE 004 p.5

Mr. Bill Rohwer (FWS/CDFG-MCBCP/SD-2710.3) 3

1. A complete description of the purpose and need of the proposed project, including all practicable alternatives that have been considered to avoid or significantly reduce project impacts to listed and other sensitive plant and animal species and vegetation types (*e.g.*, stream habitat, riparian, scrublands, grasslands, woodlands). 1

2. Detailed descriptions of the types of sensitive habitats, both terrestrial and aquatic, that may be affected by the proposed project or project alternatives. Maps and tables should be included to summarize such information. 2

3. A description of the biological resources associated with each habitat type. These descriptions should include both qualitative and quantitative assessments of the resources present and potentially occurring on the proposed project site and alternatives. The description should also include complete species lists for all sensitive or rare biological resources onsite. We recommend that protocol or focused surveys be conducted prior to circulation of the DEIS/EIR, and their results included in the DEIE/EIR, for the public to adequately assess impacts to Federal and State-listed species and other natural resources. Because we generally consider protocol surveys for listed species to be current for up to one year, updated surveys should be conducted within one year prior to project approval. 3

   a. The arroyo toad surveys should be conducted in appropriate habitat within all areas that may be directly or indirectly affected by the proposed project. For example, the footprint of operations, as well as all areas that would potentially be affected by artificial night lighting and changes (up- and down-stream) in hydrology, water quality, and fluvial geomorphology of the stream system should be surveyed. Please note that the toad is known to use both streambeds and drainages for breeding and dispersal (Service 2001), and the adjacent uplands for foraging and burrowing (Griffin et al. 1999; Griffin and Case 2001; Service 2001), up to 1.2 kilometers away from the occupied streambed (Holland and Sisk 2000). Additional information suggests that toads may move as much as five miles up- or down-stream within a drainage (U.S. Forest Service, unpublished data). Because of the documented biology of this species, it is the Service's policy to consider all suitable upland habitat within one kilometer of occupied streams as occupied.

   b. We recommend that a site assessment be conducted to determine whether there is suitable habitat for Southwestern pond turtle (*Emys marmorata pallida*, pond turtle), a California species of special concern, within the project footprint and area of potential effect. If there is suitable habitat, we recommend that surveys be conducted for pond turtle, and the results included in the DEIS/EIR, and avoidance, minimization, and mitigation be included in the DEIS/EIR if there pond turtles are present.

4. An assessment of direct, indirect, and cumulative impacts from the proposed project to fish and wildlife species and associated habitats. Direct impacts are the immediate effects of the project on the species or its habitat, and include the effects of interrelated and interdependent actions that would not occur but for the proposed project. All facets of the project (*e.g.*, construction, operation and maintenance) should be included in this assessment. Indirect impacts are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. These impacts may occur outside of the area directly affected by the proposed project. We recommend that you make your cumulative impacts analysis broad 4

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Response:

1. Please refer to Chapter 1 and Chapter 2 of the EIS/EIR for purpose and need and alternatives development.

2. Please refer to Sections 3.3 and 4.3, *Biological Resources* for the requested information.

3. Please refer to Sections 3.3 and 4.3, *Biological Resources* for the requested information.

4. Cumulative impacts with respect to Biological Resources is presented in Section 5.4.3.

F3 – U.S. Fish and Wildlife Service *and California Department of Fish & Game(page 4 of 6)*

Jan 31 05 02:42p
01/31/2005 14:15 FAX 7609180638 US FISH AND WILDLIFE 005 p.6

Mr. Bill Rohwer (FWS/CDFG-MCBCP/SD-2710.3) 4

enough to include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the area affected by your project. 4 (cont)

5. Include specific plans for avoiding, minimizing, and mitigating project-related impacts, including cumulative impacts of direct and indirect habitat loss, degradation, or modification. These plans should be prepared by persons with specific expertise on southern California wildlife, native plants, and ecosystems. Each plan should include a detailed monitoring program with provisions for assessing the success of mitigation efforts and contingency plans to be implemented if initial efforts are unsuccessful. The plans should also discuss funding assurances and responsible parties that will guarantee the successful implementation of mitigation and monitoring programs and ensure the protection in perpetuity of conservation sites. Issues that should be addressed include restrictions on vehicle and human access, proposed land dedications, monitoring and management programs, control of illegal dumping, and restrictions on lighting near conservation areas. 5

6. An assessment of potential impacts to wetlands and jurisdictional waters of the United States. Section 404 of the Clean Water Act prohibits the unauthorized discharge of dredged or fill material into such waters, including wetlands. This section also provides that the Corps may issue permits for discharges of dredged or fill material into jurisdictional waters and wetlands. Potential areas of Corps jurisdiction should be evaluated and wetlands should be delineated using the methodology set forth in the Corps' Wetland Delineation Manual (Environmental Laboratory, 1987). The DEIS/EIR should disclose all impacts to jurisdictional waters and wetlands, and propose measures to be taken to avoid and minimize impacts, and mitigate unavoidable impacts. If it is determined that wetlands or jurisdictional waters of the United States will be affected by the proposed project, then a section 404 permit from the Corps and/or a streambed alteration agreement from the Department under section 1600 of the Fish and Game Code may be required. 6

If the project is subject to the Department's jurisdiction under section 1600, the Department will require, and the technical appendices of the CEQA document should include, a jurisdictional delineation of the affected wetlands pursuant to the U.S. Fish and Wildlife Service definition (Cowardin 1979) adopted by the Department. Please note that wetland and riparian habitats subject to the Department's authority may extend beyond the jurisdictional limits of the Corps.

7. In order to comply with Fish and Game Code Section 5937, which requires that sufficient water be released below a dam to allow fish downstream to be maintained in good condition, the DEIS/EIR should provide an analysis of the instream flows necessary to protect steelhead migration, spawning and rearing habitat in the Santa Margarita River. To establish the relationship between instream flow and habitat availability for different life stages of steelhead, the DEIS/EIR must include an Instream Flow Incremental Methodology (IFIM) analysis. IFIM is the Department's accepted standard for assessing instream flow needs for steelhead throughout California. 7

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Response:

5. Please refer to Section 4.3, *Biological Resources* for a description of special conservation and mitigation measures.

6. Please refer to Sections 3.3 and 4.3, *Biological Resources* for the requested information.

7. Please refer to Section 4.3 *Biological Resources*, for the requested information.

F3 – U.S. Fish and Wildlife Service *and California Department of Fish & Game(page 5 of 6)*

Jan 31 05 02:48p p.2
01/31/2005 14:16 FAX 7609180638 US FISH AND WILDLIFE 006

Mr. Bill Rohwer (FWS/CDFG-MCBCP/SD-2710.3) 5

8. A discussion of potential adverse impacts from any increased inundation and/or decreased surface flows on streams and watercourses and associated resources within the watershed of the proposed project. 8

9. An analysis of how implementation of water diversion, storage and groundwater recharge plans may facilitate or induce additional development and growth in the project area. 9

10. Identification of methods to be employed (*i.e.*, Best Management Practices) to prevent the discharge and disposal of toxic and/or caustic substances, including oil and gasoline, on the project site especially during construction. 10

11. An analysis of impacts to listed and other sensitive species from expected noise, pollution, night lighting, erosion, sedimentation, roads, and measures to be taken to minimize any of these adverse impacts. 11

12. An analysis of how the project would affect hydrologic and hydraulic processes such as base flow, attenuation of peak flows, and sediment transport and retention should also be included in the DEIS/EIR. 12

13. A detailed description of the current groundwater recharge program on Camp Pendleton and the relationship of the proposed project with recently authorized activities to dredge O'Neill Lake and refurbish recharge ponds 6 and 7. 13

14. A detailed description of existing obligations of the U.S. Marine Corps under the terms of the settlement with the Rancho California Water District on the Change and Time Extensions Permit 7032, Application 11518, and how those obligations have been or are being met. Please include specifics of the water supply, water quality, sensitive species and riparian habitat monitoring program that was required from the settlement and the current status of the monitoring program. 14

We appreciate the opportunity to comment on the referenced NOI. We are available to work with project proponent(s) to avoid, minimize, and/or mitigate impacts to listed and sensitive species and their habitats. If you have any questions or comments regarding this letter, please contact John O'Brien or Mary Larson (Department) at (562) 342-7173 and Jill Terp (Service) at (760) 431-9440.

Sincerely,

Jill Terp for
Karen A. Goebel
Assistant Field Supervisor
U.S. Fish and Wildlife Service

Donald R. Chadwick
Habitat Conservation Planning Supervisor
California Department of Fish and Game

Response:

8. Please refer to Section 4.2, *Water Resources* for the requested information.

9. Please refer to Section 6.1 for a discussion of Growth Inducement factors.

10. Please refer to Section 2.3.1 for Special Conservation Measures that would be implemented to avoid significant hazardous materials and waste impacts associated with construction activities.

11. Please refer to Section 4.3, *Biological Resources* for a complete analysis of potential impacts to sensitive species.

12. Please refer to Section 4.2, *Water Resources* for the requested information.

13. Please refer to Section 4.2, *Water Resources* for the requested information.

14. Please refer to Section 1.4, Project Background for a discussion of historical and existing water rights obligations.

F3 – U.S. Fish and Wildlife Service *and California Department of Fish & Game(page 6 of 6)*

Mr. Bill Rohwer (FWS/CDFG-MCBCP/SD-2710.3) 6

Literature Cited

Cowardin, Lewis M., V. Carter, G. C. Golet, and E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. Fish and Wildlife Service, U.S. Department of the Interior. U. S. Government Printing Office, Washington, D.C.

Griffin, P.C., T.J. Case, and R.N. Fisher. 1999. Radio telemetry of *Bufo californicus*, arroyo toad movement patterns and habitat preferences. Contract report to California Department of Transportation Southern Biology Pool. 66 pp.

Griffin, P.C., T.J. Case. 2001. Terrestrial habitat preferences of adult arroyo southwestern toads. Journal of Wildlife Management. 65(4): 633-644.

Holland, D.C., and N.R. Sisk. 2000. Habitat use and population demographics of the arroyo toad (*Bufo californicus*) on MCB Camp Pendleton, San Diego County, California: Final Report for 1998, 2000. 25pp + appendix.

U.S. Fish and Wildlife Service. 2001. Federal Register: Vol 66, No. 26. Final Designation of Critical Habitat for the Arroyo Toad; Final Rule. Pp. 9414-9432.

S1 – California Department of Fish and Game *(page 1 of 1)*	
The California Department of Fish and Game submitted a joint letter with the U.S. Fish and Wildlife Service. This joint letter is addressed in Comment F3 above.	**Response:** See responses to comments under F3 above.

S2 – Native American Heritage Commission *(page 1 of 3)*

Jan 31 05 04:33p
01/07/2005 15:45 7607286029 FALLBROOK PUBLIC UTI PAGE 01 p.2

STATE OF CALIFORNIA Arnold Schwarzenegger, Governor

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
(916) 657-5390 – Fax

December 23, 2004

Mr. Joe Jackson
Fallbrook Public Utility District
P.O. Box 2290
Fallbrook, CA 92082-2290

Re: NOP: Proposed Santa Margarita River Conjunctive Use Project
SCH# 2004121068

Dear Mr. Jackson,

Thank you for the opportunity to comment on the above referenced Notice of Preparation. The Commission was able to perform a record search of its Sacred Lands File for the project area. The record search failed to indicate the presence of Native American cultural resources in the immediate project area; however, the absence of specific site information in the Sacred Lands File does not guarantee the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Section 800.2 of the Federal Section 106 process (36 CFR PART 800) requires that agencies carrying out projects using federal funding or located on federal lands consult with Native American tribes in order to provide them with "a reasonable opportunity to identify (their) concerns about historic properties, advise on the identification and evaluation of historic properties, including those of traditional religious and cultural importance, articulate (their) views on the undertaking's effects on such properties, and participate in the resolution of adverse effects." Enclosed is a list of Native American individuals/organizations who may have knowledge of cultural resources in the project area. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. The Commission makes no recommendation of a single individual or group over another. By contacting all those listed, your organization will be better prepared to address claims of failure to consult with the appropriate tribe or group. A minimum of two weeks must be allowed for responses following notification. If there has been no response following the two week period, we recommend that you follow-up by telephone to ensure that the information was received. 1

Prior to project approval, he NAHC recommends that you conduct an archaeological records search at the Information Center at San Diego State University. The records search will identify whether or not recorded cultural resources exist on the project site, whether or not an archaeological survey has been conducted at the site, and provide guidance on whether further archaeological study of the area is warranted. 2

Lack of surface evidence of archeological resources does not preclude the existence of archeological resources. Lead agencies should include provisions for accidentally discovered archeological resources during construction per California Environmental Quality Act (CEQA), Public Resources Code §15064.5 (f); Health and Safety Code §7050.5; and Public Resources Code §5097.98 mandate the process to be followed in the event of an accidental discovery of any human remains in a location other than a dedicated cemetery and should be included in all environmental documents. If you have any questions, please contact me at (916) 653-6251. 3

Sincerely,

Carol Gaubatz
Program Analyst

cc: State Clearinghouse

17

Response:

1. As suggested the enclosed Native American Contacts have been added to the EIS/EIR distribution list.

2. Please refer to Sections 3.4 and 4.4, *Cultural Resources* for a complete discussion of records review and surveys performed for the Proposed Project.

3. Please refer to Section 4.4, *Cultural Resources* for the a discussion of the specific protocols that would be followed in the event that archeological resources are discovered during project implementation.

S2 – Native American Heritage Commission *(page 2 of 3)*

Native American Contacts
San Diego County
December 23, 2004

Cupa Cultural Center (Pala Band)
William J. Contreras, Archaeology and Cultural Res.
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Pauma & Yuima
Juanita Dixon, Environmental Coordinator
P.O. Box 369 Luiseno
Pauma Valley , CA 92061
(760) 742-1289
(760) 742-3422 Fax

La Jolla Band of Mission Indians
Mr. Terri Hughes, Chairperson
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Pauma Valley , CA 92061
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Pechanga Band of Mission Indians
Paul Macarro, Cultural Resource Center
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(951) 506-9491 Fax

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(760) 742-1411 Fax

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Rincon Band of Mission Indians
Culture Committee
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(760) 749-8901 Fax

Pauma & Yuima
Bennae Calac, Cultural Reosurce Coordinator
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(760) 802-1811
(760) 742-3422 Fax

Rincon Band of Mission Indians
John Currier, Chairperson
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(760) 749-8901 Fax

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resource assessment for the proposed Santa Margarita River Conjunctive Use Project, SCH# 2004121068, San Diego County.

S2 – Native American Heritage Commission *(page 3 of 3)*

Native American Contacts
San Diego County
December 23, 2004

Rincon Band of Mission Indians
Rob Shaffer, Tribal Administrator
P.O. Box 68 Luiseno
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(760) 749-1051
(760) 749-8901 Fax

San Luis Rey Band of Mission Indians
Carmen Mojado, Co-Chair
1889 Sunset Dr. Luiseno
Vista , CA 92081 Cupeno

Rincon Band of Mission Indians
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(760) 749-8901 Fax

San Luis Rey Band of Mission Indians
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(760) 742-4468
(760) 586-4858 (cell)

Rincon Band of Mission Indians
Ruth Calac, President, Ricon Heritage Commission
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(760) 749-8901 Fax

Soboba Band of Mission Indians
Robert J. Salgado, Sr., Chairperson
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Fax: (909) 654-4198

San Luis Rey Band of Mission Indians
Henry Contreras, Most Likely Descendent
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(760) 207-3618 - Cell

Twenty-Nine Palms Band of Mission Indians
Dean Mike, Chairperson
46-200 Harrison Place Luiseno
Coachella , CA 92236 Chemehuevi
(760) 775-5566
(760) 775-4639 Fax

San Luis Rey Band of Mission Indians
Russell Romo, Chairman
12064 Old Pomerado Road Luiseno
Poway , CA 92064 Cupeno
(858) 748-1586

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resource assessment for the proposed Santa Margarita River Conjunctive Use Project, SCH# 2004121066, San Diego County.

S3 – State Water Resources Control Board *(page 1 of 5)*

Mar 28 05 02:27p p.2

State Water Resources Control Board

Alan C. Lloyd, Ph.D.
Agency Secretary

Division of Water Rights
1001 I Street, 14th Floor ♦ Sacramento, California 95814 ♦ 916.341.5300
Mailing Address: P.O. Box 2000 ♦ Sacramento, California 95812-2000
FAX: 916.341.5400 ♦ www.waterrights.ca.gov

Arnold Schwarzenegger
Governor

RECEIVED: Mar 24, 2005
REPLY DATE
3/25 WPR 7000
1500

In Reply Refer
to:334:KDM:266.0

MAILED MARCH 15, 2005

U.S. Bureau of Reclamation
William J. Steele
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590

Dear Mr. Steele:

SANTA MARGARITA RIVER CONJUNCTIVE USE PROJECT – PERMITS 8511, 11357 AND 15000 (APPLICATIONS 11587, 12179 AND 31471) OF U.S. BUREAU OF RECLAMATION (RECLAMATION)

It was a pleasure meeting with representatives of the Bureau, Fallbrook Public Utilities District (Fallbrook) and Marine Corps Base Camp Pendleton on February 1, 2005 to discuss the Santa Margarita River Conjunctive Use Project. Reclamation is in the process of preparing an Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the project. At this time, 22 alternatives are being studied. Reclamation plans to narrow the alternatives to roughly the nine most feasible alternatives for further study.

During the meeting, I expressed my concerns regarding the lack of progress in developing a project pursuant to the permits listed above. Permit 8511 (priority date October 11, 1946) authorizes collection to storage of 10,000 acre-feet per annum (afa) throughout the year for domestic, municipal and irrigation purposes of use. The State Water Resources Control Board (State Water Board) has granted ten time extensions for this permit, extending the complete use date to December 31, 2008. Permit 11357 (priority date November 28, 1947) authorizes collection to storage of 10,000 afa throughout the year for domestic, municipal and irrigation purposes of use. The State Water Board has granted six time extensions for this permit, extending the complete use date to December 31, 2008. Permit 15000 (priority date September 23, 1965) authorizes collection to storage of 165,000 afa throughout the year for domestic, municipal, irrigation and military purposes of use. The State Water Board has granted three extensions of time for this permit, extending the date to complete use to December 31, 2008. The project has not been built, because Congress did not approve the project's funding.

At the meeting, it was evident that Reclamation is attempting to start construction prior to the permits' expiration date in 2008. Even if Reclamation finishes construction in 2008, it will not have an opportunity to complete full, beneficial use of water unless it obtains additional time to do so. Accordingly, Reclamation will need to submit time extension petitions for these filings. At the meeting, Division staff advised Reclamation that it is uncertain whether the State Water Board will grant additional time. The requirements for approval of any time extension are found in section 844, title 23, California Code of Regulations and are repeated in part below: 1

California Environmental Protection Agency

Recycled Paper

Response:

1. Please refer to Chapter 1 for a discussion of the legal and institutional framework and regulatory setting for the proposed project.

S3 – State Water Resources Control Board *(page 2 of 5)*

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U.S. Bureau of Reclamation -2-

> An extension of time within which to complete an application, to commence or complete construction work or apply water to full beneficial use will be granted only upon such conditions as the board determines to be in the public interest and upon a showing to the board's satisfaction that due diligence has been exercised, that failure to comply with previous time requirements has been occasioned by obstacles which could not reasonably be avoided, and that satisfactory progress will be made if an extension of time is granted. Lack of finances, occupation with other work, physical disability, and other conditions incident to the person and not to the enterprise will not generally be accepted as good cause for delay. 1 (cont)

Reclamation expressed concern about expending funds prior to knowing whether the State Water Board will approve additional time extensions for the permits. Division staff recommended that time extension petitions be timely filed in order to address this issue prior to initiating project construction.

Reclamation is currently studying 22 alternative projects. All of the proposed projects are for less water than authorized by the three permits. During the meeting, we discussed the fact that the permits should probably be reduced in size to reflect the actual project(s) that are eventually built. We also discussed the fact that any projects that involve changing the points of diversion, place of use or purpose of use will require change petitions. Pursuant to California Code of Regulations, title 23, section 794, the State Water Board requires a change petition to include certain information. The EIR/EIS should include the information required by section 794 for all proposed change petition actions. 2

Due to lack of detail regarding the proposed projects, Division staff cannot state with certainty the type of water right actions that are needed. All of the proposed projects would serve Fallbrook and the Naval Weapons Station. Change petitions are required to serve Fallbrook, because it is not in the authorized place of use. Division staff has not reviewed the permit maps to determine whether the Naval Weapons Station is within the place of use. If it is not, change petitions are required to serve this area. 3

One of the more likely projects is a groundwater recharge project. This project requires a petition to redistribute storage from the unconstructed De Luz Dam and Reservoir to the groundwater storage basin. An underground storage supplement is required for this project. 4

Some of the proposed projects include offstream storage. Unless conditions are established to assure that these storage facilities do not capture and store any water from any streams, including ephemeral streams, that flow into these storage facilities (other than temporary impoundment for flood control purposes followed by controlled releases after the flood event) these facilities will appropriate water from new water sources. New water sources cannot be added to the existing permits. Therefore, new appropriative water rights are required to initiate a basis of right to divert additional water sources for any offstream storage elements located on surface streams (including unnamed, seasonal streams). Moreover, the Santa Margarita River is identified as a fully appropriated stream system. (Wat. Code, § 1205 et seq.; SWRCB Order WR 98-08.) To acquire a new water right, the project proponents must file 5

Response:

2. Please refer to Chapter 1 for the requested information.

3. Please refer to Chapter 1 for the requested information.

4. Please refer to Chapter 1 for the requested information.

5. Other than Lake O'Neill, offstream storage is no longer being considered.

S3 – State Water Resources Control Board *(page 3 of 5)*

an application to appropriate water and successfully petition the SWRCB for amendment of the declaration of fully appropriated streams. (Cal. Code Regs., tit. 23, § 871.) The NOP proposals include construction of the Pueblitos Canyon Treatment Wetland, the DET Fallbrook Treatment Wetland, the DET Fallbrook Storage site, the spreading basin, the Red Mountain Reservoir, Rehabilitation Ponds 1-5, Site 6 Offstream Storage, the Enhanced Extraction Pipeline, and the Newton Treatment Wetland. Division staff is uncertain whether these projects can be pursued via change petitions since the Division has not yet received information on whether these facilities are located on surface streams. New sources cannot be added by petition; therefore, a change petition can only be accepted if the inflow from the new source is bypassed. If the facilities are not located on surface streams, Reclamation may petition to change the place of storage for its permits. 5 (cont)

In order to approve change petitions for the offstream storage projects, Reclamation will need to demonstrate that there is no change in the rate or timing of diversions, as compared to the permitted project. The EIS/EIR should include an evaluation of this issue in order to facilitate petition processing.

The NOP describes construction of an Instream Check Structures project. A water right is required for any dam that will collect surface water to seasonal storage (including underground storage). If Reclamation petitions to add this project to its permits, it should state whether this is an element of the groundwater storage project on the petitions. 6

Another proposed project is direct diversion at new production wells on the Santa Margarita River. Direct diversion is not an authorized method of diversion under the permits. Any petition to change the method of diversion from storage to direct diversion should be accompanied by documentation on whether the petition will change the rate and timing of diversions, as compared to operation of the permitted project. In order to approve change petitions for the offstream storage projects, Reclamation will need to demonstrate that there is no change in the rate or timing of diverions, as compared to the permitted project. 7

Lake O'Neill rehabilitation is a proposed project element. Lake O'Neill is not located on the Santa Margarita River. The EIR/EIS should identify the existing basis of right for storage in Lake O'Neill. If this project element involves silt removal from Lake O'Neill, the EIR/EIS should identify when the reservoir capacity was lost due to siltation. Portions of a water right may be lost through five or more years of non-use. 8

If additional water will be diverted from the Santa Margarita River, or other sources, for storage in an enlarged Lake O'Neill, an appropriative water right is required. If Reclamation plans to redistribute De Luz Reservoir storage to Lake O'Neill, Reclamation should petition to redistribute storage to this facility. The petition review (and consequently, the environmental review) will require evaluation of whether diversion to offstream storage changes the rate and timing of diversions, as compared to the operation of the permitted project. 9

Division staff is uncertain whether diversions can be implemented throughout the year, as authorized by Reclamation's permits, due to fish and wildlife concerns. The EIS/EIR should evaluate the impacts of the proposed changes on instream beneficial uses and identify the 10

Response:

6. Instream Check Structures are no longer being considered.

7. Please refer to Section 1.4 and 1.6 for a discussion of permits required for project implementation.

8. The dredging of Lake O'Neill is no longer a part of the Conjunctive Use Project.

9. Please refer to Section 1.4 and 1.6 for a discussion of permits required for project implementation.

10. Annual and seasonal reductions of flow within the Santa Margarita River are provided in Section 4.2 and Appendix B. Impacts to beneficial uses have been evaluated in Sections 4.2 and 4.3.

S3 – State Water Resources Control Board *(page 4 of 5)*

Mar 28 05 02:28p p.5

U.S. Bureau of Reclamation -4-

appropriate diversion season for the permits, or appropriate bypass, based on environmental and water availability considerations. 10 (cont)

A water availability analysis should be included in the EIS/EIR. The analysis should provide monthly data on water availability, for above normal, normal, below normal and critically dry water year types. The analysis should also include an evaluation of how much water must be left in the stream to keep fish in good condition. 11

Finally, Camp Pendleton is diverting water in excess of the amount authorized under License 10494 (A21471A) or any other water right acquired under California law.[1] The EIS/EIR should discuss the relationship between the project and Camp Pendleton's unauthorized diversions. Is the project intended to provide a legal basis under California law for Camp Pendleton's currently unauthorized diversions? If not, will Camp Pendleton discontinue those unauthorized diversions? If not, EIS/EIR will need to include a cumulative impacts analysis that includes consideration of present and reasonably foreseeable future unauthorized diversions by Camp Pendleton. Thank you for the opportunity to comment on the NOP. If you require further assistance, I can be contacted at (916) 341-5363. 12

Sincerely,

ORIGINAL SIGNED BY:

Katherine Mrowka, Chief
Watershed Unit #3

cc: Joe Jackson
Fallbrook Public Utility District
P.O. Box 2290
Fallbrook, CA 92088-2290

William Rohwer
U.S. Bureau of Reclamation
22708 Jefferson Avenue, Suite 202
Temecula, CA 92590

Chad P. Seber
Building 1254 WACO
Marine Corps Base
Camp Pendleton, CA 92055-5013

[1] Camp Pendleton has no federal reserved water rights, and Congress has directed that Camp Pendleton comply with California water right law.

Response:

11. Analysis of project impacts on surface water in the Santa Margarita River is provided in the *Santa Margarita River Conjunctive Use Project: Final Technical Memorandum No. 1 and 2.2* (surface water availability and surface/groundwater model, respectively). These reports were updated and include analysis to steelhead migration in the *Southern California Steelhead Passage Assessment*, *Lower Santa Margarita River, California and CUP Surface Water Availability Analysis (TM 1.1)*. Results from these studies are presented and evaluated in Sections 4.2 and 4.3 of this EIS/EIR.

12. MCB Camp Pendleton has three water "rights:" riparian, pre-1914, and license 21471. The license is perfected at 4,000 acre-feet. The pre-1914 is quantified at 1,200 acre-feet (excluding evaporative or other system losses). The riparian right has not been quantified. MCB Camp Pendleton has at no time exceeded their legal right to water and does not have any unauthorized diversions. For additional information, refer to the California State Water Resources Control Board, the Santa Margarita River Watermaster and/or the 70 years of documented legal briefs, adjudications, interlocutory judgments, etc.

S3 – State Water Resources Control Board *(page 5 of 5)*

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p.6

U.S. Bureau of Reclamation -5

Marty Kaiser
U.S. Bureau of Reclamation
2800 Cottage Way
Sacramento, CA 95825

Amy Aufdemberge
U.S. Bureau of Reclamation
2800 Cottage Way
Sacramento, CA 95825

bcc: Megan Sheely
Kate Gaffney
Steve Herrera
Erin Mahaney
John O'Hagan

KDMrowka:kdm/xrivera:3-14-05
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L1 – Endangered Habitats League / Conservation Biology Institute *(page 1 of 4)*

31 05 01:19p p.2

ENDANGERED HABITATS LEAGUE
DEDICATED TO ECOSYSTEM PROTECTION AND SUSTAINABLE LAND USE

JAN 31 2005

January 29, 2005

VIA FACSIMILE AND US MAIL

Fallbrook Public Utility District
ATTN: Joe Jackson
P.O. Box 2290, 990 E. Mission Road
Fallbrook, CA 92088-2290

RE: Santa Margarita River Conjunctive Use Project

Dear Mr. Jackson:

The Endangered Habitats League (EHL) appreciates the opportunity to comment on the Notice of Preparation for the above-referenced project. Please find enclosed a letter from the Conservation Biology Institute providing this information.

Please retain EHL on all distribution and notification lists for this project.

Sincerely,

Dan Silver
Executive Director

cc: Bill Rohwer, U.S. Bureau of Reclamation

8424 A Santa Monica Blvd., #592, Los Angeles, CA 90069-4267 • www.ehleague.org • Phone 213.804.2750 • Fax 323.654.1931

7

L1 – Endangered Habitats League / Conservation Biology Institute *(page 2 of 4)*

Jan 31 05 01:20p p.3

Conservation Biology Institute

651 Cornish Drive • Encinitas, California 92024
Phone/Fax: (760) 634-1590
http://www.consbio.org

January 26, 2005

Mr. Bill Rohwer
U.S. Bureau of Reclamation
Southern California Area Office
27708 Jefferson Ave., Suite 202
Temecula, CA 92590

Subject: **Notice of Intent to Prepare an Environmental Impact Statement/Environmental Impact Report for the Santa Margarita River Conjunctive Use Project, San Diego County, CA**

Dear Mr. Rohwer:

The Conservation Biology Institute (CBI) is a non-profit, conservation science organization, with expertise in habitat conservation planning, environmental impact studies, and special status species conservation and recovery efforts. We have prepared these comments on behalf of the Endangered Habitats League. The Santa Margarita River system is a regionally important resource, supporting a variety of high quality and sensitive habitats and species. Protection of these resources is an important responsibility of the Bureau of Reclamation (BR), Marine Corps Base (MCB) Camp Pendleton, and Fallbrook Public Utility District (FPUD). We recommend that the following issues be addressed as part of the Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the subject project.

- A thorough analysis of surface and ground water dynamics and the potential effects of the proposed project on these dynamics should be conducted. The integrity or health of riverine ecosystems is dependent on their natural flow regimes. A natural flow regime includes a number of components, such as magnitude, frequency, timing, and rate of change. The flow regime of the Santa Margarita River exhibits a high degree of intra- and inter-annual variability, which resident organisms have adapted to and which is important to the long-term integrity of this ecosystem. In addition, surface and ground waters are likely to be strongly coupled in this system, particularly in the lower alluvial reaches of the river. Thus, extraction of groundwater from the alluvial aquifer of the lower basin has the potential of modifying the natural flow regime of the river which, in turn, has the potential to adversely affect the quality of habitats associated with the river and the species that rely on these habitats. 1

8

Response:

1. Sections 3.2 and 4.2, *Water Resources* includes a discussion of baseline and potential impacts on surface and groundwater resources. Potential impacts to Biological Resources with implementation of the action alternatives are discussed in Section 4.3.

L1 – Endangered Habitats League / Conservation Biology Institute *(page 3 of 4)*

Jan 31 05 01:20p p.4

Mr. Bill Rohwer, January 26, 2005
Pg. 2

- The potential for the project to adversely affect riparian vegetation communities should be addressed. The Santa Margarita River supports extensive high quality riparian habitat that supports a number of sensitive species. Riparian habitat depends both on periodic disturbances from flooding and high ground water levels. 2

- The effects of the proposed project on ephemeral pools and backwaters should be assessed. Several sensitive species rely on ephemeral pools and backwaters that form within and adjacent to the river channel during periods of high surface discharges and groundwater elevations for breeding and foraging habitat. Species such as the arroyo toad and southwestern pond turtle use these habitats for breeding. These habitats also are a source of invertebrate production, which is an important food source for breeding riparian birds such as the least Bell's vireo and southwestern willow flycatcher. 3

- The potential for the project to affect steelhead habitat and upstream and downstream migrations should be assessed. The Santa Margarita River is one of the last remaining rivers in Southern California that can potentially support southern steelhead. Steelhead rely on adequate flows to allow passage of adults and juveniles in upstream and downstream directions. High flow events are important to periodically opening the mouth of the Santa Margarita River estuary and to maintaining high water quality in the estuary. 4

- The potential for the proposed project to alter lagoon system dynamics should be analyzed. The Santa Margarita River estuary supports the endangered tidewater goby and sensitive salt marsh habitat. This tidewater goby has evolved in dynamic lagoon systems, where lagoon mouths close and are periodically opened by high flows and storm events. Maintaining the dynamic nature of these systems is crucial to the long-term viability of this species. Salt marsh habitats are also dependent on the balance of seawater circulation and freshwater inflows, and altering this balance could adversely affect this habitat and associated sensitive species. 5

- Growth inducing impacts of the proposed project must be adequately analyzed. Developing additional municipal supplies of water is potentially growth-inducing in that it facilitates increasing residential population within the service area of FPUD. Expanding residential housing density and the associated infrastructure in the service area creates significant direct, indirect, and cumulative impacts to natural resources, including terrestrial resources in areas removed from the river corridor. 6

9

Response:

2. Please refer to response to comment #1 on previous page.

3. Please refer to response to comment #1 on previous page.

4. Please refer to response to comment #1 on previous page.

5. Please refer to response to comment #1 on previous page.

6. Growth inducement factors are discussed in Section 6.1

L1 – Endangered Habitats League / Conservation Biology Institute *(page 4 of 4)*

Jan 31 05 01:20p p.5

Mr. Bill Rohwer, January 26, 2005
Pg. 3

Please feel to contact me if you require clarification or wish to discuss these issues further.

Sincerely,

Michael D. White, Ph.D.
Senior Ecologist

Cc: Mr. Joe Jackson, Fallbrook Public Utility District

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L2 – Jane Comella *(page 1 of 1)*

Written Comment Form
Santa Margarita River Conjunctive Use Project

Department of the Navy, Marine Corps Base Camp Pendleton
Bureau of Reclamation
Fallbrook Public Utility District

Your input is important to us; please use this comment sheet to provide input on issues to be evaluated in the Draft EIS/EIR. Your comments will be addressed in the Draft EIS/EIR. Please include your name and address below to receive a copy of the Draft EIS/EIR.

Member of the Fallbrook Land Conservancy Trails Council. I am concerned that the Santa Margarita River Valley from the San Diego State Santa Margarita Ecological Reserve to the Sandia Creek / DeLuz Road intersection remain open to passive recreational use. 1

Additional space? Please use other side.

Name* Jane Comella
Address 1446 Hillcrest Lane
City/State/Zip Code Fallbrook, CA 92028

* *Comments, including names and home addresses of respondents, will be made available for public review. Individual respondents may request their home address be withheld from public disclosure. Please prominently state at the beginning of your comment if you wish your name and/or address withheld from public disclosure.*

Please submit your comments to the court stenographer at the Sign-In Station or mail your comments to:

Bureau of Reclamation, Southern California Area Office
Attention: Bill Rohwer, Planning Officer
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
Or comments can be faxed to: (951) 695-5319

To ensure that your comments are considered in the Draft EIS/EIR, comments must be received by January 31, 2005.

4

Response:

1. The preservation of the OMSZ is an important component of the Conjunctive Use Project and can occur through more than one route or mechanism. The Proposed Action involves a transfer of the land into Federal or other third party ownership as conservation land. In both cases, all existing passive recreational activities would be maintained.

L3 – Joe Comella *(page 1 of 1)*

Comment	Response
Written Comment Form **Santa Margarita River Conjunctive Use Project** **Department of the Navy, Marine Corps Base Camp Pendleton** **Bureau of Reclamation** **Fallbrook Public Utility District** Your input is important to us; please use this comment sheet to provide input on issues to be evaluated in the Draft EIS/EIR. Your comments will be addressed in the Draft EIS/EIR. Please include your name and address below to receive a copy of the Draft EIS/EIR. I am a member of the Fallbrook Land Conservancy Trails Council. I am concerned that as this project progresses through the various stages to completion, that there is consideration for passive recreational uses of the trails throughout the watershed area, specifically from the Southern end of the Santa Margarita Ecological Preserve to the border of Camp Pendleton. 1 The Trails Council has been maintaining the trails in the Santa Margarita watershed and it would be beneficial for everyone to continue this relationship (in writing) allowing the Fallbrook Land Conservancy Trails Council to continue with their volunteering trail maintenance to provide passive recreational use of this area. The benefits to all entities is obvious. *Additional space? Please use other side.* **Name*** Joe Comella **Address** 1446 Hillcrest Ln **City/State/Zip Code** Fallbrook, Ca 92028 * *Comments, including names and home addresses of respondents, will be made available for public review. Individual respondents may request their home address be withheld from public disclosure. Please prominently state at the beginning of your comment if you wish your name and/or address withheld from public disclosure.* Please submit your comments to the court stenographer at the Sign-In Station or mail your comments to: **Bureau of Reclamation, Southern California Area Office** **Attention: Bill Rohwer, Planning Officer** **27708 Jefferson Avenue, Suite 202** **Temecula, CA 92590** Or comments can be faxed to: (951) 695-5319 To ensure that your comments are considered in the Draft EIS/EIR, comments must be received by January 31, 2005. 3	**Response:** 1. The preservation of the OMSZ is an important component of the Conjunctive Use Project and can occur through more than one route or mechanism. The Proposed Action involves a transfer of the land into Federal or other third party ownership as conservation land. In both cases, all existing passive recreational activities would be maintained.

L4 – Donna Gebhart *(page 1 of 1)*

Feb 02 05 02:01p p.2

02/01/2005 12:58 7607319919 GEBHART & ASSOC. INC. PAGE 01/01

...njunctive Use Project

...of the Navy, Marine Corps Base Camp Pendleton
Bureau of Reclamation
Fallbrook Public Utility District

Your input is important to us; please use this comment sheet to provide input on issues to be evaluated in the Draft EIS/EIR. Your comments will be addressed in the Draft EIS/EIR. Please include your name and address below to receive a copy of the Draft EIS/EIR.

We appreciate the opportunity to be able to comment. I chair the Fallbrook Land Conservancy Trails Council - We maintain the trails in the Santa Margarita Riversted. We have approx. 10 m/s of trails. This is an integral part of the trail system in Fallbrook which also is one block away from the Court SM Park which is not open yet but we do have an operating agreement with the county for. Our maps of trails & pathways have also been accepted by the Co. of San Diego as part of the S.D. Co. Trails Master Plan. When the conjunctive use agreement is finalized we would very much appreciate being able to have input as far as listing trails for passive recreational use for the community. As you get closer to the end, we would be happy to meet with you to discuss how we can accomplish these goals. *Additional space? Please use other side.* 1

Name* Donna Gebhart 760-731-9441
Address 1609 Santa Margarita Dr.
City/State/Zip Code Fallbrook, Ca 92028 dgebhart@pacbell.net

* *Comments, including names and home addresses of respondents, will be made available for public review. Individual respondents may request their home address be withheld from public disclosure. Please prominently state at the beginning of your comment if you wish your name and/or address withheld from public disclosure.*

Please submit your comments to the court stenographer at the Sign-In Station or mail your comments to:

Bureau of Reclamation, Southern California Area Office
Attention: Bill Rohwer, Planning Officer
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
Or comments can be faxed to: (951) 695-5319

To ensure that your comments are considered in the Draft EIS/EIR, comments must be received by January 31, 2005.

21

Response:

1. The preservation of the OMSZ is an important component of the Conjunctive Use Project and can occur through more than one route or mechanism. The Proposed Action involves a transfer of the land into Federal or other third party ownership as conservation land. In both cases, all existing passive recreational activities would be maintained.

I1 – Barbara Hayden *(page 1 of 1)*

Written Comment Form
Santa Margarita River Conjunctive Use Project

Department of the Navy, Marine Corps Base Camp Pendleton
Bureau of Reclamation
Fallbrook Public Utility District

Your input is important to us; please use this comment sheet to provide input on issues to be evaluated in the Draft EIS/EIR. Your comments will be addressed in the Draft EIS/EIR. Please include your name and address below to receive a copy of the Draft EIS/EIR.

I am very concerned that the public have recreational access to the 1400 acres for hiking, horse back riding, bird watching, etc. 1

Additional space? Please use other side.

Name* Barbara Hayden
Address 2411 N Stage Coach Ln
City/State/Zip Code Fallbrook, Ca 92028

* *Comments, including names and home addresses of respondents, will be made available for public review. Individual respondents may request their home address be withheld from public disclosure. Please prominently state at the beginning of your comment if you wish your name and/or address withheld from public disclosure.*

Please submit your comments to the court stenographer at the Sign-In Station or mail your comments to:

Bureau of Reclamation, Southern California Area Office
Attention: Bill Rohwer, Planning Officer
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
Or comments can be faxed to: (951) 695-5319

To ensure that your comments are considered in the Draft EIS/EIR, comments must be received by January 31, 2005.

Response:

1. The preservation of the OMSZ is an important component of the Conjunctive Use Project and can occur through more than one route or mechanism. The Proposed Action involves a transfer of the land into Federal or other third party ownership as conservation land. In both cases, all existing passive recreational activities would be maintained.

I2 – Alberta Jane Parker *(page 1 of 1)*

Written Comment Form

Santa Margarita River Conjunctive Use Project

Department of the Navy, Marine Corps Base Camp Pendleton
Bureau of Reclamation
Fallbrook Public Utility District

Your input is important to us; please use this comment sheet to provide input on issues to be evaluated in the Draft EIS/EIR. Your comments will be addressed in the Draft EIS/EIR. Please include your name and address below to receive a copy of the Draft EIS/EIR.

I have a question pertaining to the purity + safety of the water pumped out of the aquifers. Much of the water entering the Santa Margarita River (particularly in summer) is agriculture runoff, + as such includes both fertilizers + pestisides. How much of these contaminants are removed in the aquifer? Won't the effect of these contaminants increase over time (years)? Monitoring is a passive activity. What can be actively done to preserve purity? 1

Additional space? Please use other side.

Name* Alberta Jane Parker
Address 1694 Santa Margarita
City/State/Zip Code Fallbrook 92028

* *Comments, including names and home addresses of respondents, will be made available for public review. Individual respondents may request their home address be withheld from public disclosure. Please prominently state at the beginning of your comment if you wish your name and/or address withheld from public disclosure.*

Please submit your comments to the court stenographer at the Sign-In Station or mail your comments to:

Bureau of Reclamation, Southern California Area Office
Attention: Bill Rohwer, Planning Officer
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590
Or comments can be faxed to: (951) 695-5319

To ensure that your comments are considered in the Draft EIS/EIR, comments must be received by January 31, 2005.

Response:

1. Water quality concerns are addressed under Section 4.2, *Water Resources*.

I3 – James E. Pigg *(page 1 of 1)*

Jan 31 05 04:34p p.5

11/8/04

Keyword

James F. Pigg
4851 Quail Run
Las Cruces, NM 88011

1 November 2004

Bureau of Reclamation
Southern California Area Office
Attn: Bill Rohwer
27708 Jefferson Ave, Suite 202
Temecula, CA 92590

EIS/EIR Mailing List

Please include me on the mailing list for the EIS/EIR for the Santa Margarita River Conjunctive Use Project. Electronic format is preferred, if available. 1

Mailing address:

James Pigg
4851 Quail Run
Las Cruces, NM 88011

Email address:

jfpigg@mindspring.com

Thank you,

James Pigg

20

Response:

1. Individual has been added to the EIS/EIR mailing list as requested.

permit does not authorize the permit holder to perform any land-disturbing activities or otherwise enter upon lands or waters owned by others without the owners' express permission.

The proposed project would consist of the following: (1) A 650-feet-wide and up to 7-feet-high concrete diversion structure; (2) a 6-mile-long penstock that would feed up to five, 1-mile-long pressurized, reinforced concrete pipes creating approximately 125 feet of head; (3) a powerhouse, containing up to four turbine-generators; and (4) an undefined interconnection point to the grid within five to eight miles of the proposed powerhouse. The estimated annual generation of the Stony Creek Project would be 100,000 megawatt-hours.

Applicant Contact: Mr. Paul Grist, President, Archon Energy 1, Inc., 101 E. Kennedy Blvd., Suite 2800, Tampa, Florida 33602; phone: (415) 377–2460.

FERC Contact: Shana Murray; phone: (202) 502–8333.

Deadline for filing comments, motions to intervene, competing applications (without notices of intent), or notices of intent to file competing applications: 60 days from the issuance of this notice. Competing applications and notices of intent must meet the requirements of 18 CFR 4.36.

The Commission strongly encourages electronic filing. Please file comments, motions to intervene, notices of intent, and competing applications using the Commission's eFiling system at *http://www.ferc.gov/docs-filing/efiling.asp.* Commenters can submit brief comments up to 6,000 characters, without prior registration, using the eComment system at *http://www.ferc.gov/docs-filing/ecomment.asp.* You must include your name and contact information at the end of your comments. For assistance, please contact FERC Online Support at *FERCOnlineSupport@ferc.gov,* (866) 208–3676 (toll free), or (202) 502–8659 (TTY). In lieu of electronic filing, please send a paper copy to: Secretary, Federal Energy Regulatory Commission, 888 First Street NE., Washington, DC 20426. The first page of any filing should include docket number P–14571–000.

More information about this project, including a copy of the application, can be viewed or printed on the "eLibrary" link of Commission's Web site at *http://www.ferc.gov/docs-filing/elibrary.asp.* Enter the docket number (P–14571) in the docket number field to access the document. For assistance, contact FERC Online Support.

Dated: May 1, 2014.

Kimberly D. Bose,

Secretary.

[FR Doc. 2014–10613 Filed 5–8–14; 8:45 am]

BILLING CODE 6717–01–P

ENVIRONMENTAL PROTECTION AGENCY

[ER–FRL–9014–8]

Environmental Impact Statements; Notice of Availability

Responsible Agency: Office of Federal Activities, General Information (202) 564–7146 or *http://www.epa.gov/compliance/nepa/.*

Weekly receipt of Environmental Impact Statements
Filed 04/28/2014 through 05/02/2014 Pursuant to 40 CFR 1506.9.

Notice

Section 309(a) of the Clean Air Act requires that EPA make public its comments on EISs issued by other Federal agencies. EPA's comment letters on EISs are available at: *http://www.epa.gov/compliance/nepa/eisdata.html.*

EIS No. 20140132, Final EIS, FHWA, TX, Grand Parkway Segments H and I–1, *Review Period Ends:* 06/09/2014, *Contact:* Gregory S. Punske 512–536–5900.

EIS No. 20140133, Final EIS, FERC, LA, Cameron Liquefaction Project, *Review Period Ends:* 06/09/2014, *Contact:* Danny Laffoon 202–502–6257.

EIS No. 20140134, Draft Supplement, BPA, ID, Hooper Springs Transmission Project, *Comment Period Ends:* 08/07/2014, *Contact:* Tish Eaton 503–230–3469.

EIS No. 20140135, Draft EIS, RUS, SC, McClellanville 115 kV Transmission Project, *Comment Period Ends:* 06/23/2014, *Contact:* Lauren McGee Rayburn 202–695–2540.

EIS No. 20140136, Draft EIS, FTA, WA, Link Light Rail Operations and Maintenance Satellite Facility, *Comment Period Ends:* 06/23/2014, *Contact:* James Saxton 206–220–7954.

EIS No. 20140137, Draft Supplement, BLM, ID, Cottonwood Resource Management Plan Amendment for Domestic Sheep Grazing, *Comment Period Ends:* 08/07/2014, *Contact:* Scott Pavey 208–769–5059.

EIS No. 20140138, Final EIS, FHWA, OH, Cleveland Opportunity Corridor, *Contact:* Naureen Dar 614–280–6846.

Under MAP–21 section 1319, FHWA has issued a single FEIS and ROD. Therefore, the 30-day wait/review period under NEPA does not apply to this action.

EIS No. 20140139, Draft EIS, USAF, FL, Gulf Regional Airspace Strategic Initiative Landscape Initiative, *Comment Period Ends:* 06/23/2014, *Contact:* Michael Spaits 850–882–2836.

EIS No. 20140140, Draft EIS, CALTRANS, CA, Centennial Corridor Project, *Comment Period Ends:* 07/08/2014, *Contact:* Jennifer Taylor 559–445–6455.

EIS No. 20140141, Final EIS, NPS, NJ, Gateway National Recreation Area Final General Management Plan, *Review Period Ends:* 06/09/2014, *Contact:* Jennifer Nersesian 718–354–4664.

EIS No. 20140142, Draft Supplement, STB, UT, Six County Association of Governments Proposed Rail Line between Levan and Salina, *Comment Period Ends:* 06/23/2014, *Contact:* Phillis Johnson-Ball 202–245–0304.

EIS No. 20140143, Draft EIS, BR, CA, Contra Loma Reservoir and Recreation Area Resource Management Plan, *Comment Period Ends:* 07/02/2014, *Contact:* David Woolley 559–487–5049.

EIS No. 20140144, Draft EIS, USMC, BR, CA, Santa Margarita River Conjunctive Use Project, *Comment Period Ends:* 06/23/2014, *Contact:* Kristin Thomas 760–725–9741.

The U.S. Department of Defense's Marine Corps and the U.S. Department of the Interior's Bureau of Reclamation are joint lead agencies for the above project.

EIS No. 20140145, Final EIS, USFS, CO, Cumbres Vegetation Management Project, *Review Period Ends:* 06/20/2014, *Contact:* Diana McGinn 719–852–6241.

Amended Notices

EIS No. 20140086, Draft EIS, USFS, ID, Upper North Fork HFRA Ecosystem Restoration Project, *Comment Period Ends:* 05/05/2014, *Contact:* Maggie Seaberg 208–756–2711. Revision to FR Notice Published 3/21/2014; Extending Comment Period from 5/5/2014 to 5/19/2014.

EIS No. 20140087, Final EIS, FHWA, TX, Trinity Parkway, From IH–35E/SH–183 to US–17/SH–310, *Review Period Ends:* 05/09/2014, *Contact:* Salvador Deocampo 512–536–5950. Revision to the FR Notice Published 3/21/2014; Extending Review Period from 05/05/2014 to 05/09/2014.

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Directory of Public Comments on the Draft EIS/EIR

Organization	Commenter	Comment Tracking Code	Page Number
Federal Agencies			
U.S. Environmental Protection Agency	Kathleen Martyn Goforth	A1	3

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

JUN 2 3 2014

Kristin Thomas
U.S. Marine Corps
Marine Corps Base Camp Pendleton
Building 22165
Camp Pendleton, California 92055-5008

Subject: Santa Margarita River Conjunctive Use Project Draft Environmental Impact Report/ Environmental Impact Statement (EIS), San Diego County, California [CEQ # 20140144]

Dear Ms. Thomas:

The U.S. Environmental Protection Agency (EPA) has reviewed the above referenced document. Our review and comments are provided pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality's (CEQ) NEPA Implementation Regulations at 40 CFR 1500-1508, and our NEPA review authority under Section 309 of the Clean Air Act.

We have rated this Draft EIS as EC-2 – Environmental Concerns-Insufficient Information (see enclosed "Summary of Rating Definitions and Follow-Up Action"). Our rating is based on our concerns about the proposed project's potential impacts on water resources, habitat, and special status species. We recommend that the Final EIS provide additional information regarding these issues, and include commitments to additional mitigation measures to reduce impacts to water and air quality and biological resources. We also recommend that the Final EIS include the Adaptive Management Plan/Facility Operating Plan, which should clearly articulate the proposed project's management objectives and options for operating facilities to meet these objectives. Our detailed comments are enclosed.

We appreciate the opportunity to review this Draft EIS. If you have questions, please call me at (415) 972-3521 or contact Jeanne Geselbracht at 415-972-3853.

Sincerely,

Kathleen Martyn Goforth, Manager
Environmental Review Section

Enclosures: EPA's Summary of Rating Definitions and Follow-Up Action
EPA's Detailed Comments

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cc: William Steele, U.S. Bureau of Reclamation, Temecula
Brian Brady, Fallbrook Public Utility District
Theresa O'Rourke Bradford, U.S. Army Corps of Engineers
Peter Beck, US. Fish and Wildlife Service, Carlsbad
Rodney McInnis, National Marine Fisheries Service

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Summary of Rating Definitions and Follow-up Action

Environmental Impact of the Action

LO--Lack of Objections
The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC--Environmental Concerns
The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO--Environmental Objections
The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU--Environmentally Unsatisfactory
The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1--Adequate
EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2--Insufficient Information
The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3--Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

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Santa Margarita River Conjunctive Use Project Draft EIS
EPA Comments – June, 2014

Compliance with Clean Water Act Section 404
According to the Draft EIS, Alternative 1 would result in a permanent loss of approximately 2.67 acres of waters of the U.S. and a temporary loss of 0.80 acres (Table 4.3-3, pg. 4-34). The aquatic ecosystem would be altered by this project through permanent and temporary habitat loss and degradation, and changes to hydrological processes.

The purpose of Section 404 of the Clean Water Act (CWA) is to restore and maintain the chemical, physical, and biological integrity of waters by prohibiting discharges of dredged or fill material that would result in avoidable or significant adverse impacts on the aquatic environment. EPA's *Federal Guidelines for Specification of Disposal Sites for Dredged or Fill Materials* (40 CFR 230), promulgated pursuant to Section 404(b)(1) of the CWA (Guidelines), provide the standards by which proposed discharges must be evaluated. The burden to demonstrate compliance with the Guidelines rests with the permit Applicant. The Guidelines contain four main requirements that must be met to obtain a Section 404 permit:

a) Section 230.10(a) prohibits a discharge if there is a less environmentally damaging practicable alternative to the proposed project.
b) Section 230.10(b) prohibits discharges that will result in a violation of water quality standards or toxic effluent standards, jeopardize a threatened or endangered species, or violate requirements imposed to protect a marine sanctuary.
c) Section 230.10(c) prohibits discharges that will cause or contribute to significant degradation of waters. Significant degradation may include individual or cumulative impacts to human health and welfare; fish and wildlife; ecosystem diversity, productivity and stability; and recreational, aesthetic or economic values.
d) Section 230.10(d) prohibits discharges unless all appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem.

Pursuant to the Guidelines, mitigation of project impacts begins with the avoidance and minimization of direct, indirect, and cumulative impacts to the aquatic ecosystem, followed by compensatory measures if a loss of aquatic functions and/or acreage is unavoidable. Compensatory mitigation is intended only for unavoidable impacts to waters of the U.S. after the least environmentally damaging practicable alternative (LEDPA) has been determined.

The Draft EIS has not clearly demonstrated that all practicable measures to minimize unavoidable impacts to waters of the U.S. have been incorporated into the proposed project design. For project components such as pipelines, transmission lines, access roads, and the wastewater treatment plant, opportunities exist to avoid and minimize direct, indirect, and cumulative impacts to waters by applying sensitive design criteria (e.g., shifting the alignment of roads and placement of wells and power line towers; reducing the footprint of buildings and access roads; etc.).

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Recommendations: The Final EIS should discuss and demonstrate compliance with the Guidelines by discussing the steps that would be taken to avoid and minimize impacts to waters of the U.S. For project components that could affect waters of the U.S., the Final EIS should evaluate alternative locations, configurations, and designs to avoid these waters. Avoidance of sensitive plant species should be an important consideration in such evaluations. The Final EIS should provide additional details, including acres of waters of the U.S. avoided for each component as a result of these avoidance measures. 1

For those impacts to waters of the U.S. that are unavoidable, the Final EIS should describe, in detail, the project commitments to compensatory mitigation measures, as appropriate, consistent with the Compensatory Mitigation for the Loss of Aquatic Resources, Final Rule, 33CFR 325 and 332, April 10, 2008. 2

Biological Resources

According to the Draft EIS (p. 2-51), the proposed project would reduce lower Santa Margarita River streamflow and groundwater levels relative to historic averages. Riparian and estuarine habitat would be adversely affected through changes in the distribution and duration of seasonal aquatic habitats and reduced productivity of groundwater-dependent riparian vegetation, and these impacts would adversely affect special status species, including least Bell's vireo, southwestern willow flycatcher, arroyo toad, light-footed clapper rail, California least tern, southern California steelhead, and Belding's savannah sparrow. The Draft EIS concludes, however, that the permanent loss of riparian habitat on Marine Corps Base (MCB) Camp Pendleton would be compensated in accordance with the 1995 Riparian/ Estuarine Biological Opinion (BO). The Draft EIS (pp. 2-22, 23) also states that the BO and Special Conservation Measure (SCM) #2 would ensure that pumping would not result in groundwater drawdown deeper than 15 feet below the surface (i.e., the upper limit of willow riparian root zone depth beyond which plants are unable to utilize groundwater), and that the "relationship between the 15-foot (5-m) depth to water and the health of the riparian vegetation" would be improved to prevent changes to the environment that are not within the natural range of conditions.

The meaning of this commitment is unclear, and the specific needs (e.g., distribution and duration of seasonal aquatic habitats, saturated soils, recruitment conditions, etc.) of the potentially affected biological resources are not identified in the Draft EIS. In addition, the metrics that would represent the "natural range of conditions" in the context of SCM #2 are unclear. For example, would project-induced drawdown within the natural range of conditions be allowed for an extended number of years (e.g., during a drought) or during seasons when shallow groundwater or saturated soil is critical for various species? Conditions that could further stress the system and have adverse impacts on habitat and wildlife should be avoided. EPA is concerned that SCM #2 may not sufficiently protect or improve the functions of the lower Santa Margarita River aquatic, estuarine, and riparian habitats and their associated wildlife. 3

Recommendation: The Final EIS should describe the specific habitat needs of the potentially affected species, and commit to measures that would be implemented to meet these needs. The Final EIS should also describe commitments to improve habitat in the project area, and discuss the anticipated effects of these efforts. This information should 4

2

Response:

1. The proposed action will require a 404/401 Individual Permit (IP).
Below has been added on page 4-53 bullet #1:
Unavoidable impacts to jurisdictional wetlands and other waters of the U.S. shall require to be outlined in the Army Corps of Engineer IP. The development of a mitigation and monitoring plan is a requirement of CWA Sections 401 and 404 permit applications for activities that would discharge dredge or fill materials into jurisdictional waters. During the design phase of the project, the Marine Corps chose a footprint that is the lease environmentally damaging and practicable alternative to meet the purpose and need. The mitigation and monitoring plan should include details regarding site appropriateness, preparation (e.g., grading), recontouring, planting specifications (including seed mixes and plant palettes), and irrigation design (if determined necessary), as well as maintenance and monitoring procedures (including monitoring period and reporting). The plan should also outline yearly success criteria and remedial measures should the mitigation effort fall short of the success criteria.
Conservation measures outlined in the EIS that will minimize impacts to jurisdictional wetlands and other waters of the U.S. include the necessity of a biological monitor for the duration of the project that is familiar with CWA Sections 401 and 404 to minimize impacts "on the ground"; topsoil during construction will be salvaged and reapplied, to the maximum extent practicable all water crossing must be completed within 24 hours.
2. Compensation for impacts will be outlined in the Army Corps of Engineer IP, after the Final EIS, but prior to construction. The development of a mitigation and monitoring plan is a requirement of CWA Sections 401 and 404 permit applications for activities that would discharge dredge or fill materials into jurisdictional waters.
3. Formal Section 7 consultation with USFWS Final BO 15 Aug 2016) and NOAA Fisheries (Draft Bo Received 11 Aug 2016) focus was placed on reduced groundwater and streamflow in the SMR due to the proposed project. The final EIS/EIR reflects effort through the consultation process to improve conditions for southern California steelhead and riparian endangered terrestrial species (arroyo toad, least Bell's vireo, southwestern willow flycatcher); and develop a model that could predict streamflow, and help make informed decisions on water management in the future. As a conservation measure the Marine Corps will develop an Adaptive Management Plan (AMP) to manage project diversion, recharge, production and delivery facilities that will meet specific conservation measures outlined in both the USFWS and NOAA Fisheries Biological Opinions. Information on the AMP, the model used to predict effects, and the Marine Corps commitment to managing their biological and hydrological resources can be found in the Final and Draft Aug 2016 Biological Opinions for both the USFWS and NOAA Fisheries consultations.

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feed into the objectives, triggers, thresholds, and action commitments associated with affected resources to be addressed in the Adaptive Management Plan/Facility Operating Plan (AMP/FOP), which is further discussed below. Careful consideration of these objectives, triggers, thresholds, and action commitments should factor into development of the water management details of the proposed project (e.g., timing, duration, flow rates, diversion rates, pumping rates, water sources, etc.). As development of the AMP/FOP progresses and these details are further analyzed and incorporated into the plan, the proposed action may need refining, and the Final EIS should clarify any such refinements. 4

Adaptive Management

Management of water resources within the Santa Margarita River watershed is complex because of its dynamic natural system; competing resource needs; natural- and human-induced stressors, including cleanup of contaminated groundwater in Installation Restoration areas; and legal and regulatory requirements. The Draft EIS describes the AMP/FOP that would be developed by MCB Camp Pendleton to adaptively manage project diversion, recharge, production, and delivery facilities. The AMP/FOP would incorporate tools and models to describe the natural system's response to various stressors, management objectives and a logic-based series of responses to guide active basin management, and monitoring to gather near real-time physical data.

The Draft EIS describes SCMs #1-3 for project operations and SCMs #4-83 for project construction. While many of the SCMs address seasonal restrictions to protect special status species during construction or maintenance activities, the operational SCMs do not identify the needs/restrictions for protecting these species throughout project operations. It is unclear, therefore, what the AMP/FOP will be based upon with respect to triggers, thresholds, and action commitments for biological resources.

Recommendation: The AMP/FOP should clearly articulate the proposed project's numerous management objectives and options for operating facilities to meet these objectives, and should be included in the Final EIS. The objectives identified in the plan should be explicit and measurable, and the triggers, thresholds, and associated action commitments should be well defined. The uncertainties in the lower Santa Margarita River system should be identified so that appropriate monitoring is developed to not only track anticipated responses to management, but to also uncover unexpected results. The AMP/FOP should identify the parties who will be involved in implementing it (e.g., stakeholders, parties who will be monitoring resources and assessing system responses, decision makers, etc.). A well-considered and thorough plan will be critical to successful management of the lower Santa Margarita River watershed. 5

The Draft EIS (p. 2-13) provides general plans under Alternative 1 for restricting groundwater pumping during dry and below normal water years to maintain groundwater levels within their historical range, prevent aquifer compaction and seawater intrusion, and reduce potential impacts to riparian habitat. During drought periods when groundwater is insufficient to meet demand or during emergency situations, groundwater pumping would be curtailed and imported water would be delivered from the San Diego County Water Authority (SDCWA) to MCB Camp

3

Response:

4. Both the Final USFWS BO (Aug 2016) and the Draft NOAA Fisheries BO indicate the commitments the project has committed to as well as a plan for future involvement and coordination with both agencies in the development and implementation of the AMP.

The EIS/EIR has been updated with specific habitat needs of the potentially affects species and the conservation measures to reduce these effects using the updated information from both the Final and Draft Biological Opinions from both USFWS and NOAA fisheries.

. The AMP/FOP is in review and is being coordinated with and reviewed by both USFWS and NOAA Fisheries.

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Pendleton at an average rate of 500 acre-feet per year to help meet the base's potable water demand.

Recommendation: The Final EIS should clarify the conditions under which these measures would be taken. The Final EIS should also identify the source of the SDCWA water and the potential maximum annual delivery from SDCWA to MCB Camp Pendleton, and describe the indirect and cumulative effects related to the consumption of water from this source. 6

Air Impacts

Measures identified in the Draft EIS (p. 2-36) to reduce PM_{10} emissions from construction activities include watering unpaved roads and actively graded surfaces up to three times daily, reducing speeds on unpaved roads to 15 miles per hour (mph), suspending grading activities if wind speeds exceed 25 mph, and replacing ground cover in graded areas as soon as possible. We support use of these measures and offer additional measures to reduce emissions of other air pollutants.

Recommendation: The Final EIS should identify additional mitigation measures that would be implemented to minimize air pollutant emissions from the proposed project, and specifically include measures to address potential impacts to nearby residents, including sensitive receptors. Diesel particulate matter (DPM), criteria pollutants, and greenhouse gas emissions can be reduced by implementing appropriate mitigation measures, such as the following: 7

- Use particle traps and other appropriate controls to reduce emissions of DPM and other air pollutants. Traps control approximately 80 percent of DPM, and specialized catalytic converters (oxidation catalysts) control approximately 20 percent of DPM, 40 percent of carbon monoxide emissions, and 50 percent of hydrocarbon emissions;
- Minimize construction-related trips of workers and equipment, including trucks and heavy equipment;
- Procure new vehicles that are non-diesel or use diesel engines from model year 2010 or later to ensure low black carbon emissions; and
- Employ periodic, unscheduled inspections to ensure that construction equipment is properly maintained at all times and does not unnecessarily idle, is tuned to manufacturer's specifications, and is not modified to increase horsepower except in accordance with established specifications.

Climate Change

The Draft EIS discusses the proposed project's potential climate change impacts in terms of its potential greenhouse gas emissions, but does not address potential impacts of climate change on the project. Executive Order 13653 (November 1, 2013) directs the Departments of Defense and Interior, and other agencies, to undertake various action to promote greater climate change

4

Response:

6. The AMP/FOP states an average annual of 250 AFY and that the max may not exceed 2,000 AFY. As indicated in Section 2.3.1.4 Special Conservation Measures of the EIS/EIR, the AMP/FOP actively improves and empirically manages the effect of the project on environmental resources by adjusting project-related stresses that affect the natural system response. The AMP monitors and collects near real-time data that would identify triggers, which are hydrologic related parameters (e.g., groundwater level or streamflow), and thresholds, which are numeric values for triggers that would initiate a modification to project operations and meet delivery requirements. From the data gathered in the AMP, the FOP can be developed to manage the project facilities after project conclusion. (The AMP is currently written based on models that closely emulate the project results.). As seen in Section 2.3.1 of the EIS/EIR, and Table 2.3-1, the source of water and delivery methods are proposed as new facilities for Alternative 1 and 2. Table 2.3-2 also outlines the The proposed Operation plan for the inflatable Weir Diversion Structure and Headgate.

If the bi-directional pipeline were to be used in the future to import water additional agreements would be required and likely additional NEPA to review all potential impacts at that time.

7. The EIS/EIR has been updated to include the following SCM to minimize air pollutant emissions from the project: "Reclamation, the USMC, and FPUD would develop a construction specification for the construction work that will implement BMPs to minimize air emissions from equipment and vehicles. The specification will include requirements for minimizing construction-related trips, minimizing idling, and proper equipment maintenance and inspection."

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resilience. Department of Interior Secretarial Order 3289[1] also instructs its bureaus to address the impacts of climate change, including the following recommendations:

- Adapt water management strategies to address the possibility of shrinking water supplies and more frequent and extended droughts;
- Conserve and manage fish and wildlife resources, including migratory birds and federally listed threatened and endangered species; and
- Continue to provide state-of-the-art science to better understand the impacts of climate change and to develop science-based adaptive management strategies for natural and cultural resource managers.

Recommendations: EPA recommends that the Final EIS analyze the potential impacts of climate change, over the life of the project, on resources such as water quality and quantity, vegetation/habitat, wildlife, and economic factors. The AMP/FOP should account, in advance, for climate change and take a conservative approach to adaptation objectives, triggers, thresholds, action commitments, and monitoring needs. 8

We recommend that the lead agencies and their partners consider and incorporate commitments to energy efficiency and renewable energy options in all aspects of the project, such as procurement/sourcing, construction, and operations, including for water and wastewater treatment and pumping. 9

Special Conservation Measures

EPA supports MCB Camp Pendleton's plan, per SCM #3, to incorporate recycled water use, Installation Restoration site remediation, and other water-related management activities into the AMP/FOP, as well the low impact development features identified in SCM #31. EPA encourages efficient use and management of water supply, including a focus on demand-side management measures. We advocate development and implementation of water conservation plans, use of conservation performance requirements, and strong assurances that certain levels of conservation will be attained.

Recommendation: The Final EIS and AMP/FOP should include specific details on the objectives, triggers, thresholds, and action commitments related to SCM #3 management activities. 10

SCM #31 states that noxious weeds may be controlled by hand weeding or herbicide application in disturbed areas as necessary to prevent their establishment.

Recommendation: The Final EIS should identify the herbicides that could be used for the project and the trigger(s) for their use, and discuss precautions that would be taken to ensure against detrimental effects on non-targeted species, including special status species. EPA recommends that herbicides be used only in the context of an integrated pest management program that prioritizes non-chemical and least toxic pest management methods. 11

[1] Department of Interior Secretarial Order 3289, Amendment No. 1, February 22, 2010, Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources.

5

Response:

8. Climate change has been added to the EIS Section 3.2.4.3. Climate change is expected to result in more extreme winter storms with flashier flood hazards and increased peak runoff resulting in greater discharges to the ocean (California Department of Water Resources 2009a). Although individual winter storms may be flashier, some studies estimate up to a 4% reduction in annual precipitation in southern California over the next 50 years (Cayan 2009).

Climate change is also addressed in the USFWS and NMFS BOs.

9. Design is compliant with numerous energy efficient guidelines and codes:

-PL-109-58 (1992; R 2005) Energy Efficient Procurement Requirements

-Energy Star

-Where products are specified to meet or exceed the specified energy efficiency requirement of FEMP-designated or Energy Star certified product categories, equipment selected shall have as a minimum the efficiency rating identified under "Energy-Efficient Products" at http://www1.eere.energy.gov/femp/procurement. These specifications conform to the efficiency requirements as defined in Public Law PL-109-58, "Energy Policy Act of 2005" for federal procurement of energy-efficient products. Equipment having a lower efficiency than Energy Star or FEMP requirements may be specified if SECTION 23 00 00 Page 7 Raw Water Pipeline from Pendleton to Fallbrook P1220 the designer determines the equipment to be more life-cycle cost effective using the life-cycle cost analysis methodology and procedure in 10 CFR 436.

10. The AMP/FOP includes details related to management activities and to conservation.

11. MCB Camp Pendleton has an Integrated Pest Management Plan and will defer to that for all pesticide use

Appendix B

Surface Water and Groundwater Model Results

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APPENDIX B

SUMMARY OF SURFACE WATER AND GROUNDWATER MODEL RESULTS

A surface water and groundwater model (Model) has been used to provide information necessary to make decisions related to the Santa Margarita River (SMR) Conjunctive Use Project (SMR CUP) (U.S. Bureau of Reclamation [Reclamation] 2007). The Model is a three-dimensional USGS MODFLOW surface water and groundwater model originally developed in 2001 for the Permit 15000 Study (Reclamation 2001). The Model was updated in 2005 and used to develop over 16 project alternatives, including ten original alternatives (Reclamation 2007a) and six subsequent alternatives (Stetson Engineers Inc. [Stetson] 2012a,b). Of the 16 model runs, only two project alternatives (Alternatives 1 and 2) were found to efficiently meet the long-term water demands of Marine Corps Base (MCB) Camp Pendleton and Fallbrook Public Utility District (FPUD), reduce FPUD's dependence on imported water, maintain watershed resources, and improve water supply reliability by managing the yield of the Lower SMR Basin while protecting environmental resources.

This appendix discusses the most recent Model results for surface water flows and groundwater levels in the lower SMR Basin using flow data from the updated *CUP Surface Water Availability Analysis (TM 1.1)* (Reclamation et al. 2012). This report utilizes model simulations performed by Stetson to compare the effects of Alternatives 1 and 2 Model simulations with results from a Baseline Model simulation.

B.1 MODEL DESCRIPTION

Using the Model, a study was completed to maximize the potential yield for the SMR CUP within limitations set by physical and environmental constraints. The streamflow, groundwater production, environmental, and infrastructure parameters and constraints used for the Baseline and Alternatives 1 and 2 simulations are provided in Table B-1. The parameters and constraints include: historical water levels and hydrologic conditions; Cooperative Water Resources Management Agreement (CWRMA) or Title 22 releases; 3 cubic feet per second (cfs) minimum bypass flows at the diversion structure to meet downstream riparian needs; water quality; and prevention of seawater intrusion and compaction (i.e., subsidence) to the groundwater aquifer (Reclamation 2007). Figure B-1 shows the spatial domain of the Model used for this study. The Model encompasses the Upper Ysidora, Chappo, and Lower Ysidora groundwater sub-basins.

A 50-year simulation period was developed for the Model to describe physical and environmental characteristics during varying hydrologic conditions that are typical in the SMR watershed. The 50-year simulation period utilizes historical hydrologic data (i.e., 1952 through 2001) that encompasses the range of varying hydrologic conditions within the watershed. These hydrologic conditions are described as Extremely Dry (ED), Very Dry (VD), Below Normal (BN), Above Normal (AN), and Very Wet (VW). ED and VD hydrologic conditions are identical except for that ED conditions are based on antecedent conditions and may only occur immediately following a VD or ED year. During the 50-year period, ED/VD conditions occurred for 12 years (24%), BN conditions for 14 years (28%), AN conditions for 15 years (30%), and VW conditions for 9 years (18%).

Table B-1. Modeling Assumptions Used for Alternative Analysis

Operational Parameter \ Run	No-Action Alternative (Baseline)	Alternative 1 Groundwater Wells Only	Alternative 2 Groundwater and Gallery Wells
Streamflow			
CWRMA	✓	✓	✓
3-cfs Bypass	✓	✓	✓
CWRMA Emergency Water	✓	✓	✓
Groundwater Production			
Upper Ysidora/Chappo Pumping	✓	✓	✓
Water Conservation during Droughts	✓	✓	✓
Gallery Wells			✓
Lower Ysidora Pumping (Title 22)			
Historical Pumping Distribution	✓	✓	✓
Environmental Parameters			
VOC Constraint[1]	✓	✓	✓
No Aquifer Compaction[2]		✓	✓
Riparian Water Level Constraint[3]		✓	
Subsurface Flow at LY Narrows		✓	✓
Infrastructure			
Existing Groundwater Wells	12	12	12
New Groundwater Wells		4	4
New Gallery Wells			4
Recharge Ponds	7	7	7
Bi-Directional Pipeline		✓	✓
Minimum Basin Yield (af/y)	6,300	4,600	5,000
Maximum Basin Yield (afy)	8,800	15,800	21,500
Average Basin Yield (af/y)	8,400	10.800	12,800

Notes: [1] The VOC Constraint requires that water not be pumped from wells with known contamination. Groundwater from Well 26018 has shown TCE concentrations below the MCL and has been included in all model runs per discussions with the Base.
[2] The potential for aquifer compaction is indicated by dewatering of areas with a higher percentage of clay sediments.
[3] The Riparian Water Level Constraint requires that groundwater levels in the riparian corridor are not dropped below historical measured water levels.

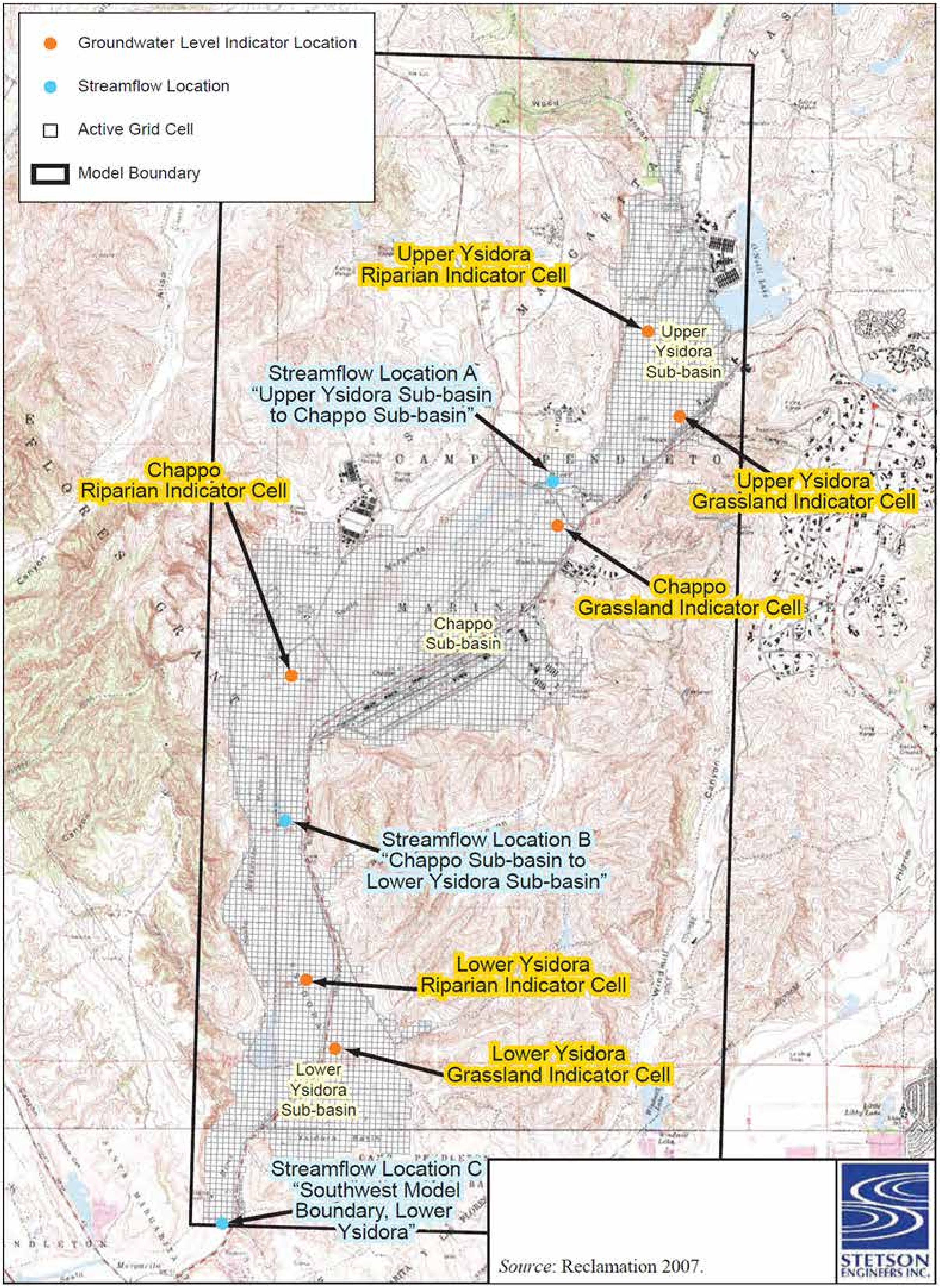

Figure B-1
Model Grid, Boundary, Groundwater Indicator Locations,and Streamflow Locations

The Model was used to assess the effects of various project components such as groundwater pumping, diversions from the SMR, and recharge from the SMR and recharge ponds. A Baseline Model simulation (Attachment 1; Stetson 2012a) was developed and serves as the basis for comparison of other simulations representing Alternative 1 (Attachment 2; Stetson 2012b) and Alternative 2 (Attachment 3; Stetson 2012c). Comparison of groundwater levels and streamflow quantities during different hydrologic conditions allows for assessment of potential impacts between the No-Action Alternative (Baseline) and the action alternatives.

The Baseline Model establishes physical parameters under existing conditions that rely only on existing infrastructure to meet potable groundwater requirements on MCB Camp Pendleton. Alternatives 1 and 2 would rely on increased diversion and recharge rates and new production and gallery wells to increase sustained basin yield to meet MCB Camp Pendleton and FPUD demands, but include water management constraints to prevent negative environmental impacts. These constraints vary by alternative and would include maintenance of groundwater levels within their historical range to protect riparian water levels (Alternative 1), no aquifer compaction (both action alternatives), and/or no seawater intrusion by maintaining minimum subsurface flow out of the model at the Lower Ysidora Narrows (both action alternatives). The action alternatives include the construction of a bi-directional pipeline that would connect MCB Camp Pendleton to an off-base source of imported water. MCB Camp Pendleton access to imported water would allow for an increase in sustained basin yield due to the availability of an alternative water supply during prolonged drought conditions. Under Alternative 1 and 2 operations, groundwater pumping would be curtailed during dry hydrologic conditions to protect physical and environmental concerns and instead rely on imported water to meet a portion of MCB Camp Pendleton's water demand.

B.2 RESULTS AND DISCUSSION

The average annual groundwater pumping under the Baseline Model simulation is 8,400 af/y (Stetson 2012a), which is 400 af/y less than the 8,800 af/y allowed under existing water rights due to conservation measures during ED/VD hydrologic conditions. Based on the environmental constraints and operational parameters that were used to develop each action alternative, increases in Alternatives 1 and 2 sustained basin yield above baseline yield would be limited to 10,800 af/y and 12,800 af/y, respectively (Stetson 2012b,c); this equates to an increase over the Baseline by 2,400 af/y and 4,400 af/y, respectively. Imported water supplies required to meet sustained basin yield requirements for Alternatives 1 and 2 are 500 af/y and 1,100 af/y, respectively.

The Model simulates evapotranspiration which measures consumptive use of groundwater by riparian phreatophytes. Modeled evapotranspiration can be used as an indicator of potential impacts to riparian habitat and the riverine environment. A substantial decline in annual evapotranspiration could be indirectly related to a stressed riverine environment. Evapotranspiration for the Baseline and two action alternatives is described in the annual Model budget shown in Attachments 1 through 3. Baseline evapotranspiration averaged 2,500 af/y under Baseline conditions and decreased by 100 af/y (4%) for both Alternatives 1 and 2. This is not considered a significant decline in annual evapotranspiration.

Analysis of specific environmental parameters may be assessed from the Model's groundwater budget and groundwater level hydrographs shown in Section B.2-1. VOC migration occurs when groundwater production wells are placed near known contaminant plumes. Aquifer compaction may occur when groundwater levels drop below the highest clay layer in the aquifer. Impacts to riparian habitat may occur when groundwater levels below the SMR drop below the root extinction depth of riparian vegetation. Lastly, seawater intrusion may occur when subsurface outflow from the Model at the Lower Ysidora

Narrows becomes a negative number. Each of these physical and environmental factors was reviewed throughout the development of the Baseline and Alternative 1 and 2 Model simulations.

The simulated groundwater level and SMR streamflow information relating to Alternatives 1 and 2 is summarized below in Section B.2-1, *Groundwater Levels* and Section B.2-2, *SMR Streamflow*, respectively.

B.2.1 Groundwater Levels

In order to assess the changes in groundwater levels between the Baseline Model simulation and the Model simulations for Alternatives 1 and 2, six "indicator" locations were identified that depict water levels representative of conditions in each sub-basin. Two locations were chosen in each sub-basin, with one location representing conditions in the riparian zone and the other location representing conditions in grassland areas that do not contain phreatophyte vegetation. Figure B-1 shows the locations of each of these six indicator locations.

B.2.1.1 Alternative 1 Simulation

Figures 1 to 3 in Attachment 2 (Stetson 2012b) show the simulated groundwater levels in Upper Ysidora, Chappo, and Lower Ysidora sub-basins, respectively, comparing the Baseline Model simulation to the Alternative 1 Model simulation (*Note*: Alternative 1 is referred to as "Run 16b" in Attachment 2). Each figure presents two graphs, one for the riparian indicator location and one for the grassland location. The following information is presented on each graph:

<u>Riparian Indicator</u>

The following lines are shown on each of the graphs for the riparian indicator locations:

- *Land Surface Elevation*: This line represents the elevation of the ground surface at this location.
- *Low Water Level*: This line shows the elevation of the lowest recorded groundwater level in the area of the indicator location.
- *Baseline Simulated Water Level*: The red dashed line is the calculated groundwater level from the baseline simulation.
- *Alternative 1 Simulated Water Level*: The green line is the calculated groundwater level from the Alternative 1 simulation. This simulation was termed "Run 16B" by Stetson (Stetson 2012b).

<u>Grassland Indicator</u>

The following lines are shown on each of the graphs for the riparian indicator locations:

- *Land Surface Elevation*: This line represents the elevation of the ground surface at this location.
- *Baseline Simulated Water Level*: The red dashed line is the calculated groundwater level from the baseline simulation.
- *Alternative 1 Simulated Water Level*: The green line is the calculated groundwater level from Alternative 1 simulation.

The riparian and grassland indicator graphs also have shaded vertical bands behind the lines. Each of the colors of these bands represents the hydrologic condition for a specific year (i.e., ED [Drought], VD, BN, AN, or VW).

Results

During several ED/VD years groundwater levels in the riparian indicator drop to the measured historical low in the Upper Ysidora and Chappo sub-basins. The Alternative 2 Model includes the same constraints outlined in an Adaptive Management Plan (AMP) (Stetson 2009) that reduce pumping rates during ED/VD and further reduce pumping rates as historical low groundwater levels are approached. Specifically, groundwater pumping would be curtailed when the average monthly groundwater level drops to within 3 feet (ft) of the historical minimum. These groundwater levels would be determined by a series of telemetered groundwater monitoring wells. Pumping would be further reduced or shut off if the groundwater level is within 0.5 ft of the historic minimum. Pumping rates would remain reduced until the average monthly groundwater levels returned to 0.5 ft above the historical minimum (Stetson 2009). As a result, groundwater levels would not drop below historical groundwater lows.

Under Alternative 1, the effect of lowered groundwater levels in the Upper Ysidora and Chappo sub-basins may result in reduced pumping efficiency or production from other MCB Camp Pendleton supply wells. However, the AMP would monitor water levels throughout the groundwater basin and production rates at individual wells would be adjusted accordingly to maintain yield.

Simulated groundwater levels in the grassland area of the Upper Ysidora and Chappo sub-basins are allowed to drop lower than in the riparian indicator because these areas have no phreatophytes to be adversely affected by the lowered groundwater table (i.e., no historical groundwater level constraint has been set). Simulated groundwater levels at the riparian and grassland indicators in the Lower Ysidora sub-basin (Figure 3 in Attachment 2) are similar to baseline conditions because agricultural pumping would continue to be discontinued in this sub-basin.

B.2.1.2 Alternative 2 Simulation

Figures 1 to 3 in Attachment 3 (Stetson 2012c) show the simulated groundwater levels in Upper Ysidora, Chappo, and Lower Ysidora sub-basins, respectively, comparing the Baseline Model simulation to the Alternative 2 Model simulation (*Note*: Alternative 2 is referred to as "Run 13A" in Attachment 3). Each figure presents two graphs, one for the riparian indicator location and one for the grassland location. The types of data included on each of the graphs are the same as described in Section B.2.1.1.

Results

Simulated groundwater levels at the riparian indicator in the Upper Ysidora Sub-basin typically drop below Baseline conditions during AN conditions and drop below measured historical groundwater levels during 19 dryer years in the 50-year simulation period (Figure 1 in Attachment 3). Groundwater levels in the Chappo and Lower Ysidora sub-basins are projected to remain above the historic low measured water level throughout the 50-year simulation period (Figures 2 and 3 in Attachment 3).

If groundwater levels drop below historical levels as a result of Alternative 2, there is the potential for significant impacts to occur to groundwater resources. However, an AMP (similar to Alternative 1) would be adopted to mitigate these impacts. Specifically, groundwater pumping would be curtailed when the average monthly groundwater level drops to within 3 ft of the historical minimum. These groundwater levels would be determined by a series of telemetered groundwater monitoring wells. Pumping would be further reduced or shut off if the groundwater level is within 0.5 ft of the historic minimum. Pumping rates would remain reduced until the average monthly groundwater levels returned to 0.5 ft above the historical minimum (Stetson 2009).

Simulated groundwater levels in the grassland area of the Upper Ysidora and Chappo sub-basins are allowed to drop lower than in the riparian indicator because these areas have no phreatophytes to be adversely affected by the lowered groundwater table (i.e., no historical groundwater level constraint has been set). The effects to existing MCB Camp Pendleton supply wells and riparian areas would be similar to those under Alternative 1.

B.2.2 SMR STREAMFLOW

The Model provides simulated streamflow data for the following three locations on the SMR: (1) at the boundary between the Upper Ysidora and Chappo sub-basins, (2) between the Chappo and Lower Ysidora sub-basins, and (3) at the southwest model boundary, which is approximately 0.5 mile upstream of the SMR Estuary (Reclamation 2007). In addition, average monthly streamflow data were compiled for each of the hydrologic conditions (i.e., ED/VD, BN, AN, or VW) and for the entire 50-year simulation period.

B.2.2.1 Alternative 1 Simulation

Figure 4 in Attachment 2 (Stetson 2012b) shows the simulated streamflow in the SMR at the three locations mentioned above. Each graph shows two separate lines. The lines represent:

- *Baseline Simulated Water Level*: The red dashed line is the calculated streamflow in the SMR from the baseline simulation.
- *Alternative 1 Simulation*: The green line is the calculated streamflow in the SMR from the Alternative 1 simulation.

Note that the vertical axis of each of the graphs is shown on a “log” scale and represents variations in streamflow over several orders of magnitude.

Table B-2 shows the average monthly SMR flow for all years and the four hydrologic conditions in Alternative 1 simulation at streamflow location “C,” the Lower Ysidora Narrows (see Figure B-1), which is located approximately 0.5 mile upstream of the SMR Estuary. For comparison, the simulated flow data for the Baseline Model simulation (i.e., the No-Action Alternative), and changes in SMR flow between the Baseline and Alternative 1 Model simulations are also provided in Table B-2. The changes in flow are presented in terms of flow rate (acre-feet per month [af/m]) and percent change from Baseline conditions. The change in flow between the Baseline and Alternative 1 Model simulations is also shown graphically in Table B-2.

<u>Results</u>

The results in Figure 4 in Attachment 2 show the changes in monthly streamflow in the SMR due to increased diversions and pumping rates under Alternative 1 compared with the Baseline Model simulation. As shown in Table B-2, streamflow reduction would occur during the summer months during AN and VW hydrologic conditions; and early/late wet season during BN hydrologic conditions. There is a slight improvement in streamflow due to the AMP during most months of ED/VD hydrologic conditions.

B.2.2.2 Alternative 2 Simulation

Figure 4 in Attachment 3 (Stetson 2012c) shows the Alternative 2 simulated streamflow in the SMR at the same three locations described in Section B.2.2.1. The types of data included on each of the graphs are the same as described in Section B.2.2.1.

Table B-3 shows the average monthly SMR flow for all years and the four hydrologic conditions in the

Alternative 2 Model simulation at streamflow location "C," the Lower Ysidora Narrows (see Figure B-1), which is located approximately 0.5 mile upstream of the SMR Estuary. The change in flow between the Baseline and Alternative 2 Model simulations is also shown graphically in Table B-3.

Results

The results in Figure 4 in Attachment 3 show the decrease in streamflow in the SMR due to increased diversions and pumping rates with four new gallery wells under Alternative 2. Additional periods of lower (than Baseline) flow are evident during several years. The peak flows in the SMR are relatively unchanged under Alternative 2.

Similar to Alternative 1, average streamflow under Alternative 2 would be reduced during the summer months during VW hydrologic conditions (Table B-3). Alternative 2 shows more streamflow reduction than Alternative 1 throughout the year during AN and BN hydrologic conditions. There is a substantial improvement in streamflow due to the AMP during most months of ED/VD hydrologic conditions.

B.3 REFERENCES.

Reclamation. 2007. Santa Margarita River Conjunctive Use Project: Final Technical Memorandum No. 2.2, 2 Volumes. Prepared by Stetson Engineers. April 2007. Available at: http://www.usbr.gov/lc/socal/planning.html.

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Stetson. 2008. Technical Memorandum to Camp Pendleton Office of Water Resources: Surface Water and Groundwater Modeling Analyses of Gallery Well Alternatives for the Santa Margarita River Conjunctive Use Project (CUP). September 10, 2008.

_____. 2009. Draft Technical Memorandum to Reclamation: Response to Questions Regarding the Santa Margarita Conjunctive Use Project Environmental Impact Statement. April28, 2009.

_____. 2012a. Baseline Run: using updated TM 1.1 Streamflow.

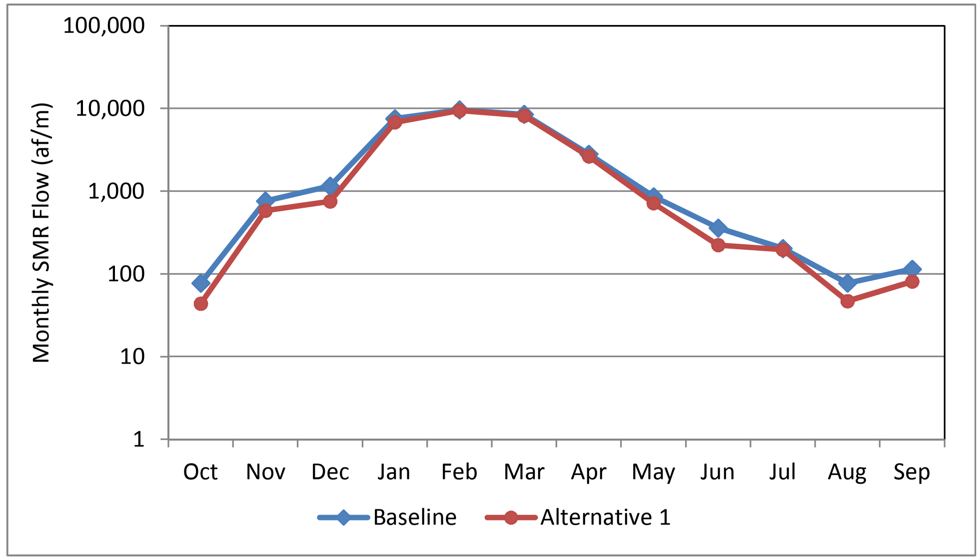
_____. 2012b. Run 16B Annual Pumping Summary: using updated TM 1.1 Streamflow.

_____. 2012c. Run 13A Basin Yield: using updated TM 1.1 Streamflow.

_____. 2012d. Average Monthly Streamflow by Subbasin/Hydrologic Condition for Baseline, Run 13A, and Run 16B. Provided via email by Reclamation. 17 April.

Table B-2. Baseline and Alternative 1 Comparison of Monthly SMR Flow at Lower Ysidora Narrows

All Years Month	Baseline af/m	Alternative 1 af/m	Change in SMR Flow af/m	%
Oct	78	44	-34	-43%
Nov	761	582	-179	-24%
Dec	1,154	754	-400	-35%
Jan	7,515	6,813	-702	-9%
Feb	9,601	9,416	-186	-2%
Mar	8,499	8,160	-339	-4%
Apr	2,807	2,645	-163	-6%
May	858	718	-140	-16%
Jun	359	224	-136	-38%
Jul	204	196	-7	-4%
Aug	78	47	-31	-39%
Sep	114	81	-33	-29%



VW Month	Baseline af/m	Alternative 1 af/m	Change in SMR Flow af/m	%
Oct	57	10	-46	-81%
Nov	374	265	-108	-29%
Dec	1,655	1,141	-514	-31%
Jan	34,007	32,264	-1,743	-5%
Feb	44,934	44,528	-406	-1%
Mar	34,020	33,103	-916	-3%
Apr	8,446	8,070	-376	-4%
May	3,356	3,065	-291	-9%
Jun	1,415	1,025	-390	-28%
Jul	866	887	21	2%
Aug	309	179	-130	-42%
Sep	577	419	-157	-27%

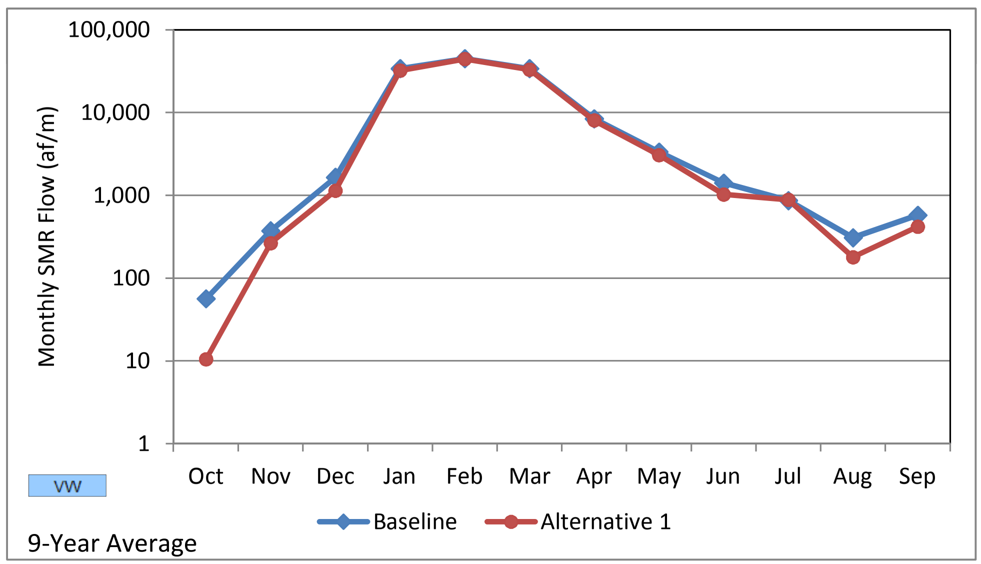
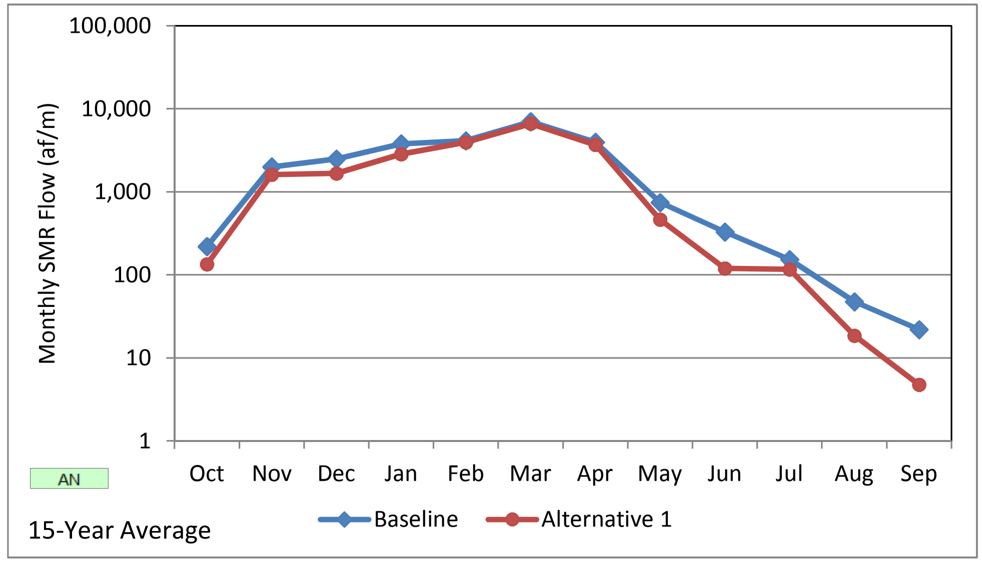


Table B-2. Baseline and Alternative 1 Comparison of Monthly SMR Flow at Lower Ysidora Narrows (cont.)

AN	Baseline	Alternative 1	Change in SMR Flow	
Month	af/m	af/m	af/m	%
Oct	219	134	-85	-39%
Nov	1,998	1,612	-386	-19%
Dec	2,483	1,664	-819	-33%
Jan	3,781	2,842	-939	-25%
Feb	4,126	3,947	-178	-4%
Mar	6,973	6,631	-342	-5%
Apr	3,961	3,688	-272	-7%
May	744	463	-281	-38%
Jun	329	120	-210	-64%
Jul	154	116	-37	-24%
Aug	48	19	-29	-61%
Sep	22	5	-17	-78%



BN	Baseline	Alternative 1	Change in SMR Flow	
Month	af/m	af/m	af/m	%
Oct	3	3	0	-9%
Nov	306	125	-181	-59%
Dec	368	167	-201	-55%
Jan	690	346	-344	-50%
Feb	923	719	-204	-22%
Mar	992	733	-259	-26%
Apr	325	271	-54	-17%
May	103	89	-14	-14%
Jun	17	7	-9	-56%
Jul	4	4	0	-9%
Aug	3	2	0	-5%
Sep	2	2	0	-3%

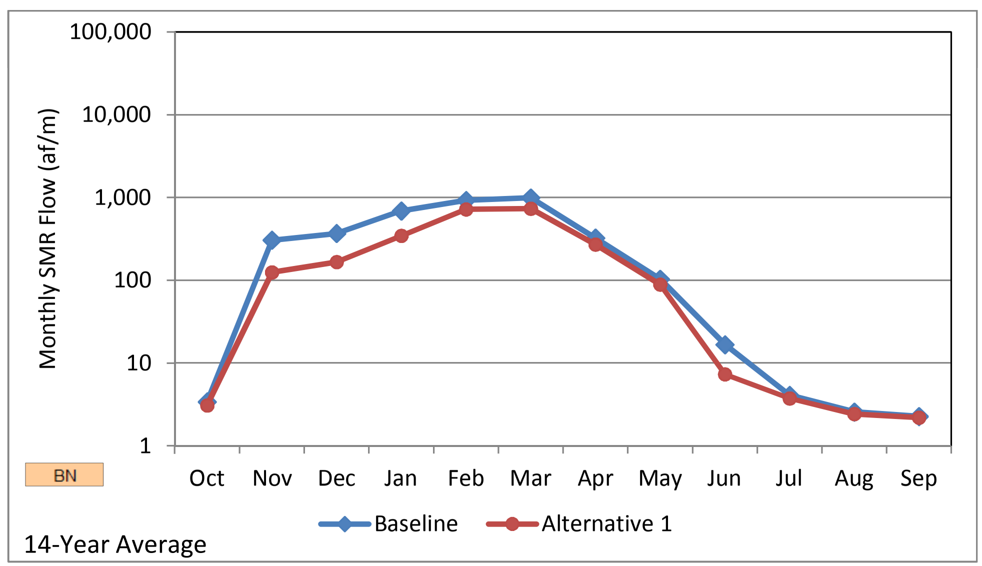


Table B-2. Baseline and Alternative 1 Comparison of Monthly SMR Flow at Lower Ysidora Narrows (cont.)

VD/ED	Baseline	Alternative 1	Change in SMR Flow	
Month	af/m	af/m	af/m	%
Oct	3	3	0	15%
Nov	38	67	29	76%
Dec	34	10	-23	-69%
Jan	275	235	-40	-15%
Feb	70	62	-8	-12%
Mar	24	29	5	22%
Apr	33	41	8	24%
May	7	9	1	18%
Jun	4	5	1	19%
Jul	2	3	0	15%
Aug	29	35	6	21%
Sep	13	15	2	14%

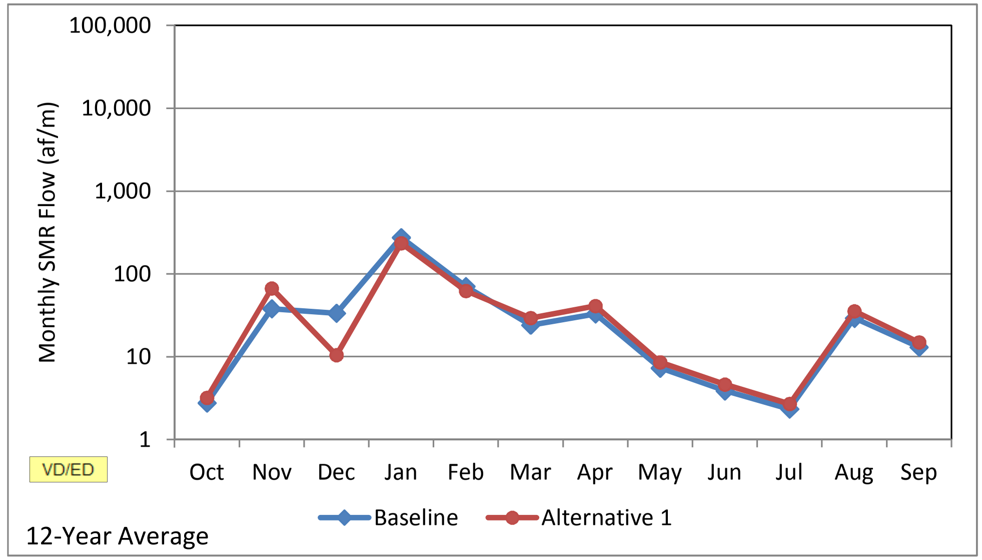
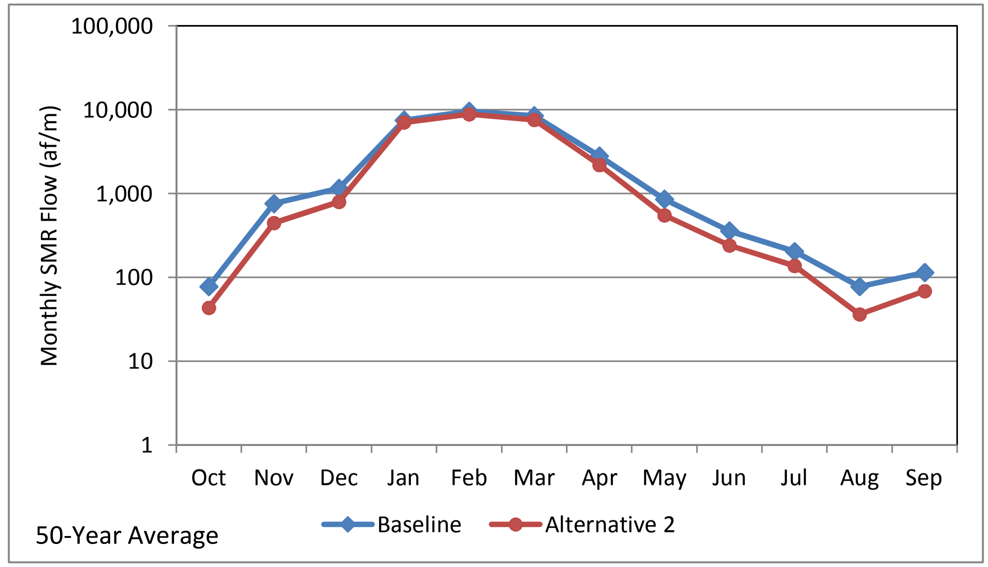


Table B-3. Baseline and Alternative 2 Comparison of Monthly SMR Flow at Lower Ysidora Narrows

All Years	Baseline	Alternative 2	Change in SMR Flow	
Month	af/m	af/m	af/m	%
Oct	78	43	-34	-44%
Nov	761	445	-316	-41%
Dec	1,154	796	-358	-31%
Jan	7,515	7,078	-437	-6%
Feb	9,601	8,831	-770	-8%
Mar	8,499	7,588	-911	-11%
Apr	2,807	2,192	-615	-22%
May	858	550	-308	-36%
Jun	359	240	-119	-33%
Jul	204	137	-66	-33%
Aug	78	36	-41	-53%
Sep	114	69	-46	-40%



VW	Baseline	Alternative 2	Change in SMR Flow	
Month	af/m	af/m	af/m	%
Oct	57	24	-33	-58%
Nov	374	79	-295	-79%
Dec	1,655	1,086	-569	-34%
Jan	34,007	32,957	-1,050	-3%
Feb	44,934	42,930	-2,004	-4%
Mar	34,020	31,559	-2,461	-7%
Apr	8,446	6,929	-1,517	-18%
May	3,356	2,436	-920	-27%
Jun	1,415	1,046	-370	-26%
Jul	866	627	-239	-28%
Aug	309	117	-192	-62%
Sep	577	324	-253	-44%

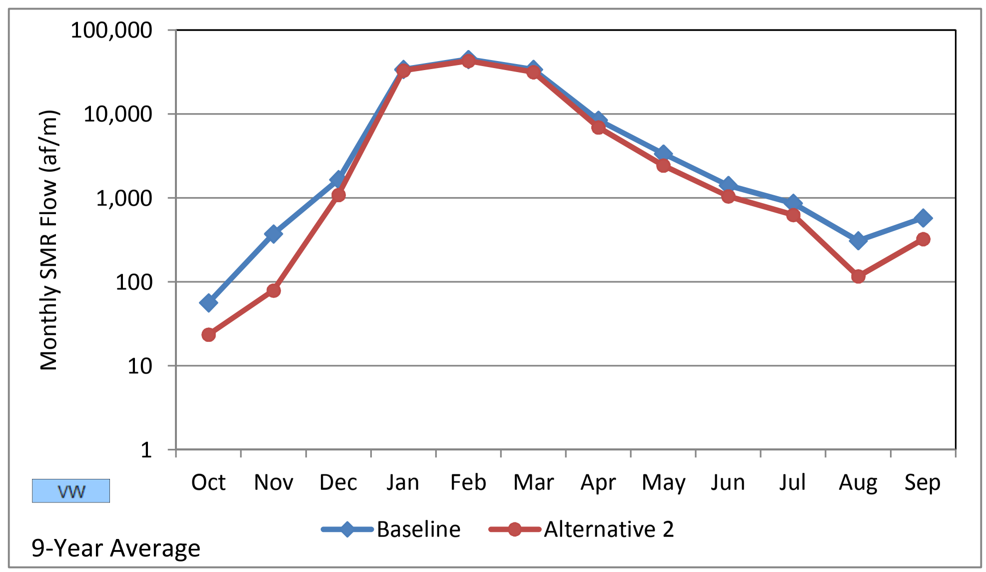
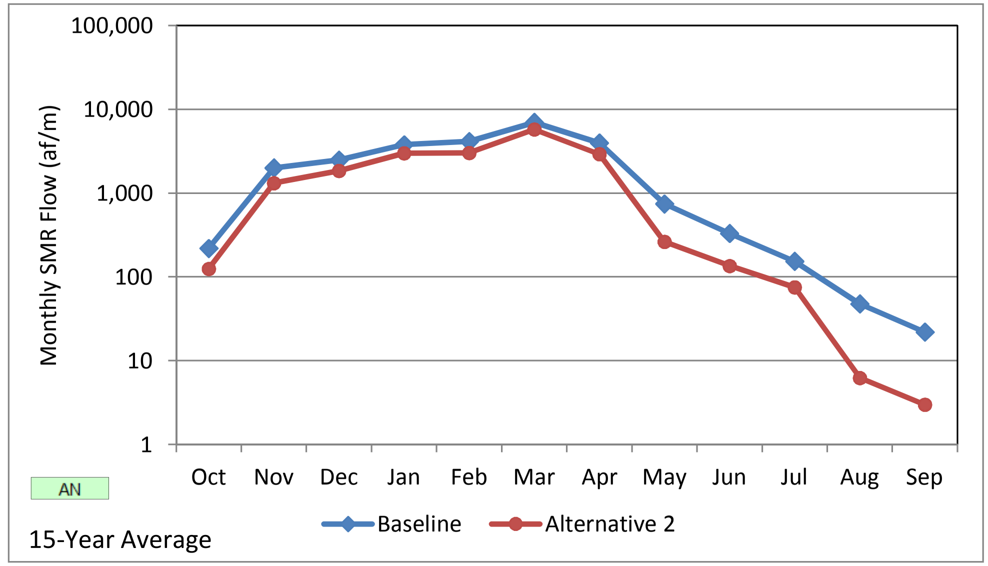


Table B-3. Baseline and Alternative 2 Comparison of Monthly SMR Flow at Lower Ysidora Narrows (cont.)

AN Month	Baseline af/m	Alternative 2 af/m	Change in SMR Flow af/m	Change in SMR Flow %
Oct	219	125	-95	-43%
Nov	1,998	1,314	-684	-34%
Dec	2,483	1,839	-644	-26%
Jan	3,781	2,984	-797	-21%
Feb	4,126	3,010	-1,116	-27%
Mar	6,973	5,744	-1,229	-18%
Apr	3,961	2,919	-1,042	-26%
May	744	262	-482	-65%
Jun	329	135	-195	-59%
Jul	154	75	-78	-51%
Aug	48	6	-41	-87%
Sep	22	3	-19	-86%



BN Month	Baseline af/m	Alternative 2 af/m	Change in SMR Flow af/m	Change in SMR Flow %
Oct	3	3	0	-13%
Nov	306	69	-237	-78%
Dec	368	164	-203	-55%
Jan	690	523	-167	-24%
Feb	923	511	-412	-45%
Mar	992	518	-474	-48%
Apr	325	140	-185	-57%
May	103	41	-62	-60%
Jun	17	22	5	32%
Jul	4	4	-1	-13%
Aug	3	2	0	-5%
Sep	2	2	0	-5%

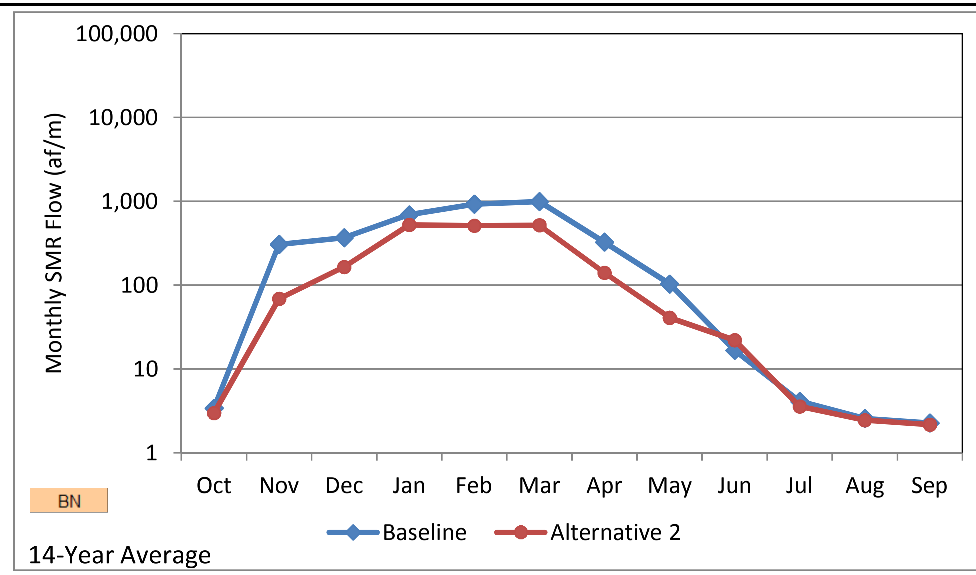
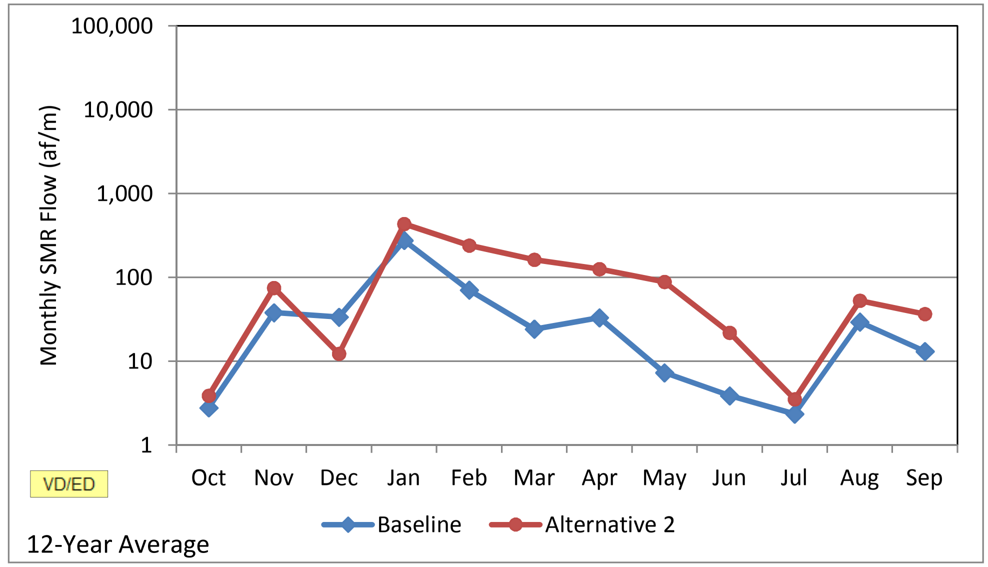


Table B-3. Baseline and Alternative 2 Comparison of Monthly SMR Flow at Lower Ysidora Narrows (cont.)

VD/ED	Baseline	Alternative 2	Change in SMR Flow	
Month	af/m	af/m	af/m	%
Oct	3	4	1	40%
Nov	38	75	37	97%
Dec	34	12	-21	-63%
Jan	275	433	158	57%
Feb	70	240	169	240%
Mar	24	162	138	573%
Apr	33	125	92	280%
May	7	88	81	1112%
Jun	4	22	18	464%
Jul	2	4	1	50%
Aug	29	53	23	80%
Sep	13	37	23	179%



Attachment 1

Baseline Run: Lower Santa Margarita River Surface and Groundwater Model

Draft: for negotiation purposes

TABLE 1 BASELINE RUN; using TM 1.1 Streamflow
LOWER SANTA MARGARITA RIVER GROUNDWATER MODEL

Hydrologic Condition

HC	Cnt	Oct to Apr Strflw
VW	9	Very Wet > 58,032
AN	15	Above Normal > 15,957
BN	14	Below Normal < 15,957
VD	5	Very Dry < 5,781
ED	7	Extremely Dry (2nd+ VD)

8,400 AFY 50-Year Average Annual Production

Model Year	HC	Oct-Apr HC descrip	Groundwater Production * UY Total af/WY	CH Total af/WY	LY Total af/WY	LSMR Total af/WY	CWRMA Emergency Water af/WY
1	VW	Very Wet	3,520	5,280	-	8,800	-
2	BN	Below Normal	4,016	4,784	-	8,800	-
3	BN	Below Normal	4,488	4,312	-	8,800	-
4	VD	Very Dry	4,258	4,091	-	8,349	-
5	ED	Extremely Dry	3,626	3,483	-	7,109	603
6	ED	Extremely Dry	3,231	3,105	-	6,336	400
7	AN	Above Normal	3,379	4,219	-	7,598	-
8	VD	Very Dry	3,786	4,564	-	8,349	-
9	ED	Extremely Dry	3,626	3,483	-	7,109	600
10	ED	Extremely Dry	3,231	3,105	-	6,336	2,055
11	BN	Below Normal	3,875	3,723	-	7,598	591
12	VD	Very Dry	4,258	4,091	-	8,349	-
13	ED	Extremely Dry	3,626	3,483	-	7,109	-
14	ED	Extremely Dry	3,231	3,105	-	6,336	-
15	AN	Above Normal	3,379	4,219	-	7,598	-
16	AN	Above Normal	3,520	5,280	-	8,800	-
17	BN	Below Normal	4,016	4,784	-	8,800	-
18	VW	Very Wet	3,992	4,808	-	8,800	-
19	BN	Below Normal	4,016	4,784	-	8,800	-
20	BN	Below Normal	4,488	4,312	-	8,800	-
21	VD	Very Dry	4,258	4,091	-	8,349	-
22	BN	Below Normal	4,269	4,102	-	8,371	-
23	BN	Below Normal	4,488	4,312	-	8,800	-
24	BN	Below Normal	4,488	4,312	-	8,800	-
25	VD	Very Dry	4,258	4,091	-	8,349	-
26	ED	Extremely Dry	3,626	3,483	-	7,109	-
27	VW	Very Wet	3,379	4,219	-	7,598	-
28	AN	Above Normal	3,520	5,280	-	8,800	-
29	VW	Very Wet	3,520	5,280	-	8,800	-
30	AN	Above Normal	3,520	5,280	-	8,800	-
31	AN	Above Normal	3,520	5,280	-	8,800	-
32	VW	Very Wet	3,520	5,280	-	8,800	-
33	AN	Above Normal	3,520	5,280	-	8,800	-
34	AN	Above Normal	3,520	5,280	-	8,800	-
35	AN	Above Normal	3,520	5,280	-	8,800	-
36	BN	Below Normal	4,016	4,784	-	8,800	-
37	AN	Above Normal	3,992	4,808	-	8,800	-
38	BN	Below Normal	4,016	4,784	-	8,800	-
39	BN	Below Normal	4,488	4,312	-	8,800	-
40	VW	Very Wet	3,992	4,808	-	8,800	-
41	AN	Above Normal	3,520	5,280	-	8,800	-
42	VW	Very Wet	3,520	5,280	-	8,800	-
43	AN	Above Normal	3,520	5,280	-	8,800	-
44	VW	Very Wet	3,520	5,280	-	8,800	-
45	AN	Above Normal	3,520	5,280	-	8,800	-
46	AN	Above Normal	3,520	5,280	-	8,800	-
47	VW	Very Wet	3,520	5,280	-	8,800	-
48	BN	Below Normal	4,016	4,784	-	8,800	-
49	BN	Below Normal	4,488	4,312	-	8,800	-
50	AN	Above Normal	3,992	4,808	-	8,800	-
		Min	3,231	3,105	-	6,336	-
		Max	4,488	5,280	-	8,800	2,055
		Median	3,626	4,784	-	8,800	-
		Average	3,803	4,564	-	8,367	85

* *Note: groundwater pumping limited by vested water rights.*

Draft: for negotiation purposes

TABLE 1 BASELINE RUN; using TM 1.1 Streamflow
LOWER SANTA MARGARITA RIVER GROUNDWATER MODEL

Average Annual Pumping

	Yearly Count	UY Total af/WY	CH Total af/WY	LY Total af/WY	LSMR Total af/WY	CWRMA Emergency Water af/WY
VW	9	3,609	5,057	-	8,666	-
AN	15	3,564	5,075	-	8,640	-
BN	14	4,226	4,457	-	8,683	42
VD	5	4,164	4,186	-	8,349	-
ED	7	3,457	3,321	-	6,778	523

Average Monthly Pumping

%	Month	UY Total af/m	CH Total af/m	LY Total af/m	LSMR Total af/m	CWRMA Emergency Water af/m
8.3%	Oct	316	379	-	695	16
7.1%	Nov	270	324	-	593	20
5.9%	Dec	224	269	-	493	20
6.2%	Jan	236	283	-	519	2
5.6%	Feb	212	255	-	467	2
7.8%	Mar	296	355	-	651	2
7.9%	Apr	302	362	-	664	2
8.6%	May	328	393	-	721	4
10.0%	Jun	381	457	-	839	4
11.4%	Jul	434	521	-	956	4
10.9%	Aug	416	500	-	916	4
10.2%	Sep	388	465	-	853	4
100%	Avg Anl	3,803	4,564	-	8,367	85

TABLE 2 BASELINE Run (using TM 1.1 Streamflow) Pumping Summaries

	Subbasin	Building #	State ID	# mos Q	% of 600 mos	% of Subbasin	80% Utilization af/m	Potential 100% Yield gpm
1	UY	2673	10/4-7A2	600	100%	21%	110	1,000
2	UY	26072	10/4-7A3	600	100%	21%	110	1,000
3	UY	2602	10/4-7R2	600	100%	21%	110	1,000
4	UY	26018	10/4-18B1	600	100%	19%	99	900
5	UY	26071	10/4-7H3	600	100%	17%	88	800
6	CH	23093	10/4-18E3	600	100%	20%	121	1,100
7	CH	23073	10/4-18M5	600	100%	21%	132	1,200
8	CH	23063	10/5-13R2	600	100%	20%	121	1,100
9	CH	330925	10/5-23G4	600	100%	5%	31	283
10	CH	23001	10/5-23J1	600	100%	22%	137	1,250
11	CH	330924	10/5-23K2	600	100%	7%	41	375
12	CH	330923	10/5-23K3	600	100%	5%	30	275
13	LY	2200	10/5-26F1				181	1,650
14	LY	2D3	11/5-2D3				55	500
15	LY	2D4	11/5-2D4				55	500

UY/CH Well Capacity: 1,127 af/m 10,283 gpm

% Pumping in Subbasin for Camp Supply

May through April

		DRY <4			WET >4		
		51%	49%	0%	40%	60%	0%
mo	Anl %	UY	CH	LY	UY	CH	LY
MAY	8.6%	4.4%	4.2%	-	3.4%	5.2%	-
JUN	10.0%	5.1%	4.9%	-	4.0%	6.0%	-
JUL	11.4%	5.8%	5.6%	-	4.6%	6.9%	-
AUG	10.9%	5.6%	5.4%	-	4.4%	6.6%	-
SEP	10.2%	5.2%	5.0%	-	4.1%	6.1%	-
OCT	8.3%	4.2%	4.1%	-	3.3%	5.0%	-
NOV	7.1%	3.6%	3.5%	-	2.8%	4.3%	-
DEC	5.9%	3.0%	2.9%	-	2.4%	3.5%	-
JAN	6.2%	3.2%	3.0%	-	2.5%	3.7%	-
FEB	5.6%	2.8%	2.7%	-	2.2%	3.4%	-
MAR	7.8%	4.0%	3.8%	-	3.1%	4.7%	-
APR	7.9%	4.0%	3.9%	-	3.2%	4.8%	-

Max Pumping in Subbasin adding wells as needed

	UY	CH	LY	Total (afm)
# exst wells	5	7	-	
af/m (80%)	515	612	-	1,127
avg af/well	103	87	-	
% of total	46%	54%		

TABLE 3 Baseline Run (TM 1.1 strflw) Annual Pumping by Well
Annual Well Production (AF/Y)

	Building #:	2673	26072	2602	26018	26071
	Max Annual Pumping	955	955	955	859	764
	Potential w/ 80% Util	1,315	1,315	1,315	1,184	1,052
	Potential Well Yield (gpm)	1,000	1,000	1,000	900	800
		UY	UY-VOC	UY	UY	UY
Settlement		10/4-7A2	10/4-7A3	10/4-7R2	10/4-18B1	10/4-7H3
Year	HC	(af/y)	(af/y)	(af/y)	(af/y)	(af/y)
1	VW	749	749	749	674	599
2	BN	854	854	854	769	684
3	AN	955	955	955	859	764
4	VD	906	906	906	815	725
5	ED	771	771	771	694	617
6	ED	688	688	688	619	550
7	AN	719	719	719	647	575
8	VD	806	806	806	725	644
9	ED	771	771	771	694	617
10	ED	688	688	688	619	550
11	BN	824	824	824	742	660
12	VD	906	906	906	815	725
13	ED	771	771	771	694	617
14	ED	688	688	688	619	550
15	AN	719	719	719	647	575
16	AN	749	749	749	674	599
17	BN	854	854	854	769	684
18	VW	849	849	849	764	680
19	BN	854	854	854	769	684
20	BN	955	955	955	859	764
21	VD	906	906	906	815	725
22	BN	908	908	908	817	727
23	BN	955	955	955	859	764
24	BN	955	955	955	859	764
25	VD	906	906	906	815	725
26	ED	771	771	771	694	617
27	VW	719	719	719	647	575
28	AN	749	749	749	674	599
29	VW	749	749	749	674	599
30	AN	749	749	749	674	599
31	AN	749	749	749	674	599
32	VW	749	749	749	674	599
33	AN	749	749	749	674	599
34	AN	749	749	749	674	599
35	AN	749	749	749	674	599
36	BN	854	854	854	769	684
37	AN	849	849	849	764	680
38	BN	854	854	854	769	684
39	BN	955	955	955	859	764
40	VW	849	849	849	764	680
41	AN	749	749	749	674	599
42	VW	749	749	749	674	599
43	AN	749	749	749	674	599
44	VW	749	749	749	674	599
45	BN	749	749	749	674	599
46	AN	749	749	749	674	599
47	VW	749	749	749	674	599
48	BN	854	854	854	769	684
49	BN	955	955	955	859	764
50	AN	849	849	849	764	680
	Min	688	688	688	619	550
	Max	955	955	955	859	764
	Median	771	771	771	694	617
	Average	809	809	809	728	647

	UY	UY-VOC	UY	UY	UY
	10/4-7A2	10/4-7A3	10/4-7R2	10/4-18B1	10/4-7H3
Month	(af/m)	(af/m)	(af/m)	(af/m)	(af/m)
Oct	67	67	67	60	54
Nov	57	57	57	52	46
Dec	48	48	48	43	38
Jan	50	50	50	45	40
Feb	45	45	45	41	36
Mar	63	63	63	57	50
Apr	64	64	64	58	51
May	70	70	70	63	56
Jun	81	81	81	73	65
Jul	92	92	92	83	74
Aug	89	89	89	80	71
Sep	82	82	82	74	66
Annual Total	809	809	809	728	647

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TABLE 3 Baseline Run (TM 1.1 strflw) Annual Pumping by Well (Continued)

	Building #:	23093	23073	23063	330925	23001	330924	330923
	Max Annual Pumping	761	830	761	782	865	519	761
	Potential w/ 80% Util	1,447	1,578	1,447	1,486	1,644	986	1,447
	Potential Well Yield (gpm)	1,100	1,200	1,100	1,130	1,250	750	1,100
Settlement Year	HC	CH 10/4-18E3 (af/y)	CH 10/4-18M5 (af/y)	CH 10/5-13R2 (af/y)	CH 10/5-23G4 (af/y)	CH 10/5-23J1 (af/y)	CH 10/5-23K2R (af/y)	CH 10/5-23K3 (af/y)
1	VW	761	830	761	782	865	519	761
2	BN	690	752	690	709	784	470	690
3	AN	622	678	622	639	706	424	622
4	VD	590	643	590	606	670	402	590
5	ED	502	548	502	516	571	342	502
6	ED	448	488	448	460	509	305	448
7	AN	608	663	608	625	691	415	608
8	VD	658	718	658	676	748	449	658
9	ED	502	548	502	516	571	342	502
10	ED	448	488	448	460	509	305	448
11	BN	537	586	537	551	610	366	537
12	VD	590	643	590	606	670	402	590
13	ED	502	548	502	516	571	342	502
14	ED	448	488	448	460	509	305	448
15	AN	608	663	608	625	691	415	608
16	AN	761	830	761	782	865	519	761
17	BN	690	752	690	709	784	470	690
18	VW	693	756	693	712	788	473	693
19	BN	690	752	690	709	784	470	690
20	BN	622	678	622	639	706	424	622
21	VD	590	643	590	606	670	402	590
22	BN	591	645	591	607	672	403	591
23	BN	622	678	622	639	706	424	622
24	BN	622	678	622	639	706	424	622
25	VD	590	643	590	606	670	402	590
26	ED	502	548	502	516	571	342	502
27	VW	608	663	608	625	691	415	608
28	AN	761	830	761	782	865	519	761
29	VW	761	830	761	782	865	519	761
30	AN	761	830	761	782	865	519	761
31	AN	761	830	761	782	865	519	761
32	VW	761	830	761	782	865	519	761
33	AN	761	830	761	782	865	519	761
34	AN	761	830	761	782	865	519	761
35	AN	761	830	761	782	865	519	761
36	BN	690	752	690	709	784	470	690
37	AN	693	756	693	712	788	473	693
38	BN	690	752	690	709	784	470	690
39	BN	622	678	622	639	706	424	622
40	VW	693	756	693	712	788	473	693
41	AN	761	830	761	782	865	519	761
42	VW	761	830	761	782	865	519	761
43	AN	761	830	761	782	865	519	761
44	VW	761	830	761	782	865	519	761
45	BN	761	830	761	782	865	519	761
46	AN	761	830	761	782	865	519	761
47	VW	761	830	761	782	865	519	761
48	BN	690	752	690	709	784	470	690
49	BN	622	678	622	639	706	424	622
50	AN	693	756	693	712	788	473	693
	Min	448	488	448	460	509	305	448
	Max	761	830	761	782	865	519	761
	Median	690	752	690	709	784	470	690
	Average	658	718	658	676	748	449	658

Month	CH 10/4-18E3 (af/m)	CH 10/4-18M5 (af/m)	CH 10/5-13R2 (af/m)	CH 10/5-23G4 (af/m)	CH 10/5-23J1 (af/m)	CH 10/5-23K2R (af/m)	CH 10/5-23K3 (af/m)
Oct	55	60	55	56	62	37	55
Nov	47	51	47	48	53	32	47
Dec	39	42	39	40	44	26	39
Jan	41	45	41	42	46	28	41
Feb	37	40	37	38	42	25	37
Mar	51	56	51	53	58	35	51
Apr	52	57	52	54	59	36	52
May	57	62	57	58	64	39	57
Jun	66	72	66	68	75	45	66
Jul	75	82	75	77	85	51	75
Aug	72	79	72	74	82	49	72
Sep	67	73	67	69	76	46	67
Annual Total	658	718	658	676	748	449	658

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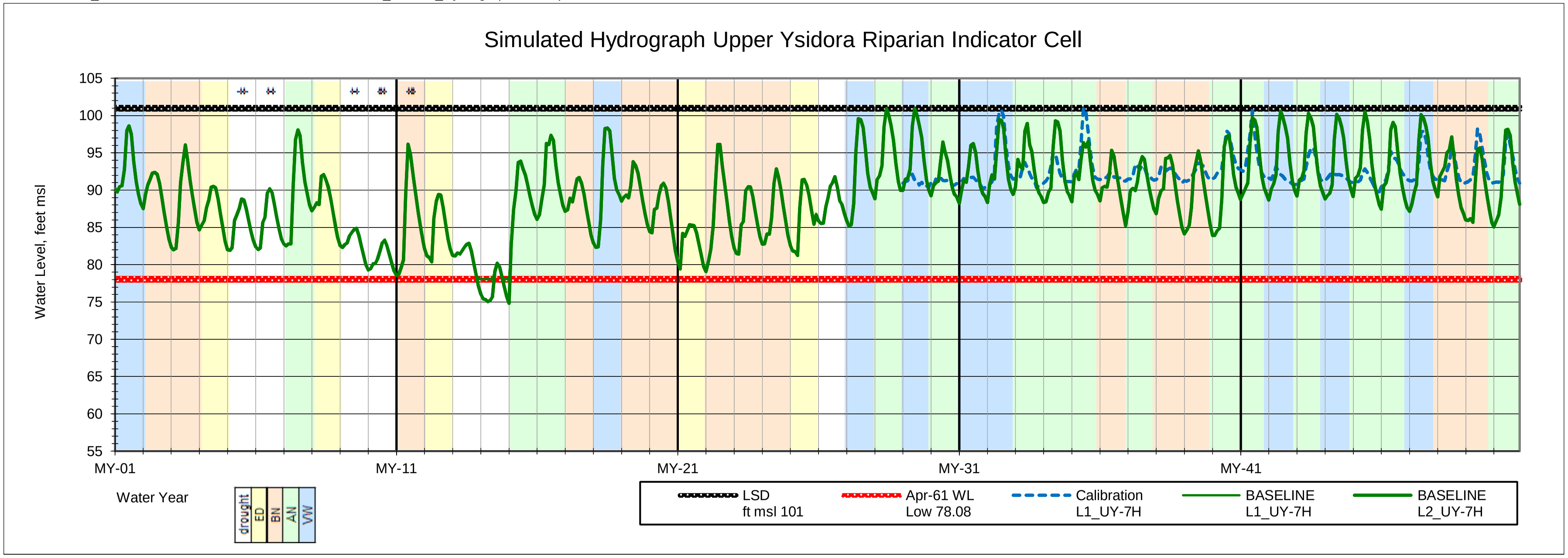
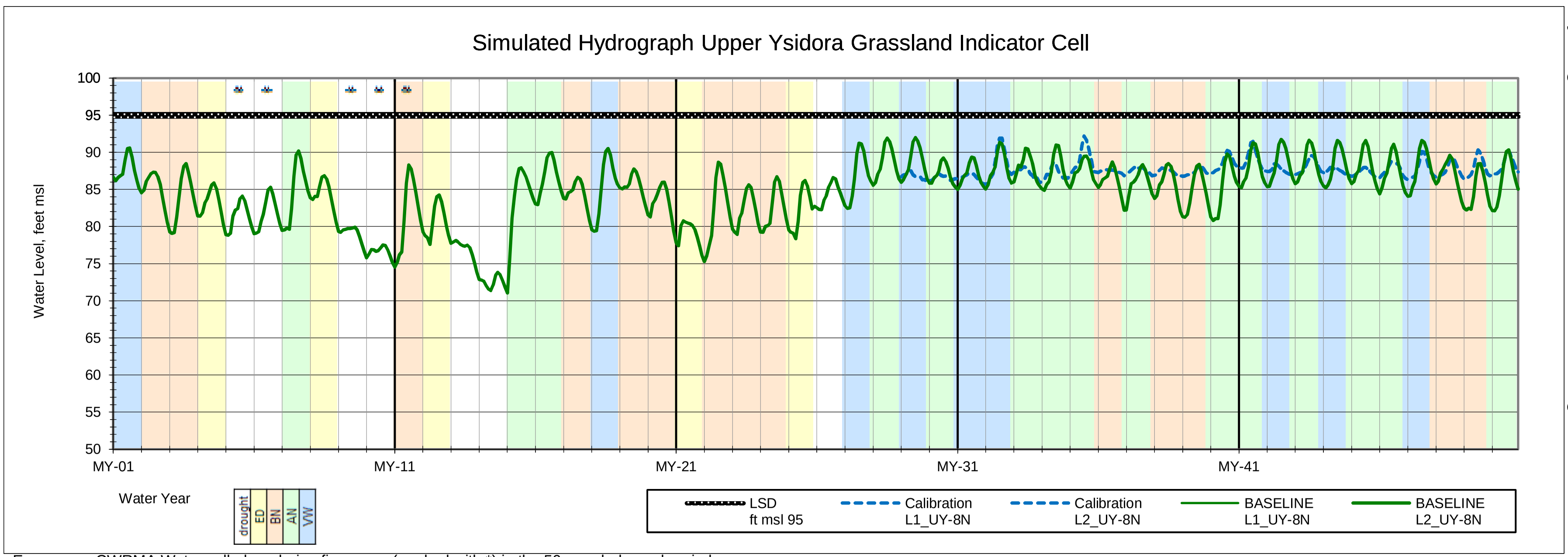
FIGURE 1 Baseline (TM1.1 strflw) and Calibration Hydrographs
2-Party Negotiation Model Run; 8,400 Average Annual AFY





Emergency CWRMA Water called on during five years (marked with *) in the 50-year balanced period
Layer 1 (L1) and Layer 2 (L2) simulated groundwater levels are at similar elevations and the graph lines are printed on top of each other.

FIGURE 2 Baseline (TM1.1 strflw) and Calibration Hydrographs
2-Party Negotiation Model Run; 8,400 Average Annual AFY

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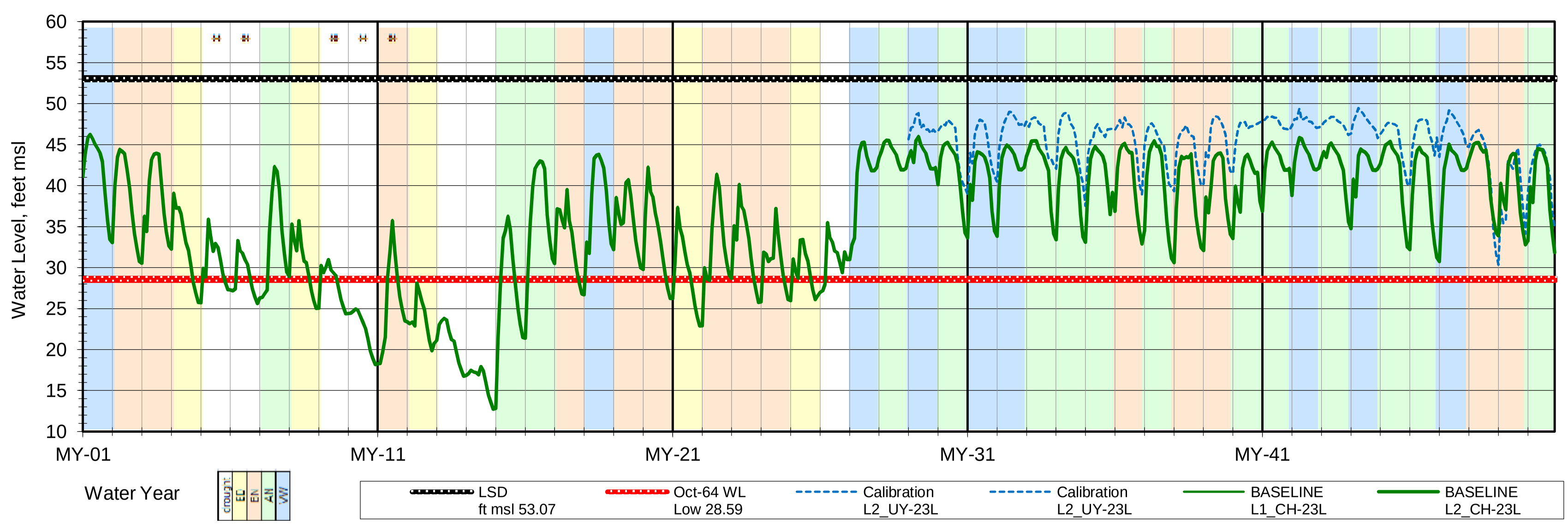
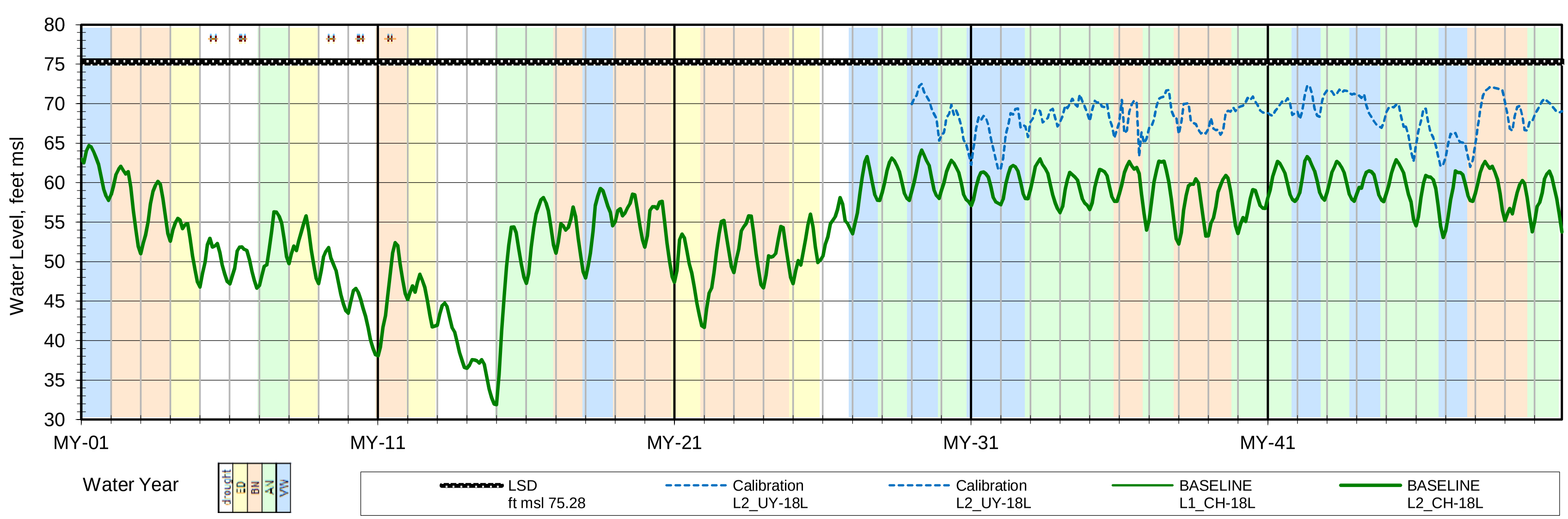
Simulated Hydrograph Chappo Riparian Indicator Cell



Simulated Hydrograph Chappo Grassland Indicator Cell



Emergency CWRMA Water called on during five years (marked with *) in the 50-year balanced period.

Layer 1 (L1) and Layer 2 (L2) simulated groundwater levels are at similar elevations and the graph lines are printed on top of each other.

FIGURE 3 Baseline (TM1.1 strflw) and Calibration Hydrographs
2-Party Negotiation Model Run; 8,400 Average Annual AFY

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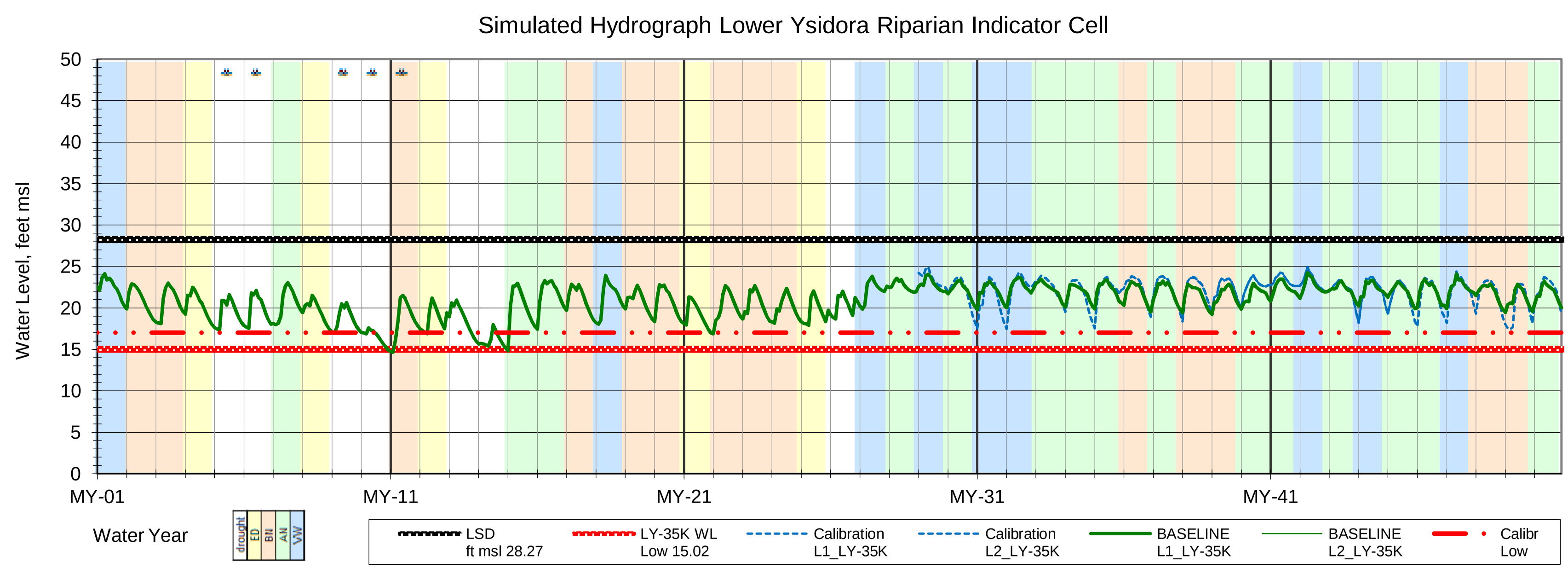

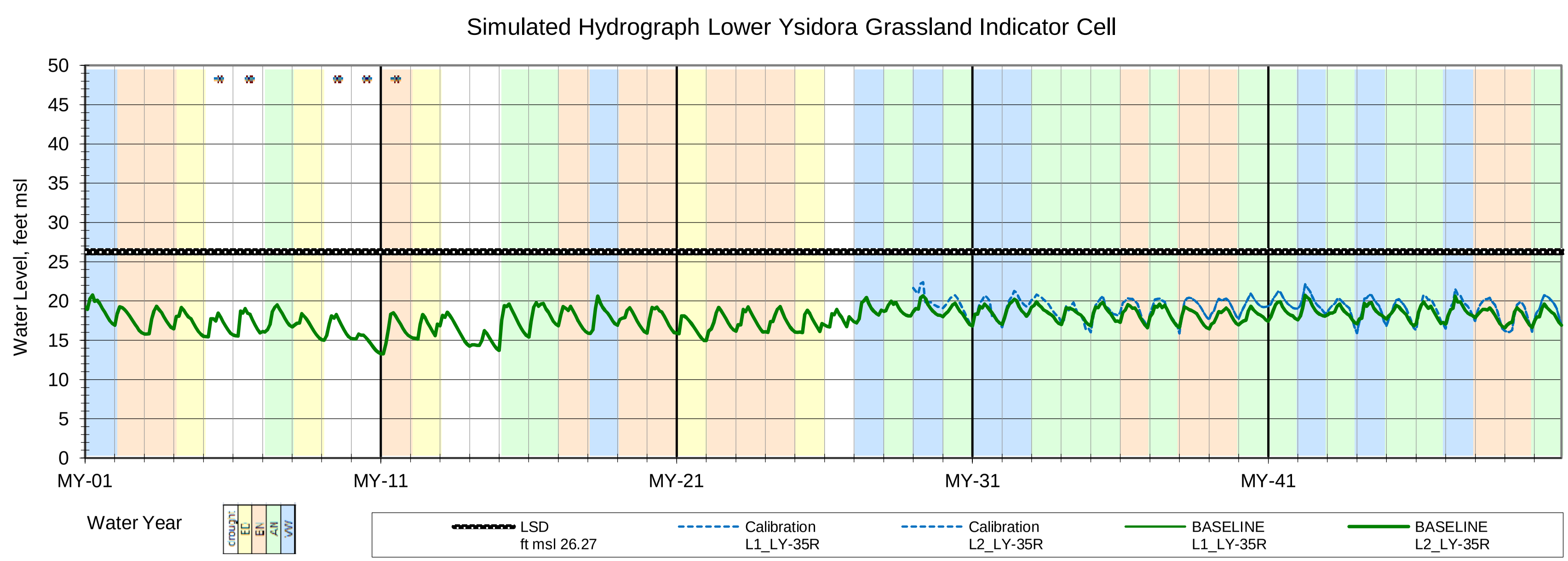

Emergency CWRMA Water called on during five years (marked with *) in the 50-year balanced period.
Layer 1 (L1) and Layer 2 (L2) simulated groundwater levels are at similar elevations and the graph lines are printed on top of each other.

FIGURE 4 Baseline and Calibration Streamflow
2-Party Negotiation Model Run; Baseline 8,400 Average Annual AFY

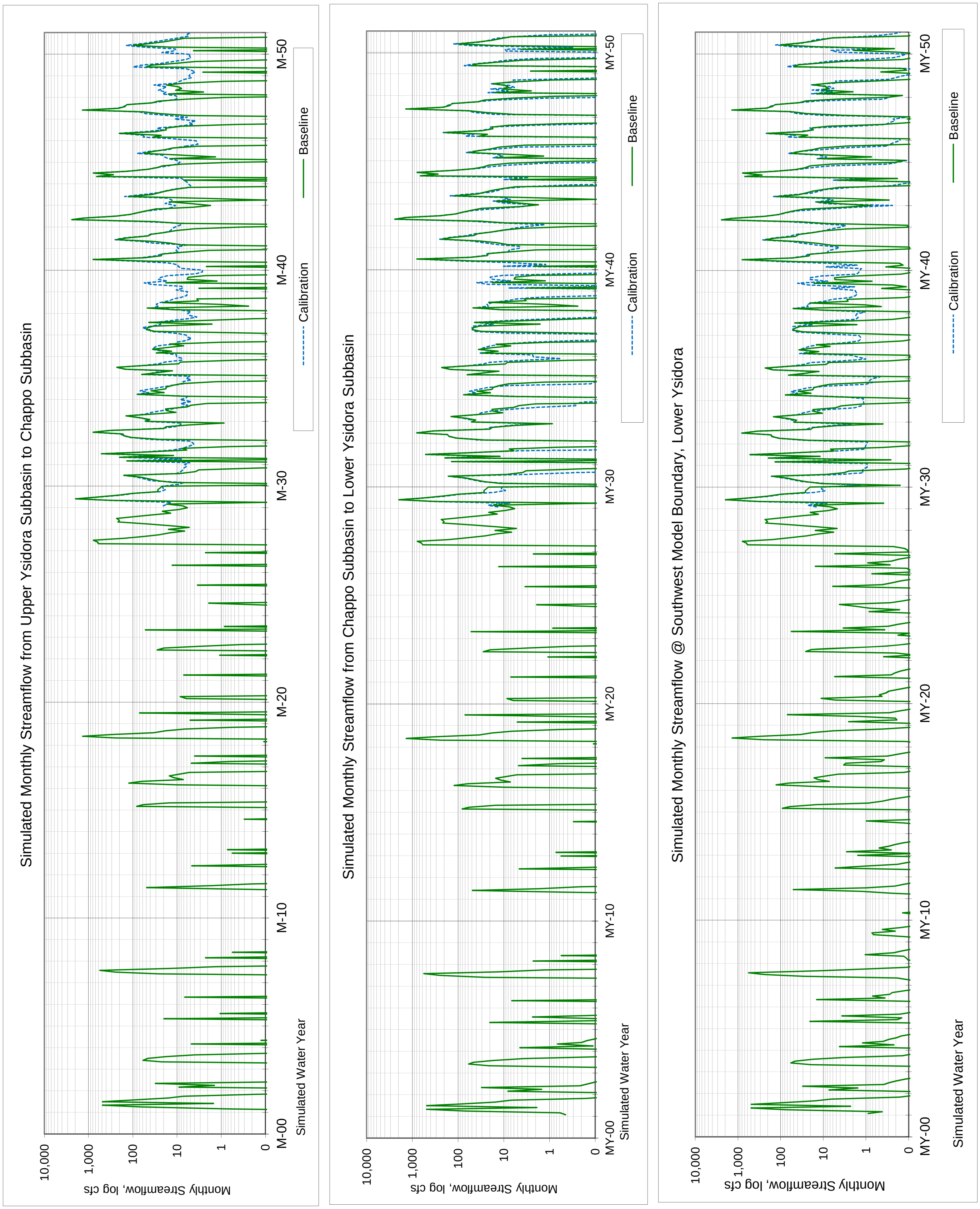

TABLE 4 2-Party Negotiation Baseline Model Run; 8,400 Average Annual AFY

Average Hydrologic Condition Water Budget (af/y)

% Time Exceedence	> 76%	76% to 50%	50% to 19%	< 19%
# Years	12	14	15	9
	Very & Extrm Dry	Below Normal	Above Normal	Very Wet
Inflow:				
Santa Margarita River Inflow	5,500	11,600	32,800	132,900
Subsurface Underflow	600	600	600	600
Lake O'Neill Spill and Release	700	1,400	1,700	2,100
Fallbrook Creek	100	400	1,400	3,800
Title 22 Water	0	0	0	0
Minor Tributary Drainages	1,600	1,500	2,400	4,900
Areal Precipitation	500	400	700	1,600
Total Inflow:	9,000	15,900	39,600	145,900
Outflow:				
Santa Margarita River Outflow	500	3,800	24,800	130,000
Subsurface Underflow	0	100	100	100
Groundwater Pumping	7,400	8,700	8,600	8,700
Evapotranspiration	1,300	2,400	3,000	3,300
Diversions to Lake O'Neill	900	1,800	2,300	2,700
Total Outflow:	10,100	16,800	38,800	144,800
Net Simulated Change of Groundwater in Storage:	-1,100	-700	700	1,100
	-	(200)	100	-

Median Hydrologic Condition Water Budget (af/y)

% Time Exceedence	> 76%	76% to 50%	50% to 19%	< 19%
# Years	12	14	15	9
	Very & Extrm Dry	Below Normal	Above Normal	Very Wet
Inflow:				
Santa Margarita River Inflow	5,800	12,300	26,700	121,300
Subsurface Underflow	600	600	600	600
Lake O'Neill Spill and Release	800	1,300	2,000	2,300
Fallbrook Creek	100	300	1,100	3,500
Title 22 Water	0	0	0	0
Minor Tributary Drainages	1,500	1,400	2,500	4,700
Areal Precipitation	400	300	500	1,600
Outflow:				
Santa Margarita River Outflow	400	3,400	19,600	117,300
Subsurface Underflow	0	100	100	100
Groundwater Pumping	7,100	8,800	8,800	8,800
Evapotranspiration	1,300	2,400	3,100	3,300
Diversions to Lake O'Neill	900	1,700	2,500	2,700
Net Simulated Change of Groundwater in Storage:	-1,400	-1,200	300	900

Average Subbasin Water Budget (af/y)

	Upper Ysidora	Chappo	Lower Ysidora	SMR Basin	
Inflow:					
Santa Margarita River Inflow	38,300	34,800	31,400	38,300	85%
Subsurface Underflow *	600	1,200	400	600	1%
Lake O'Neill Spill and Release	1,500	-	-	1,500	3%
Fallbrook Creek	1,200	-	-	1,200	3%
Title 22 Water	-	-	0	0	0%
Minor Tributary Drainages	600	1,100	700	2,400	5%
Areal Precipitation	200	300	200	800	2%
Total Inflow:	42,400	37,400	32,700	44,800	
Outflow:					
Santa Margarita River Outflow	34,800	31,400	32,000	32,000	71%
Subsurface Underflow *	1,200	400	100	100	0%
Groundwater Pumping	3,800	4,600	0	8,400	19%
Evapotranspiration *	700	1,100	700	2,500	6%
Diversions to Lake O'Neill	1,900	-	-	1,900	4%
Total Outflow:	42,400	37,500	32,800	44,900	
Net Simulated Change of Groundwater in Storage: *	0	0	0	-100	
	-	(100)	(100)	-	

Note: * Subbasin Averages are based on the last rate of the stress period
Values are rounded to the nearest 100 acre-feet, which may result in a summation rounding error

Median Subbasin Water Budget (af/y)

	Upper Ysidora	Chappo	Lower Ysidora	SMR Basin
Inflow:				
Santa Margarita River Inflow	16,700	11,400	7,900	16,700
Subsurface Underflow *	600	1,100	400	600
Lake O'Neill Spill and Release	1,500	-	-	1,500
Fallbrook Creek	600	-	-	600
Title 22 Water	-	-	-	0
Minor Tributary Drainages	600	900	600	2,100
Areal Precipitation	200	200	200	500
Outflow:				
Santa Margarita River Outflow	11,400	7,900	7,800	7,800
Subsurface Underflow *	1,100	400	100	100
Groundwater Pumping	3,600	4,800	0	8,800
Evapotranspiration *	800	1,200	800	2,700
Diversions to Lake O'Neill	2,000	-	-	2,000
Net Simulated Change of Groundwater in Storage: *	-100	-200	0	0

Note: The sum of median values does not reflect the change of groundwater in storage.
Median values are not cummulative.
* Subbasin Medians are based on the last rate of the stress period
Values are rounded to the nearest 100 acre-feet

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TABLE 5 Baseline Run Annual Water Budget Summary

Lower Santa Margarita River Groundwater Model | Baseline w TM1.1strflw 092012

Modflow Volumetric Budget Output and Streamflow | 9/21/12

Annual Surface Water Budget

							GAGE					LSMR
MY		SMR Flow In	LON Diversion	Ponds Diversion	Release & Spill	Str Gain+ / Loss-	SMR @ UY->CH	Str Gain+ / Loss-	SMR @ CH->LY	Str Gain+ / Loss-	SMR Flow Out	Str Gain+ / Loss-
1	VW	72,916	-2754	-6575	1,399	-2,030	70,886	-1,500	69,386	1,655	71,041	-1,875
2	BN	9,851	-1646	-3545	1,552	-3,969	5,882	-3,374	2,508	-26	2,482	-7,369
3	AN	19,081	-1468	-5437	1,058	-6,424	12,657	-3,957	8,701	-228	8,472	-10,609
4	VD	6,075	-1440	-2315	1,120	-5,014	1,061	-773	288	125	413	-5,662
5	ED	6,672	-908	-1410	971	-4,415	2,256	-979	1,277	270	1,547	-5,124
6	ED	4,277	-710	-1593	387	-4,214	63	348	411	596	1,007	-3,270
7	AN	59,305	-1596	-6986	383	-5,915	53,390	-2,832	50,558	479	51,037	-8,267
8	VD	6,521	-1361	-2683	1,217	-4,409	2,112	-1,946	166	-47	119	-6,402
9	ED	4,099	-1013	-1048	1,016	-3,401	697	-694	3	150	152	-3,946
10	ED	4,629	-848	-1609	519	-4,534	94	-94	-	33	33	-4,595
11	BN	11,484	-902	-5045	501	-6,308	5,176	-2,340	2,836	157	2,993	-8,491
12	VD	5,622	-580	-2104	434	-5,012	610	-318	292	208	499	-5,123
13	ED	3,321	-573	-1160	285	-3,321	-	43	43	226	269	-3,052
14	ED	3,589	-300	-1583	234	-3,589	-	18	18	71	89	-3,500
15	AN	20,522	-2438	-5035	551	-8,303	12,220	-2,957	9,262	897	10,159	-10,363
16	AN	22,816	-1985	-6917	1,558	-3,995	18,821	-4,087	14,734	732	15,466	-7,350
17	BN	6,199	-1426	-2565	1,196	-4,187	2,012	-1,444	568	472	1,040	-5,159
18	VW	117,031	-2248	-7919	1,642	-2,455	114,576	-2,849	111,726	1,314	113,040	-3,990
19	BN	12,744	-2305	-3811	1,680	-5,063	7,680	-3,051	4,629	-51	4,578	-8,166
20	BN	6,645	-1257	-2416	1,190	-4,280	2,364	-1,476	889	225	1,114	-5,531
21	VD	7,214	-1614	-1401	1,009	-5,407	1,807	-1,374	433	-40	393	-6,821
22	BN	13,310	-1576	-6098	1,206	-6,514	6,796	-3,761	3,035	-201	2,835	-10,475
23	BN	9,953	-1385	-2536	1,037	-5,504	4,449	-1,223	3,226	512	3,738	-6,215
24	BN	7,708	-1613	-3881	1,115	-5,725	1,984	-1,861	123	388	511	-7,197
25	VD	7,560	-797	-3217	1,010	-5,607	1,953	-1,754	199	268	467	-7,093
26	ED	6,746	-1217	-2413	576	-4,661	2,085	-1,157	928	476	1,404	-5,342
27	VW	138,265	-2906	-8290	2,063	-220	138,046	-2,391	135,654	1,827	137,481	-784
28	AN	61,252	-2721	-11307	2,352	-2,734	58,519	-4,627	53,891	323	54,215	-7,038
29	VW	195,725	-2739	-11207	2,413	1,176	196,901	-2,302	194,599	1,704	196,304	578
30	AN	27,995	-2749	-5856	2,126	-3,796	24,199	-4,619	19,580	-27	19,553	-8,442
31	AN	61,581	-2697	-5904	2,204	-1,738	59,842	-4,022	55,820	458	56,278	-5,302
32	VW	105,365	-2720	-8572	2,385	268	105,632	-4,111	101,521	736	102,258	-3,107
33	AN	28,766	-2714	-8555	2,173	-3,529	25,238	-4,155	21,082	191	21,273	-7,493
34	AN	21,480	-2702	-7839	2,094	-4,538	16,942	-5,111	11,831	-232	11,599	-9,881
35	AN	38,995	-2197	-7066	1,812	-1,512	37,483	-4,444	33,039	445	33,483	-5,512
36	BN	13,900	-2115	-4177	1,524	-3,343	10,557	-3,405	7,152	3	7,155	-6,745
37	AN	18,856	-1744	-5158	1,293	-2,851	16,004	-3,371	12,633	413	13,047	-5,809
38	BN	12,534	-1767	-4681	1,311	-3,453	9,080	-3,746	5,334	82	5,416	-7,118
39	BN	12,024	-2156	-5634	1,717	-5,858	6,166	-4,086	2,080	-277	1,803	-10,221
40	VW	66,151	-2779	-7721	2,318	-3,995	62,155	-4,729	57,427	61	57,488	-8,663
41	AN	40,738	-2711	-8745	2,263	-3,800	36,938	-5,082	31,855	86	31,941	-8,797
42	VW	256,836	-2723	-10492	2,325	1,608	258,444	-2,932	255,512	994	256,506	-330
43	AN	23,081	-2752	-10335	2,268	-4,354	18,727	-4,644	14,084	24	14,107	-8,974
44	VW	122,236	-2675	-9801	2,233	-930	121,305	-3,624	117,681	1,001	118,682	-3,553
45	BN	17,853	-2748	-9355	2,043	-4,544	13,309	-4,337	8,972	-177	8,795	-9,058
46	AN	26,690	-1995	-7991	1,461	-3,483	23,208	-3,232	19,975	496	20,472	-6,218
47	VW	121,259	-2716	-9884	2,559	-781	120,477	-4,230	116,247	1,080	117,327	-3,932
48	BN	13,194	-2744	-7175	2,078	-4,938	8,257	-4,024	4,233	-151	4,082	-9,112
49	BN	15,504	-1815	-5717	1,199	-5,757	9,746	-3,440	6,306	-229	6,077	-9,427
50	AN	20,633	-2478	-7882	2,028	-5,489	15,144	-4,015	11,129	9	11,139	-9,495
	avg	38,336	-1,920	-5,613	1,462	**-3,857**	34,479	**-2,801**	31,678	**350**	32,028	**-6,308**
	med	16,678	-1,990	-5,676	1,430	-4,200	11,388	-3,142	7,926	216	7,814	-6,574
AVERAGES												
VD/ED	12	5,527	-947	-1,878	731	-4,465	1,062	-723	338	195	533	-4,994
BN	14	11,636	-1,818	-4,760	1,382	-4,960	6,676	-2,969	3,706	52	3,758	-7,877
AN	15	32,786	-2,330	-7,401	1,708	-4,164	28,622	-4,077	24,545	271	24,816	-7,970
VW	9	132,865	-2,696	-8,940	2,149	-818	132,047	-3,185	128,862	1,152	130,014	-2,851
	50											
MEDIANS												
VD/ED	12	5,849	-878	-1,601	774	-4,475	879	-734	244	179	403	-5,123
BN	14	12,279	-1,706	-4,429	1,258	-5,001	6,481	-3,389	3,131	(12)	3,366	-7,767
AN	15	26,690	-2,478	-7,066	2,028	-3,800	23,208	-4,087	19,580	323	19,553	-8,267
VW	9	121,259	-2,723	-8,572	2,318	-781	120,477	-2,932	116,247	1,080	117,327	-3,107
	50											

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TABLE 5 Baseline Run Annual Water Budget Summary (continued)

Lower Santa Margarita River Groundwater Model

Modflow Volumetric Budget Output

Annual Groundwater Budget Model Run: Baseline w TM1.1strflw 092012

	INFLOW:					OUTFLOW:					
MY	Storage	Recharge	Stream Leakance	GHB	TOTAL GW IN	Storage	Wells	ET	Stream Leakance	GHB	TOTAL GW OUT
1	5,164	7,622	6,809	603	20,199	3,165	8,800	3,366	4,819	67	20,217
2	5,332	3,729	5,833	604	15,498	2,899	8,800	2,526	1,236	50	15,511
3	5,481	5,637	8,434	609	20,160	6,492	8,800	2,519	2,315	48	20,174
4	5,757	2,598	4,810	608	13,773	3,329	8,349	1,712	343	51	13,784
5	4,657	1,708	6,361	618	13,344	4,682	7,107	1,440	79	45	13,353
6	4,364	2,323	4,741	615	12,043	4,075	6,336	1,400	197	52	12,059
7	4,752	7,578	8,111	606	21,047	7,452	7,599	2,247	3,702	56	21,056
8	5,976	2,831	4,814	607	14,227	3,570	8,349	1,637	650	44	14,250
9	3,960	1,398	4,793	619	10,770	2,404	7,110	1,149	77	47	10,786
10	3,517	1,724	3,092	625	8,959	1,756	6,336	814	37	31	8,974
11	5,822	5,500	7,893	612	19,827	8,843	7,596	1,452	1,906	42	19,839
12	5,262	2,376	5,769	621	14,028	4,357	8,349	1,183	110	43	14,042
13	4,679	1,393	3,180	627	9,879	1,687	7,110	944	107	48	9,896
14	3,687	1,905	3,212	650	9,454	2,392	6,336	674	36	34	9,471
15	4,663	6,067	10,615	612	21,957	10,863	7,596	1,703	1,756	53	21,972
16	4,920	7,514	9,718	598	22,750	6,986	8,802	2,668	4,246	57	22,758
17	5,767	2,874	5,891	607	15,138	3,669	8,799	1,988	640	53	15,149
18	4,885	9,098	9,513	599	24,096	7,753	8,799	2,713	4,789	59	24,114
19	5,418	3,992	6,258	603	16,271	3,749	8,799	2,298	1,396	50	16,292
20	6,182	2,780	5,797	610	15,369	4,203	8,799	1,866	461	52	15,383
21	5,682	1,680	5,760	629	13,751	4,059	8,349	1,237	80	44	13,770
22	6,139	6,437	8,354	607	21,537	8,728	8,372	1,947	2,452	50	21,550
23	5,914	2,987	6,798	618	16,316	5,354	8,799	1,758	376	51	16,339
24	5,450	4,318	6,726	607	17,101	5,606	8,799	1,697	957	53	17,112
25	5,083	3,788	7,328	614	16,813	6,224	8,349	1,547	657	51	16,828
26	4,038	2,826	6,520	607	13,991	4,580	7,107	1,765	496	55	14,003
27	3,818	9,490	9,307	598	23,213	6,784	7,599	3,081	5,696	65	23,224
28	3,763	11,685	7,844	591	23,883	3,730	8,799	3,515	7,787	59	23,890
29	3,829	12,229	7,661	589	24,308	3,898	8,790	3,590	7,966	66	24,311
30	3,861	6,072	7,583	599	18,115	2,764	8,815	3,239	3,262	54	18,135
31	3,914	6,329	8,310	598	19,152	3,988	8,792	3,065	3,258	57	19,159
32	3,910	9,307	8,928	593	22,738	4,858	8,792	3,333	5,698	63	22,744
33	4,548	8,751	7,241	597	21,136	3,398	8,815	3,324	5,565	56	21,158
34	4,343	8,056	8,391	599	21,388	4,378	8,792	3,065	5,110	53	21,398
35	3,910	7,477	8,609	597	20,593	4,504	8,792	3,147	4,102	57	20,604
36	5,257	4,421	6,680	602	16,961	3,111	8,815	2,913	2,096	56	16,991
37	4,545	5,553	8,173	602	18,874	4,949	8,792	2,918	2,142	58	18,859
38	5,230	4,920	7,668	604	18,420	4,617	8,792	2,670	2,282	52	18,413
39	5,266	5,808	7,759	606	19,440	5,585	8,815	2,709	2,307	53	19,470
40	3,845	7,920	9,091	608	21,465	5,904	8,792	2,899	3,813	52	21,462
41	3,673	9,086	8,701	599	22,059	4,020	8,792	3,365	5,829	56	22,063
42	4,132	11,361	7,805	590	23,889	4,300	8,815	3,471	7,247	62	23,895
43	4,222	10,491	7,254	595	22,562	3,510	8,792	3,379	6,839	53	22,574
44	3,955	10,468	8,310	592	23,326	4,614	8,792	3,301	6,591	58	23,357
45	5,409	9,504	6,428	597	21,938	3,643	8,815	3,209	6,240	53	21,961
46	5,406	8,379	7,553	597	21,935	5,112	8,792	2,899	5,083	57	21,944
47	3,563	10,836	9,435	590	24,424	5,650	8,792	3,269	6,630	65	24,407
48	4,669	7,346	6,405	597	19,017	2,824	8,815	3,157	4,190	54	19,039
49	5,923	5,854	6,635	606	19,017	5,149	8,792	2,617	2,440	49	19,048
50	5,142	8,219	7,920	599	21,880	5,785	8,792	2,879	4,364	54	21,875
avg	4,774	6,045	7,136	606	18,561	4,719	8,367	2,425	3,009	53	18,573
med	4,715	5,961	7,440	604	19,296	4,368	8,792	2,669	2,378	53	19,314
AVERAGES											
VD/ED	4,722	2,213	5,032	620	12,586	3,593	7,432	1,292	239	45	12,601
BN	5,556	5,034	6,795	606	17,989	4,856	8,687	2,343	2,070	51	18,007
AN	4,476	7,793	8,297	600	21,166	5,195	8,638	2,929	4,357	55	21,175
VW	4,122	9,815	8,540	596	23,073	5,214	8,664	3,225	5,917	62	23,081
MEDIANS											
VD/ED	4,668	2,114	4,812	618	13,548	3,814	7,110	1,319	109	46	13,561
BN	5,434	4,671	6,657	606	17,761	4,410	8,799	2,412	2,001	52	17,763
AN	4,545	7,578	8,173	599	21,388	4,504	8,792	3,065	4,246	56	21,398
VW	3,910	9,490	8,928	593	23,326	4,858	8,792	3,301	5,698	63	23,357

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TABLE 5 Baseline Run Annual Water Budget Summary (continued)				
Lower Santa Margarita River Groundwater Model				
Modflow Volumetric Budget Output				
Annual Groundwater Budget				
MY	NET Storage	NET Str Lknc	In-Out	% bal
1	-2,000	1,990	-18.3	-0.09%
2	-2,433	4,597	-13.0	-0.08%
3	1,011	6,119	-13.5	-0.07%
4	-2,427	4,467	-11.1	-0.08%
5	25	6,283	-8.8	-0.07%
6	-289	4,544	-15.6	-0.13%
7	2,700	4,408	-9.5	-0.05%
8	-2,406	4,164	-22.5	-0.16%
9	-1,556	4,716	-15.5	-0.14%
10	-1,761	3,056	-14.9	-0.17%
11	3,021	5,987	-11.8	-0.06%
12	-904	5,659	-14.8	-0.11%
13	-2,991	3,073	-17.1	-0.17%
14	-1,295	3,176	-17.2	-0.18%
15	6,201	8,860	-14.8	-0.07%
16	2,066	5,471	-8.4	-0.04%
17	-2,098	5,251	-10.9	-0.07%
18	2,867	4,724	-18.2	-0.08%
19	-1,669	4,862	-20.8	-0.13%
20	-1,979	5,335	-14.0	-0.09%
21	-1,623	5,680	-18.6	-0.14%
22	2,590	5,902	-12.4	-0.06%
23	-560	6,421	-22.3	-0.14%
24	156	5,769	-11.2	-0.07%
25	1,141	6,671	-15.6	-0.09%
26	542	6,024	-12.4	-0.09%
27	2,966	3,611	-11.4	-0.05%
28	-32	57	-7.6	-0.03%
29	69	-305	-2.7	-0.01%
30	-1,097	4,320	-20.4	-0.11%
31	73	5,053	-6.9	-0.04%
32	948	3,230	-6.6	-0.03%
33	-1,150	1,676	-21.5	-0.10%
34	34	3,281	-9.7	-0.05%
35	595	4,506	-11.3	-0.05%
36	-2,146	4,584	-30.4	-0.18%
37	404	6,031	14.5	0.08%
38	-613	5,386	7.5	0.04%
39	319	5,452	-29.8	-0.15%
40	2,059	5,278	3.0	0.01%
41	347	2,872	-3.7	-0.02%
42	168	558	-6.5	-0.03%
43	-712	416	-11.7	-0.05%
44	659	1,719	-30.8	-0.13%
45	-1,765	188	-23.4	-0.11%
46	-294	2,470	-9.2	-0.04%
47	2,087	2,805	17.2	0.07%
48	-1,846	2,215	-21.8	-0.11%
49	-774	4,194	-30.5	-0.16%
50	643	3,556	5.5	0.03%
avg	-55	4,127	-12.6	-0.08%
med	-4	4,525	-12.7	-0.07%
AVERAGES				
VD/ED	(1,129)	4,793	(15)	(0)
BN	(700)	4,725	(17)	(0)
AN	719	3,940	(9)	(0)
VW	1,091	2,623	(8)	(0)
MEDIANS				
VD/ED	(1,426)	4,630	(16)	(0)
BN	(1,221)	5,293	(17)	(0)
AN	347	4,320	(10)	(0)
VW	948	2,805	(7)	(0)

TABLE 6 Baseline Run Average Monthly Water Budget Summary

Lower Santa Margarita River Groundwater Model — Baseline w TM1.1strflw 092012

Modflow Volumetric Budget Output and Streamflow — 9/21/12

Atreamflow

Avg AF/M	SMR Flow In	Diversion	Str Gain+ / Loss-	SMR @ UY->CH	Str Gain+ / Loss-	SMR @ CH->LY	Str Gain+ / Loss-	SMR Flow Out	LSMR Str Gain+ / Loss-
Oct	502	292	-320	182	-110	73	5	78	-425
Nov	1,072	491	261	1,333	-545	787	-26	761	-311
Dec	1,833	526	-550	1,283	-178	1,105	49	1,154	-679
Jan	8,239	834	-740	7,499	-123	7,376	138	7,515	-725
Feb	10,610	1,433	-956	9,654	-159	9,495	106	9,601	-1,009
Mar	9,203	1,477	-543	8,660	-255	8,406	93	8,499	-704
Apr	3,354	1,033	-256	3,097	-321	2,777	30	2,807	-547
May	1,387	705	-175	1,212	-342	870	-12	858	-530
Jun	727	505	-72	655	-279	375	-16	359	-368
Jul	494	128	-68	426	-211	215	-11	204	-291
Aug	421	61	-195	226	-143	82	-5	78	-344
Sep	493	49	-241	251	-135	116	-2	114	-379
Avg Monthly	3,195	628	-321	2,873	-233	2,640	29	2,669	-526
Med Monthly	1,230	516	-249	1,248	-195	829	1	810	-477
Avg Total=Anl	38,336	7,533	-3,857	34,479	-2,801	31,678	350	32,028	-6,308

Lower Santa Margarita River Groundwater Model

Modflow Volumetric Budget Output

Groundwater Model

	INFLOW:					OUTFLOW:						OUT-IN	OUT-IN		
Avg AF/M	Storage	Recharge	Stream Leakance	GHB	TOTAL IN	Storage	Wells	ET	Stream Leakance	GHB	TOTAL OUT	NET Storage	NET Str Lknc	In-Out	% bal
Oct	451	31	377	53	912	73	695	129	13	4	914	-379	364	-1.8	-0.19%
Nov	64	459	1,201	51	1,774	1,041	593	99	36	4	1,773	977	1,165	1.4	0.08%
Dec	259	137	665	52	1,112	466	494	90	58	6	1,113	207	607	-0.6	-0.05%
Jan	102	362	909	51	1,423	699	518	107	88	6	1,419	598	821	4.1	0.29%
Feb	72	1,351	717	46	2,186	1,262	468	146	305	6	2,186	1,190	412	-0.3	-0.01%
Mar	97	1,537	665	50	2,350	772	652	220	699	6	2,349	675	-33	1.0	0.04%
Apr	263	1,068	566	49	1,945	275	663	269	733	5	1,945	12	-168	0.3	0.01%
May	425	754	473	50	1,702	69	721	316	593	4	1,703	-355	-120	-1.4	-0.08%
Jun	765	264	403	49	1,481	10	840	311	322	3	1,486	-755	81	-5.6	-0.38%
Jul	890	64	368	51	1,373	2	956	298	119	3	1,378	-888	250	-4.1	-0.30%
Aug	782	10	370	52	1,214	14	916	253	32	3	1,218	-768	338	-3.9	-0.32%
Sep	604	9	424	51	1,088	35	852	187	13	3	1,090	-569	411	-1.6	-0.15%
Avg Monthly	398	504	595	50	1,547	393	697	202	251	4	1,548	-5	344	-1.1	-0.09%
Med Monthly	344	313	519	51	1,452	174	679	204	103	4	1,453	-172	351	-1.0	-0.07%
Avg Total=Anl	4,774	6,045	7,136	606	18,561	4,719	8,367	2,425	3,009	53	18,573	-55	4,127	-12.6	

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Attachment 2

Alternative 1: Lower Santa Margarita River Surface and Groundwater Model

TABLE 1 Run 16b Annual Pumping Summary
LOWER SANTA MARGARITA RIVER GROUNDWATER MODEL

Hydrologic Condition

HC	Cnt	Oct to Apr Strflw
VW	9	Very Wet > 58,032
AN	15	Above Normal > 15,957
BN	14	Below Normal < 15,957
VD	5	Very Dry < 5,781
ED	7	Extremely Dry (2nd+ VD)

10,800 AFY 50-Year Average Annual Production, May through April

			GW Production			Water Allocation			
Model Year	HC	Oct-Apr HC descrip	UY Total af/WY	CH Total af/WY	LSMR Total af/WY	CPEN af/WY	FPUD af/WY	Additional Water af/WY	CWRMA Emergency Water af/WY
1	VW	Very Wet	8,644	4,958	13,602	7,822	5,780	-	-
2	BN	Below Normal	7,546	3,976	11,522	7,702	3,820	-	-
3	BN	Below Normal	5,333	3,269	8,602	7,642	960	-	-
4	VD	Very Dry	4,482	2,747	7,230	6,730	500	-	-
5	ED	Extremely Dry	3,484	2,136	5,620	5,359	261	-	603
6	ED	Extremely Dry	3,152	1,932	5,084	5,084	-	-	400
7	AN	Above Normal	5,655	3,515	9,170	6,450	2,720	-	-
8	VD	Very Dry	5,919	3,033	8,952	6,730	2,223	-	-
9	ED	Extremely Dry	3,285	2,014	5,299	5,299	-	-	600
10	ED	Extremely Dry	3,115	1,909	5,024	5,024	-	-	2,055
11	BN	Below Normal	4,092	2,508	6,600	6,450	150	-	591
12	VD	Very Dry	4,575	2,804	7,380	6,730	650	-	-
13	ED	Extremely Dry	3,411	2,090	5,501	5,239	263	-	-
14	ED	Extremely Dry	2,867	1,757	4,624	4,624	-	-	-
15	AN	Above Normal	5,392	3,358	8,750	6,350	2,400	-	-
16	AN	Above Normal	8,529	4,793	13,322	7,722	5,600	-	-
17	BN	Below Normal	6,443	3,384	9,827	7,517	2,310	-	-
18	VW	Very Wet	7,933	5,496	13,430	7,582	5,848	-	-
19	BN	Below Normal	7,463	3,949	11,412	7,532	3,880	-	-
20	BN	Below Normal	5,501	3,371	8,872	7,617	1,255	-	-
21	VD	Very Dry	4,442	2,723	7,165	6,415	750	-	-
22	BN	Below Normal	4,646	2,848	7,494	6,614	880	-	-
23	BN	Below Normal	5,656	3,466	9,122	7,822	1,300	-	-
24	BN	Below Normal	5,625	3,447	9,072	7,772	1,300	-	-
25	VD	Very Dry	4,684	2,871	7,555	6,630	925	-	-
26	ED	Extremely Dry	3,682	2,257	5,939	5,359	580	-	-
27	VW	Very Wet	7,510	5,980	13,490	6,450	4,046	2,994	-
28	AN	Above Normal	9,305	5,817	15,122	7,822	5,980	1,320	-
29	VW	Very Wet	8,838	6,814	15,652	7,822	5,460	2,370	-
30	AN	Above Normal	9,155	5,647	14,802	7,822	5,980	1,000	-
31	AN	Above Normal	8,705	4,877	13,582	7,822	5,120	640	-
32	VW	Very Wet	8,774	6,583	15,357	7,822	5,460	2,075	-
33	AN	Above Normal	9,401	5,881	15,282	7,822	5,980	1,480	-
34	AN	Above Normal	8,413	4,689	13,102	7,822	5,120	160	-
35	AN	Above Normal	8,488	4,934	13,422	7,822	5,120	480	-
36	BN	Below Normal	7,120	3,722	10,842	7,822	3,020	-	-
37	AN	Above Normal	7,027	4,675	11,702	7,822	3,400	480	-
38	BN	Below Normal	7,120	3,722	10,842	7,822	3,020	-	-
39	BN	Below Normal	5,656	3,466	9,122	7,822	1,300	-	-
40	VW	Very Wet	7,432	6,250	13,682	7,822	3,740	2,120	-
41	AN	Above Normal	9,236	6,316	15,552	7,822	5,980	1,750	-
42	VW	Very Wet	8,866	6,976	15,842	7,822	5,460	2,560	-
43	AN	Above Normal	9,155	5,757	14,912	7,822	5,980	1,110	-
44	VW	Very Wet	8,838	6,704	15,542	7,822	5,460	2,260	-
45	AN	Above Normal	9,145	5,337	14,482	7,822	5,980	680	-
46	AN	Above Normal	8,705	5,037	13,742	7,822	5,120	800	-
47	VW	Very Wet	8,729	6,763	15,492	7,822	5,460	2,210	-
48	BN	Below Normal	7,658	4,044	11,702	7,822	3,880	-	-
49	BN	Below Normal	5,656	3,466	9,122	7,822	1,300	-	-
50	AN	Above Normal	7,027	4,515	11,542	7,822	3,400	320	-
		Min	2,867	1,757	4,624	4,624	-	-	-
		Max	9,401	6,976	15,842	7,822	5,980	2,994	2,055
		Median	7,074	3,835	11,127	7,797	3,210	-	-
		Average	6,630	4,172	10,802	7,163	3,102	536	85

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TABLE 1 Run 16b Annual Pumping Summary
LOWER SANTA MARGARITA RIVER GROUNDWATER MODEL

Average Annual Pumping

	Yearly Count	UY Total af/WY	CH Total af/WY	LSMR Total af/WY	CPEN af/WY	FPUD af/WY	Additional Water af/WY	CWRMA Emergency Water af/WY
VW	9	8,396	6,281	14,676	7,643	*5,190*	*1,843*	-
AN	15	8,223	5,010	13,232	7,626	*4,925*	*681*	-
BN	14	6,108	3,474	9,582	7,556	*2,027*	-	*42*
VD	5	4,820	2,836	7,656	6,647	*1,010*	-	-
ED	7	3,285	2,014	5,299	5,141	*158*	-	*523*

Average Monthly Pumping

%	Month	UY Total af/m	CH Total af/m	LSMR Total af/m	CPEN af/m	FPUD af/m	Additional Water af/m	CWRMA Emergency Water af/m
7.7%	Oct	523	304	827	614	*168*	45	16
6.9%	Nov	474	267	742	524	*177*	41	20
6.6%	Dec	469	245	714	473	*238*	3	20
7.3%	Jan	518	274	792	466	*297*	29	2
7.2%	Feb	507	272	780	414	*306*	59	2
8.3%	Mar	564	333	897	511	*311*	75	2
9.1%	Apr	596	388	984	582	*306*	95	2
9.4%	May	585	429	1,014	659	*331*	24	4
9.6%	Jun	597	443	1,040	699	*313*	27	4
10.0%	Jul	620	462	1,082	780	*265*	37	4
9.4%	Aug	609	407	1,016	751	*216*	49	4
8.5%	Sep	568	347	915	691	*175*	50	4
100%	Avg Anl	6,630	4,172	10,802	7,163	3,102	536	85

TABLE 2 Run 16b Pumping Summaries

	Subbasin	Building #	State ID	# mos Q	% of 600 mos		80% Utilization af/m	Potential 100% Yield gpm		
1	UY	2673R	10/4-7A2	600	100%	UY	99	1,000	existing	
2	UY-VOC	26072	10/4-7A3	600	100%	UY-VOC	110	1,000	existing	repair
3	UY	26002	10/4-7R2	600	100%	UY	110	1,000	existing	rehabilitate
4	UY	26018	10/4-18B1	503	84%	UY	99	900	existing	rehabilitate
5	UY	26071	10/4-7H3	412	69%	UY	77	800	existing	
6	UY	uyNEW_1	UY-4A	356	59%	UY	110	1,000	new	
7	UY	uyNEW_2	UY-2A	260	43%	UY	110	1,000	new	
8	UY	uyNEW_3	UY-1B	209	35%	UY	77	700	new	
9	CH	23093	10/4-18E3R	600	100%	CH	93	1,100	existing	
10	CH	330925	10/5-23G7	600	100%	CH	124	1,130	existing	
11	CH	23001	10/5-23J1	600	100%	CH	137	1,250	existing	ES replcmnt
12	CH	R330924	CH-5A	182	30%	CH	82	750	existing	ES replcmnt
13	CH	23063	10/5-13R3	140	23%	CH	110	1,100	existing	rehabilitate
14	CH	23073	10/4-18M5	100	17%	CH	132	1,200	existing	rehabilitate
15	CH	330923	10/5-23K3	43	7%	CH	121	1,100	existing	
16	CH	chNEW_1	CH-1B	14	2%	CH	110	1,000	new	

Well Capacity:	**1,697 af/m**	**16,030 gpm**

% Pumping in Subbasin

		62%	**38%**	**0%**	**68%**	**32%**	**0%**
mo	Anl %	UY	CH	LY	UY	CH	LY
MAY	9.1%	5.7%	3.5%	-	6.2%	2.9%	-
JUN	9.7%	6.0%	3.7%	-	6.6%	3.1%	-
JUL	10.8%	6.7%	4.1%	-	7.4%	3.5%	-
AUG	10.5%	6.5%	4.0%	-	7.1%	3.4%	-
SEP	9.7%	6.0%	3.7%	-	6.6%	3.1%	-
OCT	8.7%	5.4%	3.3%	-	5.9%	2.8%	-
NOV	7.4%	4.6%	2.8%	-	5.0%	2.4%	-
DEC	6.6%	4.1%	2.5%	-	4.5%	2.1%	-
JAN	6.5%	4.0%	2.5%	-	4.4%	2.1%	-
FEB	5.8%	3.6%	2.2%	-	3.9%	1.8%	-
MAR	7.1%	4.4%	2.7%	-	4.8%	2.3%	-
APR	8.1%	5.0%	3.1%	-	5.5%	2.6%	-

Max Pumping in Subbasin adding wells as needed

UY		CH		LY	Total
# exst wells	5	# exst wells	7		(afm)
first 3 wells	318	first 3 wells	354	-	672
+26018	416	+23073	436	-	853
+26071	**493**	+330925	546	-	1,039
+UY-4A	603	+330923	677	-	1,280
+UY-2A	712	+330924	**798**	-	1,510
+UY-1B	789	1 adntl well	908	-	1,697

TABLE 3 Run 16b Annual Pumping by Well
Annual Well Production (AF/Y)

	Building #:	2673R	26072	26002	26018	26071	uyNEW_1	uyNEW_2	uyNEW_3
	Max Annual Pumping	1,175	1,306	1,306	1,175	914	1,306	1,306	914
	Potential w/ 80% Util	1,184	1,315	1,315	1,184	921	1,315	1,315	921
	Potential Well Yield (gpm)	900	1,000	1,000	900	700	1,000	1,000	700
		UY	UY-VOC	UY	UY	UY	UY	UY	UY
Settlement		10/4-7A2	10/4-7A3	10/4-7R2	10/4-18B1	10/4-7H3	UY-4A	UY-2A	UY-1B
Year	HC	(af/y)	(af/y)	(af/y)	(af/y)	(af/y)	(af/y)	(af/y)	(af/y)
1	VW	1,133	1,259	1,259	1,133	881	1,259	1,051	669
2	BN	1,129	1,254	1,254	1,129	878	938	743	222
3	BN	1,036	1,151	1,151	1,036	478	481	0	0
4	VD	1,029	1,143	1,143	1,029	138	0	0	0
5	ED	1,008	1,121	1,121	235	0	0	0	0
6	ED	929	1,032	1,032	159	0	0	0	0
7	AN	987	1,096	1,096	645	377	538	538	377
8	VD	1,049	1,165	1,165	1,049	495	707	290	0
9	ED	970	1,078	1,078	159	0	0	0	0
10	ED	917	1,019	1,019	159	0	0	0	0
11	BN	954	1,060	1,060	463	360	195	0	0
12	VD	1,034	1,149	1,149	1,034	208	0	0	0
13	ED	1,009	1,121	1,121	161	0	0	0	0
14	ED	865	961	961	81	0	0	0	0
15	AN	970	1,078	1,078	490	381	544	544	307
16	AN	1,140	1,267	1,267	1,140	887	1,267	959	601
17	BN	1,073	1,193	1,193	1,073	835	874	202	0
18	VW	1,144	1,271	1,271	1,144	753	870	870	609
19	BN	1,112	1,236	1,236	1,112	865	1,020	729	152
20	BN	1,071	1,190	1,190	1,071	612	367	0	0
21	VD	1,064	1,182	1,182	876	138	0	0	0
22	BN	1,028	1,142	1,142	604	345	386	0	0
23	BN	1,079	1,199	1,199	1,079	619	480	0	0
24	BN	1,092	1,213	1,213	1,092	629	384	0	0
25	VD	1,024	1,138	1,138	1,024	269	90	0	0
26	ED	1,044	1,160	1,160	319	0	0	0	0
27	VW	1,090	1,211	1,211	868	675	964	964	527
28	AN	1,172	1,303	1,303	1,172	912	1,303	1,303	837
29	VW	1,157	1,286	1,286	1,157	900	1,286	1,077	688
30	AN	1,163	1,293	1,293	1,163	905	1,293	1,293	754
31	AN	1,141	1,268	1,268	1,141	887	1,268	1,059	675
32	VW	1,149	1,277	1,277	1,149	894	1,277	1,069	682
33	AN	1,175	1,306	1,306	1,175	914	1,306	1,306	914
34	AN	1,121	1,246	1,246	1,121	872	1,246	1,037	523
35	AN	1,131	1,256	1,256	1,131	879	1,256	1,048	530
36	BN	1,078	1,198	1,198	1,078	838	1,091	496	144
37	AN	1,120	1,244	1,244	1,120	651	732	538	377
38	BN	1,078	1,198	1,198	1,078	838	1,091	496	144
39	BN	1,079	1,199	1,199	1,079	619	480	0	0
40	VW	1,137	1,264	1,264	1,137	664	848	658	460
41	AN	1,164	1,293	1,293	1,164	905	1,293	1,293	831
42	VW	1,161	1,290	1,290	1,161	903	1,290	1,081	691
43	AN	1,163	1,293	1,293	1,163	905	1,293	1,293	754
44	VW	1,157	1,286	1,286	1,157	900	1,286	1,077	688
45	AN	1,162	1,291	1,291	1,162	904	1,291	1,291	753
46	AN	1,141	1,268	1,268	1,141	887	1,268	1,059	675
47	VW	1,153	1,281	1,281	1,153	896	1,281	1,072	614
48	BN	1,113	1,236	1,236	1,113	865	1,129	743	222
49	BN	1,079	1,199	1,199	1,079	619	480	0	0
50	AN	1,120	1,244	1,244	1,120	651	732	538	377
	Min	865	961	961	81	0	0	0	0
	Max	1,175	1,306	1,306	1,175	914	1,306	1,306	914
	Median	1,091	1,212	1,212	1,086	670	859	538	222
	Average	1,082	1,202	1,202	930	601	744	554	316

	UY	UY-VOC	UY	UY	UY	UY	UY	UY
	10/4-7A2	10/4-7A3	10/4-7R2	10/4-18B1	10/4-7H3	UY-4A	UY-2A	UY-1B
Month	(af/m)	(af/m)	(af/m)	(af/m)	(af/m)	(af/m)	(af/m)	(af/m)
Oct	88	98	98	68	53	65	44	9
Nov	87	97	97	69	48	47	19	9
Dec	90	100	100	73	36	51	19	2
Jan	88	98	98	73	38	52	50	22
Feb	85	94	94	71	38	54	52	19
Mar	90	99	99	78	51	57	53	36
Apr	92	102	102	82	58	65	57	38
May	95	105	105	80	58	53	53	37
Jun	92	102	102	79	55	77	53	37
Jul	93	103	103	93	57	81	53	37
Aug	92	102	102	88	56	78	53	37
Sep	90	100	100	76	54	64	50	33
Annual Total	1,082	1,202	1,202	930	601	744	554	316

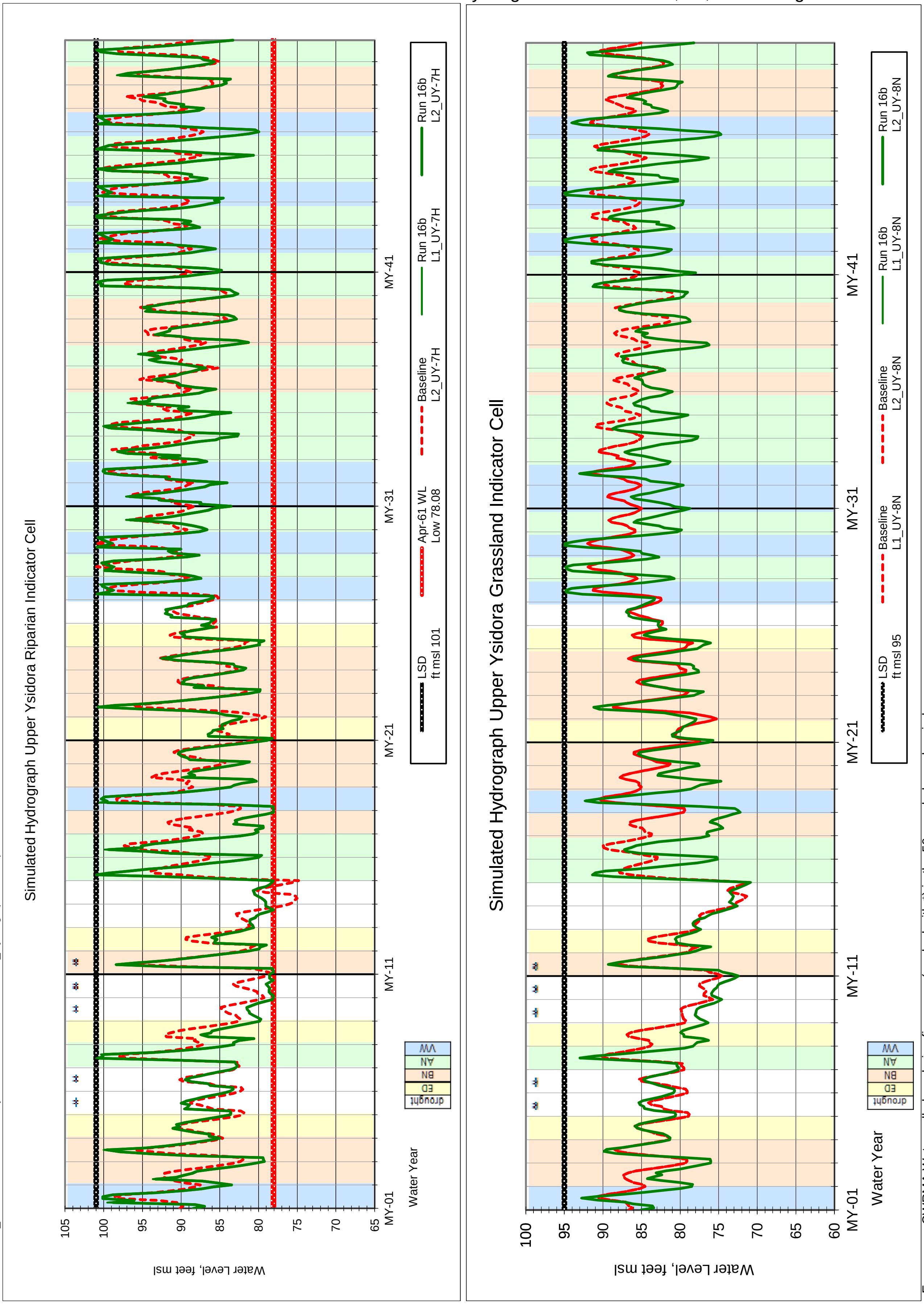
TABLE 3 Run 16b Annual Pumping by Well (Continued)

Settlement Year	HC	CH 10/4-18E3R (af/y)	CH 10/5-23G7 (af/y)	CH 10/5-23J1 (af/y)	CH CH-5A (af/y)	CH 10/5-13R3 (af/y)	CH 10/4-18M5 (af/y)	CH 10/5-23K3 (af/y)	CH CH-1B (af/y)
	Building #:	23093	330925	23001	R330924	23063	23073	330923	chNEW_1
	Max Annual Pumping	1,035	1,376	1,522	830	908	854	567	204
	Potential w/ 80% Util	1,118	1,486	1,644	986	1,315	1,578	1,447	1,315
	Potential Well Yield (gpm)	850	1,130	1,250	750	1,000	1,200	1,100	1,000
1	VW	969	1,288	1,425	505	403	367	0	0
2	BN	987	1,313	1,452	136	89	0	0	0
3	BN	860	1,144	1,265	0	0	0	0	0
4	VD	723	961	1,063	0	0	0	0	0
5	ED	562	747	826	0	0	0	0	0
6	ED	508	676	748	0	0	0	0	0
7	AN	713	948	1,049	298	288	219	0	0
8	VD	798	1,061	1,174	0	0	0	0	0
9	ED	530	704	779	0	0	0	0	0
10	ED	502	668	739	0	0	0	0	0
11	BN	660	877	971	0	0	0	0	0
12	VD	738	981	1,085	0	0	0	0	0
13	ED	550	731	809	0	0	0	0	0
14	ED	462	615	680	0	0	0	0	0
15	AN	672	893	988	298	288	219	0	0
16	AN	983	1,306	1,445	452	389	219	0	0
17	BN	891	1,184	1,310	0	0	0	0	0
18	VW	928	1,234	1,365	581	686	592	110	0
19	BN	980	1,303	1,441	136	89	0	0	0
20	BN	887	1,179	1,305	0	0	0	0	0
21	VD	716	952	1,054	0	0	0	0	0
22	BN	749	996	1,102	0	0	0	0	0
23	BN	912	1,213	1,341	0	0	0	0	0
24	BN	907	1,206	1,334	0	0	0	0	0
25	VD	755	1,004	1,111	0	0	0	0	0
26	ED	594	790	873	0	0	0	0	0
27	VW	883	1,174	1,299	678	691	612	444	198
28	AN	1,033	1,373	1,519	757	688	448	0	0
29	VW	978	1,300	1,438	670	804	853	567	204
30	AN	1,030	1,369	1,514	598	688	448	0	0
31	AN	987	1,312	1,451	520	389	219	0	0
32	VW	990	1,316	1,455	601	712	854	450	204
33	AN	1,030	1,369	1,515	830	688	448	0	0
34	AN	976	1,298	1,435	373	389	219	0	0
35	AN	968	1,287	1,423	444	377	332	104	0
36	BN	961	1,278	1,414	68	0	0	0	0
37	AN	932	1,239	1,370	295	285	342	214	0
38	BN	961	1,278	1,414	68	0	0	0	0
39	BN	912	1,213	1,341	0	0	0	0	0
40	VW	961	1,278	1,414	464	619	743	567	204
41	AN	1,035	1,376	1,522	680	694	582	426	0
42	VW	990	1,316	1,456	681	908	853	567	204
43	AN	1,030	1,370	1,515	599	689	449	104	0
44	VW	979	1,301	1,439	671	805	854	450	204
45	AN	1,012	1,346	1,489	583	576	331	0	0
46	AN	977	1,299	1,437	511	377	332	104	0
47	VW	982	1,306	1,444	603	804	853	567	204
48	BN	1,005	1,337	1,478	136	89	0	0	0
49	BN	912	1,213	1,341	0	0	0	0	0
50	AN	925	1,229	1,360	289	277	332	104	0
	Min	462	615	680	0	0	0	0	0
	Max	1,035	1,376	1,522	830	908	854	567	204
	Median	926	1,232	1,362	136	89	0	0	0
	Average	860	1,143	1,264	270	276	234	96	28

Month	CH 10/4-18E3R (af/m)	CH 10/5-23G7 (af/m)	CH 10/5-23J1 (af/m)	CH CH-5A (af/m)	CH 10/5-13R3 (af/m)	CH 10/4-18M5 (af/m)	CH 10/5-23K3 (af/m)	CH CH-1B (af/m)
Oct	70	93	103	8	11	14	4	0
Nov	65	86	95	10	13	0	0	0
Dec	64	85	94	1	0	0	0	0
Jan	68	90	100	15	2	0	0	0
Feb	66	87	97	13	9	0	0	0
Mar	70	94	104	29	23	13	0	0
Apr	73	97	108	37	43	29	0	0
May	75	99	110	36	49	33	28	0
Jun	75	99	110	35	47	56	21	0
Jul	78	103	114	34	46	55	18	14
Aug	80	107	118	38	18	17	15	14
Sep	77	102	113	14	15	18	9	0
Annual Total	860	1,143	1,264	270	276	234	96	28

FIGURE 1 Run 16b & Baseline Hydrographs
2-Party Negotiation Model Run; 10,800 Average Annual AFY

E:\CPEN_LSMR\JWS-16B 10800 yield & 10K div\POSTC.Alt 1_Hydrographs.xlsx / printed 10/17/2012

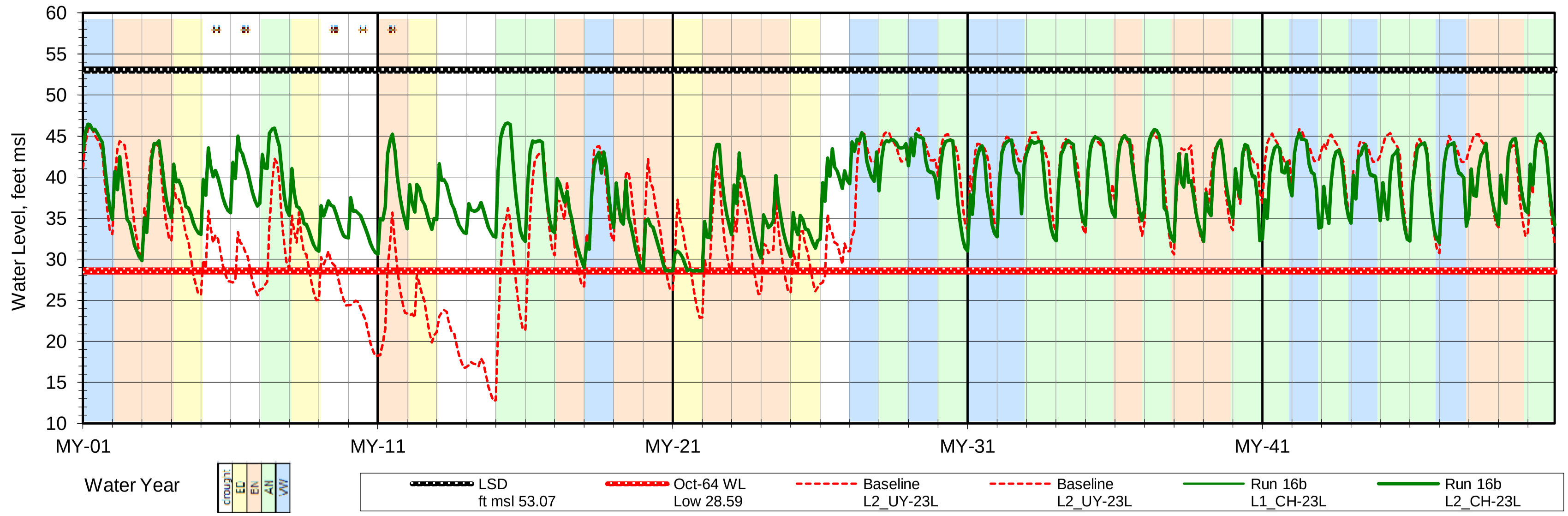


Emergency CWRMA Water called on during five years (marked with *) in the 50-year balanced period
Layer 1 (L1) and Layer 2 (L2) simulated groundwater levels are at similar elevations and the graph lines are printed on top of each other.

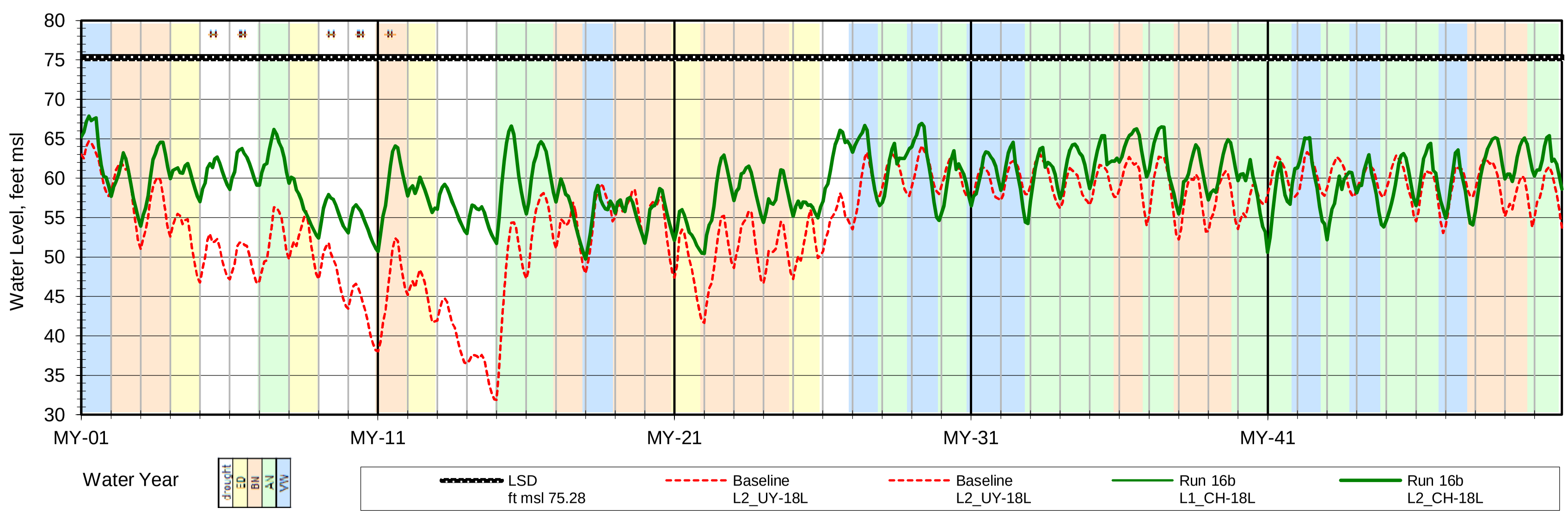
E:\CPEN_LSMR\JWS-16B 10800 yield & 10K div\POST\C.Alt 1_Hydrographs.xlsx / printed 10/17/2012

FIGURE 2 Run 16b & Baseline Hydrographs
2-Party Negotiation Model Run; 10,800 Average Annual AFY

Simulated Hydrograph Chappo Riparian Indicator Cell



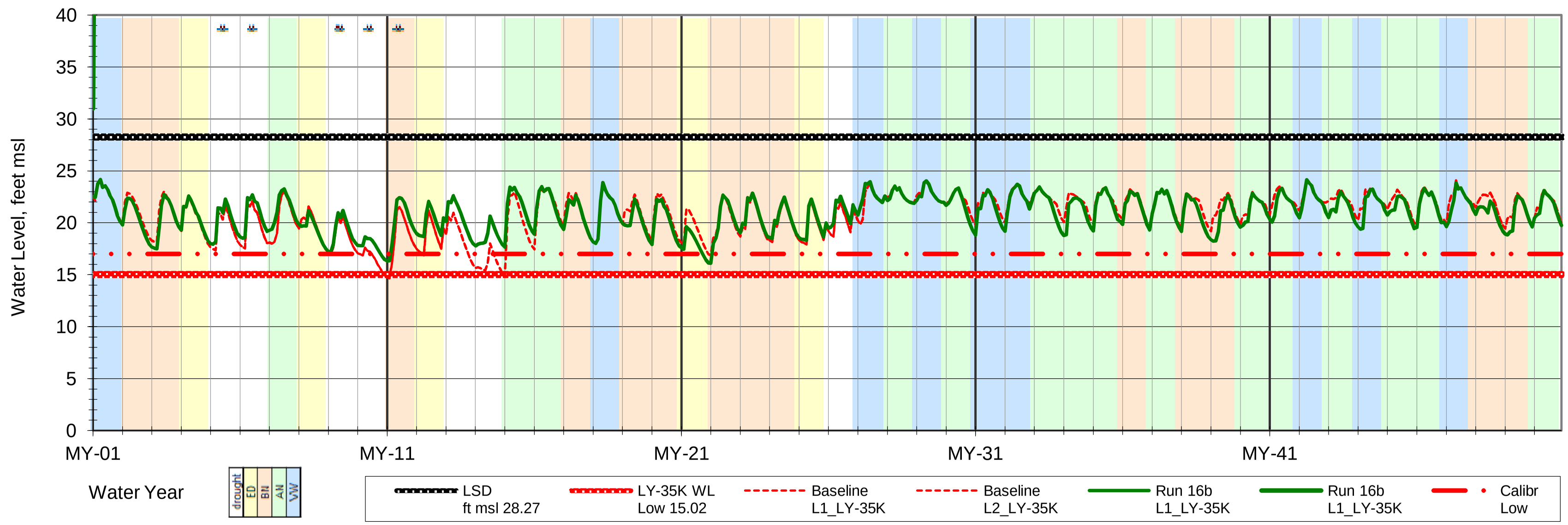
Simulated Hydrograph Chappo Grassland Indicator Cell



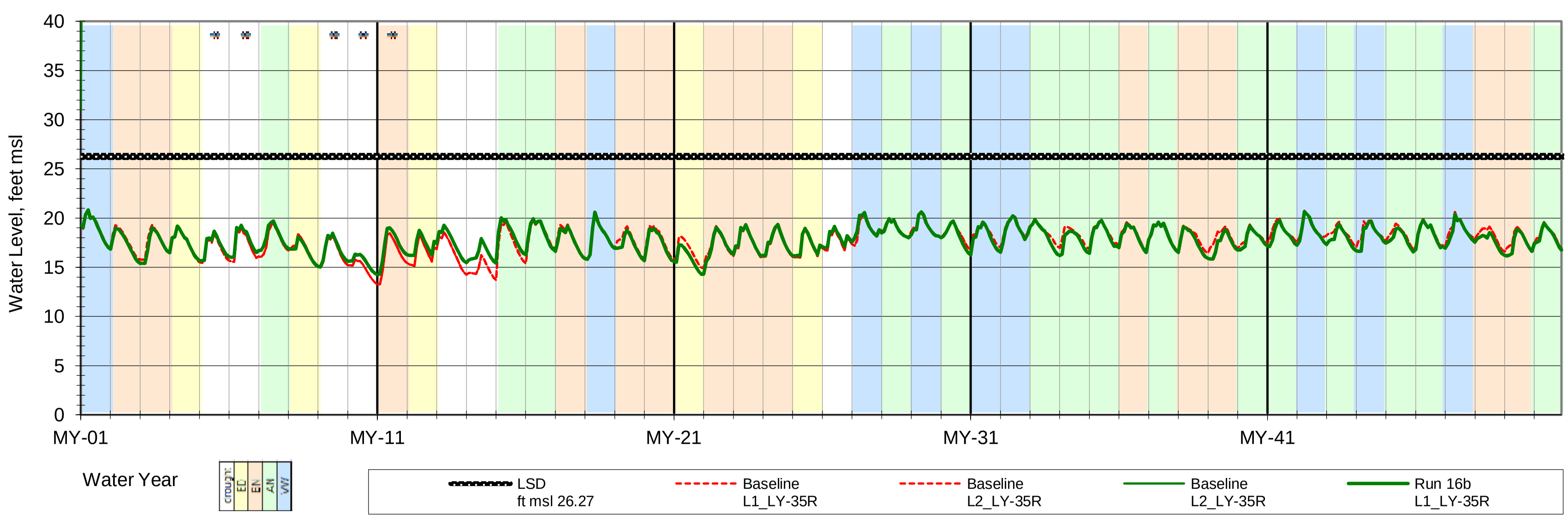
Emergency CWRMA Water called on during five years (marked with *) in the 50-year balanced period.
Layer 1 (L1) and Layer 2 (L2) simulated groundwater levels are at similar elevations and the graph lines are printed on top of each other.

FIGURE 3 Run 16b & Baseline Hydrographs
2-Party Negotiation Model Run; 10,800 Average Annual AFY

Simulated Hydrograph Lower Ysidora Riparian Indicator Cell



Simulated Hydrograph Lower Ysidora Grassland Indicator Cell



Emergency CWRMA Water called on during five years (marked with *) in the 50-year balanced period.
Layer 1 (L1) and Layer 2 (L2) simulated groundwater levels are at similar elevations and the graph lines are printed on top of each other.

FIGURE 4 Run 16b with 10,000 AFY Diversion and Baseline Streamflow
2-Party Negotiation Model Run; 10,800 Average Annual AFY

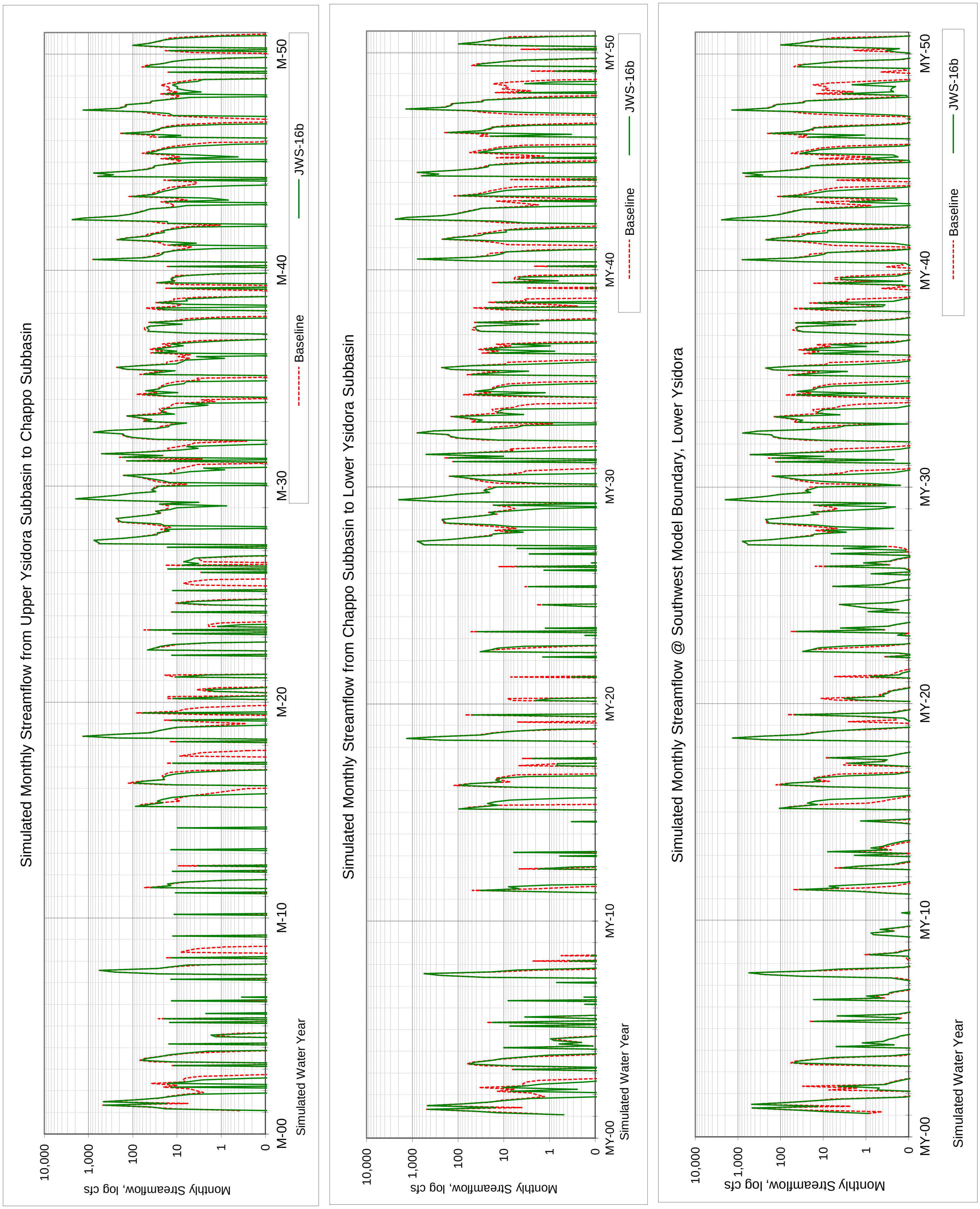


TABLE 4 2-Party Negotiation Model Run 16b; 10,800 AFY Pumping & 10,000 AFY Diversion

Average Hydrologic Condition Water Budget (af/y)

% Time Exceedence	*> 76%*	*76% to 50%*	*50% to 19%*	*< 19%*
# Years	*12*	*14*	*15*	*9*
	Very & Extrm Dry	Below Normal	Above Normal	Very Wet
Inflow:				
Santa Margarita River Inflow	5,500	11,700	32,700	132,900
Subsurface Underflow	600	600	600	600
Lake O'Neill Spill and Release	1,100	1,100	1,100	1,200
Fallbrook Creek	100	400	1,400	3,800
Title 22 Water	0	0	0	0
Minor Tributary Drainages	1,600	1,500	2,400	4,900
Areal Precipitation	600	500	700	1,600
Total Inflow:	9,500	15,800	38,900	145,000
Outflow:				
Santa Margarita River Outflow	500	2,500	21,200	125,000
Subsurface Underflow	0	100	100	100
Groundwater Pumping	6,300	9,600	13,200	14,700
Evapotranspiration	1,700	2,200	2,800	3,300
Diversions to Lake O'Neill	1,500	1,500	1,600	1,600
Total Outflow:	10,000	15,900	38,900	144,700
Net Simulated Change of Groundwater in Storage:	-500	0	-100	400
	-	(100)	100	(100)

Median Hydrologic Condition Water Budget (af/y)

% Time Exceedence	*> 76%*	*76% to 50%*	*50% to 19%*	*< 19%*
# Years	*12*	*14*	*15*	*9*
	Very & Extrm Dry	Below Normal	Above Normal	Very Wet
Inflow:				
Santa Margarita River Inflow	5,800	12,300	26,700	121,300
Subsurface Underflow	600	600	600	600
Lake O'Neill Spill and Release	1,100	1,100	1,200	1,200
Fallbrook Creek	100	300	1,100	3,500
Title 22 Water	0	0	0	0
Minor Tributary Drainages	1,500	1,400	2,500	4,700
Areal Precipitation	400	300	500	1,600
Outflow:				
Santa Margarita River Outflow	500	2,900	15,200	110,600
Subsurface Underflow	0	0	100	100
Groundwater Pumping	5,800	9,100	13,600	15,400
Evapotranspiration	1,600	2,300	2,700	3,000
Diversions to Lake O'Neill	1,500	1,500	1,600	1,600
Net Simulated Change of Groundwater in Storage:	-400	-200	400	300

Average Subbasin Water Budget (af/y)

	Upper Ysidora	Chappo	Lower Ysidora	SMR Basin	
Inflow:					
Santa Margarita River Inflow	38,300	31,900	29,300	38,300	86%
Subsurface Underflow *	600	1,300	400	600	1%
Lake O'Neill Spill and Release	1,100	-	-	1,100	2%
Fallbrook Creek	1,200	-	-	1,200	3%
Title 22 Water	-	-	0	0	0%
Minor Tributary Drainages	600	1,100	700	2,400	5%
Areal Precipitation	200	300	200	800	2%
Total Inflow:	42,000	34,600	30,600	44,400	
Outflow:					
Santa Margarita River Outflow	31,900	29,300	29,700	29,700	67%
Subsurface Underflow *	1,300	400	100	100	0%
Groundwater Pumping	6,500	4,300	0	10,800	24%
Evapotranspiration *	700	900	800	2,400	5%
Diversions to Lake O'Neill	1,600	-	-	1,600	4%
Total Outflow:	42,000	34,900	30,600	44,600	
Net Simulated Change of Groundwater in Storage: *	0	0	0	-100	
	-	(300)	-	(100)	

Note: * Subbasin Averages are based on the last rate of the stress period
Values are rounded to the nearest 100 acre-feet, which may result in a summation rounding error

Median Subbasin Water Budget (af/y)

	Upper Ysidora	Chappo	Lower Ysidora	SMR Basin
Inflow:				
Santa Margarita River Inflow	16,700	8,600	4,900	16,700
Subsurface Underflow *	600	1,300	400	600
Lake O'Neill Spill and Release	1,100	-	-	1,100
Fallbrook Creek	600	-	-	600
Title 22 Water	-	-	-	0
Minor Tributary Drainages	600	900	600	2,100
Areal Precipitation	100	0	6,499	500
Outflow:				
Santa Margarita River Outflow	8,600	4,900	4,700	4,700
Subsurface Underflow *	1,300	400	100	100
Groundwater Pumping	6,800	4,200	0	11,100
Evapotranspiration *	800	1,000	800	2,600
Diversions to Lake O'Neill	1,600	-	-	1,600
Net Simulated Change of Groundwater in Storage: *	-400	-100	0	-100

Note: The sum of median values does not reflect the change of groundwater in storage.
Median values are not cummulative.
* Subbasin Medians are based on the last rate of the stress period
Values are rounded to the nearest 100 acre-feet

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TABLE 5 Run 16b Annual Water Budget Summary

Lower Santa Margarita River Groundwater Model

Modflow Volumetric Budget Output and Streamflow

JWS-16b 10,800 AFY Pumping & 10,000 AFY Diversion

12/22/11

Annual Surface Water Budget

MY		SMR Flow In	LON Diversion	Ponds Diversion	Release & Spill	Str Gain+ / Loss-	GAGE SMR @ UY->CH	Str Gain+ / Loss-	SMR @ CH->LY	Str Gain+ / Loss-	SMR Flow Out	LSMR Str Gain+ / Loss-
1	VW	72,916	-1,543	-12,768	1,152	-5,545	67,371	-952	66,419	1,655	68,074	-4,842
2	BN	9,851	-1,358	-5,516	1,104	-7,522	2,329	-1,946	383	17	400	-9,450
3	BN	19,081	-1,804	-7,680	1,124	-8,261	10,820	-4,012	6,808	-277	6,530	-12,551
4	VD	6,075	-1,324	-2,824	1,122	-4,989	1,087	-752	335	127	462	-5,613
5	ED	6,672	-1,538	-1,599	1,125	-4,475	2,197	-1,144	1,054	318	1,372	-5,300
6	ED	4,277	-1,417	-1,067	1,000	-3,461	816	-302	514	670	1,184	-3,093
7	AN	59,305	-1,724	-8,831	1,080	-6,459	52,846	-2,232	50,613	611	51,225	-8,080
8	VD	6,521	-1,381	-2,856	1,134	-5,724	797	-768	29	70	98	-6,422
9	ED	4,099	-1,522	-549	1,110	-3,365	734	-731	3	158	161	-3,938
10	ED	4,629	-1,717	-740	1,080	-3,941	688	-688	-	37	37	-4,591
11	BN	11,484	-1,432	-5,713	1,126	-6,390	5,094	-2,419	2,675	243	2,918	-8,566
12	VD	5,622	-1,500	-1,309	1,057	-4,681	941	-790	150	319	469	-5,153
13	ED	3,321	-1,471	-277	1,100	-2,500	821	-461	360	253	613	-2,708
14	ED	3,589	-1,461	-431	1,011	-3,006	583	-563	20	105	125	-3,464
15	AN	20,522	-1,781	-8,943	1,111	-7,503	13,019	-1,378	11,641	1,121	12,763	-7,760
16	AN	22,816	-1,556	-10,771	1,167	-8,544	14,272	-2,609	11,663	946	12,609	-10,207
17	BN	6,199	-1,527	-2,487	1,135	-5,462	736	-506	230	486	716	-5,483
18	VW	117,031	-1,613	-13,773	1,160	-6,977	110,054	-3,160	106,894	1,292	108,186	-8,845
19	BN	12,744	-1,612	-4,628	1,135	-8,255	4,488	-1,605	2,884	24	2,908	-9,836
20	BN	6,645	-1,324	-3,416	1,120	-5,639	1,006	-827	179	214	393	-6,252
21	VD	7,214	-1,788	-2,134	1,038	-6,441	773	-753	20	70	90	-7,124
22	BN	13,310	-1,318	-7,699	1,162	-5,785	7,525	-3,446	4,079	-257	3,822	-9,488
23	BN	9,953	-1,768	-3,097	1,068	-6,675	3,278	-888	2,390	546	2,936	-7,017
24	BN	7,708	-1,376	-4,323	1,191	-6,062	1,647	-1,550	97	416	513	-7,195
25	VD	7,560	-1,684	-2,740	1,103	-6,657	903	-735	168	295	463	-7,097
26	ED	6,746	-1,338	-3,279	1,119	-4,141	2,605	-2,034	571	531	1,102	-5,644
27	VW	138,265	-1,693	-18,003	1,204	-3,513	134,753	-2,292	132,461	1,890	134,352	-3,914
28	AN	61,252	-1,595	-22,187	1,189	-9,006	52,246	-5,115	47,131	326	47,458	-13,795
29	VW	195,725	-1,600	-20,316	1,297	-4,468	191,257	-2,610	188,648	1,732	190,380	-5,345
30	AN	27,995	-1,621	-8,538	1,154	-9,172	18,823	-3,654	15,169	75	15,243	-12,752
31	AN	61,581	-1,565	-9,222	1,160	-7,059	54,522	-3,441	51,081	453	51,534	-10,046
32	VW	105,365	-1,569	-14,362	1,247	-5,413	99,952	-4,793	95,159	640	95,800	-9,565
33	AN	28,766	-1,600	-11,999	1,123	-9,069	19,697	-4,126	15,572	318	15,890	-12,877
34	AN	21,480	-1,585	-12,438	1,112	-9,456	12,024	-4,655	7,369	-231	7,138	-14,342
35	AN	38,995	-1,527	-9,383	1,132	-6,802	32,193	-3,808	28,385	436	28,820	-10,175
36	BN	13,900	-1,588	-5,878	1,111	-6,960	6,940	-3,000	3,940	-14	3,926	-9,974
37	AN	18,856	-1,552	-6,754	1,140	-4,485	14,370	-2,790	11,581	429	12,009	-6,846
38	BN	12,534	-1,564	-6,622	1,111	-7,022	5,512	-2,797	2,715	177	2,892	-9,642
39	BN	12,024	-1,485	-7,429	1,138	-7,051	4,973	-3,649	1,323	-246	1,078	-10,946
40	VW	66,151	-1,760	-12,355	1,170	-7,276	58,874	-4,436	54,439	76	54,514	-11,636
41	AN	40,738	-1,581	-15,038	1,163	-10,080	30,658	-5,844	24,814	137	24,951	-15,787
42	VW	256,836	-1,603	-20,281	1,244	-3,940	252,896	-3,652	249,244	1,229	250,473	-6,363
43	AN	23,081	-1,628	-13,783	1,157	-10,069	13,013	-4,411	8,601	-10	8,591	-14,490
44	VW	122,236	-1,552	-19,256	1,181	-6,915	115,321	-4,061	111,260	1,014	112,274	-9,962
45	AN	17,853	-1,586	-11,866	1,142	-9,396	8,456	-3,996	4,460	-181	4,279	-13,573
46	AN	26,690	-1,624	-12,460	1,169	-8,194	18,496	-3,062	15,435	513	15,948	-10,743
47	VW	121,259	-1,570	-17,558	1,244	-7,487	113,772	-4,404	109,368	1,194	110,562	-10,696
48	BN	13,194	-1,618	-8,962	1,134	-8,696	4,498	-3,940	559	-115	444	-12,750
49	BN	15,504	-1,620	-6,760	1,140	-6,842	8,662	-3,347	5,314	-243	5,072	-10,432
50	AN	20,633	-1,578	-10,860	1,179	-7,217	13,417	-3,334	10,083	69	10,152	-10,481
	avg	38,336	-1,563	-8,435	1,138	-6,481	31,855	-2,569	29,286	393	29,679	-8,657
	med	16,678	-1,574	-7,689	1,135	-6,739	8,559	-2,700	4,887	274	4,676	-9,148
AVERAGES												
VD/ED	12	5,527	(1,512)	(1,650)	1,083	(4,448)	1,079	(810)	269	246	515	(5,012)
BN	14	11,724	(1,528)	(5,729)	1,129	(6,902)	4,822	(2,424)	2,398	69	2,468	(9,256)
AN	15	32,704	(1,607)	(11,538)	1,145	(8,167)	24,537	(3,630)	20,906	334	21,241	(11,464)
VW	9	132,865	(1,612)	(16,519)	1,211	(5,726)	127,139	(3,373)	123,766	1,191	124,957	(7,908)
	50											
MEDIANS												
VD/ED	12	5,849	(1,486)	(1,454)	1,101	(4,308)	819	(743)	159	205	463	(5,226)
BN	14	12,279	(1,545)	(5,795)	1,130	(6,901)	4,735	(2,608)	2,533	21	2,900	(9,565)
AN	15	26,690	(1,586)	(10,860)	1,154	(8,544)	18,496	(3,654)	15,169	326	15,243	(10,743)
VW	9	121,259	(1,600)	(17,558)	1,204	(5,545)	113,772	(3,652)	109,368	1,229	110,562	(8,845)
	50											

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TABLE 5 Run 16b Annual Water Budget Summary (continued)

Lower Santa Margarita River Groundwater Model

Modflow Volumetric Budget Output

Annual Groundwater Budget Model Run: JWS-16b 10,800 AFY Pumping & 10,000 AFY Diversion

	INFLOW:					OUTFLOW:					
MY	Storage	Recharge	Stream Leakance	GHB	TOTAL GW IN	Storage	Wells	ET	Stream Leakance	GHB	TOTAL GW OUT
1	7,659	13,815	6,838	598	28,911	4,831	13,602	3,315	7,119	67	28,934
2	6,770	5,702	5,734	603	18,809	4,162	11,522	1,917	1,188	49	18,838
3	5,228	7,878	8,587	610	22,304	8,106	8,602	2,522	3,039	46	22,315
4	4,716	3,118	4,425	606	12,865	3,186	7,229	2,011	398	51	12,876
5	4,118	1,917	5,898	617	12,550	4,664	5,620	2,135	105	46	12,570
6	4,098	1,820	4,952	616	11,486	3,967	5,085	2,244	154	53	11,503
7	6,095	9,433	7,394	606	23,529	6,958	9,169	2,884	4,464	58	23,534
8	5,815	3,010	4,063	611	13,499	2,828	8,953	1,550	152	44	13,528
9	2,943	923	4,874	630	9,370	2,599	5,298	1,359	81	47	9,384
10	2,883	870	3,655	639	8,048	1,889	5,025	1,070	43	36	8,063
11	5,790	6,194	7,626	618	20,228	9,187	6,600	2,272	2,137	47	20,243
12	4,890	1,607	6,267	626	13,390	4,190	7,378	1,703	83	47	13,401
13	4,341	530	3,678	640	9,190	2,000	5,500	1,522	148	51	9,221
14	3,074	794	3,965	669	8,502	2,599	4,626	1,185	55	45	8,510
15	7,277	9,984	8,150	613	26,024	10,085	8,749	2,569	4,589	58	26,049
16	6,694	11,377	8,843	596	27,511	7,133	13,322	2,684	4,332	58	27,528
17	5,799	2,808	5,638	614	14,859	3,235	9,828	1,621	145	52	14,880
18	6,671	14,940	10,606	603	32,820	10,064	13,430	2,544	6,745	59	32,841
19	6,359	4,809	6,322	606	18,096	4,470	11,412	1,733	461	49	18,125
20	5,636	3,799	5,354	609	15,398	4,527	8,871	1,529	434	51	15,411
21	3,797	2,413	5,165	629	12,004	3,678	7,165	1,081	57	40	12,021
22	6,325	8,058	7,119	603	22,104	8,710	7,495	2,273	3,593	48	22,119
23	6,113	3,561	6,568	619	16,861	5,459	9,121	1,995	257	51	16,883
24	5,248	4,784	6,467	605	17,104	5,278	9,073	1,887	831	54	17,122
25	4,483	3,340	6,657	618	15,099	5,627	7,555	1,579	298	52	15,112
26	3,682	3,717	6,685	606	14,690	5,372	5,939	2,539	803	56	14,709
27	6,536	19,197	8,581	591	34,904	6,816	13,492	3,324	11,221	66	34,919
28	5,992	22,521	9,155	583	38,250	6,455	15,129	3,354	13,267	59	38,264
29	6,892	21,322	8,464	584	37,262	6,164	15,634	3,441	11,956	66	37,261
30	6,054	8,747	8,611	597	24,008	4,024	14,807	2,626	2,505	54	24,016
31	5,321	9,640	9,624	597	25,181	5,944	13,590	2,548	3,069	55	25,207
32	6,189	15,090	10,973	590	32,842	7,314	15,358	3,039	7,084	62	32,858
33	6,221	12,183	8,717	594	27,716	4,559	15,266	2,782	5,051	55	27,713
34	5,611	12,649	8,871	595	27,725	6,263	13,108	2,727	5,588	50	27,736
35	4,784	9,780	9,826	597	24,986	5,647	13,430	2,897	2,989	56	25,020
36	4,449	6,129	7,438	601	18,618	3,776	10,836	2,732	1,221	55	18,620
37	5,691	7,163	7,713	601	21,168	4,428	11,708	2,778	2,199	57	21,171
38	5,673	6,864	7,645	603	20,784	5,921	10,836	2,300	1,680	51	20,787
39	5,255	7,599	6,956	604	20,413	6,203	9,137	2,576	2,475	49	20,439
40	6,635	12,534	9,183	606	28,958	6,740	13,682	2,798	5,702	51	28,975
41	5,774	15,335	10,904	595	32,608	6,818	15,542	2,911	7,282	55	32,608
42	6,974	21,120	8,838	583	37,516	6,433	15,840	3,246	11,949	61	37,529
43	6,726	13,935	8,586	592	29,839	6,104	14,922	2,700	6,093	51	29,870
44	6,979	19,904	9,504	588	36,974	7,622	15,542	3,007	10,751	57	36,978
45	7,966	12,006	7,484	595	28,051	5,969	14,463	2,530	5,023	52	28,037
46	7,874	12,856	8,770	595	30,094	7,645	13,751	2,553	6,152	57	30,158
47	6,152	18,480	10,973	588	36,194	8,379	15,496	3,014	9,240	65	36,194
48	5,165	9,114	7,277	597	22,153	4,752	11,708	2,647	3,028	52	22,187
49	6,015	6,910	6,933	604	20,461	6,015	9,114	2,656	2,642	47	20,474
50	7,231	11,180	7,025	597	26,033	6,221	11,547	2,815	5,395	54	26,032
avg	5,693	8,869	7,392	606	22,560	5,620	10,802	2,394	3,706	53	22,575
med	5,807	7,968	7,416	603	22,129	5,784	11,124	2,551	2,816	52	22,153
AVERAGES											
VD/ED	4,070	2,005	5,024	626	11,724	3,550	6,281	1,665	198	47	11,741
BN	5,702	6,015	6,833	607	19,157	5,700	9,582	2,190	1,652	50	19,175
AN	6,354	11,919	8,645	597	27,515	6,284	13,234	2,757	5,200	55	27,529
VW	6,743	17,378	9,329	592	34,042	7,151	14,675	3,081	9,085	62	34,054
MEDIANS											
VD/ED	4,108	1,869	4,913	622	12,277	3,432	5,779	1,565	126	47	12,295
BN	5,731	6,162	6,944	605	19,518	5,368	9,129	2,272	1,451	50	19,541
AN	6,095	11,377	8,717	596	27,511	6,221	13,590	2,727	5,023	55	27,528
VW	6,671	18,480	9,183	590	34,904	6,816	15,358	3,039	9,240	62	34,919

TABLE 5 Run 16b Annual Water Budget Summary (continued)

Lower Santa Margarita River Groundwater Model

Modflow Volumetric Budget Output

Annual Groundwater Budget

MY	NET Storage	NET Str Lknc	In-Out	% bal
1	-2,828	-281	-23.3	-0.08%
2	-2,607	4,546	-29.9	-0.16%
3	2,878	5,548	-11.6	-0.05%
4	-1,530	4,027	-10.4	-0.08%
5	545	5,793	-20.1	-0.16%
6	-131	4,798	-16.4	-0.14%
7	863	2,930	-5.0	-0.02%
8	-2,987	3,911	-29.2	-0.22%
9	-344	4,792	-14.5	-0.15%
10	-994	3,612	-15.9	-0.20%
11	3,398	5,489	-15.0	-0.07%
12	-700	6,185	-11.4	-0.08%
13	-2,342	3,530	-31.2	-0.34%
14	-475	3,909	-8.0	-0.09%
15	2,808	3,561	-25.3	-0.10%
16	438	4,511	-16.8	-0.06%
17	-2,564	5,494	-21.6	-0.15%
18	3,393	3,861	-21.2	-0.06%
19	-1,889	5,861	-28.6	-0.16%
20	-1,109	4,920	-13.3	-0.09%
21	-119	5,108	-16.6	-0.14%
22	2,385	3,526	-14.9	-0.07%
23	-654	6,311	-22.4	-0.13%
24	30	5,636	-17.6	-0.10%
25	1,143	6,359	-12.4	-0.08%
26	1,690	5,882	-18.8	-0.13%
27	280	-2,640	-14.6	-0.04%
28	464	-4,112	-13.4	-0.03%
29	-728	-3,492	1.2	0.00%
30	-2,029	6,107	-7.5	-0.03%
31	622	6,554	-25.6	-0.10%
32	1,125	3,889	-16.0	-0.05%
33	-1,662	3,666	2.6	0.01%
34	652	3,283	-10.7	-0.04%
35	863	6,837	-33.1	-0.13%
36	-673	6,217	-2.9	-0.02%
37	-1,263	5,514	-3.1	-0.01%
38	248	5,964	-3.3	-0.02%
39	948	4,481	-26.3	-0.13%
40	106	3,480	-16.8	-0.06%
41	1,045	3,623	-0.4	0.00%
42	-542	-3,111	-12.9	-0.03%
43	-622	2,493	-30.8	-0.10%
44	643	-1,247	-3.9	-0.01%
45	-1,997	2,461	14.5	0.05%
46	-230	2,617	-63.6	-0.21%
47	2,227	1,733	-0.2	0.00%
48	-413	4,249	-33.7	-0.15%
49	0	4,291	-12.4	-0.06%
50	-1,010	1,630	1.4	0.01%
avg	-73	3,686	-15.7	-0.09%
med	-125	4,138	-15.0	-0.08%
AVERAGES				
VD/ED	(520)	4,825	(17)	(0)
BN	(2)	5,181	(18)	(0)
AN	(71)	3,445	(14)	(0)
VW	408	244	(12)	(0)
MEDIANS				
VD/ED	(410)	4,795	(16)	(0)
BN	(207)	5,492	(16)	(0)
AN	438	3,561	(11)	(0)
VW	280	(281)	(15)	(0)

TABLE 6 Run 16b Average Monthly Water Budget Summary

Lower Santa Margarita River Groundwater Model

Modflow Volumetric Budget Output and Streamflow

JWS-16b 10,800 AFY Pumping & 10,000 AFY Diversion

12/22/11

Atreamflow

Avg AF/M	SMR Flow In	Diversion	Str Gain+ / Loss-	SMR @ UY->CH	Str Gain+ / Loss-	SMR @ CH->LY	Str Gain+ / Loss-	SMR Flow Out	LSMR Str Gain+ / Loss-
Oct	502	292	-449	53	-17	36	7	44	-458
Nov	1,072	504	199	1,271	-679	593	-11	582	-490
Dec	1,833	924	-1,011	822	-120	701	52	754	-1,079
Jan	8,239	1,736	-1,477	6,763	-93	6,670	143	6,813	-1,426
Feb	10,610	1,761	-1,115	9,494	-184	9,310	106	9,416	-1,194
Mar	9,203	1,950	-887	8,316	-246	8,070	90	8,160	-1,043
Apr	3,354	1,318	-446	2,908	-290	2,618	27	2,645	-709
May	1,387	879	-336	1,052	-325	726	-9	718	-670
Jun	727	502	-266	461	-231	230	-6	224	-503
Jul	494	48	-94	400	-196	204	-8	196	-298
Aug	421	47	-268	153	-107	46	1	47	-374
Sep	493	39	-331	161	-81	80	1	81	-412
Avg Monthly	3,195	833	-540	2,655	-214	2,440	33	2,473	-721
Med Monthly	1,230	691	-391	937	-190	647	4	650	-587
Avg Total=Anl	38,336	9,998	-6,481	31,855	-2,569	29,286	393	29,679	-8,657

Lower Santa Margarita River Groundwater Model

Modflow Volumetric Budget Output

Groundwater Model

Avg AF/M	INFLOW: Storage	Recharge	Stream Leakance	GHB	TOTAL IN	OUTFLOW: Storage	Wells	ET	Stream Leakance	GHB	TOTAL OUT	OUT-IN NET Storage	OUT-IN NET Str Lknc	In-Out	% bal
Oct	557	195	261	53	1,067	110	826	121	8	4	1,068	-447	253	-1.6	-0.15%
Nov	73	552	1,465	51	2,141	1,256	743	96	42	4	2,141	1,183	1,424	0.0	0.00%
Dec	337	471	678	52	1,537	661	714	90	68	6	1,537	323	610	0.0	0.00%
Jan	143	1,301	858	51	2,353	1,206	792	108	241	6	2,353	1,063	618	-0.7	-0.03%
Feb	107	1,645	791	46	2,590	1,143	779	148	512	6	2,588	1,036	279	2.0	0.08%
Mar	151	1,935	707	50	2,843	850	898	224	860	6	2,838	699	-153	4.1	0.14%
Apr	426	1,299	565	48	2,338	230	983	273	847	5	2,338	-196	-283	-0.1	0.00%
May	631	868	476	50	2,026	65	1,015	317	631	4	2,031	-567	-154	-5.5	-0.27%
Jun	803	479	374	49	1,706	12	1,039	306	350	3	1,710	-791	24	-3.9	-0.23%
Jul	960	107	389	52	1,507	9	1,082	290	127	3	1,512	-951	261	-4.8	-0.32%
Aug	860	8	382	52	1,303	27	1,015	245	15	3	1,304	-834	367	-1.6	-0.12%
Sep	645	9	445	51	1,151	53	916	177	5	3	1,154	-592	440	-3.5	-0.31%
Avg Monthly	474	739	616	50	1,880	468	900	200	309	4	1,881	-6	307	-1.3	-0.10%
Med Monthly	491	516	521	51	1,866	170	907	201	184	4	1,871	-321	270	-1.2	-0.08%
Avg Total=Anl	5,693	8,869	7,392	606	22,560	5,620	10,802	2,394	3,706	53	22,575	-73	3,686	-15.7	

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Attachment 3

Alternative 2: Lower Santa Margarita River Surface and Groundwater Model

TABLE 1 RUN 13A BASIN YIELD: using TM 1.1 Streamflow

LOWER SANTA MARGARITA RIVER GROUNDWATER MODEL

Hydrologic Condition

12,840 AFY 50-Year Average Annual Production

HC	Cnt	Oct to Apr Strflw
VW	9	Very Wet > 58,032
AN	15	Above Normal > 15,957
BN	14	Below Normal < 15,957
VD	5	Very Dry < 5,781
ED	7	Extremely Dry (2nd+ VD)
	50	

PC	HC	Q Adjst	Anl Q	Cnt	
1	2+ AN @ VW	2,800	16,900	5	10%
2	2+ AN @ AN	1,300	15,400	9	18%
3	Standard	0	14,100	10	20%
4	1st BN	-3,800	10,300	6	12%
5	2ndBN	-5,300	8,800	3	6%
6	3+BN/all Dry	-9,000	5,100	17	34%
				50	100%

MY	HC	Oct-Apr HC descrip	May-Apr Pumping Condition	Gallery Wells (af/y)	UY Total (af/y)	CH Total (af/y)	LY Total (af/y)	Groundwater Production Total (af/y)	Total Basin Yield (af/y)	CWRMA Emergency Water (af/y)	Additional Supply of Water (af/y)
1	VW	Very Wet	3	5,028	8,725	4,371	-	13,096	18,124	-	-
2	BN	Below Normal	4	1,606	7,119	3,451	-	10,570	12,176	-	-
3	BN	Below Normal	3	2,962	5,413	2,383	-	7,796	10,758	-	1,600
4	VD	Very Dry	6	872	4,307	1,656	-	5,963	6,835	-	-
5	ED	Extremely Dry	6	642	3,116	1,208	-	4,323	4,965	100	400
6	ED	Extremely Dry	6	654	3,171	1,275	-	4,446	5,100	2,252	-
7	AN	Above Normal	3	3,045	5,915	2,860	-	8,776	11,821	-	-
8	VD	Very Dry	6	984	5,721	2,786	-	8,507	9,491	-	-
9	ED	Extremely Dry	6	654	3,171	1,275	-	4,446	5,100	150	-
10	ED	Extremely Dry	6	654	3,171	1,275	-	4,446	5,100	350	200
11	BN	Below Normal	6	1,702	3,223	1,275	-	4,498	6,200	1,781	400
12	VD	Very Dry	6	654	3,171	1,275	-	4,446	5,100	1,813	-
13	ED	Extremely Dry	6	654	3,171	1,275	-	4,446	5,100	-	-
14	ED	Extremely Dry	6	654	3,171	1,275	-	4,446	5,100	-	-
15	AN	Above Normal	3	5,233	6,031	2,860	-	8,891	14,125	-	-
16	AN	Above Normal	2	4,616	9,166	4,569	-	13,735	18,351	-	-
17	BN	Below Normal	6	1,098	7,078	3,370	-	10,448	11,547	-	-
18	VW	Very Wet	3	4,896	7,783	3,495	-	11,278	16,174	-	-
19	BN	Below Normal	4	1,955	7,648	3,451	-	11,099	13,054	-	-
20	BN	Below Normal	5	1,064	6,085	2,383	-	8,468	9,532	-	-
21	VD	Very Dry	6	787	3,816	1,726	-	5,542	6,329	-	1,400
22	BN	Below Normal	6	1,951	3,274	1,275	-	4,549	6,500	-	200
23	BN	Below Normal	6	854	3,171	1,275	-	4,446	5,300	-	-
24	BN	Below Normal	6	654	3,171	1,275	-	4,446	5,100	-	-
25	VD	Very Dry	6	654	3,171	1,275	-	4,446	5,100	2,093	-
26	ED	Extremely Dry	6	654	3,171	1,275	-	4,446	5,100	2,417	-
27	VW	Very Wet	3	4,984	5,992	2,860	-	8,853	13,837	-	-
28	AN	Above Normal	2	5,255	9,319	4,833	-	14,152	19,407	-	-
29	VW	Very Wet	1	5,866	9,601	5,362	-	14,963	20,829	-	-
30	AN	Above Normal	2	4,269	9,592	5,011	-	14,602	18,871	-	-
31	AN	Above Normal	2	5,659	9,379	4,995	-	14,375	20,033	-	-
32	VW	Very Wet	1	6,271	9,573	5,296	-	14,870	21,140	-	-
33	AN	Above Normal	2	6,275	9,814	4,993	-	14,807	21,082	-	-
34	AN	Above Normal	2	4,443	9,184	4,702	-	13,887	18,329	-	-
35	AN	Above Normal	2	4,447	9,276	4,768	-	14,044	18,491	-	-
36	BN	Below Normal	4	2,174	8,167	3,648	-	11,815	13,988	-	-
37	AN	Above Normal	3	3,454	7,701	3,495	-	11,196	14,650	-	-
38	BN	Below Normal	4	1,955	7,648	3,451	-	11,099	13,054	-	-
39	BN	Below Normal	5	2,074	6,175	2,383	-	8,558	10,632	3,030	-
40	VW	Very Wet	3	3,292	7,126	3,312	-	10,438	13,730	-	-
41	AN	Above Normal	2	4,439	9,102	4,775	-	13,878	18,317	-	-
42	VW	Very Wet	1	6,370	9,734	5,421	-	15,155	21,525	-	-
43	AN	Above Normal	2	3,969	9,592	5,011	-	14,602	18,571	-	-
44	VW	Very Wet	1	5,866	9,601	5,362	-	14,963	20,829	-	-
45	AN	Above Normal	4	3,665	9,570	5,001	-	14,571	18,236	-	-
46	AN	Above Normal	3	5,055	9,187	4,774	-	13,961	19,016	-	-
47	VW	Very Wet	1	5,558	9,432	5,329	-	14,761	20,320	-	-
48	BN	Below Normal	4	2,011	8,535	3,875	-	12,410	14,420	-	-
49	BN	Below Normal	5	2,286	6,262	2,383	-	8,645	10,932	-	-
50	AN	Above Normal	3	3,421	7,580	3,476	-	11,056	14,477	-	-
			Min	642	3,116	1,208	-	4,323	4,965	0	0
			Max	6,370	9,814	5,421	-	15,155	21,525	3,030	1,600
			Median	**2,624**	**7,122**	**3,411**	**-**	**10,509**	**13,392**		
			% of Median	25.0%	67.8%	32.5%	0.0%				
			Average	**2,965**	**6,666**	**3,208**	**-**	**9,873**	**12,838**	**280**	**84**
			% of Average Total Basin Yield	23.1%	51.9%	25.0%	0.0%				

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LOWER SANTA MARGARITA RIVER GROUNDWATER MODEL

12,840 AFY 50-Year Average Annual Production

Hydrologic Condition

HC	Cnt	Oct to Apr Strflw
VW	9	Very Wet > 58,032
AN	15	Above Normal > 15,957
BN	14	Below Normal < 15,957
VD	5	Very Dry < 5,781
ED	7	Extremely Dry (2nd+ VD)
	50	

PC	HC	Q Adjst	Anl Q	Cnt	
1	2+ AN @ VW	2,800	16,900	5	10%
2	2+ AN @ AN	1,300	15,400	9	18%
3	Standard	0	14,100	10	20%
4	1st BN	-3,800	10,300	6	12%
5	2ndBN	-5,300	8,800	3	6%
6	3+BN/all Dry	-9,000	5,100	17	34%
				50	100%

Average Annual and Median Pumping

	Yearly Count	Gallery Wells (af/y)	UY Total (af/y)	CH Total (af/y)	LY Total (af/y)	Production Groundwater Total (af/y)	Total Basin Yield (af/y)	CWRMA Emergency Water (af/y)	Additional Supply of Water (af/y)
AVERAGES									
VW	9	5,348	8,619	4,534	-	13,153	18,501	-	-
AN	15	4,483	8,694	4,408	-	13,102	17,585	-	-
BN	14	1,739	5,926	2,563	-	8,489	10,228	344	157
VD/ED	12	710	3,527	1,465	-	4,992	5,702	765	167
	50								
MEDIANS									
VW	9	5,558	9,432	5,296	-	14,761	20,320	-	-
AN	15	4,443	9,187	4,774	-	13,961	18,351	-	-
BN	14	1,953	6,219	2,383	-	8,602	10,845	-	-
VD/ED	12	654	3,171	1,275	-	4,446	5,100	125	-

Average Monthly Pumping

%	Month	Gallery Wells (af/m)	UY Total (af/m)	CH Total (af/m)	LY Total (af/m)	LSMR Total (af/m)	Total Basin Yield (af/m)	CWRMA Emergency Water (af/m)	Additional Supply of Water (af/m)
8%	Oct	84	535	257	-	792	877	4	16
7%	Nov	93	457	223	-	680	772	51	20
6%	Dec	139	385	186	-	571	710	48	12
6%	Jan	323	440	202	-	641	964	21	8
6%	Feb	440	426	187	-	613	1,053	19	-
9%	Mar	549	580	264	-	844	1,393	24	4
9%	Apr	600	608	274	-	881	1,481	24	4
9%	May	106	579	272	-	851	957	42	4
10%	Jun	116	662	317	-	979	1,094	41	-
11%	Jul	200	682	360	-	1,043	1,243	5	4
10%	Aug	162	684	345	-	1,029	1,191	1	4
10%	Sep	154	628	321	-	949	1,103	-	8
	Avg Anl	2,965	6,666	3,208	-	9,873	12,838	280	84

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TABLE 2 RUN 13A (using TM 1.1 Streamflow) Pumping Summaries

		Bldg #	State ID #	# mos Q	% of 600 mos	% of Subbasin	80% Utilization af/m	Potential 100% Yield gpm
1	UY	2673	10/4-7A2	600	100%	10%	142	1,000
2	UY	26072	10/4-8D1	600	100%	11%	121	1,100
3	UY	2671	10/4-7H2	600	100%	8%	82	750
4	UY	26018	10/4-18B	600	100%	10%	110	1,000
5	UY	2603	10/4-7R2	600	100%	10%	110	1,000
6	UY	Gallery1	Gallery1	139	23%	*n/a*	252	2,300
7	UY	Gallery2	Gallery2	159	27%	*n/a*	252	2,300
8	UY	Gallery3	Gallery3	139	23%	*n/a*	252	2,300
9	UY	Gallery4	Gallery4	600	100%	*n/a*	252	2,300
10	UY	UY-1	UY-1	362	60%	10%	110	1,000
11	UY	UY-2	UY-2	600	100%	10%	110	1,000
12	UY	UY-3	UY-3	294	49%	10%	110	1,000
13	UY	UY-4	UY-4	178	30%	10%	110	1,000
14	UY	UY-5	UY-5	138	23%	10%	110	1,000
15	CH	2393	10/4-18E3	600	100%	19%	121	1,100
16	CH	2373	10/4-18M4&5	600	100%	25%	153	1,400
17	CH	2363	10/5-13R2	600	100%	21%	132	1,200
18	CH	33925	10/5-23G4	600	100%	21%	132	1,200
19	CH	2301	10/5-23J1	-	**0%**	**0%**	**0**	-
20	CH	33924	10/5-23K2	-	**0%**	**0%**	**0**	-
21	CH	33923	10/5-23K3	-	**0%**	**0%**	**0**	-
22	CH	CH-1	CH-1	600	100%	14%	88	800

% Pumping in Subbasin

		Wet Year Subbasin Split			Dry Year Subbasin Split		
		69%	**31%**	**0%**	**75%**	**25%**	**0%**
mo	Anl %	UY	CH	LY	UY	CH	LY
OCT	8.3%	5.7%	2.6%	0.00%	6.2%	2.1%	0.00%
NOV	7.1%	4.9%	2.2%	0.00%	5.3%	1.8%	0.00%
DEC	5.9%	4.1%	1.8%	0.00%	4.4%	1.5%	0.00%
JAN	6.2%	4.3%	1.9%	0.00%	4.7%	1.6%	0.00%
FEB	5.6%	3.9%	1.7%	0.00%	4.2%	1.4%	0.00%
MAR	7.8%	5.4%	2.4%	0.00%	5.8%	1.9%	0.00%
APR	7.9%	5.5%	2.5%	0.00%	6.0%	2.0%	0.00%
MAY	8.6%	5.9%	2.7%	0.00%	6.5%	2.2%	0.00%
JUN	10.0%	6.9%	3.1%	0.00%	7.5%	2.5%	0.00%
JUL	11.4%	7.9%	3.5%	0.00%	8.6%	2.9%	0.00%
AUG	10.9%	7.6%	3.4%	0.00%	8.2%	2.7%	0.00%
SEP	10.2%	7.0%	3.2%	0.00%	7.6%	2.5%	0.00%

Max monthly pumping in subbasin adding wells as needed

af/m	UY	CH	Total
# exst wells	4	4	8
af/m (80%)	422	537	959
avg af/well	105	134	240
Gallery Wells	1,430		1,430
1 adntl well	1,540	625	2,165
2 adntl well	1,650	712	2,362
3 adntl well	1,759	800	2,559
4 adntl well	1,869	888	2,757
5 adntl well	1,978		2,866

Wet Year Algorithm Monthly Counts

	AN 3000 af/y	VW 6100 af/y	Total	% of 50 yrs
Oct	-	-	-	0%
Nov	-	-	-	0%
Dec	-	-	-	0%
Jan	6	1	7	16%
Feb	6	4	10	22%
Mar	8	5	13	29%
Apr	9	6	15	33%
May	-	-	-	0%
	29	16	45	

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TABLE 3 RUN 13A (using TM 1.1 Streamflow) Annual Pumping by Well

Annual Well Production (AF/Y)

MY	HC	10/4-7A2	10/4-8D1	10/4-7H2	10/4-18B	10/4-7R2	UY-1	UY-2	UY-3	UY-4	UY-5	Gallery1	Gallery2	Gallery3	Gallery4
	Building #:	2673	26072	2671	26018	2603	new	new	new	new	new	new	new	new	new
	Max Annual Pumping	0	1,337	911	1,215	1,215	1,215	1,215	1,213	988	789	1,308	2,098	1,308	1,960
	Potential w/ 80% Util	1,315	1,447	986	1,315	1,315	1,315	1,315	1,315	1,315	1,315	3,025	3,025	3,025	3,025
	Potential Well Yield (gpm)	1,000	1,100	750	1,000	1,000	1,000	1,000	1,000	1,000	1,000	2,300	2,300	2,300	2,300
		UY	UY	UY	UY	UY	UY	UY	UY	UY	UY	UY	UY	UY	UY
		10/4-7A2	10/4-8D1	10/4-7H2	10/4-18B	10/4-7R2	UY-1	UY-2	UY-3	UY-4	UY-5	Gallery1	Gallery2	Gallery3	Gallery4
MY	HC	(af/y)	(af/y)	(af/y)	(af/y)	(af/y)	(af/y)	(af/y)	(af/y)	(af/y)	(af/y)	(af/y)	(af/y)	(af/y)	(af/y)
1	VW	0	1,271	867	1,156	1,156	1,156	1,156	971	594	399	1,004	1,218	1,004	1,801
2	BN	0	1,216	829	1,106	1,106	1,053	1,106	604	100	0	250	0	250	1,106
3	BN	0	1,000	682	909	909	657	909	347	0	0	600	552	600	1,210
4	VD	0	959	654	872	872	80	872	0	0	0	0	0	0	872
5	ED	0	707	482	642	642	0	642	0	0	0	0	0	0	642
6	ED	0	719	490	654	654	0	654	0	0	0	0	0	0	654
7	AN	0	908	619	825	825	506	825	609	399	399	552	714	552	1,226
8	VD	0	1,083	738	984	984	650	984	298	0	0	0	0	0	984
9	ED	0	719	490	654	654	0	654	0	0	0	0	0	0	654
10	ED	0	719	490	654	654	0	654	0	0	0	0	0	0	654
11	BN	0	719	490	654	654	0	654	52	0	0	400	150	400	752
12	VD	0	719	490	654	654	0	654	0	0	0	0	0	0	654
13	ED	0	719	490	654	654	0	654	0	0	0	0	0	0	654
14	ED	0	719	490	654	654	0	654	0	0	0	0	0	0	654
15	AN	0	908	619	825	825	506	825	724	399	399	1,050	1,368	1,050	1,765
16	AN	0	1,306	890	1,187	1,187	1,187	1,187	1,003	609	609	900	1,116	900	1,699
17	BN	0	1,208	824	1,098	1,098	1,050	1,098	601	100	0	0	0	0	1,098
18	VW	0	1,199	818	1,090	1,090	857	1,090	839	399	399	956	1,218	956	1,766
19	BN	0	1,268	865	1,153	1,153	1,153	1,153	704	198	0	300	150	300	1,205
20	BN	0	1,170	798	1,064	1,064	830	1,064	96	0	0	0	0	0	1,064
21	VD	0	866	590	787	787	0	787	0	0	0	0	0	0	787
22	BN	0	719	490	654	654	0	654	103	0	0	400	300	400	851
23	BN	0	719	490	654	654	0	654	0	0	0	100	0	100	654
24	BN	0	719	490	654	654	0	654	0	0	0	0	0	0	654
25	VD	0	719	490	654	654	0	654	0	0	0	0	0	0	654
26	ED	0	719	490	654	654	0	654	0	0	0	0	0	0	654
27	VW	0	908	619	825	825	506	825	686	399	399	1,056	1,218	1,056	1,653
28	AN	0	1,316	897	1,196	1,196	1,196	1,196	1,012	706	602	900	1,663	900	1,792
29	VW	0	1,303	888	1,184	1,184	1,184	1,184	1,093	890	691	1,056	1,948	1,056	1,806
30	AN	0	1,332	908	1,211	1,211	1,211	1,211	1,005	804	701	700	1,309	700	1,560
31	AN	0	1,299	886	1,181	1,181	1,181	1,181	1,090	791	588	1,102	1,663	1,102	1,792
32	VW	0	1,299	886	1,181	1,181	1,181	1,181	1,181	791	691	1,154	2,098	1,154	1,864
33	AN	0	1,334	910	1,213	1,213	1,213	1,213	1,213	804	701	1,200	1,915	1,200	1,960
34	AN	0	1,295	883	1,178	1,178	1,178	1,178	990	807	499	800	1,309	800	1,534
35	AN	0	1,294	882	1,176	1,176	1,176	1,176	988	806	602	700	1,411	700	1,636
36	BN	0	1,305	890	1,186	1,186	1,186	1,186	815	412	0	300	300	300	1,274
37	AN	0	1,199	818	1,090	1,090	857	1,090	757	399	399	650	762	650	1,391
38	BN	0	1,268	865	1,153	1,153	1,153	1,153	704	198	0	300	150	300	1,205
39	BN	0	1,170	798	1,064	1,064	830	1,064	186	0	0	400	150	400	1,124
40	VW	0	1,147	782	1,043	1,043	586	1,043	683	399	399	604	714	604	1,370
41	AN	0	1,295	883	1,178	1,178	1,178	1,178	905	706	602	700	1,411	700	1,628
42	VW	0	1,293	881	1,175	1,175	1,175	1,175	1,084	988	789	1,308	1,948	1,308	1,806
43	AN	0	1,332	908	1,211	1,211	1,211	1,211	1,005	804	701	550	1,309	550	1,560
44	VW	0	1,303	888	1,184	1,184	1,184	1,184	1,093	890	691	1,056	1,948	1,056	1,806
45	AN	0	1,329	906	1,208	1,208	1,208	1,208	1,002	802	698	500	1,207	500	1,458
46	AN	0	1,297	884	1,179	1,179	1,179	1,179	1,088	809	393	800	1,663	800	1,792
47	VW	0	1,291	880	1,174	1,174	1,174	1,174	986	890	691	1,106	1,696	1,106	1,650
48	BN	0	1,337	911	1,215	1,215	1,215	1,215	817	405	203	300	150	300	1,261
49	BN	0	1,170	798	1,064	1,064	830	1,064	273	0	0	400	300	400	1,186
50	AN	0	1,162	793	1,057	1,057	689	1,057	760	503	503	550	864	550	1,457
	Min	0	707	482	642	642	0	642	0	0	0	0	0	0	642
	Max	0	1,337	911	1,215	1,215	1,215	1,215	1,213	988	789	1,308	2,098	1,308	1,960
	Median	0	1,185	808	1,077	1,077	844	1,077	695	399	101	450	426	450	1,244
		0.0%	11.3%	7.7%	10.2%	10.2%	8.0%	10.2%	6.6%	3.8%	1.0%	4.3%	4.1%	4.3%	11.8%
	Average	0	1,080	736	981	981	707	981	567	356	275	494	718	494	1,259
		0.0%	10.9%	7.5%	9.9%	9.9%	7.2%	9.9%	5.7%	3.6%	2.8%	5.0%	7.3%	5.0%	12.7%

	10/4-7A2	10/4-8D1	10/4-7H2	10/4-18B	10/4-7R2	UY-1	UY-2	UY-3	UY-4	UY-5	Gallery1	Gallery2	Gallery3	Gallery4
	UY	UY	UY	UY	UY	UY	UY	UY	UY	UY	UY	UY	UY	UY
Month	(af/m)	(af/m)	(af/m)	(af/m)	(af/m)	(af/m)	(af/m)	(af/m)	(af/m)	(af/m)	(af/m)	(af/m)	(af/m)	(af/m)
Oct	0	88	60	80	80	60	80	46	30	10	2	0	2	80
Nov	0	84	57	77	77	56	77	30	0	0	8	0	8	77
Dec	0	76	52	70	70	43	70	5	0	0	26	11	26	76
Jan	0	83	56	75	75	47	75	23	2	2	72	63	72	115
Feb	0	76	52	69	69	44	69	39	8	0	103	102	103	132
Mar	0	89	61	81	81	58	81	62	38	28	130	129	130	160
Apr	0	91	62	83	83	61	83	66	44	34	138	150	138	173
May	0	95	65	86	86	68	86	50	31	10	10	0	10	86
Jun	0	99	67	90	90	69	90	61	49	49	2	22	2	90
Jul	0	100	68	91	91	67	91	67	59	47	0	109	0	91
Aug	0	103	70	93	93	70	93	62	49	49	0	68	0	93
Sep	0	95	65	86	86	64	86	56	46	46	2	64	2	86
Annual Total	0	1,080	736	981	981	707	981	567	356	275	494	718	494	1,259
	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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TABLE 3 RUN 13A (using TM 1.1 Streamflow) Annual Pumping by Well (Continued)

MY	HC	10/4-18E3	10/4-18M4&5	10/5-13R2	10/5-23G4	10/5-23J1	10/5-23K2	10/5-23K3	CH-1
	Building #:	2393	2373	2363	33925	2301	33924	33923	new
	Max Annual Pumping	1,046	1,332	1,141	1,141	0	0	0	761
	Potential w/ 80% Util	1,447	1,841	1,578	1,578	0	0	0	1,052
	Potential Well Yield (gpm)	1,100	1,400	1,200	1,200	0	0	0	800
		CH	CH	CH	CH	CH	CH	CH	CH
		(af/y)	(af/y)	(af/y)	(af/y)	(af/y)	(af/y)	(af/y)	(af/y)
1	VW	844	1,074	920	920	0	0	0	613
2	BN	666	848	727	727	0	0	0	484
3	BN	460	585	502	502	0	0	0	334
4	VD	319	407	349	349	0	0	0	232
5	ED	233	297	254	254	0	0	0	169
6	ED	246	313	268	268	0	0	0	179
7	AN	552	703	602	602	0	0	0	401
8	VD	538	684	586	586	0	0	0	391
9	ED	246	313	268	268	0	0	0	179
10	ED	246	313	268	268	0	0	0	179
11	BN	246	313	268	268	0	0	0	179
12	VD	246	313	268	268	0	0	0	179
13	ED	246	313	268	268	0	0	0	179
14	ED	246	313	268	268	0	0	0	179
15	AN	552	703	602	602	0	0	0	401
16	AN	882	1,122	962	962	0	0	0	641
17	BN	650	828	710	710	0	0	0	473
18	VW	674	858	736	736	0	0	0	490
19	BN	666	848	727	727	0	0	0	484
20	BN	460	585	502	502	0	0	0	334
21	VD	333	424	363	363	0	0	0	242
22	BN	246	313	268	268	0	0	0	179
23	BN	246	313	268	268	0	0	0	179
24	BN	246	313	268	268	0	0	0	179
25	VD	246	313	268	268	0	0	0	179
26	ED	246	313	268	268	0	0	0	179
27	VW	552	703	602	602	0	0	0	401
28	AN	933	1,187	1,018	1,018	0	0	0	678
29	VW	1,035	1,317	1,129	1,129	0	0	0	753
30	AN	967	1,231	1,055	1,055	0	0	0	703
31	AN	964	1,227	1,052	1,052	0	0	0	701
32	VW	1,022	1,301	1,115	1,115	0	0	0	743
33	AN	964	1,226	1,051	1,051	0	0	0	701
34	AN	907	1,155	990	990	0	0	0	660
35	AN	920	1,171	1,004	1,004	0	0	0	669
36	BN	704	896	768	768	0	0	0	512
37	AN	674	858	736	736	0	0	0	490
38	BN	666	848	727	727	0	0	0	484
39	BN	460	585	502	502	0	0	0	334
40	VW	639	813	697	697	0	0	0	465
41	AN	922	1,173	1,005	1,005	0	0	0	670
42	VW	1,046	1,332	1,141	1,141	0	0	0	761
43	AN	967	1,231	1,055	1,055	0	0	0	703
44	VW	1,035	1,317	1,129	1,129	0	0	0	753
45	AN	965	1,228	1,053	1,053	0	0	0	702
46	AN	921	1,173	1,005	1,005	0	0	0	670
47	VW	1,028	1,309	1,122	1,122	0	0	0	748
48	BN	748	952	816	816	0	0	0	544
49	BN	460	585	502	502	0	0	0	334
50	AN	671	854	732	732	0	0	0	488
	Min	233	297	254	254	0	0	0	169
	Max	1,046	1,332	1,141	1,141	0	0	0	761
	Median	658	838	718	718	0	0	0	479
		6.3%	8.0%	6.8%	6.8%	0.0%	0.0%	0.0%	4.6%
	Average	619	788	675	675	0	0	0	450
		6.3%	8.0%	6.8%	6.8%	0.0%	0.0%	0.0%	4.6%

Month	CH 10/4-18E3 (af/m)	CH 10/4-18M4&5 (af/m)	CH 10/5-13R2 (af/m)	CH 10/5-13R2 (af/m)	CH 10/5-23J1 (af/m)	CH 10/5-23K2 (af/m)	CH 10/5-23K3 (af/m)	CH CH-1 (af/m)
Oct	50	63	54	54	0	0	0	36
Nov	43	55	47	47	0	0	0	31
Dec	36	46	39	39	0	0	0	26
Jan	39	49	42	42	0	0	0	28
Feb	36	46	39	39	0	0	0	26
Mar	51	65	56	56	0	0	0	37
Apr	53	67	58	58	0	0	0	38
May	53	67	57	57	0	0	0	38
Jun	61	78	67	67	0	0	0	44
Jul	70	89	76	76	0	0	0	51
Aug	67	85	73	73	0	0	0	48
Sep	62	79	68	68	0	0	0	45
Annual Total	619	788	675	675	0	0	0	450
	-	-	-	-	-	-	-	-

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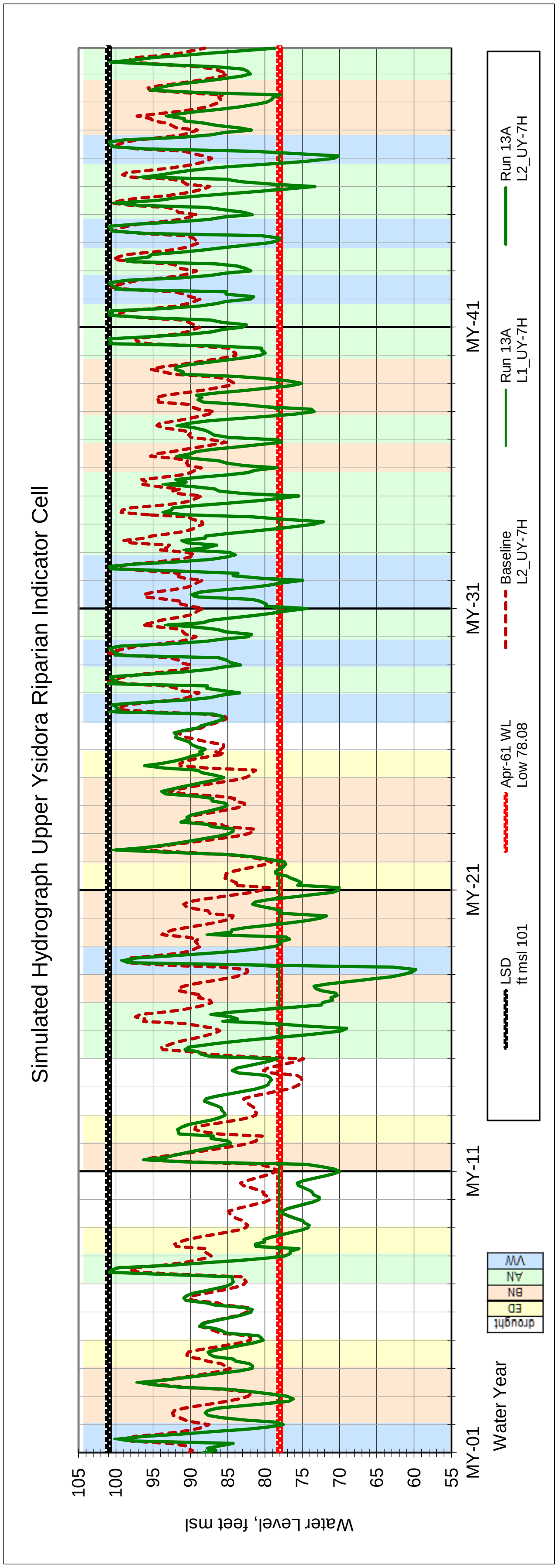
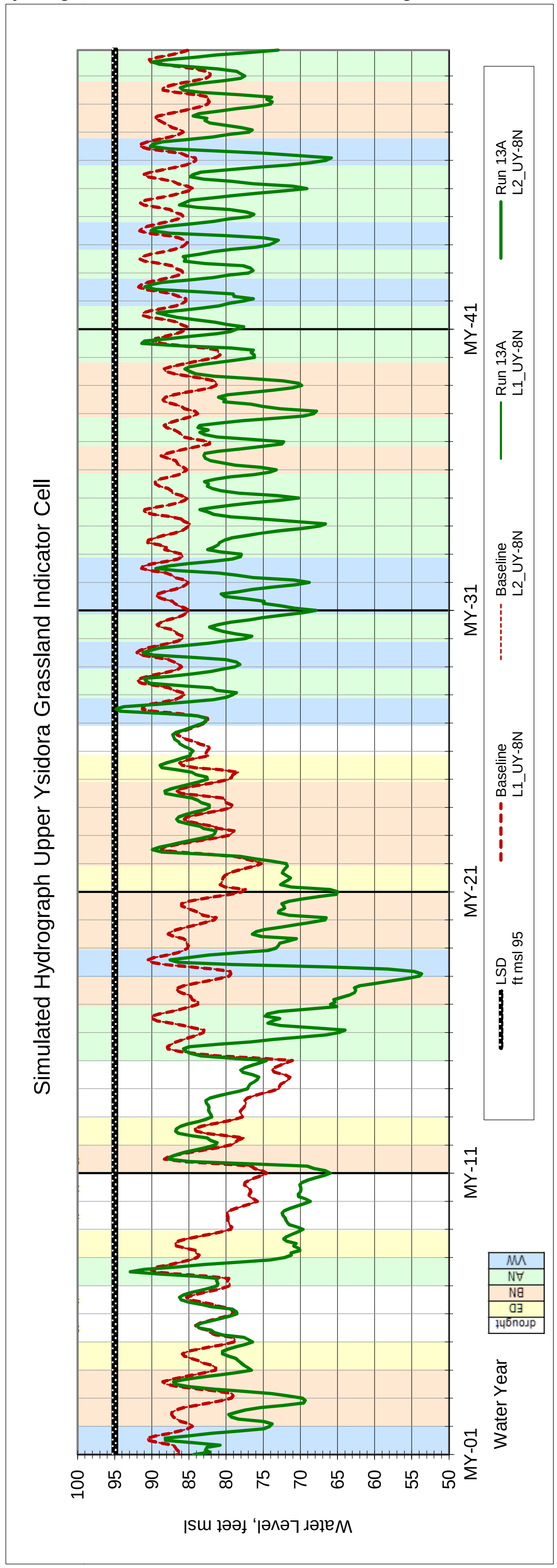
FIGURE 1 Run 13A and Baseline Hydrographs using TM1.1 Streamflow
2-Party Negotiation Model Run; 12,800 Average Annual AFY





Layer 1 (L1) and Layer 2 (L2) simulated groundwater levels are at similar elevations and the graph lines are printed on top of each other.

FIGURE 2 Run 13A and Baseline Hydrographs using TM1.1 Streamflow
2-Party Negotiation Model Run; 12,800 Average Annual AFY

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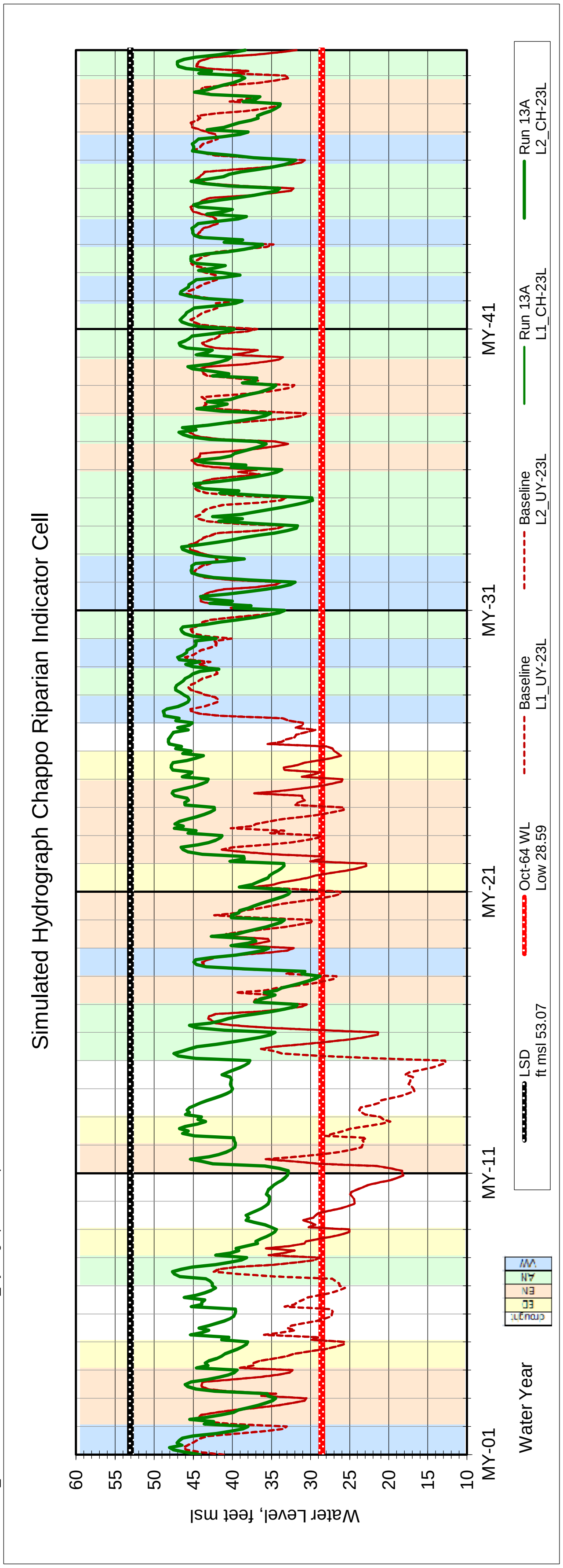
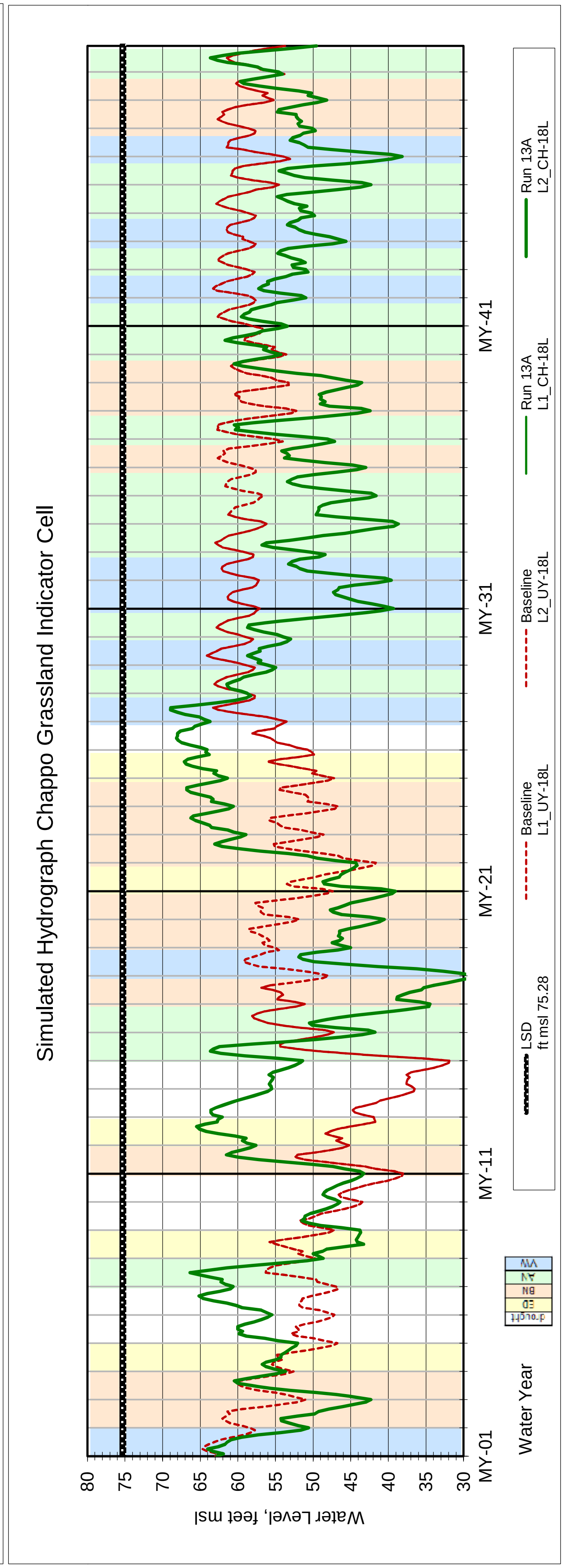
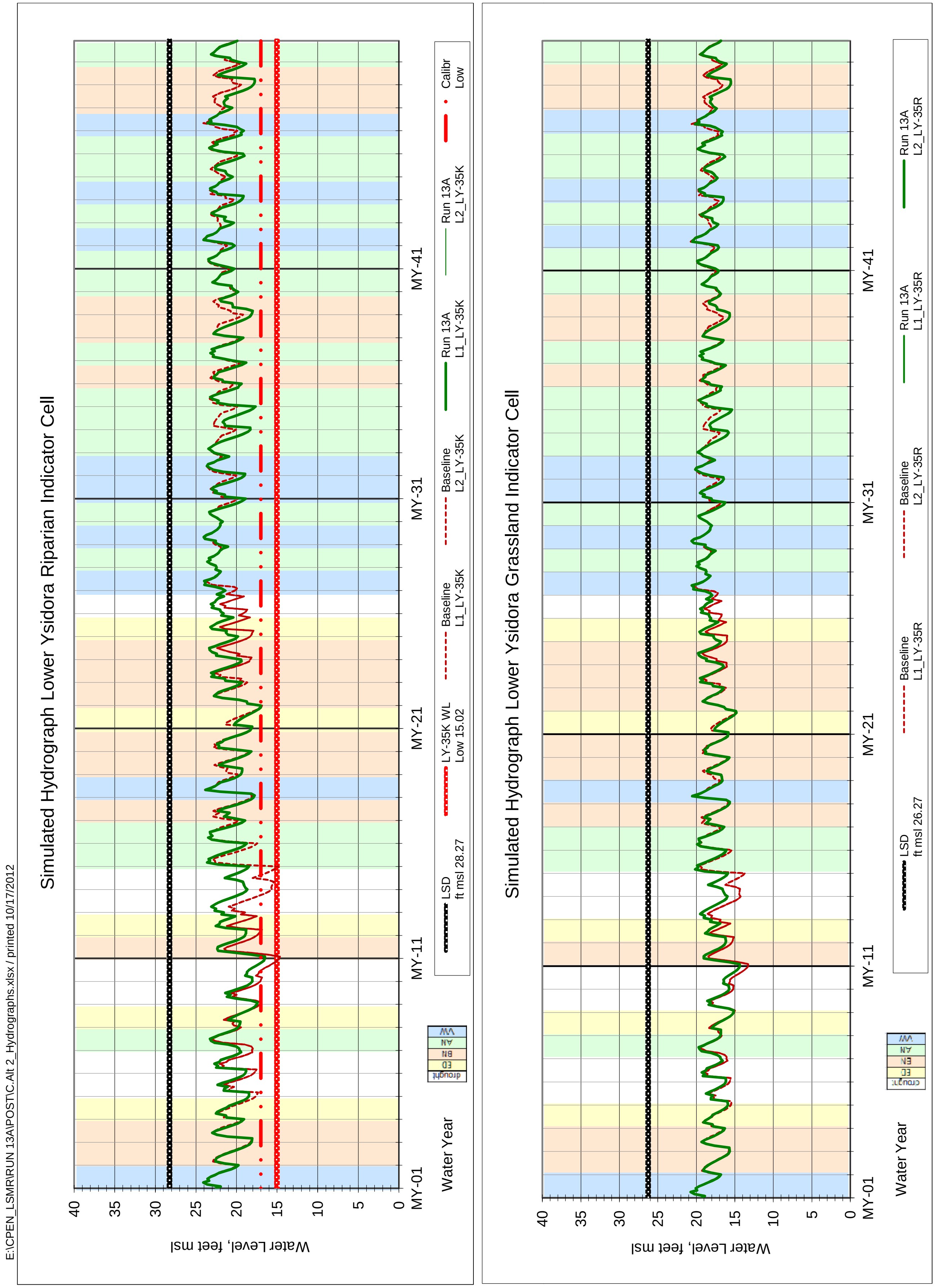




Layer 1 (L1) and Layer 2 (L2) simulated groundwater levels are at similar elevations and the graph lines are printed on top of each other.

FIGURE 3   Run 13A and Baseline Hydrographs using TM1.1 Streamflow
2-Party Negotiation Model Run; 12,800 Average Annual AFY



Layer 1 (L1) and Layer 2 (L2) simulated groundwater levels are at similar elevations and the graph lines are printed on top of each other.

FIGURE 4 Run 13 A and Baseline Streamflow, TM 1.1
2-Party Negotiation Model Run; 12,800 Average Annual AFY

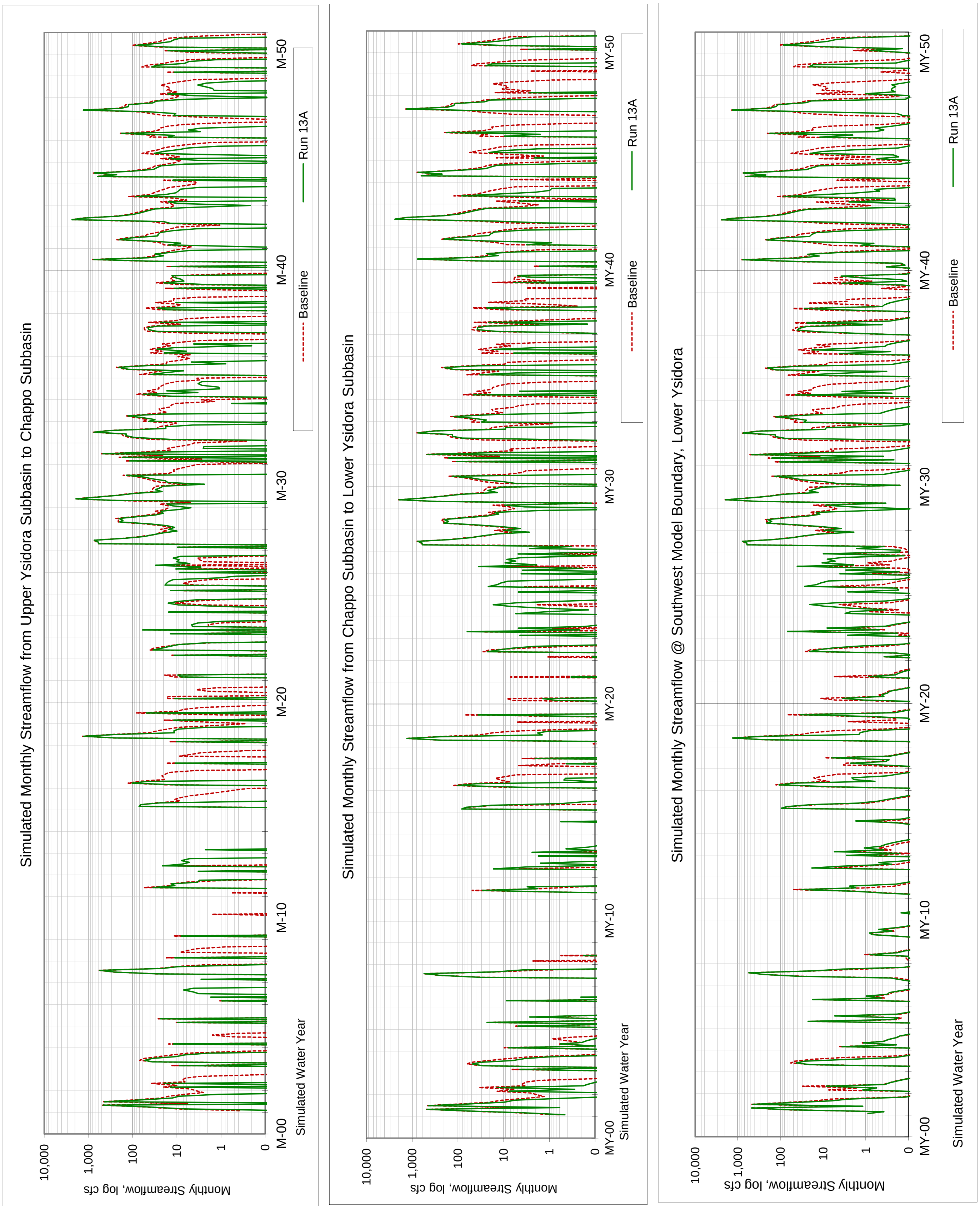


TABLE 4 2-Party Negotiation Gallery Well Model Run 13A; 12,800 Average Annual AFY

Average Hydrologic Condition Water Budget (af/y)

% Time Exceedence	*> 76%*	*76% to 50%*	*50% to 19%*	*< 19%*
# Years	*12*	*14*	*15*	*9*
	Very & Extrm Dry	Below Normal	Above Normal	Very Wet
Inflow:				
Santa Margarita River Inflow	6,200	12,000	32,900	132,900
Subsurface Underflow	600	600	600	600
Lake O'Neill Spill and Release	700	1,400	1,700	2,100
Fallbrook Creek	100	400	1,400	3,800
Title 22 Water	0	0	0	0
Minor Tributary Drainages	1,600	1,500	2,400	4,900
Areal Precipitation	600	500	700	1,600
Total Inflow:	9,800	16,400	39,700	145,900
Outflow:				
Santa Margarita River Outflow	1,300	1,800	18,600	120,100
Subsurface Underflow	0	100	100	100
Groundwater Pumping	5,700	10,800	17,100	18,500
Evapotranspiration	2,200	2,200	2,500	3,100
Diversions to Lake O'Neill	900	1,800	2,300	2,700
Total Outflow:	10,100	16,700	40,600	144,500
Net Simulated Change of Groundwater in Storage:	-200	-200	-900	1,500
	(100)	(100)	-	(100)

Average Subbasin Water Budget (af/y)

	Upper Ysidora	Chappo	Lower Ysidora	SMR Basin	
Inflow:					
Santa Margarita River Inflow	38,600	29,300	27,600	38,600	86%
Subsurface Underflow *	600	1,400	400	600	1%
Lake O'Neill Spill and Release	1,500	-	-	1,500	3%
Fallbrook Creek	1,200	-	-	1,200	3%
Title 22 Water	-	-	0	0	0%
Minor Tributary Drainages	600	1,100	700	2,400	5%
Areal Precipitation	200	300	200	800	2%
Total Inflow:	42,700	32,100	28,900	45,100	
Outflow:					
Santa Margarita River Outflow	29,300	27,600	28,000	28,000	62%
Subsurface Underflow *	1,400	400	100	100	0%
Groundwater Pumping	6,700	3,200	0	9,900	22%
Gallery Well Production	3,000	-	-	3,000	7%
Evapotranspiration *	600	1,000	800	2,400	5%
Diversions to Lake O'Neill	1,900	-	-	1,900	4%
Total Outflow:	42,900	32,200	28,900	45,300	
Net Simulated Change of Groundwater in Storage: *	-100	0	0	-100	
	(100)	(100)	-	(100)	

Note: * Subbasin Averages are based on the last rate of the stress period

Values are rounded to the nearest 100 acre-feet, which may result in a summation rounding error

Median Hydrologic Condition Water Budget (af/y)

% Time Exceedence	*> 76%*	*76% to 50%*	*50% to 19%*	*< 19%*
# Years	*12*	*14*	*15*	*9*
	Very & Extrm Dry	Below Normal	Above Normal	Very Wet
Inflow:				
Santa Margarita River Inflow	6,300	12,900	26,700	121,300
Subsurface Underflow	600	600	600	600
Lake O'Neill Spill and Release	800	1,300	2,000	2,300
Fallbrook Creek	100	300	1,100	3,500
Title 22 Water	0	0	0	0
Minor Tributary Drainages	1,500	1,400	2,500	4,700
Areal Precipitation	400	300	500	1,600
Outflow:				
Santa Margarita River Outflow	400	1,900	12,000	103,800
Subsurface Underflow	0	100	100	100
Groundwater Pumping	5,100	11,200	18,500	20,300
Evapotranspiration	2,100	2,100	2,400	2,900
Diversions to Lake O'Neill	900	1,700	2,500	2,700
Net Simulated Change of Groundwater in Storage:	-200	-600	-800	1,200

Median Subbasin Water Budget (af/y)

	Upper Ysidora	Chappo	Lower Ysidora	SMR Basin
Inflow:				
Santa Margarita River Inflow	16,700	5,400	4,100	16,700
Subsurface Underflow *	600	1,300	400	600
Lake O'Neill Spill and Release	1,500	-	-	1,500
Fallbrook Creek	600	-	-	600
Title 22 Water	-	-	-	0
Minor Tributary Drainages	600	900	600	2,100
Areal Precipitation	200	200	200	500
Outflow:				
Santa Margarita River Outflow	5,400	4,100	4,500	4,500
Subsurface Underflow *	1,300	400	100	100
Groundwater Pumping	7,100	3,400	0	13,400
Evapotranspiration *	600	1,000	900	2,300
Diversions to Lake O'Neill	2,000	-	-	2,000
Net Simulated Change of Groundwater in Storage: *	-300	-300	0	-300

Note: The sum of median values does not reflect the change of groundwater in storage.

Median values are not cummulative. Values are rounded to the nearest 100 acre-foot

* Subbasin Medians are based on the last rate of the stress period

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TABLE 5 Model Run 13A Annual Water Budget Summary

Lower Santa Margarita River Groundwater Model

Modflow Volumetric Budget Output and Streamflow

RUN 13A w TM1.1strflw

2/23/12

Annual Surface Water Budget

MY		SMR Flow In	LON Diversion	Ponds Diversion	Release & Spill	Str Gain+ / Loss-	GAGE SMR @ UY->CH	Str Gain+ / Loss-	SMR @ CH->LY	Str Gain+ / Loss-	SMR Flow Out	LSMR Str Gain+ / Loss-
1	VW	72,916	-2754	-9005	1,399	-10,181	62,735	-131	62,604	1,697	64,301	-8,615
2	BN	9,851	-1646	-3545	1,552	-7,832	2,019	-1,333	686	4	690	-9,160
3	AN	20,681	-1468	-6773	1,058	-11,724	8,957	-3,344	5,613	-178	5,435	-15,246
4	VD	6,075	-1440	-2315	1,120	-5,363	712	-463	249	122	371	-5,705
5	ED	6,569	-908	-1410	971	-4,542	2,027	-630	1,397	365	1,762	-4,807
6	ED	6,129	-710	-1593	387	-4,843	1,286	-741	545	689	1,234	-4,895
7	AN	59,305	-1596	-9311	383	-8,401	50,904	-760	50,144	679	50,823	-8,482
8	VD	6,521	-1361	-2859	1,217	-5,863	658	-648	10	86	96	-6,425
9	ED	3,649	-1013	-1048	1,016	-3,177	472	-468	3	167	170	-3,479
10	ED	3,123	-848	-1609	519	-3,123	-	0	-	39	39	-3,085
11	BN	13,074	-902	-6018	501	-9,307	3,767	-1,832	1,935	283	2,218	-10,856
12	VD	7,435	-580	-2267	434	-4,529	2,906	-1,581	1,325	193	1,517	-5,918
13	ED	3,321	-573	-1160	285	-3,187	133	52	185	318	503	-2,818
14	ED	3,589	-300	-1593	234	-3,589	-	33	33	123	156	-3,433
15	AN	20,522	-2438	-5330	551	-10,745	9,778	299	10,076	1,255	11,331	-9,191
16	AN	22,816	-1985	-7341	1,558	-13,151	9,665	-637	9,028	979	10,007	-12,809
17	BN	6,199	-1426	-2565	1,196	-5,554	645	-493	151	475	627	-5,572
18	VW	117,031	-2248	-11669	1,642	-14,156	102,875	-2,535	100,340	1,677	102,016	-15,015
19	BN	12,744	-2305	-4217	1,680	-9,029	3,715	-1,500	2,214	3	2,217	-10,526
20	BN	6,645	-1257	-2416	1,190	-5,986	659	-533	126	258	384	-6,260
21	VD	8,614	-1614	-1401	1,009	-7,568	1,046	-1,025	21	81	101	-8,513
22	BN	13,510	-1576	-7095	1,206	-8,072	5,437	-2,948	2,490	-139	2,351	-11,159
23	BN	9,953	-1385	-2542	1,037	-4,695	5,258	-827	4,431	551	4,982	-4,971
24	BN	7,708	-1613	-3963	1,115	-4,494	3,214	-999	2,215	366	2,581	-5,127
25	VD	9,653	-797	-3611	1,010	-4,439	5,214	-1,427	3,787	221	4,009	-5,645
26	ED	9,163	-1217	-2413	576	-3,882	5,281	-809	4,472	620	5,092	-4,071
27	VW	138,265	-2906	-12948	2,063	-6,498	131,767	312	132,079	1,975	134,054	-4,211
28	AN	61,252	-2721	-16066	2,352	-13,559	47,693	-3,591	44,102	427	44,529	-16,723
29	VW	195,725	-2739	-16536	2,413	-10,839	184,886	-2,097	182,790	1,697	184,487	-11,238
30	AN	27,995	-2749	-6406	2,126	-12,089	15,906	-2,130	13,776	113	13,889	-14,106
31	AN	61,581	-2697	-6807	2,204	-13,402	48,178	-2,272	45,906	465	46,371	-15,210
32	VW	105,365	-2720	-11912	2,385	-13,711	91,654	-4,395	87,259	712	87,971	-17,394
33	AN	28,766	-2714	-8864	2,173	-14,329	14,438	-1,481	12,956	376	13,333	-15,433
34	AN	21,480	-2702	-8476	2,094	-15,431	6,049	-2,968	3,081	-73	3,008	-18,472
35	AN	38,995	-2197	-8109	1,812	-12,505	26,491	-3,208	23,282	338	23,620	-15,375
36	BN	13,900	-2115	-4623	1,524	-9,801	4,100	-2,544	1,556	4	1,560	-12,340
37	AN	18,856	-1744	-5429	1,293	-8,822	10,034	-1,993	8,041	415	8,456	-10,400
38	BN	12,534	-1767	-4732	1,311	-9,272	3,262	-1,609	1,653	250	1,903	-10,630
39	BN	15,053	-2156	-5887	1,717	-10,807	4,246	-3,445	801	-243	558	-14,495
40	VW	66,151	-2779	-11080	2,318	-10,023	56,128	-2,917	53,210	158	53,369	-12,782
41	AN	40,738	-2711	-12043	2,263	-13,781	26,957	-3,690	23,266	182	23,448	-17,290
42	VW	256,836	-2723	-15723	2,325	-11,236	245,600	-2,232	243,367	1,147	244,514	-12,322
43	AN	23,081	-2752	-12099	2,268	-13,745	9,336	-3,575	5,761	46	5,807	-17,274
44	VW	122,236	-2675	-14823	2,233	-13,774	108,462	-3,081	105,381	1,080	106,461	-15,774
45	BN	17,853	-2748	-10619	2,043	-12,648	5,205	-3,111	2,094	-111	1,982	-15,870
46	AN	26,690	-1995	-8838	1,461	-13,389	13,302	-1,830	11,472	561	12,032	-14,658
47	VW	121,259	-2716	-14977	2,559	-14,797	106,462	-3,763	102,699	1,141	103,840	-17,419
48	BN	13,194	-2744	-7414	2,078	-11,342	1,853	-1,689	164	-10	154	-13,040
49	BN	15,504	-1815	-6800	1,199	-10,169	5,335	-2,825	2,510	-187	2,323	-13,180
50	AN	20,633	-2478	-9322	2,028	-10,316	10,317	-2,737	7,580	18	7,598	-13,035
	avg	38,615	-1,920	-6,912	1,462	**-9,274**	29,340	**-1,763**	27,577	**428**	28,006	**-10,609**
	med	16,678	-1,990	-6,590	1,430	-9,912	5,386	-1,649	4,109	271	4,496	-11,008
AVERAGES												
VD/ED	12	6,153	-947	-1,940	731	-4,509	1,645	-642	1,002	252	1,254	-4,899
BN	14	11,980	-1,818	-5,174	1,382	-8,501	3,480	-1,835	1,645	108	1,752	-10,228
AN	15	32,893	-2,330	-8,747	1,708	-12,359	20,533	-2,261	18,272	374	18,646	-14,247
VW	9	132,865	-2,696	-13,186	2,149	-11,691	121,174	-2,315	118,859	1,254	120,113	-12,752
	50											
MEDIANS												
VD/ED	12	6,325	-878	-1,601	774	-4,484	879	-639	217	180	437	-4,851
BN	14	12,909	-1,706	-4,677	1,258	-9,150	3,741	-1,649	1,794	4	1,943	-10,743
AN	15	26,690	-2,478	-8,476	2,028	-13,151	13,302	-2,272	11,472	376	12,032	-15,210
VW	9	121,259	-2,723	-12,948	2,318	-11,236	106,462	-2,535	102,699	1,147	103,840	-12,782
	50											

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TABLE 5 Model Run 13A Annual Water Budget Summary (continued)
Lower Santa Margarita River Groundwater Model
Modflow Volumetric Budget Output

Annual Groundwater Budget Model Run: RUN 13A w TM1.1strflw

	INFLOW:					OUTFLOW:					
MY	Storage	Recharge	Stream Leakance	GHB	TOTAL GW IN	Storage	Wells	ET	Stream Leakance	GHB	TOTAL GW OUT
1	8,722	10,069	8,537	615	27,942	4,404	18,124	3,131	2,239	67	27,965
2	7,348	3,740	6,629	614	18,331	4,043	12,174	1,838	240	49	18,344
3	4,951	6,978	10,578	615	23,122	8,752	10,758	2,410	1,155	47	23,122
4	4,498	2,613	4,683	612	12,406	3,351	6,837	2,005	174	51	12,417
5	4,040	1,722	6,074	623	12,460	5,143	4,966	2,206	109	47	12,470
6	3,710	2,344	6,508	612	13,174	5,051	5,099	2,631	339	54	13,173
7	7,576	9,917	5,657	608	23,758	5,546	11,820	2,961	3,378	59	23,764
8	6,265	3,014	4,082	621	13,982	2,980	9,493	1,423	72	44	14,011
9	3,147	1,414	4,433	649	9,644	3,267	5,099	1,271	86	48	9,770
10	3,297	1,731	2,275	673	7,976	1,804	5,101	951	45	37	7,938
11	4,426	6,490	8,650	632	20,198	10,523	6,201	2,164	1,269	47	20,204
12	3,239	2,555	6,850	613	13,257	4,773	5,099	2,780	559	48	13,258
13	4,442	1,405	3,088	618	9,553	1,694	5,101	2,472	250	52	9,570
14	3,526	1,931	3,168	637	9,262	2,332	5,099	1,717	69	49	9,266
15	8,386	6,389	7,734	622	23,131	6,384	14,125	2,241	341	58	23,149
16	8,733	7,964	10,852	625	28,173	7,408	18,538	1,827	348	57	28,179
17	6,954	2,893	5,794	633	16,274	3,393	11,545	1,173	129	52	16,292
18	7,025	12,856	13,985	645	34,511	14,263	16,175	2,158	1,868	58	34,523
19	7,661	4,408	6,912	617	19,598	4,862	13,053	1,561	97	48	19,621
20	6,292	2,798	6,198	627	15,917	4,832	9,532	1,380	135	51	15,930
21	3,214	1,690	7,440	649	12,993	5,427	6,329	1,146	67	42	13,010
22	4,617	7,452	7,819	608	20,496	9,174	6,499	2,546	2,232	50	20,501
23	3,930	3,012	5,840	616	13,399	4,467	5,301	2,927	670	52	13,418
24	3,880	4,426	5,372	604	14,282	4,201	5,099	3,177	1,756	56	14,289
25	3,675	4,201	6,786	607	15,269	4,927	5,101	3,237	1,955	56	15,275
26	2,975	2,849	5,833	604	12,262	2,539	5,099	3,494	1,081	58	12,271
27	6,233	14,167	8,150	606	29,155	5,868	13,843	3,618	5,777	66	29,172
28	5,776	16,430	10,211	600	33,018	4,938	19,399	3,375	5,250	59	33,020
29	5,691	17,557	11,221	601	35,070	5,820	20,822	3,326	5,041	66	35,075
30	8,251	6,635	9,906	610	25,401	3,597	18,893	2,410	459	54	25,414
31	8,090	7,252	14,284	617	30,243	8,003	20,041	1,931	241	55	30,271
32	6,602	12,668	16,919	608	36,798	10,204	21,120	2,649	2,741	61	36,776
33	8,827	9,070	9,917	613	28,427	4,516	21,097	2,146	652	54	28,465
34	7,560	8,703	12,443	617	29,322	7,982	18,480	1,641	1,191	47	29,342
35	6,662	8,540	14,004	610	29,816	8,322	18,572	2,181	673	54	29,802
36	6,800	4,881	10,170	609	22,459	5,978	13,981	2,013	452	54	22,478
37	7,466	5,847	10,721	612	24,646	7,156	14,669	2,401	379	57	24,662
38	7,415	4,977	9,252	615	22,258	6,944	13,039	1,816	413	50	22,263
39	5,048	6,084	10,376	615	22,124	8,219	10,629	2,323	895	48	22,114
40	5,948	11,272	9,343	618	27,181	7,169	13,728	2,938	3,287	52	27,175
41	5,716	12,374	11,478	606	30,174	5,395	18,320	3,060	3,386	56	30,216
42	6,749	16,575	11,823	604	35,751	6,566	21,534	3,049	4,532	61	35,740
43	7,323	12,259	9,688	604	29,874	5,854	18,572	2,668	2,743	51	29,888
44	6,543	15,496	12,810	608	35,457	7,943	20,845	2,785	3,866	56	35,495
45	9,458	10,767	8,173	606	29,004	5,923	18,251	2,339	2,433	51	28,997
46	9,068	9,252	11,180	615	30,115	7,966	19,031	1,995	1,100	56	30,148
47	5,647	15,909	15,266	613	37,436	10,262	20,317	2,725	4,082	64	37,449
48	6,474	7,599	7,140	604	21,816	4,201	14,417	1,928	1,217	51	21,814
49	6,198	6,956	7,920	615	21,690	7,507	10,927	2,156	1,074	43	21,708
50	7,599	9,642	8,104	606	25,950	6,772	13,935	2,805	2,443	53	26,008
avg	6,073	7,355	8,646	617	22,691	5,973	12,837	2,342	1,500	53	22,704
med	6,279	6,795	8,161	613	22,791	5,683	13,391	2,331	985	52	22,800
AVERAGES											
VD/ED	3,836	2,289	5,102	627	11,853	3,607	5,702	2,111	400	49	11,869
BN	6,179	5,463	7,589	615	19,846	6,019	10,761	2,096	929	50	19,855
AN	7,466	9,150	10,450	612	27,678	6,573	17,083	2,404	1,583	54	27,697
VW	6,573	14,063	12,006	613	33,256	8,055	18,501	2,931	3,715	61	33,263
MEDIANS											
VD/ED	3,601	2,137	5,258	620	12,433	3,309	5,100	2,105	141	48	12,444
BN	6,383	4,929	7,479	615	20,347	5,393	11,236	2,084	783	51	20,352
AN	7,576	8,703	10,578	612	28,427	6,772	18,538	2,401	1,100	55	28,465
VW	6,543	14,167	11,823	608	35,070	7,169	20,317	2,938	3,866	61	35,075

TABLE 5 Model Run 13A Annual Water Budget Summary (continued)
Lower Santa Margarita River Groundwater Model
Modflow Volumetric Budget Output
Annual Groundwater Budget

MY	NET Storage	NET Str Lknc	In-Out	% bal
1	-4,317	6,298	-23.0	-0.08%
2	-3,305	6,389	-12.8	-0.07%
3	3,801	9,423	-0.1	0.00%
4	-1,147	4,509	-11.2	-0.09%
5	1,102	5,966	-10.3	-0.08%
6	1,341	6,169	0.9	0.01%
7	-2,029	2,279	-6.4	-0.03%
8	-3,285	4,010	-29.0	-0.21%
9	119	4,347	-126.6	-1.30%
10	-1,492	2,230	37.2	0.47%
11	6,097	7,382	-6.0	-0.03%
12	1,534	6,291	-1.0	-0.01%
13	-2,748	2,838	-16.5	-0.17%
14	-1,194	3,099	-4.2	-0.05%
15	-2,002	7,393	-18.0	-0.08%
16	-1,325	10,503	-5.6	-0.02%
17	-3,561	5,665	-17.9	-0.11%
18	7,238	12,117	-12.2	-0.04%
19	-2,798	6,816	-23.3	-0.12%
20	-1,460	6,063	-13.7	-0.09%
21	2,213	7,374	-17.4	-0.13%
22	4,557	5,587	-5.1	-0.02%
23	537	5,170	-19.1	-0.14%
24	321	3,616	-7.5	-0.05%
25	1,251	4,831	-5.9	-0.04%
26	-436	4,752	-9.3	-0.08%
27	-365	2,373	-16.8	-0.06%
28	-838	4,961	-2.7	-0.01%
29	129	6,180	-4.8	-0.01%
30	-4,653	9,447	-13.5	-0.05%
31	-87	14,043	-28.0	-0.09%
32	3,602	14,178	21.5	0.06%
33	-4,311	9,265	-37.9	-0.13%
34	422	11,251	-19.7	-0.07%
35	1,660	13,331	14.5	0.05%
36	-822	9,718	-19.1	-0.08%
37	-310	10,342	-16.0	-0.06%
38	-471	8,838	-4.7	-0.02%
39	3,170	9,481	9.6	0.04%
40	1,221	6,056	5.9	0.02%
41	-321	8,092	-42.0	-0.14%
42	-184	7,291	10.4	0.03%
43	-1,469	6,944	-14.5	-0.05%
44	1,400	8,944	-37.9	-0.11%
45	-3,535	5,739	6.2	0.02%
46	-1,102	10,080	-32.8	-0.11%
47	4,614	11,185	-13.3	-0.04%
48	-2,273	5,923	2.1	0.01%
49	1,309	6,846	-18.1	-0.08%
50	-826	5,661	-57.2	-0.22%
avg	-101	7,146	-13.4	-0.07%
med	-343	6,343	-12.5	-0.06%
AVERAGES				
VD/ED	(229)	4,701	(16)	(0)
BN	(160)	6,659	(9)	(0)
AN	(893)	8,868	(19)	(0)
VW	1,482	8,291	(8)	(0)
MEDIANS				
VD/ED	(158)	4,631	(10)	(0)
BN	(646)	6,226	(10)	(0)
AN	(838)	9,423	(16)	(0)
VW	1,221	7,291	(12)	(0)

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TABLE 6 Gallery Well Model Run 13A Average Monthly Water Budget Summary

Lower Santa Margarita River Groundwater Model — RUN 13A w TM1.1strflw

Modflow Volumetric Budget Output and Streamflow — 2/23/12

Atreamflow

Avg AF/M	SMR Flow In	Diversion	Str Gain+ / Loss-	SMR @ UY->CH	Str Gain+ / Loss-	SMR @ CH->LY	Str Gain+ / Loss-	SMR Flow Out	LSMR Str Gain+ / Loss-
Oct	506	292	-414	92	-53	39	4	43	-462
Nov	1,124	511	-163	960	-507	454	-8	445	-678
Dec	1,873	526	-1,006	867	-120	748	49	796	-1,077
Jan	8,266	834	-1,290	6,975	-42	6,933	145	7,078	-1,188
Feb	10,626	1,793	-1,814	8,812	-98	8,714	116	8,831	-1,796
Mar	9,229	1,934	-1,581	7,648	-157	7,491	97	7,588	-1,641
Apr	3,380	1,299	-1,022	2,358	-203	2,155	37	2,192	-1,187
May	1,429	866	-664	765	-210	555	-5	550	-879
Jun	764	539	-338	426	-178	248	-8	240	-524
Jul	500	128	-255	244	-102	143	-5	137	-362
Aug	422	61	-339	83	-53	30	6	36	-386
Sep	497	49	-388	109	-41	68	0	69	-428
Avg Monthly	3,218	736	-773	2,445	-147	2,298	36	2,334	-884
Med Monthly	1,276	533	-539	816	-111	504	5	498	-779
Avg Total=Anl	38,615	8,832	-9,274	29,340	-1,763	27,577	428	28,006	-10,609

Lower Santa Margarita River Groundwater Model

Modflow Volumetric Budget Output

Groundwater Model

	INFLOW:					OUTFLOW:									
Avg AF/M	Storage	Recharge	Stream Leakance	GHB	TOTAL IN	Storage	Wells	ET	Stream Leakance	GHB	TOTAL OUT	OUT-IN NET Storage	OUT-IN NET Str Lknc	In-Out	% bal
Oct	605	31	412	54	1,102	94	878	123	7	3	1,105	-512	405	-3.4	-0.31%
Nov	87	479	1,525	52	2,143	1,261	771	95	11	4	2,143	1,174	1,515	0.1	0.01%
Dec	305	142	1,027	53	1,526	703	711	87	19	6	1,526	399	1,009	0.1	0.00%
Jan	178	367	1,312	52	1,910	799	967	105	32	6	1,909	620	1,280	0.5	0.02%
Feb	137	1,687	942	47	2,814	1,508	1,055	142	99	6	2,810	1,371	843	3.6	0.13%
Mar	162	1,992	794	52	3,000	1,033	1,396	218	347	6	2,999	871	448	0.9	0.03%
Apr	420	1,340	582	50	2,393	281	1,471	263	375	5	2,396	-139	207	-3.1	-0.13%
May	427	920	430	52	1,829	201	956	307	358	4	1,827	-226	72	1.6	0.09%
Jun	867	310	401	50	1,628	36	1,095	301	198	3	1,633	-831	203	-5.1	-0.31%
Jul	1,092	68	363	52	1,575	7	1,243	285	42	3	1,581	-1,084	321	-5.5	-0.35%
Aug	995	11	389	53	1,448	9	1,191	240	6	3	1,449	-986	382	-1.3	-0.09%
Sep	798	9	466	52	1,324	40	1,102	177	5	3	1,326	-758	461	-1.8	-0.14%
Avg Monthly	506	613	720	51	1,891	498	1,070	195	125	4	1,892	-8	595	-1.1	-0.09%
Med Monthly	424	338	524	52	1,728	241	1,075	197	37	4	1,730	-182	426	-0.6	-0.04%
Avg Total=Anl	6,073	7,355	8,646	617	22,691	5,973	12,837	2,342	1,500	53	22,704	-101	7,146	-13.4	

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Appendix C-1

Plant Community Descriptions, Tables, and Figures

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Plant Community Descriptions (Alternative 1)

Riparian Communities

- Southern Riparian Woodland (SRW, CLORF, SWRF, CWRF) – a medium-density, broad-leafed riparian woodland community dominated by small trees or shrubs, with scattered taller riparian tree species. Characteristic species within southern riparian woodland include California sycamore (*Platanus racemosa*), willows (*Salix* spp.), Fremont's cottonwood (*Populus fremontii*), and Mexican elderberry (*Sambucus nigra*).
- Southern Riparian Scrub (SWS, MFS, SRS) – a dense, winter-deciduous riparian scrub community. In the project areas, it is typically dominated by mulefat (*Bacharris glutinosa*) and arroyo willow and may include several other willow species (e.g., black willow and western sand bar willow [*Salix exigua*]) and stinging nettle (*Urtica holosericea*). This habitat type is considered an early successional stage that will grow to riparian woodland, eventually without disturbance.
- Open Water/Open Gravel (OW, FLO) – encompass non-vegetated or very sparsely vegetated areas. Included in this habitat type are sand and gravel washes, mud banks, and open water. Vegetation may occur in these floodplains or channels but is usually less than 10% total cover.
- Freshwater Marsh (FWM, CVFM) – wetlands that are permanently flooded by standing freshwater lacking a significant current. Characteristic species include woolly sedge (*Carex pellita*), cattail (*Typha* spp.), and southern mudwort (*Limosella aquatica*).
- Mixed Woodland (SRF) – characterized by riparian woodlands containing less than 70% willows and a low occurrence of exotic vegetation. Plant species included in this community are California sycamore, willows, coast live oak (*Quercus agrifolia*), and Mexican elderberry.
- Sycamore Grassland (SG) – grasslands containing open, winter-deciduous broad-leaved riparian woodland overwhelmingly dominated by well-spaced California sycamore. The understory is usually dominated by non-native grasses (*Bromus* spp., *Vulpia* spp., etc.).
- Grass-forb Mix (NNR) – includes exotic species such as mustard (*Brassica* spp.), sweet fennel (*Foeniculum vlugare*), non-native grasses, and goldenbush (*Isocoma menziesii*).
- Mixed Willow-Exotic/ Exotic-Other (NNR, ARU) – characterized as containing less than 70% willows, with a large percentage of exotic plants including giant reed (*Arundo donax*), tamarisk (*Tamarix* spp.), common reed (*Phragmites australis*), and pampas grass (*Cortaderia* spp.).

Upland Scrub Communities

- Diegan Coastal Sage (DCSS, CSSB) – consists of sparsely to densely spaced, low- growing, drought-deciduous shrubs. Plant species characteristic of Diegan Coastal Sage Scrub include coastal sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), black sage (*Salvia mellifera*), white sage (*Salvia apiana*), and bush monkey-flower (*Mimulus aurantiacus*).

Upland Grassland/ Herbaceous Communities

- Non-native Grassland (NNG, NNGB) – a community dominated by non-native annual grasses and weedy herbaceous species. Dominant exotic species include ripgut brome (*Bromus diandrus*), red brome (*Bromus madritensis* ssp. *rubens*), wild oats (*Avena* spp.), wild barley (*Hordeum* spp.), Italian ryegrass (*Festuca perennis*), filaree (*Erodium* spp.), and soft chess brome (*Bromus hordeaceus*).
- Non-native Vegetation (NNGB) – characterized by non-native, invasive broadleaf species. Within the project area this community is dominated by sweet fennel, non-native thistle species (*Carduus pycnocephalus*, *Silybum marianum*, *Centaurea melitensis*), and mustard species (*Brassica nigra*, *Hirschfeldia incana*).
- Purple Needlegrass (VNG) – dominated by the perennial, bunch-forming purple needlegrass (*Stipa pulchra*). This community usually occurs on fine-textured (often clay) soils. Native and introduced annual grasses usually occur between the perennials, often exceeding the bunchgrasses in cover.

Upland Woodland Communities

- Eucalyptus Woodland (EUC) – non-native woodland dominated by large naturalized blue and/or red gum trees (*Eucalyptus* spp.).
- Coast Live Oak Woodland (CLO) – dominated by coast live oak that occurs on shaded slopes, bottomlands, and valleys, but not particularly in riparian corridors.

Disturbed/Developed

- Disturbed Habitat and Developed (DIST, DEV) – is where past or present physical disturbance is prevalent such that an area is no longer recognizable as a native or naturalized vegetation association; in addition to areas that do not support native vegetation and are characterized by permanent or semi-permanent structures.

Plant Community Descriptions (Alternative 2)

Riparian Communities

- Southern Riparian Woodland (SRW) (62500) is a medium-density riparian woodland community dominated by small trees or shrubs, with scattered taller riparian tree species. Characteristic species within SRW include California sycamore (*Platanus racemosa*), willows (*Salix* spp.), and elderberry (*Sambucus nigra* ssp. *caerulea*).
- Southern Coast Live Oak Riparian Forest (CLORF) (61310) is a dense riparian forest dominated by coast live oak with a closed, or nearly-closed, canopy. Characteristic species include mugwort, toyon (*Heteromeles arbutifolia*), California wild rose (*Rosa californica*), California blackberry, poison oak, and blue elderberry.
- Southern Arroyo Willow Riparian Forest (SWRF) (61320) is a winter-deciduous riparian forest dominated by arroyo willow (*Salix lasiolepis*) and having closed, or nearly-closed canopies. Characteristic species include mugwort, mule-fat (*Baccharis salicifolia*), California sycamore, cottonwoods (*Populus* spp.), black willow (*Salix gooddingii*), and stinging nettle (*Urtica dioica*).
- Southern Cottonwood/Willow Riparian Forest (CWRF) (61330) is a tall, open, broad-leaved winter-deciduous riparian forest that is dominated by willows (*Salix* spp.), western cottonwood (*Populus fremontii*), and/or black cottonwood (*Populus trichocarpa*).
- Southern Willow Scrub (SWS) (63320) is a dense, winter-deciduous riparian scrub community. In the project areas, it is typically dominated by arroyo willow and may include several other willow species (e.g., black willow and western sand bar willow [*Salix exigua*]) and mule-fat.
- Southern Riparian Forest (SRF) (61300) is a riparian community with mixed tree canopy, but no apparent dominant species. Typical trees may include coast live oak (*Quercus agrifolia*), willows (*Salix* spp.), western sycamore (*Platanus racemosa*), and/or western cottonwood.
- Southern Riparian Scrub (SRS) (63300) is a shrubby riparian thicket dominated by willows and coyote brush.
- Sycamore Grassland (SG) (62100) is open to moderately closed, winter-deciduous broad-leaved riparian woodland overwhelmingly dominated by well-spaced sycamore (*Platanus racemosa*), with blue elderberry widely spaced in the subcanopy. The understory is usually dominated by non-native grasses.
- Mule-fat Scrub (MFS) (63310) is a riparian scrub community dominated by mule-fat and often represents an early seral stage in the establishment of willow- or sycamore-dominated riparian forests. Other species that are characteristic of this vegetation community include arroyo willow and poison hemlock.
- Non-native Riparian (NNR) (65000) is dominated by non-native species, including giant reed (*Arundo donax*), tamarisk (*Tamarix* spp.), common reed (*Phragmites australis*), and pampas grass (*Cortaderia* spp.). NNR is found in a variety of wetland habitats, often where disturbance has occurred.
- Arundo-dominated Riparian (ARU) (65100) describes riparian thickets that are almost exclusively dominated by giant reed (*Arundo donax*).

Upland Scrub Communities

- Diegan Coastal Sage Scrub (DCSS) (32510) consists of sparsely to densely spaced, lowgrowing, drought-deciduous shrubs. Plant species characteristic of DCSS include coastal sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), black sag (*Salvia mellifera*), white sage (*Salvia apiana*), and bush monkey-flower (*Mimulus aurantiacus*).
- Diegan Coastal Sage Scrub: Baccharis-Dominated (CSSB) (32530) is similar to DCSS but dominated by coyote brush (*Baccharis pilularis*). This community is often found within other forms of DCSS on mesic slopes and adjacent to drainages, particularly on previously disturbed sites. Other characteristic species include California sagebrush, California buckwheat, and coastal goldenbush (*Isocoma menziesii*).
- Coastal Sage-Chaparral Scrub (CSS-CHAP) (37G00) is a mixed community of both low, soft leaved coastal sage species and taller leathery leaved shrubs. The dominant taller evergreen species within the project area include lemonade berry (*Rhus integrifolia*), toyon (*Heteromeles arbutifolia*) and laurel sumac.
- Southern Mixed Chaparral (SMC) (37130) is a sclerophyll shrub dominated community often with patches of bare soil or forming a mosaic with scrub communities. This community is typically found on dry, rocky slopes with little soil and moderate temperatures. In the project area, SMC is typically dominated by chamise (*Adenostema fasciculatum*), with laurel sumac (*Malosma laurina*) and scrub oak (*Quercus berberidifolia*) as common components.

Upland Grassland/ Herbaceous Communities

- Valley Needlegrass Grassland (VNG) (42110) is dominated by the perennial, bunch-forming purple needlegrass (*Stipa pulchra*). This community usually occurs on fine-textured (often clay) soils. Native and introduced annual grasses usually occur between the perennials, often exceeding the bunchgrasses in cover.
- Non-native Grassland (NNG) (42200) is dominated by non-native annual grasses and weedy herbaceous species. Dominant exotic species include ripgut brome (*Bromus diandrus*), red brome (*Bromus madritensis* ssp. *rubens*), wild oats (*Avena* spp.), wild barley (*Hordeum* spp.), Italian ryegrass (*Festuca perennis*), filaree (*Erodium* spp.), and soft chess brome (*Bromus hordeaceus*).
- Non-native Grassland: Broadleaf-dominated (NNGB) (42210) is dominated by non-native, invasive broadleaf species. NNGB is generally found in disturbed areas. Within the project area this community is dominated by sweet fennel (*Foeniculum vulgare*), non-native thistle species (*Carduus pycnocephalus*, *Silybum marianum*, *Centaurea melitensis*), and mustard species (*Brassica nigra*, *Hirschfeldia incana*).

Bottomland Communities

- Coastal and Valley Freshwater Marsh (CVFM) is typically dominated by perennial, emergent monocots (e.g., rushes [*Juncus* spp.], sedges [*Carex* spp.], cattails [*Typha* spp.]), and often consists of uniform stands with closed canopies. This community occurs in wetlands that are permanently to semi-permanently flooded by standing freshwater lacking a significant current. Prolonged saturation of such areas permits the accumulation of deep, peaty soils.

- Freshwater Marsh (FWM) (52400) typically occurs on MCB Camp Pendleton in coastal floodplains and valleys; dominated by sedges, (*Carex* spp.), bulrushes (*Scripus* spp.), and cattails (*Typha* spp.).
- Non-vegetated Floodplain or Channel (FLO) (64200) includes the sandy, gravelly, or rocky fringe of waterways or flood channels. Vegetation may occur in these floodplains or channels but is usually less than 10% total cover.
- Open Water (OW) (13140) areas include the freshwater waters and substrates of mostly unvegetated bodies of water. This habitat type includes ponds, lakes, creeks, streams, and rivers.

Upland Woodland Communities

- Eucalyptus Woodland (EUC) (11100) is a type of non-native woodland dominated by large naturalized blue and/or red gum trees (*Eucalyptus* spp.).
- Coast Live Oak Woodland (CLO) (71160) is a woodland dominated by coast live oak that occurs on shaded slopes, bottomlands, and valleys, but not particularly in riparian corridors. Holland/Oberbauer identifies variations for open canopy (71161) and dense canopy (71162).

Disturbed/Developed

- Agriculture (AGR) (18300) describes areas used as agricultural fields in the past and/or present.
- Disturbed Habitat (DIST) (11000) is where past or present physical disturbance is prevalent such that an area is no longer recognizable as a native or naturalized vegetation association.
- Urban/Developed (DEV) (12000) areas do not support native vegetation and are characterized by permanent or semi-permanent structures.

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Table C-1. Potential Permanent Impacts to Plant Communities within the Santa Margarita River Conjunctive Use Project Area for the Alternative 1

Plant Community Type	Waters of the U.S. (No/ Yes)	Permanent Impact Acreages within the Project Area							
		Diversion Weir	O'Neill Ditch	Production Wells, Conveyance Pipelines, and Permanent Access Roads	Bi-directional Pipeline and Booster Pump Stations			FPUD WTP	Project Total
		MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	DET Fallbrook	Non-DOD	Non-DOD	
Riparian (as defined by the Riparian BO)									
Southern Riparian Woodland	No	-	-	-	-	-	-	-	0.00
	Yes	-	0.02	-	-	-	-	-	0.02
Southern Riparian Scrub	No	0.15	-	0.81	-	-	-	-	0.96
	Yes	0.35	0.53	-	-	-	-	-	0.88
Open Water/Open Gravel	No	-	-	-	-	-	-	-	0.00
	Yes	0.35	1.26	-	-	-	-	-	1.61
Freshwater Marsh	No	-	-	-	-	-	-	-	0.00
	Yes	-	-	-	-	-	-	-	0.00
Mixed Woodland	No	0.08	-	0.07	-	-	-	-	0.15
	Yes	0.12	0.07	-	-	-	-	-	0.19
Sycamore Grassland	No	-	-	-	-	-	-	-	0.00
	Yes	-	-	-	-	-	-	-	0.00
Grass-forb Mix	No	0.13	-	0.83	-	-	-	-	0.96
	Yes	0.15	0.27	-	-	-	-	-	0.42
Mixed-willow Exotic/ Exotic-Other	No	-	-	-	-	-	-	-	0.00
	Yes	-	0.01	-	-	-	-	-	0.01
	Subtotal	***1.33***	***2.16***	***1.71***	***0.00***	***0.00***	***0.00***	***0.00***	***5.20***

Plant Community Type	Waters of the U.S. (No/ Yes)	Permanent Impact Acreages within the Project Area							
		Diversion Weir	O'Neill Ditch	Production Wells, Conveyance Pipelines, and Permanent Access Roads	Bi-directional Pipeline and Booster Pump Stations			FPUD WTP	Project Total
		MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	DET Fallbrook	Non-DOD	Non-DOD	
Upland Scrub									
Diegan Coastal Sage Scrub	N/A	0.23	0.03	-	0.17	-	-	-	0.43
Subtotal		***0.23***	***0.03***	***0.00***	***0.17***	***0.00***	***0.00***	***0.00***	***0.43***
Upland Grassland/Herb									
Non-native Grassland	N/A	-	-	-	-	-	-	-	***0.00***
Non-native Vegetation	N/A	-	-	-	-	-	-	-	***0.00***
Purple Needlegrass	N/A	-	-	-	-	-	-	-	***0.00***
Subtotal		***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***
Upland Woodland									
Eucalyptus Woodland	N/A	-	0.05	-	-	-	-	-	***0.05***
Coast Live Oak Woodland	N/A	-	-	-	-	-	-	-	***0.00***
Subtotal		***0.00***	***0.05***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.05***
Disturbed/Developed									
Disturbed and Developed Habitat	N/A	0.04	0.06	0.23	0.08	0.00	0.21	5.09	5.71
Subtotal		***0.04***	***0.06***	***0.23***	***0.08***	***0.00***	***0.21***	***5.09***	***5.71***
Total		**1.60**	**2.29**	**1.94**	**0.25**	**0.00**	**0.21**	**5.09**	**11.38**

FPUD = Fallbrook Public Utility District; WTP = Water Treatment Plant; MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station, Detachment Fallbrook; DOD = Department of Defense.

Table C-2. Potential Temporary Impacts to Plant Communities within the Santa Margarita River Conjunctive Use Project Area for Alternative 1

Plant Community Type	Temporary Impact Acreages within the Project Area								
	Diversion Weir	O'Neill Ditch	Production Wells, Conveyance Pipelines, and Permanent Access Roads	Temporary Construction Lay-down Area	Bi-directional Pipeline[2] and Booster Pump Stations			FPUD WTP	Project Total
	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	DET Fallbrook	Non-DOD	Non-DOD	
Riparian (as defined by the Riparian BO) [1]									
Southern Riparian Woodland	-	0.24	2.24	-	-	0.11	-	-	2.60
Southern Riparian Scrub	0.41	0.20	4.37	0.01	0.60	0.50	-	-	6.09
Open Water/Open Gravel	0.31	0.23	0.75	-	-	-	-	-	1.29
Freshwater Marsh	-	-	-	-	-	-	-	-	0.00
Mixed Woodland	0.22	2.84	0.49	-	0.15	-	-	-	3.70
Sycamore Grassland	-	-	-	-	-	-	-	-	0.00
Grass-forb Mix	0.24	4.57	3.40	-	-	-	-	-	8.21
Mixed-willow Exotic/ Exotic-Other	-	0.22	0.23	-	-	-	-	-	0.45
Subtotal	***1.18***	***8.30***	***11.49***	***0.01***	***0.75***	***0.61***	***0.00***	***0.00***	***22.34***
Upland Scrub									
Diegan Coastal Sage Scrub	0.20	1.47	0.22	-	7.27	16.16	-	-	25.32
Subtotal	***0.20***	***1.47***	***0.22***	***0.00***	***7.27***	***16.16***	***0.00***	***0.00***	***25.32***
Upland Grassland/Herb									
Non-native Grassland	-	-	0.13	0.83	2.76	5.08	-	-	8.79
Non-native Vegetation	-	-	-	-	0.45	-	-	-	0.45
Purple Needlegrass	-	-	-	-	-	0.67	-	-	0.67

Plant Community Type	Temporary Impact Acreages within the Project Area								
	Diversion Weir	O'Neill Ditch	Production Wells, Conveyance Pipelines, and Permanent Access Roads	Temporary Construction Lay-down Area	Bi-directional Pipeline[2] and Booster Pump Stations			FPUD WTP	Project Total
	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	DET Fallbrook	Non-DOD	Non-DOD	
Subtotal	***0.00***	***0.00***	***0.13***	***0.83***	***3.21***	***5.75***	***0.00***	***0.00***	***9.91***
Upland Woodland									
Eucalyptus Woodland	-	0.22	0.13	-	0.90	0.49	-	-	1.73
Coast Live Oak Woodland	-	-	-	-	0.03	0.58	-	-	0.61
Subtotal	***0.00***	***0.22***	***0.13***	***0.00***	***0.92***	***1.07***	***0.00***	***0.00***	***2.34***
Disturbed/Developed									
Disturbed and Developed Habitat	0.05	1.59	4.73	0.11	14.59	3.22	43.96	2.15	70.41
Subtotal	***0.05***	***1.59***	***4.73***	***0.11***	***14.59***	***3.22***	***43.96***	***2.15***	***70.41***
Total	**1.43**	**11.58**	**16.69**	**0.95**	**26.74**	**26.81**	**43.96**	**2.15**	**130.31**

[1] Impacts to Waters of the United States (WOTUS) are included in the overall temporary impact acreage impact assessment for riparian habitat, and not separated out in this analysis.

[2]For temporary impacts to the Bi-directional Pipeline, it is estimated that construction will require 50 feet out of the 100 foot wide footprint in straight segments, plus additional width when the pipeline turns corners; therefore, 60% of the overall vegetation impacts to the 100 foot corridor was used as an acreage impact. Appendix A Figures depict 100%, rather than 60%, for illustration purposes.

FPUD = Fallbrook Public Utility District; WTP = Water Treatment Plant; MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station, Detachment Fallbrook; DOD = Department of Defense.

Table C-3. Potential Permanent Impacts to Plant Communities within the Santa Margarita River Conjunctive Use Project Area for the Alternative 2

Plant Community Type	Permanent Impact Acreages within the Project Area								
	Recharge Ponds	Diversion Weir	O'Neill Ditch	Production Wells, Conveyance Pipelines, and Permanent Access Roads	Bi-directional Pipeline and Booster Pump Stations			Gallery Wells	Project Total
	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	DET Fallbrook	Non-DOD	MCB Camp Pendleton	
Riparian									
Non-native Riparian (NNR)	-	-	-	-	-	-	-	0.09	0.09
Sycamore Grassland (SG)	-	-	0.63	-	-	-	-	-	0.63
Southern Riparian Scrub (SRS)	-	0.30	0.68	0.80	-	-	-	0.89	2.67
Southern Riparian Woodland (SRW)	-	0.41	0.11	0.07	-	-	-	3.21	3.80
Subtotal	***0.00***	***0.71***	***1.42***	***0.87***	***0.00***	***0.00***	***0.00***	***4.19***	***7.19***
Upland Scrub									
Diegan Coastal Sage Scrub: Baccharis dominated (CSSB)	-	-	-	-	0.02	-	-	-	0.02
Diegan Coastal Sage Scrub (DCSS)	-	0.26	0.23	-	0.16	-	-	-	0.65
Southern Mixed Chaparral (SMC)	-	-	-	-	-	0.004	-	-	0.004
Subtotal	***0.00***	***0.26***	***0.23***	***0.00***	***0.18***	***0.004***	***0.00***	***0.00***	***0.67***
Upland Grassland/Herb									
Non-Native Grassland: Broadleaf-dominated (NNGB)	-	0.06	0.56	0.83	-	-	-	0.03	***1.48***
Subtotal	***0.00***	***0.06***	***0.56***	***0.83***	***0.00***	***0.00***	***0.00***	***0.03***	***1.48***

Plant Community Type	**Permanent Impact Acreages within the Project Area**								
	Recharge Ponds	**Diversion Weir**	**O'Neill Ditch**	**Production Wells, Conveyance Pipelines, and Permanent Access Roads**	**Bi-directional Pipeline and Booster Pump Stations**			**Gallery Wells**	**Project Total**
	MCB Camp Pendleton	**MCB Camp Pendleton**	**MCB Camp Pendleton**	**MCB Camp Pendleton**	**MCB Camp Pendleton**	**DET Fallbrook**	**Non-DOD**	**MCB Camp Pendleton**	
Bottomland									
Non-Vegetated Floodplain/Channel (FLO)	-	0.10	-	-	-	-	-	-	***0.10***
Freshwater Marsh (FWM)	-	0.23	-	-	-	-	-	-	***0.23***
Subtotal	***0.00***	***0.33***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.33***
Upland Woodland									
Eucalyptus Woodland (EUC))	-	-	0.05	-	-	-	-	-	***2.93***
Subtotal	***0.00***	***0.00***	***0.05***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.05***
Disturbed/Developed									
Urban/Developed (DEV)	-	0.0004	0.06	0.03	0.08	-	0.21	0.05	0.43
Subtotal	***0.00***	***0.0004***	***0.06***	***0.03***	***0.08***	***0.00***	***0.21***	***0.05***	***0.43***
Total	**0.00**	**1.36**	**2.32**	**1.73**	**0.26**	**0.004**	**0.21**	**4.27**	**10.15**

FPUD = Fallbrook Public Utility District; WTP = Water Treatment Plant; MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station, Detachment Fallbrook; DOD = Department of Defense.

Table C-4. Potential Temporary Impacts to Plant Communities within the Santa Margarita River Conjunctive Use Project Area for Alternative 2

Plant Community Type	Temporary Impact Acreages within the Project Area								
	Recharge Ponds	Diversion Weir	O'Neill Ditch	Production Wells, Conveyance Pipelines, and Permanent Access Roads	Bi-directional Pipeline and Booster Pump Stations			Gallery Wells	Project Total
	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	DET Fallbrook	Non-DOD	MCB Camp Pendleton	
Riparian									
Southern Coast Live Oak Riparian Forest	-	-	-	-	-	1.15	-	-	1.15
Southern Cottonwood-willow Riparian Forest (CWRF)	-	-	-	-	-	-	0.64	-	0.64
Mule-fat Scrub (MFS)	-	-	-	0.24	0.18	-	-	-	0.42
Non-native Riparian (NNR)	-	-	-	0.08	-	-	-	0.07	0.16
Sycamore Grassland (SG)	0.33	-	2.12	0.28	-	-	-	-	2.73
Southern Riparian Forest (SRF)	-	-	-	-	0.25	-	-	-	0.25
Southern Riparian Scrub (SRS)	1.87	0.06	1.06	5.28	0.77	1.00	-	0.76	10.80
Southern Riparian Woodland (SRW)	1.65	0.47	0.74	3.32	-	-	-	1.34	7.52
Southern Arroyo Willow Riparian Forest	-	-	-	0.02	-	-	-	-	0.02
Southern Willow Scrub (SWS)	-	-	-	0.01	-	-	-	-	0.01
Subtotal	***3.85***	***0.53***	***3.92***	***9.24***	***1.21***	***2.15***	***0.64***	***2.17***	***23.71***
Upland Scrub									

Plant Community Type	Temporary Impact Acreages within the Project Area								
	Recharge Ponds	Diversion Weir	O'Neill Ditch	Production Wells, Conveyance Pipelines, and Permanent Access Roads	Bi-directional Pipeline and Booster Pump Stations			Gallery Wells	Project Total
	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	DET Fallbrook	Non-DOD	MCB Camp Pendleton	
Diegan Coastal Sage Scrub: Baccharis dominated (CSSB)	-	-	-	0.09	0.80	-	-	-	0.89
Coastal Sage-Chaparral Scrub (CSS-CHAP)	-	-	-	0.10	2.97	-	-	-	3.07
Diegan Coastal Sage Scrub (DCSS)	0.08	0.21	1.83	0.01	11.35	28.11	0.01	-	41.60
Southern Mixed Chaparral (SMC)	-	-	-	-	-	-	3.43	-	3.43
Subtotal	***0.08***	***0.21***	***1.83***	***0.20***	***15.11***	***28.11***	***3.44***	***0.00***	***48.98***
Upland Grassland/Herb									
Non-native Grassland (NNG)	-	-	-	0.13	3.09	13.59	1.89	-	***18.69***
Non-Native Grassland: Broadleaf-dominated (NNGB)	6.00	0.25	3.76	3.49	-	-	-	-	***13.51***
Valley Needlegrass Grassland (VNG)	-	-	-	-	-	1.27	-	-	***1.27***
Subtotal	***6.00***	***0.25***	***3.76***	***3.61***	***3.09***	***14.86***	***1.89***	***0.00***	***33.46***
Bottomland									
Coastal and Valley Freshwater Marsh (CVFM)	-	-	-	0.01	-	-	-	-	***0.01***
Non-Vegetated Floodplain/Channel (FLO)	0.27	0.06	-	-	-	-	-	0.11	***0.44***
Freshwater Marsh (FWM)	-	0.40	0.01	-	-	0.75	-	-	***1.16***
Open Water (OW)	-	-	0.02	0.07	-	-	-	-	***0.09***

Plant Community Type	Temporary Impact Acreages within the Project Area								
	Recharge Ponds	**Diversion Weir**	**O'Neill Ditch**	**Production Wells, Conveyance Pipelines, and Permanent Access Roads**	**Bi-directional Pipeline and Booster Pump Stations**			**Gallery Wells**	**Project Total**
Plant Community Type	**MCB Camp Pendleton**	**MCB Camp Pendleton**	**MCB Camp Pendleton**	**MCB Camp Pendleton**	**MCB Camp Pendleton**	**DET Fallbrook**	**Non-DOD**	**MCB Camp Pendleton**	
Subtotal	***0.27***	***0.46***	***0.03***	***0.08***	***0.00***	***0.75***	***0.00***	***0.11***	***1.70***
Upland Woodland									
Coast Live Oak Woodland (CLO)	-	-	-	-	-	-	0.85	-	***0.85***
Eucalyptus Woodland (EUC))	-	-	0.22	0.001	1.13	1.56	0.02	-	***2.93***
Subtotal	***0.00***	***0.00***	***0.05***	***0.00***	***0.00***	***0.00***	***0.00***	***0.00***	***0.05***
Disturbed/Developed									
Agriculture (AGR)	-	-	-	-	-	-	11.13	-	11.13
Urban/Developed (DEV)	4.46	0.05	1.90	3.96	21.01	12.59	21.45	0.03	65.45
Disturbed Habitat (DIST)	-	-	-	0.10	0.21	2.25	-	-	2.57
Subtotal	***4.46***	***0.05***	***1.90***	***4.06***	***21.22***	***14.84***	***32.58***	***0.03***	***79.14***
Total	**14.66**	**1.50**	**11.67**	**17.19**	**41.76**	**62.27**	**39.42**	**2.31**	**190.77**

FPUD = Fallbrook Public Utility District; WTP = Water Treatment Plant; MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station, Detachment Fallbrook; DOD = Department of Defense.

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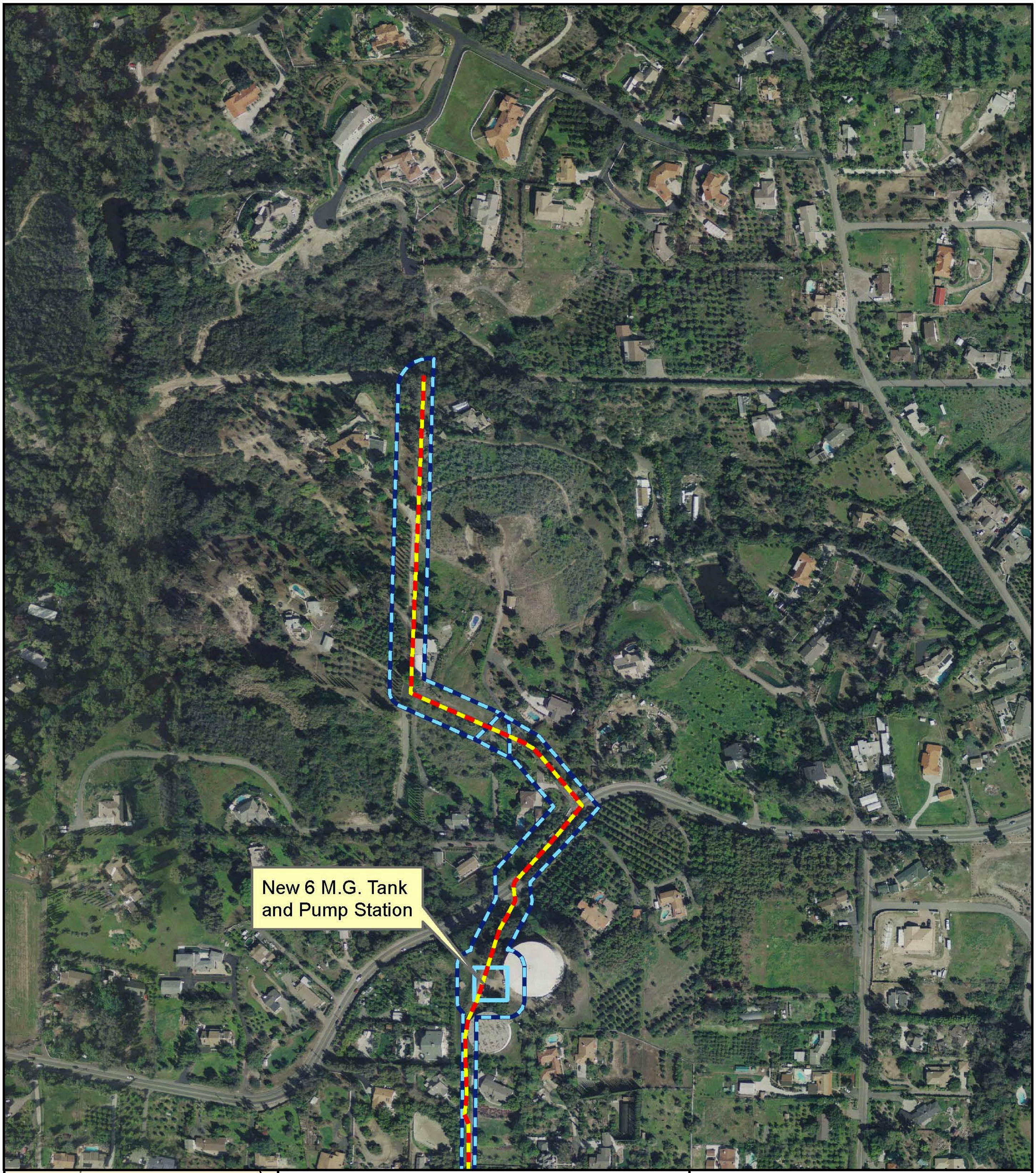
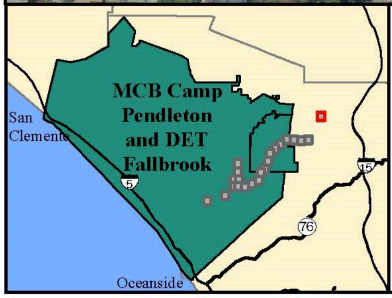




Legend

- Permanent Impact Area
- Temporary Impact Area
- Alternative 1 and 2
- DET Fallbrook Boundary
- XYZ Pant Community Code

Plant Communities for
Alternatives 1 and 2

0 200 400 Feet

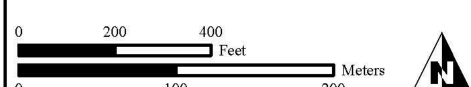
0 100 200 Meters

Sources: San Diego County 2010;
MCB Camp Pendleton 2012; DET Fallbrook 2012

Legend

Temporary Impact Area
Alternative 1 and 2
DET Fallbrook Boundary

Plant Communities for Alternatives 1 and 2



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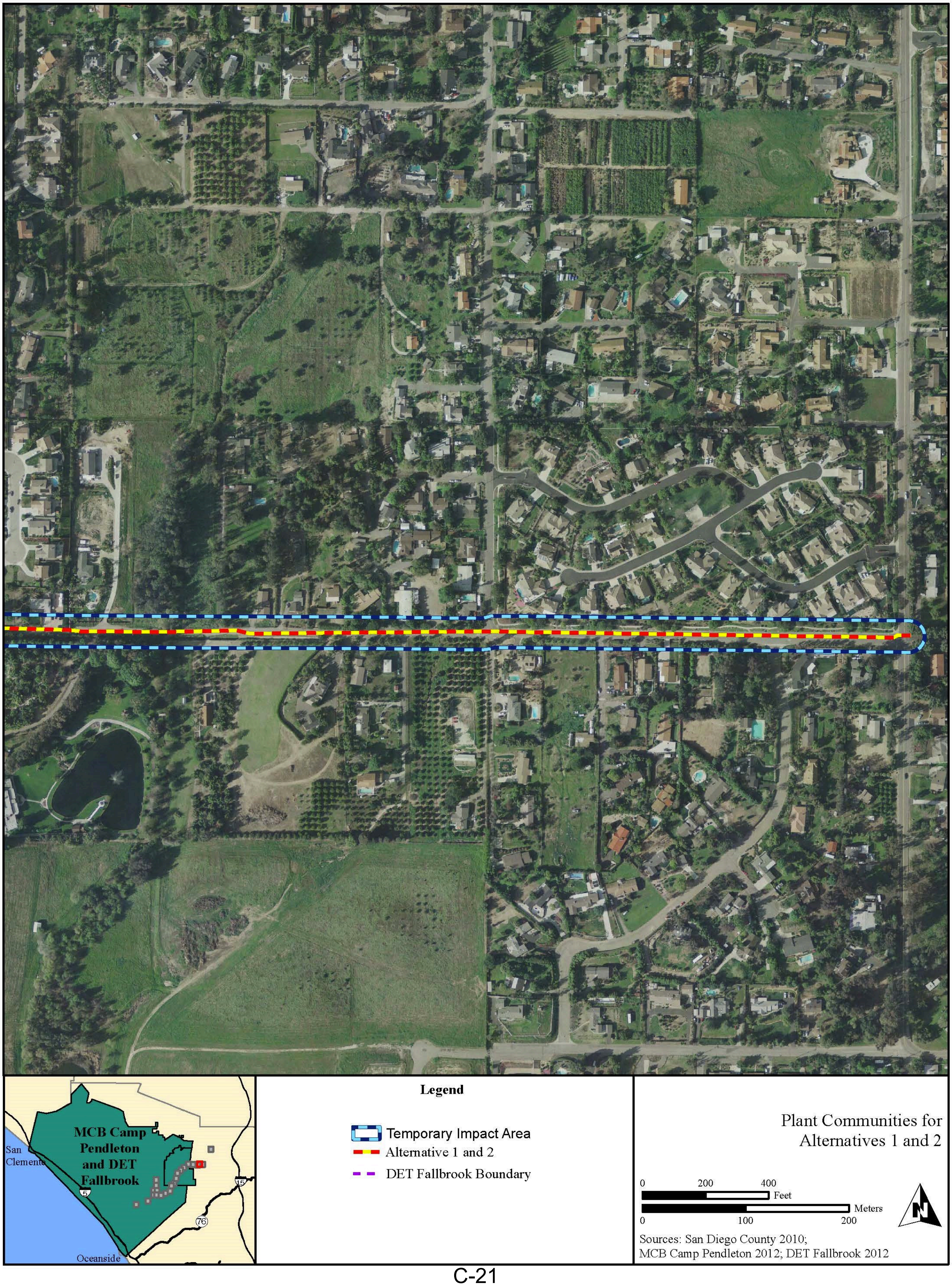
MCB Camp Pendleton and DET Fallbrook
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Temporary Impact Area
Alternative 1 and 2
DET Fallbrook Boundary
Plant Communities for Alternatives 1 and 2
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Sources: San Diego County 2010;
MCB Camp Pendleton 2012; DET Fallbrook 2012


MCB Camp Pendleton and DET Fallbrook
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Temporary Impact Area
Alternative 1 and 2
DET Fallbrook Boundary
Plant Communities for Alternatives 1 and 2
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Sources: San Diego County 2010; MCB Camp Pendleton 2012; DET Fallbrook 2012

Legend

- Permanent Impact Area
- Temporary Impact Area
- Alternative 1 and 2
- DET Fallbrook Boundary
- XYZ Pant Community Code

Plant Communities for Alternatives 1 and 2

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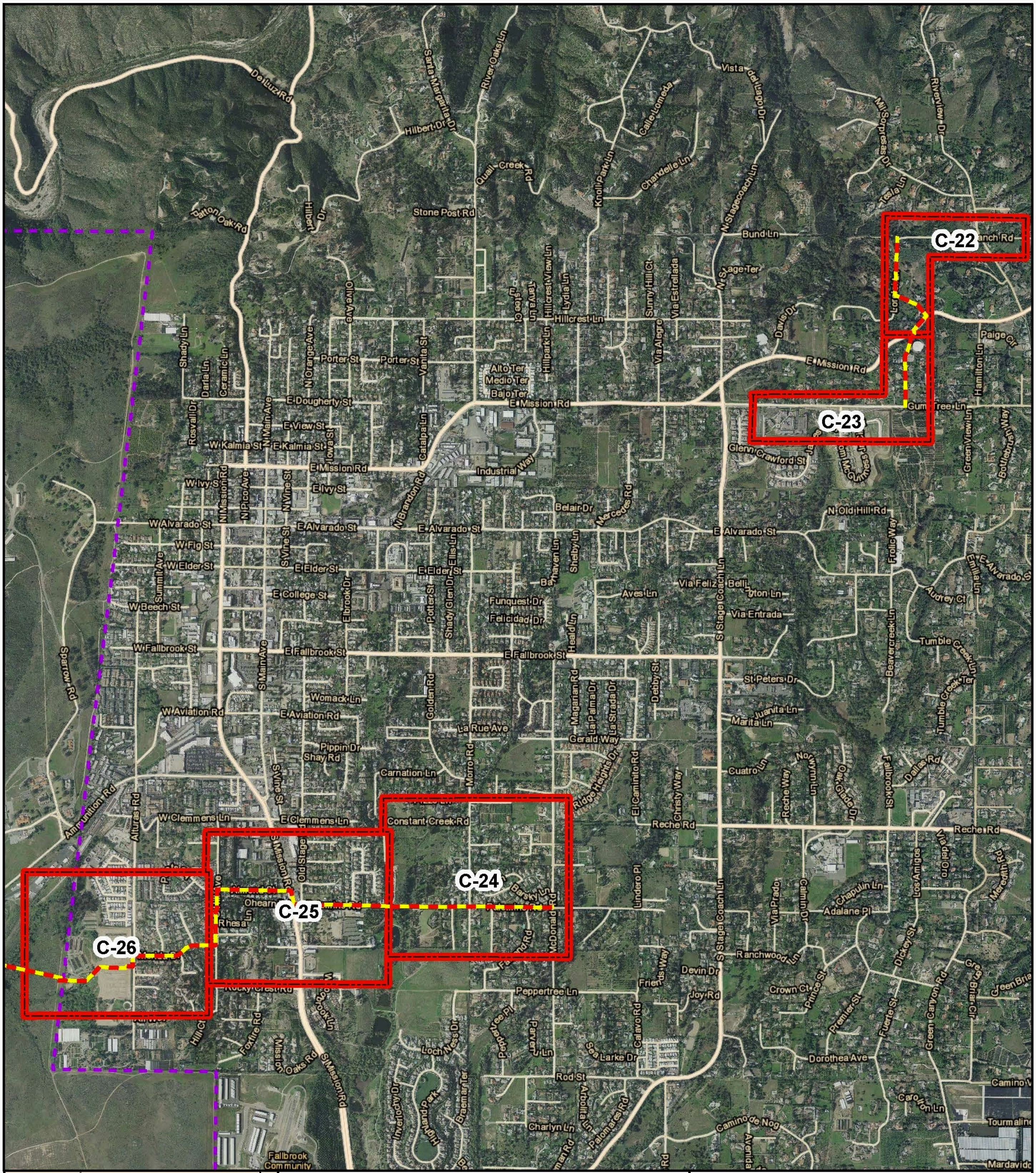
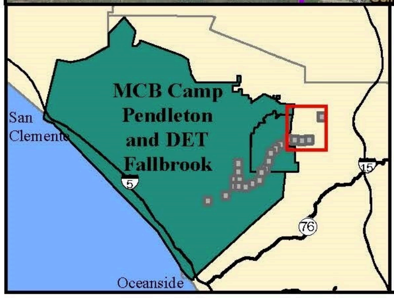
Sources: San Diego County 2010; MCB Camp Pendleton 2012; DET Fallbrook 2012





Legend

- Figure Grid
- Alternative 1 and 2
- DET Fallbrook Boundary

FPUD Facilities Key for Plant Communities for Alternatives 1 and 2

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0 500 1,000 Meters

Sources: San Diego County 2010; MCB Camp Pendleton 2012; DET Fallbrook 2012


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DET Fallbrook Boundary
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Sources: San Diego County 2010; MCB Camp Pendleton 2012; DET Fallbrook 2012


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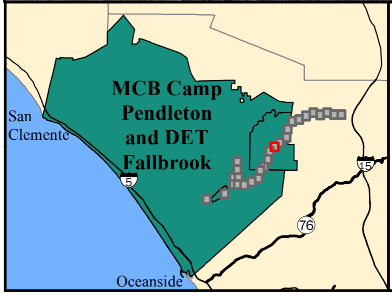
Sources: San Diego County 2010; MCB Camp Pendleton 2012; DET Fallbrook 2012



Legend

- Permanent Impact Area
- Temporary Impact Area
- Alternative 1 and 2
- XYZ Plant Community Code

Plant Communities for Alternatives 1 and 2

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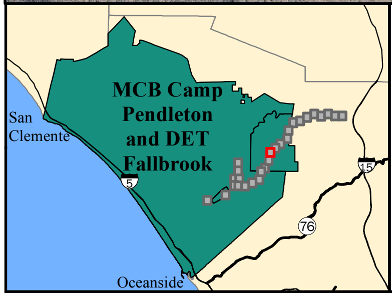
Sources: San Diego County 2010;
MCB Camp Pendleton 2012; DET Fallbrook 2012



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Permanent Impact Area

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Alternative 1 and 2

XYZ Plant Community Code

Plant Communities for Alternatives 1 and 2

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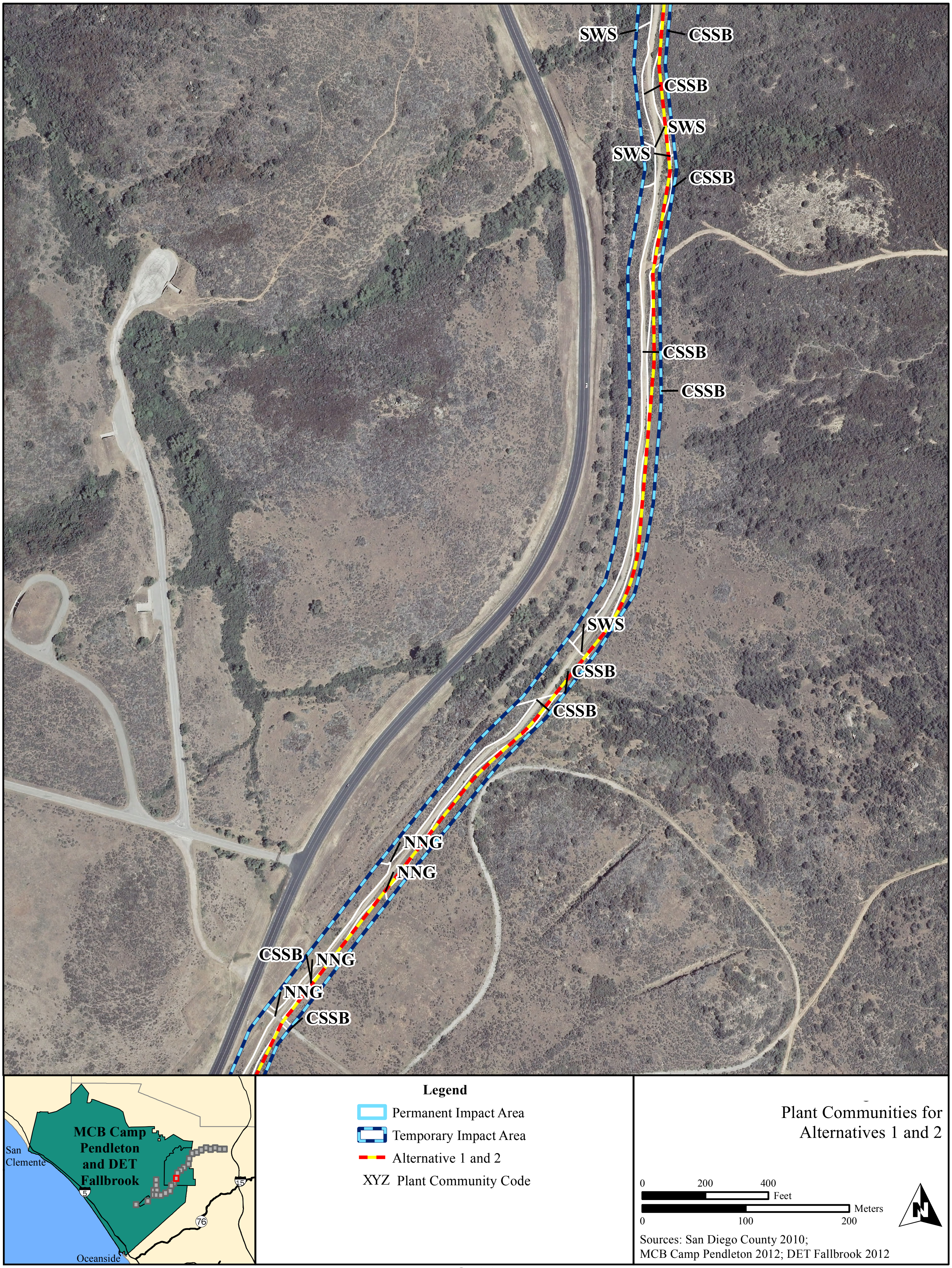
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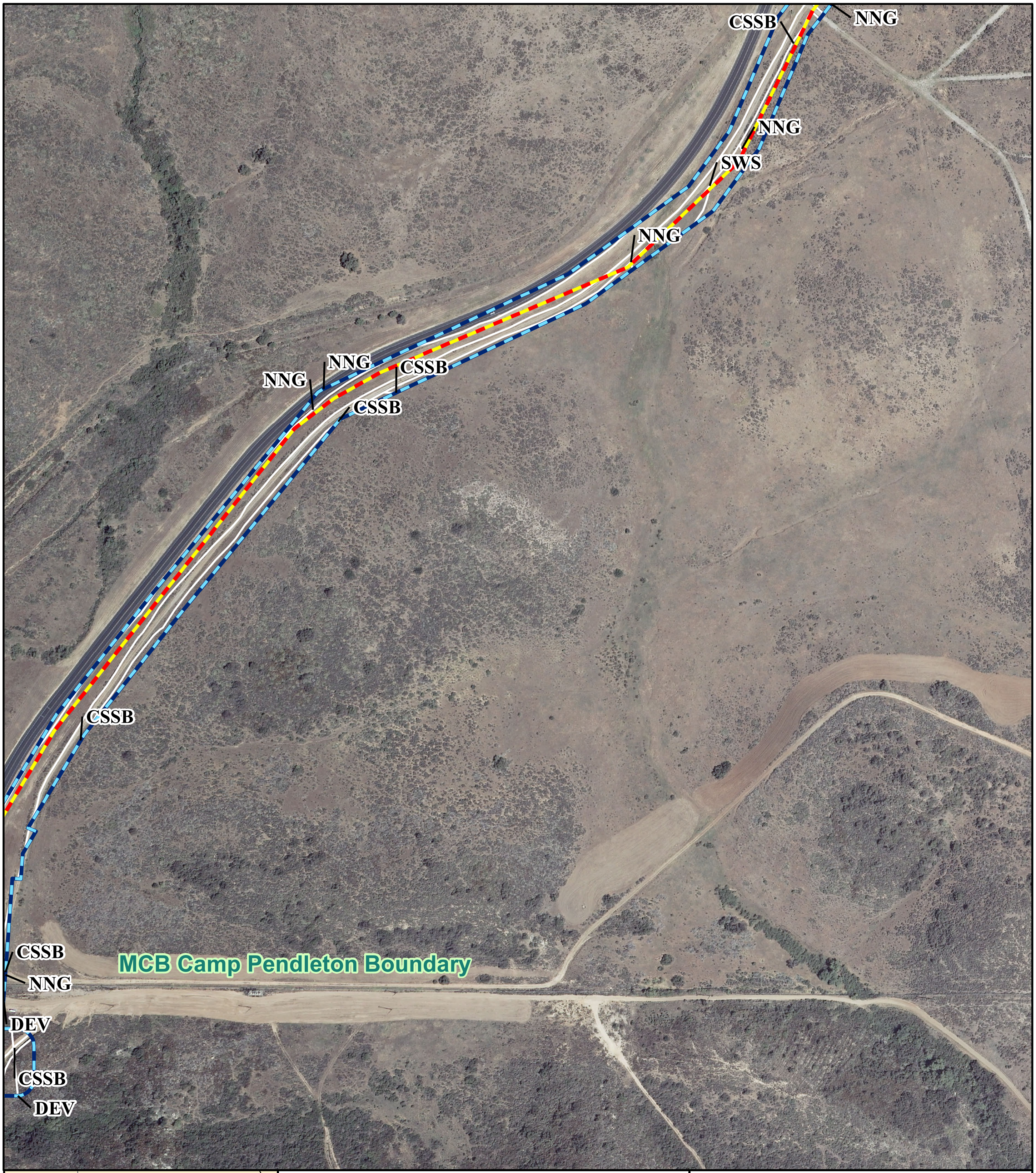
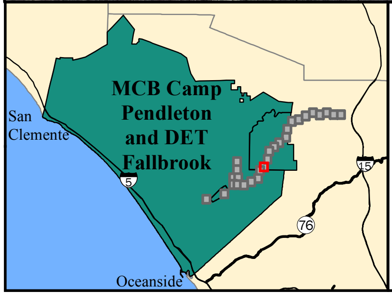
Sources: San Diego County 2010; MCB Camp Pendleton 2012; DET Fallbrook 2012





Legend

Permanent Impact Area
Temporary Impact Area
Alternative 1 and 2
XYZ Plant Community Code

Plant Communities for Alternatives 1 and 2

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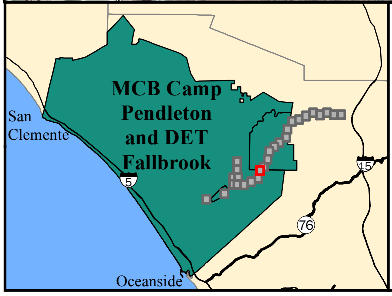
Sources: San Diego County 2010; MCB Camp Pendleton 2012; DET Fallbrook 2012



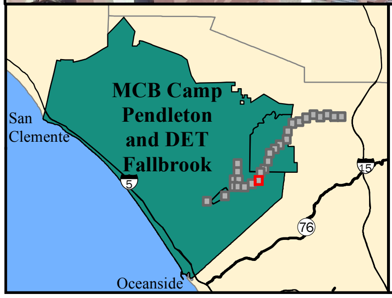
Legend

Permanent Impact Area
Temporary Impact Area
Alternative 1 and 2
XYZ Plant Community Code

Plant Communities for Alternatives 1 and 2

0 200 400 Feet
0 100 200 Meters

Sources: San Diego County 2010; MCB Camp Pendleton 2012; DET Fallbrook 2012



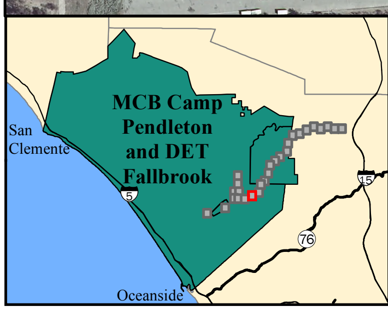
Legend

Permanent Impact Area
Temporary Impact Area
Alternative 1 and 2
XYZ Plant Community Code

Plant Communities for Alternatives 1 and 2

0 200 400 Feet
0 100 200 Meters

Sources: San Diego County 2010; MCB Camp Pendleton 2012; DET Fallbrook 2012



Legend

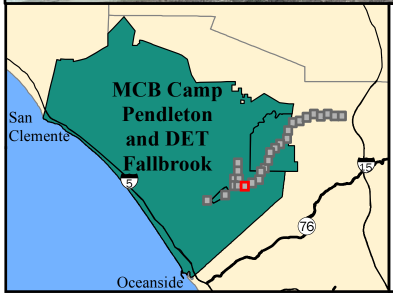
- Permanent Impact Area
- Temporary Impact Area
- Alternative 1 and 2
- XYZ Plant Community Code

Plant Communities for Alternatives 1 and 2

0 200 400 Feet

0 100 200 Meters

Sources: San Diego County 2010; MCB Camp Pendleton 2012; DET Fallbrook 2012



Legend

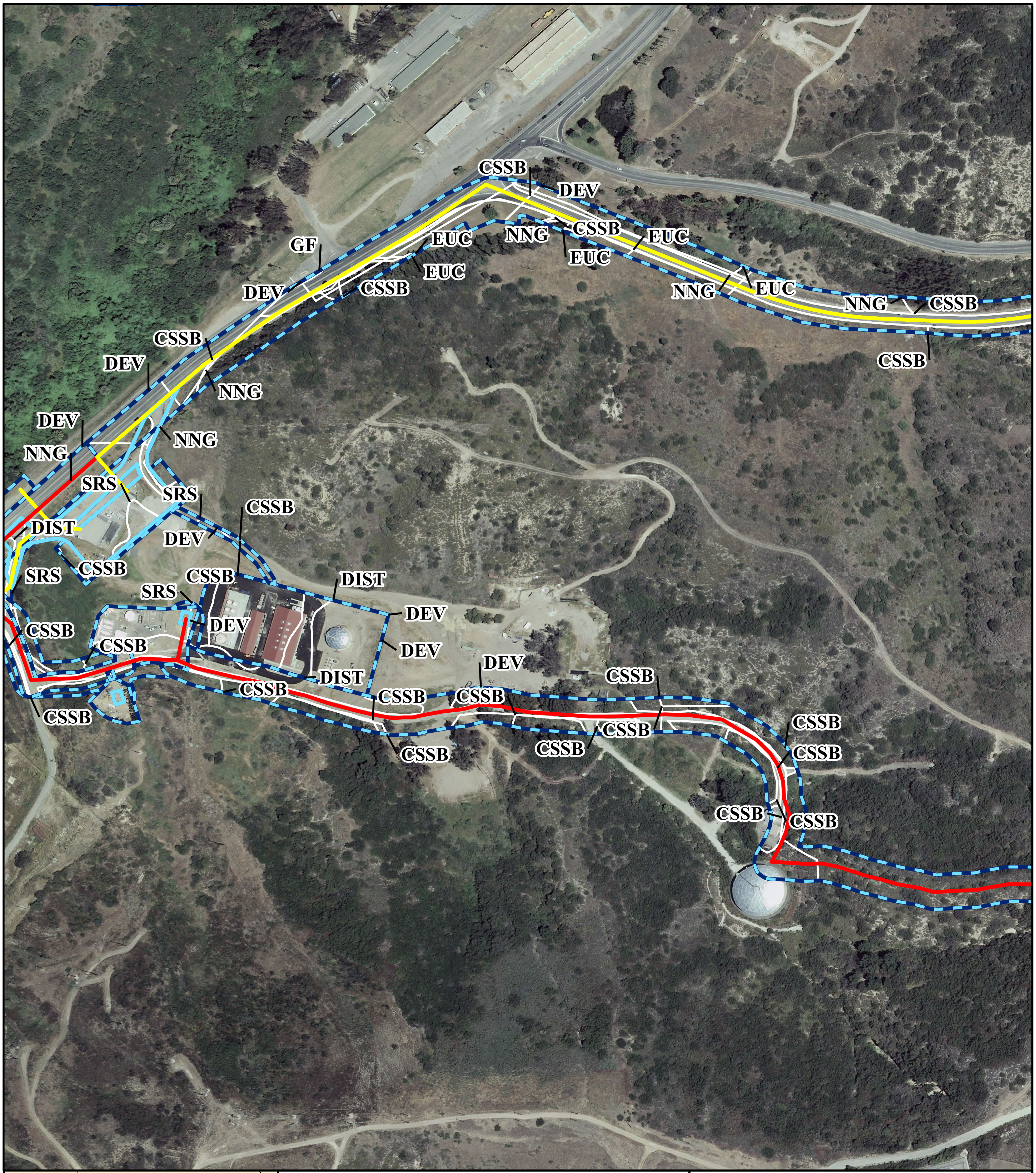
- Permanent Impact Area
- Temporary Impact Area
- Alternative 1 and 2
- Alternative 1
- Alternative 2
- XYZ Plant Community Code

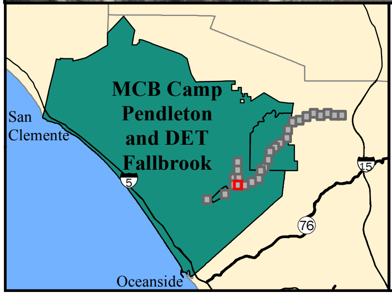
Plant Communities for Alternatives 1 and 2

0 200 400 Feet

0 100 200 Meters

Sources: San Diego County 2010; MCB Camp Pendleton 2012; DET Fallbrook 2012





Legend

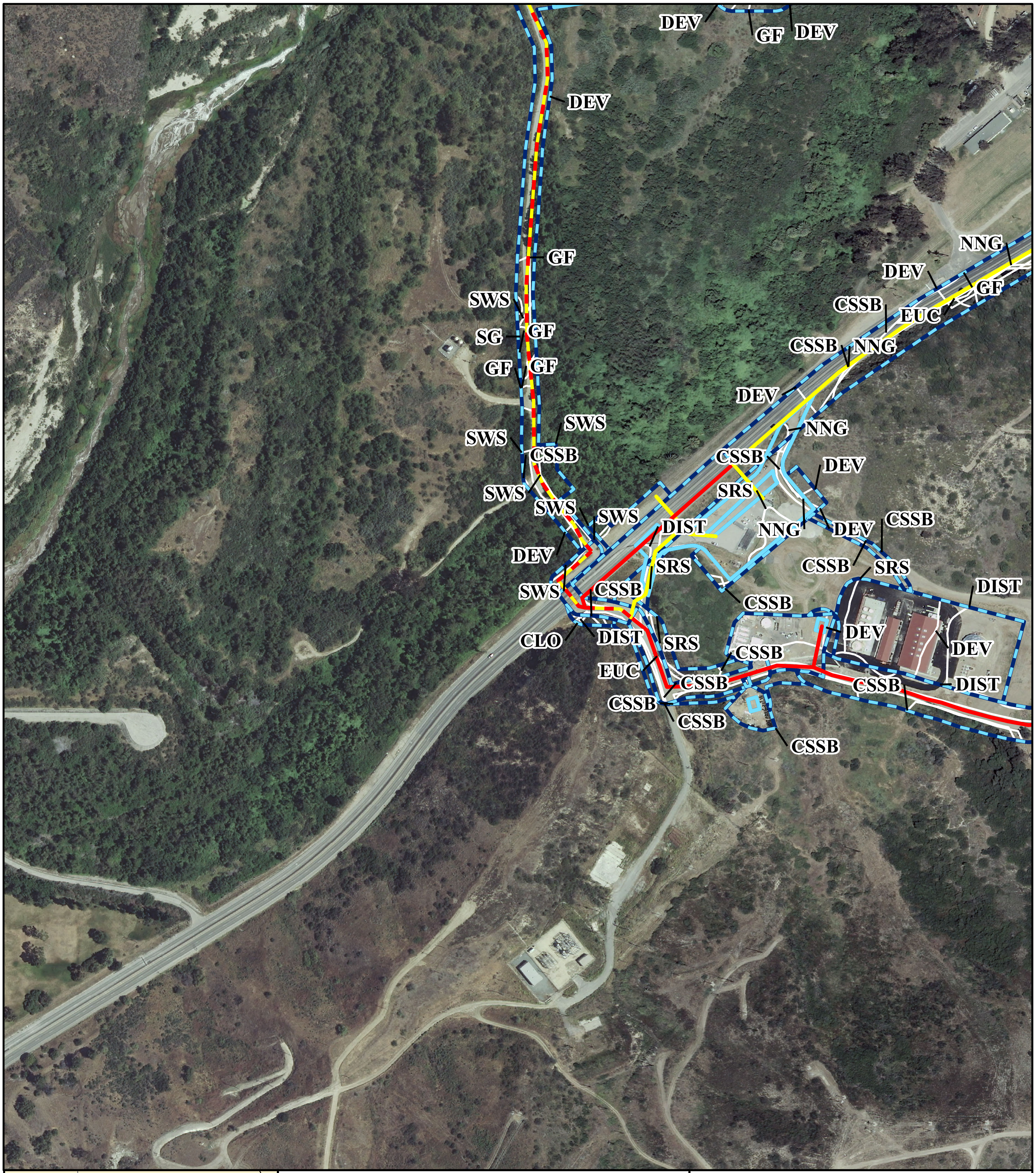
- Permanent Impact Area
- Temporary Impact Area
- Alternative 1
- Alternative 2
- XYZ Plant Community Code

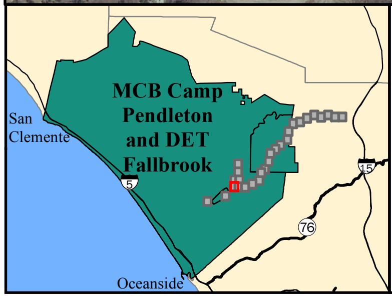
Plant Communities for Alternatives 1 and 2

0 200 400 Feet

0 100 200 Meters

Sources: San Diego County 2010; MCB Camp Pendleton 2012; DET Fallbrook 2012





Legend

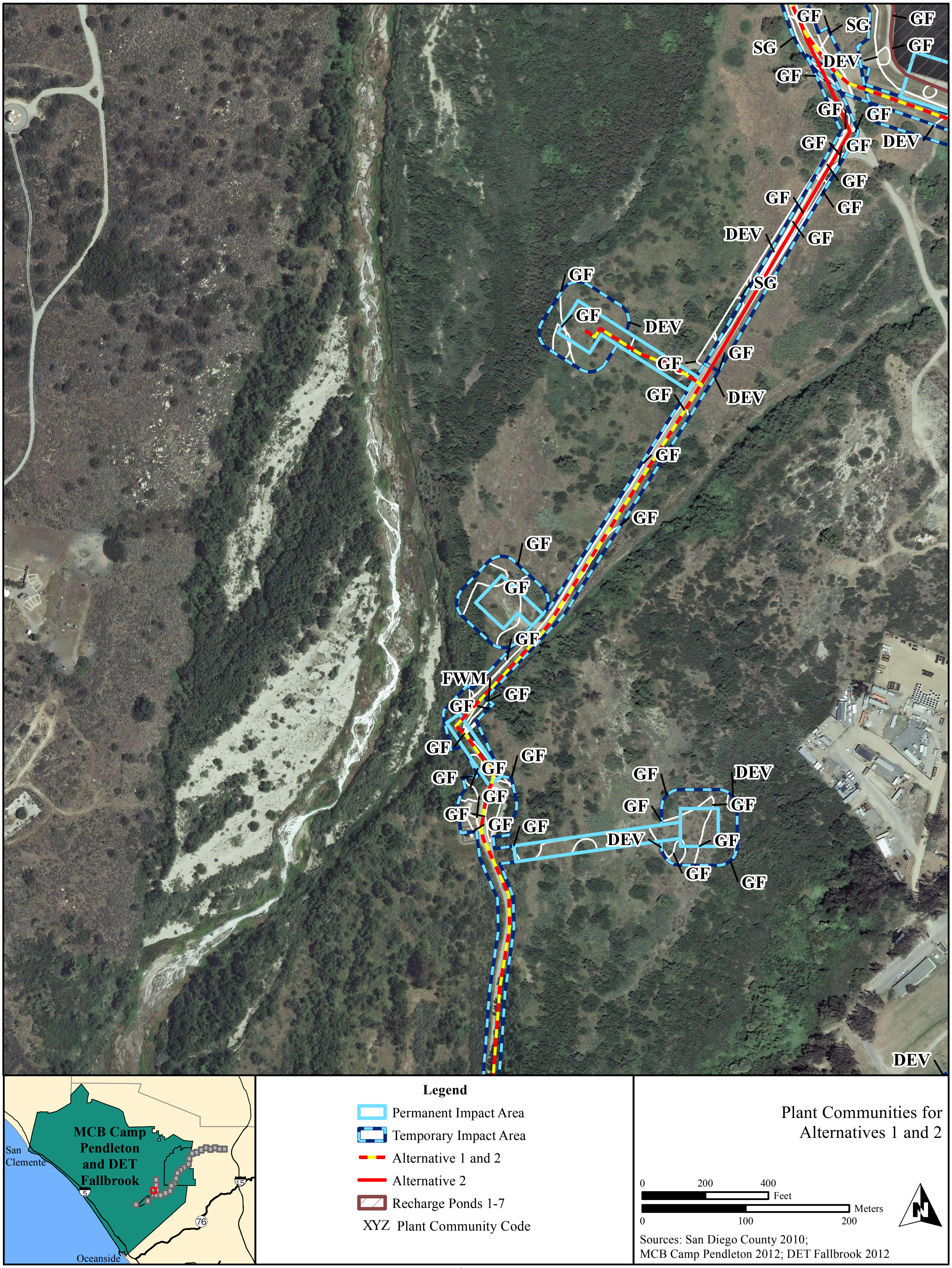
- Permanent Impact Area
- Temporary Impact Area
- Alternative 1 and 2
- Alternative 1
- Alternative 2
- XYZ Plant Community Code

Plant Communities for Alternatives 1 and 2

0 200 400 Feet

0 100 200 Meters

Sources: San Diego County 2010; MCB Camp Pendleton 2012; DET Fallbrook 2012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MCB Camp Pendleton and DET Fallbrook
San Clemente
Oceanside
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Alternative 1 and 2
Alternative 2
Recharge Ponds 1-7
XYZ Plant Community Code
Plant Communities for Alternatives 1 and 2
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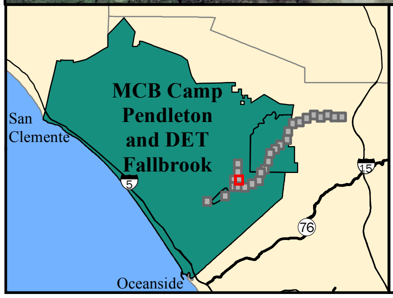
0 100 200 Meters
Sources: San Diego County 2010; MCB Camp Pendleton 2012; DET Fallbrook 2012



Legend

- Permanent Impact Area
- Temporary Impact Area
- Alternative 1 and 2
- Alternative 1
- Alternative 2
- Recharge Ponds 1-7
- XYZ Plant Community Code

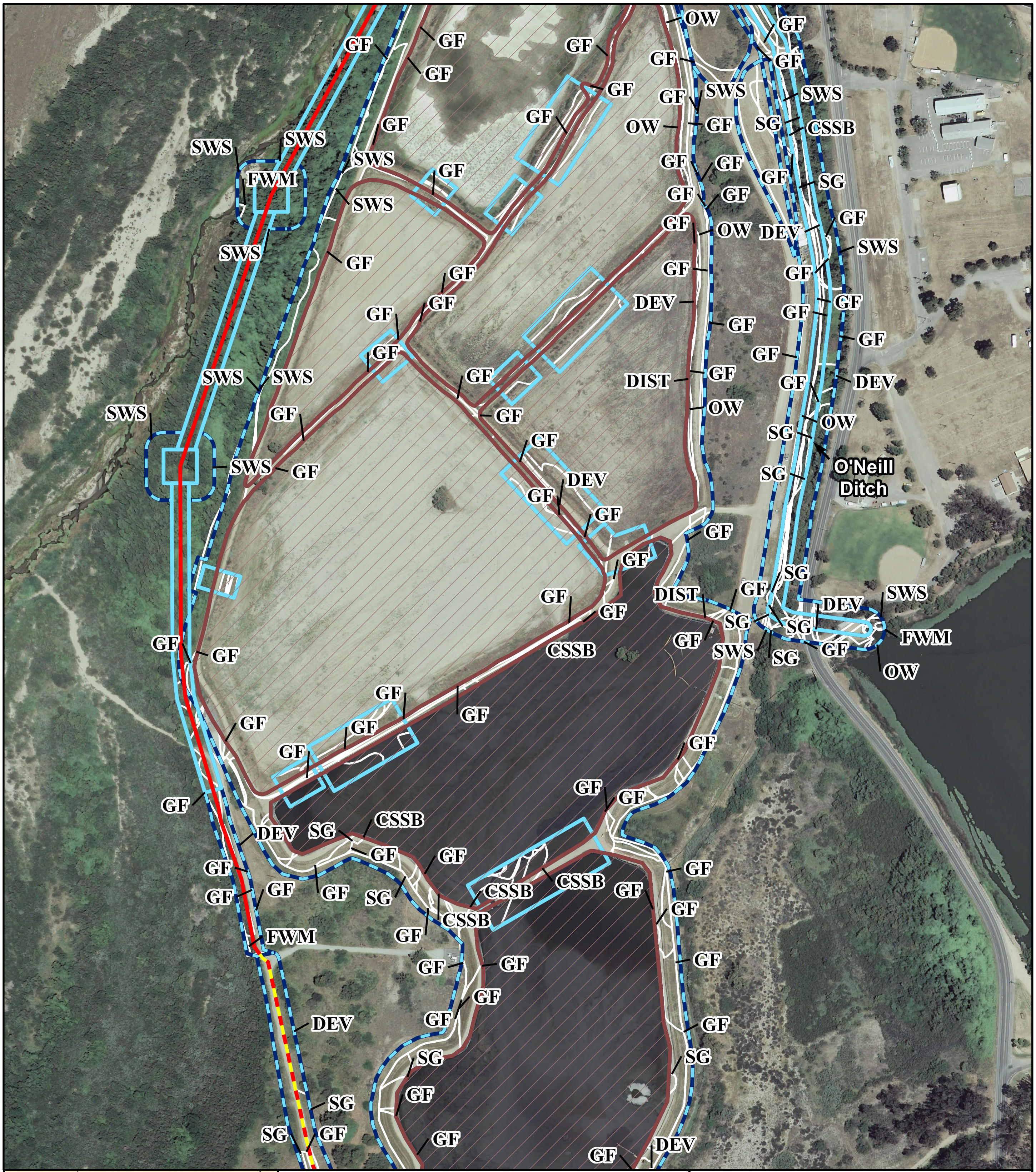
Plant Communities for Alternatives 1 and 2

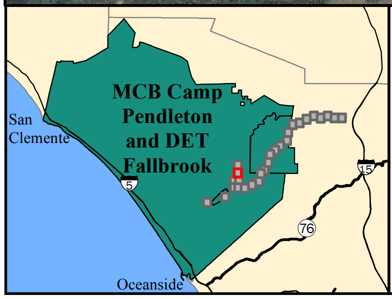
0 200 400 Feet

0 100 200 Meters

N

Sources: San Diego County 2010; MCB Camp Pendleton 2012; DET Fallbrook 2012





Legend

- Permanent Impact Area
- Temporary Impact Area
- Alternative 1 and 2
- Alternative 2
- Recharge Ponds 1-7
- XYZ Plant Community Code

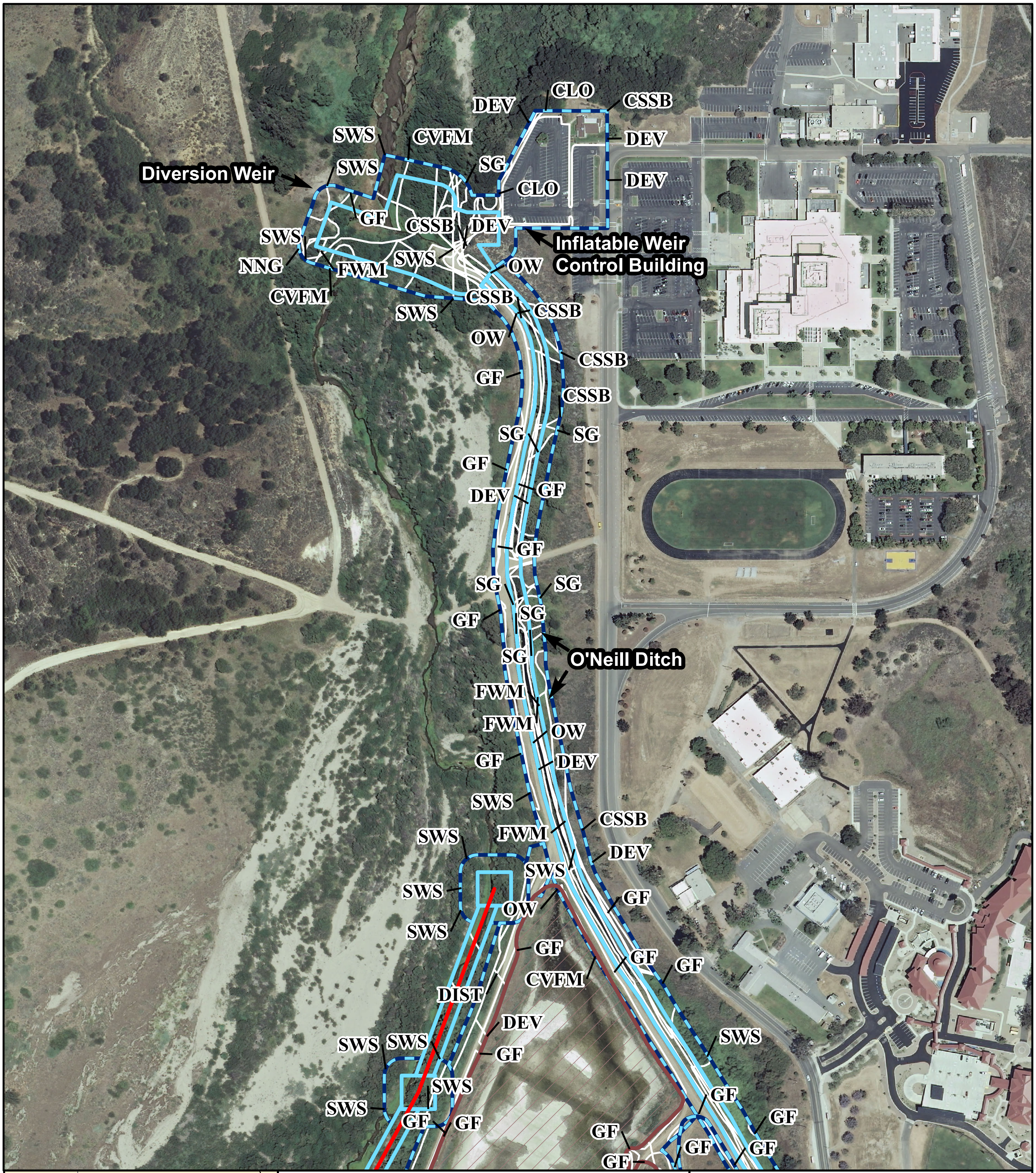
Plant Communities for Alternatives 1 and 2

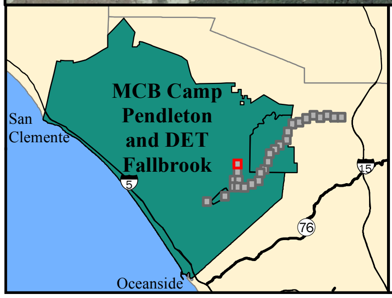
0 200 400 Feet

0 100 200 Meters

N

Sources: San Diego County 2010; MCB Camp Pendleton 2012; DET Fallbrook 2012





Legend

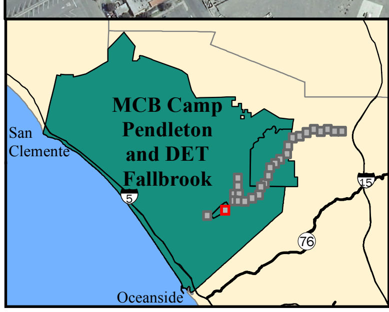
- Permanent Impact Area
- Temporary Impact Area
- Alternative 2
- Recharge Ponds 1-7
- XYZ Plant Community Code

Plant Communities for
Alternatives 1 and 2

0 200 400 Feet

0 100 200 Meters

Sources: San Diego County 2010;
MCB Camp Pendleton 2012; DET Fallbrook 2012



Legend

Permanent Impact Area

Temporary Impact Area

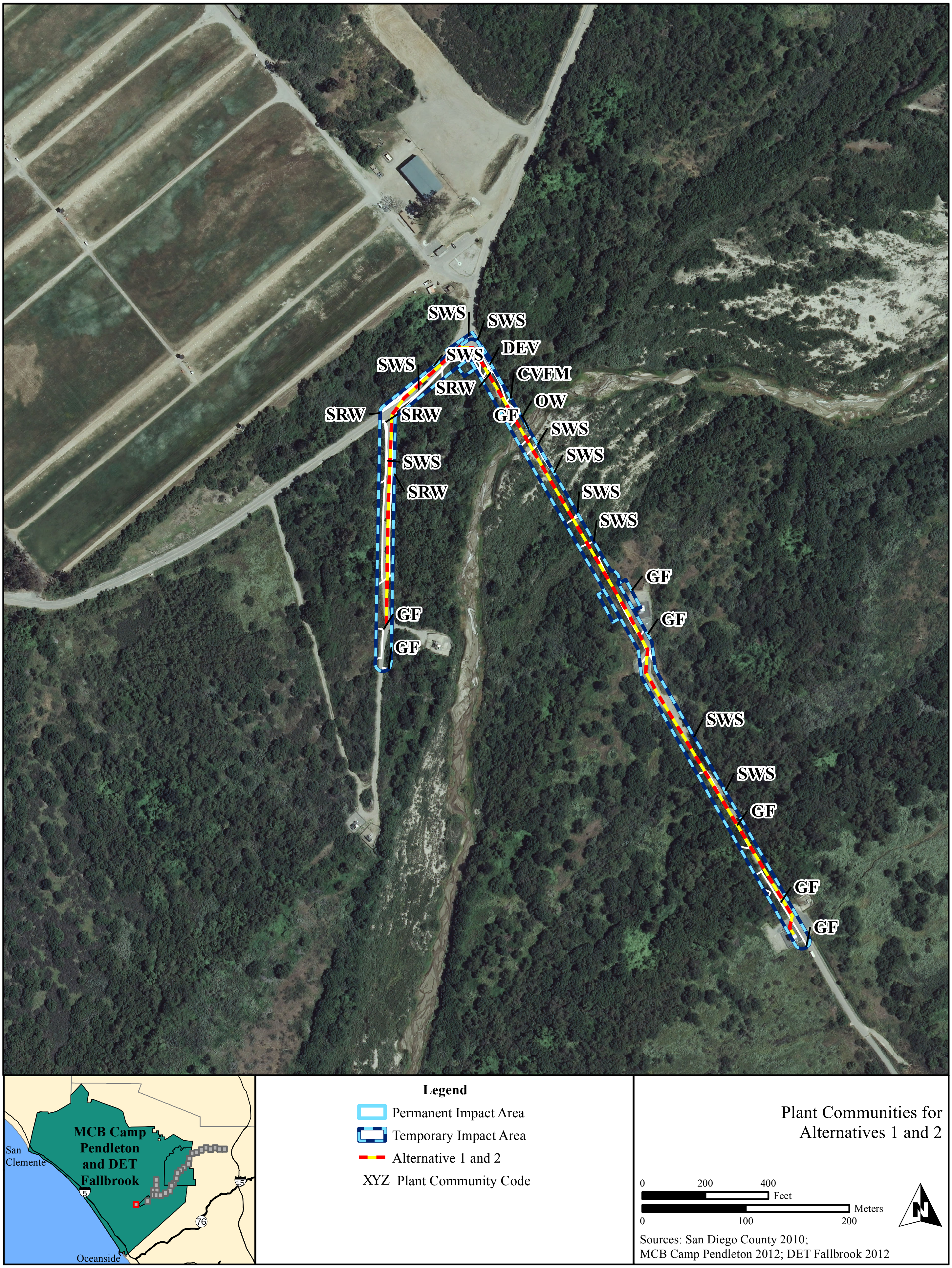
XYZ Plant Community Code

Plant Communities for Alternatives 1 and 2

0 200 400 Feet

0 100 200 Meters

Sources: San Diego County 2010; MCB Camp Pendleton 2012; DET Fallbrook 2012



Legend

Permanent Impact Area

Temporary Impact Area

Alternative 1 and 2

XYZ Plant Community Code

Plant Communities for Alternatives 1 and 2

0 200 400 Feet

0 100 200 Meters

Sources: San Diego County 2010; MCB Camp Pendleton 2012; DET Fallbrook 2012

Appendix C-2

Threatened & Endangered Species Figures

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A DESCRIPTION OF FEDERALLY- AND STATE-LISTED SPECIES THAT MAY BE AFFECTED BY THE ACTION

Alternative 1 and Alternative 2 overlaps a number of federally- and state-listed species habitats resulting in a diverse assemblage within or adjacent to the project area (Overview in Figure C-1; Grids A-D in the Overview are in Figures C-2 to C-5). Those species addressed in this appendix are those known or reasonably likely to occur in the Action Area of both Alternatives, with this analysis conducted for the USFWS Section 7 Consultation for Alternative 1. The Action Area consists of MCB Camp Pendleton and Detachment Fallbrook; the City of Fallbrook is omitted for there are no expected impacts to listed species. Stephens' kangaroo rat habitat is depicted in Section C-5 of this appendix.

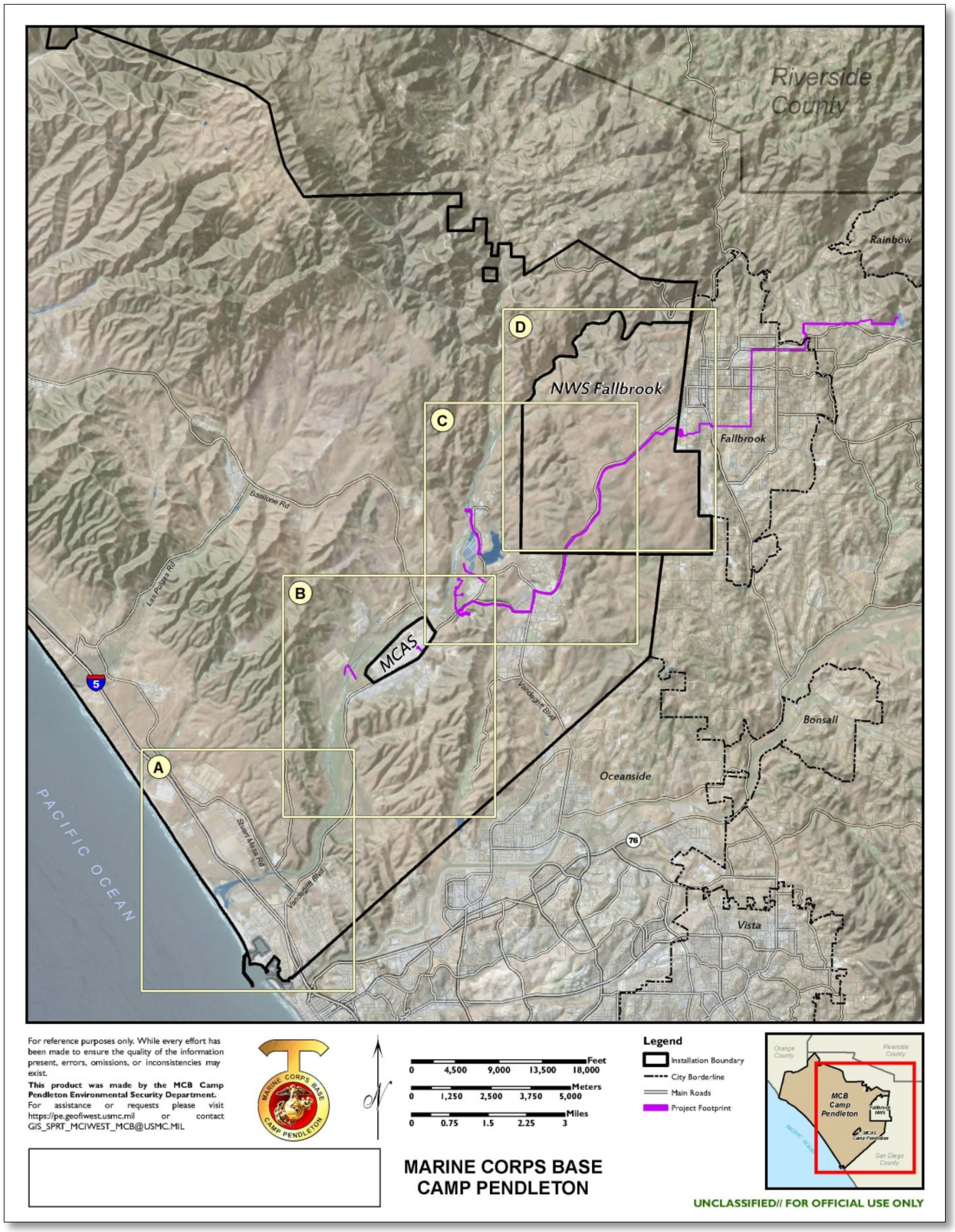

Figure C-1. Overview of the Action Area.

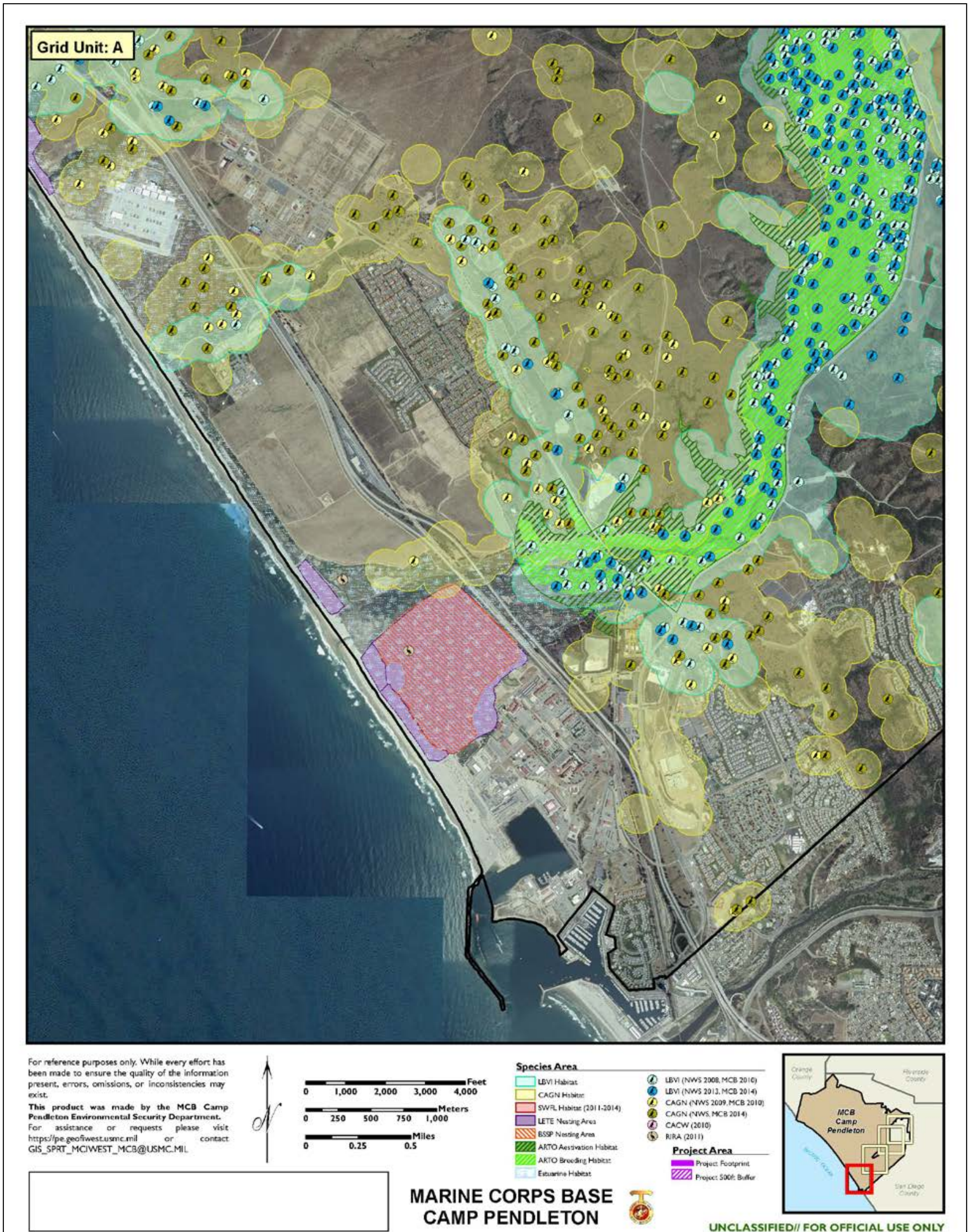

Figure C-2. Listed Species Locations within the Action Area. Grid A.

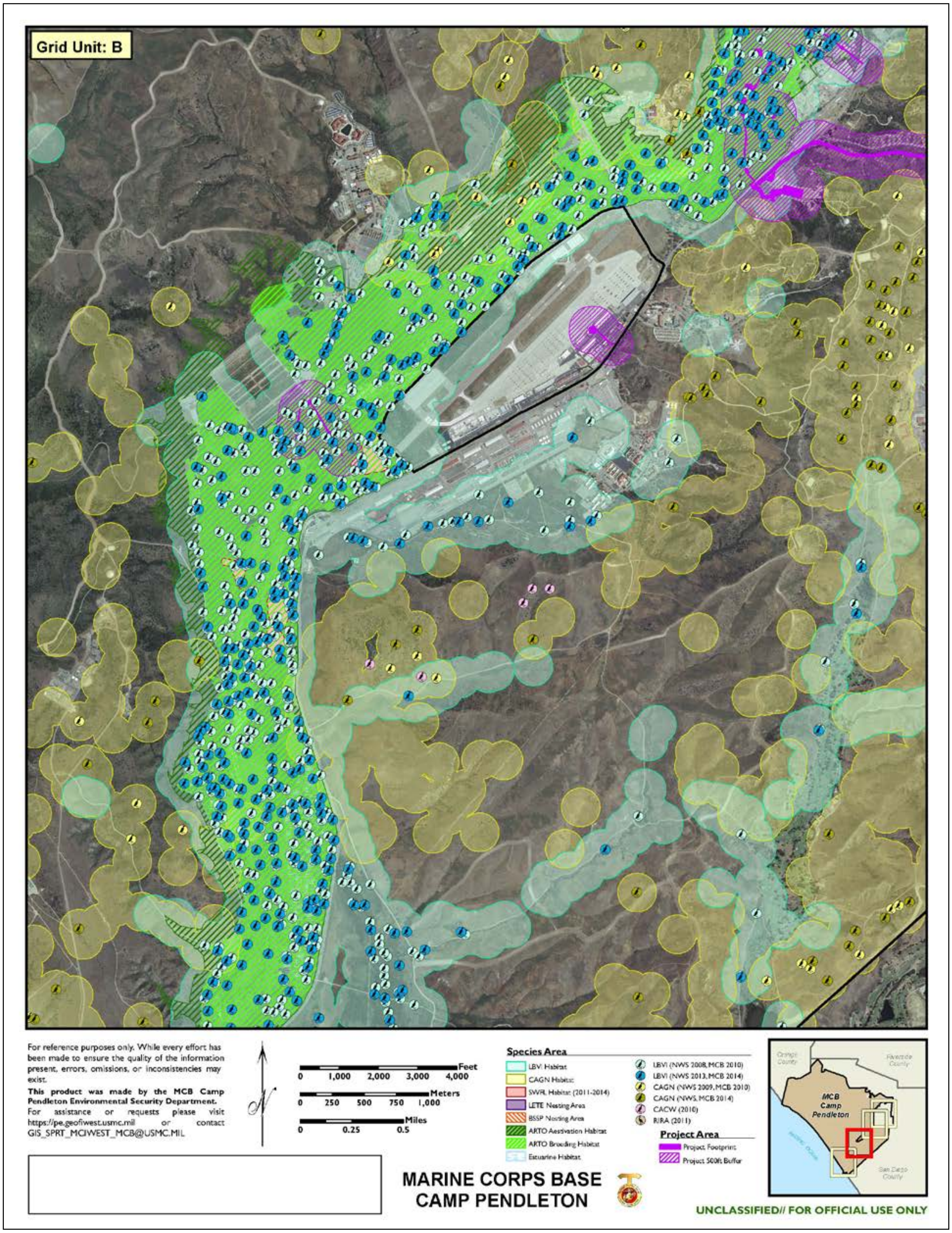

Figure C-3. Listed Species Locations within the Action Area. Grid B.

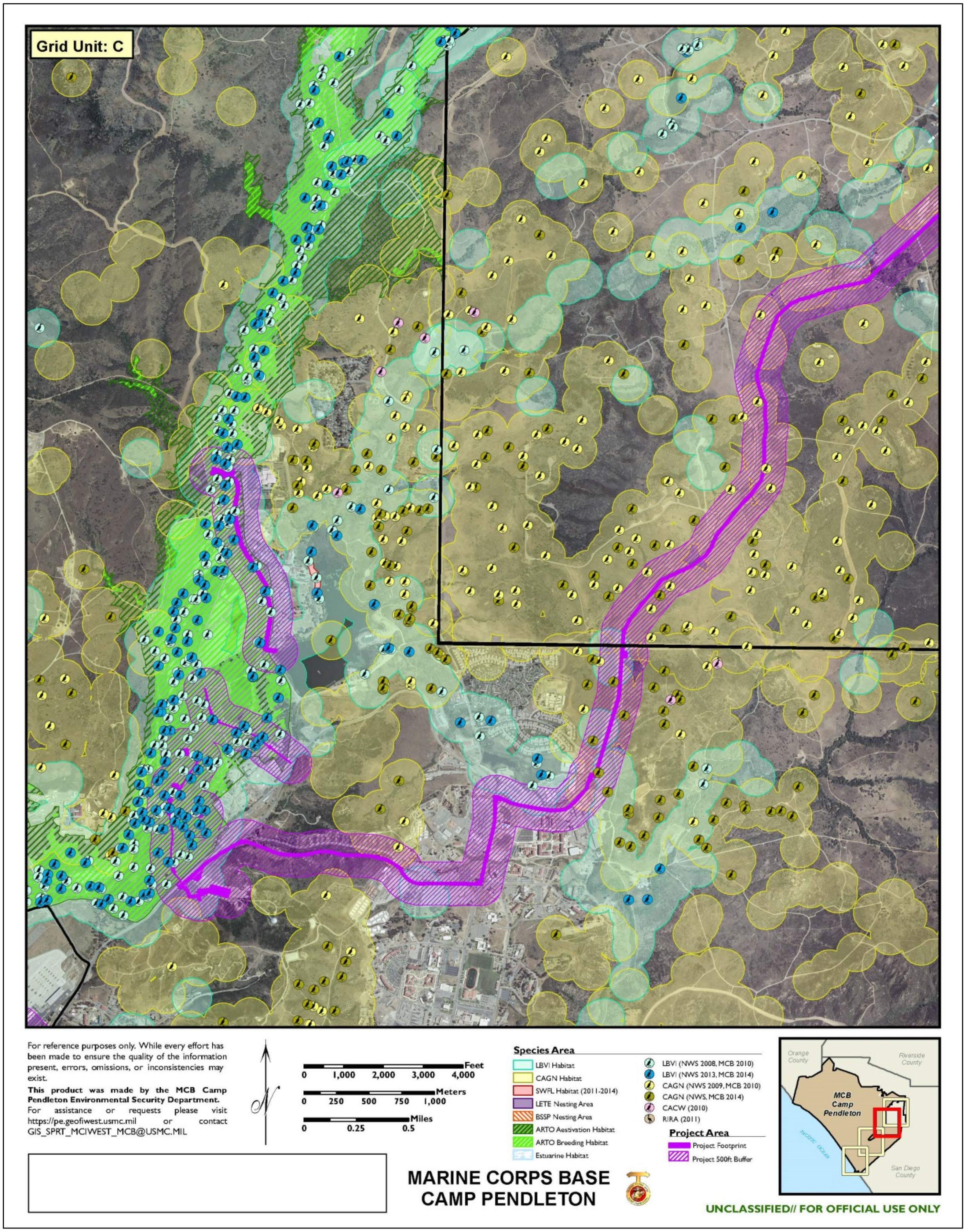

Figure C-4. Listed Species Locations within the Action Area. Grid C.

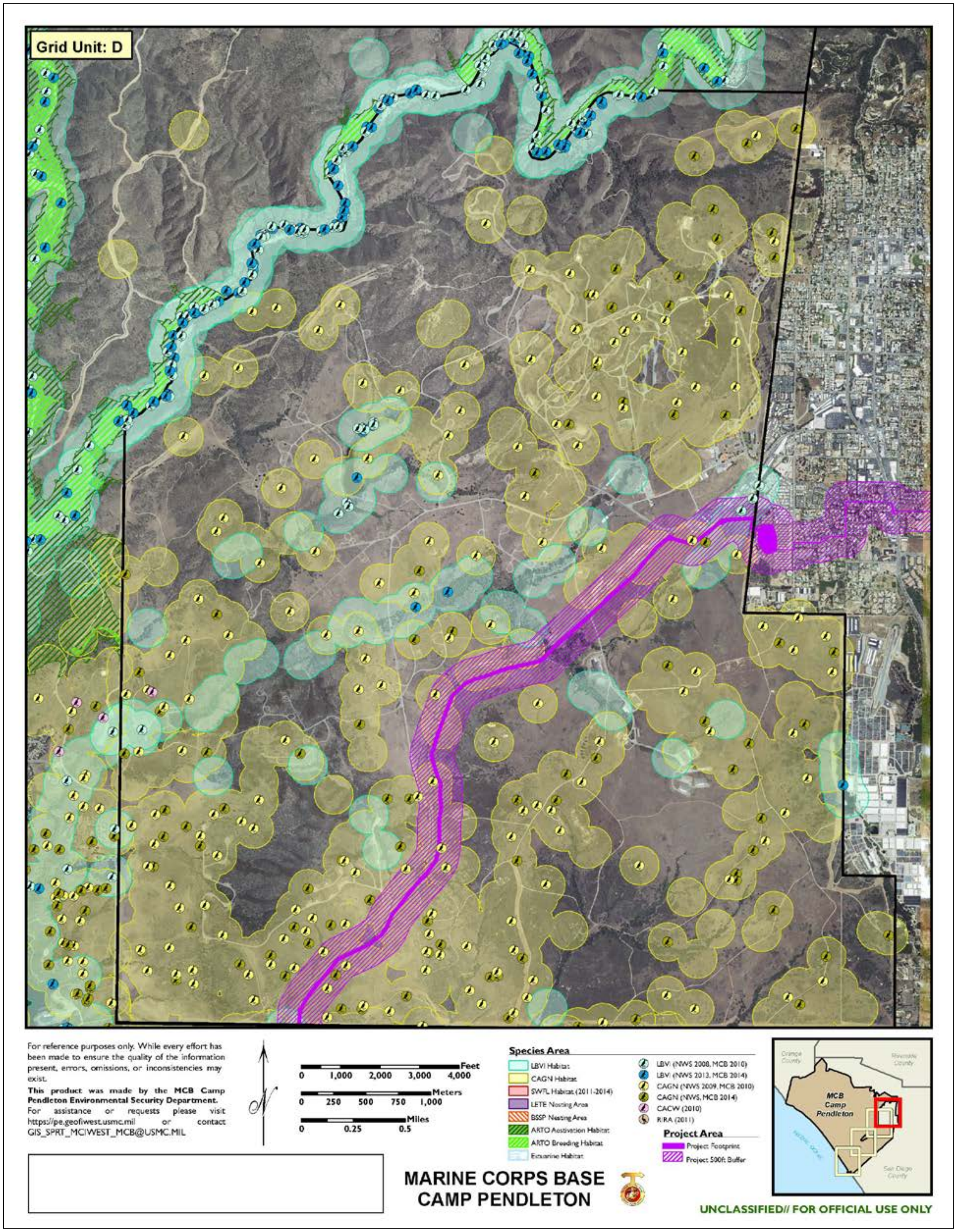

Figure C-5. Listed Species Locations within the Action Area. Grid D.

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Appendix C-3

OSMZ

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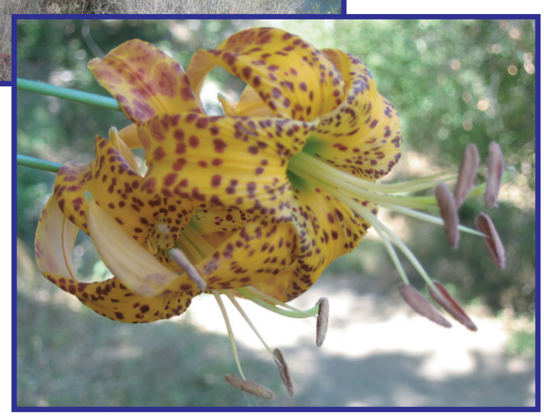
Final Botanical Survey Report

Santa Margarita River Conjunctive Use Project



Open Space Management Zone
Fallbrook Public Utility District, California

Prepared by TEC Inc.
514 Via de la Valle, Suite 308
Solana Beach, CA 92075

August 2008

INTRODUCTION

This report documents the results of botanical surveys conducted between March and July, 2008, of a proposed 1,384-acre Open Space Management Zone (OSMZ) in Fallbrook, San Diego County, California. The designation of the OSMZ is proposed as part of the Santa Margarita River (SMR) Conjunctive Use Project (CUP) currently under review by the U.S. Bureau of Reclamation, Marine Corps Base Camp Pendleton, and the Fallbrook Public Utility District (FPUD). The OSMZ is owned by the FPUD and is at the site of the formerly proposed Fallbrook Dam and Reservoir. The OSMZ would be included in the CUP to help protect water quality and allow for passive recreation use. Mitigation, if required for other elements of the CUP, could also be incorporated into the OSMZ.

The scope of the botanical surveys was to conduct three complete surveys of the OSMZ, with surveys approximately six weeks apart in order to overlap the appropriate season(s) for detecting all potentially occurring rare plants. Federally and state-listed plant species, as well as California Native Plant Society (CNPS) list 1B through 4 species were searched for.

METHODOLOGY

TEC conducted database searches and a three-visit botanical inventory for the 1,384-acre OSMZ in accordance with *Guidelines for Conducting and Reporting Botanical Inventories for Federally listed, Proposed and Candidate Plants* (U.S. Fish and Wildlife Service 1996), *Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, or Endangered Plants and Natural Communities* (California Department of Fish and Game 2000), and *Botanical Survey Guidelines of the California Native Plant Society* (CNPS) (CNPS 2001). Surveys were conducted at the rate of approximately 100 acres per person per day. Thus, it required 14 person-days for each of the three surveys (42 person-days total).

The 1,384-acre OSMZ is within the Fallbrook and Temecula quadrangles. TEC Inc. ordered and reviewed California Department of Fish and Game (CDFG) California Natural Diversity Database (CNDDB) data for rare, threatened, endangered, and sensitive animals, plants, and natural communities for the Fallbrook and Temecula quadrangles. San Diego County Association of Governments (SANDAG 1995) vegetation mapping was used to create vegetation maps of the OSMZ. These maps are provided as Figures 1 through 9 at the end of this report.

Plant surveys were conducted throughout the 1,384-acre OSMZ. However, some steep chaparral slopes and dense riparian areas were inaccessible and Urban/Developed areas were not surveyed. TEC and TEC-subcontractor biologists surveyed for all potentially occurring federally and state-listed and proposed species and CNPS list 1B through 4 species. List 1B species are rare throughout their range and occur primarily within California. List 2 species are rare in California, but more widespread outside the State. List 3 species appear to be rare but require more information to determine appropriate rank. List 4 species have restricted distribution within California. Biologists Carolyn Martus (independent consultant) and Margie Mulligan (San Diego Natural History Museum), along with Melissa Tu of TEC, conducted the surveys. Surveys were conducted from March through July 2008. The first survey was conducted from March 17 through April 4, the second survey was conducted from April 28 through May 16, and the third survey was conducted form June 9 through July 16, 2008.

RESULTS

At least 318 plant species, 237 of which are native, were documented within the OSMZ during the surveys. Appendix A includes the list of all plant species encountered. The majority of the OSMZ is native vegetation except for some avocado groves and houses that are within the edges of the footprint, and a few roads that go though the OSMZ. There are heavily used dirt trails through the OSMZ especially along the SMR. People were observed fishing and people and dogs were observed swimming at the convergence of Sandia Creek and the SMR. The steep hillsides of the OSMZ are dominated by dense chaparral habitat with small patches of coastal sage scrub. Along Sandia Creek and the SMR are dense are of riparian forests dominated by willows (*Salix* sp.), sycamores (*Platanus racemosa)*, and cottonwoods (*Populus fremontii ssp. fremontii)*. Areas along the south side of the SMR are dominated by dense coast live oak woodland. Portions of the OSMZ near the Sandia Creek and SMR burned during the October 2003 wildfire and large sections of the northeastern section of the OSMZ burned during the October 2007 wildfire. The chaparral habitat which burned in 2003 is recovering well. The northeastern section which burned in 2007 was dominated by California poppies (*Eschscholzia californica)* and *Phacelia* species during the spring. Photographs of the OSMZ, filed by date, are contained on a separate CD.

Rare plant species observed during the plant surveys are shown in Table 1 and Figures 2 through 9. No state or federally listed plant species were found during the plant surveys; however, five species of CNPS listed species were documented. Appendix B includes California Natural Diversity Database (CNDDB) forms and photographic documentation of rare plant species. Each rare plant is discussed below.

Table 1. Rare Plants Documented in the OSMZ

Common Name	Scientific Name	Family	Federal/ State/CNPS Status*	Approximate Population Size	Location on Figures
Rainbow Manzanita	*Arctostaphylos rainbowensis*	Ericaceae	1B.1	341	Figures 2-6
Chaparral sand-verbena	*Abronia villosa* var. *aurita*	Nyctaginaceae	1B.1	927	Figures 4-7
Fish's Milkwort	*Polygala cornuta* var. *fishiae*	Polygalaceae	4.3	2,085	Figures 7-8
Ocellated Humboldt lily	*Lilium humboldtii* var. *ocellatum*	Liliaceae	4.2	3	Figure 6
Engelmann Oak	*Quercus engelmannii*	Fagaceae	4.2	Undetermined	Not mapped

* California Native Plant Society List (CNPS) List:

1B - Plants considered rare or endangered in California and elsewhere
2 - Plants considered rare or endangered in California but more common elsewhere.
3 - Plants for which more information is needed.
4 - Plants of limited distribution – a watch list.

CNPS Threat Codes

.1 - Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)
.2 – Fairly endangered in California (20-80% occurrences threatened)
.3 – Not very endangered in California (<20% of occurrences threatened or no current threats known)

Rainbow Manzanita (*Arctostaphylos rainbowensi*), a CNPS list 1B species, was found in chaparral habitat within the OSMZ (Figures 2-6, photo below). This species is found in chaparral habitat and is restricted to southwestern Riverside County, south of Pauba Valley, and northeastern San Diego County, north of the San Luis Rey River, between 300 and 600 meters (Keeley and Massihi 1994). The species also occurs on Camp Pendleton. The CDFG CNDDB forms listed historical records of Rainbow

Manzanita from the town of Rainbow, the Santa Rosa Plateau, and southeast of the SMR and Gavilan Mountain peak; however, there were not any listing of Rainbow Manzanita with the OSMZ (CDFG 2008). Three hundred forty one individuals of Rainbow Manzanita were documented during 2008 plant surveys in chaparral habitat on the steep slopes east and west of Sandia Creek and on the slopes north and south of the SMR (Figures 2-6). Some of areas of chaparral were too steep and thick to walk through so this species was identified through binocular scans of the hillside. It is likely that there are more small pockets of Rainbow Manzanita within the OSMZ. CNDDB forms for Rainbow Manzanita are included in Appendix B.

Chaparral Sand-Verbena (*Abronia villosa* var. *aurita)*, a CNPS list 1B.1 species, was found along sandy benches above Sandia Creek and the Santa Margarita River (SMR) (Figures 4-7, photo at right). The CDFG CNDDB forms listed a historical record of Chaparral Sand-Verbena in the SMR river ford north of Fallbrook from 1964 (CDFG 2008). Chaparral Sand-Verbena is typically found in chaparral habitat; however, within the OSMZ, Chaparral Sand-Verbena was found in sandy soil in the vicinity of the Sandia Creek and the SMR. This species was documented for the first time on Camp Pendleton during 2008, in an area of the floodplain of the SMR that may be impacted by the SMRCUP. It is reasonable to infer that the Camp Pendleton population was derived from the upstream populations within the OSMZ. Nine hundred twenty seven individuals of chaparral sand-verbena were documented during 2008 plant surveys (Figures 4-7). CNDDB forms for chaparral sand-verbena are included in Appendix B.

Fish's Milkwort (*Polygala cornuta* var. *fishiae*), a CNPS list 4.3 species, was found in coast live oak woodland south of the SMR (Figures 7-8, photo at left). Approximately 2,085 individuals were found. CNDDB forms for Fish's Milkwort are included in Appendix B.

Ocellated Humboldt lily (*Lilium humboldtii* var. *ocellatum*), a CNPS list 4.2 species, was found along the well used SMR trail in a coast live oak woodland (Figure 7, photo at right). Three individuals were observed in May and on the third survey on June 20, 2008 only two individuals were observed. This species is at risk of being collected. A CNDDB form for the ocellated Humboldt lily individuals is included in Appendix B.

Engelmann Oak (*Quercus engelmannii*), a CNPS list 4 species, was found along the north side of Sandia Creek road and at the top of a few small drainages near an avocado grove on the north side of the project area. Since Engelmann oak is relatively common in San Diego County and the CNDDB does not normally solicit information on list 4 species, no CNDDB form was prepared.

Interesting scrub oaks have been documented in the OSMZ. During 2008 plant surveys Torrey scrub oak (*Quercus* X*acutidens*) was encountered. Tom Chester has documented two scrub oak hybrid species in the area including scrub oak x Engelmann oak and Torrey oak x Engelmann oak (Chester 2003).

San Miguel savory (*Satureja chandleri*), a CNPS list 1B.2, species was documented in 1983 seven miles south of Temecula along Sandia Creek (CDFG 2008). No San Miguel savory was encountered during 2008 plant surveys.

CONCLUSIONS

Although no federally or state-listed endangered plant species were detected, the OSMZ contains native scrub and woodland plant communities that are of high quality and support a high diversity of native plant species as indicated by the plant list in Appendix A. Two CNPS list 1B (considered rare and endangered) species were found in fairly large numbers at multiple sites, reinforcing the conservation value of the OSMZ. The preservation of apparent source populations of Chaparral Sand-Verbena upstream of Camp Pendleton on the OSMZ could conceivably help to mitigate impacts, if they cannot be avoided, of the SMRCUP on the Camp Pendleton population of this species.

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Keeley, J.E. and A. Massihi. 1994. *Arctostaphylos rainbowensis*, A New Burl-forming Manzanita from Northern San Diego County, California. Madrono 41(1): 1-12.

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U.S. Fish and Wildlife Service. 1996. *Guidelines for Conducting and Reporting Botanical Inventories for Federally listed, Proposed and Candidate Plants.*

Figures: Attached

Appendices

Appendix A: Plant List
Appendix B: CNDDB FORMS

Photographs

Compiled on accompanying DVD

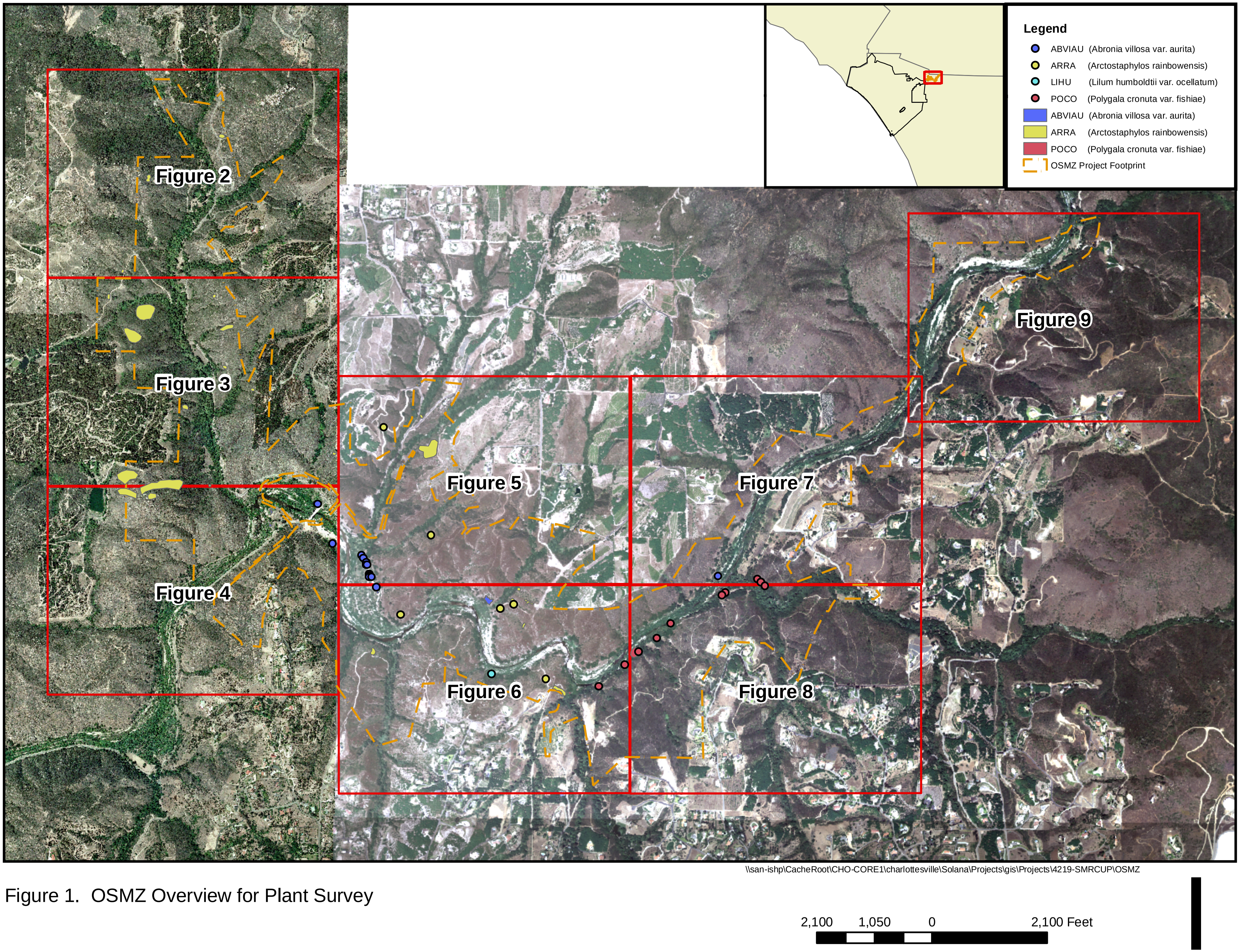

Figure 1. OSMZ Overview for Plant Survey

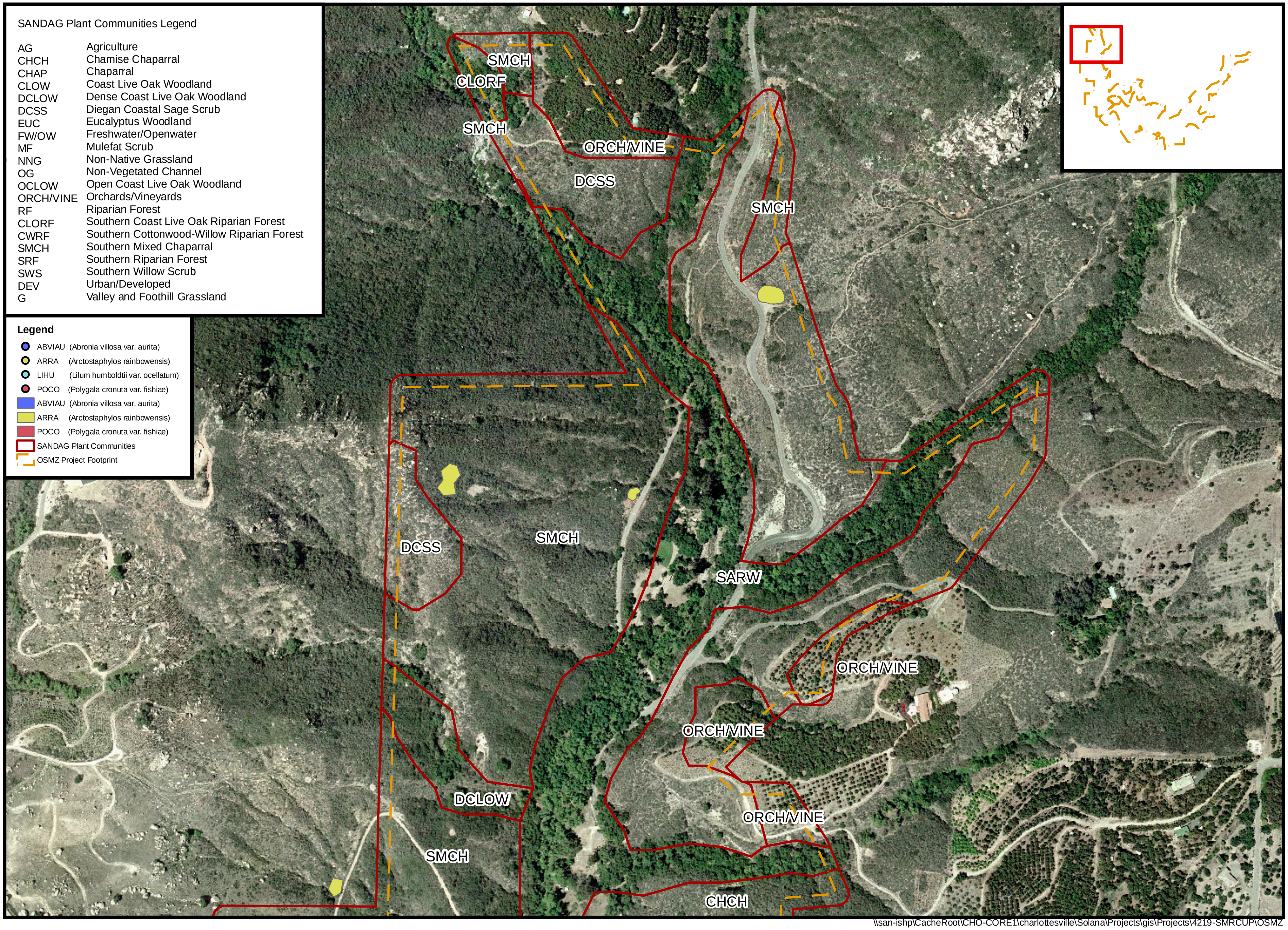

Figure 2. OSMZ Plant Survey

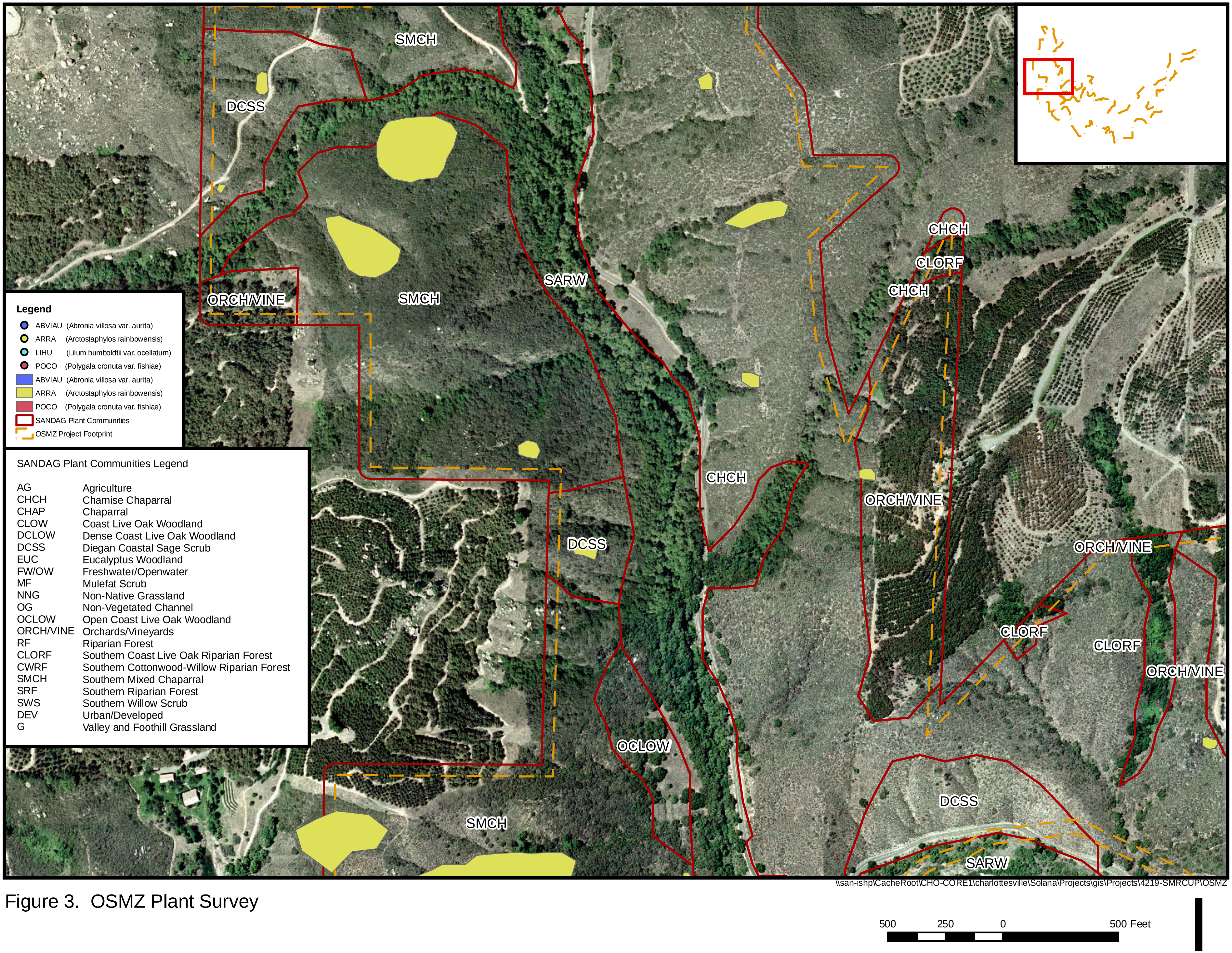

Figure 3. OSMZ Plant Survey

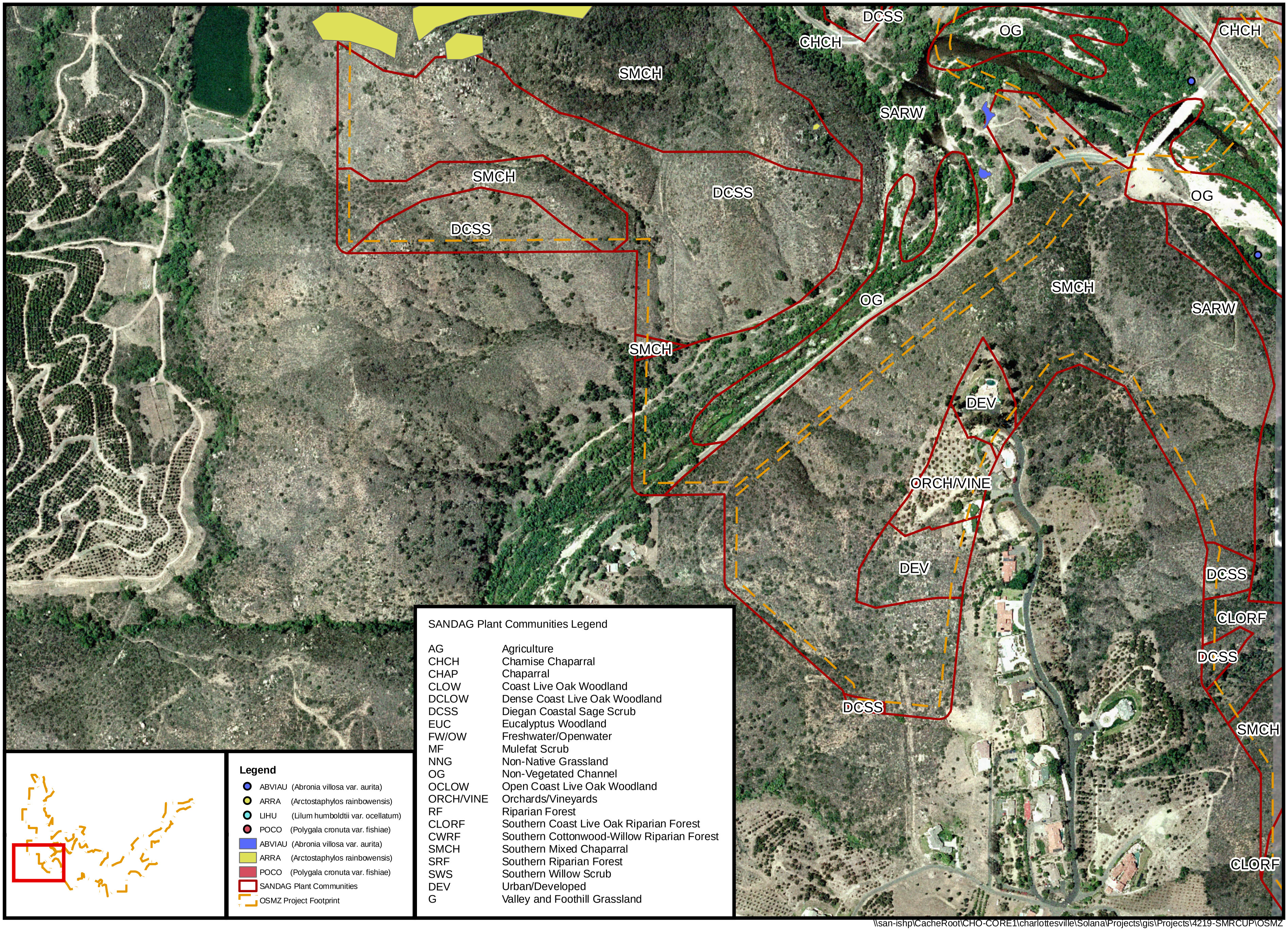

Figure 4. OSMZ Plant Survey

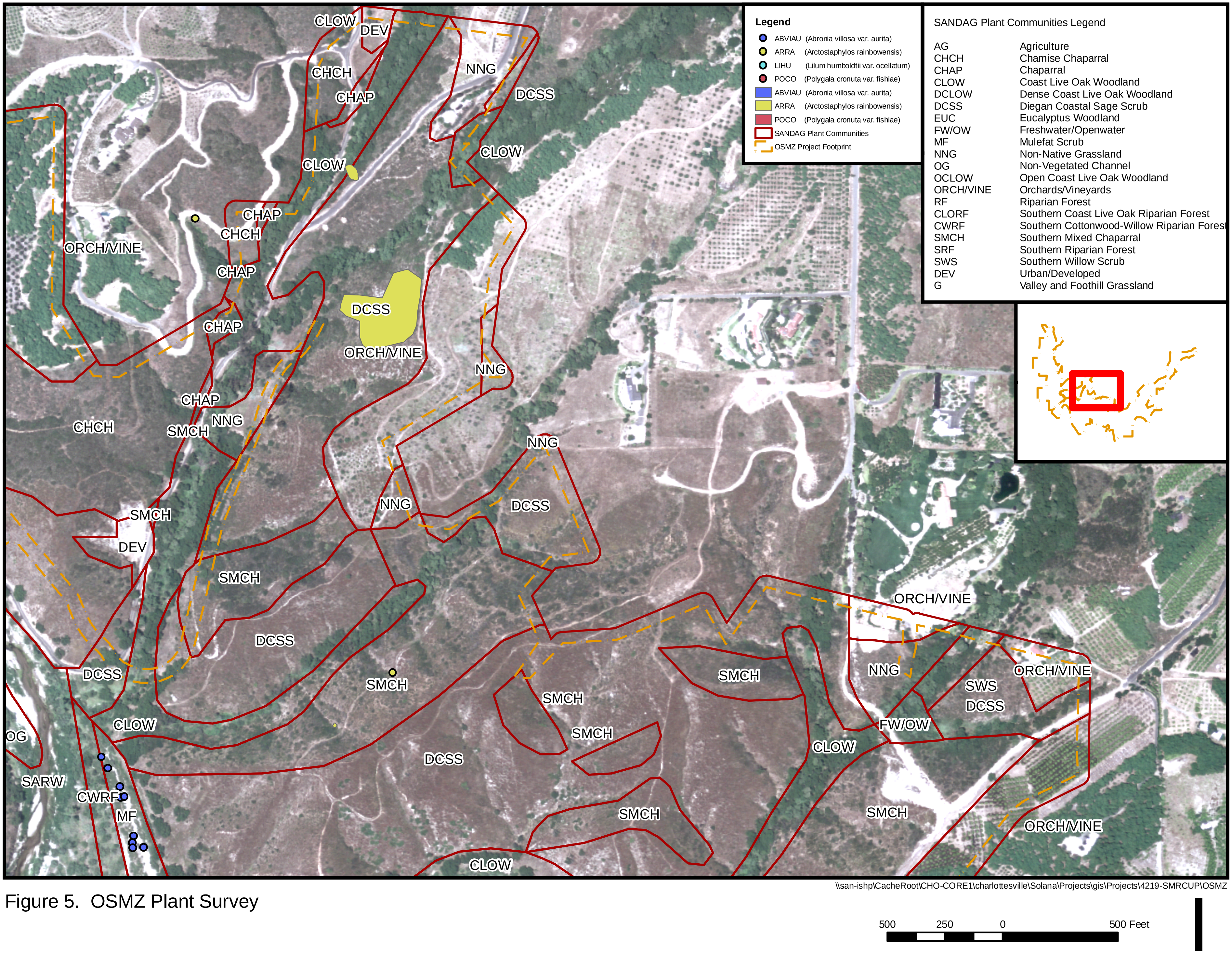

Figure 5. OSMZ Plant Survey

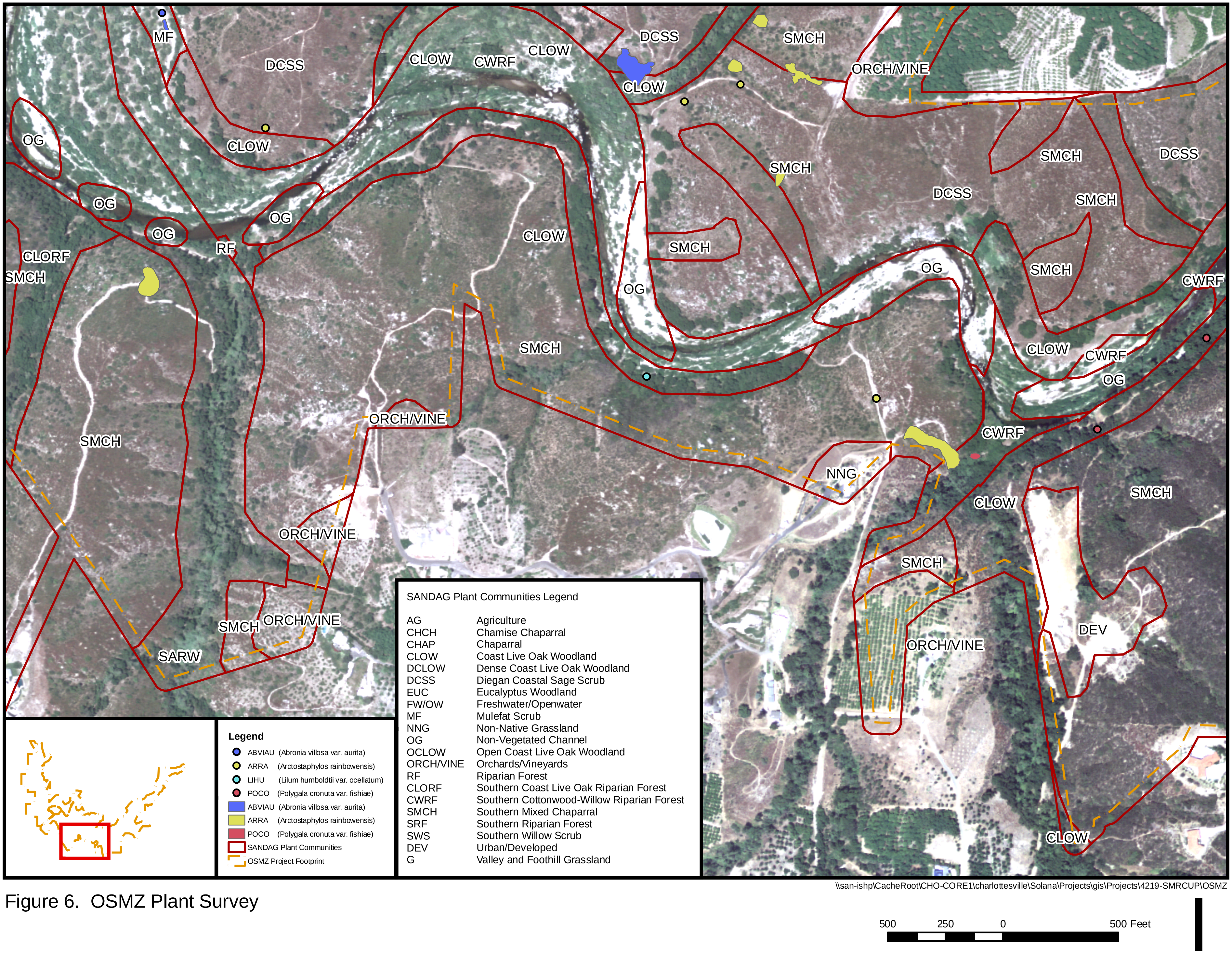

Figure 6. OSMZ Plant Survey

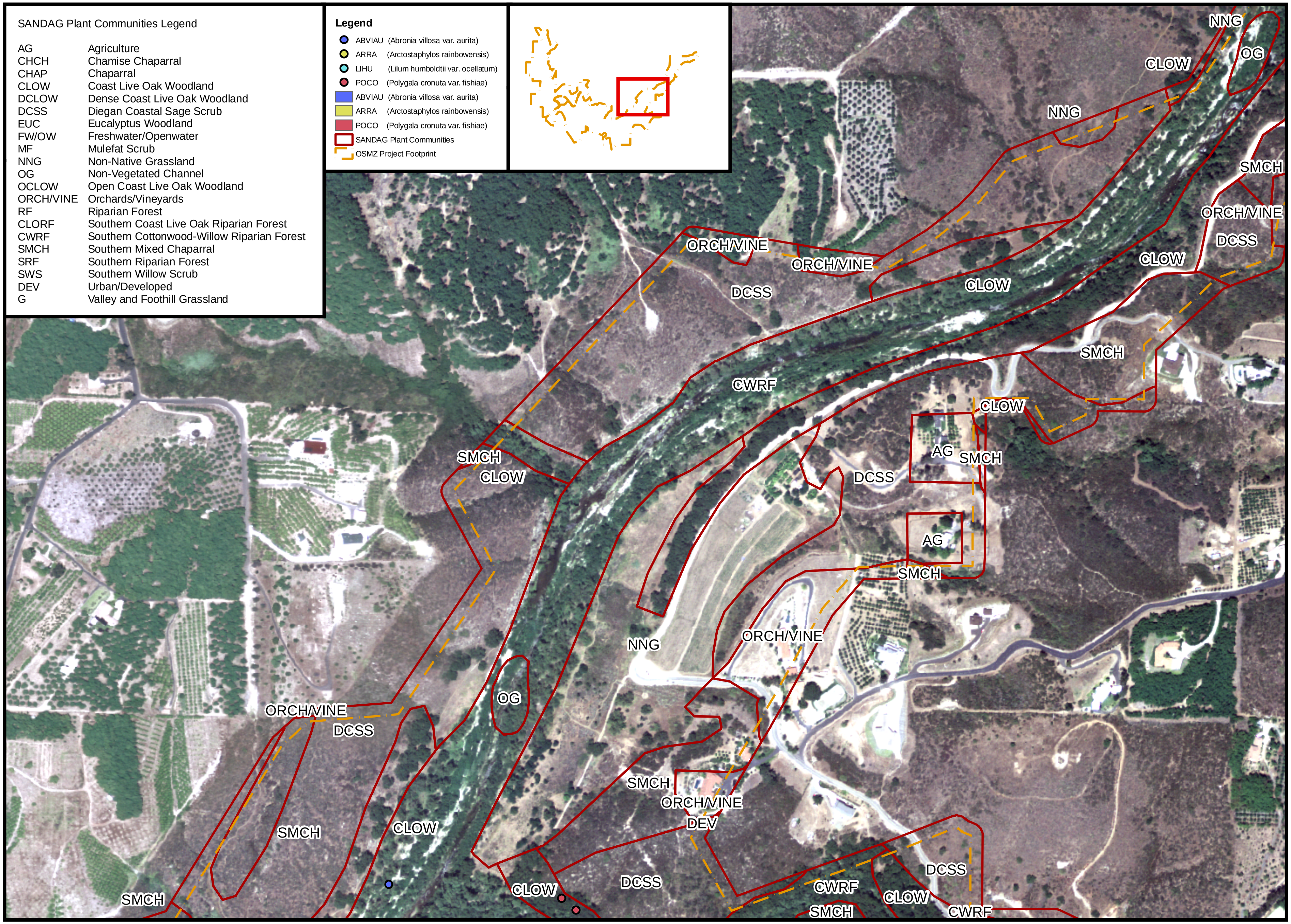

Figure 7. OSMZ Plant Survey

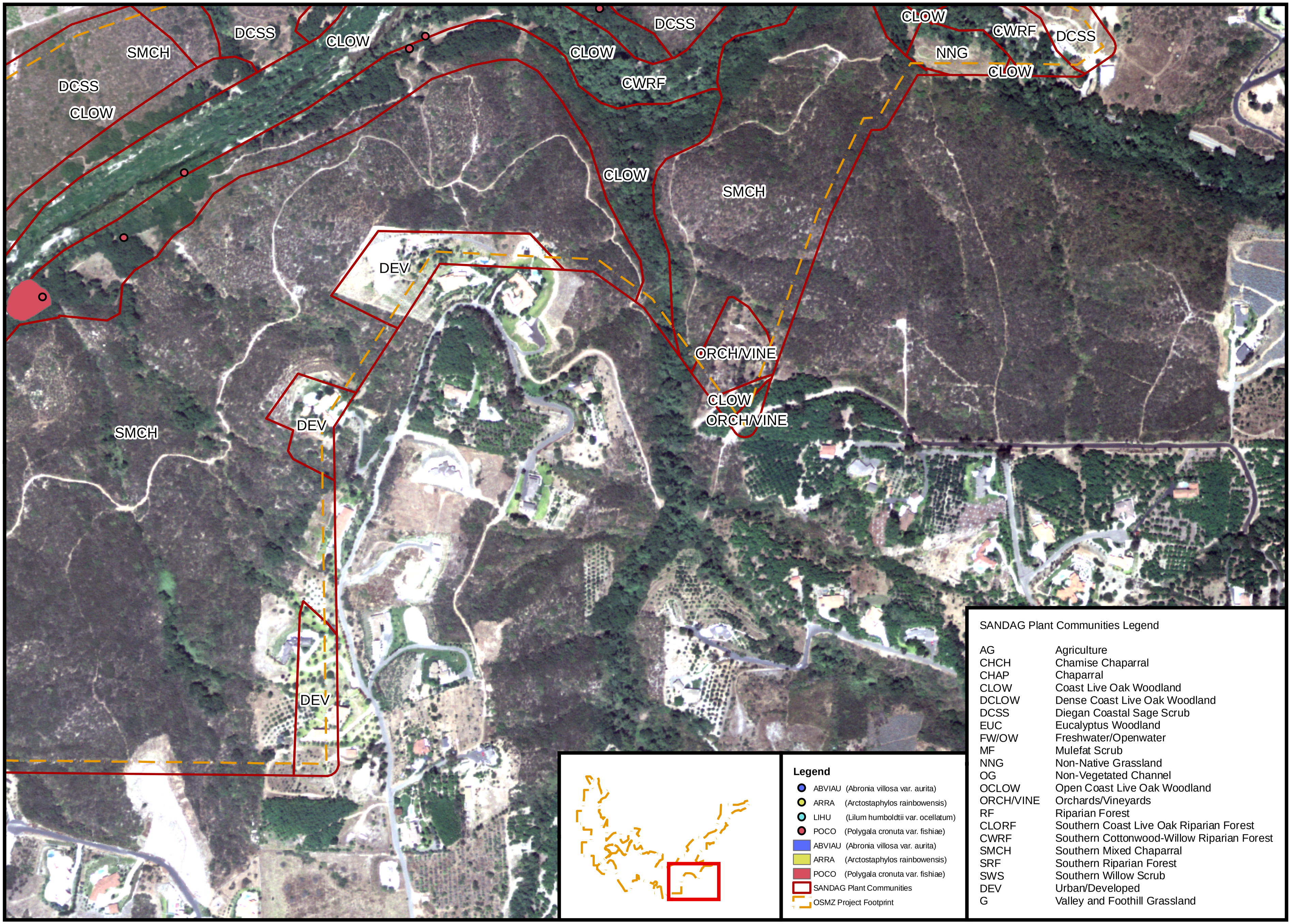

Figure 8. OSMZ Plant Survey

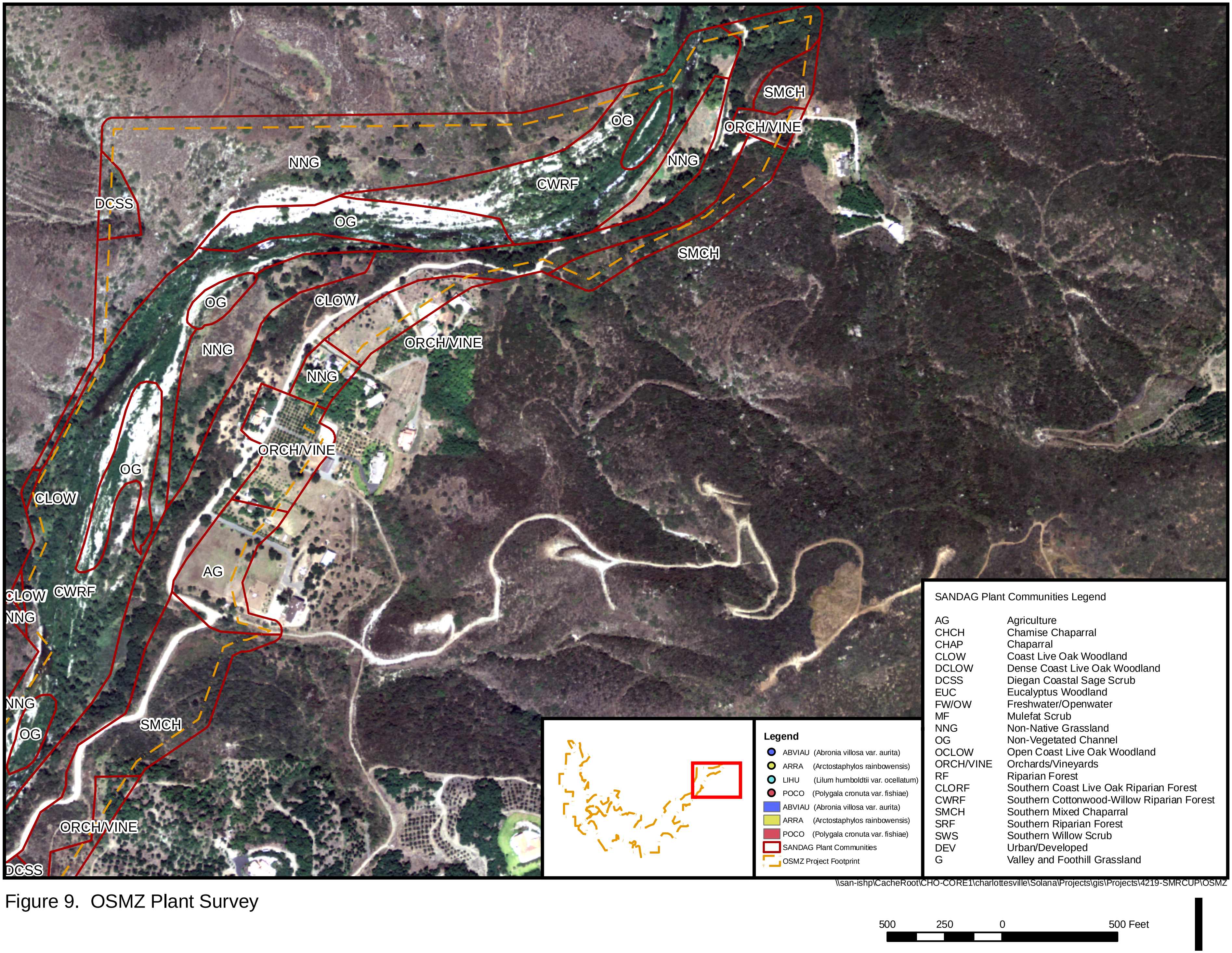

Figure 9. OSMZ Plant Survey

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SMRCUP OSMZ Plant List

CommonName	Family	Genus	Species	InfraName	Native
Blue Elderberry	Adoxaceae	*Sambucus*	*mexicana*		Yes
Century Plant	Agavaceae	*Agave*	*americana*		No
Chaparral Candle	Agavaceae	*Hesperoyucca*	*whipplei*		Yes
Iceplant	Aizoaceae	*Carpobrotus*	*edulis*		No
Spearscale	Amaranthaceae	*Atriplex*	*prostrata*		Yes
Berlandier's Pit-Seed Goosefoot	Amaranthaceae	*Chenopodium*	*berlandieri*		Yes
California Goosefoot	Amaranthaceae	*Chenopodium*	*californicum*		Yes
Mexican Tea	Amaranthaceae	*Dysphania*	*ambrosioides*		No
Prickly Russian-Thistle, Tumbleweed	Amaranthaceae	*Salsola*	*tragus*		No
Laurel Sumac	Anacardiaceae	*Malosma*	*laurina*		Yes
Sugar Bush	Anacardiaceae	*Rhus*	*ovata*		Yes
Skunkbrush	Anacardiaceae	*Rhus*	*trilobata*		Yes
Pepper Tree	Anacardiaceae	*Schinus*	*molle*		No
Western Poison-Oak	Anacardiaceae	*Toxicodendron*	*diversilobum*		Yes
Bur Chervil	Apiaceae	*Anthriscus*	*caucalis*		No
Mock-Parsley	Apiaceae	*Apiastrum*	*angustifolium*		Yes
Common Celery	Apiaceae	*Apium*	*graveolens*		No
Common Poison Hemlock	Apiaceae	*Conium*	*maculatum*		No
Rattlesnake Weed	Apiaceae	*Daucus*	*pusillus*		Yes
Whorled Marsh Pennywort	Apiaceae	*Hydrocotyle*	*verticillata*		Yes
Sharp-Tooth Sanicle	Apiaceae	*Sanicula*	*arguta*		Yes
Pacific Sanicle	Apiaceae	*Sanicula*	*crassicaulis*		Yes
Climbing Milkweed	Apocynaceae	*Sarcostemma*	*cynanchoides*	ssp. *hartwegii*	Yes
Greater Periwinkle	Apocynaceae	*Vinca*	*major*		No
Least Duckweed	Araceae	*Lemna*	*minuta*		Yes
Canary Island Date Palm	Arecaceae	*Phoenix*	*canariensis*		No
Mexican fan palm	Arecaceae	*Washingtonia*	*robusta*		No
Scapellote	Asteraceae	*Acourtia*	*microcephala*		Yes
Annual Bur-Sage	Asteraceae	*Ambrosia*	*acanthicarpa*		Yes
Western Ragweed	Asteraceae	*Ambrosia*	*psilostachya*		Yes
Coastal Sagebrush	Asteraceae	*Artemisia*	*californica*		Yes
Douglas Mugwort	Asteraceae	*Artemisia*	*douglasiana*		Yes
Emory's Baccharis	Asteraceae	*Baccharis*	*emoryi*		Yes
Coyote Bush	Asteraceae	*Baccharis*	*pilularis*		Yes
Mule-Fat, Seep-Willow	Asteraceae	*Baccharis*	*salicifolia*		Yes
Rush Sweetbush	Asteraceae	*Bebbia*	*juncea*	var. *aspera*	Yes
California Brickellbush	Asteraceae	*Brickellia*	*californica*		Yes
Italian Thistle	Asteraceae	*Carduus*	*pycnocephalus*		No
Yellow Star-Thistle	Asteraceae	*Centaurea*	*solstitialis*		No
White Pincushion	Asteraceae	*Chaenactis*	*artemisiifolia*		Yes
Yellow Pincushion	Asteraceae	*Chaenactis*	*glabriuscula*	var. *glabriuscula*	Yes
Bull Thistle	Asteraceae	*Cirsium*	*vulgare*		No
Blessed Thistle	Asteraceae	*Cnicus*	*benedictus*		No
Common Sand-Aster	Asteraceae	*Corethrogyne*	*filaginifolia*	var. *filaginifolia*	Yes
Fascicled Tarweed	Asteraceae	*Deinandra*	*fasciculata*		Yes
Blue-Eye Cape-Marigold	Asteraceae	*Dimorphotheca*	*sinuata*		No
Boundary Goldenbush	Asteraceae	*Ericameria*	*brachylepis*		Yes
Leafy Daisy	Asteraceae	*Erigeron*	*foliosus*	var. *foliosus*	Yes
Long-Stem Golden-Yarrow	Asteraceae	*Eriophyllum*	*confertiflorum*	var. *confertiflorum*	Yes
Western Goldenrod	Asteraceae	*Euthamia*	*occidentalis*		Yes
Southern Sawtooth Goldenbush	Asteraceae	*Hazardia*	*squarrosa*	var. *grindelioides*	Yes
Crete Hedypnois	Asteraceae	*Hedypnois*	*cretica*		No
Western Sunflower	Asteraceae	*Helianthus*	*annuus*		Yes
Telegraph Weed	Asteraceae	*Heterotheca*	*grandiflora*		Yes
Smooth Cat's Ear	Asteraceae	*Hypochaeris*	*glabra*		No
Prickly Lettuce	Asteraceae	*Lactuca*	*serriola*		No
Southern Goldfields	Asteraceae	*Lasthenia*	*coronaria*		Yes
Tidy Tips	Asteraceae	*Layia*	*platyglossa*		Yes
Scale-Broom	Asteraceae	*Lepidospartum*	*squamatum*		Yes
Cud Aster	Asteraceae	*Lessingia*	*filaginifolia*	var. *filaginifolia*	Yes
Narrow-Leaf Filago	Asteraceae	*Logfia*	*gallica*		Yes
Osmadenia	Asteraceae	*Osmadenia*	*tenella*		Yes
Salt Marsh Fleabane	Asteraceae	*Pluchea*	*odorata*		Yes
Arrow Weed	Asteraceae	*Pluchea*	*sericea*		Yes
Odora	Asteraceae	*Porophyllum*	*gracile*		Yes
Fragrant Everlasting	Asteraceae	*Pseudognaphalium*	*beneolens*		Yes
Fragrant Cudweed	Asteraceae	*Pseudognaphalium*	*luteo-album*		No
White Everlasting	Asteraceae	*Pseudognaphalium*	*microcephalum*		Yes
Cotton-Batting Plant	Asteraceae	*Pseudognaphalium*	*stramineum*		Yes
Common Groundsel	Asteraceae	*Senecio*	*vulgaris*		No
Prickly Sow-Thistle	Asteraceae	*Sonchus*	*asper*	ssp. *asper*	No
Common Sow-Thistle	Asteraceae	*Sonchus*	*oleraceus*		No

SMRCUP OSMZ Plant List

CommonName	Family	Genus	Species	InfraName	Native
Deane's Small Wreath-Plant	Asteraceae	*Stephanomeria*	*exigua*	ssp. *deanei*	Yes
Silver Puffs	Asteraceae	*Uropappus*	*lindleyi*		Yes
Cocklebur	Asteraceae	*Xanthium*	*strumarium*		Yes
Alder	Betulaceae	*Alnus*	*rhombifolia*		Yes
Catalpa	Bignoniaceae	*Catalpa*	*spp.*		No
Cryptantha	Boraginaceae	*Cryptantha*	*clevelandii*	var. *florosa*	Yes
Cryptantha	Boraginaceae	*Cryptantha*	*clevelandii*	var. *clevelandii*	Yes
Nievitas Cryptantha	Boraginaceae	*Cryptantha*	*intermedia*		Yes
Prickly Cryptantha	Boraginaceae	*Cryptantha*	*muricata*		Yes
Slender Pectocarya	Boraginaceae	*Pectocarya*	*linearis*	ssp. f*erocula*	Yes
California Popcornflower	Boraginaceae	*Plagiobothrys*	*collinus*	var. *californicus*	Yes
Black Mustard	Brassicaceae	*Brassica*	*nigra*		No
Lesser Wart-Cress	Brassicaceae	*Coronopus*	*didymus*		No
Short-Pod Mustard	Brassicaceae	*Hirschfeldia*	*incana*		No
Wild Radish	Brassicaceae	*Raphanus*	*sativus*		No
Water-Cress	Brassicaceae	*Rorippa*	*nasturtium-aquaticum*		No
London Rocket	Brassicaceae	*Sisymbrium*	*irio*		No
Hare's-Ear Cabbage	Brassicaceae	*Sisymbrium*	*orientale*		No
Mesa Prickly Pear	Cactaceae	*Opuntia*	*xvaseyi*		Yes
Desert Prickly Pear	Cactaceae	*Opuntia*	*phaecantha*		Yes
Notch Fringepod	Brassicaceae	*Thysanocarpus*	*laciniatus*		Yes
Johnston's Honeysuckle	Caprifoliaceae	*Lonicera*	*subspicata*	var. *denudata*	Yes
Mouse-Ear Chickweed	Caryophyllaceae	*Cerastium*	*glomeratum*		No
Snapdragon Catchfly	Caryophyllaceae	*Silene*	*antirrhina*		Yes
Common Catchfly	Caryophyllaceae	*Silene*	*gallica*		No
Southern Pink	Caryophyllaceae	*Silene*	*laciniata*	ssp. *laciniata*	Yes
Common Chickweed	Caryophyllaceae	*Stellaria*	*media*		No
Peak Rush-Rose	Cistaceae	*Helianthemum*	*scoparium*		Yes
Southern California Morning-Glory	Convolvulaceae	*Calystegia*	*macrostegia*	ssp. *arida*	Yes
Chaparral Dodder	Convolvulaceae	*Cuscuta*	*californica*	var. *californica*	Yes
Dodder	Convolvulaceae	*Cuscuta*	*campestris*		Yes
Ladies' Fingers	Crassulaceae	*Dudleya*	*edulis*		Yes
Chalk Dudleya	Crassulaceae	*Dudleya*	*pulverulenta*		Yes
Calabazilla	Cucurbitaceae	*Cucurbita*	*foetidissima*		Yes
Manroot, Wild-Cucumber	Cucurbitaceae	*Marah*	*macrocarpus*	var. *macrocarpus*	Yes
Barbara's Sedge	Cyperaceae	*Carex*	*barbarae*		Yes
San Diego Sedge	Cyperaceae	*Carex*	*spissa*		Yes
Triangular-Fruit Sedge	Cyperaceae	*Carex*	*triquetra*		Yes
Tall Flatsedge	Cyperaceae	*Cyperus*	*eragrostis*		Yes
African Umbrella Plant	Cyperaceae	*Cyperus*	*involucratus*		No
Brown Umbrella-Sedge	Cyperaceae	*Cyperus*	*niger*		Yes
Fragrant Flatsedge	Cyperaceae	*Cyperus*	*odoratus*		Yes
Dombey's Spike-Rush	Cyperaceae	*Eleocharis*	*montevidensis*		Yes
Viscid Bulrush	Cyperaceae	*Schoenoplectus*	*acutus*	var. *occidentalis*	Yes
Olney's Bulrush	Cyperaceae	*Schoenoplectus*	*americanus*		Yes
Small-Fruit Bulrush	Cyperaceae	*Scirpus*	*microcarpus*		Yes
Durango Root	Datiscaceae	*Datisca*	*glomerata*		Yes
Western Bracken	Dennstaedtiaceae	*Pteridium*	*aquilinum*	var. *pubescens*	Yes
Coastal Wood Fern	Dryopteridaceae	*Dryopteris*	*arguta*		Yes
Common Horsetail	Equisetaceae	*Equisetum*	*arvense*		Yes
Common Scouring-Rush	Equisetaceae	*Equisetum*	*hyemale*	ssp. *affine*	Yes
Smooth Scouring-Rush	Equisetaceae	*Equisetum*	*laevigatum*		Yes
Rainbow Manzanita	Ericaceae	*Arctostaphylos*	*rainbowensis*		Yes
Mission Manzanita	Ericaceae	*Xylococcus*	*bicolor*		Yes
Small-Seed Sandmat	Euphorbiaceae	*Chamaesyce*	*polycarpa*		Yes
California Croton	Euphorbiaceae	*Croton*	*californicus*		Yes
Doveweed	Euphorbiaceae	*Croton*	*setigerus*		Yes
Chinese Caps	Euphorbiaceae	*Euphorbia*	*crenulata*		Yes
Petty Spurge	Euphorbiaceae	*Euphorbia*	*peplus*		No
Castor Bean	Euphorbiaceae	*Ricinus*	*communis*		No
Cootamundra Wattle	Fabaceae	*Acacia*	*baileyana*		No
False Indigo	Fabaceae	*Amorpha*	*fruticosa*		Yes
Leather Root	Fabaceae	*Hoita*	*macrostachya*		Yes
San Diego Sweet Pea	Fabaceae	*Lathyrus*	*vestitus*	var. *alefeldii*	Yes
Grab Lotus	Fabaceae	*Lotus*	*hamatus*		Yes
Heermann's Lotus	Fabaceae	*Lotus*	*heermannii*	var. *heermannii*	Yes
Alkali Lotus	Fabaceae	*Lotus*	*salsuginosus*	var. *salsuginosus*	Yes
Short-Wing Deerweed	Fabaceae	*Lotus*	*scoparius*	var. *brevialatus*	Yes
Bishop's/Strigose Lotus	Fabaceae	*Lotus*	*strigosus*		Yes
Miniature Lupine	Fabaceae	*Lupinus*	*bicolor*		Yes
Hall's Bush Lupine	Fabaceae	*Lupinus*	*excubitus*	var. *hallii*	Yes
Stinging Lupine	Fabaceae	*Lupinus*	*hirsutissimus*		Yes

SMRCUP OSMZ Plant List

CommonName	Family	Genus	Species	InfraName	Native
Arroyo Lupine	Fabaceae	*Lupinus*	*succulentus*		Yes
Collar Lupine	Fabaceae	*Lupinus*	*truncatus*		Yes
California Burclover	Fabaceae	*Medicago*	*polymorpha*		No
White Sweetclover	Fabaceae	*Melilotus*	*albus*		No
Indian Sweetclover	Fabaceae	*Melilotus*	*indicus*		No
Honey Mesquite	Fabaceae	*Prosopis*	*glandulosa*	var. *torreyana*	Yes
Tree Clover	Fabaceae	*Trifolium*	*ciliolatum*		Yes
Rose Clover	Fabaceae	*Trifolium*	*hirtum*		No
Valley Clover	Fabaceae	*Trifolium*	*willdenovii*		Yes
Winter Vetch	Fabaceae	*Vicia*	*villosa*	ssp. *villosa*	No
Coast Live Oak, Encina	Fagaceae	*Quercus*	*agrifolia*	var. *agrifolia*	Yes
Engelmann's/Mesa Blue Oak	Fagaceae	*Quercus*	*engelmannii*		Yes
Torrey's Scrub Oak	Fagaceae	*Quercus*	X *acutidens*		Yes
Canchalagua	Gentianaceae	*Centaurium*	*venustum*		Yes
Alkali Chalice	Gentianaceae	*Eustoma*	*exaltatum*		Yes
Long-Beak Filaree/Storksbill	Geraniaceae	*Erodium*	*botrys*		No
Red-Stem Filaree/Storksbill	Geraniaceae	*Erodium*	*cicutarium*		No
Cut-Leaf Geranium	Geraniaceae	*Geranium*	*dissectum*		No
White-Flower Currant	Grossulariaceae	*Ribes*	*indecorum*		Yes
Salt Heliotrope	Heliotropaceae	*Heliotropium*	*curassavicum*		Yes
Small-Flower Soap Plant	Hyacinthaceae	*Chloragalum*	*parviflorum*		Yes
Whispering Bells	Hydrophyllaceae	*Emmenanthe*	*penduliflora*	var. *penduliflora*	Yes
Common Eucrypta	Hydrophyllaceae	*Eucrypta*	*chrysanthemifolia*	var. *chrysanthemifolia*	Yes
Small-Flower Baby Blue Eyes	Hydrophyllaceae	*Nemophila*	*menziesii*	var. *integrifolia*	Yes
Caterpillar Phacelia	Hydrophyllaceae	*Phacelia*	*cicutaria*	var. *hispida*	Yes
Wild Canterbury-Bell	Hydrophyllaceae	*Phacelia*	*minor*		Yes
Phacelia	Hydrophyllaceae	*Phacelia*	*minor x P. parryi*		Yes
Branching Phacelia	Hydrophyllaceae	*Phacelia*	*ramosissima*	var. *latifolia*	Yes
Fiesta Flower	Hydrophyllaceae	*Pholistoma*	*auritum*	var. *auritum*	Yes
Blue-Eyed-Grass	Iridaceae	*Sisyrinchium*	*bellum*		Yes
Pecan	Juglandaceae	*Carya*	*illinoinensis*		No
Southern California Black Walnut	Juglandaceae	*Juglans*	*californica*	var. *californica*	Yes
Iris-Leaf Rush	Juncaceae	*Juncus*	*xiphioides*		Yes
Henbit	Lamiaceae	*Lamium*	*amplexicaule*		No
Horehound	Lamiaceae	*Marrubium*	*vulgare*		No
Mint	Lamiaceae	*Mentha*	*spp.*		No
White Sage	Lamiaceae	*Salvia*	*apiana*		Yes
Chia	Lamiaceae	*Salvia*	*columbariae*		Yes
Black Sage	Lamiaceae	*Salvia*	*mellifera*		Yes
Woolly Bluecurls	Lamiaceae	*Trichostema*	*lanatum*		Yes
Splendid Mariposa Lily	Liliaceae	*Calochortus*	*splendens*		Yes
Chaparral Bushmallow	Malvaceae	*Malacothamnus*	*fasciculatus*		Yes
Cheeseweed	Malvaceae	*Malva*	*parviflora*		No
Eucalyptus	Myrtaceae	*Eucalyptus*	*spp.*		No
Chaparral Sand-Verbena	Nyctaginaceae	*Abronia*	*villosa*	var. *aurita*	Yes
Coastal Wishbone Plant	Nyctaginaceae	*Mirabilis*	*laevis*	var. *crassifolia*	Yes
Olive	Oleaceae	*Olea*	*europaea*		No
California Sun Cup	Onagraceae	*Camissonia*	*bistorta*		Yes
False-Mustard	Onagraceae	*Camissonia*	*californica*		Yes
Canyon Godetia	Onagraceae	*Clarkia*	*epilobioides*		Yes
Four-Spot Clarkia	Onagraceae	*Clarkia*	*purpurea*	ssp. *quadrivulnera*	Yes
Canyon Clarkia	Onagraceae	*Clarkia*	*similis*		Yes
California Fuchsia	Onagraceae	*Epilobium*	*canum*	ssp. *canum*	Yes
Willow Herb	Onagraceae	*Epilobium*	*ciliatum*	ssp. *ciliatum*	Yes
Drummond's Gaura	Onagraceae	*Gaura*	*drummondii*		No
California Evening-Primrose	Onagraceae	*Oenothera*	*californica*		Yes
Great Marsh Evening-Primrose	Onagraceae	*Oenothera*	*elata*	ssp. *hirsutissima*	Yes
Purple Owl's-Clover	Orobanchaceae	*Castilleja*	*exserta*	ssp. *exserta*	Yes
Dark-Tip Bird's Beak	Orobanchaceae	*Cordylanthus*	*rigidus*	ssp. *setigerus*	Yes
California Wood-Sorrel	Oxalidaceae	*Oxalis*	*albicans*	ssp. *californica*	Yes
Bermuda-Buttercup	Oxalidaceae	*Oxalis*	*pes-caprae*		No
California Peony	Paeoniaceae	*Paeonia*	*californica*		Yes
Golden Ear-Drops	Papaveraceae	*Dicentra*	*chrysantha*		Yes
California Poppy	Papaveraceae	*Eschscholzia*	*californica*		Yes
Fire Poppy	Papaveraceae	*Papaver*	*californicum*		Yes
Cream Cups	Papaveraceae	*Platystemon*	*californicus*		Yes
Coast Monkey Flower	Phrymaceae	*Mimulus*	*aurantiacus*	var. *puniceus*	Yes
Slope Semiphore	Phrymaceae	*Mimulus*	*brevipes*		Yes
Scarlet Monkey Flower	Phrymaceae	*Mimulus*	*cardinalis*		Yes
Seep Monkey Flower	Phrymaceae	*Mimulus*	*guttatus*		Yes
Climbing Snapdragon	Plantaginaceae	*Antirrhinum*	*kelloggii*		Yes
Nuttall's Snapdragon	Plantaginaceae	*Antirrhinum*	*nuttallianum*	ssp. *nuttallianum*	Yes

SMRCUP OSMZ Plant List

CommonName	Family	Genus	Species	InfraName	Native
Chinese Houses	Plantaginaceae	*Collinsia*	*heterophylla*		Yes
Yellow Bush Penstemon	Plantaginaceae	*Keckiella*	*antirrhinoides*	var. *antirrhinoides*	Yes
Climbing Bush Penstemon	Plantaginaceae	*Keckiella*	*cordifolia*		Yes
Large Blue Toadflax	Plantaginaceae	*Linaria*	*canadensis*		Yes
Showy Penstemon	Plantaginaceae	*Penstemon*	*spectabilis*	var. *spectabilis*	Yes
Dot-Seed Plantain	Plantaginaceae	*Plantago*	*erecta*		Yes
English Plantain	Plantaginaceae	*Plantago*	*lanceolata*		No
Common Plantain	Plantaginaceae	*Plantago*	*major*		No
Water Speedwell	Plantaginaceae	*Veronica*	*anagallis-aquatica*		No
Western Sycamore	Platanaceae	*Platanus*	*racemosa*		Yes
Notch-Leaf Marsh-Rosemary	Plumbaginaceae	*Limonium*	*sinuatum*		No
Giant Stipa	Poaceae	*Achnatherum*	*coronatum*		Yes
Water Beardgrass	Poaceae	*Agrostis*	*viridis*		No
Giant Reed	Poaceae	*Arundo*	*donax*		No
Slender Wild Oat	Poaceae	*Avena*	*barbata*		No
Wild Oat	Poaceae	*Avena*	*fatua*		No
Ripgut Grass	Poaceae	*Bromus*	*diandrus*		No
Foxtail Chess, Red Brome	Poaceae	*Bromus*	*madritensis*	ssp. *rubens*	No
Pampas Grass	Poaceae	*Cortaderia*	*selloana*		No
Bermuda Grass	Poaceae	*Cynodon*	*dactylon*		No
Common Barnyard Grass	Poaceae	*Echinochloa*	*crus-galli*		No
Panic Veldt Grass	Poaceae	*Ehrharta*	*erecta*		No
Long-Flower Veldt Grass	Poaceae	*Ehrharta*	*longiflora*		No
Jepson's Blue Wildrye	Poaceae	*Elymus*	*glaucus*	ssp. *jepsonii*	Yes
Nit Grass	Poaceae	*Gastridium*	*ventricosum*		No
Glaucous Barley	Poaceae	*Hordeum*	*murinum*	ssp. *glaucum*	No
Golden-Top	Poaceae	*Lamarckia*	*aurea*		No
Mexican Sprangletop	Poaceae	*Leptochloa*	*fusca*	ssp. *uninervia*	Yes
Giant Wild-Rye	Poaceae	*Leymus*	*condensatus*		Yes
Beardless Wild-Rye	Poaceae	*Leymus*	*triticoides*		Yes
Coast Range Melic	Poaceae	*Melica*	*imperfecta*		Yes
Natal Grass	Poaceae	*Melinis*	*repens*	ssp. *repens*	No
Little-Seed Muhly	Poaceae	*Muhlenbergia*	*microsperma*		Yes
Foothill Needlegrass	Poaceae	*Nassella*	*lepida*		Yes
Purple Needlegrass	Poaceae	*Nassella*	*pulchra*		Yes
Common Knotgrass	Poaceae	*Paspalum*	*distichum*		Yes
African Fountain Grass	Poaceae	*Pennisetum*	*setaceum*		No
Smilo Grass	Poaceae	*Piptatherum*	*miliaceum*		No
Annual Beard Grass	Poaceae	*Polypogon*	*monspeliensis*		No
Mediterranean Schismus	Poaceae	*Schismus*	*barbatus*		No
Hairy Rat-Tail Fescue	Poaceae	*Vulpia*	*myuros*	var. *hirsuta*	No
Blue False-Gilia	Polemoniaceae	*Allophyllum*	*glutinosum*		Yes
Many-Flower Woolly-Star	Polemoniaceae	*Eriastrum*	*sapphirinum*	ssp. dasyanthum	Yes
Grassland Gilia	Polemoniaceae	*Gilia*	*angelensis*		Yes
Ball Gilia	Polemoniaceae	*Gilia*	*capitata*	ssp. *abrotanifolia*	Yes
Coast Baby-Star	Polemoniaceae	*Leptosiphon*	*parviflorus*		Yes
Fish's Milkwort	Polygalaceae	*Polygala*	*cornuta*	var. *fishiae*	Yes
Fringed Spineflower	Polygonaceae	*Chorizanthe*	*fimbriata*	var. *fimbriata*	Yes
Prostrate Spineflower	Polygonaceae	*Chorizanthe*	*procumbens*		Yes
Tall Buckwheat	Polygonaceae	*Eriogonum*	*elongatum*	var. *elongatum*	Yes
Inland California Buckwheat	Polygonaceae	*Eriogonum*	*fasciculatum*	var. *foliolosum*	Yes
Slender Buckwheat	Polygonaceae	*Eriogonum*	*gracile*		Yes
Willow Smartweed, Willow Weed	Polygonaceae	*Polygonum*	*lapathifolium*		Yes
Granny's Hairnet, G. C. P.	Polygonaceae	*Pterostegia*	*drymarioides*		Yes
Desert Rhubarb	Polygonaceae	*Rumex*	*hymenosepalus*		Yes
California Polypody	Polypodiaceae	*Polypodium*	*californicum*		Yes
Red Maids	Portulacaceae	*Calandrinia*	*ciliata*		Yes
Common Calyptridium	Portulacaceae	*Calyptridium*	*monandrum*		Yes
Mexican Miner's-Lettuce	Portulacaceae	*Claytonia*	*perfoliata*	ssp. *mexicana*	Yes
Scarlet Pimpernel	Primulaceae	*Anagallis*	*arvensis*		No
Padre's Shooting Star	Primulaceae	*Dodecatheon*	*clevelandii*	ssp. *clevelandii*	Yes
Maidenhair Fern	Pteridaceae	*Adiantum*	*capillus-veneris*		Yes
California Cotton Fern	Pteridaceae	*Cheilanthes*	*newberryi*		Yes
Coffee Fern	Pteridaceae	*Pellaea*	*andromedifolia*		Yes
Bird's Foot Cliff-Brake	Pteridaceae	*Pellaea*	*mucronata*	var. *mucronata*	Yes
Ropevine Clematis	Ranunculaceae	*Clematis*	*pauciflora*		Yes
Parry's Larkspur	Ranunculaceae	*Delphinium*	*parryi*	ssp. *parryi*	Yes
Smooth-Leaf Meadow-Rue	Ranunculaceae	*Thalictrum*	*fendleri*	var. *polycarpum*	Yes
Thick-Leaf-Lilac	Rhamnaceae	*Ceanothus*	*crassifolius*		Yes
Ramona-Lilac	Rhamnaceae	*Ceanothus*	*tomentosus*		Yes
Holly-Leaf Redberry	Rhamnaceae	*Rhamnus*	*ilicifolia*		Yes
Chamise	Rosaceae	*Adenostoma*	*fasciculatum*		Yes

SMRCUP OSMZ Plant List

CommonName	Family	Genus	Species	InfraName	Native
San Diego Mountain-Mahogany	Rosaceae	*Cercocarpus*	*minutiflorus*		Yes
Toyon, Christmas Berry	Rosaceae	*Heteromeles*	*arbutifolia*		Yes
Islay, Holly-Leaf Cherry	Rosaceae	*Prunus*	*ilicifolia*	ssp. *ilicifolia*	Yes
California Blackberry	Rosaceae	*Rubus*	*ursinus*		Yes
California Rose	Rosaceae	*Rosa*	*californica*		Yes
Narrow-Leaf Bedstraw	Rubiaceae	*Galium*	*angustifolium*	ssp. *angustifolium*	Yes
Common Bedstraw, Goose Grass	Rubiaceae	*Galium*	*aparine*		No
Western Cottonwood	Salicaceae	*Populus*	*fremontii*	ssp. *fremontii*	Yes
Narrow-Leaf Willow	Salicaceae	*Salix*	*exigua*		Yes
Black Willow	Salicaceae	*Salix*	*goodingii*		Yes
Red Willow	Salicaceae	*Salix*	*laevigata*		Yes
Arroyo Willow	Salicaceae	*Salix*	*lasiolepis*		Yes
Yerba Mansa	Saururaceae	*Anemopsis*	*californica*		Yes
Coast Jepsonia	Saxifragaceae	*Jepsonia*	*parryi*		Yes
Hill Star	Saxifragaceae	*Lithophragma*	*heterophyllum*		Yes
Scarlet Monkey Flower	Scrophulariaceae	*Mimulus*	*cardinalis*		Yes
Downy Monkey Flower	Scrophulariaceae	*Mimulus*	*pilosus*		Yes
Bigelow's Spike-Moss	Selaginellaceae	*Selaginella*	*bigelovii*		Yes
Western Jimson Weed	Solanaceae	*Datura*	*wrightii*		Yes
Tree Tobacco	Solanaceae	*Nicotiana*	*glauca*		No
Indian Tobacco	Solanaceae	*Nicotiana*	*quadrivalvis*		Yes
White Nightshade	Solanaceae	*Solanum*	*americanum*		Yes
Douglas's Nightshade	Solanaceae	*Solanum*	*douglasii*		Yes
Parish's Nightshade	Solanaceae	*Solanum*	*parishii*		Yes
Blue Dicks	Themidaceae	*Dichelostemma*	*capitatum*	ssp. *capitatum*	Yes
Broad-Leaf Cattail	Typhaceae	*Typha*	*latifolia*		Yes
Chinese Elm	Ulmaceae	*Ulmus*	*parvifolia*		Yes
California Pellitory	Urticaceae	*Parietaria*	*hespera*	var. *californica*	Yes
Hoary Nettle	Urticaceae	*Urtica*	*dioica*		Yes
Southern California Wild Grape	Vitaceae	*Vitis*	*girdiana*		Yes

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FINAL

Wildlife Survey Report

Santa Margarita River Conjunctive Use Project

Open Space Management Zone

Fallbrook Public Utility District, California

Prepared by:

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September 12, 2008

Introduction

This report documents the results of a general wildlife survey of a proposed 1,384-acre Open Space Management Zone (OSMZ) in Fallbrook, San Diego County, California (Figure 1). The survey was completed between June 17 and July 19, 2008. The designation of the OSMZ is proposed as part of the Santa Margarita River Conjunctive Use Project (CUP) currently under review by the U.S. Bureau of Reclamation, Marine Corps Base Camp Pendleton, and the Fallbrook Public Utility District (FPUD). The OSMZ is owned by the FPUD and is at the site of the formerly proposed Fallbrook Dam and Reservoir. The OSMZ would be included in the CUP to help protect water quality and allow for passive recreation use. Mitigation, if required for other elements of the CUP, could also be incorporated into the OSMZ.

The purpose of the general wildlife survey was to document the general animal communities occurring within the OSMZ. As such, all vertebrate animals encountered during the survey, or otherwise detected, were identified to species and recorded. In addition, the number and location of all threatened and/or endangered species encountered were also documented. Due to the special nature of bats, specific surveys were conducted in an effort to document summer use of the OSMZ by this unique group of mammals. Although a survey targeting invertebrates was not undertaken, many identifiable invertebrates were also documented. While a botanical survey has also been completed for this project, a reduced botanical evaluation was completed during this survey due to its importance in identifying potential vertebrate species.

Methods

Plant Community
The plant communities within the project area were identified based on the dominant species. The identification of plant communities generally followed Holland (1986).

Wildlife Survey
Prior to conducting a general wildlife survey of the site, a review of potential sensitive species was completed. The potential for a species to occur within the project area was based on the geographic range of the species and the apparent presence of suitable habitat. Suitable habitat was based on the general type of plant community or communities associated with a species. The general wildlife survey for invertebrates and vertebrates was accomplished by walking the edge of the riparian plant communities located along the Santa Margarita River and Sandia Creek. In addition, portions of the upland communities were also surveyed where access permitted. Daylight surveys of the site were completed on June 17, 18, 20; Jul 3, 11, 15, & 29. Night surveys were also completed on Jul 3, 15, & 19. Additional surveys were completed by John Konecny, Konecny Biological Services, on June 23, 26, and 27, and July 1, 3, and 30.

Bat Survey
The night surveys focused primarily on the local bat fauna but also included nocturnal mammals. All bat surveys were conducted adjacent to the Santa Margarita River and Sandia Creek. Surveys were initiated just before sunset and continued to around midnight. Bat calls were recorded along the Santa Margarita River from the parking area located near the junction of De Luz Road and Sandia Creek Road, upstream to approximately 0.25 miles past the parking area for the Sandia Creek Trail (a distance of approximately 2 miles). Sandia Creek was surveyed from the confluence of the creek with the Santa Margarita River, upstream to the point the creek diverged from the road and access was no longer possible (a distance of approximately 3 miles). The ultrasonic calls of bats were recorded using a Pettersson Ultrasound Detector D 240x, and two

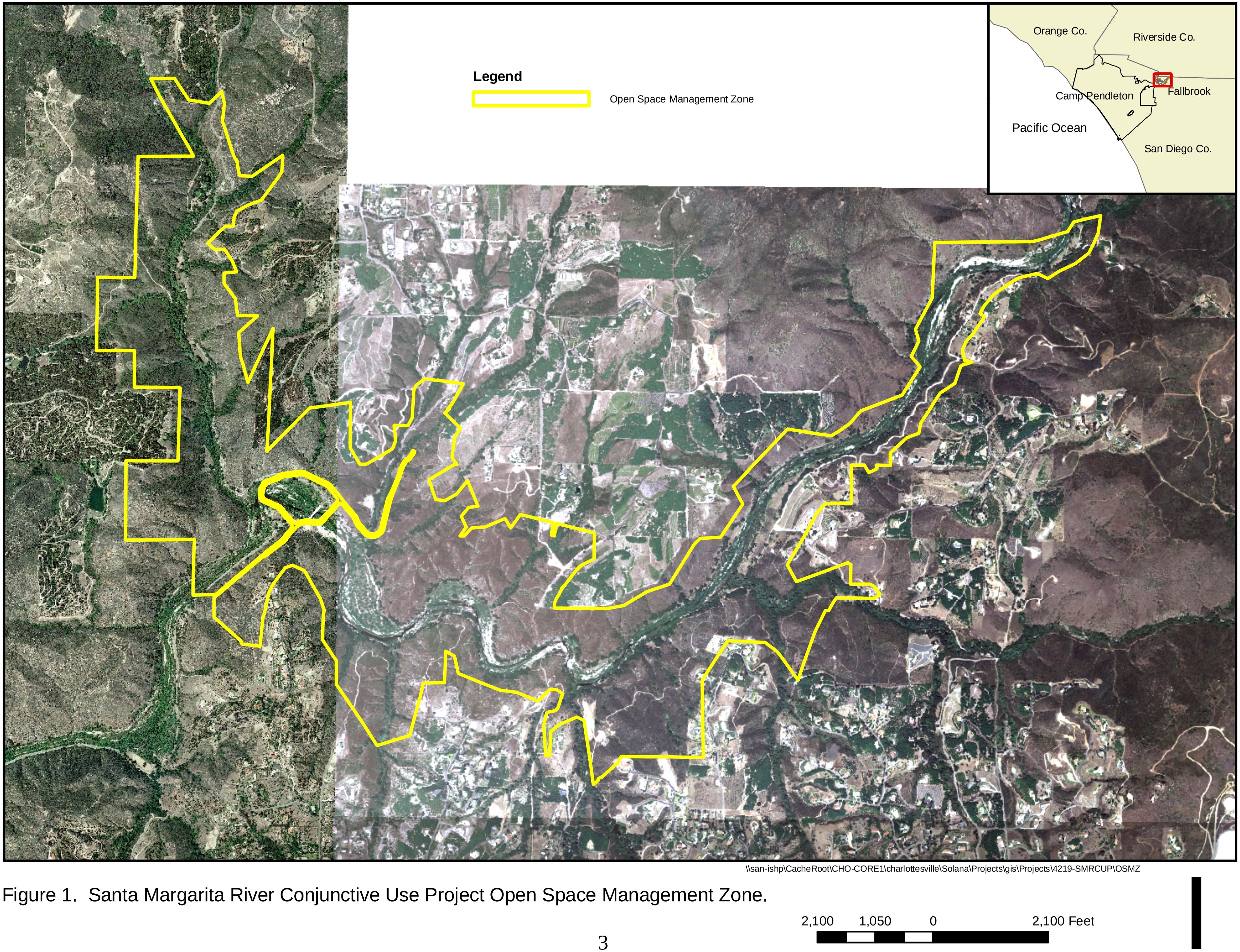

Figure 1. Santa Margarita River Conjunctive Use Project Open Space Management Zone.

digital recorders; both a Zoom Handy Recorder H2 and an Olympus Digital Voice Recorder VN-480 were used. All calls were later processed and identified to species using SonoBat 2.5.

Landscape

In addition to the potential presence of sensitive wildlife resources on site, the location of the site was qualitatively assessed as to its spatial importance to other natural communities and their associated biological communities. The purpose of this initial assessment was to evaluate the potential role the parcel could play in maintaining biological connectivity and integrity within this and adjacent areas.

An attempt was made to use the current scientific and standard English names for the animals encountered during this survey. As such, several references were used (Butterflies: Opler and Warren 2003; Dragonflies and Damselflies: Manolis 2003; Fish: Nelson et. al 2004; Reptiles and Amphibians: Crother et. al. 2000, Corther et al. 2003; Mammals: Hall 1981, Ingles 1965; and Birds: AOU Checklist 1998).

Results

Plant Community

Within the project area, the riparian forest located along the Santa Margarita River is composed of southern cotton wood willow riparian forest, southern coast live oak riparian forest, and southern willow scrub. Southern willow scrub appears to be the most common riparian plant community along the Santa Margarita River. The riparian plant community along Sandia Creek appears to be dominated by southern coast live oak riparian forest with embedded pockets southern willow scrub. The upland plant communities include chamise chaparral and coastal sage scrub. The coastal sage scrub includes both California buckwheat dominated and California sage brush dominated patches. Burned areas of chamise chaparral are currently dominated by California buckwheat dominated coastal sage scrub. These burned areas are expected to shift back to chamise dominated chaparral in the future.

Wildlife Survey

Based on a review of information regarding the distribution of Federal and State threatened and endangered species (e.g., listing documents, recovery plans, other literature), and the plant communities located within the project area, nine different listed animals were determined to have the potential to occur within the OSMZ (Table 1).

Table 1. List of potential Federal and State listed endangered and threatened species; based on geographic location of OSMZ and general distribution of species.

Common Name	**Scientific Name**	**Status**
Quino checkerspot butterfly	*Euphydryas editha quino*	FE
Steelhead trout	*Oncorhynchus mykiss*	FT
Western yellow-billed cuckoo	*Coccyzus americanus*	FC, SE
Least Bell's vireo	*Vireo bellii pusillus*	FE, SE
Southwestern willow flycatcher	*Empidonx traillii extimus*	FE, SE
Willow flycatchers (all subspecies)	*Empidonax traillii*	SE
Coastal California gnatcatcher	*Polioptila californica californica*	FT
California red-legged frog	*Rana aurora draytonii*	FE
Arroyo toad	*Bufo californicus*	FE

FE: Federal Endangered; FT; Federal Threatened; FC: Federal Candidate; SE; State Endangered; ST: State Threatened

In addition to the threatened and endangered species, 32 sensitive animal species were also determined to have potential to occur within the project area (Table 2). For the purpose of this report, sensitive species are those listed by the State as being “species of special concern.” Species of special concern are designated based on declining population levels, limited ranges, and/or continuing threats that have made them vulnerable to extinction (CDFG 2006).

Table 2. Potential sensitive animals; based on general location of project and habitat affinities of each species.

Common Name	**Scientific Name**	**CDFG Status**
Hermes copper	*Lycaena hermes*	CDFG: SSC
Pacific lamprey	*Lampetra tridentate*	CDFG: SSC
Steelhead	*Oncorhynchus mykiss*	CDFG: SSC
Arroyo chub	*Gila orcutti*	CDFG: SSC
Coast range newt	*Taricha torosa torosa*	CDFG: SSC
Western spadefoot toad	*Spea hammondii*	CDFG: SSC
Western pond turtle	*Clemmys marmorata pallida*	CDFG: SSC
San Diego horned lizard	*Phrynosoma coronatum blainvillei*	CDFG: SSC
Belding’s orange-throated whiptail	*Aspidoscelis hyperythrus beldingi*	CDFG: SSC
Silvery legless lizard	*Anniella pulchra pulchra*	CDFG: SSC
Coast patch-nosed snake	*Salvadora hexalepis virgultea*	CDFG: SSC
Two-striped garter snake	*Thamnophis hammondii*	CDFG: SSC
Northern red diamond rattlesnake	*Crotalus ruber*	CDFG: SSC
Cooper’s hawk	*Accipiter cooperi*	CDFG: SSC
Burrowing owl	*Sthene cunicularia*	CDFG: SSC
Loggerhead shrike	*Lanius ludovicianus*	CDFG: SSC
Yellow warbler	*Dendroica petechia brewsteri*	CDFG: SSC
Yellow-breasted chat	*Icteria virens*	CDFG: SSC
Southern California rufous-crowned sparrow	*Aimophila ruficeps canescens*	CDFG: SSC
Bell’s sage sparrow	*Amphispiza belli belli*	CDFG: SSC
Northwestern San Diego pocket mouse	*Chaetodipus fallax fallax*	CDFG: SSC
California leaf-nosed bat	*Macrotus californicus*	CDFG: SSC
Pallid bat	*Antrozous pallidus*	CDFG: SSC
Townsend’s big-eared bat	*Corynorhinus townsendii*	CDFG: SSC
Spotted bat	*Euderma maculatum*	CDFG: SSC
Western mastiff bat	*Eumops perotis californicus*	CDFG: SSC
Big free-tailed bat	*Nyctinomops macrotis*	CDFG: SSC
Dulzura pocket mouse	*Chaetodipus californicus femoralis*	CDFG: SSC
Northwestern San Diego pocket mouse	*Chaetodipus fallax fallax*	CDFG: SSC
San Diego desert woodrat	*Neotoma lepida intermedia*	CDFG: SSC
Ramona grasshopper mouse	*Onochomys torridus ramona*	CDFG: SSC
American badger	*Taxadea taxus*	CDFG: SSC

CDFG: California Department of Fish and Game; SSC: Species of Special Concern

Wildlife Survey

A high diversity (richness and abundance) of invertebrates and vertebrates was observed during this survey. In both total numbers, and number of unique species, birds accounted for the majority of vertebrates observed. Lists of all invertebrates and vertebrates observed or otherwise detected are provided (Appendices 1 and 2).

Invertebrates

Focused surveys were not completed for invertebrates. However, many species were observed and identifiable to species. The most obvious species included butterflies such as the western tiger swallowtail (*Papilio rutulus*), checkered white (*Pontia protodice*), mourning cloak (*Nymphalis antiopa*), common buckeye (*Junonia coenia*), Lourquin's admiral (*Liminitis lourquini*), California sister (*Adelpha bredowii*), Mormon metalmark (*Apodemia mormo*), Acmon blue (*Icaricia acmon*), and fiery skipper (*Hylephila phyeus*). Other noticeable species included several species of dragonflies such as the firery skimmer (*Hylephila phyeus*) and California darner (*Aeshna californica*).

Fish

Although specific surveys were not completed for fish, one native fish, the arroyo chub (*Gila orcutti*), was abundant and commonly observed within the Santa Margarita River. In addition to the arroyo chub, three exotic fish, the mosquito fish (*Gambusia affinis*), bluegill (*Lepomis macrochirus*), and common carp (*Cyprinus carpio*), were also observed.

Amphibians

Two native amphibians, the California toad (*Bufo boreas halophilus*), and Pacific tree frog (*Pseudacris regilla*), were also abundant and commonly observed within the Santa Margarita River. The Pacific tree frog was also common within Sandia Creek.. The bullfrog (*Rana catesbeiana*) was also present and was heard calling from several deep pools.

Reptiles

Despite the appropriateness of the habitat for most of southern California's native reptiles, only a few reptiles were observed during this survey. Reptiles observed included the western pond turtle (*Clemmys marmorata pallida*), western skink (*Eumeces skiltonianus*), Belding orange-throated whiptail (*Cnemidophorus hyperythrus beldingi*), western fence lizard (*Sceloporus occidentalis*), alligator lizard (*Gerrhonotus multicarinatus*), and southern Pacific rattlesnake (*Crotalus oreganos helleri*).

Mammals

Other than bats, mammals detected during this survey included the big-eared woodrat (*Neotoma macrotus*), California ground squirrel (*Spermophilus beecheyi nudipus*), desert cottontail rabbit (*Sylvilagus audobonii sanctidiegi*), stripped skunk (*Mephitis mephitis holzneri*), western spotted skunk (*Spilogale gracilis*), long-tailed weasel (*Mustela frenata*), coyote (*Canis latrans clepticus*), and bobcat (*Lynx rufus californicus*).

Bats

Seven species of bats were found to be occupying the site. Bats detected during this summer survey included the big brown bat (*Eptesicus fuscus*), Silver-haired bat (*Lasionycteris noctivagans*), western red bat (*Lasiurus blossevillii*), California bat (*Myotis californicus*), western small-footed bat (*Myotis ciliolabrum*), western pipistrelle bat (*Pipistrellus Hesperus)*, and Brazilian free-tailed bat (*Tadarida brasiliensis*).

Birds

Sixty-three species of birds were detected during surveys of the site. In both total number, and number of unique species, birds accounted for the majority of vertebrates observed. Several nesting pairs of least Bell's vireo (*Vireo bellii pusillus*) were observed within and adjacent to the riparian plant communities associated with the Santa Margarita River and near the mouth of Sandia Creek (Table 3). In addition, least Bell's vireos were observed nesting in the coast live oak woodlands that bordered the Santa Margarita River.

Table 3. Locations of least Bell's vireo territories (UTM, NAD 83, Zone 11; +/-5 meters).

Record	Species	Status	Easting	Northing
1	LBVI	Pair	0477766	3696590
2	LBVI	Pair	0478026	3696510
3	LBVI	Pair	0478166	3696572
4	LBVI	Pair	0478318	3696700
5	LBVI	Pair	0476606	3695873
6	LBVI	Pair	0476760	3696439
7	LBVI	Pair	0477574	3697187

LBVI: Least Bell's vireo

Landscape Connectivity
In regard to maintaining biological diversity within the region, the site is located in a very important area in southern California. The Santa Margarita River and adjacent upland plant communities connect interior biological communities in San Diego County to large blocks of natural habitat located along the coast (e.g., Santa Margarita and Santa Ana Mountains). This connection is important in maintaining the biological connectivity of the region and gene flow for many terrestrial species.

Discussion

Plant Communities
The riparian plant communities located along the Santa Margarita River and Sandia Creek are robust and diverse. Several species of willows as well as Freemont cottonwood, western sycamore, and coast live oak are common along these waterways. The upland plant communities include chamise chaparral and coastal sage scrub. The coastal sage scrub includes both California buckwheat dominated and California sage brush dominated patches. Burned areas of chamise chaparral are currently dominated by California buckwheat dominated coastal sage scrub and are expected to shift back to a chamise chaparral in the future. Although all native plant communities appeared to be robust, non-native plant species were evident throughout the project area. Because of the variety of plant communities, and their generally good condition, a large number of species of animals are anticipated to occur within the OSMZ.

Invertebrates
The invertebrate community appears to be robust. Although focused surveys designed to quantify the different distributions and numbers of various taxonomic groups (e.g., species) were not completed during this survey, a large variety of both aquatic and terrestrial invertebrates were observed.

Amphibians
The number of amphibians detected is significantly lower than expected for the project area. The reason for the difference is likely due to the time of year the survey was completed. Most of the species are active during the cooler, wetter times of the year and are generally deep within burrows and other protected areas by early summer. Based on the suitability of habitat, the California newt (*Taricha torosa*), Montrey salamander (*Ensatina eschscholtzii eschscholtzii*), arboreal salamander (*Aneides lugubris*), garden slender salamander (*Batrachoseps pacificus major*), western spadefoot (*Spea hammondii*), and arroyo toad (*Bufo californicus*), are all anticipated to occur within the project area.

Another endangered species, the red-legged frog (*Rana aurora draytonii*) may remain in the Santa Margarita River. However, this species has not been observed in the Santa Margarita River in recent years. The closest remaining population of California red-legged frog persisted on the Santa Rosa Plateau until the mid to late 1990's, but appears to have been extirpated. From a recovery perspective, the Santa Margarita River provides an important opportunity for reintroduction of this species. However, an exotic control program that targets non-native species such as the bullfrog, bluegill, and common carp is needed.

Reptiles
The number of reptiles detected is also significantly lower than expected for the OSMZ. Given the suitability of habitat and distribution of many species, most of the species that are likely present went undetected during this survey. The reason for the low number of observed reptiles is due to the time of year of the survey and the survey methodology. In order to accurately and efficiently detect the majority of reptilian species, numerous pit-fall arrays and traps would need to installed in the various plant communities present within the project area. The survey period would also need to span the active period of each of these species (i.e., spring, summer, fall, and winter). Species that were not detected, but likely occur in the project area include the San Diego banded gecko (*Coleonyx variegates abbotti*), San Diego coast horned lizard (*Phrynosoma coronatum blainvellii*), coastal western whiptail (*Aspidoscelis tigris multiscutatus*), silvery legless lizard (*Aniella pulchra pulchra*), coastal rosy boa (*Lichanura trivirgata roseofusca*), San Diego ring-necked snake (*Diadophis punctatus similes*), western yellow-bellied racer (*Coluber constrictor mormon*), red coachwhip (*Masticophis flagellum piceus*), chaparral whipsnake (*Masticophis lateralis lateralis*), coast patch-nosed snake (*Salvadora hexalepis virgultea*), California glossy snake (*Arizona elegans occidentalis*), San Diego gopher snake (*Pituophis melanoleucus annectens*), California kingsnake (*Lampropeltis getulus californiae*), western long-nosed snake (*Rhinocheilus lecontei lecontei*), Hammond's two-stripped garter snake (*Thamnophis hammondii hammondii*), California black-headed snake (*Tantilla planiceps*), California lyre sanke (*Trimorphodon biscutatus vandenburghi*), night snake (*Hypsiglena torquata*), northern red diamond rattlesnake (*Crotalus rubber ruber*), and southwestern speckled rattlesnake (*Crotalus mitchellii pyrrhus*).

Mammals
The number of mammalian species detected is also significantly lower than the number expected to occur in this area. The reason for this is the nocturnal nature of most mammals. In addition, most mammals are very shy and avoid people. Thus, visual surveys typically detect few of the mammals that are present. In order to efficiently detect the majority of mammal species using this area, several small mammal trapping grids, pitfall arrays, track stations, and scent/photo traps would need to be established in each plant community. Native mammals that were not detected, but likely occur in the project area include the ornate shrew (*Sorex ornatus ornatus*), gray shrew (*Notiosorex crawfordi crawfordi*), broad-handed mole (*Scapanus latimanus occultus*), brush rabbit (*Sylvilagus bachmani cinerascens*), San Diego pocket mouse (*Chaetodipus fallax fallax*), California pocket mouse (*Chaetodipus californicus californicus*), Dulzura kangaroo rat (*Dipodomys simulans*), western harvest mouse (*Reithrodontomys megalotis longicaudus*), California mouse (*Peromyscus californicus insignis*), cactus mouse (*Peromyscus eremicus fraterculus*), brush mouse (*Peromyscus boylii rowleyi*), deer mouse (*Peromyscus maniculatus gambelii*), Ramona grasshopper mouse (*Onychomys torridus ramona*), desert wood rat (*Neotoma lepida intermedia*), California meadow mouse (*Microtus californicus sanctidiegi*), gray fox (*Urocyon cinereoargenteus californicus*), raccoon (*Procyon lotor psora*), ringtail (*Bassariscus astutus octavus*), long-tailed weasel (*Mustela frenata latirostra*), spotted skunk (*Spilogale putorius phenax*), badger (*Taxidea taxus jeffersonii*), and mountain lion (*Felis concolor californica*).

Bats
Seven species of bats were found occupying the site during this summer survey. Additional bat species would likely be detected during an expanded survey that included the spring and fall (Table 4). Based on the location and number of calls, the foraging habitat for all of the detected species appeared to overlap to large degree, and focus around the riparian plant community. A spring survey would likely detect various species of bats using an expanded area that included the chaparral and coastal sage scrub located on the hillsides bordering the Santa Margarita River and Sandia Creek. The riparian plant community provides unlimited roosting opportunities for species such as the western red bat and western small-footed bat. In addition, numerous roosting opportunities for rock crevice roosters such as the Brazilian free-tailed bat and western pipistrelle are also available within the project area.

Table 4. Other species of bats that may use habitat within the project area at different times of the year and to differing degrees.

Common Name	**Scientific Name**
California leaf-nosed bat	*Macrotus californicus*
Western long-eared bat	*Myotis evotis*
Fringed bat	*Myotis thysanodes*
Long-legged bat	*Myotis volans*
Yuma bat	*Myotis yumanensis*
Spotted bat	*Euderma maculatum*
Townsend's big-eared bat	*Corynorhinus townsendii*
Western mastiff bat	*Eumops perotis californicus*
Big free-tailed bat	*Nyctinomops macrotis*

Birds
The number of birds detected is typical of robust riparian woodland plant communities in coastal southern California. The presence of nesting least Bell's vireos in many of the suitable patches of habitat underscores the importance of riparian habitat within the OSMZ to the continuing recovery of this species. During a least Bell's vireo survey of the upper Santa Margarita River in the early 1990's, from the De Luz Road crossing on Marine Corps Base Camp Pendleton (Base), to the eastern edge of the Base near Fallbrook, no least Bell's vireo were observed in this area (A. Davenport, pers. obs.).

Suitable habitat for the southwestern willow flycatcher also occurs within the OSMZ. Although a focused survey was not completed, and the species not detected during the general wildlife survey, the southwestern willow flycatcher is anticipated to occur within the project area during migration. In addition, due to the presence of high quality habitat, southwestern willow flycatchers may currently nest within the project area. Due to the difficulty of detecting this species during various phases of its nesting cycle, a focused survey would be necessary to quantify the number and location of southwestern willow flycatchers within this area.

Suitable habitat for the western yellow-billed cuckoo also occurs within the OSMZ. A focused survey was not completed for this species during this study. However, yellow-billed cuckoos have been documented within recent years along the San Luis Rey River as well as the Santa Margarita River (A. Davenport, pers. obs.).

Landscape Connectivity
As previously discussed, the OSMZ is located in a very important area for maintaining regional biological diversity. The Santa Margarita River and adjacent upland plant communities connect

interior biological communities in San Diego County to large blocks of natural habitat located along the coast (e.g., Santa Margarita and Santa Ana Mountains). This connection is important in maintaining the biological connectivity of the region and gene flow for many terrestrial species. Without this connection, the movement of terrestrial animals and/or gene flow within and between populations over large regions of southern California will cease for many species. The absence or reduction in gene flow may result in diminished genetic diversity and the ability of a species to adapt to changing environmental conditions. In addition, the loss of connection between populations located in different regions may increase the probability of extinction for isolated populations too small to maintain viability.

Conclusion

The Santa Margarita River, Sandia Creek, and adjacent uplands within the OSMZ provide high value habitat for a large number of California endemic species. The OSMZ is regionally important to the conservation of southern California's endemic species.

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Appendix 1. Invertebrate Animals Observed within Project Area.

<u>Lepidopters (Butterlies and Moths)</u>

Hesperiidae (Skippers)

Fiery skipper	*Hylephila phyeus*

Lycaenidae (Coppers, Hairstreaks, Blues)

Acmon blue	*Icaricia acmon*

Nymphalidae (Brushfoot Butterflies)

Mourning cloak	*Nymphalis antiopa*
Common buckeye	*Junonia coenia*
Lourquin's admiral	*Liminitis lourquini*
California sister	*Adelpha bredowii*

Papilionidae (Parnassians, Swallowtails)

Western tiger swallowtail	*Papilio rutulus*

Pieridae (Whites, Sulfurs)

Checkered white	*Pontia protodice*

Riodinidae (Metalmarks)

Mormon metalmark	*Apodemia mormo*

<u>Odonata (Dragonflies and Damselflies)</u>

Aeshnidae (Darners)

California darner	*Aeshna californica*

Libellulidae (Skimmers, Emeralds, Baskettails, Cruisers)

Flame skimmer	*Libellula saurata*

Appendix 2. Vertebrate Animals Observed within Project Area.

FISH

Centrarchidae (Sunfishes, Basses)	
Bluegill	*Lepomis macrochirus*
Cyprinidae (Minnows)	
Arroyo chub	*Gila orcutti*
Common carp	*Cyprinus carpio*
Poeciliidae (Livebearers)	
Mosquito fish	*Gambusia affinis*

AMPHIBIANS

Bufonidae (True Toads)	
Western toad	*Bufo borea halophilus*
Hylidae (Tree frogs)	
Pacific tree frog	*Pseudacri regillia*
Ranidae (True frogs)	
Bull frog	*Rana catesbiana*

REPTILES

Emydidae (Box, Water Turtles)	
Western pond turtle	*Clemmys marmorata pallida*
Iguanidae (Iguanid Lizards)	
Western fence lizard	*Sceloporus occidentalis*
Scincidae (Skinks)	
Western skink	*Eumeces skiltonianus*
Teiidae (Whiptails, Allies)	
Belding orange-throated whiptail	*Cnemidophorus hyperythrus beldingi*
Anguidae (Alligator Lizards, Allies)	
Southern Alligator Lizard	*Gerrhonotus multicarinatus*
Viperidae (Vipers)	
Pacific rattlesnake	*Crotalus oreganos hellerii*

Appendix 2. Vertebrate Animals Observed within Project Area (Cont.).

BIRDS

Anatidae (Ducks, Geese, Swans)	
Mallard	*Anas platyrhynchos*
Odontophoridae (New World Quail)	
California quail	*Callipepla californica*
Ardeidae (Herons, bitterns, allies)	
Green heron	*Butorides virescens*
Great blue heron	Ardea herodias
Cathartidae (New World Vultures)	
Turkey vulture	*Cathartes aura*
Accipitridae (Hawks, Kites, Eagles, Allies)	
Cooper's hawk	*Accipiter cooperii*
Red-shouldered hawk	*Buteo lineatus*
Red Tailed Hawk	*Buteo jamaicensis*
Falcondidae (Caracaras, Falcons)	
American kestrel	*Falco sparverius*
Rallidae (Rails, Gallinules, Coots)	
Virginia rail	*Rallus limicola*
Columbidae (Pigeons, Doves)	
Mourning dove	*Zenaida macroura*
Tytonidae (Barn Owls)	
Barn owl	*Tyto alba*
Strigidae (Typical Owls)	
Great horned owl	*Bubo virginianus*
Caprimulgidae (Goatsuckers)	
Lesser nighthawk	*Chordeiles acutipennis*
Trochilidae (Hummingbirds)	
Black-chinned hummingbird	*Archilochus alexandri*
Costa's hummingbird	*Calypte costae*
Anna's hummingbird	*Calypte anna*
Allen's hummingbird	*Selasphorus sasin*

Appendix 2. Vertebrate Animals Observed within Project Area (Cont).

Alcedinidae (Kingfishers)	
Belted kingfisher	*Ceryle alcyon*
Picidae (Woodpeckers, allies)	
Acorn woodpecker	*Melanerpes formicivorus*
Northern flicker	*Colaptes auratus*
Nuttal's woodpecker	*Picoides nuttallii*
Tyrannidae (Tyrant Flycatchers)	
Western wood-pewee	*Contopus sordidulus*
Pacific-slope flycatcher	*Empidonax difficilis*
Black phoebe	*Sayornis nigricans*
Ash-throated flycatcher	*Myiarchus cinerascens*
Cassin's kingbird	*Tyrannus vociferans*
Vireonidae (Vireos)	
Least Bell's vireo	*Vireo bellii pusillus*
Hutton's vireo	*Vireo huttoni*
Warbling vireo	*Vireo gilvus*
Corvidae (Crows, Jays)	
Western scrub-jay	*Aphelocoma californica*
Common raven	*Corvus corax*
American crow	*Corvus brachyrhynchos*
Hirundinidae (Swallows)	
Tree swallow	*Tachycineta bicolor*
Cliff swallow	*Petrochelidon pyrrhonota*
Northern rough-wing swallow	*Stelgidopteryx serripennis*
Timaliidae (Babblers)	
Wrentit	*Chamaea fasciata*
Paridae (Chickadees, Titmice)	
Oak titmouse	*Baeolophus inornatus*
Aegithalidae (Long-tailed tits, bushtits)	
Bushtit	*Psaltriparus minimus*
Troglodytidae (Wrens)	
House wren	*Troglodytes aedon*
Bewick's wren	*Thryomanes bewickii*
Sylviidae (Old World Warblers, Gnatcatchers)	
Blue-gray gnatcatcher	*Polioptila caerulea*
Turdidae (Thrushes)	
Western bluebird	*Sialia mexicana*

Appendix 2. Vertebrate Animals Observed within Project Area (Cont).

Mimidae (Mockingbirds, Thrashers)

Northern mockingbird	*Mimus polyglottos*
California thrasher	Toxostoma redivivum

Ptilogonatidae (Silky-flycatchers)

Phainopepla	*Phainopepla nitens*

Parulidae (Wood-warblers)

Orange-crowned warbler	*Vermivora celata*
Yellow warbler	*Dendroica petechia*
Common yellowthroat	*Geothlypis trichas*
Yellow-breasted chat	*Icteria virens*

Emberizidae (Emberizids)

California towhee	*Pipilo crissalis*
Spotted towhee	*Pipilo maculatus*
Lark sparrow	*Chondestes grammacus*
Song sparrow	*Melospiza melodia*

Cardinalidae (Cardinals, Saltators, Allies)

Black-headed grosbeak	*Pheucticus melanocephalus*
Blue grosbeak	*Passerina caerulea*

Icteridae (Blackbirds)

Red-winged blackbird	*Agelaius phoeniceus*
Brown-headed cowbird	*Molothrus ater*
Hooded oriole	*Icterus cucullatus*
Bullock's oriole	*Icterus bullockii*

Fringillidae (Fringilline and Cardueline Finches, Allies)

House finch	*Carpodacus mexicanus*
American goldfinch	*Carduelis tristis*
Lesser goldfinch	*Carduelis psaltria*

MAMMALS

Canidae (Coyote, Wolves, Foxes, Dogs)

Coyote	*Canis latrans clepticus*

Felidae (Cats, Allies)

Bobcat	*Lynx rufus*

Leporidae (Rabbits, Hares)

Desert cottontail	*Sylvilagus audubonii*

Sciuridae (Squirrels and Relatives)

California ground squirrel	*Spermophilus beecheyi*

Appendix 2. Vertebrate Animals Observed within Project Area (Cont).

Mustelidae (Weasels and Relatives)	
Long-tailed weasel	*Mustela frenata*
Western spotted skunk	*Spilogale gracilis*
Geomyidae (Pocket Gophers)	
Valley pocket gopher	*Thomomys bottae*
Muridae (Murids)	
Big-eared woodrat	*Neotoma macrotis*

Appendix C-4

Resource Effects Model for Federally-listed Species

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Table C-5. Santa Margarita River Conjunctive Use Project Construction Resource Effect Model for Federally Listed Species

Species	Permanent Direct Effect	Temporary Direct Effect	Indirect Effects
	<u>*Permanent Direct*</u>*: irreversible construction effects within the permanent direct impact area as a result of project implementation; i.e., all proposed development features (Diversion Weir, O'Neill Ditch, Production Wells, Conveyance Pipelines, Access Roads, Booster Pump Stations, etc).*	<u>*Temporary Direct*</u>[1]*: reversible construction effects within the temporary direct impact area; e.g., temporary trenches for pipeline, temporary work zones, construction staging within sites outside of permanent developed areas.*	<u>*Construction Indirect Effects (500-foot buffer)*</u>*: Project effects within 500-ft of construction that are indirectly related to project implementation; effects that occur adjacent to the project footprint later in time (e.g., noise effects from construction).* <u>*Operational Project Effects*</u>*: effects within the Action Area from the proposed operation of the project (e.g., pumping from the groundwater wells, and diversion of water from the weir), that are to occur later in time.*
Arroyo Toad	<u>Habitat:</u> Effects to occupied <u>breeding</u> habitat[2] (defined as all suitable riparian habitat [less if there is a physical barrier, e.g., elevated dirt road] within an 82-foot elevation buffer) within the proposed development features (i.e., permanent impacts). Effects to occupied <u>aestivation/movement</u> habitat[3] (defined as an 82-foot elevation upland buffer adjacent to occupied riparian habitat [less if there is a physical barrier, e.g., Vandegrift Blvd. or Lake O'Neill]) within the proposed development features. <u>Individual:</u> The number of individuals impacted is determined by multiplying the total permanent and temporary impact acreage by the density of arroyo toad per acre, named in USFWS 2010; in USFWS 2010, effects to individuals are defined as 4.6 arroyo toads/acre in riparian (i.e., breeding) habitat and 0.72 arroyo toads/acre in upland (i.e., aestivation) habitat.	<u>Habitat:</u> Effects to occupied breeding or aestivation/movement habitat (as defined in the "Habitat" effects determination in arroyo toad "Permanent Direct Effect" analysis) within the temporary direct impact area. <u>Individual</u>: See "Individual" effects determination in arroyo toad "Permanent Direct Effect" analysis. The number of individuals impacted in temporary impact areas is combined with those in permanent impact areas.	<u>Construction (500-foot buffer):</u> Not significant <u>Operational:</u> Determined in the USFWS Section 7 Consultation (USFWS 2016). Future CUP operations will lead to a predicted average 11.6 percent decline in surface flows and a 10.2 percent decline in evapotranspiration on the Lower SMR, with a corresponding decline in loss of habitat and decline in the ARTO population.

Species	Permanent Direct Effect	Temporary Direct Effect	Indirect Effects
	Permanent Direct: irreversible construction effects within the permanent direct impact area as a result of project implementation; i.e., all proposed development features (Diversion Weir, O'Neill Ditch, Production Wells, Conveyance Pipelines, Access Roads, Booster Pump Stations, etc).	*Temporary Direct*[1]*: reversible construction effects within the temporary direct impact area; e.g., temporary trenches for pipeline, temporary work zones, construction staging within sites outside of permanent developed areas.*	*Construction Indirect Effects (500-foot buffer): Project effects within 500-ft of construction that are indirectly related to project implementation; effects that occur adjacent to the project footprint later in time (e.g., noise effects from construction).* *Operational Project Effects: effects within the Action Area from the proposed operation of the project (e.g., pumping from the groundwater wells, and diversion of water from the weir), that are to occur later in time.*
Least Bell's Vireo	Habitat: Effects to vireo-occupied habitat is defined as riparian scrub and riparian woodland[4] that occurs within 152 m (500 ft) of any documented vireo location (1995-2014 on MCBCP; 1993-2014 on DET Fallbrook), within the proposed development features (i.e., permanent impacts). Individual: Effects to LBVI territories defined as riparian scrub and riparian woodland[4] within 0.8 ha (1.9 ac) [5] of each of the vireo territory locations documented in 2010 and 2014 on MCB Camp Pendleton[6] and 2008 and 2013 on DET Fallbrook[6] within the proposed development features. An impact to ≥20% of a territory is assumed to have a substantial increase in mortality or reproductive output of the LBVI assumed pair (i.e., "take"). Both permanent and temporary impacts are combined for the analysis.	Habitat: Effects to vireo-occupied habitat is defined as riparian scrub and riparian woodland[4] that occurs within 152 m (500 ft) of any documented vireo location (1995-2014 on MCBCP; 1993-2014 on DET Fallbrook), within the temporary impact area. Individual: See "Individual" effects determination in least Bell's vireo "Permanent Direct Effect" analysis. The number of individual territories impacted in temporary impact areas is combined with those in permanent impact areas, noting that the temporary impacts would occur for 2-5 years until the habitat can be restored.	Construction (500-foot buffer): Indirect effects to territories defined as the number of territories (LBVI points+ 162ft buffer of riparian habitat[4]) within the 500-foot site buffers documented in 2010/2014 on MCB Camp Pendleton[6] and 2008/2013 on DET Fallbrook[6]. Operational: Determined in the USFWS Section 7 Consultation (USFWS 2016). Future CUP operations will lead to a predicted average 11.6 percent decline in surface flows and a 10.2 percent decline in evapotranspiration on the Lower SMR, with a corresponding decline in loss of habitat and the carrying capacity for LBVI.

Species	Permanent Direct Effect	Temporary Direct Effect	Indirect Effects
	Permanent Direct: irreversible construction effects within the permanent direct impact area as a result of project implementation; i.e., all proposed development features (Diversion Weir, O'Neill Ditch, Production Wells, Conveyance Pipelines, Access Roads, Booster Pump Stations, etc).	*Temporary Direct[1]: reversible construction effects within the temporary direct impact area; e.g., temporary trenches for pipeline, temporary work zones, construction staging within sites outside of permanent developed areas.*	*Construction Indirect Effects (500-foot buffer): Project effects within 500-ft of construction that are indirectly related to project implementation; effects that occur adjacent to the project footprint later in time (e.g., noise effects from construction).* *Operational Project Effects: effects within the Action Area from the proposed operation of the project (e.g., pumping from the groundwater wells, and diversion of water from the weir), that are to occur later in time.*
Southwestern Willow Flycatcher	Habitat: Effects to occupied habitat (defined as all riparian habitat[7] within delineated flycatcher territories, as determined through Basewide surveys from 2011-2014, or within 100 feet of these delineated territories) within the proposed facility sites and other work areas to be permanently developed. Individual: An individual impact analysis was not conducted since SWFL habitat/territories were not directly impacted.	Habitat: Effects to occupied habitat (defined as all riparian habitat[7] within delineated flycatcher territories, as determined through Basewide surveys from 2011-2014, or within 100 feet of these delineated territories) within the temporary direct impact area. Individual: An individual impact analysis was not conducted since SWFL habitat/territories were not directly impacted.	Construction (500-foot buffer): Indirect effects to territories (defined as all riparian habitat[7] within delineated flycatcher territories, as determined through Basewide surveys from 2011-2014) occur when territories overlap with the 500-foot site buffers. Operational: Determined in the USFWS Section 7 Consultation (USFWS 2016). Future CUP operations will lead to a predicted average 11.6 percent decline in surface flows and a 10.2 percent decline in evapotranspiration on the Lower SMR; however, this is offset with the placement of 3 artificial seeps to are expected to promote conditions favorable for SWFL.

Species	Permanent Direct Effect	Temporary Direct Effect	Indirect Effects
	<u>Permanent Direct</u>: irreversible construction effects within the permanent direct impact area as a result of project implementation; i.e., all proposed development features (Diversion Weir, O'Neill Ditch, Production Wells, Conveyance Pipelines, Access Roads, Booster Pump Stations, etc).	*<u>Temporary Direct</u>[1]: reversible construction effects within the temporary direct impact area; e.g., temporary trenches for pipeline, temporary work zones, construction staging within sites outside of permanent developed areas.*	*<u>Construction Indirect Effects (500-foot buffer)</u>: Project effects within 500-ft of construction that are indirectly related to project implementation; effects that occur adjacent to the project footprint later in time (e.g., noise effects from construction).* *<u>Operational Project Effects</u>: effects within the Action Area from the proposed operation of the project (e.g., pumping from the groundwater wells, and diversion of water from the weir), that are to occur later in time.*
Coastal California Gnatcatcher	<u>Habitat:</u> Effects to gnatcatcher-occupied habitat is defined as all Diegan coastal sage scrub that occurs within 152 m (500 ft) of any documented gnatcatcher location, within the proposed development features (i.e., permanent impacts). <u>Individuals:</u> Effects to CAGN territories defined as Diegan coastal sage scrub within 2.3 ha (5.7 ac) [8] of each of the gnatcatcher territory locations documented in 2010 and 2014 on MCB Camp Pendleton[9] and 2009 and 2014 on DET Fallbrook[9] within the proposed development features. An impact to ≥20% of a territory is assumed to have a substantial increase in mortality or reproductive output of the CAGN assumed pair (i.e., "take"). Both permanent and temporary impacts are combined for the analysis; note that temporary impacts were more than 99% of the impacts for the proposed project footprint.	<u>Habitat:</u> Effects to gnatcatcher-occupied habitat is defined as all Diegan coastal sage scrub that occurs within 152 m (500 ft) of any documented gnatcatcher location, within the temporary impact area. <u>Individual:</u> See "Individual" effects determination in coastal California gnatcatcher "Permanent Direct Effect" analysis. The number of individual territories impacted in temporary impact areas is combined with those in permanent impact areas; note that the temporary impacts were more than 99% of the impacts for the proposed project footprint and that the temporary impacts would occur for 4-5 years until the habitat can be restored.	<u>Construction (500-foot buffer):</u> Indirect effects to territories defined as the number of territories (CAGN points+282ft buffer of Diegan coastal sage scrub habitat) within the 500-foot site buffers documented in 2010/2014 on MCB Camp Pendleton[9] and 2009/2014 on DET Fallbrook[9]. <u>Operational:</u> Not significant

Species	Permanent Direct Effect	Temporary Direct Effect	Indirect Effects
	<u>Permanent Direct</u>: irreversible construction effects within the permanent direct impact area as a result of project implementation; i.e., all proposed development features (Diversion Weir, O'Neill Ditch, Production Wells, Conveyance Pipelines, Access Roads, Booster Pump Stations, etc).	*<u>Temporary Direct</u>[1]: reversible construction effects within the temporary direct impact area; e.g., temporary trenches for pipeline, temporary work zones, construction staging within sites outside of permanent developed areas.*	*<u>Construction Indirect Effects (500-foot buffer)</u>: Project effects within 500-ft of construction that are indirectly related to project implementation; effects that occur adjacent to the project footprint later in time (e.g., noise effects from construction).* *<u>Operational Project Effects</u>: effects within the Action Area from the proposed operation of the project (e.g., pumping from the groundwater wells, and diversion of water from the weir), that are to occur later in time.*
Stephens' Kangaroo Rat	<u>Habitat:</u> Effects to kangaroo rat-occupied habitat is defined as all Diegan coastal sage scrub and grassland that occurs within 50 m (164 ft) of any documented SKR trapped location, within the proposed development features (i.e., permanent impacts). <u>Individuals:</u> Effects to SKR territories defined as Diegan coastal sage scrub/grassland within 0.79 ha (1.94 ac) [10] of each of the SKR trap locations documented during the Fall 2015 survey effort. An impact to ≥20% of a territory is assumed to have a substantial increase in mortality or reproductive output of SKR (i.e., "take").	<u>Habitat:</u> Effects to kangaroo rat-occupied habitat is defined as all Diegan coastal sage scrub and grassland that occurs within 50 m (164 ft) of any documented SKR trapped location, within the temporary impact area. <u>Individual:</u> See "Individual" effects determination in Stephens' kangaroo rat "Permanent Direct Effect" analysis. The number of individual territories impacted in temporary impact areas is combined with those in permanent impact areas; note 100% of the impacts were temporary.	<u>Construction (500-foot buffer):</u> Not analyzed <u>Operational:</u> Not significant

Notes:

1 Temporary impacts include those impacts around the Diversion Weir, O'Neill Ditch, Production Wells, Conveyance Pipeline (approximately 50 foot corridor), Access Roads, Booster Pump Stations, Laydown Areas, Bi-Directional Pipeline (60% of an approximate 100 foot corridor + additional width needed for turns), and Water Treatment Plant.

2 Occupied arroyo toad breeding riparian habitat is defined as the entire extent of riparian habitat within the Base's 82-foot Elevation Arroyo Toad Buffer within the proposed project footprint. Specific notes are as follows:

- All wetland types should be included, unless location-specific analysis indicates that sufficient vegetative cover is lacking.
- Open water (Lake O'Neill) is not considered suitable habitat.
- Tidal and brackish water habitats are considered non-suitable wetlands.
- The following riparian habitat layers were considered in this analysis: Arundo-dominated riparian, cismontane alkali marsh, coastal and valley freshwater marsh, disturbed wetland, grass-forb mix, mixed willow exotic, mixed woodland, open water/open gravel, riparian forest, riparian woodland, southern coastal salt marsh, southern riparian scrub, southern riparian woodland, southern sycamore-alder riparian woodland, southern willow scrub, and tamarisk scrub.
- Consider whether occupied breeding habitat is interrupted by irregular project limits; such habitat may extend into other project areas.

3 Occupied aestivation/movement habitat is defined as all suitable aestivation and dispersal habitat within the Base's 82-foot Elevation Arroyo Toad Buffer within the proposed project footprint. Specific notes are as follows:

- All upland habitat types should be included, except developed areas and alkali playas.

- Arroyo toads may traverse some roadways and berms; consider location-specific conditions before excluding areas beyond such features. However, if there is a physical barrier (e.g., development or steep slopes), these are excluded.
- The following upland habitat layers were considered in this analysis: coast live oak woodland, coastal sage-chaparral, Diegan coastal sage scrub, Engelmann oak woodland, non-native grassland, scrub oak chaparral, valley and foothill grassland, and valley needlegrass grassland.
- Consider whether occupied aestivation/movement habitat is interrupted by irregular project limits; such habitat may extend into other project areas.

4 The following riparian habitat layers were considered in the LBVI habitat analysis on MCBCP: mixed woodland, riparian forest, riparian woodland, southern riparian scrub, southern riparian woodland, southern sycamore-alder riparian woodland, southern willow scrub. For Detachment Fallbrook data, the “Riparian” habitat layers were used.

5 Least Bell’s vireo territory sizes were based on the average size of vireo territories, which was determined to be 1.9 acres (0.8 hectare/ 82,764 ft^2] or a 162-ft buffer radius (area =π[$radius^2$]), as defined in the BUI BO (USFWS 2010).

6 For MCB Camp Pendleton, the 2010 data was used because it was the highest recorded population documented on Base, and the 2014 data was used because it is the most recent data set. For DET Fallbrook, installation-wide surveys are conducted every five years, and the 2008 and 2013 data sets reflect the most robust data sets for the installation.

7 The following riparian habitat layers were considered in the SWFL habitat analysis on MCBCP: mixed woodland, riparian forest, riparian woodland, southern riparian scrub, southern riparian woodland, southern sycamore-alder riparian woodland, southern willow scrub. There is no breeding SWFL on Detachment Fallbrook.

8 Coastal California gnatcatcher territory sizes were based on the average size of gnatcatcher territories, which was determined to be 5.7 acres (2.3 hectares/ 248,293 ft^2) or a 282-ft buffer radius (area =π[$radius^2$]), as defined in the BUI BO (USFWS 2010).

9 On MCB Camp Pendleton, Base-wide surveys are scheduled every three to four years (most recently in 2010 and 2014); on Detachment Fallbrook, installation-wide surveys are conducted every five years (most recently in 2009 and 2014). 2010 represents a year with abundant winter rain; 2014 reflects a survey that overlaps with prolonged drought (3 years) and the May 2014 wildfires on MCB Camp Pendleton and Detachment Fallbrook. 2014 data on MCB Camp Pendleton and Detachment Fallbrook is draft data.

10 Stephens’ kangaroo rat territory sizes were developed during Section 7 consultation with the USFWS and represent an estimate of SKR “typical movements”, where the individual typically moves short distances (50 meters) within its home territory.

Appendix C-5

Listed Species Construction Effects Analysis

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Direct Effects to Least Bell's Vireo (LBVI) Territories

With project construction of Alternative 1, there is a total potential effect to approximately 14.16 acres of least Bell's vireo occupied habitat (2.20 acres permanent; 11.96 acres temporary). The amount of each 1.9-acre LBVI territory in 2010 and 2014 on MCB Camp Pendleton is noted in Table C-6; no 2008 or 2013 Detachment Fallbrook least Bell's vireo territories were impacted by the project footprint. Territory names in Table C-6 correspond to those locations in Figures C-6 through C-11. A territory is considered significantly impacted if greater than 20% will be removed.

Table C-6.				
Percent Impact on LBVI Territories on MCB Camp Pendleton[1]				
2010 Territory Name	Amount of Riparian[2] Habitat in 1.9 acre (162-ft buffer) Territory	Amount of Riparian[2] Habitat Permanently Impacted within 1.9 acre Territory	Amount of Riparian[2] Habitat Temporarily Impacted within 1.9 acre Territory	% Territory Impacted[3]
2010LBVI_01M	0.90	0.10	0.22	35.6
2010LBVI_02M	1.49	0.20	0.26	30.9
2010LBVI_03M	1.21	0.09	0.11	16.5
2010LBVI_04M	0.53	0.02	0.09	20.8
2010LBVI_05M	0.90	0.01	0.03	4.4
2010LBVI_06M	1.45	0	0.03	2.1
2010LBVI_07M	0.64	0.02	0.20	34.4
2010LBVI_08M	0.83	0.13	0.40	63.9
2010LBVI_09M	0.61	0	0.02	3.3
2010LBVI_10M	0.59	0.10	0.38	81.4
2010LBVI_11M	1.57	0	0.13	8.3
2010LBVI_12M	1.06	0	0.18	17.0
2010LBVI_13M	1.65	0.14	0.23	22.4
2010LBVI_14M	1.76	0.27	0.05	18.2
2010LBVI_15M	1.37	0	0.10	7.3
2010LBVI_16M	0.58	0.01	0.20	36.2
2010LBVI_17M	0.88	0	0.35	39.8
2010LBVI_18M	1.17	0.16	0.04	17.1
2010LBVI_19M	0.74	0.06	0.29	47.3
2010LBVI_20M	1.84	0.03	0.20	12.5
2010LBVI_21M	1.65	0	0.27	16.4
2010LBVI_22M	1.07	0	0.17	15.9
2010LBVI_23M	1.16	0	0.15	12.9
2010LBVI_24M	0.37	0	0.03	8.1
2010LBVI_25M	0.45	0	0.03	6.7
2010LBVI_26M	1.68	0	0.04	2.4
2010LBVI_27M	1.35	0	0.01	0.7
2010LBVI_28M	1.53	0	0.33	21.6
2010LBVI_29M	1.65	0	0.31	18.8

2010LBVI_30M	1.56	0	0.16	10.3
2010LBVI_31M	1.42	0	0.01	0.7
2014 Territory Name	Amount of Riparian[2] Habitat in 1.9 acre (162-ft buffer) Territory	Amount of Riparian[2] Habitat Permanently Impacted within 1.9 acre Territory	Amount of Riparian[2] Habitat Temporarily Impacted within 1.9 acre Territory	% Territory Impacted[3]
2014LBVI_01M	1.19	0	0.06	5.0
2014LBVI_02M	1.14	0.01	0.02	2.6
2014LBVI_03M	1.37	0.01	0.03	2.9
2014LBVI_04M	0.31	0.02	0.19	67.7
2014LBVI_05M	0.69	0.12	0.33	65.2
2014LBVI_06M	0.56	0	0.12	21.4
2014LBVI_07M	1.18	0	0.24	20.3
2014LBVI_08M	1.14	0	0.12	10.5
2014LBVI_09M	0.87	0	0.17	19.5
2014LBVI_10M	0.85	0	0.14	16.5
2014LBVI_11M	1.31	0.16	0.07	17.6
2014LBVI_12M	1.58	0	0.09	5.7
2014LBVI_13M	1.78	0	0.20	11.2
2014LBVI_14M	1.69	0	0.13	7.7
2014LBVI_15M	0.91	0	0.39	42.9
2014LBVI_16M	1.12	0.13	0	11.6
2014LBVI_17M	0.66	0.06	0	9.0
2014LBVI_18M	1.21	0.03	0.26	24.0
2014LBVI_19M	1.84	0.03	0.20	12.5
2014LBVI_20M	1.32	0.13	0.25	28.8
2014LBVI_21M	1.20	0	0.27	22.5
2014LBVI_22M	1.42	0	0.28	19.7
2014LBVI_23M	1.71	0	0.33	19.3

1 No LBVI-occupied habitat is being permanently impacted from construction of the Project Action on DET Fallbrook.

2 The following riparian habitat layers were considered in the LBVI habitat analysis on MCBCP: mixed woodland, riparian forest, riparian woodland, southern riparian scrub, southern riparian woodland, southern sycamore-alder riparian woodland, southern willow scrub. For Detachment Fallbrook data, the “Riparian” habitat layers were used.

3 Percent of “Territory Impacted” includes both temporary and permanent impacts from construction of the Project Action.

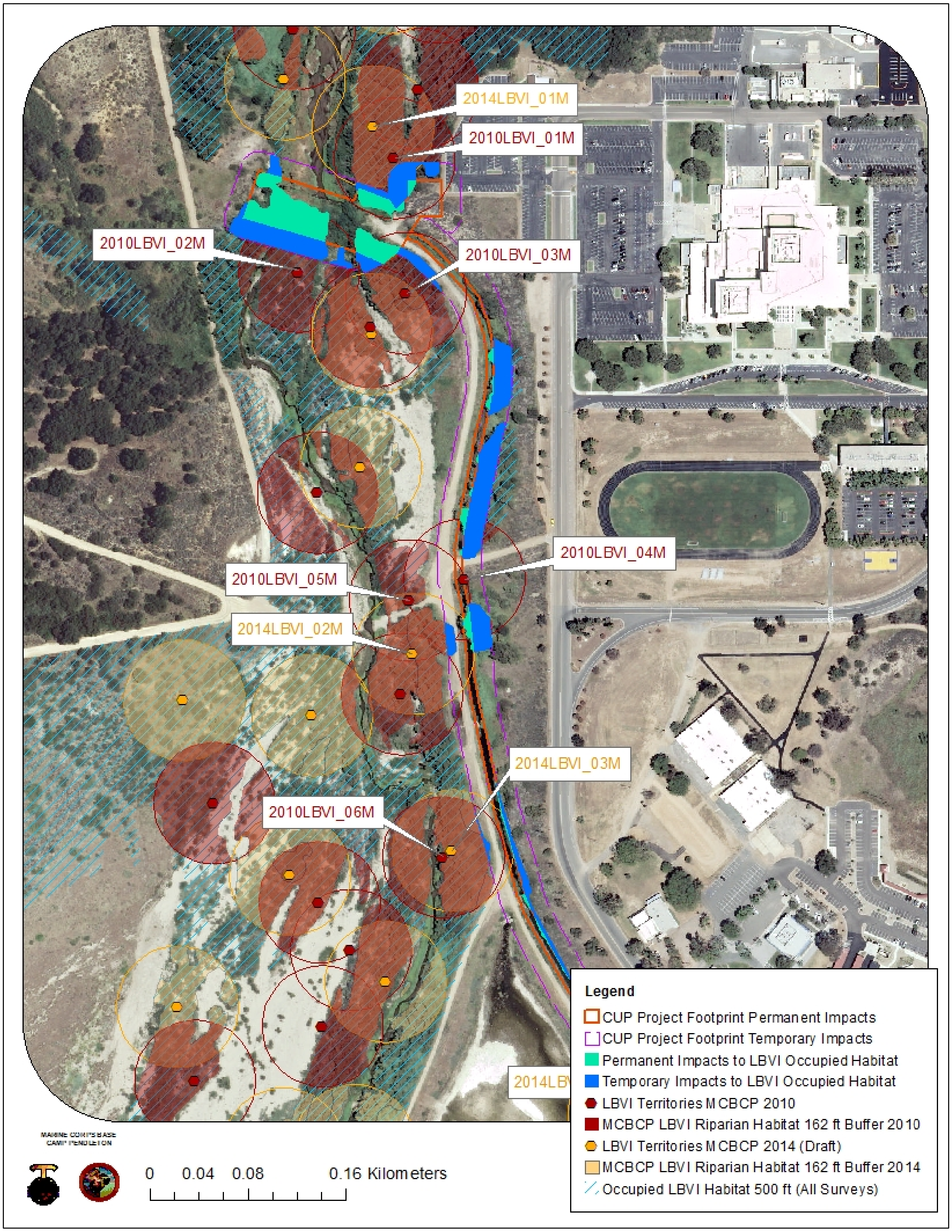

Figure C-6. MCB Camp Pendleton. LBVI Territories in 2010 and 2014 that are directly impacted by construction of the Project Action.

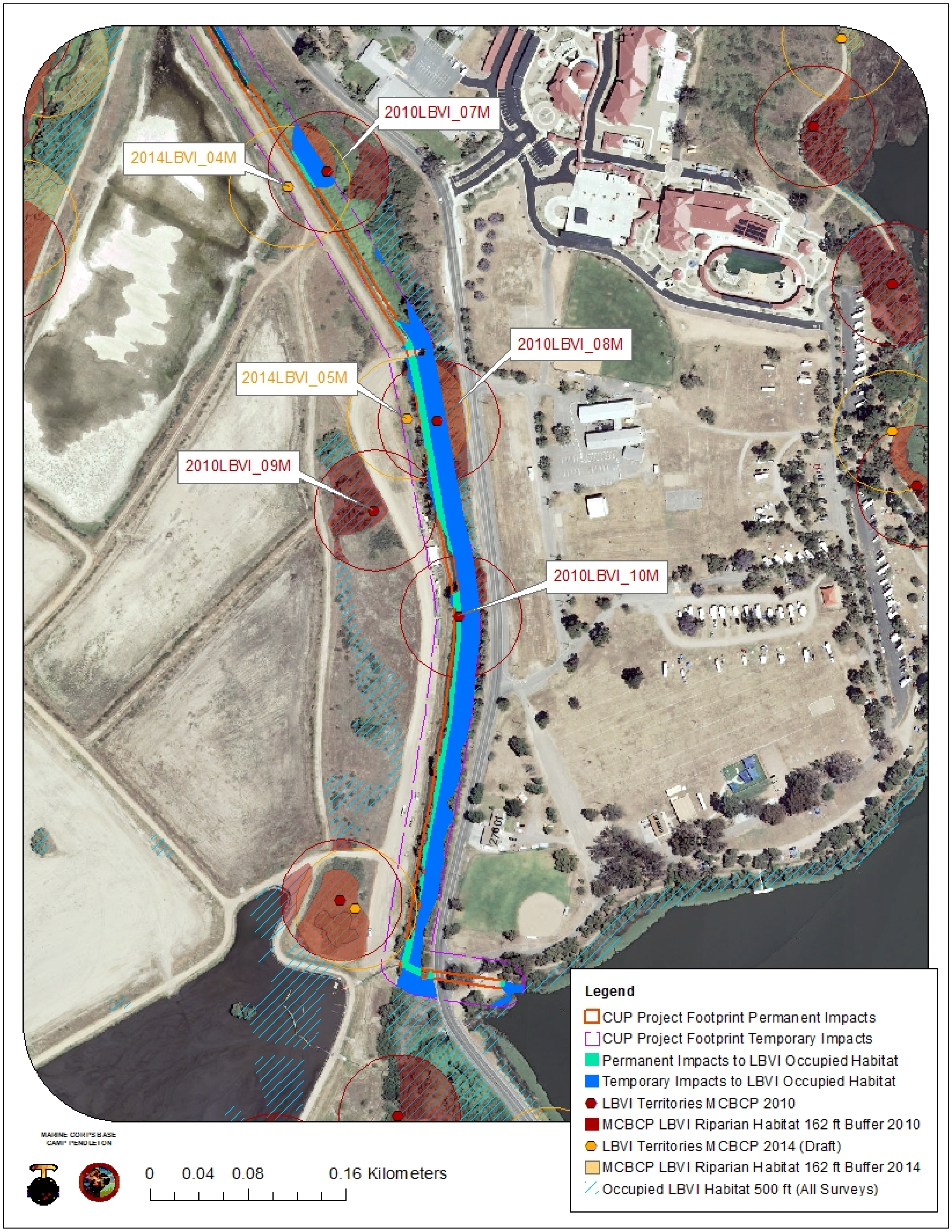

Figure C-7. MCB Camp Pendleton. LBVI Territories in 2010 and 2014 that are directly impacted by construction of the Project Action.

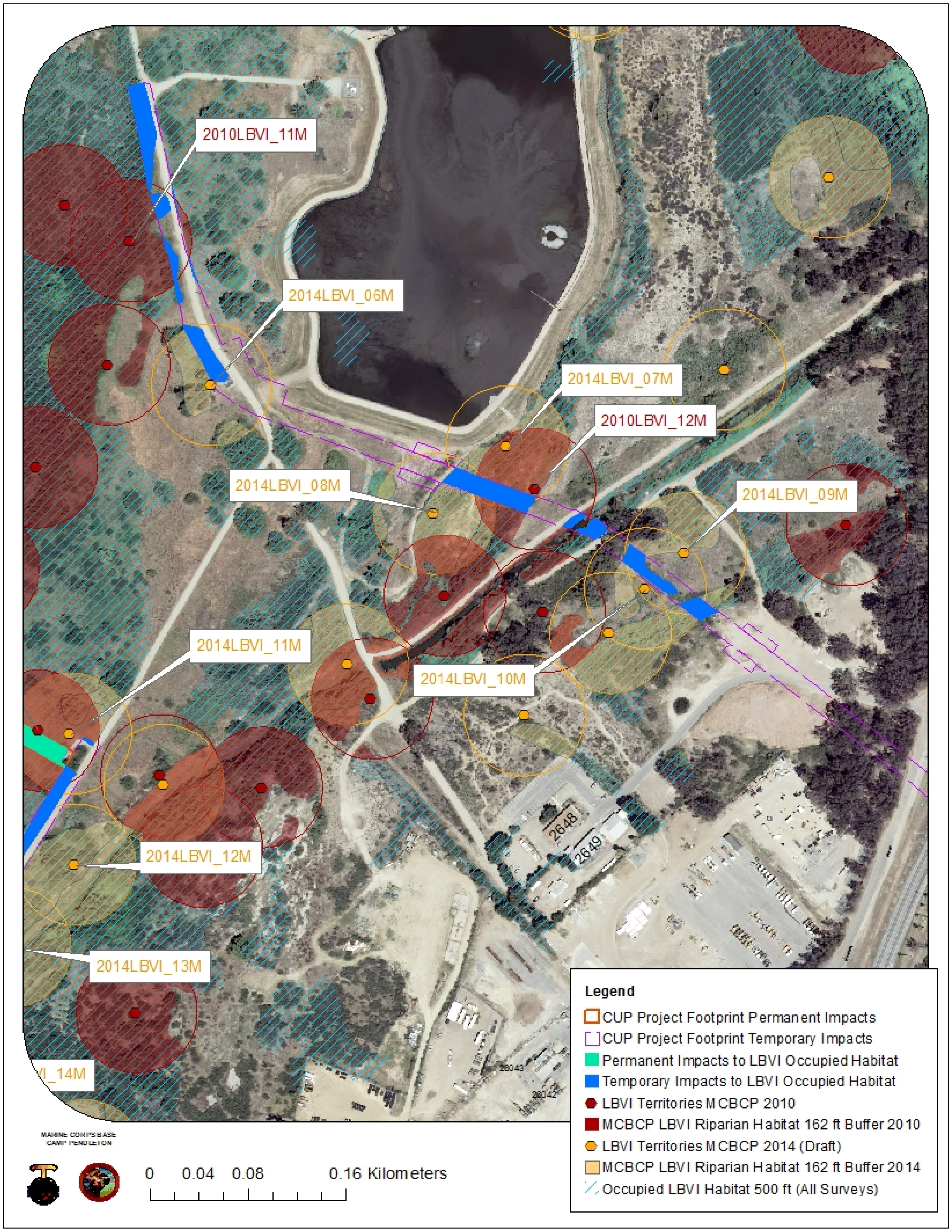

Figure C-8. MCB Camp Pendleton. LBVI Territories in 2010 and 2014 that are directly impacted by construction of the Project Action.

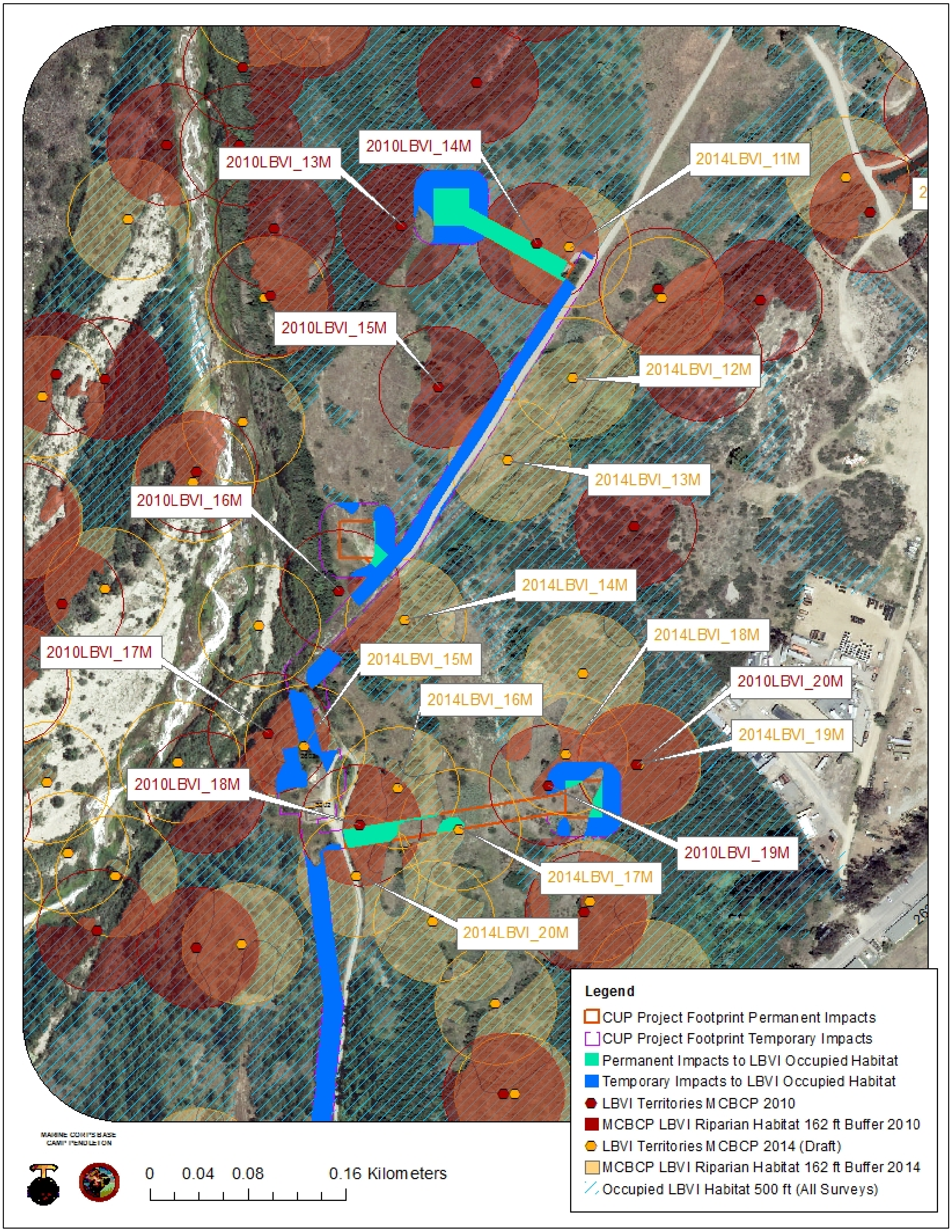

Figure C-9. MCB Camp Pendleton. LBVI Territories in 2010 and 2014 that are directly impacted by construction of the Project Action.

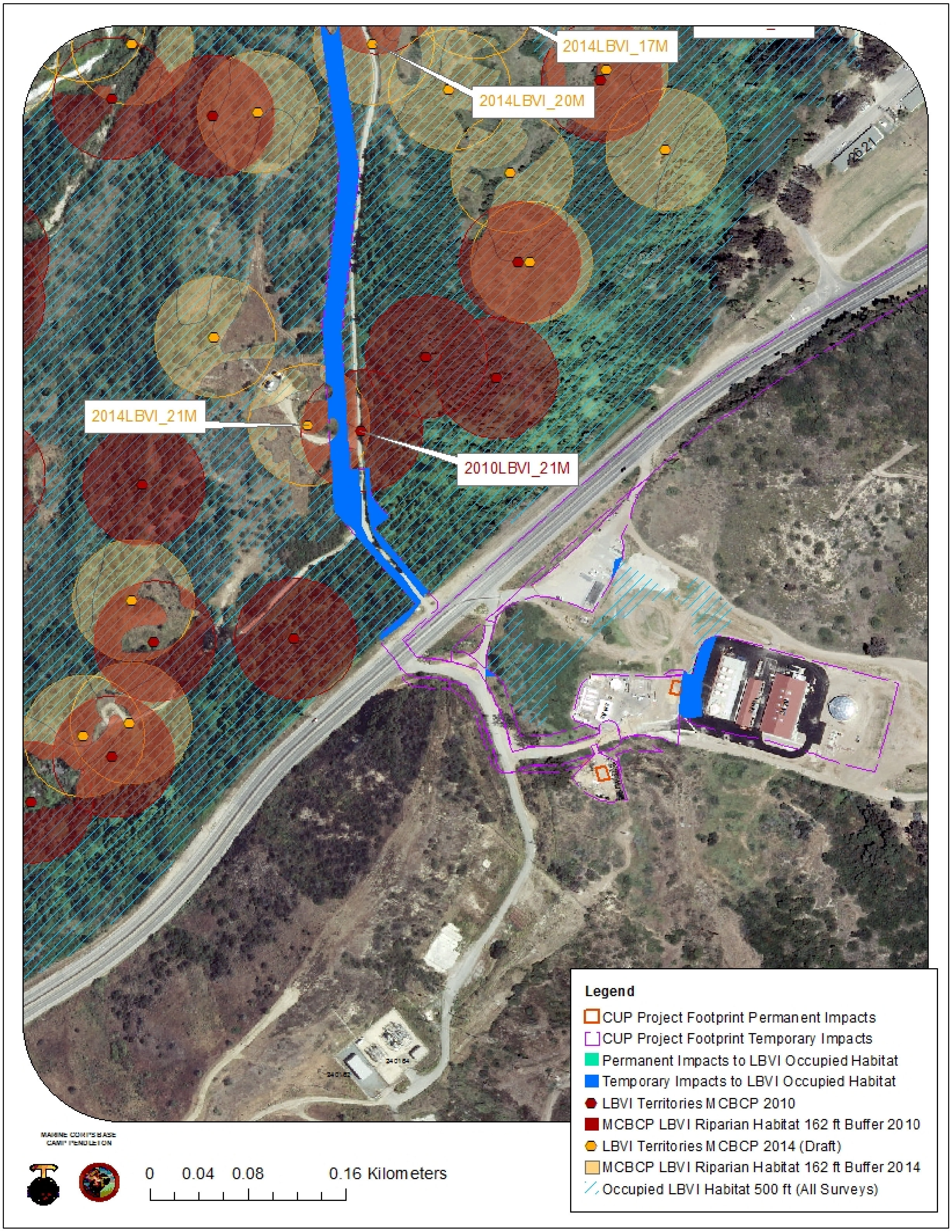

Figure C-10. MCB Camp Pendleton. LBVI Territories in 2010 and 2014 that are directly impacted by construction of the Project Action.

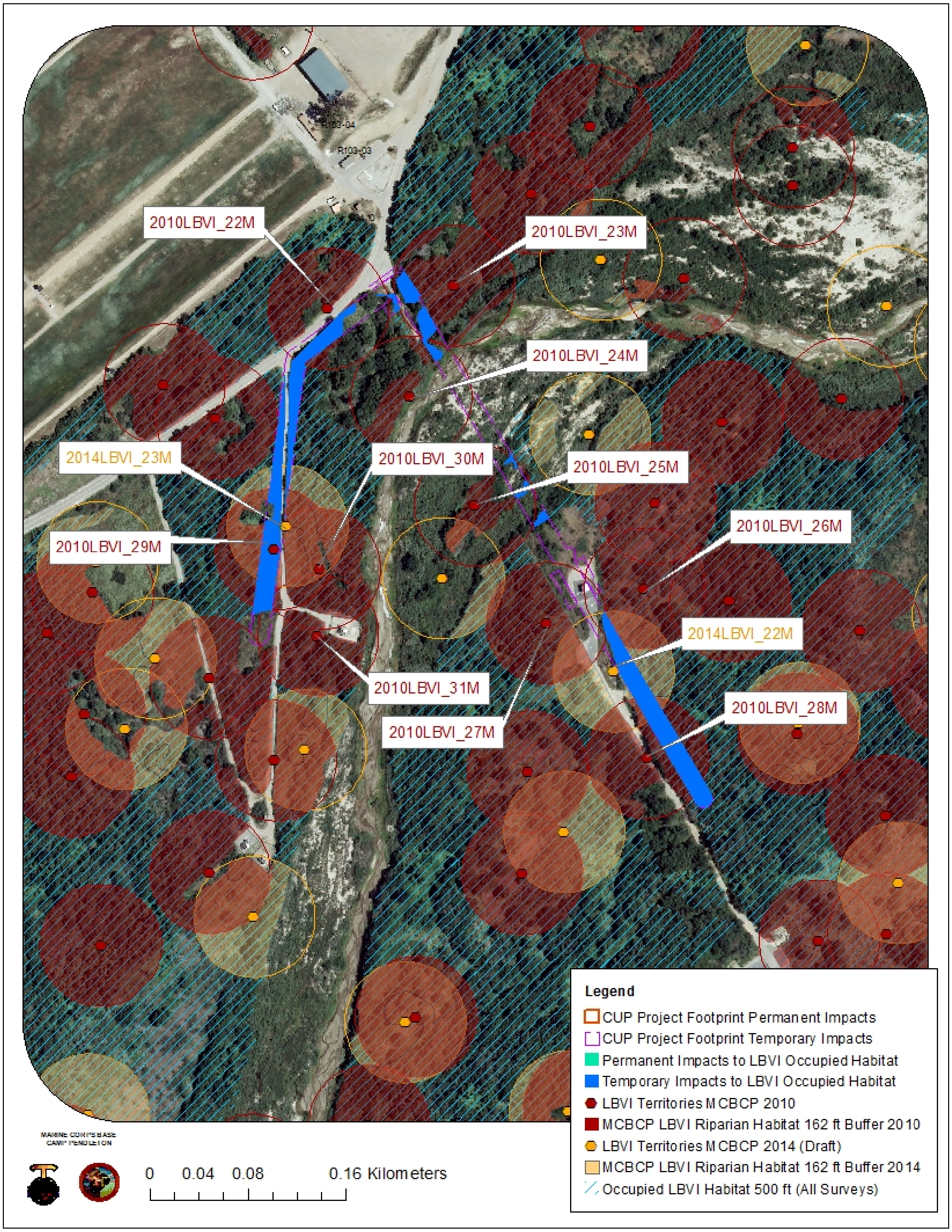

Figure C-11. MCB Camp Pendleton. LBVI Territories in 2010 and 2014 that are directly impacted by construction of the Project Action.

Indirect Effects to Least Bell's Vireo (LBVI) Territories at the Diversion Weir

Construction at the diversion weir must take place during the LBVI breeding season; to determine how many LBVI may be significantly impacted by construction at the weir, the number of LBVI territories from 2010 and 2014 that overlap within 250 ft. of construction was noted (Figure C-12); 250 feet is the distance assumed where LBVI would be significantly impacted.

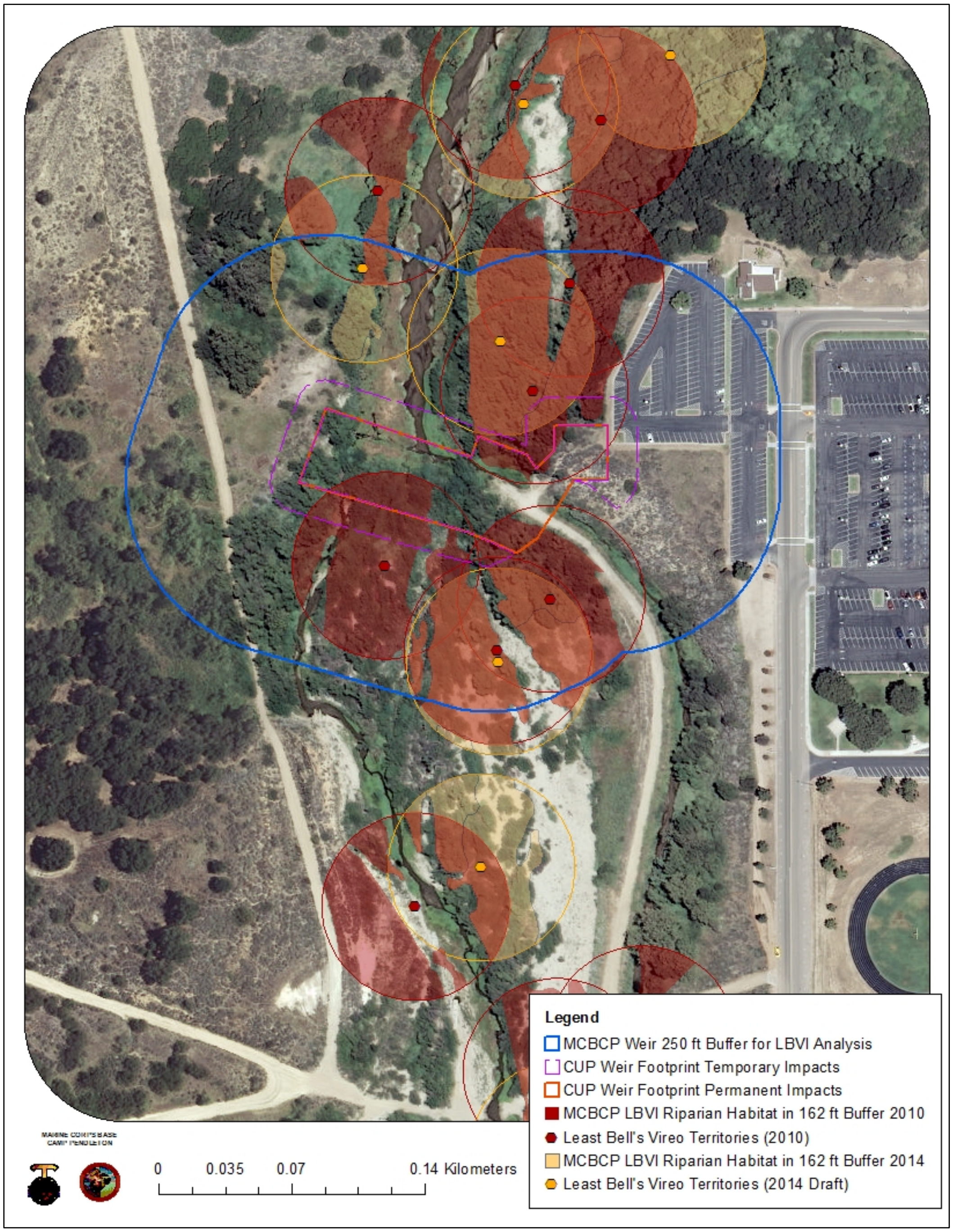

Figure C-12. MCB Camp Pendleton. LBVI Territories in 2010 and 2014 that are indirectly impacted by construction of the diversion weir.

California Gnatcatcher

With project construction, over 99% of the impacts to California gnatcatcher habitat are temporary. The amount of each 5.7-acre CAGN territory in 2009/2014 on DET Fallbrook and 2010/2014 on MCB Camp Pendleton that is temporarily impacted is noted in Table D-2. Territory names in Table C-7 correspond to those locations in Figures C-13 through C-15. A territory is considered significantly impacted if greater than 20% will be removed temporarily.

Table C-7.				
Percent Impact on CAGN Territories on Detachment Fallbrook				
2009 Territory Name	Amount of CSS in 5.7 acre (282-ft buffer) Territory	Amount of CSS Temporarily Impacted within 5.7 acres Territory	% Territory Temporarily Impacted	Burned in 2014?
2009CAGN_01	4.09	0.97	23.7	Partial
2009CAGN_02	5.26	0.65	12.2	Yes
2009CAGN_03	5.44	0.61	11.2	Yes
2009CAGN_04	5.70	0.01	0.1	Yes
2009CAGN_05	5.11	0.20	3.9	No
2009CAGN_06	5.56	0.22	4.0	No
2014 Territory Name				
2014CAGN_01	4.25	0.67	15.8	Partial
2014CAGN_02	5.22	0.32	6.1	Yes
Percent Impact on CAGN Territories on MCB Camp Pendleton[1]				
2014 Territory Name	Amount of CSS in 5.7 acre (282-ft buffer) Territory	Amount of CSS Temporarily Impacted within 5.7 acres Territory	% Territory Temporarily Impacted	Burned in 2014?
2014CAGN_01M	3.78	0.59	15.6	No
2014CAGN_02M	5.51	0.30	5.4	No
2014CAGN_03M	4.78	0.96	20.1	No

1 No CAGN Territories from 2010 are directly impacted from construction of the Project Action.

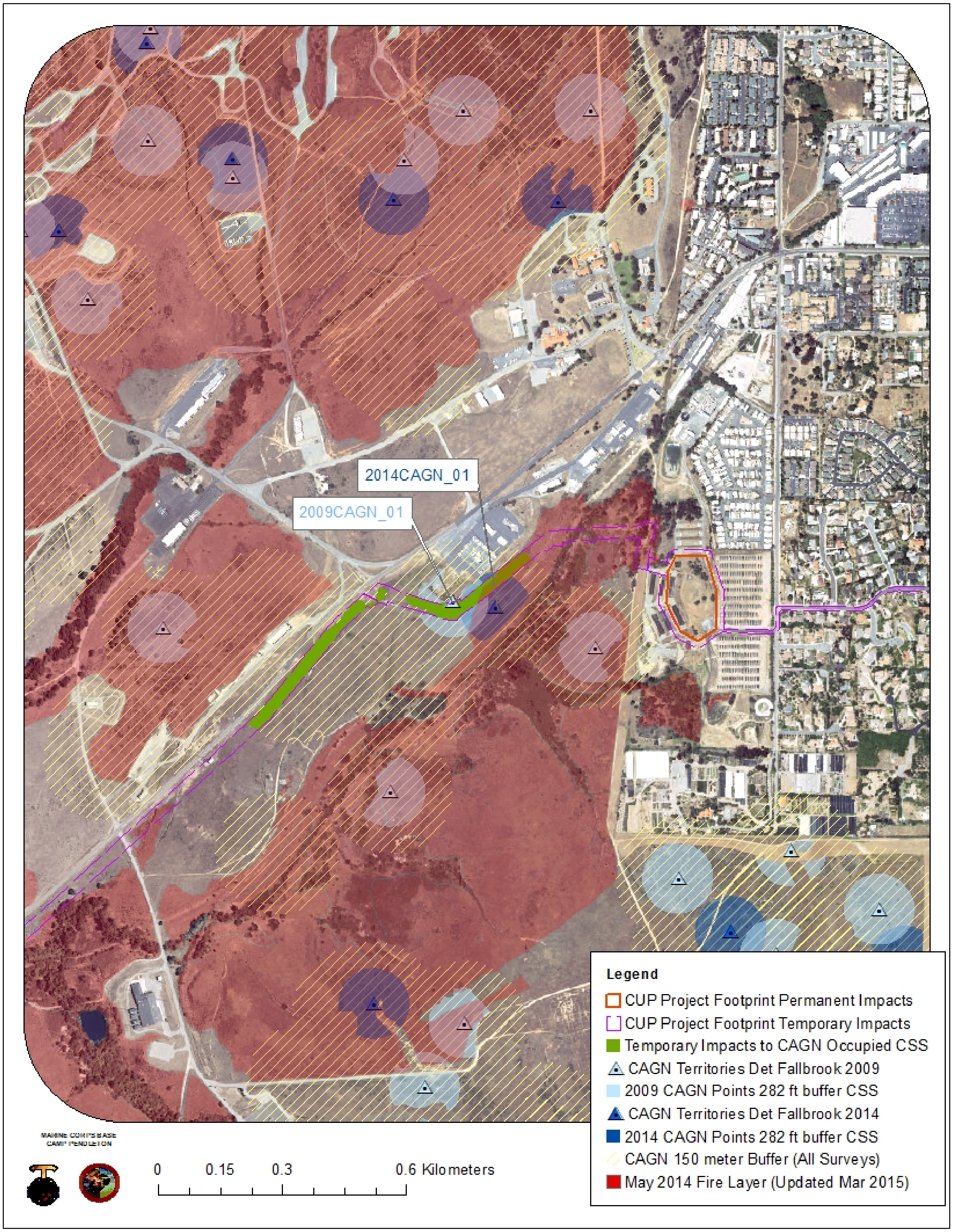

Figure C-13. Detachment Fallbrook. CAGN Territories in 2009 and 2014 that are directly impacted by construction of the Project Action.

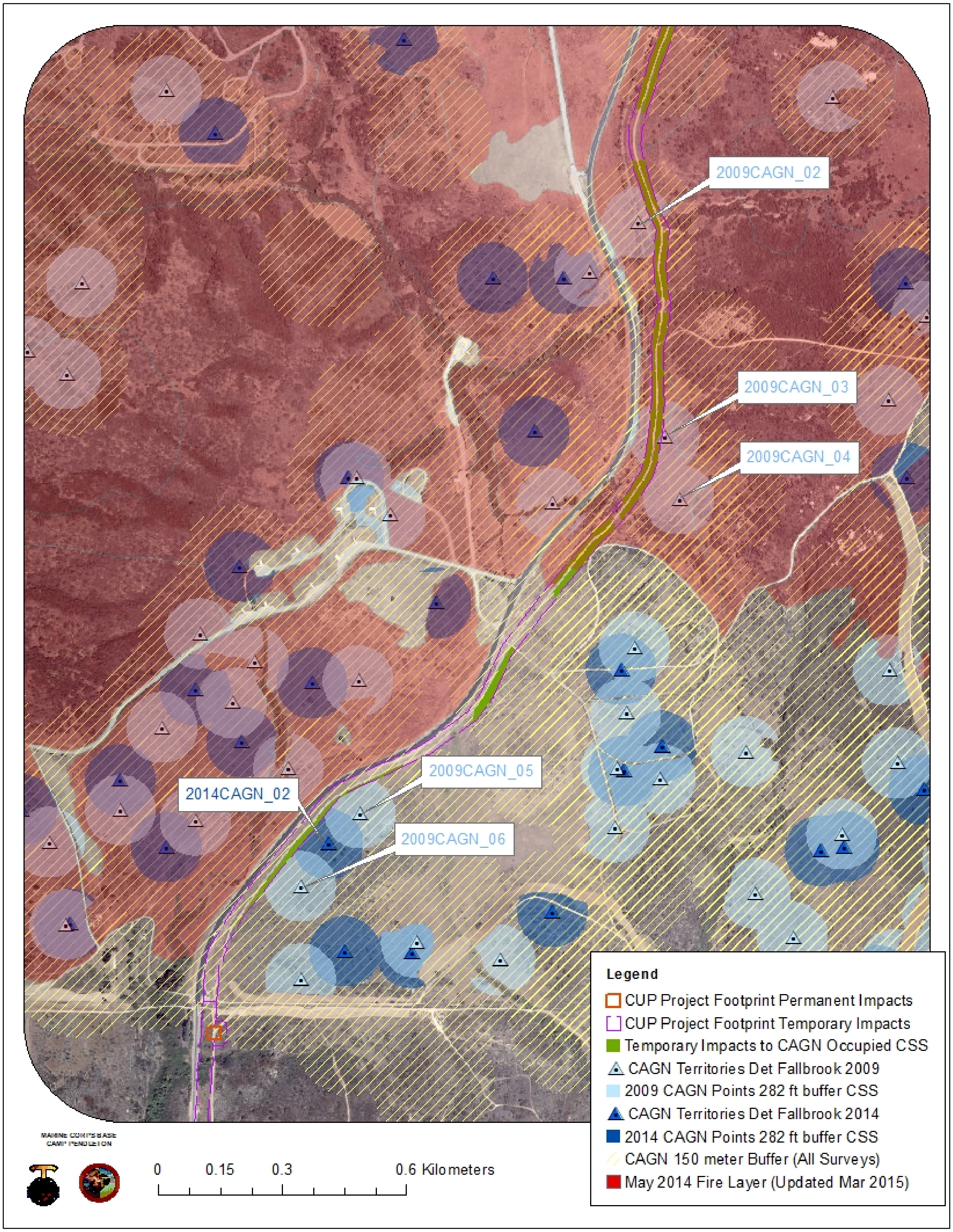

Figure C-14. Detachment Fallbrook. CAGN Territories in 2009 and 2014 that are directly impacted by construction of the Project Action.

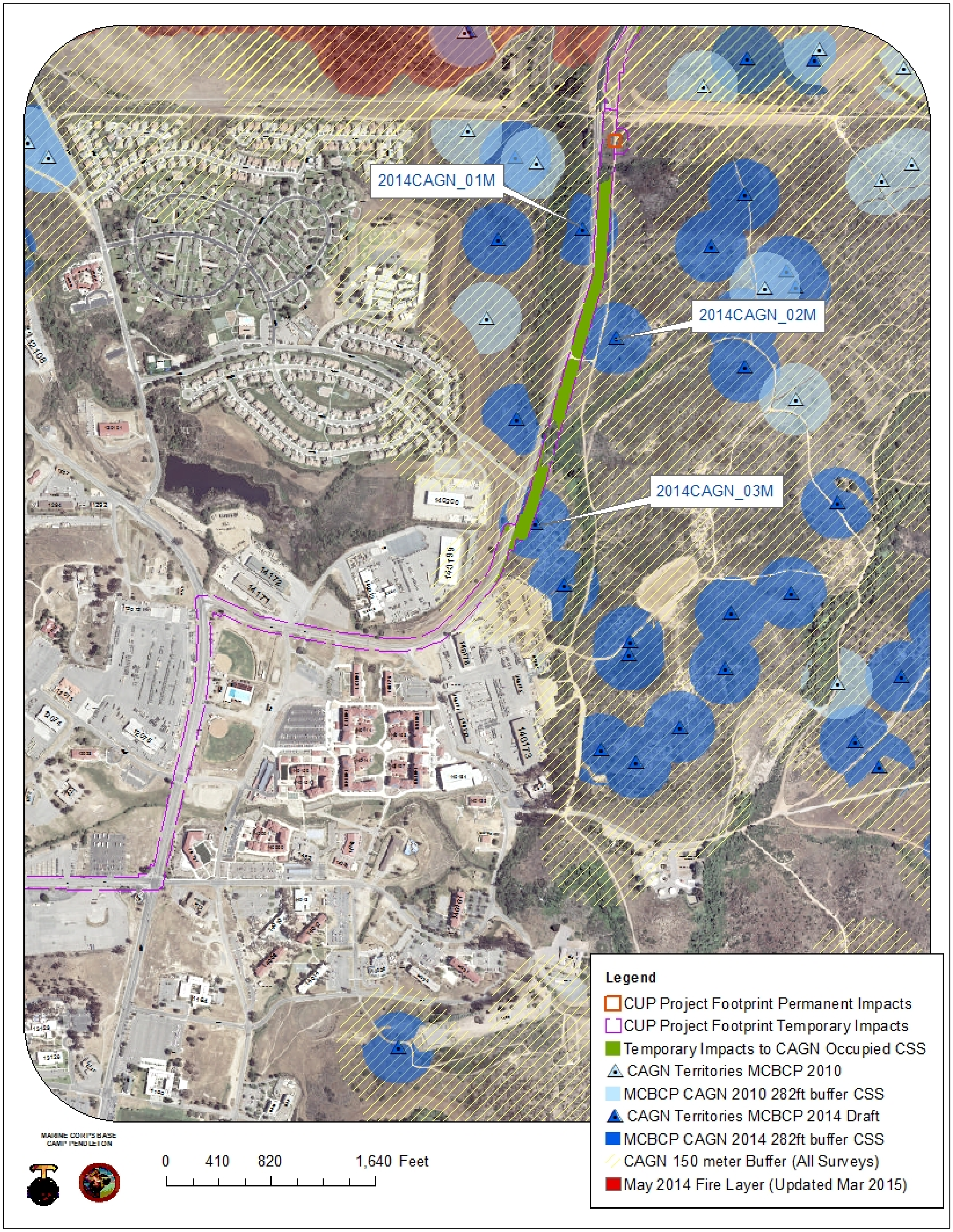

Figure C-15. MCB Camp Pendleton. CAGN Territories in 2014 that are directly impacted by construction of the Project Action. No 2010 CAGN Territories are directly impacted by construction.

Direct Effects to Stephens' Kangaroo Rat (SKR) Territories

With project construction, there is a total potential effect to approximately 1.29 acres of Stephens' kangaroo rat (SKR) occupied habitat; all effects are temporary from the construction of the Bi-directional Pipeline and located on Detachment Fallbrook.

A territory is considered significantly impacted if greater than 20% will be impacted. SKR surveying was conducted within the CUP project footprint, and within 300 feet from the footprint in appropriate habitat, in October and November 2015. Four locations of SKR were trapped during the Fall 2015 survey effort: one within the footprint, and three within the 300 ft. buffer (Table C-8; Figure C-16).

To estimate significant impacts, a 50-meter buffer was created around each positive SKR trap location during the 2015 effort. The 50-meter buffer represents an estimate of SKR "typical movements", where the individual typically moves short distances within its home territory. The MCB Camp Pendleton SKR Habitat Management Plan (in Draft in 2015; author: USGS) names that SKR typically move short distances (<50 meters). Note that two of the SKR territories (the trap location + 50 meter buffer) are located within the temporary CUP project footprint (Figure C-16).

The amount of non-developed habitat (all habitat types other than Ammunition Road, since this area was burned in the May 2014 wildfires thus creating more open habitat) within the 50-meter buffer for each of the positive SKR identifications was measured; the percentage of this habitat impacted by the CUP project footprint was calculated. In total, two of the four territories of SKR have significant impacts (Table C-8).

Table C-8.

Impact Analysis on Stephens' Kangaroo Rat Territories on Detachment Fallbrook[1]

SKR ID Number (2015 Territory Name)	Amount of Non-Developed Habitat[2] in 1.94 acre (50-meter buffer) Territory	Amount of Non-Developed Habitat[2] Temporarily Impacted within Territory 1.94 acre Territory (acres)	% Territory Impacted	Distance from CUP Temporary Impact Footprint (meters)
SKR2015_01	0	0	0	64
SKR2015_02	1.94	0.55	28.4%	16
SKR2015_03	1.68	0.74	44.0%	0 (within footprint)
SKR2015_04	0	0	0	59

1 No SKR-occupied habitat is being impacted from the CUP project footprint on MCB Camp Pendleton. On Det Fallbrook, all impacts are temporary with the construction of the Bi-directional Pipeline.

2 All habitat types other than Ammunition Road (developed) were considered for the SKR analysis. Habitat is predominately non-native grassland, and Diegan coastal sage scrub burned by the May 2014 fires.

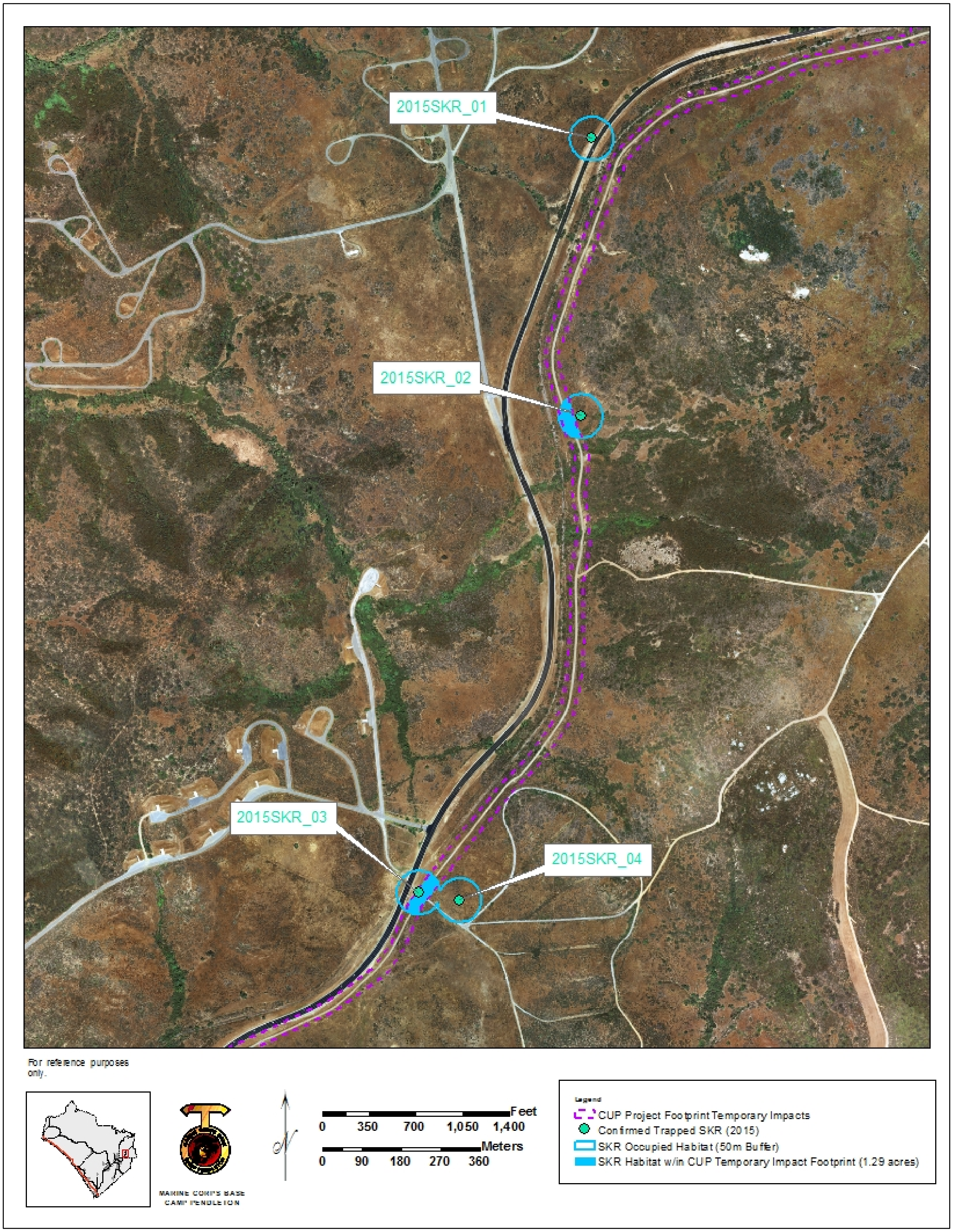

Figure C-16. Detachment Fallbrook. SKR Territories, as defined as 50 meters around positive trap locations during survey efforts in 2015, which are directly impacted by construction of the Project Action.

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Appendix C-6

Technical Memorandum: LSMR Groundwater Model

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TECHNICAL MEMORANDUM 102913.1

2171 E. Francisco Blvd., Suite K • San Rafael, California • 94901
TEL: (415) 457-0701 FAX: (415) 457-1638 e-mail: mollyp@stetsonengineers.com

TO: AC/S Environmental Security DATE: October 30, 2013

FROM: Stetson Engineers Inc. JOB NO: 2408-1001

RE: Use of Groundwater Model to Estimate Impact to Riparian Vegetation from the Proposed Santa Margarita River Conjunctive Use Project and its Relationship to the Riparian Biological Opinion

Stetson Engineers was requested to assess potential impacts to Arroyo Toad habitat on the Santa Margarita River due to the proposed Santa Margarita River Conjunctive Use Project (CUP). Using the results from the Lower Santa Margarita River (LSMR) Groundwater Model, Stetson was able to assess changes in streamflow conditions between historical and future groundwater management operations. The model results that were relied upon to investigate segments of the river that were either flowing or not flowing were based on the model developed to assess the passage criteria for steelhead in the Lower Santa Margarita River (Stetson, 2012).

The LSMR Model for the CUP was developed using the United States Geological Survey (USGS) MODFLOW surface and groundwater finite difference model, to simulate groundwater flow in the Lower Santa Margarita Basin (Reclamation, 2007). This model was then adapted to investigate opportunities for steelhead passage in the Lower Santa Margarita River based on comparing historical to future CUP conditions. The period of record chosen to represent historical conditions was based on the hydrology and groundwater operations that occurred between Water Year 1997 and 2009. Using the same climatic conditions, the 13-year hydrology that occurred during the historical period was applied to represent future conditions. Hence, potential project related impacts on the environment could be assessed based on comparing historical to future results.

The results developed from the historical and future LSMR model runs were reviewed for specific months that corresponded to field data collected for Arroyo Toad. While the model does not assess conditions on specific species, it does estimate changes that occur to environments that the species rely on for survival. Specifically, the Lower Santa Margarita River is represented in the LSMR Model by 200-ft by 200-ft grid cells. The data from individual cells that underlie the river were reviewed and compared for flow/no flow conditions. The results of this analysis were provided under separate delivery to AC/S Environmental Security on October 29, 2013.

During the development of the LSMR Model, simulated water levels in riparian (Figure 1) and grassland indicator cells were reviewed in order to estimate the impact of groundwater management operations (Reclamation, 2007). The location of both riparian and grassland cells were based on historical monitoring well data and locations where monitoring wells could be most useful to determine project related impacts. Riparian indicator cells were located outside the active river channel, but as close to the riparian corridor as to monitor variations in groundwater levels below the river. Grassland indicator cells were located away from the riparian corridor in areas where phreatophytes did not occur. Historical aerial photographs and vegetation GIS coverage maps, provided by AC/S ES, were used to distinguish between vegetation types that relied on groundwater and those that only relied on precipitation. These data were used as input to the LSMR Model so evapotranspiration (ET) by phreatophytes could be simulated.

During the development of the LSMR Model and the management scenarios developed for the CUP, three constraints were placed on the future project conditions: 1) aquifer compaction could not occur; 2) pumping could not cause seawater intrusion, and; 3) historical depth to groundwater could not be exceeded. In all management scenarios investigated and presented in development of the CUP, all three of these constraints were met.

The LSMR Model simulates evpotranspiration (ET) by phreatophytes based on depth to groundwater and the root zone. The equation that is used by the model to calculate ET is based on an inverse relationship between maximum potential ET and depth to groundwater; the greater the depth to groundwater the less ET will occur. At a point called the extinction depth, ET goes to zero since the roots are not able reach groundwater levels. The LSMR Model uses an extinction depth of 20 feet below ground surface for trees, 8 feet for wetland areas, and 3 feet below ground surface for water.

The relationship between the riparian indicator cells, the depth to groundwater beneath the river, and the extinction depth of phreatophytes was not directly studied prior to our investigation of Arroyo Toad. Because of the restrictions of the Riparian Biological Opinion to maintain groundwater levels within 15 feet of riparian vegetation, Stetson Engineers began an investigation of the relationship between model constraints and simulated groundwater levels. While the riparian indicator cells were previously chosen to represent water levels below the river, they were not located within riparian vegetation due to restrictions in well construction activities that would occur in these areas. Hence, the existing monitoring wells, located in riparian indicator cells, were used to link model generated water levels to historical minima.

Review of LSMR simulated groundwater levels below the active stream channel showed that CUP related water levels were within 15 feet of the ground surface in both the Upper Ysidora and Lower Ysidora Sub-basins (Figure 2a and 2c). Inspection of the groundwater levels below the active river channel in the Chappo showed that the simulated values were within 15 feet in 39 of the 50-year simulated period based on 1952 to 2001 hydrology (Figure 2b). During 10 of the 11 years that were characterized by groundwater levels greater than 15 feet below the simulated riverbed surface during future CUP conditions, the CUP simulated levels were higher than baseline conditions. Both baseline (historical) and future CUP conditions were simulated using the same 50-year hydrologic period of record that occurred between 1952 and 2001.

The LSMR model results describe a reduction of 100 AFY (4%) in ET by phreatophytes from the Baseline to the CUP model runs, while meeting all three model constraints. The same model results also show that observed historical minima in riparian indicator cells, which may be located outside the riparian corridor, are met during the same 50-year simulation period. Finally, recent review of the model results, related to Arroyo Toad analysis, indicate that the groundwater levels below the river bed are within 15 feet in the Upper and Lower Ysidora Sub-basins; and higher than Baseline groundwater levels in the Chappo Sub-basin.

Based on the LSMR Model results, a potential exists for a reduction in phreatophyte ET during CUP conditions that will require monitoring under the Adaptive Management Program/Facilities Operation Plan (AMP/FOP). A simulated reduction in phreatophyte ET could be expressed in the field as stressed vegetation or an actual loss of vegetation. The goal of the AMP/FOP will be to tie the LSMR simulated results to the actual field observations and subsequently adjust the pumping schedule to avoid adverse impacts. The AMP/FOP will incorporate the relationship between the riparian indicator cells and the health of the riparian vegetation so that the requirements of the Riparian Biological Opinion are met. Additionally, the results from the on-going Arroyo Toad monitoring program will be used as an input to the AMP/FOP so that observed pools and streamflow are used in the decision making process.

MODFLOW Streamflow Constraints Related to the Arroyo Toad Analysis

The MODFLOW streamflow routing (SFR) package[1] was used to simulate flow in the main Santa Margarita River channel; and to account for diversions to the recharge ponds and Lake O'Neill, spills and releases from Lake O'Neill, and side tributary flows to the main channel within the model domain. The SFR used 284 model cells to represent the main river channel[2] from upstream of the diversion structure to the Lower Ysidora Narrows.

The SFR tracks flow in the stream cells and water exchanges with the groundwater aquifer. Leakage from the stream to the aquifer is calculated for each cell based on the head difference between the aquifer and the stream, and on the streambed conductance term. The amount of leakage at each stream cell (either into or out of the aquifer) is integrated into the groundwater flow model water budget[3]. Streambed recharge to the aquifer ceases when all of

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[1] USGS Open-File Report 88-729; Documentation of a Computer Program to Simulate Stream-Aquifer Relations using a MODFLOW. USGS Open-File Report 2004-1042; A New Streamflow-Routing (SFR1) Package to Simulate Stream-Aquifer Interaction with MODFLOW-2000.

[2] The SFR package for the LSMR Model simulated a total of 673 stream cells to account for the diversion channel, the Lake O'Neill outlet channel, Fallbrook Creek 'bypass', 20 side tributary drainages, historical oxidation pond discharge locations, and the MCAS channelized drainage ditch. During dryer months, many of the drainages had do flow; however during wet years, all of the stream cells simulated streamflow.

[3] *ibid,* USGS Open-File Report 88-729

the streamflow in the upstream reaches has leaked into the aquifer resulting in a dry stream. Sometimes, if the groundwater level in the aquifer is above the streambed elevation, base flow from the aquifer to the stream can occur and the river can have a flowing reach downstream of a dry reach[4].

For the Arroyo Toad analysis, flow in the model cells that represent the Santa Margarita River main channel was processed from the model output files. The available simulated streamflow in the model cells includes: flow into the model cell, flow to or from the aquifer, and flow out of the model cell[5]. If the simulated stream is dry, there is no recorded flow. A post-processing spreadsheet was developed to extract the flow data for each stress period (month) of interest. GIS files were constructed to provide mapping for the extents of flow and no-flow cells.

There are constraints that should be considered in order to develop a thorough understanding of what can be inferred from the modeling efforts. The following components of model construction can influence the streamflow results:

- The streamflow calculations are highly dependent upon the streambed elevation assigned to each stream cell. Stream bed elevations were based upon TOMI/TOMA[6] five-foot contour intervals and USGS topographical maps. Smoothing was required so that the streambed progressed down gradient. A fraction of a foot difference between the assigned elevation and the 'true' elevation could affect the flow/no-flow result.
- The streambed conductance (leakance in and out of the aquifer) term is constant throughout the simulation period.
- Model cell size was constructed with 200-foot by 200-foot cells. The stream cell width was kept constant with the model cell size. More stream cells were used at wider portions of the river. Each monthly stress period simulates the river as the same size, whether it is dry, normal, or wet. This can affect the available flow available for recharging the aquifer and in the stream.
- Average monthly flow is simulated into the upstream model cell. This does not account for the flashiness of the stream system following flood events. The model results are from the end of the monthly stress period when streamflow is often different from average flow.

There are constraints that should be considered to develop an understanding of what can be inferred from the model. Foremost of these constraints is the sensitivity of both ground elevation and groundwater level surfaces. Variations in these surfaces of few inches may cause a cell to be depicted as either flowing or not flowing. Variations of these surfaces of a few feet

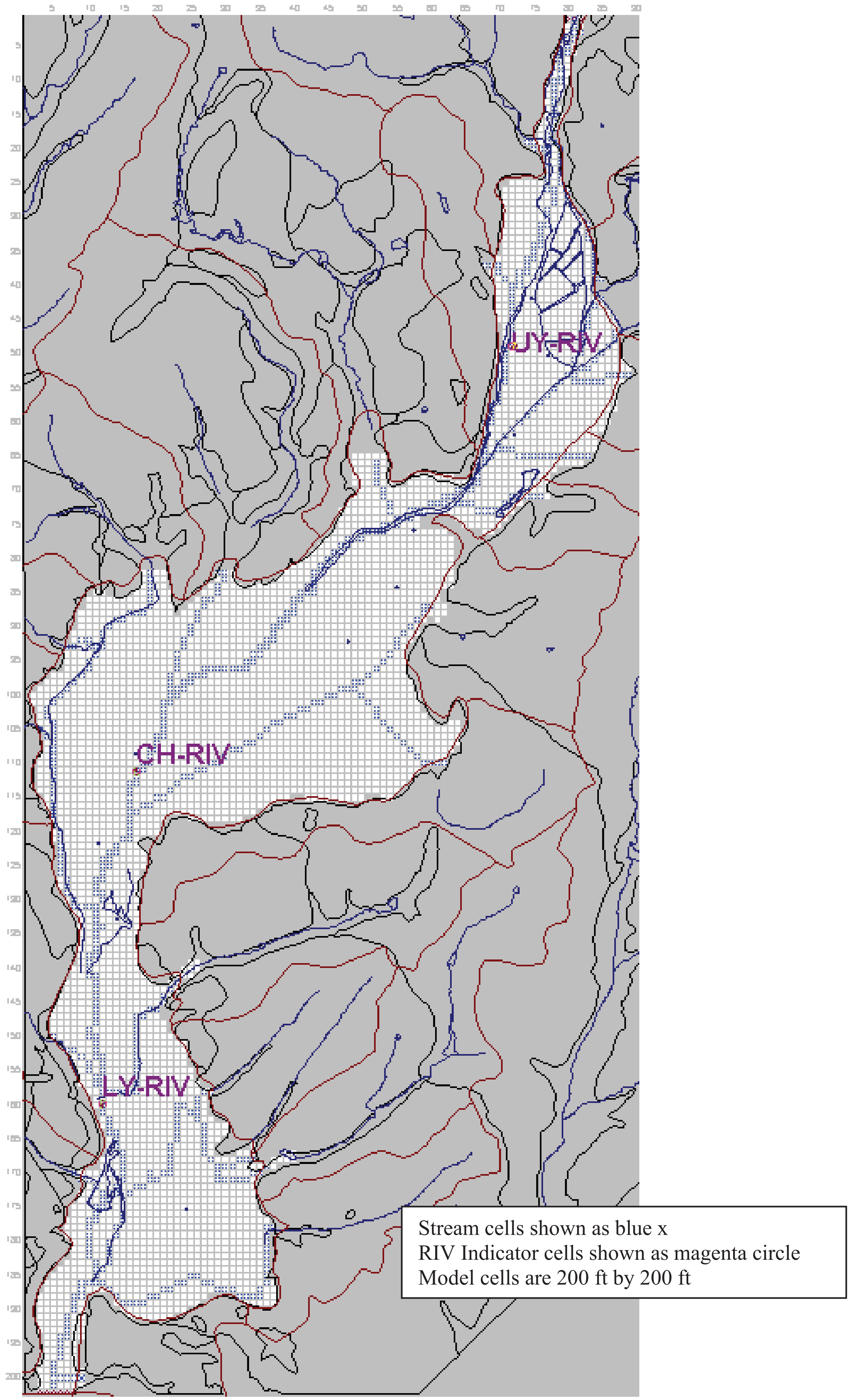
[4] Some simplifying assumptions occur with the SFR package: streamflow entering the modeled area is assumed to be instantly available to downstream reaches during each monthly stress period. This assumption generally holds true given the relative difference between the slower groundwater flow compared to the faster surface water flow. Another assumption is that leakage between streams and aquifers is instantaneous[4]. In other words, the stream leakage to the aquifer is limited only by the head difference and the streambed conductance term, and will fill any unsaturated cells beneath the stream as if flows downstream until it are dry.
[5] Fortran print flags were added to the SFR package to have the streamflow printed to the flow model's output file.
[6] Army Corps of Engineers, 2001; Topographical minima and maxima (TOMI/TOMA) 5-foot contour intervals.

may result in entire reaches (multiple contiguous cells) being shown as flowing or not flowing. Representations of average monthly groundwater pumping and average monthly groundwater levels may represent actual conditions during one part of a month, but not during other parts of the same month. Based on the constraints associated with the accuracy of surface elevations (both ground and water level), empirical data that relate observed streamflow data to monthly stresses, at locations other than Basilone Bridge (USGS #11046000), will be required to refine the results of the Arroyo Toad analysis as it relates to project related impacts to streamflow.

REFERENCES

Department of the Interior, Bureau of Reclamation (Reclamation). 2007. Santa Margarita River Conjunctive Use Project: Final Technical Memorandum No. 2.2, 2 Volumes. Prepared by Stetson Engineers Inc. April 2007.

Stetson. 2012. Southern California Steelhead Passage Assessment, Lower Santa Margarita River, California and CUP Surface Water Availability Analysis (TM 1.1). Prepared for U.S. Department of the Interior, Bureau of Reclamation (Reclamation), Marine Corps Base Camp Pendleton, and Fallbrook Public Utility. 27 April.



STETSON ENGINEERS INC.

Arroyo Toad Study

LSMR Model Location Map Showing River Indicator Cells

FIGURE 2A   Run 16b & Baseline Hydrographs
2-Party Negotiation Model Run; 10,800 Average Annual AFY

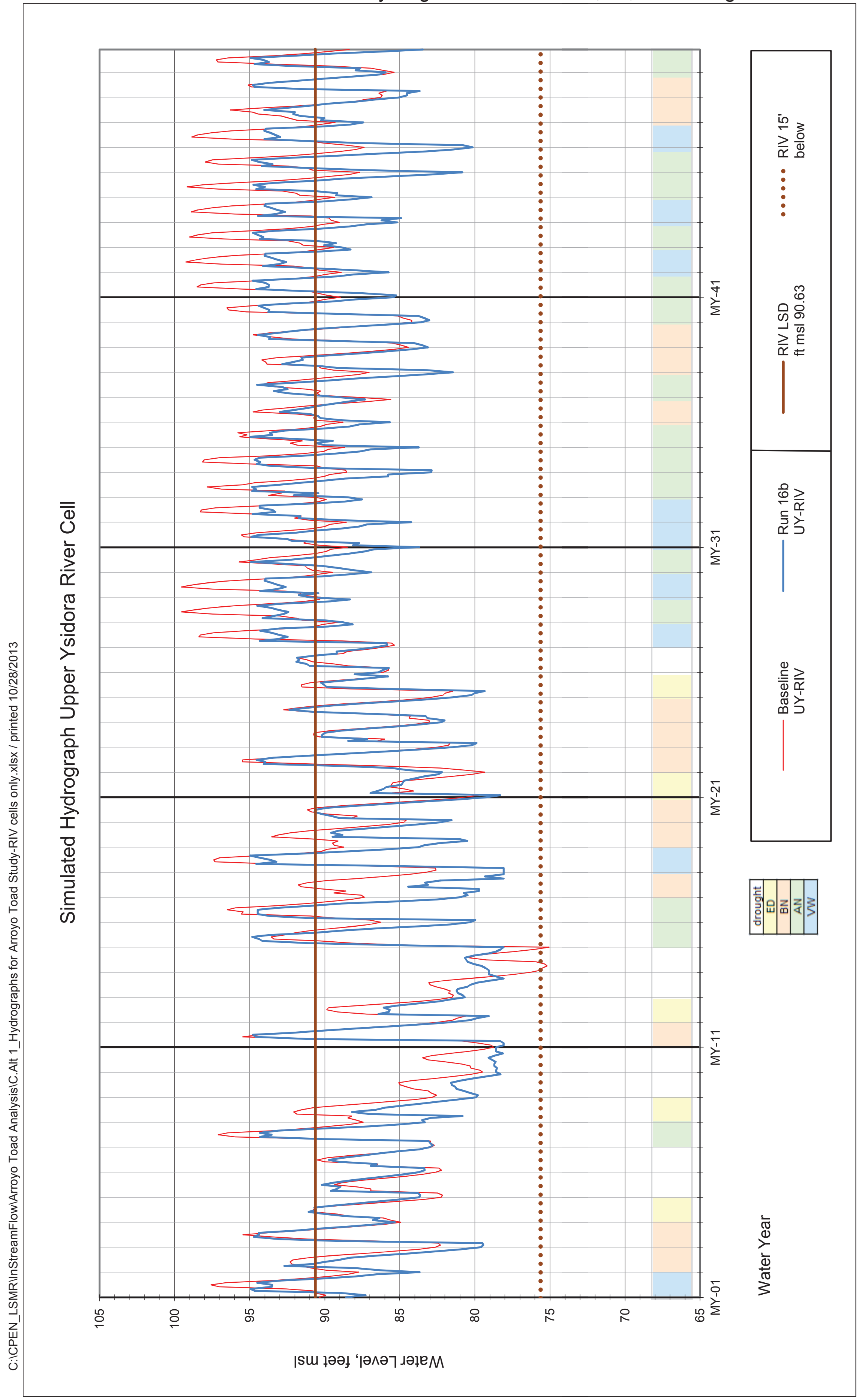


FIGURE 2B Run 16b & Baseline Hydrographs
2-Party Negotiation Model Run; 10,800 Average Annual AFY

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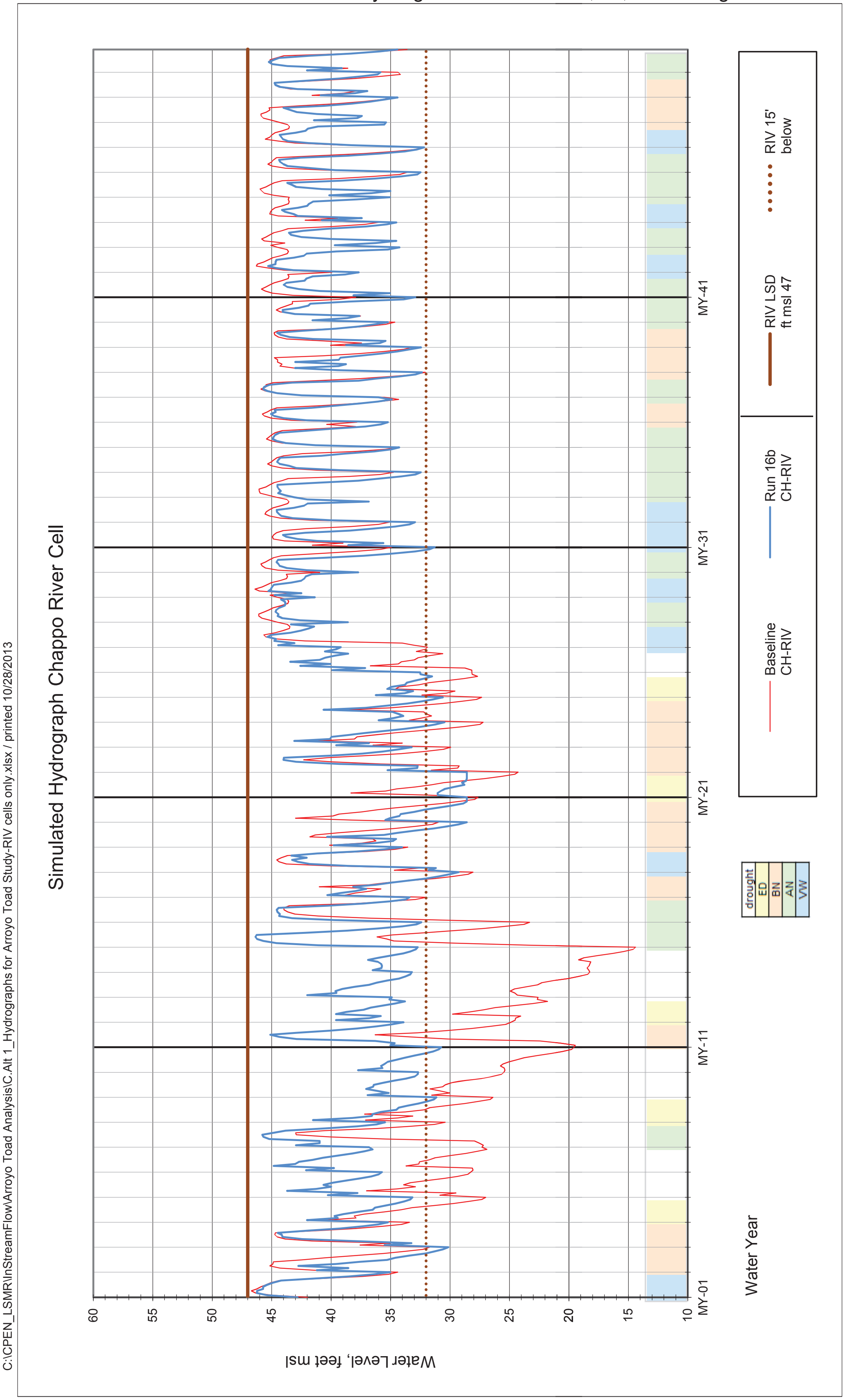
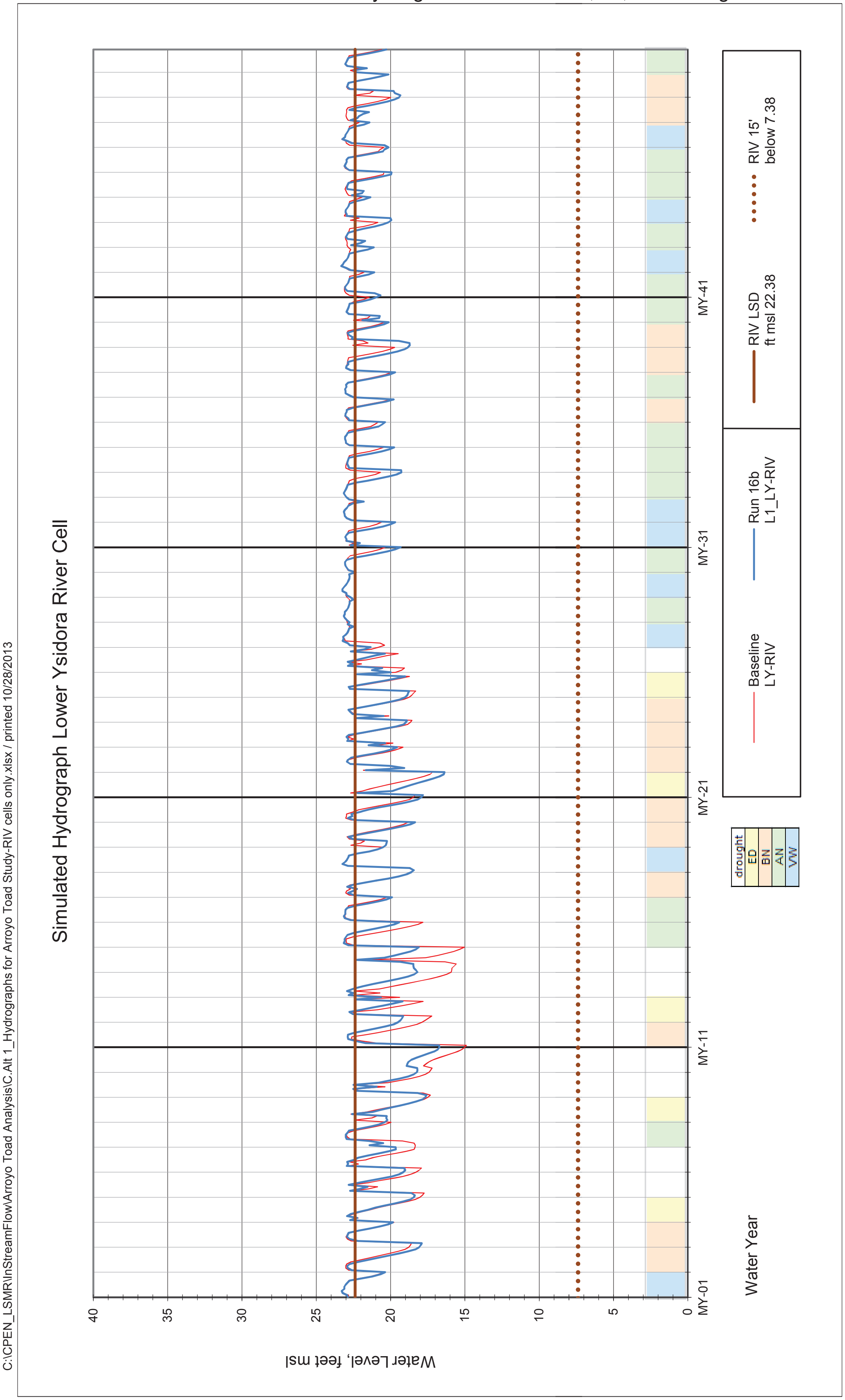


FIGURE 2C Run 16b & Baseline Hydrographs
2-Party Negotiation Model Run; 10,800 Average Annual AFY



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Appendix C-7

Technical Memorandum: Operational ARTO Impacts

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FROM: MCB Camp Pendleton, Environmental Security
TO: U.S. Fish and Wildlife Service
DATE: January 28, 2016

SUBJ: OPERATIONAL IMPACTS TO SEGMENTS 4 THROUGH 8

The purpose of this enclosure is to respond to the United States Fish and Wildlife Service (USFWS) request to look at Conjunctive Use Project (CUP) water management operational impacts to Segments 4 through 7[1] on the lower Santa Margarita River (SMR) and provide a conservation measure for operations on these reaches for the Section 7 USFWS consultation. The September 2015 BA provided an impact analysis for the entire basin downstream of the Point of Diversion that was performed following consultation with USFWS, USGS Biological, USGS Hydrological, and Camp Pendleton personnel (See Attachment 1). Following review of the September 2015 Biological Assessment (BA), a request was made by the USFWS to investigate impact to water resources in Segments 4 through 7 due to the critical nature of these reaches to support ARTO habitat.

The original Lower Santa Margarita River (LSMR) Model presented in the September 2015 BA provides a robust impact analysis for the entire basin downstream of the Point of Diversion; however, statistically, it cannot be narrowed down to look at individual Segments (i.e., the sample size of modelled cells would be too small if individual Segments are evaluated). Therefore, the Lower Santa Margarita River (LSMR) Model was refined that increased the predictive accuracy by relying on observed hydrological and biological datasets. In order to establish accountability and provide a physical relationship between historical and CUP operational data in the future, the investigative area was expanded to include Segment 8 which contains the long-term USGS stream gauge at Ysidora (11046000).

This Attachment briefly describes the refined analysis for ARTO Segments 4 through 8 and the potential impact to these segments due to the CUP water management operations. The use of all available observed data to increase the accuracy of the updated analysis provides increased reliance in the use of the LSMR Model's simulated results. The results from the 10-year model were correlated with the 50-year model to assess the impact at Segments 4 to 8 during the balanced hydrologic period, showing a 14.6% impact. Impacts occur during Below Normal and some Above Normal Hydrologic conditions due to a shift in the occurrence interval.

[1] Segments 4-7 refer to transect segments designated by United States Geological Survey (USGS) arroyo toad monitoring plan, and shown to correspond to the arroyo toad population downstream of the Ysidora USGS gauge.

Assumptions of Existing Basin-wide Analysis

The September 2015 BA indicated that under Recent Management conditions, 59.7% of the stream within the model boundary is wetted for four continuous months over a 50-year period. Under CUP operations (named “CUP RPM-7 50-year” model in Table 1), the portion of wetted stream within the model boundary drops 11.6% to 48.1%, over the same 50-year period.

The value of this analysis is based on the statistical methods that relied on large amounts of data output from the CUP groundwater model to assess changes. The stream is represented by 220 cells, each of which has groundwater levels within the cell calculated 600 times over a 50-year period. In all, 11,000 values were used to statically analyze the impact of the CUP on the streamflow conditions in the Santa Margarita River. Therefore, the large population of points provide meaningful statistics when establishing the presence or absence of surface water over a large area (ARTO Segments 2 through 11).

The statistical analysis was further based on each cell requiring four months of continuous flow: March through June for (Very Dry) and Below Normal (BN); and April through July for Above Normal (AN) and Very Wet (VW)[2]. If four continuous months have groundwater levels less than 3 feet below the surface, then the cell is considered wet; if any one, or more, of the cells has depth to groundwater greater than 3 feet, then the cell is dry. The four month period for each hydrologic condition was based on data that extended beyond Segments 4 through 8; hence no allowance was made for early rainfall and storm events that might result in an above normal year with flows that naturally stopped before the end of June in Segment 6, but not in Segment 10.

The limitations of the groundwater model and meaningfulness of the statistical methods were previously established based on consultation with USGS-Hydro, USGS-ARTO, FWS, CPEN, and Stetson Engineers. In addition, the following points regarding the physical and environmental conditions should be considered when assessing available tools to assess impacts.

- The development of the 3-foot depth to water trigger, used to identify flowing cells throughout the entire stream reach, was based on the entire model dataset. The depth to water trigger for Reaches 4 through 7 would likely be a different value if only those data were to be assessed.
- Cell size in the model is 0.92 acres. A single cell may be simulating multiple elevations of the river from the thalweg to the 100-year flood plain.
- The river simulated in the model is static and is based on its 1968 location from a USGS topographic quadrangle. The actual river is an active channel, meandering back and forth across the floodplain, eroding and depositing sediments based on storm events.

In addition to these model constraints, as well as physical and environmental conditions, uncertainties exist regarding ARTO habitat, specifically:

[2] Annotation for hydrologic periods defined in the hydrologic model used in the USFWS CUP BA: VD- Very Dry; BN- Below Normal; AN- Above Normal, and VW- Very Wet.

- No direct relationship exists between groundwater levels and soil moisture used by ARTO for burrowing. CPEN installed soil moisture meters in 2014 and 2015, and have not yet gathered adequate data to develop a relationship.
- Uncertainty exists as to the "four continuous month" requirement for which the analysis is based. The analysis in the BA is based on March through June during Above Normal and Very Wet Years and April through July during Below Normal and Very Dry years.

The constraints and limitations of the model suggested the best method for assessing impacts to Segments 4 through 8 was to rely on observed data collected by the USGS ARTO and USGS HYDRO. The following section describes the development of a 10-year model for assessing impacts on Segments 4 through 8 by relying on observed data.

Methodology to Assess Impacts to Segments 4 Through 8

A new model run was simulated from 2005 to 2014 in order to assess its accuracy based on observed data gathered by both USGS ARTO and USGS HYDRO. Comparison of model results to actual field observations increases the reliability of the model to make predictive assessments of future CUP operations. The matrix provided in Table 1 depicts the streamflow, groundwater production, and infrastructure that was included in the development of the 10-Year LSRM Model Run. Comparison of the different Operational Parameters for the different model simulations show that 2005-14 Observed conditions were wetter than the 50-year period; and groundwater pumping was less than that which would occur under future CUP conditions.

Two model runs were simulated using the 10-year LSMR Model: (1) Observed Conditions ("Observed 2005-2014"); and (2) CUP conditions ("CUP RPM-7 2005-2014"). The Observed model run simulated actual streamflow and groundwater pumping that occurred between 2005 and 2014. The CUP model run simulated future stresses that would occur under project conditions. Both simulations provided information on the occurrence of surface water in the stream channel and groundwater levels below the channel on a cell by cell basis. Each of these cells can then be associated with ARTO Segments so that simulated data can be compared to actual field observations by both location and time.

Surface flow and groundwater level output data from the 10-Year LSMR Observed Model Simulation was sorted by stream segment so it could be compared to USGS Flow at Ysidora and USGS ARTO observation of flow at specific segments. The result was a time based matrix from 2005 through 2014 that compared: location, USGS ARTO estimated flow, USGS Flow at Ysidora, simulated depth to groundwater, and simulated presence of surface water.

The results of comparing these datasets indicated that simulated depth to groundwater in Segments 4 through 8 did not offer the best degree of accuracy in determining presence of water when comparing to the USGS ARTO estimated flow at specific cells. Further investigation determined that if both simulated depth to water and presence of surface water was compared to USGS ARTO observed flow, then the accuracy of simulating historical occurrences of surface water increased. Hence, a simulated cell was determined to have water present if either the depth to water was less than 3 feet or surface water was flowing in the stream cell.

The 10-Year LSMR Model was then used to simulate future CUP conditions over the same period from 2005 to 2014 so that it could be compared to the historical simulation. Similar to the verification process of simulated historical conditions to observed conditions, the simulated presence of water was based on either the depth to water being less than 3 feet or the occurrence of surface water in the stream cell. Observed simulated data was compared to CUP simulated data for Segments 4 through 7 as shown in Figure 1. A similar graph showing a comparison of the Observed model run to the CUP model run, for Segments 4 through 8, showed that there was no impact since flow occurs continuously under both conditions at Segment 8 (Ysidora Gauge).

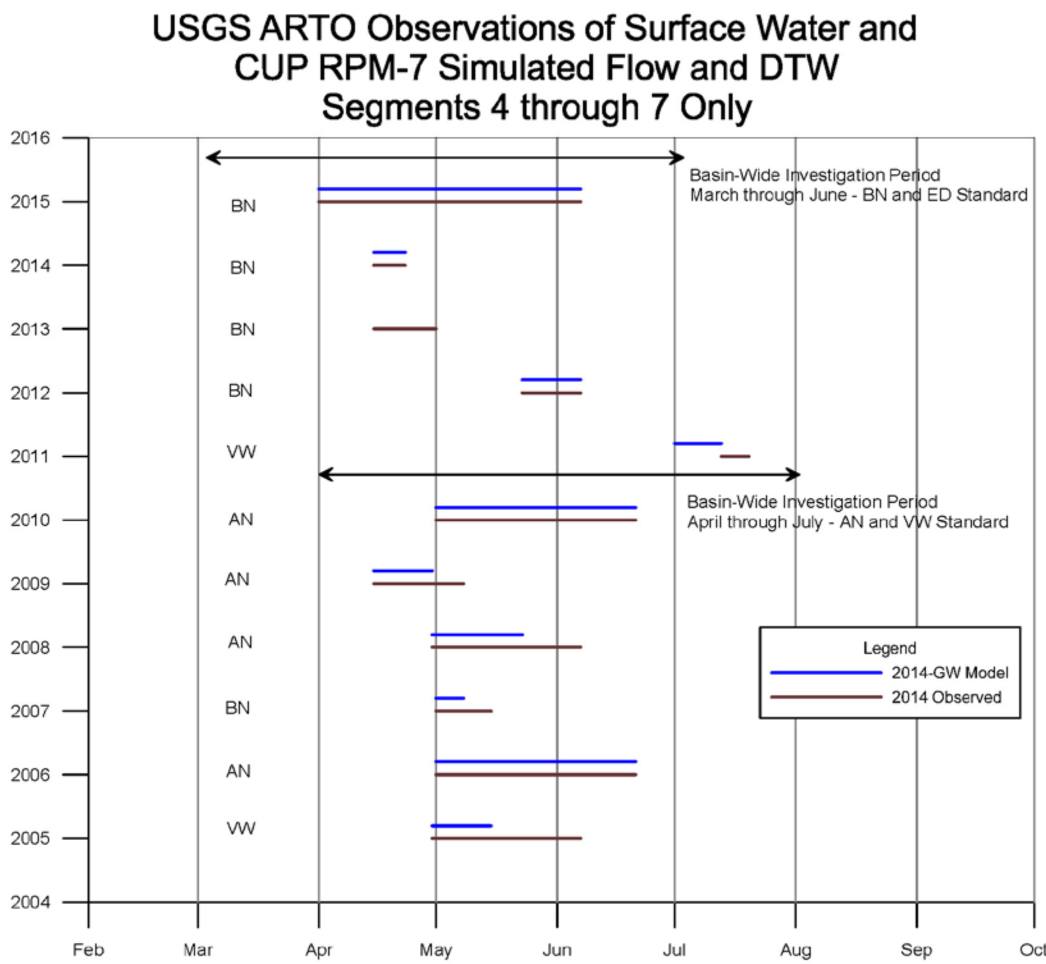

Figure 1

CUP impact in Figure 1 is shown by the difference between the blue line (CUP) and brown line (observed). The plot only reflects the observations made by USGS ARTO when surface water was present and does not identify data points when the stream was dry. The results of this analysis showed that observed observations collected by USGS indicate ARTO are finished breeding in July of Very Wet years; June of Above Normal years; and May of Below Normal years. The observed and modeled data also show that when flow was present in any of these three months, it was present in the preceding months as well. Therefore, there is no need to look at continuous data, only at the data that indicates whether surface water was present at the end of the ARTO breeding cycle, based on hydrologic condition.

Qualitative analysis during model verification (comparing simulated with observed data) indicated impacts occurred during at the following segments under differing hydrologic conditions.

- Segment 4 – 2007 BN
- Segment 5 – 2007 BN and 2009 AN
- Segment 6 – 2007 BN
- Segment 7 – 2013 BN
- Segment 8 - none
- Impacts occur during Below Normal and some Above Normal Hydrologic conditions due to a shift in the occurrence interval.
- Very Wet (2005 and 2012) and Extremely Dry (2013 and 2014) conditions not affected.

Impacts to ARTO Habitat in Segments 4 through 8

Based on the model verification for Segments 4 through 8 discussed in the previous section, an impact analysis was performed using the 154 model stream cells that align with Segments 4 through 8. The following assumptions were used to assess future CUP impacts:

- 10-year model developed (Observed and CUP Simulations)
- Actual USGS ARTO and Ysidora Flow data used to validate relationship between observed data (flow) and report presence of water (ARTO) in Segment 4 through 8.
- Analysis relied on DTW greater than 3 feet or presence of surface flow
- Presence of water in July to analyze VW
- Presence of water in June used to analyze AN

– Presence of water in May used to analyze BN and VD/ED

The simulated streamflow and depth to water for the Observed and CUP Model were compared for each of the ARTO stream segments 4 through 8 for the presence of water based on hydrologic condition (i.e., the last month during VW is July, June for AN, and May for BN or VDED). The Observed model run simulated the presence of water at the end of the last month based on hydrologic conditions 90.7% of the time. The results from the Observed 10-year model (2005-2014) were correlated with the 50-year model to assess the impact at Segments 4 to 8 during the balanced hydrologic period; the model run simulated the presence of water 76.1% of the time, with the CUP water management operations showing a 14.6% impact in Segments 4-8 (Table 1). Hence, the impact to Segment 4 through 8 are greater than the averaged simulated impacts along the full length of the Santa Margarita River below the Point of Diversion, which are 11.6%.

Table 1. Observed and CUP 10-Year LSMR Model Runs to Assess Impacts to ARTO Segments 4 - 8

Run / Operational Parameter	units	1 Observed 2005-2014	2 CUP RPM-7 2005-2014	3 CUP RPM-7 50-year
STREAMFLOW AND RECHARGE				
WY2005-2014 Observed Hydrology w CWRMA	AFY	46,160	46,160	38,300
GROUNDWATER PRODUCTION				
Historical Groundwater Pumping	AFY	6,050		
Future CPEN Demand	AFY		7,820	7,820
Conjunctive Use Project Yield	AFY		10,710	10,710
INFRASTRUCTURE				
Historical/Existing Infrastructure		✓		
CUP Diversion Structure, Ponds, Wells			✓	✓
Bypass Flows – Riparian / Steelhead	cfs	3	150/60/3	150/60/3
RIPARIAN 10-YEAR IMPACT ANALYSIS FOR USGS BIOL SEGMENTS 4-8				
WY 1952-2001 (50-Year Model) 10-yr Model Results Projected to 50-Year Model for USGSbiol Segments 4 - 8	%	*n/a*	14.6 %	*n/a*
RIPARIAN 50-YEAR IMPACT ANALYSIS				
Full Stream USGS Segments 1 - 11	%	*n/a*	*n/a*	11.6 %

APPENDIX

DESCRIPTION OF MODEL RUNS

Historical Model Run: The Historical model run includes conditions with less streamflow prior to CWRMA releases, historical groundwater production for camp supply and agriculture use, and the existing diversion structure with historical Lake O'Neill and recharge pond operations. The Historical model run also includes an average annual wastewater release of 1,400 AFY that either recharged at the oxidation ponds or discharged to the stream; this was discontinued in the early 2000s. This Historical model run simulates the changes in Base's water demand, agricultural land use, infrastructure, and management practices from WY 1952 through WY 2001.

Recent Management Model Run: The Recent Management model run incorporates the current operation of production wells and infrastructure using the 12-year period from WY 2003 through WY 2014. CWRMA releases with the existing Lake O'Neill and recharge ponds are simulated under Recent Management conditions. This model run was established to evaluate the hydrologic conditions over a 50-year balanced model period with continued management practices and the Base's water demand that exists today.

The simulated surface water and groundwater conditions for each model run are described below and used to assess impacts in Chapter 5 and 6. The Historical model run simulates actual conditions that occurred between 1952 and 2001, while the Recent model run simulates conditions that would have existed during the same 50 years if CWRMA, pumping, and other recent water management operations were in effect. Both model runs are useful for assessing impacts in the future under project conditions since they may provide a range in what may occur due to variability in well location, pumping volumes, and other water management techniques that change over time.

CUP RPM-7 Model Run (50-year): The CUP model run includes CWRMA releases and improvements in infrastructure to the diversion weir, headgate and ditch, ponds, and Lake O'Neill. The groundwater production meets both the Base's future water demand and the water delivery requirement to FPUD. This model run included an AMP that satisfied the riparian groundwater level constraint during dry conditions. Improvements to the diversion weir, headgate, and ditch result in an increase in diversion capacity from 60 cfs to 200 cfs. Recharge ponds 6 and 7, which were not previously operational, have been rehabilitated for use under the CUP to increase recharge capacity in the Upper Ysidora Sub-basin. Other improvements include additional wells to allow CPEN to pump additional groundwater during Very Wet hydrologic conditions to meet the water delivery requirements to FPUD so pumping may be curtailed during drier conditions to reduce the impact on the environment. Additionally, from consultation with the National Marine Fisheries Service (NMFS), diversion operations were modified to maximize opportunities for upstream and downstream migration of steelhead, and to preserve the natural shape of the receding limb of the storm hydrograph. The net result is a modification of diversion timing and rate, and a reduction of project yield from the original CUP model presented in the September 2015 BA.

Observed 2005-2014 Model Run: Observation-based analysis utilizes USGS ARTO data from 2005 to 2014, observed streamflow at the Ysidora (USGS) gauge, and Model Simulations to predict the presence of water in these segments. Additional model run (not a new model) that added a new parameter-observed data, modified from the existing basin-wide surface and groundwater model (LSMR).
The use of observed data by the USGS (ARTO and HYDRO) allows for validation of the 10-year model

and the ability to measure impacts under Project conditions through the AMP.

Validated against 20 transects within 4 segments. Model matched observed data in nearly all cases (99%). Stream-aquifer interaction investigation (on-going) was relied upon to tie Segments 4 through 7 to flow at the Ysidora Gauge (Segment 8). USGS ARTO data show a correlation exists between streamflow at Ysidora and flow at downstream segments.

Appendix D

Record of Non-Applicability & Air Quality Data

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UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS WEST-MARINE CORPS BASE BOX 555010
CAMP PENDLETON, CALIFORNIA 92055-5010

5090
ENV/PLN

MEMORANDUM FOR THE RECORD

From: Commanding General
To: Director, Environmental Security

Subj: RECORD OF NON-APPLICABILITY (RONA) FOR NEPA 19971002; SANTA MARGARITA RIVER CONJUNCTIVE USE PROJECT, MCB CAMP PENDLETON, DET FALLBROOK, AND COMMUNITY OF FALLBROOK, CALIFORNIA

Ref: (a) U.S. Environmental Protection Agency, Determining Conformity of General Federal Actions to State or Federal Implementation Plans; Final Rule, published in the Federal Register on 30 November 1993 (40 CFR Parts 6, 51, and 93)
(b) U.S. Environmental Protection Agency, Revisions to the General Conformity Regulations; Final Rule, published in the Federal Register on 5 April 2010(40 CFR Parts 51 and 93)
(c) OPNAVINST 5090.1C (Appendix F)

Encl: (1) Santa Margarita River Conjunctive Use Project Emissions Analysis for Clean Air Act Conformity Applicability

1. References (a), (b), and (c) provide implementing guidance for documenting Clean Air Act (CAA) Conformity Determination requirements. The General Conformity Rule applies to federal actions proposed within areas which are designated as either non-attainment or maintenance areas for a National Ambient Air Quality Standard (NAAQS) for any of the criteria pollutants.

2. The Proposed Action would occur within the San Diego Air Basin (SDAB) at DET Fallbrook and the community of Fallbrook, California, and the San Diego Air Basin (SDAB) portion of Marine Corps Base Camp Pendleton. This portion of the SDAB is currently in non-attainment of the 8-hour ozone (O_3) NAAQS and is a maintenance area for carbon monoxide (CO) NAAQS. The SDAB is in attainment of the NAAQS for all other criteria pollutants. Therefore, only project emissions of CO and O_3 (or

its precursors, volatile organic compounds [VOCs] and oxides of nitrogen [NO_x]) were analyzed for conformity rule applicability. The annual *de minimis* threshold levels for this region are 100 tons of VOC, NO_x, and CO. Federal actions may be exempt from conformity determinations if they do not exceed designated *de minimis* threshold levels.

3. An emissions analysis for the Santa Margarita River Conjunctive Use Project is presented in the enclosure. *De minimis* thresholds for applicable criteria pollutants would not be exceeded as a result of implementation of the Proposed Action and a formal Conformity Determination is not considered necessary.

4. To the best of my knowledge, the information presented in this RONA is correct and accurate, and I concur in the finding that implementation of the Proposed Action does not require a formal CAA Conformity Determination.

KEVIN J. KILLEA

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ENV

Table A-1
Santa Margarita River Conjunctive Use Project
Construction Equipment Emissions

Improvements to Existing Facilities

Replacement of Existing Sheet Pile Diversion with Inflatable Diversion Structure (Alt1, Alt2)	Fuel	HP	Load Factor	Emission Factors, g/bhp-hr									No of Equipment	Hrs/day	Months	Emissions, lbs/day									Emissions, tons/year								
Equipment				CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O				CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O
Tractors/Loaders/Backhoes	Diesel	108	55	4.07	1.19	7.16	0.007	0.654	0.582	568.3	0.108	0.680	2	8	2	8.53	2.49	15.00	0.01	1.37	1.22	1190.75	0.23	1.43	0.22	0.06	0.39	0.00	0.04	0.03	30.96	0.01	0.04
Dump Trucks	Diesel	479	57	1.82	0.57	5.55	0.006	0.295	0.263	568.3	0.051	0.527	2	8	2	17.53	5.49	53.45	0.06	2.84	2.53	5473.24	0.49	5.08	0.46	0.14	1.39	0.00	0.07	0.07	142.30	0.01	0.13
Bulldozers	Diesel	357	59	4.25	0.83	7.51	0.006	0.32	0.285	568.3	0.075	0.713	1	8	2	15.79	3.08	27.90	0.02	1.19	1.06	2111.18	0.28	2.65	0.41	0.08	0.73	0.00	0.03	0.03	54.89	0.01	0.07
Crane	Diesel	399	43	2.44	0.63	6.27	0.006	0.243	0.216	568.3	0.053	0.596	1	8	2	7.38	1.91	18.97	0.02	0.74	0.65	1719.67	0.16	1.80	0.19	0.05	0.49	0.00	0.02	0.02	44.71	0.00	0.05
Rough Terrain Forklift	Diesel	93	60	4.14	1.28	7.55	0.007	0.69	0.614	568.3	0.115	0.717	1	8	2	4.07	1.26	7.43	0.01	0.68	0.60	559.29	0.11	0.71	0.11	0.03	0.19	0.00	0.02	0.02	14.54	0.00	0.02
																53.30	**14.23**	**122.76**	**0.12**	**6.81**	**6.06**	**11054.13**	**1.27**	**11.66**	**1.39**	**0.37**	**3.19**	**0.00**	**0.18**	**0.16**	**287.41**	**0.03**	**0.30**

Improvements to O'Neill Ditch and Headgate (Alt1, Alt2)	Fuel	HP	Load Factor	Emission Factors, g/bhp-hr									No of Equipment	Hrs/day	Months	Emissions, lbs/day									Emissions, tons/year								
Equipment				CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O				CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O
Excavator	Diesel	168	57	2.19	0.59	6.15	0.006	0.229	0.204	568.3	0.053	0.584	1	8	3	3.70	1.00	10.39	0.01	0.39	0.34	959.82	0.09	0.99	0.14	0.04	0.41	0.00	0.02	0.01	37.43	0.00	0.04
Tractors/Loaders/Backhoes	Diesel	108	55	4.07	1.19	7.16	0.007	0.654	0.582	568.3	0.108	0.680	2	8	3	8.53	2.49	15.00	0.01	1.37	1.22	1190.75	0.23	1.43	0.33	0.10	0.59	0.00	0.05	0.05	46.44	0.01	0.06
Bulldozers	Diesel	357	59	4.25	0.83	7.51	0.006	0.32	0.285	568.3	0.075	0.713	1	8	3	15.79	3.08	27.90	0.02	1.19	1.06	2111.18	0.28	2.65	0.62	0.12	1.09	0.00	0.05	0.04	82.34	0.01	0.10
																28.01	**6.57**	**53.29**	**0.05**	**2.95**	**2.62**	**4261.74**	**0.59**	**5.06**	**1.09**	**0.26**	**2.08**	**0.00**	**0.11**	**0.10**	**166.21**	**0.02**	**0.20**

Improvements to Recharge Ponds 1-7 (Alt1, Alt2)	Fuel	HP	Load Factor	Emission Factors, g/bhp-hr									No of Equipment	Hrs/day	Months	Emissions, lbs/day									Emissions, tons/year								
Equipment				CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O				CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O
Excavator	Diesel	168	57	2.19	0.59	6.15	0.006	0.229	0.204	568.3	0.053	0.584	1	4	1	1.85	0.50	5.19	0.01	0.19	0.17	479.91	0.04	0.49	0.02	0.01	0.07	0.00	0.00	0.00	6.24	0.00	0.01
Tractors/Loaders/Backhoes	Diesel	108	55	4.07	1.19	7.16	0.007	0.654	0.582	568.3	0.108	0.680	1	4	1	2.13	0.62	3.75	0.00	0.34	0.30	297.69	0.06	0.36	0.03	0.01	0.05	0.00	0.00	0.00	3.87	0.00	0.00
																3.98	**1.12**	**8.94**	**0.01**	**0.54**	**0.48**	**777.60**	**0.10**	**0.85**	**0.05**	**0.01**	**0.12**	**0.00**	**0.01**	**0.01**	**10.11**	**0.00**	**0.01**

Proposed New Facilities

Production Wells and Collection System (Alt1, Alt2)	Fuel	HP	Load Factor	Emission Factors, g/bhp-hr									No of Equipment	Hrs/day	Months	Emissions, lbs/day									Emissions, tons/year								
Equipment				CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O				CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O
Drill Rig	Diesel	291	75	3.16	0.7	6.71	0.006	0.271	0.241	568.3	0.063	0.637	1	8	1.5	12.16	2.69	25.83	0.02	1.04	0.93	2187.55	0.24	2.45	0.24	0.05	0.50	0.00	0.02	0.02	42.66	0.00	0.05
Tractors/Loaders/Backhoes	Diesel	108	55	4.07	1.19	7.16	0.007	0.654	0.582	568.3	0.108	0.680	2	8	1.5	8.53	2.49	15.00	0.01	1.37	1.22	1190.75	0.23	1.43	0.17	0.05	0.29	0.00	0.03	0.02	23.22	0.00	0.03
																20.69	**5.19**	**40.83**	**0.04**	**2.41**	**2.15**	**3378.30**	**0.47**	**3.88**	**0.40**	**0.10**	**0.80**	**0.00**	**0.05**	**0.04**	**65.88**	**0.01**	**0.08**

Gallery Wells and Collection System (Alt2)	Fuel	HP	Load Factor	Emission Factors, g/bhp-hr									No of Equipment	Hrs/day	Months	Emissions, lbs/day									Emissions, tons/year								
Equipment				CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O				CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O
Drill Rig	Diesel	291	75	3.16	0.7	6.71	0.006	0.271	0.241	568.3	0.063	0.637	1	8	3	12.16	2.69	25.83	0.02	1.04	0.93	2187.55	0.24	2.45	0.47	0.11	1.01	0.00	0.04	0.04	85.31	0.01	0.10
Tractors/Loaders/Backhoes	Diesel	108	55	4.07	1.19	7.16	0.007	0.654	0.582	568.3	0.108	0.680	2	8	3	8.53	2.49	15.00	0.01	1.37	1.22	1190.75	0.23	1.43	0.33	0.10	0.59	0.00	0.05	0.05	46.44	0.01	0.06
Excavator	Diesel	168	57	2.19	0.59	6.15	0.006	0.229	0.204	568.3	0.053	0.584	1	8	3	3.70	1.00	10.39	0.01	0.39	0.34	959.82	0.09	0.99	0.14	0.04	0.41	0.00	0.02	0.01	37.43	0.00	0.04
																24.39	**6.18**	**51.22**	**0.05**	**2.80**	**2.49**	**4338.12**	**0.56**	**4.87**	**0.95**	**0.24**	**2.00**	**0.00**	**0.11**	**0.10**	**169.19**	**0.02**	**0.19**

Water Treatment Plant for FPUD (Alt1)	Fuel	HP	Load Factor	Emission Factors, g/bhp-hr									No of Equipment	Hrs/day	Months	Emissions, lbs/day									Emissions, tons/year								
Equipment				CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O				CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O
Excavators	Diesel	168	57	2.19	0.59	6.15	0.006	0.229	0.204	568.3	0.053	0.584	2	8	6	7.40	1.99	20.77	0.02	0.77	0.69	1919.63	0.18	1.97	0.58	0.16	1.62	0.00	0.06	0.05	149.73	0.01	0.15
Backhoe	Diesel	108	55	4.07	1.19	7.16	0.007	0.654	0.582	568.3	0.108	0.680	2	8	6	8.53	2.49	15.00	0.01	1.37	1.22	1190.75	0.23	1.43	0.67	0.19	1.17	0.00	0.11	0.10	92.88	0.02	0.11
Loaders	Diesel	108	55	4.07	1.19	7.16	0.007	0.654	0.582	568.3	0.108	0.680	2	8	6	8.53	2.49	15.00	0.01	1.37	1.22	1190.75	0.23	1.43	0.67	0.19	1.17	0.00	0.11	0.10	92.88	0.02	0.11
Dump Trucks	Diesel	479	57	1.82	0.57	5.55	0.006	0.295	0.263	568.3	0.051	0.527	2	8	6	17.53	5.49	53.45	0.06	2.84	2.53	5473.24	0.49	5.08	1.37	0.43	4.17	0.00	0.22	0.20	426.91	0.04	0.40
Crane	Diesel	399	43	2.44	0.63	6.27	0.006	0.243	0.216	568.3	0.053	0.596	1	8	6	7.38	1.91	18.97	0.02	0.74	0.65	1719.67	0.16	1.80	0.58	0.15	1.48	0.00	0.06	0.05	134.13	0.01	0.14
Bobcat	Diesel	44	55	6.07	2.25	5.68	0.007	0.578	0.514	568.3	0.203	0.540	1	8	6	2.59	0.96	2.42	0.00	0.25	0.22	242.56	0.09	0.23	0.20	0.07	0.19	0.00	0.02	0.02	18.92	0.01	0.02
Compactor	Diesel	8	43	3.47	0.68	4.33	0.009	0.274	0.244	568.3	0.061	0.411	1	8	6	0.21	0.04	0.26	0.00	0.02	0.01	34.48	0.00	0.02	0.02	0.00	0.02	0.00	0.00	0.00	2.69	0.00	0.00
Compressor	Diesel	106	48	4.08	1.32	7.76	0.007	0.686	0.611	568.3	0.119	0.737	1	8	6	3.66	1.18	6.96	0.01	0.62	0.55	509.98	0.11	0.66	0.29	0.09	0.54	0.00	0.05	0.04	39.78	0.01	0.05
Welder	Diesel	45	45	6.72	2.86	6.06	0.007	0.662	0.589	568.3	0.258	0.576	1	8	6	2.40	1.02	2.16	0.00	0.24	0.21	202.97	0.09	0.21	0.19	0.08	0.17	0.00	0.02	0.02	15.83	0.01	0.02
Wackers	Diesel	16	38	2.35	0.71	4.64	0.007	0.274	0.244	568.3	0.064	0.441	1	8	6	0.25	0.08	0.50	0.00	0.03	0.03	60.94	0.01	0.05	0.02	0.01	0.04	0.00	0.00	0.00	4.75	0.00	0.00
Paver	Diesel	100	62	4.4	1.5	8.75	0.007	0.759	0.676	568.3	0.135	0.831	1	8	6	4.81	1.64	9.57	0.01	0.83	0.74	621.44	0.15	0.91	0.38	0.13	0.75	0.00	0.06	0.06	48.47	0.01	0.07
																63.29	**19.30**	**145.08**	**0.15**	**9.07**	**8.07**	**13166.41**	**1.73**	**13.78**	**4.94**	**1.51**	**11.32**	**0.01**	**0.71**	**0.63**	**1026.98**	**0.13**	**1.08**

Expand Existing Water Treatment Plant and New Surface WTP at Haybam Canyon (Alt2)	Fuel	HP	Load Factor	Emission Factors, g/bhp-hr									No of Equipment	Hrs/day	Months	Emissions, lbs/day									Emissions, tons/year								
Equipment				CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O				CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O
Excavators	Diesel	168	57	2.19	0.59	6.15	0.006	0.229	0.2038	568.3	0.053	0.584	2	8	6	7.40	1.99	20.77	0.02	0.77	0.69	1919.63	0.18	1.97	0.58	0.16	1.62	0.00	0.06	0.05	149.73	0.01	0.15
Backhoe	Diesel	108	55	4.07	1.19	7.16	0.007	0.654	0.5821	568.3	0.108	0.680	2	8	6	8.53	2.49	15.00	0.01	1.37	1.22	1190.75	0.23	1.43	0.67	0.19	1.17	0.00	0.11	0.10	92.88	0.02	0.11
Loaders	Diesel	108	55	4.07	1.19	7.16	0.007	0.654	0.5821	568.3	0.108	0.680	2	8	6	8.53	2.49	15.00	0.01	1.37	1.22	1190.75	0.23	1.43	0.67	0.19	1.17	0.00	0.11	0.10	92.88	0.02	0.11
Dump Trucks	Diesel	479	57	1.82	0.57	5.55	0.006	0.295	0.2626	568.3	0.051	0.527	2	8	6	17.53	5.49	53.45	0.06	2.84	2.53	5473.24	0.49	5.08	1.37	0.43	4.17	0.00	0.22	0.20	426.91	0.04	0.40
Crane	Diesel	399	43	2.44	0.63	6.27	0.006	0.243	0.2163	568.3	0.053	0.596	1	8	6	7.38	1.91	18.97	0.02	0.74	0.65	1719.67	0.16	1.80	0.58	0.15	1.48	0.00	0.06	0.05	134.13	0.01	0.14
Bobcat	Diesel	44	55	6.07	2.25	5.68	0.007	0.578	0.5144	568.3	0.203	0.540	1	8	6	2.59	0.96	2.42	0.00	0.25	0.22	242.56	0.09	0.23	0.20	0.07	0.19	0.00	0.02	0.02	18.92	0.01	0.02
Compactor	Diesel	8	43	3.47	0.68	4.33	0.009	0.274	0.2439	568.3	0.061	0.411	1	8	6	0.21	0.04	0.26	0.00	0.02	0.01	34.48	0.00	0.02	0.02	0.00	0.02	0.00	0.00	0.00	2.69	0.00	0.00
Compressor	Diesel	106	48	4.08	1.32	7.76	0.007	0.686	0.6105	568.3	0.119	0.737	1	8	6	3.66	1.18	6.96	0.01	0.62	0.55	509.98	0.11	0.66	0.29	0.09	0.54	0.00	0.05	0.04	39.78	0.01	0.05
Welder	Diesel	45	45	6.72	2.86	6.06	0.007	0.662	0.5892	568.3	0.258	0.576	1	8	6	2.40	1.02	2.16	0.00	0.24	0.21	202.97	0.09	0.21	0.19	0.08	0.17	0.00	0.02	0.02	15.83	0.01	0.02
Wackers	Diesel	16	38	2.35	0.71	4.64	0.007	0.274	0.2439	568.3	0.064	0.441	1	8	6	0.25	0.08	0.50	0.00	0.03	0.03	60.94	0.01	0.05	0.02	0.01	0.04	0.00	0.00	0.00	4.75	0.00	0.00
Paver	Diesel	100	62	4.4	1.5	8.75	0.007	0.759	0.6755	568.3	0.135	0.831	1	8	6	4.81	1.64	9.57	0.01	0.83	0.74	621.44	0.15	0.91	0.38	0.13	0.75	0.00	0.06	0.06	48.47	0.01	0.07
																63.29	**19.30**	**145.08**	**0.15**	**9.07**	**8.07**	**13166.41**	**1.73**	**13.78**	**4.94**	**1.51**	**11.32**	**0.01**	**0.71**	**0.63**	**1026.98**	**0.13**	**1.08**

Water Conveyance/Distribution System to Red Mountain Reservoir (Alt1)	Fuel	HP	Load Factor	Emission Factors, g/bhp-hr									No of Equipment	Hrs/day	Months	Emissions, lbs/day									Emissions, tons/year								
Equipment				CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O				CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O
Rough Terrain Forklift	Diesel	93	60	4.14	1.28	7.55	0.007	0.69	0.614	568.3	0.115	0.717	2	8	3	8.15	2.52	14.86	0.01	1.36	1.21	1118.58	0.23	1.41	0.32	0.10	0.58	0.00	0.05	0.05	43.62	0.01	0.06
Excavators	Diesel	168	57	2.19	0.59	6.15	0.006	0.229	0.204	568.3	0.053	0.584	4	8	3	14.79	3.99	41.55	0.04	1.55	1.38	3839.27	0.36	3.95	0.58	0.16	1.62	0.00	0.06	0.05	149.73	0.01	0.15
Trencher	Diesel	63	75	4.35	1.47	8.72	0.007	0.734	0.653	568.3	0.133	0.828	1	8	3	3.63	1.23	7.27	0.01	0.61	0.54	473.59	0.11	0.69	0.14	0.05	0.28	0.00	0.02	0.02	18.47	0.00	0.03
Compactor	Diesel	8	43	3.47	0.68	4.33	0.009	0.274	0.244	568.3	0.061	0.411	2	8	3	0.42	0.08	0.53	0.00	0.03	0.03	68.96	0.01	0.05	0.02	0.00	0.02	0.00	0.00	0.00	2.69	0.00	0.00
Backhoe	Diesel	108	55	4.07	1.19	7.16	0.007	0.654	0.582	568.3	0.108	0.680	1	8	2	4.26	1.25	7.50	0.01	0.69	0.61	595.38	0.11	0.71	0.11	0.03	0.20	0.00	0.02	0.02	15.48	0.00	0.02
Loaders	Diesel	108	55	4.07	1.19	7.16	0.007	0.654	0.582	568.3	0.108	0.680	1	8	2	4.26	1.25	7.50	0.01	0.69	0.61	595.38	0.11	0.71	0.11	0.03	0.20	0.00	0.02	0.02	15.48	0.00	0.02
Dump Trucks	Diesel	479	57	1.82	0.57	5.55	0.006	0.295	0.263	568.3	0.051	0.527	1	8	2	8.76	2.74	26.73	0.03	1.42	1.26	2736.62	0.25	2.54	0.23	0.07	0.69	0.00	0.04	0.03	71.15	0.01	0.07
Crane	Diesel	399	43	2.44	0.63	6.27	0.006	0.243	0.216	568.3	0.053	0.596	1	8	2	7.38	1.91	18.97	0.02	0.74	0.65	1719.67	0.16	1.80	0.19	0.05	0.49	0.00	0.02	0.02	44.71	0.00	0.05
Paver	Diesel	100	62	4.4	1.5	8.75	0.007	0.759	0.676	568.3	0.135	0.831	1	8	2	4.81	1.64	9.57	0.01	0.83	0.74	621.44	0.15	0.91	0.13	0.04	0.25	0.00	0.02	0.02	16.16	0.00	0.02
																56.48	**16.60**	**134.47**	**0.13**	**7.91**	**7.04**	**11768.88**	**1.48**	**12.77**	**1.82**	**0.53**	**4.33**	**0.00**	**0.25**	**0.22**	**377.50**	**0.05**	**0.41**

Water Conveyance/Distribution System to Gheen Zone (Alt2)	Fuel	HP	Load Factor	Emission Factors, g/bhp-hr									No of Equipment	Hrs/day	Months	Emissions, lbs/day									Emissions, tons/year								
Equipment				CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O				CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O
Rough Terrain Forklift	Diesel	93	60	4.14	1.28	7.55	0.007	0.69	0.614	568.3	0.115	0.717	2	8	3	8.15	2.52	14.86	0.01	1.36	1.21	1118.58	0.23	1.41	0.32	0.10	0.58	0.00	0.05	0.05	43.62	0.01	0.06
Excavators	Diesel	168	57	2.19	0.59	6.15	0.006	0.229	0.204	568.3	0.053	0.584	4	8	3	14.79	3.99	41.55	0.04	1.55	1.38	3839.27	0.36	3.95	0.58	0.16	1.62	0.00	0.06	0.05	149.73	0.01	0.15
Trencher	Diesel	63	75	4.35	1.47	8.72	0.007	0.734	0.653	568.3	0.133	0.828	1	8	3	3.63	1.23	7.27	0.01	0.61	0.54	473.59	0.11	0.69	0.14	0.05	0.28	0.00	0.02	0.02	18.47	0.00	0.03
Compactor	Diesel	8	43	3.47	0.68	4.33	0.009	0.274	0.244	568.3	0.061	0.411	2	8	3	0.42	0.08	0.53	0.00	0.03	0.03	68.96	0.01	0.05	0.02	0.00	0.02	0.00	0.00	0.00	2.69	0.00	0.00
Backhoe	Diesel	108	55	4.07	1.19	7.16	0.007	0.654	0.582	568.3	0.108	0.680	1	8	2	4.26	1.25	7.50	0.01	0.69	0.61	595.38	0.11	0.71	0.11	0.03	0.20	0.00	0.02	0.02	15.48	0.00	0.02
Loaders	Diesel	108	55	4.07	1.19	7.16	0.007	0.654	0.582	568.3	0.108	0.680	1	8	2	4.26	1.25	7.50	0.01	0.69	0.61	595.38	0.11	0.71	0.11	0.03	0.20	0.00	0.02	0.02	15.48	0.00	0.02
Dump Trucks	Diesel	479	57	1.82	0.57	5.55	0.006	0.295	0.263	568.3	0.051	0.527	1	8	2	8.76	2.74	26.73	0.03	1.42	1.26	2736.62	0.25	2.54	0.23	0.07	0.69	0.00	0.04	0.03	71.15	0.01	0.07
Crane	Diesel	399	43	2.44	0.63	6.27	0.006	0.243	0.216	568.3	0.053	0.596	1	8	2	7.38	1.91	18.97	0.02	0.74	0.65	1719.67	0.16	1.80	0.19	0.05	0.49	0.00	0.02	0.02	44.71	0.00	0.05
Paver	Diesel	100	62	4.4	1.5	8.75	0.007	0.759	0.676	568.3	0.135	0.831	1	8	2	4.81	1.64	9.57	0.01	0.83	0.74	621.44	0.15	0.91	0.13	0.04	0.25	0.00	0.02	0.02	16.16	0.00	0.02
																56.48	**16.60**	**134.47**	**0.13**	**7.91**	**7.04**	**11768.88**	**1.48**	**12.77**	**1.82**	**0.53**	**4.33**	**0.00**	**0.25**	**0.22**	**377.50**	**0.05**	**0.41**

Alternative Totals

Table A-2
Santa Margarita River Conjunctive Use Project
Construction Truck Emissions

Vehicle Class	No. of Trucks Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	CO Running Exhaust (g/mi)	NO_X Running Exhaust (g/mi)	VOC Running Exhaust (g/mi)	SOx Running Exhaust (g/mi)	PM10 Running Exhaust (g/mi)	PM10 Tire Wear (g/mi)	PM10 Brake Wear (g/mi)	PM2.5 Running Exhaust (g/mi)	PM2.5 Tire Wear (g/mi)	PM2.5 Brake Wear (g/mi)	CO2 Running Exhaust (g/mi)	CH4 Running Exhaust (g/mi)
Heavy-duty truck	15	27	40	6.303	17.209	1.262	0.019	0.713	0.036	0.028	0.656	0.009	0.012	1992.7	0.059

Emissions, lbs/day							
CO	NOx	VOCs	SOx	PM10	PM2.5	CO2	CH4
8.34	**22.76**	**1.67**	**0.03**	**1.03**	**0.90**	**2635.9**	**0.08**

Emissions, tons/year							
CO	NOx	VOCs	SOx	PM10	PM2.5	CO2	CH4
1.04	**2.85**	**0.21**	**0.00**	**0.13**	**0.11**	**329.48**	**0.01**

Emission Factors from EMFAC2007, Year 2009, 60 F, 27 mph

Unpaved Road Emissions		PM10	PM2.5
E = k(s/12)^a(W/3)^b	k	1.5	0.15
Assume s = 8.5	a	0.9	0.9
Assume W = 10	b	0.45	0.45
Assume 5 miles of travel per vehicle per day			
Emission Factor		1.8906	0.1891
Control Efficiency		61%	61%
Emissions, lbs/day		55.30	5.53
Emissions, tons/year		6.91	0.69

Table A-3
Santa Margarita River Conjunctive Use Project
Worker Vehicle Emissions

Construction Phase	Vehicle Class	No. of Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	CO Running Exhaust (g/mi)	CO Start-Up (g/start)[a]	NO_X Running Exhaust (g/mi)	NO_X Start-Up (g/start)[a]	VOCs Running Exhaust (g/mi)	VOCs Start-Up (g/start)[a]	VOCs Hot-Soak (g/trip)	VOCs Resting Loss (g/hr)	VOCs Running Evaporative (g/mi)	VOCs Diurnal Evaporative (g/hr)	SOx Running Exhaust (g/mi)	SOx Start-Up (g/start)[a]	PM10 Running Exhaust (g/mi)	PM10 Start-Up (g/start)[a]	PM10 Tire Wear (g/mi)	PM10 Brake Wear (g/mi)	PM2.5 Running Exhaust (g/mi)	PM2.5 Start-Up (g/start)[a]	PM2.5 Tire Wear (g/mi)	PM2.5 Brake Wear (g/mi)	CO2 Running Exhaust (g/mi)	CO2 Start-Up (g/start)[a]	CH4 Running Exhaust (g/mi)	CH4 Start-Up (g/start)[a]
All	Light-duty truck, catalyst	50	33	40	2.924	11.289	0.284	0.56	0.055	0.816	0.183	0.024	0.047	0.054	0.004	0.002	0.013	0.016	0.008	0.013	0.011	0.014	0.002	0.005	399.538	203.967	0.027	0.046

Emissions, lbs/day

CO	NOx	VOCs	SOx	PM10	PM2.5	CO2	CH4
14.14	1.31	0.65	0.02	0.15	0.08	1784.15	0.12

Emissions, tons/year

CO	NOx	VOCs	SOx	PM10	PM2.5	CO2	CH4
1.77	0.16	0.08	0.00	0.02	0.01	223.02	0.02
						26.76	0.0019

Assume startup after 8 hours
Assume 45 minutes run
2009 Emission Factors

Table A-4
Santa Margarita River Conjunctive Use Project
Operational Maintenance Activities
Heavy Equipment Emissions

Operational Maintenance Activities

Maintenance Recharge Ponds 1-7 (Alt1, Alt2)	Fuel	HP	Load Factor	Emission Factors, g/bhp-hr									No of Equipment	Hrs/day	Months
Equipment				CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O			
Excavator	Diesel	168	57	2.19	0.59	6.15	0.006	0.229	0.204	568.3	0.053	0.584	1	4	1
Tractors/Loaders/Backhoes	Diesel	108	55	4.07	1.19	7.16	0.007	0.654	0.582	568.3	0.108	0.680	1	4	1

Maintenance Recharge Ponds 1-7 (Alt1, Alt2)	Emissions, lbs/day									Emissions, tons/year								
Equipment	CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	CO	VOC	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O
Excavator	1.85	0.50	5.19	0.01	0.19	0.17	479.91	0.04	0.49	0.02	0.01	0.07	0.00	0.00	0.00	6.24	0.00	0.01
Tractors/Loaders/Backhoes	2.13	0.62	3.75	0.00	0.34	0.30	297.69	0.06	0.36	0.03	0.01	0.05	0.00	0.00	0.00	3.87	0.00	0.00
	3.98	**1.12**	**8.94**	**0.01**	**0.54**	**0.48**	**777.60**	**0.10**	**0.85**	**0.05**	**0.01**	**0.12**	**0.00**	**0.01**	**0.01**	**10.11**	**0.00**	**0.01**

Table A-5
Santa Margarita River Conjunctive Use Project
Operational Maintenance Truck Emissions

Vehicle Class	No. of Trucks Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	CO Running Exhaust (g/mi)	NO_X Running Exhaust (g/mi)	VOC Running Exhaust (g/mi)	SOx Running Exhaust (g/mi)	PM10 Running Exhaust (g/mi)	PM10 Tire Wear (g/mi)	PM10 Brake Wear (g/mi)	PM2.5 Running Exhaust (g/mi)	PM2.5 Tire Wear (g/mi)	PM2.5 Brake Wear (g/mi)	CO2 Running Exhaust (g/mi)	CH4 Running Exhaust (g/mi)	Emissions, lbs/day CO	Emissions, lbs/day NOx	Emissions, lbs/day VOCs	Emissions, lbs/day SOx	Emissions, lbs/day PM10	Emissions, lbs/day PM2.5	Emissions, lbs/day CO2	Emissions, lbs/day CH4
Heavy-duty truck	15	27	40	6.303	17.209	1.262	0.019	0.713	0.036	0.028	0.656	0.009	0.012	1992.669	0.059	**8.34**	**22.76**	**1.67**	**0.03**	**1.03**	**0.90**	**2635.86**	**0.08**

Emissions, tons/year							
CO	NOx	VOCs	SOx	PM10	PM2.5	CO2	CH4
0.13	**0.34**	**0.03**	**0.00**	**0.02**	**0.01**	**39.54**	**0.00**

Emission Factors from EMFAC2007, Year 2009, 60 F, 27 mph

Unpaved Road Emissions		PM10	PM2.5
E = k(s/12)^a(W/3)^b	k	1.5	0.15
Assume s = 8.5	a	0.9	0.9
Assume W = 10	b	0.45	0.45
Assume 5 miles of travel per vehicle per day			
Emission Factor		1.890604	0.18906
Control Efficiency		61%	61%
Emissions, lbs/day		55.30017	5.530017
Emissions, tons/year		0.829503	0.08295

Table A-6
Santa Margarita River Conjunctive Use Project
Operational Worker Vehicle Emissions

		No. of Workers	Speed	VMT	CO		NO_X		VOCs						SOx		PM10				PM2.5				CO2		CH4		Emissions, lbs/day							
Construction Phase	Vehicle Class	Per Construction Phase	(mph)	(mi/vehicle-day)	Running Exhaust (g/mi)	Start-Up (g/start)[a]	Running Exhaust (g/mi)	Start-Up (g/start)[a]	Running Exhaust (g/mi)	Start-Up (g/start)[a]	Hot-Soak (g/trip)	Resting Loss (g/hr)	Running Evaporative (g/mi)	Diurnal Evaporative (g/hr)	Running Exhaust (g/mi)	Start-Up (g/start)[a]	Running Exhaust (g/mi)	Start-Up (g/start)[a]	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Start-Up (g/start)[a]	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Start-Up (g/start)[a]	Running Exhaust (g/mi)	Start-Up (g/start)[a]	CO	NOx	VOCs	SOx	PM10	PM2.5	CO2	CH4
Maintenance	Light-duty truck, catalyst	50	33	40	2.924	11.289	0.284	0.56	0.055	0.816	0.183	0.024	0.047	0.054	0.004	0.002	0.013	0.016	0.008	0.013	0.011	0.014	0.002	0.005	399.538	203.967	0.027	0.046	14.14	1.31	0.65	0.02	0.15	0.08	1784.15	0.12

Assume startup after 8 hours
Assume 45 minutes run time
2009 Emission Factors from

Emissions, tons/year							
CO	NOx	VOCs	SOx	PM10	PM2.5	CO2	CH4
0.21	0.02	0.01	0.00	0.00	0.00	26.76	0.00

Appendix E

Agency Correspondence

Appendix E

Agency Correspondence

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September 19, 2013

Reply in Reference To: USMC_2013_0322_001

Danielle Page
Head, Cultural Resource Management Branch
Assistant Chief of Staff, Environmental Security
United States Marine Corps
Box 555010
Camp Pendleton, CA 92055-5010

Re: Santa Margarita River Conjunctive Use Project (your 5090, ENV/CRS, February 13, 2013)

Dear Ms. Page:

Thank you for requesting my comments on the above cited undertaking in accordance with Section 106 of the *National Historic Preservation Act of 1966* (16 U.S.C. 470f), as amended, and its implementing regulation found at 36 CFR Part 800. The Santa Margarita River Conjunctive Use Project (SMR CUP) is a joint effort involving the Marine Corps Base Camp Pendleton (MCB Camp Pendleton), Bureau of Reclamation (BUR), and Fallbrook Public Utilities District (FPUD).

The purposes of the SMR CUP are to help meet the water demands of FPUD and MCB Camp Pendleton, to reduce dependence on imported water while maintaining watershed resources, and to improve water supply reliability by managing the yield of the lower Santa Margarita River basin, and perfecting the water rights permits that were assigned to the BUR in 1974. The SMR CUP includes some or all of the following components, which are configured differently for Action Alternatives 1 and Action Alternatives 2:

(1) Replacement of the existing diversion structure on the SMR;
(2) Improvements to O'Neill Ditch and headgate;
(3) Improvements to existing storage and recharge ponds;
(4) Installation of new production wells, gallery wells, and associated collection system infrastructure;
(5) Construction or expansion of water treatment facilities;
(6) Construction of pumping plants and a bi-directional pipeline; and
(7) Establishment of an open space management zone (OSMZ).

Action Alternatives 1 and 2 have the same general construction methods. New facilities associated with the project would be located in roadways, existing rights-of-way, and other disturbed areas as much as possible to minimize impacts to cultural resources. The direct impact areas for proposed new facilities (e.g., pump stations, groundwater production wells, and treatment facilities) would include the following: a 30-feet perimeter for parking/facility access, a fence surrounding the facility at the edge of the 30-feet perimeter, and 10-feet wide firebreak outside and surrounding the fence line. Construction related activities and temporary disturbance may also occur within a 50-feet wide buffer around these areas. During construction, existing roads would be used to provide access from public streets to staging areas, laydown and storage areas, and work zones. The staging, laydown, and storage areas would include heavy use recreation areas with a high percentage of bare ground, areas that are currently paved or otherwise disturbed, and road shoulders.

A pedestrian survey of the SMR CUP area was conducted by ASM Affiliates during January 21-30, 2009 and they also conducted a Phase I cultural resources survey of the area in March of 2009. ASM personnel also conducted an investigation of the historic Martin Reservoir at that time. A second survey was conducted by ASM on March 21, 2012 to address changes in the design of the SMR CUP. The survey work completed by ASM personnel covered the locations identified for both SMR CUP action alternatives. The ASM surveys covered a total of 766 acres of the SMR Basin from the Marine Corps Air Station to O'Neill Lake, a 0.34 mile by 100 feet linear stretch of the OSMZ, and the historic Martin Reservoir near the City of Fallbrook. The surveys resulted in the identification of 27 cultural resources within the SMR CUP area, and those resources are summarized in Enclosure 1.

Of the 27 cultural resources identified by MCB Camp Pendleton, it has determined that seven (7) are eligible for listing on the National Register of Historic Places (NRHP), while the remaining 20 are ineligible for listing. After applying the criteria of adverse effect for the SMR CUP, MCB Camp Pendleton has imposed the following conditions to ensure that the proposed undertaking will not directly or indirectly alter the qualifying characteristics of the seven (7) eligible cultural resources (i.e., CA-SDI-10156/12599H, CA-SDI-4421, CA-SDI-12577, CA-SDI-13938, CA-SDI-13985, CA-SDI-13991, and CA-SDI-14005H [segment B]):

1. Avoidance of all historic properties identified within the APE;

2. Archaeological and Native American monitoring of all ground disturbing activities within the APE near historic properties, archaeological sites, or for any drilling or trenching operations within the SMR floodplain;

3. The development of an archaeological monitoring and discovery plan for the SMR CUP;

4. The development of a monitoring and discovery plan (reviewed and approved by the Cultural Resources Section) that will be implemented through a contract independent from the construction contract to ensure that ground disturbing activities within vicinity of any identified cultural resource are properly monitored;

5. Establish a 50 foot buffer of all NRHP eligible resources by a qualified archaeologist and Native American monitor to ensure that the proposed undertaking will not directly or indirectly alter the qualifying characteristics of any NRHP-eligible property;

6. The qualified archaeologist and Native American monitor will be approved by the Cultural Resources Section two weeks prior to the start of ground disturbing activities;

7. The qualified archaeologist is to contact the Cultural Resources Section one week prior to the start of ground disturbing activities; and

8. The submittal of a monitoring report upon completion of the project for review and approval by the Cultural Resources Section, prior to submittal of that report with the California SHPO.

With the imposed conditions listed above, MCB Camp Pendleton has determined that a finding of "No Adverse Effect" for the SMR CUP is appropriate, subject to 36 CFR 800.5(b). MCB Camp Pendleton also requested us to concur with or comment on the following determinations:

1. The following two sites are considered to be eligible for listing on the NRHP (pending completion of a formal evaluation) – CA-SDI-4421 and CA-SDI-13991;

2. The following nine sites have been determined to be ineligible for listing on the NRHP: CA-SDI-10157, CA-SDI-12628, CA-SDI-13942H, CA-SDI-13984, CA-SDI-13987, CA-SDI-13990, CA-SDI-15126, CA-SDI-14381, and Martin Reservoir.

3. For CA-SDI-10158, the Southern portion of Locus G2 has been determined to a non-contributing element of that site.

After reviewing your letter of March 13, 2013, I have the following comments:

1) In your letter, you state that you believe CA-SDI-4421 and CA-SDI-13991 to be eligible for listing on the NRHP pending completion of a formal evaluation. I recommend that you treat both sites as being eligible for the purposes of the SMR CUP and ensure that those sites are not affected, either directly or indirectly, by activities associated with the proposed undertaking;

2) I concur with your determination that the nine sites identified above are ineligible for listing on the NRHP;

3) I concur with your determination that for CA-SDI-10158, the Southern portion of Locus G2 is a non-contributing element of that site;

4) A report detailing the monitoring results will be provided to this office upon the conclusion of construction related ground disturbance. I look forward to receiving that report.

5) In your letter, you stated that you are consulting with six federally and one non-federally recognized tribal governments, and has notified the public through contacts with the San Diego Archaeological Society in regards to the proposed undertaking.

6) If you agree to assume eligibility for the purposes of this undertaking for CA-SDI-4421 and CA-SDI-13991, and conduct the proposed undertaking in accordance with the conditions described above, then I concur that pursuant to 36 CFR Part 800.5(b), a Finding of No Adverse Effect is appropriate for the SMR CUP; and

7) Please be advised that under certain circumstances, such as an unanticipated discovery or a change in project description, you may have future responsibilities for this proposed undertaking under 36 CFR Part 800.

Thank you for seeking my comments and considering historic properties as part of your project planning. If you have any questions or concerns, please contact either of the following members of my staff: Ed Carroll at (916) 445-7006 or at e-mail at Ed.Carroll@parks.ca.gov or Duane Marti at (916) 445-7030 or at email at Duane.Marti@parks.ca.gov.

Sincerely,

Carol Roland-Nawi, Ph.D.

Carol Roland-Nawi, Ph.D.
State Historic Preservation Officer

Cultural Resources Located Within the SMR CUP area

Site Identification	Description of Resource	USMC's determination of eligibility for NRHP	OHP's comments and/or concurrence
CP SMR CUP 1	A historic culvert that is part of a water conveyance system associated with the percolation ponds just west of Lake O'Neill. Culvert is approximately 30 feet long, 0.18 feet wide, and with a maximum height of 17 feet. The culvert is constructed with cinder blocks and two drainage pipes of heavy corrugated metal	Ineligible	Concurred with determination of ineligible on 09/14/2010 (USMC100224A).
CP SMR CUP 2	A historic culvert that is part of a water conveyance system associated with the percolation ponds just west of Lake O'Neill. Culvert is approximately 13 feet by 18 feet, with a height of 7 feet. The culvert is constructed with cinder blocks and a single 3-feet diameter pipe of heavy corrugated metal.	Ineligible	Concurred with determination of ineligible on 09/14/2010 (USMC100224A).
CP SMR CUP 3	A historic culvert that is part of a water conveyance system associated with the percolation ponds just west of Lake O'Neill. Culvert is approximately 60 feet by 10 feet, with a height of 9 feet. The north and south ends of the culvert features a corrugated metal pipe extending into the canal.	Ineligible	Concurred with determination of ineligible on 09/14/2010 (USMC100224A).
CP SMR CUP 4 (O'Neill Ditch)	A historic culvert that is part of a water conveyance system associated with the percolation ponds just west of Lake O'Neill. The culvert is a 1.4 kilometer long earthen ditch that extended from CP SMR CUP 2 southward to the Lake O'Neill Dam. The ditch varies between 4 and 6 meters in width and is approximately 2 meters deep.	Ineligible	Concurred with determination of ineligible on 09/14/2010 (USMC100224A).
CA-SDI-4421	Located along the Santa Margarita River (SMR), the site was recorded originally in 1975 as a bedrock milling site and consisted of a cluster of flat bedrock outcrops with 38 mortars, 20 basins, and 2 isolated slicks. The site was revisited in 1995, but was inaccessible because it was inundated by the SMR. Revisited on March 30, 2011 and it was noted that the bedrock milling had been affected by erosion associated with the rise and fall of the SMR.	The site has not been evaluated formally for NRHP eligibility. USMC considers the site to be eligible pending completion of a formal evaluation.	In the current letter, USMC requested OHP to comment on the status of the site.

Site Identification	Description of Resource	USMC's determination of eligibility for NRHP	OHP's comments and/or concurrence
CA-SDI-10157	Located on the SMR flood plain, the site was recorded in 1984 as a sparse shell scatter that may be associated with the historic village of *Topomai* (CA-SDI-10156/12599). The site is 70 meters by 30 meters and consists of *chione* and *donax* shell. No additional artifacts were found within the site area. The site was tested in 1995 and only a small amount of surface artifacts were found and no subsurface features or deposits were encountered during the test excavations.	Based on the results of the testing, it was determined to be ineligible.	In the current letter, USMC requested OHP to concur with the determination of ineligible.
CA-SDI-10156 and CA-SDI-12599H	This site is located on the SMR floodplain, approximately 2.2 kilometers southwest of O'Neill Lake. It consists of both the prehistoric/ethnohistoric Luiseño village of *Topomai* (CA-SDI-10156) and the historic Santa Margarita Ranch Complex (CA-SDI-12599H).	Eligible	Concurred with determination of eligible on 04/22/2010 (USMC100209B).
CA-SDI-12570	The site is located on a terrace edge on the north side of the SMR and west of a seasonal drainage. Site was recorded originally in 1992 as a very small temporary camp. Site was revisited in 1995, but could not be relocated. Site was revisited in 2001 and identified as a low-density flake scatter. Site was tested in 2009, and based on the testing; it was determined to be ineligible.	Ineligible	Concurred with determination of ineligible on 04/22/2010 (USMC100209B).
CA-SDI-12571	The site is located on a small knoll approximately 800 meters west of the SMR. The site was recorded originally in 1992 and described as an artifact scatter containing a core, a unifacial cobble tool, 3 pieces of debitage, and fire affected rock (FAR). It was noted that a road traversed the site and minor grading had resulted possibly in the destruction and displacement of portions of the site. In 2009 and 2011, the site was revisited and the surveyors were unable to locate any of the previously identified artifacts in the site area.	Ineligible	Concurred with determination of ineligible on 04/22/2010 (USMC100209B).

Site Identification	Description of Resource	USMC's determination of eligibility for NRHP	OHP's comments and/or concurrence
CA-SDI-12577	The site is located on the northeast side of the Ysidora Basin on a low graded area. The site was recorded originally in 1992 as a dense artifact scatter with a disturbed, but intact subsurface component. It was tested in 1995 and based on the artifacts recovered and radiocarbon dating, determined to be an Early Archaic site.	Eligible	Concurred with determination of eligible on 03/03/1997 (USMC961217A).
CA-SDI-12628	a) The site is located on the margin of an alluvial flood plain north a road and immediately south of the SMR. The site was recorded originally in 1992 as a large shell midden with a small amount of cultural material, possibly representing a habitation site. Was tested in 1995 and three loci (A, B, and C) were identified. Site was determined to be eligible. b) Site was tested and excavated again in 1998 and 2002 in support of two subsequent projects. While the site was originally evaluated to be eligible, subsequent impacts to the site through subsequent construction activities have disturbed and damaged it, resulting in a lack of integrity and research potential. USMC now believes that the site is ineligible.	a) Eligible b) Ineligible	a) Concurred with determination of eligible on 03/03/1997 (USMC961217A). b) In the current letter, USMC requested OHP to concur with the determination of ineligible.
CA-SDI-13938	The site is located on an alluvial floodplain 50 meters west of the SMR. The site was recorded originally in 1995 as an artifact scatter containing flaked stone artifacts, groundstone implements, FAR, and one *argopecten* shell. During the 2009 survey by ASM, a larger scatter of shell (approximately 10-20 pieces) were identified in the site area, but none of the lithic artifacts recorded in 1995 were relocated. Site was determined to be eligible.	Eligible	Concurred with determination of eligible on 04/22/2010 (USMC100209B).
CA-SDI-13941H	The site is located on a terrace 40 meters south of a chapel along the eastern portion of the Chappo cantonment area. The site contains a historic water trough made of poured concrete and was recorded in 1995. The trough measures 20 feet by 60 inches by 16 inches and has an inscription of "No. 9 June 22 35" on its eastern side. In 2001, trough was	Ineligible	Concurred with determination of ineligible on 04/22/2010 (USMC100209B).

Site Identification	Description of Resource	USMC's determination of eligibility for NRHP	OHP's comments and/or concurrence
	revisited by ASM, who noted similarities between it and others used at MCB Camp Pendleton as laundry facilities.		
CA-SDI-13942H	This site is located on a dirt road 50 meters south of a concrete building at the western end of the Chappo area. The site was recorded in 1995 and described as a sparse historic trash scatter. The site measures 10 meters by 25 meters, and includes metal, ceramics, and glass artifacts. Site was tested in 2010 with 7 shovel scrapes and 14 shovel test pits, which resulted in recovery of no additional cultural resources. Subsequent road maintenance activities have disturbed the site.	Ineligible	In the current letter, USMC requested OHP to concur with the determination of ineligible.
CA-SDI-13981H	The O'Neill Dam which is located at the southwestern end of Lake O'Neill. The dam was recorded originally in 1995 and is 1,400 feet by 40 feet with a height of 10 feet. The dam was originally built in 1883, but it has been altered and refurbished multiple times, compromising its historic integrity.	Ineligible	Concurred with determination of ineligible on 04/22/2010 (USMC100209B).
CA-SDI-13984	The site is located on a terrace approximately 110 meters east of the SMR. It was recorded originally in 1995 and described as a bedrock milling site consisting of 4 slicks, 4 mortars, and 1 unknown triangular shaped milling feature with 2 pestles. The site was tested in 2005 by e2M with 8 shovel test pits. No artifacts were recovered.	Ineligible	In the current letter, USMC requested OHP to concur with the determination of ineligible.
CA-SDI-13985	The site is located on a terrace above and approximately 140 meters east of the SMR. It was recorded originally in 1995 and described as a bedrock milling site consisting of 6 milling features within a cluster of bedrock outcrops. The milling features contained 15 milling surfaces, including mortars, basins, slicks, and cupules.	Eligible	Concurred with determination of eligible on 04/22/2010 (USMC100209B).
CA-SDI-13987	The site is located in the flood plain on the north side of SMR, approximately 400 meters south of one road and 600 meters of the intersection of two other roads. The site was recorded originally in 1995 and described as a low density artifact scatter measuring 50 meters by 140 meters. Two	Ineligible	In the current letter, USMC requested OHP to concur with the determination of ineligible.

Site Identification	Description of Resource	USMC's determination of eligibility for NRHP	OHP's comments and/or concurrence
	core/hammerstones, 2 ceramic sherds, 1 metate fragment, 7 flakes, a sawed bone, and FAR were identified. The site was tested in 1997 with 10 shovel test pits. Only five prehistoric pieces of debitage were located, while historic materials, including 102 pieces of cow bones were located. It was concluded that the site was a redeposition of eroded material from upstream, and no substantial intact deposits were located and no diagnostic artifacts were recovered.		
CA-SDI-13990	The site is located directly below a high terrace in the SMR flood plain. The site was recorded originally in 1995 and described as a sparse artifact scatter that included 3 manos, 3 mano fragments, 3 metavolcanic flakes, a chalcedony flake, and several groundstone fragments. It was noted that the site had been disturbed by grading and maintenance activities associated with a dirt road that traversed the site. The site was tested in 2008 with 33 shovel test pits. No cultural material was recovered either on the surface or from the STPs.	Ineligible	In the current letter, USMC requested OHP to concur with the determination of ineligible.
CA-SDI-13991	The site is located on the highest terrace within the SMR floodplain and is traversed by a road. The site was recorded originally in 1995 and described as a sparse lithic scatter measuring 40 meters by 25 meters. Artifacts included 1 metate fragment, 1 mano fragment, 1 core tool, 1 hammerstone, 1 flake, and 20 pieces of FAR.	The site has not been evaluated formally for NRHP eligibility. USMC considers the site to be eligible pending completion of a formal evaluation.	In the current letter, USMC requested OHP to comment on the status of the site.
CA-SDI-13996H	The site is located on a terrace above the SMR, immediately west of a road. The site was recorded originally in 1995 and described as a scatter of historic debris, including glass, ceramics, metal, brick, and concrete. The site measures 80 meters by 40 meters, and maybe be associated with a wooden fence corners 20 meters south of the site, and some concrete slabs, which may have been the remains of a building foundation.	Ineligible	Concurred with determination of ineligible on 04/22/2010 (USMC100209B).

Site Identification	Description of Resource	USMC's determination of eligibility for NRHP	OHP's comments and/or concurrence
CA-SDI-14060	The site is located between a road and CA-SDI-14005H on the east bank of the SMR. The site was recorded originally in 1995 and described as 175 meters by 105 meters lithic scatter with a moderately dense midden of *donax, choine, and argopecten* shells. The site was tested in 1995 with 8 shovel tests pits and 3 test excavation units, which recovered only a sparse amount of marine shell and faunal material mixed with historic debris. Analysis of the soil matrix indicated that the entire excavated portion of the site was entirely composed on artificial fill, and the small amount of sparsely distributed cultural material was determined to be secondary deposits. In 1999 during archaeological monitoring for a construction project, FAR was discovered in the site area. The site was again tested in 1999 with 11 mechanical trenches, 14 shovel test pits, and 3 test excavation units. The testing recovered low density deposits of lithic debitage, shell, and intrusive historic materials.	Ineligible After the testing in 1999, it was determined that the previous ineligibility determination was still valid.	Concurred with determination of ineligible on 03/03/1997 (USMC961217A).
CA-SDI-15126	The site is located on a berm within the SMR basin on the north side of a road approximately 200 meters northeast of CA-SDI-12628 (described earlier in this enclosure). The site was recorded originally in 1992 as a lithic scatter measuring 10 meters by 30 meters. The site was tested with 4 shovel test pits, 4 test excavation units, and 3 mechanical trenches, which recovered a moderate density of *donax*, scallop, and freshwater mussel shell, lithic debitage, and flaked stone tool fragments.	Ineligible	In the current letter, USMC requested OHP to concur with the determination of ineligible.
CA-SDI-10158	The site is located 175 meters south of an ammunition bunker and is traversed by Maverick Road. The site measures 370 meters by 150 meters, and was recorded originally in 1996 and described as a temporary prehistoric camp or habilitation site. The site is composed of 8 loci (Locus A, B, C, D, E, F, G1, and G2). Each locus contains a variety of milling features including grinding	Southern portion of Locus G2 is a non-contributing element of CA-SDI-10158.	In the current letter, USMC requested OHP to comment on the status of the southern portion of Locus G2.

Site Identification	Description of Resource	USMC's determination of eligibility for NRHP	OHP's comments and/or concurrence
	slicks, mortars, proto-mortar, and basins. Artifacts found associated with the milling features included flakes, debitage, mano fragments, and metate fragments. The site was determined to be eligible in 2006, but that determination was never reviewed by OHP. The southern portion of Locus G2 would be affected by the SMR CUP. The southern portion of Locus G2 was tested in 2006 to determine if it contributed to the eligibility of the overall site. On the surface, only a small portion (approximately 20 meters by 10 meters) appeared to be intact. Twenty four shovel test pits and 3 test excavation units were excavated, which recovered 53 chipped stone flakes and debitage, 4 shell fragments, a piece of charcoal, and various metal and glass bottle fragments. Due to a lack of diagnostic artifacts and the observed low site integrity of the southern portion of Locus G2, it was determined that the southern portion of Locus G2 was a non-contributing element of CA-SDI-10158		
CA-SDI-14005H	The site is a portion of the Atchison, Topeka, and Santa Fe Railroad. It was recorded originally in 1995 and evaluated for eligibility in 1997. It was determined that the site was eligible under Criteria A, B, and D.	Eligible	Concurred with determination of eligible on 03/03/1997 (USMC961217A).
CA-SDI-14381	The site is located on either side of Ammunition Road near Building 442 at Naval Weapons Station Seal Beach, Fallbrook Annex. The side was recorded originally in 1996 and described as a temporary prehistoric camp or habitation site that measured 60 meters by 150 meters. The site is composed of two loci (Locus A and B) with millstone features and associated lithic scatters. At the time of the initial survey, Locus A and B contained 8 mano fragments, 2 hammerstones, 3 flakes, 5 pieces of debitage, a discoidal gaming piece, and an obsidian desert side-notched projectile point. The site was tested in 2006 and it was noted that the condition of the site had deteriorated,	Ineligible	In the current letter, USMC requested OHP to concur with the determination of ineligible.

Site Identification	Description of Resource	USMC's determination of eligibility for NRHP	OHP's comments and/or concurrence
	particularly around Locus A, due to erosion and flooding from a nearby arroyo. Seventeen shovel test pits and 2 test excavation units were excavated, resulting in 3 flakes and 1 piece of debitage. As a result of the low site integrity and lack of diagnostic artifacts, the site was determined to be ineligible.		
Martin Reservoir	The Martin Reservoir was constructed for the FPUD as a Public Works Administration project between February and June 1939. It is a poured-concrete structure with an approximate height of 13 feet and a diameter of 120 feet. The reservoir has a cover supported by wooden truss framing that extends from the top of the concrete tank to the rooftop cover and around the circumference of the tank. A ventilating mesh covers the wooden truss framing, and two pipes exist at the southern end of the reservoir. Located along the northern side of the reservoir is a 17 feet by 11 feet wooden lean-to shed that was a later addition. The reservoir was evaluated in 2009 and it was determined that it was not eligible under any of the four criteria.	Ineligible	In the current letter, USMC requested OHP to concur with the determination of ineligible.

Summary of eligibility determinations

ELIGIBLE (**seven** sites) The following **five** sites have been determined eligible by USMC and previously OHP has reviewed and concurred with those determinations: CA-SDI-10156/12599H, CA-SDI-12577, CA-SDI-13938, CA-SDI-13985, and CA-SDI-14005H. The following **two** sites have been considered to be eligible by USMC (pending completion of a formal evaluation) and in the current letter they have requested OHP to comment on those considerations: CA-SDI-4421 and CA-SDI-13991.
INELIGIBLE (**twenty** sites) The following **ten** sites have been determined ineligible by USMC and previously OHP has reviewed and concurred with those determinations: CP SMR CUP 1, CP SMR CUP 2, CP SMR CUP 3, CP SMR CUP 4 (O'Neill Ditch), CA-SDI-12570, CA-SDI-12571, CA-SDI-13941H, CA-SDI-13981H, CA-SDI-13996H, and CA-SDI-14060,

The following **nine** sites have been determined ineligible by USMC and in the current letter they have requested OHP to concur with those determinations: CA-SDI-10157, CA-SDI-12628, CA-SDI-13942H, CA-SDI-13984, CA-SDI-13987, CA-SDI-13990, CA-SDI-15126, CA-SDI-14381, and Martin Reservoir.

The following **one** site has been determined by USMC to be a non-contributing element of CA-SDI-10158 and in the current letter they have requested OHP to comment on that determination: CA-SDI-10158 (Southern portion of Locus G2).