RECLAMATION

Managing Water in the West

Water Transfer Program for the San Joaquin River Exchange Contractors Water Authority, 2014–2038

Draft
Environmental Impact Statement/ Environmental Impact Report

Mid-Pacific Region

May 2012

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San Joaquin River Exchange Contractors Water Authority

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Abbreviations & Acronyms

°C	degrees Celsius
°F	degrees Fahrenheit
$\mu g/m^3$	microgram(s) per cubic meter
µmhos	microhom(s)
µS/cm	microSiemen(s) per centimeter
AB	Assembly Bill
AFY	acre-feet per year
BA	Biological Assessment
BMP	best management practice
BO	Biological Opinion
BPS	best performance standard
CARB	California Air Resources Board
CCC	Columbia Canal Company
CCID	Central California Irrigation District
CCWD	Contra Costa Water District
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CNDDB	California Natural Diversity Data Base
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent(s)
CRLF	California red-legged frog
CTS	California tiger salamander
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
D-1641	State Board's Water Right Decision 1641
Delta	Sacramento-San Joaquin River Delta
DMC	Delta-Mendota Canal
DWR	California Department of Water Resources
EA	Environmental Assessment
EBMUD	East Bay Municipal Utility District
EC	electrical conductivity
EFH	Essential Fish Habitat

EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
Exchange Contractors	San Joaquin River Exchange Contractors Water Authority
FWCA	Fish and Wildlife Coordination Act
FCWD	Firebaugh Canal Water District
FMMP	Farmland Mapping and Monitoring Program
FONSI	Finding of No Significant Impact
GHG	greenhouse gas
GWP	Global Warming Potential
Interior	U.S. Department of the Interior
IPCC	Intergovernmental Panel on Climate Change
ITAs	Indian Trust Assets
ICR	Interim Contract Renewal
KDSA	Kenneth D. Schmidt and Associates
KWB	Kern Water Bank
LTCR	Long-Term Contract Renewal
M&I	municipal and industrial
µmhos/cm	micromhos per centimeter
mg/L	milligram(s) per liter
MOU	Memorandum of Understanding
N_2O	nitrous oxide
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NWR	National Wildlife Refuge
OCAP	Operations Criteria and Plan
PDA	public domain allotment
PEIS	Programmatic Environmental Impact Statement
PM_{10}	particulate matter 10 microns or less in diameter
$PM_{2.5}$	particulate matter 2.5 microns or less in diameter
ppm	part(s) per million
Program	Water Transfer Program
PVWMA	Pajaro Valley Water Management Agency

PWD	Panoche Water District
Reclamation	Bureau of Reclamation
Regional Board	Central Valley Regional Water Quality Control Board
ROD	Record of Decision
RWSP	Refuge Water Supply Program
SB	Senate Bill
SBCWD	San Benito County Water District
SCVWD	Santa Clara Valley Water District
Service	U.S. Fish and Wildlife Service
SJRRP	San Joaquin River Restoration Program
SJVAPCD	San Joaquin Valley Air Pollution Control District
SLCC	San Luis Canal Company
SLWD	San Luis Water District
State Board	State Water Resources Control Board
SWP	State Water Project
TDS	total dissolved solids
TMDL	Total Maximum Daily Load
TMML	Total Maximum Monthly Load
USC	United States Code
VAMP	Vernalis Adaptive Management Program
WA	Wildlife Area
WAP	Water Acquisition Program
WSMP	Water Supply Management Program
WSP	Water Shortage Policy
WWD	Westlands Water District

Executive Summary

ES.1 Background

This report examines the environmental effects of the proposed transfer and/or exchange of up to 150,000 acre-feet of substitute water from the San Joaquin River Exchange Contractors Water Authority (Exchange Contractors) to the San Joaquin Valley wetland habitat areas, to other Central Valley Project (CVP) contractors, and/or selected State Water Project (SWP) contractors. This report has been prepared in accordance with the National Environmental Policy Act of 1969, as amended (NEPA), and the California Environmental Quality Act of 1970 (CEQA).

U.S. Department of the Interior (Interior), Bureau of Reclamation (Reclamation), as the Federal lead agency, has prepared this document pursuant to NEPA to examine the environmental effects of the transfer and/or exchange of up to 150,000 acre-feet of substitute water from the Exchange Contractors to several potential users over a 25-year timeframe (water service years 2014–2038), where necessary, to supplement previous environmental compliance documents prepared by Reclamation and the Exchange Contractors (see Section 1.3 for discussion of Possible Related Projects). The water from the Exchange Contractors would be transferred to San Joaquin Valley wildlife refuges (i.e., the wildlife and wetland habitat areas located in the San Joaquin River Basin) and Tulare Lake Basin wildlife refuges, to Friant Division and San Luis Unit CVP contractors, and/or to SWP contractors west and south of the Sacramento-San Joaquin River Delta (Delta), specifically Kern County Water Agency (KCWA) (SWP water), Santa Clara Valley Water District (SCVWD) (CVP/SWP water), East Bay Municipal Utility District (EBMUD) (CVP water), Contra Costa Water District (CCWD) (CVP water), and Pajaro Valley Water Management Agency (PVWMA) (CVP water). All transfers would be consistent with CVP place of use requirements. The proposed Federal action is to (1) acquire water for the San Joaquin River Basin and the Tulare Lake Basin wildlife refuges (Incremental Level 4 under the Central Valley Project Improvement Act [CVPIA]) and/or (2) approve transfers and/or exchanges of Exchange Contract/CVP water from the Exchange Contractors to other CVP and SWP contractors.

The San Joaquin River Exchange Contractors Water Authority[1] (Exchange Contractors), as the lead agency for the State of California, has prepared this document pursuant to CEQA to examine the environmental impacts of:

[1] The San Joaquin River Exchange Contractors Water Authority consists of Central California Irrigation District, San Luis Canal Company, Firebaugh Canal Water District, and Columbia Canal Company. These entities are commonly known as the "Exchange Contractors."

(1) Continuing the existing transfer of their CVP water (up to 130,000 acre-feet total per year with up to 80,000 acre-feet from conservation and up to 50,000 acre-feet from temporary land fallowing) in the same manner that was documented in the 10-Year Water Transfer Program Environmental Impact Report/Environmental Impact Statement (EIS/EIR) (prepared prior to 2005) and extending it past the period studied in the 10-Year Water Transfer Program EIR/EIS and for water years 2014 to 2038 in the San Joaquin Valley, San Benito County, and Santa Clara County, and

(2) Expanding the transfer by up to 20,000 acre-feet of conserved water under certain specified conditions (up to a total of 100,000 acre-feet of conserved water and up to a total of 50,000 acre-feet of water from fallowed land or a total of up to 150,000 acre-feet) for 2014 to 2038, and allowing for an exchange, and

(3) Including authorization to transfer and/or exchange portions of the transferred water described in (1) and (2) above to not only those CVP contractors who were included in the existing Program but also to other CVP and SWP contractors in Alameda, Contra Costa, Monterey, Santa Cruz, and Kern counties (other receiving areas).

The Exchange Contractors propose to make water available as described above for transfer and/or exchange of substitute water to either the refuges, CVP contractors for existing municipal and industrial (M&I) and/or agricultural uses, and other potential SWP contractors for agricultural and/or M&I uses, or to some combination of these users and uses.

The duration of the 25-Year Water Transfer Program (Proposed Program) is for 25 consecutive years beginning March 1, 2014, through February 28, 2039. Activities by the Exchange Contractors would occur during their calendar years 2014–2038, specifically January 1, 2014, through December 31, 2038.

ES.2 Project Purpose and Need/Objectives

The Proposed Program is to develop supplemental water supplies from willing seller agencies within the Exchange Contractors' service area through water conservation measures/tailwater recovery and crop idling/fallowing activities consistent with agency policies.

The overall purpose of the Proposed Program is to allow the annual development and transfer of CVP water from the Exchange Contractors to continue after February 28, 2014, and to provide for the delivery of transfer and/or exchange water to additional areas and contractors not included in the 10-Year Program EIS/EIR. The purposes of the proposed 25-Year Water Transfer Program are the transfer and/or exchange of CVP water from the Exchange Contractors to:

- The RWSP to meet water supply needs (Incremental Level 4) for San Joaquin River Basin wildlife refuges and the Tulare Lake Basin wildlife areas
- Other CVP contractors and SWP contractors to meet demands of agricultural and M&I uses

The continuation of a Program of temporary annual water transfers and/or exchanges is needed to maximize the use of limited water resources for agriculture, fish and wildlife resources, and M&I purposes with the following objectives:

- Develop supplemental water supplies from willing seller agencies within the Exchange Contractors' service area through water conservation measures/tailwater recovery and crop idling/fallowing activities consistent with agency policies.
- Assist in providing water supplies to meet the Incremental Level 4 requirements for the San Joaquin River Basin and Tulare Lake Basin wildlife refuges.
- Assist Friant Division CVP repayment contractors or water service contractors to obtain additional CVP water for the production of agricultural crops or livestock and/or M&I uses because of water supply shortages or when full contract deliveries cannot otherwise be made.
- Assist SWP (KCWA and SCVWD) and other CVP agricultural service and M&I contractors (San Luis Unit, SCVWD, EBMUD, CCWD, PVWMA) to obtain additional supplemental water supplies.
- Promote seasonal flexibility of deliveries to the Exchange Contractors through exchange with CVP and SWP agricultural service and M&I contractors wherein water would be delivered and then returned at a later date within the year.

The Exchange Contractors propose to develop the water from conservation (including tailwater recovery) and crop idling/temporary land fallowing activities. Action alternatives have been developed for a range of quantities of water from these sources for the delivery of the water to any or all of these potential water users. A range of water transfers and/or exchanges may be selected as the preferred action/project to respond to hydrologic and economic conditions over the 25-year period (March 1, 2014, through February 28, 2039). All transfer and/or exchange proposals will be evaluated and approved by Reclamation annually in accordance with the CVPIA's and Reclamation's guidelines for implementation of water transfers, which are discussed in Section 2.4. No changes are being proposed to these laws and guidelines with the range of alternatives evaluated herein.

The need for water supplies to the wildlife refuges is a requirement in CVPIA Section 3406(d)(2) that directs the Secretary of the Interior to acquire the increment between Level 2 and Level 4 water requirements through voluntary measures, which include water conservation, conjunctive use, purchase, lease, donations, or similar activities, or a combination of such activities, which do not require involuntary reallocations of project yield for delivery to wetland habitat areas in the Sacramento and San Joaquin valleys. The quantity of water required to meet the full Incremental Level 4 water supplies (100 percent of contract supplies) for the San Joaquin River Basin and

Tulare Lake Basin wildlife refuges is 105,514 acre-feet of water (without conveyance losses). A deficit in the full Incremental Level 4 water supply currently exists absent the constraints of the existing Refuge Water Supply Program (RWSP) budget. The action alternatives represent how the Incremental Level 4 need could be met in part by the Exchange Contractors' transfer.

Another purpose of the Proposed Program includes the continued periodic and conditional transfer of water from the Exchange Contractors, when the conditions within the Exchange Contractors' service area will permit the transfer, to water districts who are CVP agricultural and/or M&I service contractors and/or two SWP contractors, specifically to provide irrigation water for agricultural use in the San Joaquin Valley, San Benito County, Santa Clara County, and Monterey/Santa Cruz County, to participating districts in the Friant Division[2] of the CVP, and to an additional SWP agricultural service contractor in Kern County (i.e., KCWA). In most years, CVP/SWP contractors do not receive full contract amounts, and seasonal irrigation water deficits occur under all but the wettest hydrologic conditions.

ES.3 Public and Agency Involvement

The public and agency involvement process for the EIS/EIR began June 15, 2011, with the issuance of a Notice of Preparation of a Joint EIS/EIR on the 25-Year Water Transfer Program for the San Joaquin River Exchange Contractors Water Authority, 2014–2038. A Notice of Intent was published on July 6, 2011, in the *Federal Register*. The notices announced one public scoping meeting for July 13, 2011, and requested that comments on the content of the EIS/EIR be submitted by August 10, 2011. Comments addressed the following concerns: project description, water quality/hydraulics/water supply, groundwater, biological resources, economics, agricultural land use, and cumulative impacts. Comments were received from the following organizations: U.S. Fish and Wildlife Service (Service), U.S. Environmental Protection Agency, National Park Service, California Department of Transportation, Native American Heritage Commission, State Water Resources Control Board, Central Delta Water Agency, Friant Water Authority, South Delta Water Agency, Stanislaus County, and San Joaquin Tributaries Association. Appendix A, Report on Public Scoping for the EIS/EIR, contains all of the comments received during public scoping, and a summary of the comments including areas of public controversy. See also Chapter 16, Consultation and Coordination, for more information on agency coordination for this EIS/EIR.

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[2] Participating districts would be those with storage and conveyance to deliver water to the contractor as an exchange or a direct transfer.

ES.4 Alternatives Considered and Preferred Alternative

The EIS/EIR considers the No Action/No Project Alternative and four action alternatives as described below. A preferred alternative has not been selected pending completion of the public review process for the Draft EIS/EIR. A preferred alternative will be selected during the development of the Final EIS/EIR.

ES.4.1 No Action/No Project Alternative

The No Action/No Project Alternative would result in no transfer or exchange of water from the Exchange Contractors to either Interior or to any of the other potential water users at the conclusion of the existing Program on February 28, 2014 (through water year 2013). The response of the entities directly involved with the Proposed Program to no transfer from the Exchange Contractors would be:

- The Exchange Contractors would recover and reuse within their own operations the water previously transferred and generate approximately the same amount of tailwater flows. The reused tailwater would be integrated into the Exchange Contractors' water supply and reduce groundwater pumping that currently helps meet irrigation demands and capacity constraints.
- Deliveries to the wildlife refuges would consist of Level 2 and Replacement Water[3] quantities plus a portion of the Incremental Level 4 need that could reasonably be obtained from other sources. The practical result would be a reduction in deliveries to the wildlife refuges from the Exchange Contractors and additional acquisitions of water from other entities through purchases by the RWSP.
- Agricultural and M&I water users would get their CVP and SWP contractual supplies subject to the limitations in their contracts. Under the No Action/No Project Alternative, the CVP and SWP water users may obtain water from other sources or they would continue to experience shortages.
- The Exchange Contractors would not modify their operations relative to the San Joaquin River because the amounts of return flow would remain approximately the same. However, no water development from temporary land fallowing would occur in the absence of a transfer program.

[3] Replacement Water is the amount of water that the San Luis Unit, Freitas, and Kesterson national wildlife refuges, and Volta and Mendota wildlife management areas had historically received and used, which is more than Level 2 amounts but may be less than or equal to their Level 4 amounts. Replacement Water was originally provided by groundwater and tailwater, but due to water quality concerns, Reclamation entered into agreements to provide Replacement Water to the wildlife areas. When willing sellers and funds are available, Reclamation acquires water to supplement supplies to minimize the impact to CVP contractors south of the Delta.

ES.4.2 Action Alternatives

The action alternatives involve multiple sources of developed water and multiple users of that water. The action alternatives are designed based on how the water is developed and the quantity of water developed. The Exchange Contractors propose to develop water from two primary sources: conservation/tailwater recovery and crop idling/temporary land fallowing. Each action alternative has a range of water acquisition scenarios based on how the water could be used. While the focus of this EIS/EIR is on how the water is developed, the effects of how the water is used are addressed primarily in other environmental documents and summarized herein (from those documents) in Section 3.3 to provide a complete but concise analysis of both direct and indirect impacts. Groundwater pumping for application to irrigated lands within the Exchange Contractors' service area and within system capacity may occur but would not be a method for developing water for the Proposed Program.

The Proposed Program is planned for 25 years. However, contracts to implement the Program with either Reclamation or any of the CVP and SWP water users may be executed for less than 25 years. This EIS/EIR evaluates the entirety of the Program to consider the full extent of any potential impacts. In addition, Reclamation approves the transfer or exchange of any CVP water on an annual basis, resulting in an annual review of the proposed transfer amounts and how the water was developed. See Section 14.3.3 for more information on this approval process and ongoing monitoring for potential impacts.

Within the action alternatives, the Exchange Contractors would continue to employ their tailwater recovery efforts[4] and supplement their tailwater recapture program with other conserved water.[5] Assuming a maximum of 150,000 acre-feet total from all sources, up to 100,000 acre-feet would be tailwater recapture and other conservation efforts (including reduced conveyance losses, reductions in spillage, canal lining, and other irrigation efficiencies including on-farm improvements), and up to 50,000 acre-feet would be developed through temporary land fallowing[6] in any year. Given recent transfers (since 2004) of 80,000 to 88,000 acre-feet, of which 8,000 acre-feet is from fallowed land, if the transfer is up to 88,000), the proposed net transfer over existing conditions excluding fallowing, which would under the Proposed Program remain at the 50,000 level, is up to a maximum of 20,000 acre-feet additional water for transfer (i.e., up

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[4] Tailwater recovery is defined as the reuse of tailwater flows in the act or act(s) of reclaiming surface water from irrigated lands into a surface supply system. This reclamation can be achieved either by gravity or by low lift pumps. The water is reused within the political boundaries of the agency or agencies from which it originated. The tailwater recovery effort by the Exchange Contractors is their tailwater recapture program.

[5] Conserved water is defined as water made available from canal lining, changes in irrigation practices (such as drip irrigation and other microsystems), spill reductions projects, reductions in percolation to saline sinks, and other water management practices excluding land fallowing. It does not result from land fallowing above normal practices or longer than 1.5 years beginning with no irrigation from January until spring of the following year. Land fallowing that normally occurs is the nonapplication of water for 1 year on selected areas.

[6] Crop idling/land fallowing beyond normal practices is for the purpose of developing water. Lands to be fallowed would be temporary, i.e., not occur on same lands for more than 3 consecutive years.

to 150,000 acre-feet, less up to 42,000 acre-feet from fallowed land, and less 88,000 acre-feet existing).

The four action alternatives are based on the quantity of water and sources of supply. Each action alternative has a range of subalternatives or scenarios based not only on the source of supply but also on potential water users and whether these users are hydraulically connected to the San Joaquin River. A range of scenarios is evaluated and described in Appendix B, San Joaquin River Exchange Contractors Water Authority 25-Year Water Transfer Program Water Resources Analysis.

Alternative A: 50,000 Acre-Feet

Although at the discretion of the Exchange Contractors a zero transfer amount may occur in any year, Alternative A is the smallest level of program implementation framed as an alternative. All of the water would be developed from crop idling/temporary land fallowing (similar to Alternative B in the 2004 EIS/EIR); however, it could occur in any type of water year under the Exchange Contract (not just critical years as for Alternative B in the 2004 EIS/EIR). Of the maximum amount of 50,000 acre-feet per year, 8,000 acre-feet has occurred in 2009, while 42,000 acre-feet would be additional water development not yet experienced.

The maximum available water for transfer is up to 50,000 acre-feet from crop idling/temporary land fallowing. Alternative A represents a unique transfer program of only utilizing crop idling/land fallowing as the source of transfer water supply. In any type of year, the Exchange Contractors would provide up to 50,000 acre-feet of water through crop idling/land fallowing on approximately 20,000 acres of land within the Exchange Contractors' service area. Assuming a transferable quantity of 2.5 acre-feet per acre, the maximum amount of land to be temporarily idled/fallowed is approximately 20,000 acres, 8.3 percent of the irrigable land (240,000 acres) in the Exchange Contractors' service area. The affected land would be rotated to avoid idling the same land year after year, and fallowing on any parcel would be limited to not more than 3 consecutive years. Any or all of the available water could be provided to the wildlife refuges, agriculture, and M&I users subject to the limitations identified in Sections 2.3.2 and 2.4.

Alternative B: 88,000 Acre-Feet

Alternative B represents an intermediate level of program implementation and is similar to the level of implementation currently underway and experienced in both critical (2008–2009) and noncritical years. For this action alternative, the Exchange Contractors would provide up to 88,000 acre-feet of water during any noncritical Exchange Contract year through a combination of conservation and crop idling/land fallowing sources. Conservation measures are defined as tailwater recapture, recovery of irretrievable losses, and reductions in operational spills for up to 80,000 acre-feet of the total developed supply. Temporary land fallowing would contribute up to 8,000 acre-feet of developed water.

Flexibility exists in the development of 88,000 acre-feet of water for transfer. The Exchange Contractors have indicated the availability of up to 50,000 acre-feet of water from temporary crop idling/land fallowing. This source of water in combination with tailwater and other conservation opportunities can provide flexibility in the decision of transfer water source. For example, if 50,000 acre-feet were developed through conservation and tailwater recovery programs, up to 38,000 acre-feet would be developed from crop idling/land fallowing.

Any or all of the available water could be provided to the refuges, agriculture, and M&I users subject to the limitations identified in Sections 2.3.2 and 2.4.

Alternative C: 130,000 Acre-Feet

Alternative C makes available up to 130,000 acre-feet of water annually during any noncritical Exchange Contract year similar to the level of maximum transfer contemplated by the Exchange Contractors under the existing 10-Year (2005–2014) Water Transfer Program (and Alternative C in the 2004 EIS/EIR). Under this alternative, up to 80,000 acre-feet of water is made available through conservation, including tailwater recovery, and up to 50,000 acre-feet of water is made available through crop idling/temporary land fallowing. Any or all of the available water could be provided to the wildlife refuges, agriculture, and M&I users subject to the limitations identified in Sections 2.3.2 and 2.4.

Alternative D: 150,000 Acre-Feet

Alternative D expands upon Alternative C water of 130,000 acre-feet (from conservation and crop idling) with an additional 20,000 acre-feet from conservation measures not already considered in the other alternatives. These measures include the lining of canals and implementation of on-farm irrigation or district conveyance system improvements that would not have a hydrologic effect on the San Joaquin River. Alternative D represents the maximum water transfer by adding an additional increment of conservation water above existing capabilities.

ES.5 Summary Comparison of Impacts/Effects of Alternatives

Table ES-1 provides a summary of the environmental impacts (i.e., adverse effects) and mitigation for No Action/No Project, Alternative A: 50,000 Acre-Feet, Alternative B: 88,000 Acre-Feet, Alternative C: 130,000 Acre-Feet, and Alternative D: 150,000 Acre-Feet. The existing conditions set the baseline against which the alternatives are evaluated for CEQA Refer to Sections 4 through 12 for complete statements of impact (CEQA). Although no potentially significant impacts exist, and mitigation is not required, a proposed Mitigation Monitoring and Reporting Program is provided in Chapter 14 and explains the annual approval process, which allows for adaptive management to changing conditions in the future in the Delta, the San Joaquin River, and CVP operations.

The following language is considered and/or used in the table (and in the text) for CEQA determinations of impact (adverse effect) except for socioeconomic impacts:

- Potentially significant and unavoidable
- Potentially significant
- Less than significant
- No impact[7]

For socioeconomic impacts under CEQA (see Section 8.2.1), the following terms are used:

- Substantial
- Less than substantial
- No impact

Significance thresholds for CEQA also include the factors taken into consideration under NEPA to determine the significance of the action in terms of the context and the intensity of its effects. With regard to environmental consequences, CEQA requires that impacts that are regarded as “significant” be identified as such. In this EIS/EIR, for CEQA purposes, “CEQA significance criteria” are set forth by resource area. For all impacts that could be identified as potentially significant under CEQA, appropriate mitigation measures are to be identified to reduce the impacts to a less-than-significant level unless the potentially significant impact is a cumulative effect (for which no mitigation is required). For these reasons, identification of impacts as potentially significant under CEQA can be used to identify potentially significant/adverse effects under NEPA in the Record of Decision’s (ROD’s) subsequent preparation, and the mitigation measures set forth to address potentially significant impacts for CEQA will also mitigate potentially significant/adverse effects for NEPA.

However, given that no potentially significant impacts are identified under CEQA for the Proposed Program, mitigation measures are not required and are not identified in the EIS/EIR except for the mitigation/monitoring process explained in Chapter 14. Only one impact, the socioeconomic impact to agricultural production value was identified as cumulatively considerable or substantial in the short term. Over the long term, this cumulative impact is moderated by economic growth. No mitigation is required for a cumulative impact.

[7] No impact is comparable to no adverse effect where an impact is understood to be negative. Where beneficial effects are identified, the conclusion under CEQA is no impact because CEQA terminology does not address positive effects.

Table ES-1
Summary Comparison of Impacts of Alternatives and Mitigation Measures

Environmental Concern		Alternative	Impact Before Mitigation	Mitigation Measures	Impact After Mitigation
Surface Water					
SW-1	Water Quality Standards at Vernalis	No Action	N	not applicable	–
		A	N	not required	–
		B	N	not required	–
		C	N	not required	–
		D	N	not required	–
		Cumulative	N	not required	–
SW-2	Flow Standards at Vernalis	No Action	N	not applicable	–
		A	LTS	not required	–
		B	LTS	not required	–
		C	LTS	not required	–
		D	LTS	not required	–
		Cumulative	N	not required	–
SW-3	Change in New Melones Storage, Releases, and Water Deliveries	No Action	N	not applicable	–
		A	N	not required	–
		B	N	not required	–
		C	N	not required	–
		D	N	not required	–
		Cumulative	N	not required	–
SW-4	Changes in Delta CVP/SWP Water Supplies	No Action	N	not applicable	–
		A	LTS	not required	–
		B	LTS	not required	–
		C	LTS	not required	–
		D	LTS	not required	–
		Cumulative	N	not required	–
Groundwater					
GW-1	Groundwater Inflows/Outflows	No Action	LTS	not applicable	–
		A	N	not required	–
		B	N	not required	–
		C	N	not required	–
		D	N	not required	–
		Cumulative	N	not required	–
GW-2	Groundwater Quality	No Action	N	not applicable	–
		A	LTS	not required	–
		B	LTS	not required	–
		C	LTS	not required	–
		D	LTS	not required	–
		Cumulative	LTS	AB 3030 groundwater management plans	LTS

CEQA:
N = no impact   LTS = less than significant   LS = less than substantial   PS = potentially significant
PSU = potentially significant and unavoidable   S = substantial

Environmental Concern		Alternative	Impact Before Mitigation	Mitigation Measures	Impact After Mitigation
Biological Resources					
BIO-1	Effects on Special-Status Fish Species	No Action	N	not applicable	--
		A	LTS	not required	--
		B	LTS	not required	--
		C	LTS	not required	--
		D	LTS	not required	--
		Cumulative	LTS	not required	--
BIO-2	Effects on Special-Status Amphibian Species	No Action	N	not applicable	--
		A	LTS	not required	--
		B	LTS	not required	--
		C	LTS	not required	--
		D	LTS	not required	--
		Cumulative	LTS	not required	--
BIO-3	Effects on the Giant Garter Snake	No Action	N	not applicable	--
		A	LTS	not required	--
		B	LTS	not required	--
		C	LTS	not required	--
		D	LTS	not required	--
		Cumulative	LTS	not required	--
BIO-4	Effects on the Western Pond Turtle	No Action	N	not applicable	--
		A	LTS	not required	--
		B	LTS	not required	--
		C	LTS	not required	--
		D	LTS	not required	--
		Cumulative	LTS	not required	--
BIO-5	Effects on Special-Status Bird Species	No Action	N	not applicable	--
		A	N	not required	--
		B	N	not required	--
		C	N	not required	--
		D	N	not required	--
		Cumulative	N	not required	--
BIO-6	Effects on the San Joaquin Kit Fox	No Action	N	not applicable	--
		A	N	not required	--
		B	N	not required	--
		C	N	not required	--
		D	N	not required	--
		Cumulative	N	not required	--
BIO-7	Effects on Wetlands	No Action	N	not applicable	--
		A	LTS	not required	--
		B	LTS	not required	--
		C	LTS	not required	--
		D	LTS	not required	--
		Cumulative	LTS	not required	--

CEQA:

N = no impact LTS = less than significant LS = less than significant PS = potentially significant
PSU = potentially significant and unavoidable S = substantial

Environmental Concern	Alternative	Impact Before Mitigation	Mitigation Measures	Impact After Mitigation
Land Use and Agriculture				
LU-1 Conversion of Important Farmland	No Action	N	not applicable	--
	A	N	not required	--
	B	N	not required	--
	C	N	not required	--
	D	N	not required	--
	Cumulative	N	not required	--
LU-2 Conflict with Williamson Act Contract	No Action	N	not applicable	--
	A	N	not required	--
	B	N	not required	--
	C	N	not required	--
	D	N	not required	--
	Cumulative	N	not required	--
LU-3 Zoning and General Plan Consistency	No Action	N	not applicable	--
	A	N	not required	--
	B	N	not required	--
	C	N	not required	--
	D	N	not required	--
	Cumulative	N	not required	--
Socioeconomics				
SOC-1 Agricultural Production Value	No Action/No Project	N	not applicable	--
	A	LS	not applicable	--
	B	LS	not applicable	--
	C	LS	not applicable	--
	D	LS	not applicable	--
	Cumulative	S	not applicable	--
SOC-2A Net Farm-Level Costs and Income (Landowner-to-Landowner Transfers)	No Action/No Project	N	not applicable	--
	A	LS	not applicable	--
	B	LS	not applicable	--
	C	LS	not applicable	--
	D	LS	not applicable	--
	Cumulative	N	not applicable	--
SOC-2B Net Farm-Level Costs and Income (Water Transfer Sales)	No Action/No Project	Not applicable	not applicable	--
	A	N	not applicable	--
	B	N	not applicable	--
	C	N	not applicable	--
	D	N	not applicable	--
	Cumulative	N	not applicable	--

CEQA:
N = no impact LTS = less than significant LS = less than substantial PS = potentially significant
PSU = potentially significant and unavoidable S = substantial

Environmental Concern	Alternative	Impact Before Mitigation	Mitigation Measures	Impact After Mitigation
SOC-3 District-Level Costs and Income	No Action/No Project	S	not applicable	--
	A	S	not applicable	--
	B	LS	not applicable	--
	C	N	not applicable	--
	D	N	not applicable	--
	Cumulative	N	not applicable	--
SOC-4A Regional Economic Effects (Landowner-to-Landowner Transfers)	No Action/No Project	LS	not applicable	--
	A	LS	not applicable	--
	B	LS	not applicable	--
	C	LS	not applicable	--
	D	LS	not applicable	--
	Cumulative	N	not applicable	--
SOC-4B Regional Economic Effects (Water Transfer Sales)	No Action/ No Project	LS	Not applicable	
	A	LS	Not applicable	
	B	LS	Not applicable	
	C	LS	Not applicable	
	D	LS	Not applicable	
	Cumulative	N	Not applicable	
Air Quality				
AQ-1 Increased Fugitive Dust Emissions	No Action	LTS	not applicable	-
	A	LTS	not required	-
	B	LTS	not required	-
	C	LTS	not required	-
	D	LTS	not required	-
	Cumulative	N	not required	-
AQ-2 Increased Combustion Emissions	No Action	LTS	not applicable	-
	A	LTS	not required	-
	B	LTS	not required	-
	C	LTS	not required	-
	D	LTS	not required	-
	Cumulative	N	not required	-
AQ-3 Increase in Objectionable Odors	No Action	LTS	not applicable	-
	A	LTS	not required	-
	B	LTS	not required	-
	C	LTS	not required	-
	D	LTS	not required	-
	Cumulative	N	not required	-

CEQA:
N = no impact LTS = less than significant LS = less than significant PS = potentially significant
PSU = potentially significant and unavoidable S = substantial

Environmental Concern		Alternative	Impact Before Mitigation	Mitigation Measures	Impact After Mitigation
Climate Change/Greenhouse Gases					
CC-1	Increase in GHG emissions	No Action	LTS	not applicable	--
		A	LTS	not required	--
		B	LTS	not required	--
		C	LTS	not required	--
		D	LTS	not required	--
		Cumulative	N	not required	--
CC-2	Conflicts with GHG reduction plans	No Action	LTS	not applicable	--
		A	LTS	not required	--
		B	LTS	not required	--
		C	LTS	not required	--
		D	LTS	not required	--
		Cumulative	N	not required	--

CEQA:
N = no impact LTS = less than significant LS = less than substantial PS = potentially significant
PSU = potentially significant and unavoidable S = substantial

1.0 Purpose and Need

The San Joaquin River Exchange Contractors Water Authority[1] (Exchange Contractors) previously completed National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) compliance for a 10-year water transfer program (2005–2014) that makes available up to 130,000 acre-feet of water annually. In December 2004, U.S. Department of the Interior (Interior), Bureau of Reclamation (Reclamation) and the Exchange Contractors prepared a *Final Environmental Impact Statement (EIS) / Environmental Impact Report (EIR) for the 10-Year Water Transfer Program* (Program) for the period March 1, 2005, through February 28, 2015 (Reclamation water service years 2005–2014) (Reclamation and Exchange Contractors 2004). The Record of Decision (ROD) was completed March 23, 2005 (Reclamation 2005a). This existing Program consists of the transfer of up to 130,000 acre-feet of substitute[2] water (a maximum of 80,000 acre-feet of developed water from conservation measures, including tailwater recovery, and groundwater pumping and a maximum of 50,000 acre-feet from temporary land fallowing) annually from the Exchange Contractors.

Reclamation, as the Federal lead agency, has prepared this document pursuant to NEPA to examine the environmental effects of the transfer of up to 150,000 acre-feet of substitute water from the Exchange Contractors to several potential users over a 25-year timeframe (water service years 2014–2038) where necessary, to supplement previous environmental compliance documents prepared by Reclamation and the Exchange Contractors (see Section 1.3 for discussion of Possible Related Projects). The water from the Exchange Contractors would be transferred to San Joaquin Valley wildlife refuges (i.e., the wildlife and wetland habitat areas located in the San Joaquin River Basin and Tulare Lake Basin), to other Central Valley Project (CVP) contractors, or to State Water Project (SWP) contractors west and south of the Sacramento-San Joaquin River Delta (Delta), specifically Kern County Water Agency (KCWA)(SWP water), East Bay Municipal Utility District (EBMUD) (CVP water), Contra Costa Water District (CCWD) (CVP water), Pajaro Valley Water Management Agency (PVWMA)(CVP water), and Santa Clara Valley Water District (SCVWD)(CVP and SWP water). The proposed Federal action is to (1) acquire water for the San Joaquin River Basin and the Tulare Lake Basin wildlife refuges (Incremental Level 4 under the Central Valley Project Improvement Act [CVPIA]) and/or (2) approve transfers and/or exchanges of CVP water from the Exchange Contractors to other CVP and SWP contractors.

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[1] The San Joaquin River Exchange Contractors Water Authority consists of Central California Irrigation District, San Luis Canal Company, Firebaugh Canal Water District, and Columbia Canal Company. These entities are commonly known as the “Exchange Contractors.”

[2] The transfer involves “substitute water” because the Exchange Contractors’ water supply involves the substitution of CVP water in lieu of surface water diversions from the San Joaquin River in most years (which were reduced by the development of Friant Dam/Millerton Lake by Reclamation).

The Exchange Contractors, as the lead agency for the State of California, have prepared this document pursuant to CEQA to examine the environmental impacts of:

1. Continuing the existing transfer of their CVP water (up to 130,000 acre-feet total per year with up to 80,000 acre-feet from conservation and up to 50,000 acre-feet from temporary land fallowing) in the same manner that was documented in the 10-Year Water Transfer Program EIS/EIR (prepared prior to 2005) past the lapse of the period studied in the 10-Year Water Transfer Program EIR/EIS[3] and for the following period of water years 2014 to 2038 in the San Joaquin Valley, San Benito County, Santa Clara County, and

2. expanding the transfer by up to 20,000 acre-feet of conserved water under certain specified conditions (up to a total of 100,000 acre-feet of conserved water and up to a total of 50,000 acre-feet of water from fallowed land or a total of up to 150,000 acre-feet) for 2014 to 2038, and allowing for an exchange, and

3. including authorization to transfer portions of the transferred water described in (1) and (2) above to not only those CVP contractors who were included in the existing Program but also to other CVP and SWP contractors in Alameda, Contra Costa, Monterey, Santa Cruz, and Kern counties (other receiving areas).

The Exchange Contractors propose to make water available as described above for transfer and/or exchange of substitute water to either the refuges, CVP contractors for existing municipal and industrial (M&I) and/or agricultural areas, and other potential SWP contractors for agricultural and/or M&I uses, or to some combination of these users.

The duration of the Proposed Program is for 25 consecutive years beginning March 1, 2014, through February 28, 2039 (Reclamation water service contract years 2014–2038). Activities by the Exchange Contractors would occur during their calendar years 2014–2038, specifically January 1, 2014, through December 31, 2038.

1.1 History and Background

In 1995, Reclamation and the U.S. Fish and Wildlife Service (the Service) initiated a 3-year Interim Water Acquisition Program (WAP) to acquire Incremental Level 4 water for the refuges designated in the CVPIA. WAP concluded in February 1998. During this

[3] The period of transfer for this EIS/EIR bridges the previous EIS/EIR period of study. The previous EIS/EIR supporting the 10-year transfer currently undertaken described transfers for Reclamation's water years 2005 through 2014 ending February 28, 2015. Reclamation utilizes a water year ending February 28 for contractors south of the Delta. The Exchange Contractors utilize a calendar year as their water year and, therefore, the previous EIS/EIR studied and concluded transfers through the full calendar year 2015 (and up to February 28, 2015), as well as the impacts that might occur or evidence themselves at a later time. Reclamation's ROD (2005) approved the use and transfer of Exchange Contractors water through the end of Reclamation's 2013 water year up to February 28, 2014. The previous EIS/EIR can serve as a basis for approval of transfers in the period February 28, 2014, through February 28, 2015, under NEPA and CEQA.

3-year period, Reclamation met the Incremental Level 4 water supply requirements of the San Joaquin Valley refuges primarily through annual temporary transfers of water from the Exchange Contractors. In 1998, no water was acquired from the Exchange Contractors for the refuges. In 1999, the Exchange Contractors transferred 20,000 acre-feet to the WAP for the refuges and 40,000 acre-feet to westside agricultural users. In subsequent years, the Exchange Contractors transferred varying amounts of water to the combination of refuges, agricultural users, and urban water users. The WAP continues as the Refuge Water Supply Program (RWSP) and is administered by Reclamation and the Service. Table 1-1 shows a summary of water transfers conducted by the Exchange Contractors in recent years.

Table 1-1
Exchange Contractors Water Transfer Summary

Year	To South of Delta CVP Agricultural and M&I Users (acre-feet)	To Reclamation for Refuges (acre-feet)	Total (acre-feet)
1999	40,000	20,000	60,000
2000	43,000	21,500	64,500
2001	15,500	49,000	64,500
2002	2,134	63,500	65,634
2003	11,637	60,000	71,637
2004	30,000	50,210	80,210
2005	72,795	7,800	80,595
2006	30,417	49,583	80,000
2007	50,228	30,000	80,228
2008	61,026	24,132	85,158
2009	69,445	18,687	88,132
2010	56,981	27,714	84,695

Source: J. White, pers. comm., 2011a

For more information on historical water transfers by the Exchange Contractors, see Appendix B, San Joaquin River Exchange Contractors Water Authority 25-Year Water Transfer Program Water Resources Analysis (Section 2.1.2).

As explained in Appendix B, under the existing Program, the Exchange Contractors develop sources of water to temporarily reduce the need for delivery of substitute water by Reclamation. The sources of water developed by the Exchange Contractors include conservation, tailwater recapture, groundwater, and voluntary temporary land fallowing. For each acre-foot of water developed by the Exchange Contractors, an in-kind amount of water is considered acquired and left within the CVP for Reclamation to deliver to CVP contractors or wildlife areas. Physically, for each acre-foot of water transferred, a reduction of 1 acre-foot diversion occurs at the Exchange Contractors' delivery points. For purposes of accounting for water delivered to the Exchange Contractors under the Exchange Contract, water counted as transferred appears as water delivered to the Exchange Contractors.

1.1.1 Wetland Habitat Water Requirement

CVPIA Section 3406(d)(2) requires the Secretary of the Interior, immediately upon enactment, to provide firm delivery of Level 2 water supplies to the various wetland habitat areas identified in Reclamation's *Report on Refuge Water Supply Investigations* (1989) and *San Joaquin Basin Action Plan/Kesterson Mitigation Plan* (1983). These reports describe water needs and delivery requirements for each wetland habitat area to accomplish stated refuge management objectives. In the *Report on Refuge Water Supply Investigations*, average annual historical supplies were termed "Level 2," and the quantity of water needed to achieve full habitat development was termed "Level 4." Level 4 is the water supply needed for optimum habitat management. As stated in the *Report on Refuge Water Supply Investigations*, "the difference between water supplies for optimum management (Level 4) and the existing average annual water deliveries (Level 2) are related to habitat diversity, duration of late winter flooding, brood water, and pond areas" (p. II-8). In the *San Joaquin Basin Action Plan/Kesterson Mitigation Plan*, the term "Full Habitat Development" was introduced. The meaning of this term is similar to "Level 4" and will herein be referred to as "Level 4." The meaning of the term "2/3 Full Habitat Development" is similar to the term "Level 2" and will herein be referred to as "Level 2." This discussion of Level 2 is for information purposes, as the Level 2 requirement is not to be met with water transfers from the Exchange Contractors.

CVPIA Section 3406(d)(2) further directs the Secretary of the Interior to acquire the increment between Level 2 and Level 4 water requirements described in these reports through voluntary measures, which include water conservation, conjunctive use, purchase, lease, donations, or similar activities, or a combination of such activities, which do not require involuntary reallocations of project yield for delivery to wetland habitat areas in the Sacramento and San Joaquin valleys. The quantity of water required to meet the full Incremental Level 4 water supplies (100 percent of contract supplies) for the wildlife refuges is 105,514 acre-feet of water (without conveyance losses). A deficit in the full Incremental Level 4 water supply currently exists absent the constraints of the current RWSP budget. The action alternatives represent how the Incremental Level 4 need could be met in part by the Exchange Contractors' transfer.

1.1.2 Central Valley and State Water Project Contractors

The current Program CVP contractors who could participate in a proposed 2014–2038 water transfer and/or exchange of substitute water from the Exchange Contractors include westside CVP agriculture (Westlands Water District [WWD], Panoche Water District [PWD], Pacheco Water District, San Luis Water District [SLWD], Del Puerto Water District, and Patterson Water District); CVP Friant Division agriculture (24 districts); and CVP contractors in the San Felipe Division, specifically San Benito County Water District (SBCWD) and SCVWD. The Proposed 2014–2038 Program would include additional CVP contractors, specifically EBMUD, CCWD, and PVWMA; and SWP Contractor KCWA, in addition to SCVWD, which is also a SWP contractor. These districts may not receive 100 percent of their current contract amounts from the CVP and SWP and would purchase or exchange water from other sources such as the Exchange Contractors to alleviate part of their supply shortage.

If the westside irrigation districts were the recipients of future transfers from the Exchange Contractors, as has been the primary case for the last 10-year period, they would receive transfer water through the facilities that currently provide their CVP supplies, i.e., the Delta-Mendota Canal (DMC) and San Luis Unit facilities. Friant Division contractors would receive transfer water through wheeling arrangements using CVP and SWP (California Aqueduct) facilities and other third-party facilities (e.g., Cross Valley Canal) as has been accomplished over the last 10-year period. Additional water exchange arrangements may also be necessary to provide deliveries to specific Friant Division contractors. EBMUD and CCWD could receive transfer water through the facilities that provide their CVP supplies or by arrangements using the SWP (California Aqueduct). If SWP contractors were to receive transfers, the same CVP or SWP facilities utilized over the last 10 years of transfers (including the SWP share of San Luis Reservoir storage, the California Aqueduct, and Cross Valley Canal) would be utilized for exchanges and transfers to accomplish the deliveries.

1.2 Purpose and Need / Project Objectives

The overall purpose of the Proposed Program is to allow the annual development and transfer of CVP water from the Exchange Contractors to continue after February 28, 2014, and to provide for the delivery of transfer and/or exchange water to additional areas and contractors not included in the 10-Year Program EIS/EIR. The purposes of the proposed 25-Year Water Transfer Program are the transfer and/or exchange of CVP water from the Exchange Contractors to:

- The RWSP to meet water supply needs (Incremental Level 4) for San Joaquin River Basin wildlife refuges and the Tulare Lake Basin wildlife areas
- Other CVP contractors and SWP contractors to meet demands of agricultural and M&I uses

The continuation of a Program of temporary annual water transfers and/or exchanges is needed to maximize the use of limited water resources for agriculture, fish and wildlife resources, and M&I purposes with the following objectives:

- Develop supplemental water supplies from willing seller agencies within the Exchange Contractors' service area through water conservation measures/tailwater recovery and crop idling/fallowing activities consistent with agency policies.
- Assist in providing water supplies to meet the Incremental Level 4 requirements for the San Joaquin River Basin and Tulare Lake Basin wildlife refuges.
- Assist Friant Division CVP repayment contractors or water service contractors to obtain additional CVP water for the production of agricultural crops or livestock and/or M&I uses because of water supply shortages or when full contract deliveries cannot otherwise be made.

- Assist SWP (KCWA and SCVWD) and other CVP agricultural service and M&I contractors (San Luis Unit, SCVWD, EBMUD, CCWD, PVWMA) to obtain additional supplemental water supplies.
- Promote seasonal flexibility of deliveries to the Exchange Contractors through exchange with CVP and SWP agricultural service and M&I contractors wherein water would be delivered and then returned at a later date within the year.

The following sections provide additional clarification of this purpose of and need for the proposed water transfer and/or exchange.

1.2.1 Refuge Water Supplies

Pursuant to CVPIA Section 3406(d)(2), the Secretary of the Interior established the RWSP (formerly the WAP) to acquire the increment between Level 2 and Level 4 water requirements, by voluntary measures, which include water conservation, conjunctive use, purchase, lease, donations, or similar activities, or a combination of such activities that do not require involuntary reallocations of project yield for delivery to wetland habitat areas in the Sacramento and San Joaquin valleys. During the annual water service periods (March 1, 2014–February 28, 2038) RWSP needs to acquire 100 percent of the Incremental Level 4 refuge water supplies to fully implement the requirements of CVPIA Section 3406(d)(2). Therefore, one of the purposes of the Proposed Program discussed in this EIS/EIR is to transfer water to meet a portion of the Incremental Level 4 water supply requirements for certain wetland habitat areas in the San Joaquin Valley.

As described in the *Report on Refuge Water Supply Investigations* (Reclamation 1989), the total available acreage of wetlands within the Central Valley has declined from about 4 million acres in 1850 to about 300,000 acres in the 1980s. Federal National Wildlife Refuges (NWRs) and state Wildlife Areas (WAs) comprise approximately one-third of this acreage. Level 4 water is needed to optimally manage these wetland habitat areas and the wetlands within the Grassland Resource Conservation District. The difference between water supplies for optimum management (Level 4) and average annual deliveries (Level 2) is related to management for habitat diversity, which includes timing and duration of fall and late winter flooding, summer water for food production, and permanent wetland habitat maintenance. A 1995 *San Joaquin Basin Action Plan* (Reclamation 1995) updated the 1989 *Report on Refuge Water Supply Investigations* for some refuges in the San Joaquin River Basin.

To meet the water supply needs for full habitat development (full Level 4 supply) at certain wetland habitat areas in the San Joaquin Valley, plus an adequate amount to account for conveyance losses, it is estimated that up to 116,065 acre-feet will be required. The estimated quantities to be delivered to the wetlands at their boundaries, including affected NWRs, state WAs, and units of the San Joaquin Basin Action Plan managed by the Service (Unit), are presented in Table 1-2.

Table 1-2
San Joaquin Valley Refuge Incremental Water Supply Needs, Water Service Years 2014–2038

San Joaquin Valley Wetlands	Incremental Level 4 Allocation (acre-feet) at Refuge Boundary
San Luis NWR*	0
Freitas Unit *	0
Kesterson NWR *	0
E. Bear Creek Unit	4,432
W. Bear Creek Unit	3,603
Volta WA	3,000
China Island Unit	3,483
Salt Slough Unit	3,340
Los Banos WA	8,330
Mendota NWR	2,056
Grassland Resource Conservation District	55,000
Merced NWR**	2,500
Kern NWR	15,050
Pixley NWR	4,720
Losses	**10,551**
Total	**116,065**

Source: B. Hubbard, pers. comm., 2011

* The Memorandum of Understanding (MOU) with the Service clarifies the Level 4 increment for these refuges. In accordance with a Reclamation commitment prior to CVPIA, a total of 18,550 acre-feet of full habitat development water supplies will be provided. The 18,550 acre-feet includes conveyance losses for delivery of the full habitat water supplies.

** Merced NWR's allocation of Incremental Level 4 supply is not part of Reclamation's RWSP; however, it is shown as part of the San Joaquin Valley wetlands.

The actual amount of water to be acquired may vary due to hydrologic conditions, Reclamation budget constraints, and/or external conveyance limitations. This EIS/EIR will address the potential continued acquisition of a portion of the up to 105,514 acre-feet per year (AFY) for full habitat development purposes (without conveyance losses of 10,551 AFY) to the extent applicable under CVP place of use requirements. The impacts and benefits of Level 2 and Incremental Level 4 refuge water supplies are addressed in the *Refuge Water Supply Long-Term Water Supply Agreements for the San Joaquin River Basin, Final NEPA Environmental Assessment and CEQA Initial Studies* (Reclamation et al. 2001). This entire document is incorporated by reference into this EIS/EIR, and specific sections from it are summarized and referenced in the appropriate sections of this EIS/EIR (Section 3.3.2).

1.2.2 Agricultural Water Use

Another purpose of the Proposed Program includes the continued periodic and conditional transfer and/or future exchange of water from the Exchange Contractors, when the conditions within the Exchange Contractors' service area will permit the transfer, to water districts who are CVP agricultural service contractors and/or two SWP contractors, specifically to provide irrigation water for agricultural use in the San Joaquin Valley, San Benito County, Santa Clara County, and Monterey/Santa Cruz County, to participating districts in the Friant Division of the CVP, and to an additional SWP agricultural service contractor in Kern County (i.e., KCWA). In most years, CVP/SWP contractors do not receive full contract amounts, and seasonal irrigation water deficits occur under all but the wettest hydrologic conditions.

In addition, recent regulatory actions have reduced further the amount of water available to the CVP/SWP contractors south of the Delta. The “Interim Order” or “Wanger Decision” for Delta smelt (United States District Court Eastern District of California 2007) has resulted in the loss of combined SWP and CVP water supply (delivery reductions), compared to operations under State Water Resources Control Board’s (State Board’s) Water Right Decision 1641 (D-1641)(State Board 1999, revised 2000), of 732,000 acre-feet in 2008, 441,000 acre-feet in 2009, and 1,060,000 acre-feet in 2010 (Wilkinson 2011). Additional losses are likely pending resolution of the deficiencies in the Biological Opinion (BO) and full evaluation of its environmental effects. The BO on the Long-Term Operations of the CVP and SWP additionally constrains CVP and SWP water supply (NMFS 2009), as further discussed below.

Since passage of the CVPIA in 1992, with its changes in CVP management to redirect 800,000 acre-feet of yield to environmental protection, restoration, and enhancement, some CVP water service contractors have not received their full contract amounts from the CVP. Consequently, shortages are common place, and the continuation of and possible alterations to the proposed water transfer by the Exchange Contractors is needed to assist in meeting the shortages experienced by the affected districts. According to the recent BO on the Long-Term Operations of the CVP and SWP, the combined (SWP + CVP water) estimated annual average export curtailment is 330,000 AFY, affecting both CVP and SWP contractors. These estimates are over and above export curtailments associated with the “Wanger Decision” for Delta smelt. In recent water years (2005–2009), CVP agricultural service contractors south of the Delta have received 10 to 85 percent of their contract amounts except in 2006 when they received 100 percent. In 2007, south of Delta agricultural contractors received 50 percent water supply allocations, in 2008 only 40 percent, in 2009 only 10 percent, and in 2010 45 percent. The Friant Division received a 65 percent allocation in 2007; otherwise, they received 100 percent (see Table 2-2) (Reclamation 2011a).

Table 1-3 summarizes the irrigation shortages from the water balance analysis under wet and dry hydrologic scenarios and with 25 percent (dry year) to 100 percent (wet year) of contracted water (see Appendix C). It reflects actual deliveries for irrigation use, and some districts’ contract allocations have been adjusted to remove the M&I/other water component. It is important to note that the Exchange Contractors are unable to transfer water in water years in which the Exchange Contractors’ water supply is contractually limited. Typical years in which the Exchange Contractors would be able to transfer water up the amounts set forth in the Program description (Chapter 2) are years in which the CVP supplies are curtailed below approximately 75 to 80 percent of contract amounts but the Exchange Contractors receive their full contractual supply. Even in years with greater than 80 percent allocations and in wet years, many districts (including Madera Irrigation

District/other Friant Division contractors or San Luis Unit districts or the SWP districts) may not be able to take their contract supply or deliver sufficient water to maintain agricultural production and/or to avoid creating overtaxing of groundwater supplies because of wheeling or storage constraints. Those areas remain subject to deficit irrigation circumstances and need supplemental water supplies such as those being proposed by the Exchange Contractors.

Table 1-3
Existing Irrigation Water Deficit for Districts in the Project Area

	Wet Year with 100 Percent Contract Water Supply		Dry Year with 25 Percent Contract Water Supply	
Water District	**Contract Water for Agricultural Use (acre-feet)**	**Annual Irrigation Water Deficit (acre-feet)**	**Contract Water for Agricultural Use (acre-feet)**	**Annual Irrigation Water Deficit (acre-feet)**
Westlands	1,183,653	13,944	295,913	1,522,585
Panoche	93,935	0	23,484	100,262
Pacheco	10,071	0	2,518	10,050
San Luis	124,263	0	31,066	112,728
Del Puerto	140,210	0	35,053	142,547
Patterson	22,500	17,299	5,625	54,096
Byron-Bethany	19,893	0	4,973	18,485
San Benito County	40,780	0	10,195	49,996
Santa Clara Valley (CVP)	103,033		25,758	
Santa Clara Valley (SWP)	70,000	0	17,500	28,609
Santa Clara Valley (Total)	173,033		43,258	
Friant Division (Class 1)[1,2]	735,750		183,938	
Friant Division (Class 2)[1,2]	1,401,475	552,759	0	3,739,880
Friant Division (Total)	2,137,225		183,938	
Pajaro Valley	6,260	47,298	1,565	69,451
Kern County (SWP)	862,730	1,352,085	215,683	2,789,177
All Districts	4,814,553	1,983,385	853,270	8,637,867

Source: Water Balance Analysis (Appendix C)

[1] The Friant Division was assumed to receive 100 percent of both Class 1 and Class 2 deliveries in a wet year, although unlikely to occur.

[2] The Friant Division was assumed to receive no Class 2 deliveries and 25 percent of Class 1 deliveries in a dry year.

The availability of water for plant use during the growing season (primarily April through October) is one of the most important factors in crop production. Inadequate water supplies reduce crop yields and crop quality, thereby reducing economic profitability of the affected farms.

1.2.3 Santa Clara Valley Water District

SCVWD operates 3 water treatment plants and 10 local reservoirs and annually provides 390,000 acre-feet of water to over 1.8 million M&I and agricultural water users in Santa

Clara County. Half of the M&I water need is met by underground aquifers within the 1,300-square-mile county region. Nearly 39 percent of this water, up to 152,500 acre-feet, is obtained from the CVP (119,400 AFY for M&I needs and 33,100 AFY for agricultural needs). SCVWD negotiated a Water Service Contract (No. 7-07-20-W0023) that sets the dry year delivery base at 75 percent of contract quantity for M&I deliveries (or 89,550 acre-feet) (Reclamation 1976, amended 2005). A revised contract has been negotiated with Reclamation but has not been executed. The proposed continuation of authority to transfer would help to meet needs of M&I or agricultural users in years when full contract deliveries cannot be made. An exchange may involve SCVWD and San Luis Reservoir, which is a joint CVP/SWP facility.

SCVWD also has a SWP contract for 100,000 AFY for all water uses combined. Of this amount, 70,000 acre-feet is for agricultural water use.

1.2.4 Potential Additional CVP Contractors

East Bay Municipal Utility District

EBMUD's water system serves 20 incorporated and 15 unincorporated cities in Alameda and Contra Costa counties within the San Francisco East Bay Area. The water supply system consists of a network of reservoirs, aqueducts, water treatment plants, pumping plants, and distribution facilities. Raw (untreated) water from the Pardee Reservoir is transported approximately 91 miles through the Pardee Tunnel, the Mokelumne Aqueducts, and the Lafayette Aqueducts to the East Bay treatment plants and terminal reservoirs.

On an average annual basis, approximately 90 percent of the water used by EBMUD comes from the Mokelumne River watershed. EBMUD has water rights that allow for delivery of up to a maximum of 325 million gallons per day (11,969 acre-feet per day) from the Mokelumne River, subject to the availability of Mokelumne River runoff and senior water rights of other users. This supply is adequate except during severe droughts. Stemming from its effort to identify additional sources of supply to meet its long-term water demand since the 1960s, EBMUD executed a contract in 1970 with Reclamation for delivery of CVP water from the American River. A 1990 court decision and subsequent decisions affirmed EBMUD's right to take delivery of American River water from Folsom South Canal under its 1970 CVP contract, but the court also imposed conditions upon that delivery. In 2001, the CVP contract was amended to provide for water delivery from three possible diversion points with required conditions for each. In lieu of water from the American River, EBMUD now gets dry year water from the new Freeport Diversion on the Sacramento River (Appendix B [Section 2.4.2]).

The potential water transfer from the Exchange Contractors to this area is for M&I use only on a short-term basis and within its CVP total contract amount of 133,000 acre-feet.

Contra Costa Water District

CCWD serves approximately 550,000 people throughout northern, central, and eastern Contra Costa County. About 265,000 people receive treated water directly from CCWD, and the other 285,000 receive water CCWD delivers to six local agencies. Its customers include 10 major industries, 36 smaller industries, and approximately 50 agricultural users. CCWD operates raw water distribution facilities, water treatment plants, and treated water distribution facilities (CCWD 2000). CCWD sells raw water from the Contra Costa Canal for municipal, industrial, landscape irrigation, and agricultural purposes. The municipal customers are the cities of Antioch, Martinez, and Pittsburg, Southern California Water Company in Bay Point, and Diablo Water District in Oakley. These five purveyors treat the water and distribute it to approximately 220,000 residents in their communities (CCWD 2000).

CCWD draws its water from the Delta under a contract with the Federal CVP for 195,000 AFY. CCWD is the CVP's largest urban contractor. In 1998, the water district completed construction of the locally financed $450 million Los Vaqueros Project, including a 100,000 acre-foot reservoir, designed to provide improved water quality and emergency supply reliability for CCWD customers as well as net environmental benefits. The State Board subsequently issued Water Rights Permits No. 20749 and 20750 for filling Los Vaqueros Reservoir from the new intake at Old River near Highway 4 and diversion and storage of the water of Kellogg Creek. These rights are in addition to the contractual rights to divert and store water furnished through the CVP.

The potential water transfer from the Exchange Contractors to this area is for M&I use only on a short-term basis and within its CVP total contract amount of 195,000 acre-feet.

Pajaro Valley Water Management Agency

In 1984, PVWMA was formed and given the responsibility of managing groundwater resources within the Pajaro Valley. PVWMA's service area encompasses approximately 79,600 acres of irrigated agricultural lands, native and nonirrigated lands in the hillside areas, the city of Watsonville, and the unincorporated communities of Pajaro, Freedom, Corralitos, and Aromas in Monterey and Santa Cruz counties. The Pajaro Valley is home to over 80,000 residents, all of whom, to some degree, rely on the existing groundwater supply. Agriculture is the most significant economic industry in the valley. High-value crops include strawberries, bush berries, apples, flowers, lettuce, artichokes, and a variety of other vegetables.

PVWMA sought and eventually obtained, on a willing seller basis, an assignment of a portion of a CVP water supply contract from the Mercy Springs Water District. Reclamation approved the agreement in 1999, making PVWMA a CVP contractor. This assignment is for up to approximately 6,260 AFY of water. Previous deliveries of CVP water to Mercy Springs ranged from 25 to 100 percent; consequently, the potential water supply is expected to range up to 6,260 AFY.

The potential water transfer from the Exchange Contractors to this area is for agricultural and/or M&I use.

1.2.5 Potential Additional SWP Contractor

Kern County Water Agency

KCWA was created in 1961 by a special act of the California Legislature and serves as the local contracting entity for the SWP. KCWA is the second largest participant in the SWP. Its SWP contract is for 1,153,400 acre-feet. KCWA has long-term contracts with 13 local water districts, called "Member Units." Under the terms of the Monterey Amendment, which was implemented in 1995, KCWA Member Units and Dudley Ridge Water District agreed to permanently retire 45,000 acre-feet of SWP entitlement water in exchange for transferring the Kern Water Bank (KWB) property from California Department of Water Resources (DWR) to KCWA. The KWB property was simultaneously transferred from KCWA to the KWB Authority in 1995. In addition, KCWA agreed to allow up to 130,000 acre-feet of "Table A" water to be permanently sold to urban contractors on a willing buyer and seller basis.

Similar to CVP contractor circumstances, SWP contractors also are subject to shortages in supplies. Potentially KCWA may purchase water from the Exchange Contractors, or may provide exchange/banking opportunities for the transfer water.[4] Numerous groundwater banking programs have been developed in Kern County to provide more reliable supplies during dry years. The potential water transfer from the Exchange Contractors to KCWA is for agricultural and/or M&I use.

1.3 Possible Related Projects

Water transfers and/or exchanges occur throughout California and are an important component of water use and good water management. Specific projects possibly related to the Proposed Program and currently under consideration, or recently approved, and other historical background documents that may be helpful in determining other actions being taken or considered are described in the following documents. The CEQA/NEPA compliance documents for CVP contracts are incorporated by reference into this EIS/EIR (and summarized in appropriate sections in Chapter 3) because they may provide information that is substantive to the discussion and conclusions provided herein:

- *Contract for Purchase of Miller & Lux Water Rights, Contract No. Ilr-1145, July 27, 1939* (Reclamation 1939)
- *Second Amended Contract for Exchange of Waters, Contract No. I1r-1144, December 6, 1967* (Reclamation 1967)
- *Grassland Bypass Project 2010–2019 Final Environmental Impact Statement/Environmental Impact Report* (Reclamation and San Luis & Delta-Mendota Water Authority 2009)
- *San Luis Drainage Feature Re-evaluation, Record of Decision* (Reclamation 2007a)

[4] New groundwater banking is not part of the Proposed Program. Any banking facilities used to enable an exchange would need to be in an approved water bank. Water banking of CVP supplies must be in accordance with Reclamation's groundwater banking guidelines and associated checklist.

- *San Joaquin Basin Action Plan and North Grasslands Area Conveyance Facilities, Final Environmental Assessment/Initial Study* (Reclamation 1997a)
- *Report on Refuge Water Supply Investigations, Central Valley Hydrologic Basin, California* (Reclamation 1989)
- *Refuge Water Supply, Long-Term Water Supply Agreements, San Joaquin River Basin* (Reclamation et al. 2001)
- *Friant Division, Long-Term Contract Renewal, Final Environmental Assessment* (Reclamation 2001)
- *Contract between the United States and Arvin-Edison Water Storage District Providing for Project Water Service from Friant Division and for Facilities Repayment* (Reclamation 2010a)
- *Delta-Mendota Canal Unit, Long-Term Contract Renewal, Draft Environmental Assessment* (Reclamation 2000a)
- *Central Valley Project Long-Term Water Service Contract Renewal for San Felipe Division, Draft Environmental Assessment* (Reclamation 2000b)
- *Groundwater Pumping/Water Transfer Project for 25 Consecutive Years, Environmental Assessment/Initial Study* (Reclamation and Exchange Contractors 2007)
- *2010–2011 Water Transfer Program, Draft Environmental Assessment/Finding of No Significant Impact* (Reclamation 2010b)
- *One-Year Acquisition/Transfer of 8,000 Acre Feet of San Joaquin Exchange Contractors Water Authority Water to Meet South of Delta Refuges Incremental Level 4 Water Supply Needs for Water Year 2010, Final Environmental Assessment and Finding of No Significant Impact* (Reclamation 2010c)
- *San Luis Unit Long Term Contract Renewal, Draft Environmental Impact Statement* (Reclamation 2004a)
- *Central Valley Project, West San Joaquin Division, San Luis Unit Long-Term Water Service Contract Renewal, Draft Environmental Impact Statement and Appendices* (Reclamation 2005b)
- *San Luis Unit Water Service Interim Renewal Contracts 2010-2013, Finding of No Significant Impact and Final Environmental Assessment* (Reclamation 2010d)

Other environmental impact analyses relevant to the Exchange Contractors' Proposed Water Transfer Program that are underway but not completed include:

- **Long-Term "North-to-South" Water Transfer Program**
  The EIS/EIR will address transfers of CVP from water agencies in Northern California to water agencies south of the Delta and in the San Francisco Bay Area. The proposed action includes transfers of CVP and non-CVP supplies that require the use of CVP or SWP facilities for conveyance. The transfers would occur through various methods including groundwater substitution and cropland idling. Annual and multiyear transfers from 2012 through 2022 are contemplated. Public scoping was conducted in January 2011.

- **San Luis Unit Interim Contract Renewals**
  Reclamation proposes to execute five interim renewal contracts beginning February 2012, for 2 years for WWD. Six interim renewal contracts for PWD, SLWD, California Department of Fish and Game (CDFG), and the cities of Huron, Coalinga, and Avenal were completed in March 2011 for 2 years. Interim renewal contracts are undertaken under the authority of the CVPIA to provide a bridge between the expiration of the original long-term water service contracts and long-term renewal of those contracts. The San Luis Unit Long-Term Contract Renewal EIS is currently on hold and is not expected to be finalized during the preparation of the EIS/EIR for the Exchange Contractors' Proposed Water Transfer Program.
- **CVP M&I Water Shortage Policy**
  Reclamation is in the process of updating the CVP M&I Water Shortage Policy (WSP). Reclamation, the NEPA lead agency, plans to prepare an EIS to analyze the potential effects of an update to the draft 2001 M&I WSP (Proposed Action), which was evaluated in an Environmental Assessment (EA) in 2005. A Finding of No Significant Impact (FONSI) was signed in December 2005. Since that time, CVP contractors have raised questions on the WSP, and environmental and operational conditions have changed. In addition to the Service's BO in 2008 and the National Marine Fisheries Services' (NMFS') BO in 2009, changes in population projections and changes in crop types require Reclamation to provide an updated M&I WSP that recognizes the different needs of the water user community during water shortages (Reclamation 2011b).
- **Refuge Water Supply Diversification Projects**
  Reclamation has used American Recovery and Reinvestment Act of 2009 funds to install two groundwater production wells at the Volta WA that will produce up to 5,000 acre-feet of groundwater per year beginning in 2012. This project will develop a groundwater supply along the Volta Wasteway that will be used to diversify refuge water supply sources and supplement water supplies for critical spring and summer nesting habitat while improving water supply reliability. Reclamation staff will also analyze water quality through a monitoring plan. Groundwater deliveries from these wells will allow Reclamation to help meet specific goals under the CVPIA (Reclamation 2010e). Reclamation is also engaged in design, environmental, and permitting activities for the North Grassland Water Conservation and Water Quality Control Project. This project is based on a feasibility study (completed) for recirculation of water supplies to benefit the Grassland Resource Conservation District wildlife refuges.

Other projects or studies are recently approved or underway that may affect water quality and flows in the San Joaquin River. The hydrologic analysis in Chapter 4 and Appendix `B incorporates the following recent activities/approved projects and regulatory constraints:

- State Board's Decision 1641 (State Board 1999, revised 2000)

- Formal Endangered Species Act Consultation on the Proposed Coordinated Operations of the Central Valley Project (CVP) and State Water Project (SWP) (Service 2008a)
- New Melones Reservoir Operations Plan (Reclamation 1997b)
- San Joaquin River Restoration Program (SJRRP) EIS/EIR (Reclamation and DWR 2011)[5]
- Amendments to Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Salt and Boron Discharges into the Lower San Joaquin River, Draft Final Staff Report. Appendix 1: Technical TMDL Report. (Regional Board 2004)
- Westside Regional Drainage Plan (Exchange Contractors et al. 2003)

In addition to these activities, which have been incorporated quantitatively into the hydrologic analyses or addressed qualitatively to the extent that changes or conditions can be known, other studies and regulations are under consideration that could affect the hydrologic analysis of baseline conditions and future cumulative conditions for the San Joaquin River, including projects under the SJRRP for Reaches 2, 3, and 4 within the Exchange Contractors' water development area. These projects are identified here to emphasize the dynamic regional context in which the proposed water transfer would occur. The annual transfer approval process described in Section 13.3.3 will capture dynamic changes to the underlying hydrology and surrounding conditions of the San Joaquin River caused by future actions over the next 25 years from the activities that may be implemented under the following programs.

1.3.1 Irrigated Lands Waiver (Central Valley Regional Water Quality Control Board)

The Regional Board's Irrigated Lands Program addresses irrigation return flows and stormwater runoff from agricultural lands that are currently exempted from the National Pollutant Discharge Elimination System (NPDES) permit program. On July 11, 2003, the Regional Board adopted two conditional waivers of Waste Discharge Requirements for discharges from irrigated lands: coalition group waiver and individual discharger waiver. The conditional waivers allow time for coalition groups to form and begin to identify and deal with water quality problems in their watersheds. The Regional Board has renewed the Coalition Group Conditional Waiver until July 2013 (Order No. R5-2006-0053). The waiver has been amended three times. The Exchange Contractors are participating in the Westside San Joaquin River Watershed Coalition.

1.3.2 San Joaquin River Restoration Program

The SJRRP is to implement the Stipulation of Settlement in the Natural Resources Defense Council, et al., v. Kirk Rodgers, United States Bureau of Reclamation, et al.,

[5] The SJRRP EIS/EIR will not be finalized in 2011. Also, permanent (rather than only temporary) future water rights changes and associated terms and conditions to implement full Restoration Flows will be in place during the Proposed Program but are not yet in effect.

Case No. S-88-1658-LKK/GGH, United States District Court, October 23, 2006 (San Joaquin River Settlement Agreement), and in accordance with the San Joaquin River Restoration Settlement Act, Title X of Public Law 111-11. The SJRRP is a negotiated settlement effort among Reclamation, the Friant Water Users Authority, the Natural Resources Defense Council, and the Pacific Coast Federation of Fishermen's Associations. The Settlement is based on two goals: (1) to restore and maintain fish populations in "good condition" in the mainstem of the San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish; and (2) to reduce or avoid adverse water supply impacts to all of the Friant Division long-term contractors that may result from the "Interim Flows and Restoration Flows" provided for in the Settlement. The SJRRP is directed by a Management Team, which is made up of key stakeholders and includes representatives from three Federal agencies (Reclamation, Service, and NMFS) and two California agencies (DWR and CDFG). The SJRRP's area is the 150-mile stretch of San Joaquin River between Friant Dam and the confluence of the Merced River.

Salmon restoration is scheduled to begin with the reintroduction of spring/fall run Chinook salmon into the San Joaquin River between Friant Dam and the confluence with the Merced River by December 31, 2012. Interim flow releases were made starting October 1 through November 20, 2009, and in subsequent years. Juvenile salmon were also released into the San Joaquin River in 2011 and tracked as part of a survival and migration study.

A Program EIS/EIR was released for public review on April 22, 2011. The reach-specific planning studies are underway with additional NEPA/CEQA compliance scheduled for 2011–2013. As part of the SJRRP, the following environmental documents were completed on short-term components of the overall project that have independent utility:

- *Recirculation of Recaptured Water Year 2011 San Joaquin River Restoration Program Interim Flows, Final Environmental Assessment and Finding of No Significant Impact* (Reclamation 2011c, d)
- *Interim Flows Project – Water Year 2012, Final Supplemental Environmental Assessment and Finding of No Significant Impact,* (Reclamation 2011e, f)

1.3.3 Review and Potential Amendment of State Water Resources Control Board Southern Delta Salinity and San Joaquin River Flow Objectives from the 2006 Bay-Delta Plan

The State Board has initiated a process regarding potential amendments or revisions to the southern Delta salinity and San Joaquin River flow objectives included in the 2006 Bay-Delta Plan and their implementation. The outcome of the proceeding could be a revision to the current water quality and flow objectives for the San Joaquin River. Revisions could affect the hydrologic regime and operations within the study area. A report ordered to be filed with the California Legislature, without the conduct of alternative use or consideration of impacts relating to flows of water and water conditions if greater flows were provided and which flows might enhance species within the Delta areas, was prepared by the State Board staff and filed with the California Legislature in

August 2010. *Determining Flow Criteria Pursuant to Delta Reform Act* was adopted by the State Board on August 3, 2010 (Resolution 2010-0039) (State Board 2010).

1.3.4 Review and Possible Issuance of Rules by U.S. Environmental Protection Agency Relating to Delta Conditions

The U.S. Environmental Protection Agency (EPA) has given notice that it may commence rule-making proceedings to determine if special rules are required for water conditions within the Delta and the flows entering such body. The EPA has consulted with the Service and NMFS concerning the California Toxics Rule and has agreed to several actions, including reevaluating and revising selenium criteria for the protection of semiaquatic wildlife in San Francisco Bay and the Delta. The EPA intends to propose revised site-specific criteria for these water bodies and will formally request public comment on these criteria.

1.3.5 Grassland Bypass Project, 2010–2019

The Final Environmental Impact Report was completed in August 2009 (Reclamation and Authority 2009), and the ROD was signed in December 2009 (Reclamation 2009a). The purposes and objectives of the continuation of the Grassland Bypass Project, 2010–2019 are to:

- Extend the San Luis Drain Use Agreement to allow the Grassland Basin Drainers time to acquire funds and develop feasible drainwater treatment technology to meet revised Basin Plan objectives and WDRs by December 31, 2019.
- Continue the separation of unusable agricultural drainwater discharged from the Grassland Drainage Area from wetland water supply conveyance channels for the period 2010–2019.
- Facilitate drainage management that maintains the viability of agriculture in the Project Area and promotes continuous improvement in water quality in the San Joaquin River.

The Project continues the present drainwater conveyance using the San Luis Drain with discharge of a portion of the collected drainwater to Mud Slough. New features include negotiation with Reclamation and other stakeholders for a 2010 Use Agreement for the San Luis Drain, including an updated compliance monitoring plan, revised selenium and salinity load limits, an enhanced incentive performance fee system, a new Waste Discharge Requirement from the Regional Board, and mitigation for continued discharge to Mud Slough until 2019. Discharges of agricultural drainage containing selenium, salt, molybdenum, and boron to Mud Slough (North) and the San Joaquin River are reduced over the period 2010–2019. By 2019, the monthly load of selenium is to equal Total Maximum Monthly Load (TMML) established to meet water quality objectives in 2019. In-Valley treatment/drainage reuse at the San Joaquin River Improvement Project facility would be expanded to 6,900 acres.

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2.0 Alternatives

Alternatives developed for evaluation in this EIS/EIR are the No Action/No Project Alternative, and four action alternatives. The No Action/No Project Alternative represents the reasonably foreseeable future without the Exchange Contractors' Water Transfer Program after water year 2013. It also assumes no water transfers from the Exchange Contractors after the current 10-Year Program ROD ends (February 28, 2014). The action/project alternatives (hereafter called action alternatives) involve the development of water by the Exchange Contractors, up to a maximum of 150,000 acre-feet, and exchange or transfer of some or all of that water to any or all of the following uses and needs:

- Temporary water supplies to meet the Incremental Level 4 requirements for the San Joaquin River Basin and Tulare Lake Basin wildlife refuges
- Temporary water supplies to Friant Division CVP repayment and/or water service contractors for the production of agricultural crops or livestock because of water supply shortages or when full contract deliveries cannot otherwise be made
- Temporary water supplies for other CVP agricultural service and M&I contractors (San Luis Unit, SCVWD, EBMUD, CCWD, and PVWMA) as supplemental water supplies to support agricultural and/or M&I uses when full contract deliveries cannot otherwise be made
- Temporary water supplies to two SWP contractors (KCWA and SCVWD) for agricultural and/or M&I for supplemental water supplies
- Seasonal flexibility of deliveries to the Exchange Contractors through exchange with CVP and SWP agricultural service and M&I contractors wherein water would be delivered and then returned at a later date within the year

The Exchange Contractors propose to develop the water from conservation (including tailwater recovery) and crop idling/temporary land fallowing activities. Action alternatives have been developed for a range of quantities of water from these sources for the delivery of the water to any or all of these potential water users. A range of water transfers and/or exchanges may be selected as the preferred action/project to respond to hydrologic and economic conditions over the 25-year period (March 1, 2014, through February 28, 2039, i.e., Reclamation water service years 2014–2038). All transfer and/or exchange proposals will be evaluated and approved by Reclamation annually in accordance with the CVPIA's and Reclamation's guidelines for implementation of water transfers (Reclamation 1993), which are discussed in Section 2.4. No changes are being proposed to these laws and guidelines with the range of alternatives evaluated herein.

This section is organized into the following subsections:

- Project Location
- No Action/No Project Alternative

- Action/Project Alternatives
- Required Approvals and Permits
- Alternatives Considered But Eliminated
- Agency Preferred Alternative
- Summary Comparison of Alternative Impacts/Effects

2.1 Project Location

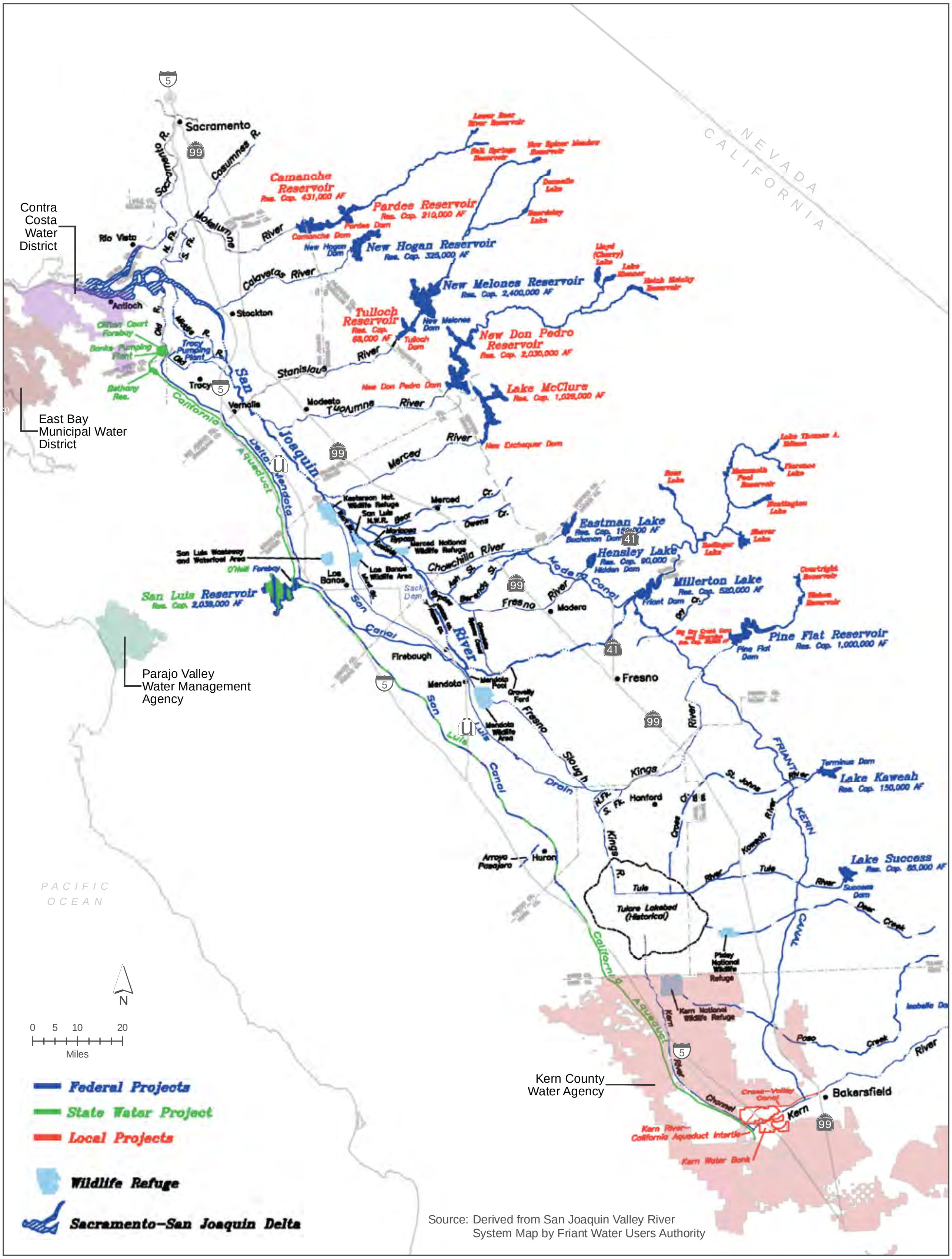
The water exchanges and transfers would occur largely within the San Joaquin Valley of Central California. Deliveries may include additional water users over the existing Program, specifically CVP contractors north, west, and south of the Delta. This proposed change would expand the Project Area from Fresno, Kern, Kings, Madera, Merced, San Benito, San Joaquin, Santa Clara, Stanislaus, and Tulare counties (10 counties) to include an additional 4 counties (Contra Costa, Alameda, Monterey, and Santa Cruz) in California. Figure 2-1 is a regional map that shows the general location of the Project Area (Program area) in the San Joaquin Valley within the state of California and key hydrologic features. The locations of the Exchange Contractors (transferor) Water Transfer Program's potential recipients (transferees) are illustrated on maps presented on the following pages and described below:

- The Exchange Contractors would develop their water from within their service area. The Exchange Contractors' service area covers 240,000 acres of agricultural land in Fresno, Madera, Merced, and Stanislaus counties, shown on Figure 2-2.
- The wetland habitat areas that would receive the water are located in Merced, Fresno, Tulare, and Kern counties, shown on Figure 2-3.
- The agricultural and/or M&I water users that would benefit from the potential transfers are located in Stanislaus, San Joaquin, Merced, Madera, Fresno, San Benito, Santa Clara, Tulare, Kern, Kings, Contra Costa, Alameda, Monterey, and Santa Cruz counties, shown on Figure 2-4 (along with the Exchange Contractors and some of the larger wetland habitat areas).

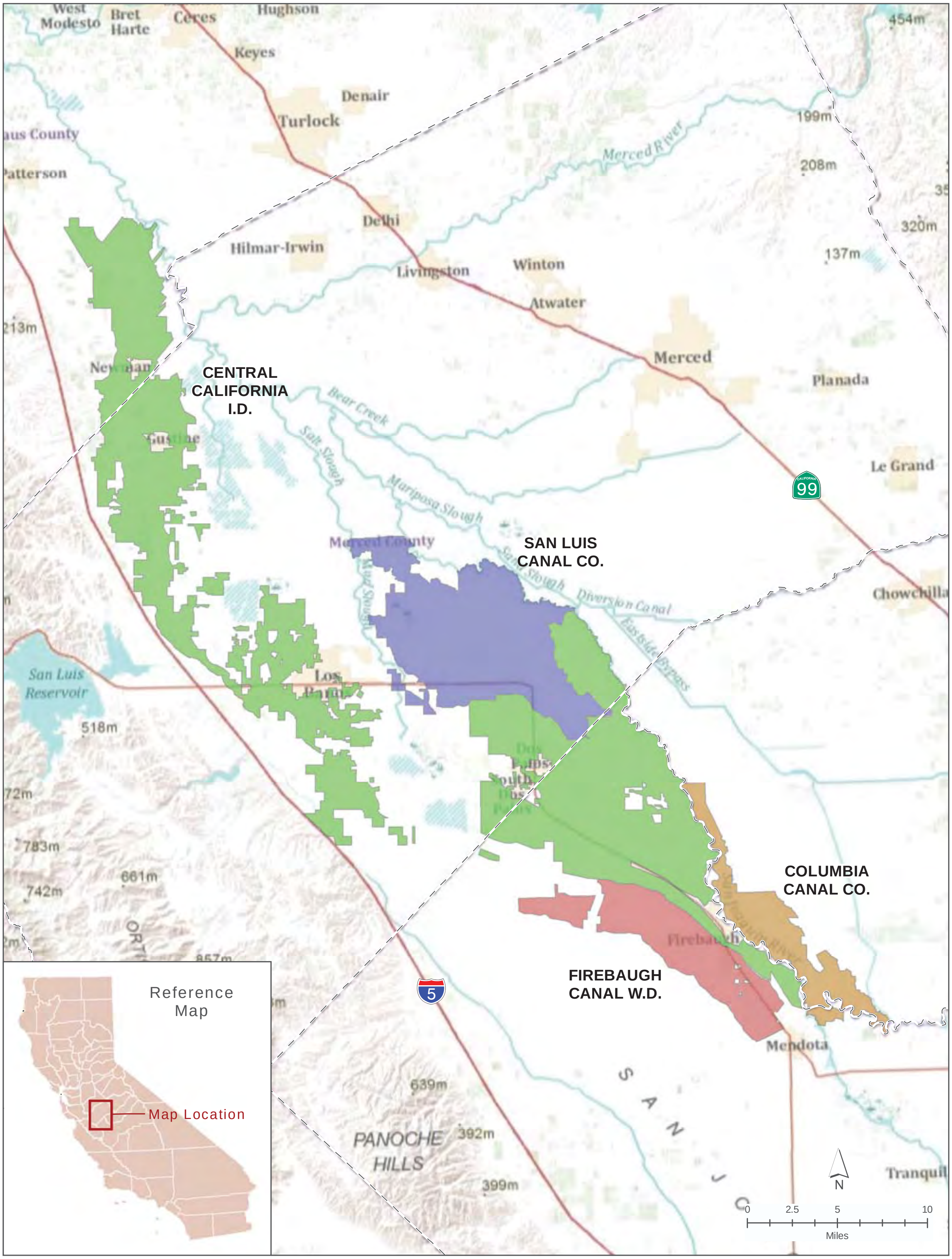
2.2 No Action / No Project Alternative

For the Exchange Contractors' Water Transfer Program for the additional water years 2014–2038 proposed over the current approved 10-Year Water Transfer Program, the No Action/No Project Alternative is considered as follows:

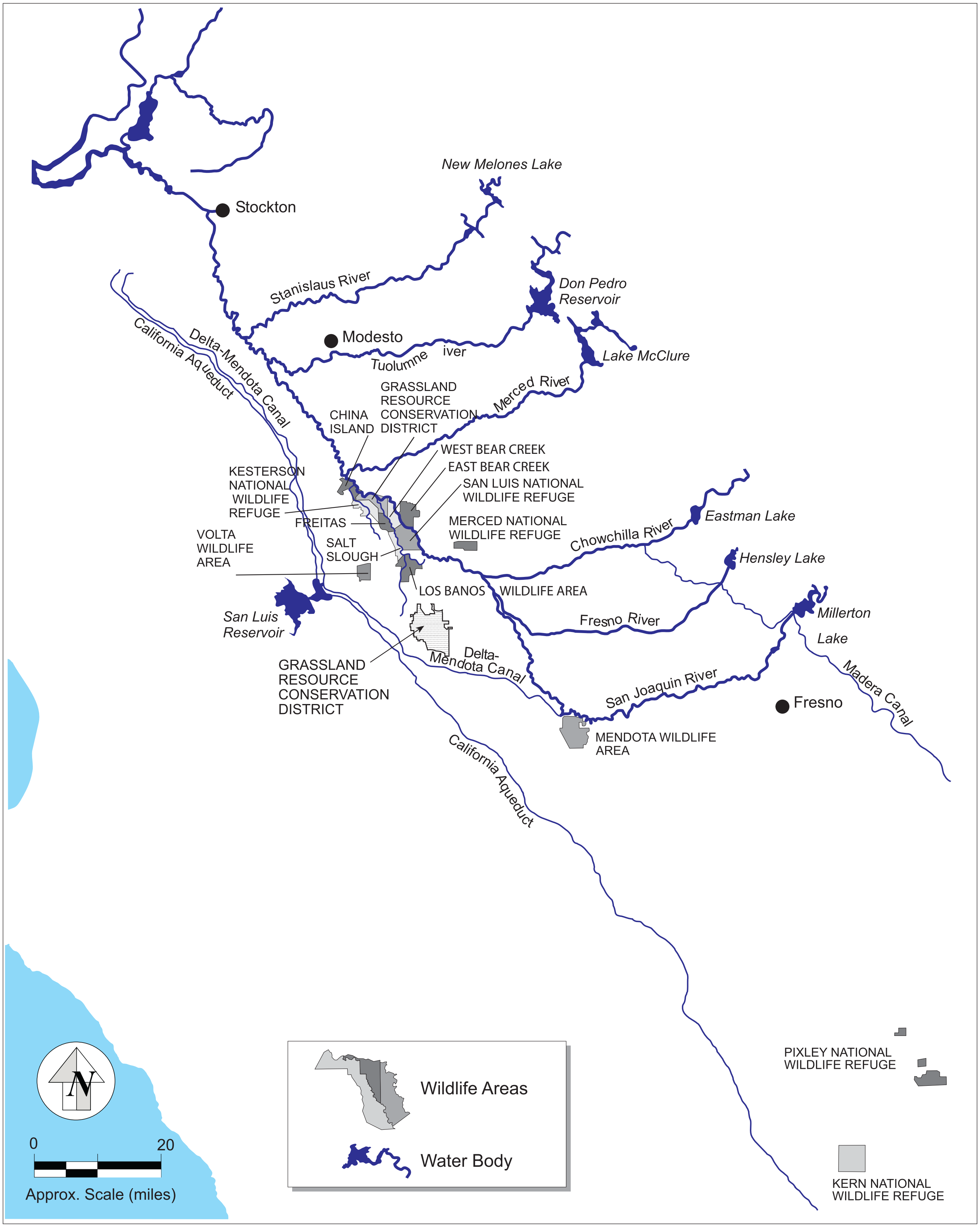
- Reclamation describes the No Action Alternative as a projection of conditions that could reasonably occur within the time period associated with the extended proposed transfer, March 1, 2014, through February 28, 2039, or water service years 2014–2038, but without any of the action alternatives being implemented after the existing Water Transfer Program expires (water year 2014). The existing Program would end after water year 2013.



Project No. 31325020	EIS/EIR	San Joaquin Valley Region with Project Area and Vicinity	Figure 2-1



Project No. 31325020	EIS/EIR	San Joaquin River Exchange Contractors Water Authority Service Area	Figure 2-2



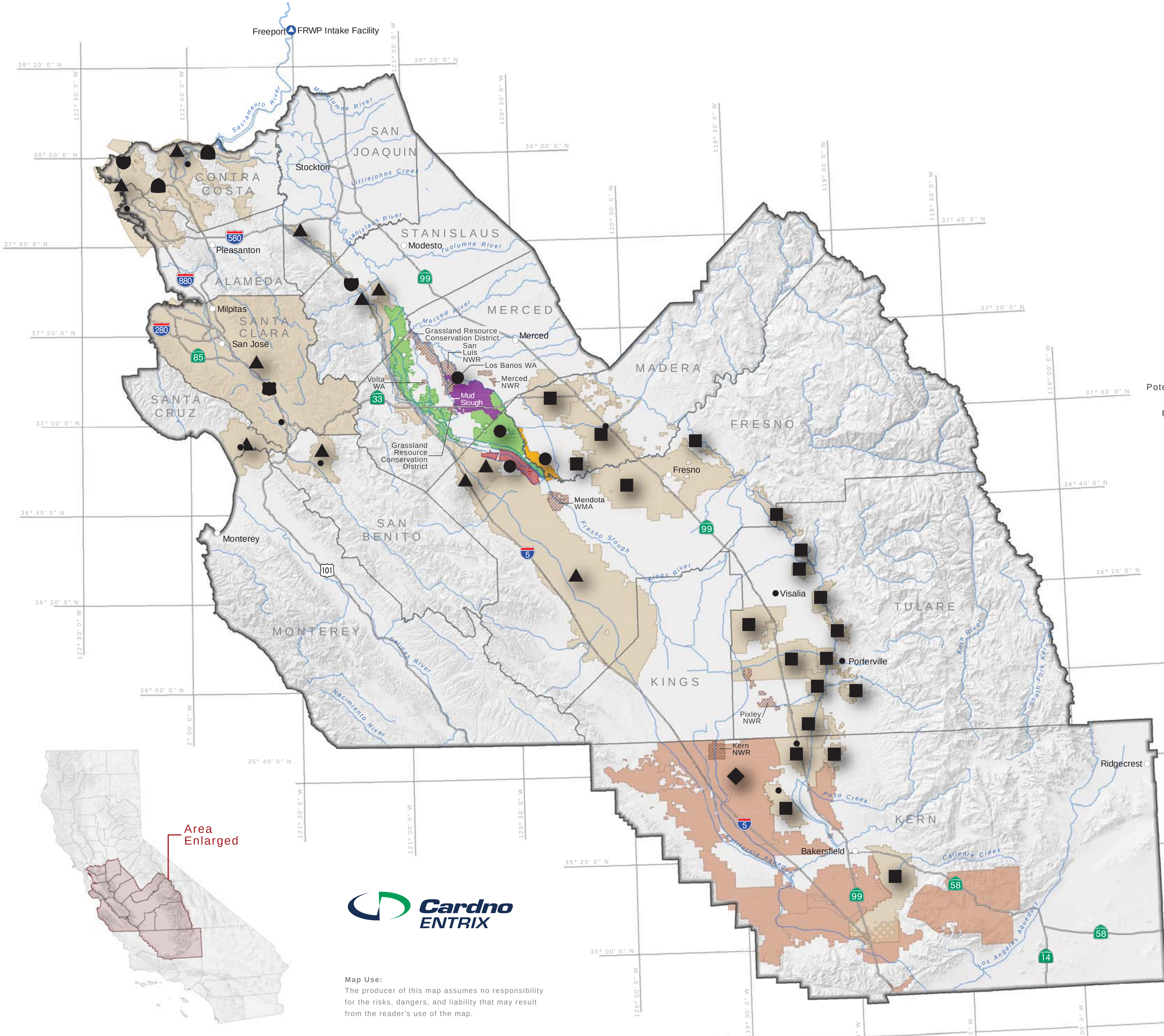
Project No. 31325020	EIS/EIR	SAN JOAQUIN VALLEY WILDLIFE AREAS	Figure 2-3

EXCHANGE CONTRACTORS

25-YEAR WATER TRANSFER PROGRAM

Program Area and Vicinity

FIGURE 2-4



Map Use: The producer of this map assumes no responsibility for the risks, dangers, and liability that may result from the reader's use of the map.

LEGEND

SAN JOAQUIN RIVER
EXCHANGE CONTRACTORS
WATER AUTHORITY

- Central California Irrigation District
- Columbia Canal Company
- Firebaugh Canal Water District
- San Luis Canal Company

- Potential Central Valley Project Water Users
- Potential State Water Project Water User
- Potential Wildlife Refuges Water Users

- County Boundary
- City / Town
- River

0 10 20 40
Scale in Miles

1 Inch = 27 Miles

Map Date: 10 | 12 | 11

Map Abbreviations:
NWR » National Wildlife Refuge
WA » Wildlife Area
WMA » Wildlife Management Area

Map Projection:
Universal Transverse Mercator (UTM)
North American Datum of 1983 (NAD83)
Zone 10 North
Linear Unit: Meter

Map Grid:
Latitude/Longitude

Data Sources:
Water District Boundaries:
U.S. Bureau of Reclamation

Wildlife Refuges:
U.S. Fish and Wildlife Service
California Department of Fish and Game

SOURCE

SAN JOAQUIN RIVER
EXCHANGE CONTRACTORS
WATER AUTHORITY

- Central California Irrigation District 1
- Columbia Canal Company 2
- Firebaugh Canal Water District 3
- San Luis Canal Company 4

RECEIVING

CENTRAL VALLEY PROJECT | WESTSIDE AND BAY AREA

- Contra Costa Water District 5
- Del Puerto Water District 6
- East Bay Municipal Utility District 7
- Pacheco Water District 8
- Pajaro Valley Water Management Agency 9
- Panoche Water District 10
- Patterson Water District 11
- Byron-Bethany Irrigation District 12
- San Benito County Water District 13
- San Luis Water District 14
- Santa Clara Valley Water District 15
- Westlands Water District 16

CENTRAL VALLEY PROJECT | EASTSIDE

- Arvin-Edison Water Storage District 17
- Chowchilla Water District 18
- Delano-Earlimart Irrigation District 19
- Exeter Irrigation District 20
- Fresno Irrigation District 21
- Garfield Water District 22
- Gravelly Ford Water District 23
- International Water District 24
- Ivanhoe Irrigation District 25
- Kaweah-Delta Water Conservation District 26
- Lewis Creek Water District 27
- Lindmore Irrigation District 28
- Lindsay-Strathmore Irrigation District 29
- Lower Tule River Irrigation District 30
- Madera Irrigation District 31
- Orange Cove Irrigation District 32
- Porterville Irrigation District 33
- Saucelito Irrigation District 34
- Shafter-Wasco Irrigation District 35
- Southern San Joaquin Municipal Utility District 36
- Stone Corral Irrigation District 37
- Tea Pot Dome Water District 38
- Terra Bella Irrigation District 39
- Tulare Irrigation District 40

- Similarly, the No Project Alternative under CEQA is the condition under which the Project does not proceed (in this case, no Water Transfer Program for water service years 2014–2038).
- Under CEQA, the basis for determining the significance of environmental impacts is existing physical conditions in June 2011 when the Notice of Preparation of an EIR was released. The No Project Alternative is evaluated against the existing condition, but is not the baseline for significance determinations unless it is equivalent to the existing condition.
- The baseline for the NEPA analysis of adverse, beneficial, or no effect is the No Action/No Project Alternative which is similar to existing conditions, i.e., the baseline condition without approved plans and projects, for some resources.
- Where "no transfer" from the Exchange Contractors would result in predictable actions by the RWSP and the Exchange Contractors after the current Program expires, these actions are discussed below.

Assumptions under the No Action/No Project Alternative

The No Action/No Project Alternative would result in no transfer or exchange of water from the Exchange Contractors to either Reclamation or to any of the other potential water users at the conclusion of the existing Program on February 28, 2014 (through water year 2013). The response of the entities directly involved with the Proposed Program to no transfer from the Exchange Contractors would be:

- The Exchange Contractors would recover and reuse within their own operations the water previously transferred. The reused tailwater would be integrated into the Exchange Contractors' water supply and reduce need for groundwater pumping that currently helps meet irrigation demands.
- The Exchange Contractors would not modify their operations relative to the San Joaquin River because the amounts of return flow would remain approximately the same. However, no water development would occur from any temporary land fallowing in the absence of a transfer program.
- Deliveries to the refuges would consist of Level 2 and Replacement Water[1] quantities plus a portion of the Incremental Level 4 need that could reasonably be obtained from other sources. The practical result would be a reduction in deliveries to the wildlife refuges from the Exchange Contractors and additional acquisitions of water from other entities through purchases by the RWSP.
- Agricultural and M&I water users would get their CVP and SWP contractual supplies subject to the limitations in their contracts. Under the No Action/No

[1] Replacement Water is the amount of water that the San Luis Unit, Freitas and Kesterson NWRs, and Volta and Mendota WAs had historically received and used, which is more than Level 2 amounts but may be less than or equal to their Level 4 amounts. Replacement Water was originally provided by groundwater and tailwater, but due to water quality concerns, Reclamation entered into agreements to provide Replacement Water to the wildlife areas. When willing sellers and funds are available, Reclamation acquires water to supplement supplies to minimize the impact to CVP contractors south of the Delta.

Project Alternative, the CVP and SWP water users may obtain water from other sources or they would continue to experience shortages.

Existing Conditions Baseline for Analysis

Existing conditions for the San Joaquin River reflect the current environment of the system that includes the following actions:

- The recent transfers of water by the Exchange Contractors (80,000 to 88,000 acre-feet, see Table 1-1)
- The curtailment of water deliveries due to ongoing regulatory actions and requirements (such as the Wanger Decision and the BO on the Long-Term Operations of the CVP and SWP) as discussed in Section 1.2.2
- Interim flows under the SJRRP, which began October 1, 2009
- The Grassland Bypass Project continuation from 2010 to 2019, which results in water quality improvements to the reduced discharges to Mud Slough (North) and the San Joaquin River[2]

2.2.1 Assumptions Related to the Wetland Habitat Areas

Under the No Action/No Project Alternative, deliveries to wetland habitat areas in the San Joaquin Valley are assumed to consist of Level 2 quantities plus 52,415 acre-feet of the Incremental Level 4 water supply. Of the 52,415 acre-feet in Table 2-1, 43,344 acre-feet could be obtained for San Joaquin River refuges and 9,071 acre-feet for Kern NWR. Lands historically managed for wetland habitat and irrigated for wildlife food supply could be flooded at the wetland habitat areas, consistent with the past 5 years' operations. A substantial portion of the Incremental Level 4 Water Supply is used for seasonal irrigation needs at the refuges. Table 2-1 summarizes the quantities of water to be delivered to the wetlands under the No Action/No Project Alternative based on an average of Incremental Level 4 deliveries to the refuges from water years 2006 through 2010.

[2] A substantial amount of the monies received from the sale of water under the transfers by Firebaugh Canal Water District (FCWD) and the portion of those proceeds attributable to conservation within the Camp l3 area of Central California Irrigation District (CCID) are invested in developing water quality control measures for reducing uncontrolled discharges of salt, selenium, and boron to the San Joaquin River and further control of those constituents in drainwater by treatment including application to land areas.

Table 2-1
San Joaquin Valley Refuge Annual Water Supplies
No Action/No Project Alternative

San Joaquin Valley Refuges	Level 2 (acre-feet)	Incremental Level 4 (acre-feet) Average of 2006-2010 Water Year Deliveries	No Action Total
San Luis NWR Complex			
San Luis Unit	19,000*	0	19,000
West Bear Creek Unit (formerly West Gallo)	7,207	0	7,207
Kesterson Unit	10,000*	0	10,000
Freitas Unit	5,290*	0	5,290
East Bear Creek Unit (formerly East Gallo)	8,863	0	8,863
Los Banos WA	16,670	3,353	20,023
Volta WA	13,000*	0	13,000
Mendota WA	27,594*	240	27,834
Grassland Resource Conservation District	125,000	33,209	156,209
North Grassland WA			
China Island Unit	6,967	2,793	9,760
Salt Slough Unit	6,680	2,049	8,729
Merced NWR	13,500	1,700	15,200
Kern National Wildlife Refuge Complex			
Kern NWR	9,950	9,071	19,021
Pixley NWR	1,280	0	1,280
Total for San Joaquin Valley Refuges	271,001	52,415	323,416

Sources: B. Hubbard, pers. com., 2011
Note: Acre-feet of water delivered at refuge boundary. Average of 2006 through 2010 deliveries.
* Includes Replacement Water as defined in Appendix B.
Merced NWR is part of the San Joaquin Valley refuges but is not a beneficiary of RWSP water. It is included here for information only.

2.2.2 Assumptions Related to the Delivery of Water to CVP Contractors

Under the No Action/No Project Alternative, the current Program would not continue, and CVP contractors in the one county would not receive transfer water.

In the absence of the proposed water transfer from the Exchange Contractors at the conclusion of the existing Program at the end of water year 2013, agricultural and M&I water users would receive their CVP contractual supplies subject to the limitations and/or shortages in their contracts with Reclamation using existing conveyance facilities. They would also rely on groundwater pumping to supplement surface water deliveries or obtain water from other sources. Absent the transfer, at times these agricultural water users would fallow additional lands. Table 2-2 shows the CVP contractual water supply and the last 5 years of allocations for each non-Friant Division district that could receive transfer/exchange water for agricultural and M&I uses. The Federal contract allocations are inclusive of all contracts for both irrigation and M&I/other uses, because Federal contract allocations allow for a portion of the supply to be converted to M&I and other uses. The Friant Division includes M&I/other contractors that were not included in Table 1-3 and are not shown on Figure 2-4 (because these users would not be part of the Proposed Program).

2.2.3 Assumptions Related to the Delivery of Water to SWP Contractors

Under No Action/No Project Alternative, deliveries may not include SCVWD as described in Section 1.2.3 (with both CVP and SWP contracts) and a SWP contractor south of the Delta, specifically KCWA, within the CVP consolidated Place-of-Use (i.e., within Kern County and not transferrable to Southern California). However, these additional areas of Kern County not previously considered in the 2004 Water Transfer Program EIS/EIR would be included under the Proposed Program to permit conjunctive use of surface water and groundwater and to permit greater flexibility for SWP exchanges and cooperative acquisition and exchange of the transferred water. Under the No Action/No Project Alternative, these water management purposes would not be met.

2.2.4 Assumptions Related to the Exchange Contractors

Reclamation and the Exchange Contractors are parties to the *Second Amended Contract for Exchange of Waters, Contract No. I1r-1144* (Contract), dated December 6, 1967, and incorporated by reference into this EIS/EIR. Under the Contract, Reclamation supplies the Exchange Contractors with a substitute supply of CVP water to be used in lieu of their rights to certain waters of the San Joaquin River. Pursuant to the terms of the Contract, up to 840,000 acre-feet of substitute water per year is made available for irrigation purposes by Reclamation from the Sacramento River and the Delta, and other sources through the CVP, and up to 650,000 acre-feet in critical dry years. The Exchange Contractors operations consist of the diversion of substitute water from the DMC, the Mendota Pool, and possibly the San Joaquin River and north fork of the Kings River. Without the transfers, the Exchange Contractors would divert all of their substitute water supply.

Table 2-2
Existing CVP and SWP Contractual Water Supplies and Recent Allocations

Water Agency/District	Reclamation Allocation for South of the Delta					
	100% Contract Water Supply (acre-feet)	100% Allocation 2006 (acre-feet)	50% Allocation 2007 (acre-feet)	40% Allocation 2008 (acre-feet)	10% Allocation 2009 (acre-feet)	45% Allocation 2010 (acre-feet)
Byron-Bethany Irrigation District[1]	20,600	20,600	10,300	8,240	2,060	9,270
Del Puerto Water District	140,210	140,210	70,105	56,084	14,021	63,095
Pacheco Water District	10,080	10,080	5,040	4,032	1,008	4,536
Pajaro Valley Mgmt Agency	6,260	6,260	3,130	2,504	626	2,817
Panoche Water District	94,000	94,000	47,000	37,600	9,400	42,300
Patterson Irrigation District	22,500	22,500	11,250	9,000	2,250	10,125
San Benito County Water District	43,800	43,800	21,900	17,520	4,380	19,710
Santa Clara Valley Water District	152,500	152,500	76,250	61,000	15,250	68,625
San Luis Water District	125,080	125,080	62,540	50,032	12,508	56,286
Westlands Water District[2]	1,150,000	1,150,000	575,000	460,000	115,000	517,500
Broadview Water District Assignment (DD#1)[3]	27,000	27,000	13,500	10,800	2,700	12,150
Centinella Water District Assignment (DD#1)[3]	2,500	2,500	1,250	1,000	250	1,125
Mercy Springs Water District Assignment (DD#2)[3]	4,198	4,198	2,099	1,679	420	1,889
Widren Water District Assignment (DD#1)[3]	2,990	2,990	1,495	1,196	299	1,346
Subtotal	*1,801,718*	*1,801,718*	*900,859*	*720,687*	*180,172*	*810,773*

Reclamation Friant Allocation						
	100% Contract Water Supply (acre-feet)	**100% Allocation 2006 (acre-feet)**	**65% Allocation 2007 (acre-feet)**	**100% Allocation 2008 (acre-feet)**	**100% Allocation 2009 (acre-feet)**	**100% Allocation 2010 (acre-feet)**
Friant Division (Class 1)	2,201,475	800,000	520,000	800,000	800,000	800,000
	100% Contract Water Supply (acre-feet)	**10% Plus Uncontrolled Allocation 2006 (acre-feet)**	**0% Allocation 2007 (acre-feet)**	**5% Plus Uncontrolled Allocation 2008 (acre-feet)**	**10% Plus Uncontrolled Allocation 2009 (acre-feet)**	**10% Plus Uncontrolled Allocation 2010 (acre-feet)**
Friant Division (Class 2)		412,713	0	78,025	271,096	686,723
State Water Project Allocation						
	100% Contract Water Supply (acre-feet)	**100% Allocation 2006 (acre-feet)**	**60% Allocation 2007 (ace-feet)**	**35% Allocation 2008 (acre-feet)**	**40% Allocation 2009 (acre-feet)**	**50% Allocation 2010 (acre-feet)**
Kern County Water Agency	998,730	998,730	599,238	349,556	399,492	499,365
Santa Clara Valley Water District	100,000	100,000	60,000	35,000	40,000	50,000
All Districts	**5,001,923**	**3,600,448**	**2,020,097**	**1,870,243**	**1,379,664**	**2,110,138**

Sources: Erma Clowers and George Bushard, South Central California Area Office, Natural Resource Management, Fresno, CA)

[1] Formerly known as Plainview Water District

[2] Not included are the assignments of CVP contracts to WWD

[3] Individual CVP contracts assigned to WWD

[4] Uncontrolled Class 2 water made available above and beyond the Class 2 declaration, normally for flood flow purposes.

[5] SWP allocation from CA DWR SWP Analysis Office Notices to SWP Contractors, http://www.water.ca.gov/swpao/deliveries.cfm, accessed May 26, 2011.

The Exchange Contractors have progressively developed conservation and recapture projects designed to meet operational capacity demands and season-long quantity needs during certain periods within their service area with the express purpose of providing for (1) more efficient use of the irrigation water within the Exchange Contractors' service area, (2) management of agricultural drainwater, (3) drought contingency supply, and (4) the additional purpose, when conditions permit, of providing quantities of water for transfer. Absent transfers, the Exchange Contractors anticipate the continuation of the use of the existing facilities for their own internal operation needs. Therefore, under the No Action/No Project Alternative, it is assumed that the Exchange Contractors will continue to operate their facilities to the extent previously used during periods in which transfers were occurring. During critical water years, water developed through tailwater recovery and conservation would be used internally as drought contingency supply, and no transfer of this type of water would occur during those years.

As previously described, the No Action/No Project Alternative differs from existing conditions in terms of the Exchange Contractors' recent provision of transfer water, prior to water year 2010. Previous existing conditions included the provision of up to 88,132 acre-feet of transfer water (water years 2005–2010, see Table 1-1) to CVP agricultural and M&I water users and wildlife areas. Those transfers were made by use of water developed by the Exchange Contractors through several of the sources of water described for the action alternatives. Absent the transfer from the Exchange Contractors, the predictable response by Reclamation's RWSP would be to seek and acquire similar refuge water supplies from other sources. The hydrology of the San Joaquin River would experience no change in terms of the transferees' use of the same amount of transfer water. A slight difference in San Joaquin River hydrology could be anticipated by Reclamation's response to acquire water from entities other than the Exchange Contractors that have a hydrologic connection with the San Joaquin River. The assumed amount of such acquisitions may be of equal quantity as the current transfer (existing conditions), but the resultant effect upon surface and subsurface return flows to the San Joaquin River hydrology is considered negligible.

2.3 Action / Project Alternatives

The action alternatives involve multiple sources of developed water and multiple users of that water. The action alternatives are designed based on how the water is developed and the quantity of water developed. The Exchange Contractors propose to develop water from two sources: a conservation/tailwater recovery program and crop idling/temporary land fallowing. Each action alternative has a range of water acquisition scenarios based on how the water could be used. While the focus of this EIS/EIR is on how the water is developed, the effects of how the water is used are addressed primarily in other environmental documents and summarized herein (from those documents)in Section 3.3 in order to provide a complete but concise analysis of both direct and indirect impacts. Groundwater pumping for application to irrigated lands within the Exchange Contractors' service area and within system capacity may occur but would not be a method for developing water for the proposed 25-Year Water Transfer Program.

The Proposed Program is planned for 25 years. However, contracts to implement the Program with either Reclamation or any of the CVP and SWP water users may be executed for less than 25 years. This EIS/EIR evaluates the entirety of the Program (25 years) to consider the full extent of any potential impacts. In addition, Reclamation approves the transfer or exchange of any CVP water on an annual basis, resulting in an annual review of the proposed transfer amounts and how the water was developed. See Section 14.3.3 for more information on this approval process and monitoring for potential impacts.

2.3.1 Water Development Alternatives

In the western and eastern San Joaquin Valley, farmers have been irrigating cropland for more than 120 years. With the increased availability of groundwater and surface water, the acreage of irrigated cropland in the San Joaquin Valley has increased more than 80 percent since the 1950s (Exchange Contractors 1997). For the Proposed Program, no new lands would be brought into production; water would be used on lands irrigated within the last 3 years (2008–2010) or temporarily fallowed due to reduced water deliveries.

Within the action alternatives, the Exchange Contractors would continue to employ their tailwater recovery efforts[3] and supplement their tailwater recapture program with other conserved water.[4] Assuming a maximum of 150,000 acre-feet total from all sources, up to 100,000 acre-feet would be tailwater recapture and other conservation efforts (including reduced conveyance losses, reductions in spillage, canal lining, and other irrigation efficiencies including on-farm improvements), and up to 50,000 acre-feet would be developed through temporary land fallowing[5] in any year. Given recent transfers of 80,000 to 88,000 acre-feet, of which 8,000 acre-feet is from temporary fallowed land if the transfer is up to 88,000), as shown in Table 1-1, the proposed net transfer over existing conditions, excluding fallowing, is up to a maximum of 20,000 acre-feet additional water for transfer (i.e., up to 150,000 acre-feet, less up to 50,000 acre-feet from fallowed land, and less 80,000 acre-feet existing).

[3] Tailwater recovery is defined as the reuse of tailwater flows in the act or act(s) of reclaiming surface water from irrigated lands into a surface supply system. This reclamation can be achieved either by gravity or by low lift pumps. The water is reused within the political boundaries of the agency or agencies from which it originated. The tailwater recovery effort by the Exchange Contractors is their tailwater recapture program.

[4] Conserved water is defined as water made available from canal lining, changes in irrigation practices (such as drip irrigation and other micro-systems), spill reductions projects, reductions in percolation to saline sinks, and other water management practices excluding land fallowing. It does not result from land fallowing above normal practices or longer than 1.5 years beginning with no irrigation from January until spring of the following year. Land fallowing that normally occurs is the nonapplication of irrigation water for 1 year on selected areas.

[5] Crop idling/land fallowing beyond normal practices is for the purpose of developing water. Lands to be fallowed would be temporary, i.e., not occur on same lands for more than 3 consecutive years.

The tailwater/conserved water and fallowing water would continue to be developed during the months of January through December (of each Exchange Contractors' water year 2014–2038).[6] The amount of water that the Exchange Contractors would develop can vary by year, and its pattern would depend upon the sources of water developed. For the maximum transfer and/or exchange of 150,000 acre-feet, an additional 62,000 acre-feet water over recent transfers/existing conditions of up to 88,000 acre-feet, it is estimated that the Exchange Contractors would develop this water in accordance with the range of values listed in Table 2-3.

Table 2-3
Estimated Quantity of Water Developed/Transferred from the Exchange Contractors, All Sources, Maximum Program

Month	Acre-Feet to be Developed for Transfer
January	1,278–1,678
February	5,961–8,961
March	7,863–10,863
April	8,358–9,358
May	11,566–11,666
June	22,967–24,067
July	27,746–30,246
August	25,222–25,722
September	7,261
October	4,051–5,451
November	607–1,407
December	220
Total	150,000

The additional tailwater/conserved water and temporary crop idling water would be commingled with the Exchange Contractors surface water supply system and used to meet their own needs, thus temporarily reducing their demand for water made available under their Contract. For each acre-foot of tailwater/conserved water or fallowed land water recovered by the Exchange Contractors for their own reuse, an equal amount of water will be considered acquired and available in the CVP for delivery to the wetlands and for delivery to CVP and SWP water users for agricultural and/or M&I uses. The transfer is CVP substitute water that would have been provided by Reclamation to the Exchange Contractors.

The four action alternatives are based on the quantity of water and sources of supply. Each action alternative has a range of subalternatives or scenarios based not only on the source of supply but also on potential water users and whether these users are

[6] Transferable water is verified by the Exchange Contractors pulling together all tailwater recapture figures from the entities and the total verifies the amount developed on an annual basis. As far as other conservation measures, the districts each have an analysis that estimates the amount of water savings.

hydraulically connected to the San Joaquin River. A range of scenarios is evaluated and described in Appendix B, "San Joaquin River Exchange Contractors Water Authority 25-Year Water Transfer Program Water Resources Analysis."

Alternative A: 50,000 Acre-Feet

Although at the discretion of the Exchange Contractors a zero transfer amount may occur in any year, Alternative A is the smallest level of program implementation framed as an alternative. All of the water would be developed from crop idling/temporary land fallowing (similar to Alternative B in the 2004 EIS/EIR); however, it could occur in any type of water year (not just critical years as for Alternative B in the 2004 EIS/EIR). Of the maximum amount of 50,000 AFY, 8,000 acre-feet has occurred in recent years, while 42,000 acre-feet would be additional water development not yet experienced.

The maximum available water for transfer is up to 50,000 acre-feet from crop idling/temporary land fallowing. Alternative A represents a unique transfer program of only utilizing crop idling/land fallowing as the source of transfer water supply. In any type of year, the Exchange Contractors would provide up to 50,000 acre-feet of water through crop idling/land fallowing on approximately 20,000 acres of land within the Exchange Contractors' service area. Assuming a transferable quantity of 2.5 acre-feet per acre, the maximum amount of land to be temporarily idled/fallowed is approximately 20,000 acres, 8.3 percent of the irrigable land (240,000 acres) in the Exchange Contractors' service area. The affected land would be rotated to avoid idling the same land year after year, and fallowing on any parcel would be limited to not more than 3 consecutive years. Any or all of the available water could be provided to the wildlife refuges, agriculture, and M&I users subject to the limitations identified in Sections 2.3.2 and 2.4.

Alternative B: 88,000 Acre-Feet

Alternative B represents an intermediate level of program implementation and is similar to the level of implementation currently underway and experienced in both critical and noncritical Exchange Contract years. For this action alternative, the Exchange Contractors would provide up to 88,000 acre-feet of water during any noncritical Exchange Contract year through a combination of conservation and crop idling/land fallowing sources. Conservation measures are defined as tailwater recapture, recovery of previously irretrievable losses, and reductions in operational spills for up to 80,000 acre-feet of the total developed supply. Temporary land fallowing would contribute up to 8,000 acre-feet of developed water.

Flexibility exists in the development of 88,000 acre-feet of water for transfer during any type of noncritical Exchange Contract water year. The Exchange Contractors have indicated the availability of up to 50,000 acre-feet of water from temporary crop idling/land fallowing. This source of water in combination with tailwater and other conservation opportunities can provide flexibility in the decision of transfer water source. For example, if 50,000 acre-feet were developed through conservation and tailwater recovery programs, up to 38,000 acre-feet would be developed from crop idling/land fallowing.

Any or all of the available water could be provided to the refuges, agriculture, and M&I users subject to the limitations identified in Sections 2.3.2 and 2.4.

Alternative C: 130,000 Acre-Feet

Alternative C makes available up to 130,000 acre-feet of water annually during any noncritical Exchange Contract year similar to the level of maximum transfer contemplated by the Exchange Contractors under the existing 10-Year (2005–2014) Water Transfer Program (and Alternative C in the 2004 EIS/EIR). Under this alternative, up to 80,000 acre-feet of water is made available through conservation, including tailwater recovery, and up to 50,000 acre-feet of water is made available through crop idling/temporary land fallowing. Any or all of the available water could be provided to the wildlife refuges, agriculture, and M&I users subject to the limitations identified in Sections 2.3.2 and 2.4.

Alternative D: 150,000 Acre-Feet

Alternative D expands upon Alternative C water of 130,000 acre-feet (from conservation and crop idling) with an additional 20,000 acre-feet from additional conservation measures not already considered in the other alternatives. These measures include the lining of canals and implementation of on-farm irrigation or district conveyance system improvements that would not have a hydrologic effect on the San Joaquin River. Alternative D represents the maximum water transfer by adding an additional increment of conservation water above existing capabilities.

2.3.2 Water Acquisition Scenarios

The action alternatives also consist of a range of acquisitions by the RWSP and the CVP/SWP contractors in any given year. A multiple year agreement with any of the transferees is possible, including the option of a specific quantity of water in each year of the agreement except for critical years resulting in reductions of Exchange Contractors' CVP supply deliveries. The extended proposed water transfers would be monitored, reviewed, and annually reported by Reclamation to calculate the cumulative transfer activity authorized under this EIS/EIR. They would be subject to the approvals and permits discussed in Section 2.4.

Each action alternative has numerous potential options for how and where the water would be used. The action alternatives are composed of the following scenarios for acquisition, transfer, and/or exchange of waters between the Exchange Contractors and other parties to bracket the extremes of water development and delivery within an environmental impact analysis:

- **Water to Refuges:** The RWSP may acquire from the Exchange Contractors up to 80,000 acre-feet of water for delivery to wetland habitat areas under CVPIA Section 3406(d)(2) to meet a portion of the Incremental Level 4 refuge water requirements. The total Incremental Level 4 requirement of these San Joaquin Valley refuges is 105,514 acre-feet annually (without conveyance losses). For each acre-foot of water developed by the Exchange Contractors for their own use, an equal amount of water would be considered available for delivery to the wetlands. CVP water would be delivered to the refuges instead of delivering the same amounts of substitute water to the Exchange Contractors.

- **Water to Agricultural and/or M&I Uses:** Agricultural and/or M&I (CVP) water users may obtain up to 100 percent of the available water (up to 150,000 acre-feet, depending on the alternative and year type) subject to operation limitations. Recipients may include any or all of the following:
  - The transfer and exchange of up to 150,000 acre-feet of temporary water supplies to CVP water service contractors in the Delta export service area: 9 westside contractors and 24 eastside contractors within the Friant Division
  - The transfer of a portion of the temporary water supplies (up to the amount of shortages incurred by SCVWD in its CVP supply[7] or its SWP supply) to SCVWD and additional CVP contractors (EBMUD, CCWD, and PVWMA, up to the amount of shortages in each agency's CVP supply) for agricultural and/or M&I uses
  - The transfer and exchange of up to the contract amount of temporary water supplies to an additional SWP contractor, KCWA, for agricultural and M&I use

A combination of the above water transfers/exchanges could occur in any year. Part of the available water supply could go to the refuges, and the remaining amount could be used for CVP and SWP agricultural and/or M&I uses. The numerous combinations of uses are not evaluated herein, but their potential impacts would lie within the range of potential impacts disclosed by the action alternatives and scenarios. The water transferred or exchanged would not result in land use changes or provide irrigation service to lands not previously cultivated. Water deliveries would not exceed quantities contained in long-term supply agreements with Reclamation (for CVP) and DWR (for SWP) nor occur outside the CVP consolidated Place-of-Use. The potential scenarios are explained in greater detail in the following sections.

Water to Wetland Habitat

One potential scenario for the water acquisitions would be for Reclamation's RWSP to acquire up to 80,000 acre-feet of the available water in any year, to meet a portion of the annual Incremental Level 4 need of 105,514 acre-feet (without conveyance losses) identified in Table 1-2, from the Exchange Contractors for the wetland habitat areas in the San Joaquin Valley. The approximate locations of the wetland habitat areas are shown on Figure 2-3.

Reclamation would make the acquired water available to the wetlands in the percentages set forth and agreed upon by the Interagency Refuge Water Management Team, in

[7] Contract supply of 152,500 AFY, 119,400 acre-feet for M&I and 33,100 acre-feet for agriculture. The M&I component may be shorted by up to 25 percent (29,850 acre-feet) and the agriculture component may be shorted entirely. The Exchange Contractors' transfer to SCVWD will not exceed the amount of shortage anticipated to occur, 62,950 acre-feet total.

[7] SWP contract supply is 100,000 AFY.

quantities not to exceed those listed in Table 2-4, and pursuant to the following agreements: *Cooperative Agreement Between the United States of America and the San Luis Canal Company for Conveyance of Wildlife Refuge Water Supplies* (Reclamation 1998a), *Cooperative Agreement Between the United States of America and the Central California Irrigation District for the Conveyance of Wildlife Refuge Water Supplies* (Reclamation 1998b), and *Cooperative Agreement Between the United States of America and the Grasslands Water District for Conveyance of Wildlife Refuge Water Supplies* (Reclamation 1998c). If all of the available Incremental Level 4 water is acquired by Reclamation and applied to the wetlands (80,000 acre-feet), the remaining up to 70,000 acre-feet (Alternative D) would be available for transfer to agricultural users and M&I during that particular year.

Table 2-4
San Joaquin Valley Refuge Incremental
Water Supply Allocation, Water Service Years 2014–2038

San Joaquin Valley Wetlands	Level 4 Increments (acre-feet) at Point of Delivery
San Luis Unit[a]	0
Freitas Unit[a]	0
Kesterson Unit[a]	0
E. Bear Creek Unit	4,432
W. Bear Creek Unit	3,603
Volta WA	3,000
China Island Unit	3,483
Salt Slough Unit	3,340
Los Banos WA	8,330
Mendota WA	2,056
Grassland Resource Conservation District	55,000
Merced NWR[b]	2,500
Kern NWR	15,050
Pixley NWR	4,720
Total	**105,514**

Source: B. Hubbard, pers. comm., 2011

Note:

[a] The MOU with the Service clarifies the Level 4 increment for these refuges. In accordance with a Reclamation commitment prior to CVPIA, a total of 18,550 acre-feet of full habitat development water supplies will be provided. The 18,550 acre-feet includes conveyance losses for delivery of the full habitat water supplies.

[b] Merced NWR is not a beneficiary of RWSP water but is part of the San Joaquin Valley refuges.

To deliver water to refuges outside of the San Joaquin River Basin, specifically to Pixley and Kern NWRs, exchanges may involve facilities referenced and described in the *Draft Finding of No Significant Impact, Conveyance of Refuge Water Supply, South San Joaquin Valley Study Area* (Reclamation 2003).

Water to Agriculture

Under this scenario, potentially all of the available water in any noncritical Exchange Contract year, up to 150,000 acre-feet, would be available to westside (nine districts) and eastside (Friant Division) CVP water service contractors (24 districts), other CVP contractors west and south of the Delta (specifically PVWMA) and/or a SWP contractor south of the Delta (specifically KCWA) that need additional irrigation water. Several of the districts could obtain some portion of the available water in each water service year, 2014–2038. SWP contractors that could participate are SCVWD and KCWA or its member units and only within the CVP consolidated Place-of-Use.

Figure 2-2 shows the Exchange Contractors' service area composed of four member districts: CCID, Columbia Canal Company (CCC), FCWD, and San Luis Canal Company (SLCC). Along with the Exchange Contractors member districts and the refuges, Figure 2-4 indicates the location of the nine westside CVP contractors that may receive the transferred water for agricultural uses: Del Puerto, Pacheco, Panoche, Patterson, Byron-Bethany (formerly Plainview), San Benito County, San Luis, Santa Clara Valley, and Westlands water districts. The additional CVP water user PVWMA is shown. The eastside Friant Division contractors' agricultural service area comprises 24 districts, as shown on Figure 2-4.

The westside irrigation districts could receive the transfer water through facilities currently providing their CVP supplies, the DMC, and San Luis Unit facilities. Friant Division contractors could receive the transfer water through wheeling arrangements utilizing CVP and SWP (California Aqueduct) facilities and other third-party facilities (e.g., Cross Valley Canal contractors, as set forth in Article 5(a) of their water service contract) (Reclamation 2010f). Water exchange arrangements would be necessary to provide deliveries to specific Friant Division contractors, and it would be the responsibility of the potential water user to make those arrangements with all involved parties for conveyance and ensure compliance with NEPA.

PVWMA could receive the transfer of water through CVP San Felipe Project facilities consistent with current circumstances. KCWA could receive transfer/exchange water through conveyance using CVP and SWP facilities and through arrangements made with third-party facilities (i.e., SCVWD and San Luis Reservoir).

Partial Allocations to Both Wetlands and Agriculture

Of the water available from the Exchange Contractors, part would be acquired by the RWSP for the refuges and part would be acquired by other CVP agricultural service contractors as described above. Other assumptions on the sources of the additional water described in Section 2.3 also apply to both.

Partial Allocations to Municipal and Industrial Uses

This scenario involves a transfer to SCVWD and additionally PVWMA for M&I and/or agricultural uses. The transferred water would be made available in the DMC as a temporarily reduced delivery to the Exchange Contractors. SCVWD would schedule with Reclamation the delivery of the transfer water, which may include temporary storage in San Luis Reservoir. The transfers would be structured to meet anticipated shortages in CVP supply and would not result in exceedances of supplies identified in the long-term contract with Reclamation. An additional scenario involves the transfer to EBMUD and CCWD for M&I supply only. Additionally, water transferred to KCWA could be used for

M&I uses. Any transfers to SCVWD and KCWA under SWP contracts would be subject to limitations in those contracts and not result in exceedances of supplies.

2.4 Required Approvals and Permits

Reclamation must approve all transfers or exchanges and complete the additional environmental analysis required for the transfers/exchanges if necessary. Reclamation will review the Proposed Program for compliance with its *Interim Guidelines for Implementation of Water Transfers Under Title XXXIV of Public Law 102-575 (Water Transfer),* Sections V(H) and V(J) (Reclamation 1993).

Reclamation is required to consult with the Service and to provide the Service an amended Biological Assessment or its equivalent if Reclamation determines that listed species or critical habitat would be adversely affected by the selected alternative, under the Federal Endangered Species Act (ESA). The biological resources section of this EIS/EIR (Chapter 6.0) will serve as the biological evaluation to determine the potential to affect listed species and their habitats. The Service's responses will be included in the Record of Decision for this EIS/EIR.

If any third party conveyance facilities are needed to enable an exchange to occur (e.g., Cross Valley Canal), then approval from the affected agency would be required.

State agencies likely to be interested in the potential transfers/exchanges are DWR, Regional Board, and CDFG. Alternatives involving SCVWD and KCWA (SWP contractors) would require approval from DWR. Under existing terms and condition to CVP water right permits and current State Board practices and regulations, none of the transfers or exchanges under the Proposed Program would require water right change petitions pursuant to the existing provisions of the California Water Code. Furthermore, recent Federal legislation lifted the consumptive use restrictions (i.e., water sales restricted to water "consumptively used or irretrievably lost") contained in the 1992 CVPIA to provide flexibility for water transfers within the CVP consolidated Place-of-Use (HR2055-81).

Some of the counties are especially interested in the movement of water resources across county boundaries. Madera and Fresno counties have groundwater ordinances that require obtaining a permit or an exemption to move groundwater out of the county. In 2004 , Fresno County granted the Exchange Contractors an exemption. Because groundwater is not proposed to be pumped to make water available for transfer, these ordinances are not applicable to the Proposed Program.

2.5 Alternatives Considered but not Evaluated in Detail

A broad range of transfers was evaluated in the *Final EIS/EIR Water Transfer Program for the San Joaquin River Exchange Contractors Water Authority 2005–2014* (URS 2004), from no transfer to a maximum of 130,000 acre-feet in Shasta Criteria noncritical years and 50,000 acre-feet in Shasta Criteria critical years. The four action alternatives have a wide variety of options based on the two primary sources of water (conservation including tailwater recovery, and crop idling/temporary land fallowing) and three broad types of water users (wildlife refuges, agricultural, and M&I users). The hydrologic analysis (Appendix B) evaluates four quantities of development of transfer water, within the range of all hydrologic year types and whether the development activities/water sources are or are not hydraulically connected to the San Joaquin River.

Both NEPA and CEQA require that an EIS or EIR identify and analyze only reasonable alternatives, i.e., those that are feasible based on current information. "Feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors. For CEQA, reasonable alternatives are to be limited to those that would avoid or substantially lessen at least one of the significant environmental impacts of a proposed project. Other alternatives and options considered, but eliminated from detailed analysis in the 2004 Final EIS/EIR for technical feasibility or other reasons (URS 2004), as well as this Draft EIS/EIR include the following:

Water Development

- **Groundwater pumping:** The action alternatives in 2004 proposed pumping of up to 20,000 acre-feet in the unconfined aquifer above the Corcoran Clay specifically for transfer and in addition to what is normally pumped for use within the Exchange Contractors' service area. Additional pumping greater than 20,000 acre-feet was unnecessary to meet project objectives in the current 2005–2014 Program, and due to system improvements and delivery procedures within the Exchange Contractors' service area, groundwater pumping is not needed for the proposed 2014–2038 Water Transfer Program.
- **Conservation:** Up to 80,000 acre-feet is included in two of the action alternatives, and an additional increment of 20,000 (for a total of 100,000 acre-feet) is included in one action alternative. Conservation levels greater than this amount were eliminated as potentially having impacts to the San Joaquin River.
- **Crop idling/temporary land fallowing:** Up to 50,000 acre-feet is assumed under the action alternatives. A greater amount was eliminated from consideration as impractical and undesirable because of potential effects on the local and regional economies, desire of district farmers to continue farming, and existing district policies.

Water Uses

- Restoration flows to the San Joaquin River: Use of transfer water for restoration flows for anadromous fish and water quality on the upper San Joaquin River was eliminated from consideration at this time because it does not help to meet the purpose and need/project objectives described in Section 1.2. Water released for San Joaquin River restoration is a different purpose than water released for specific state and Federal wildlife refuges. Reclamation is currently obligated under the CVPIA to purchase water to enhance the refuges. Water for river restoration is not a project objective.

- Additional M&I uses: To avoid population growth inducement and to minimize economic impacts, additional M&I uses of water beyond the following were not considered (based on Tables 1-3 and 2-2 and Appendix B).[8]
  - SCVWD and the maximum of 29,850 acre-feet (CVP) and 30,000 acre-feet (SWP)
  - EBMUD and the maximum of 133,000 acre-feet
  - CCWD and the maximum of 195,000 acre-feet
  - PVWMA of 6,260 acre-feet
  - KCWA of 136,000 acre-feet

Additional water to go beyond CVP contract deliveries by water year type is inconsistent with the Program's purpose and need. By limiting the water uses to those (1) consistent with current CVP and SWP contracts and quantities delivered, excluding recent pumping restrictions implemented by Court Order, to assist in alleviating water shortages associated with those contracts; and (2) consistent with Incremental Level 4 deliveries to the state and Federal wildlife refuges, the Exchange Contractors' extended Proposed Water Transfer Program (2014–2038) would help to implement existing agreements and programs, as described in Section 1.2.

2.6 Agency Preferred Alternative

The preferred alternative will be identified following review of public comments on the Draft EIS/EIR, during preparation of the Final EIS/EIR.

2.7 Summary Comparison of Alternatives

Table 2-5 provides a comparison of the alternatives to the purposes/objectives of the proposed Water Transfer Program. "No" means the purpose/objective is not met; "yes" means it is met.

Summaries of environmental impacts are contained in the text of the EIS/EIR, at the end of each section for resources potentially affected by any of the alternatives. Table 2-6 summarizes the net effects of the action alternatives on selected resources compared to existing conditions, focusing on the quantitative results for water development. The selected resources are surface water, groundwater, biological resources, and socioeconomics. Comparisons to the No Action/No Project baseline for surface water and socioeconomics are included in the paragraphs below.

Surface Water

Based on the hydrologic analyses contained in Appendix B and the comparisons to both existing conditions and No Action/No Project contained in Chapter 4, the impacts/effects

[8] Most CVP contracts do not distinguish between agricultural and M&I amounts.

are driven by the maximum land fallowing component of 50,000 AFY from this source. Therefore, the impacts/effects are the same for the action alternatives. To the extent that water from conservation is relied upon, and temporary land fallowing is reduced, the minimal impacts/effects on surface water resources are reduced.

The beneficial effects to San Joaquin River conditions identified under No Action/No Project are associated with the superposition of SJRRP flows alone compared to the results of modeled existing conditions. **Any change identified in the No Action/No Project Alternative is substantially due to the effects of the SJRRP flow assumptions.** The magnitude of SJRRP flows overwhelms the separate effect of the other components of No Action/No Project including the “no temporary fallowing” assumption associated with no transfer program. However, the effect of removing the temporary land fallowing would be an increase in tailwater return flows from the lands that have been assumed to be fallowed. The estimated difference in San Joaquin River conditions due to this “no fallowing for transfer” adjustment would be minimal. The temporary land fallowing assumed in the existing conditions is only 8,000 acre-feet, with 5,000 acre-feet not in hydrologic connectivity with the San Joaquin River. Using the same calculation protocols used for estimating the incremental loss of tailwater return flows from the action of increasing fallowing, a reduction of an annual 3,000 acre-feet due to fallowing would result in about 1 cfs of increased tailwater flow in a month. In the absence of the SJRRP flows, this 1 cfs effect is so small as to be practically “no effect” or “no impact” to the flows to the San Joaquin River and Delta.

Groundwater

Alternatives A, B, and C, assuming maximum land fallowing and compared to existing conditions, would result in a reduction in groundwater recharge of up to 8,400 AFY. In contrast, Alternative D would result in up to a 28,400 AFY reduction in groundwater recharge from both fallowing and an increase in conservation measures but not including expanded tailwater recapture efforts. The reductions in recharge result in reductions in outflow of poor quality groundwater to the east which is a beneficial effect.

Biological Resources

Land in Exchange Contractors’ service area that would be affected by Program alternatives is agricultural. However, the land fallowed would either be dryland farmed or maintained in a manner to preserve its agricultural integrity and viability, and fallowing on any one parcel would only be temporary.

The action alternatives presented herein would result in minor decreases in flows in the San Joaquin River and its tributaries from land fallowing. The conservation/tailwater recovery components would be the same as existing conditions (no change) for Alternatives B, C, and D and No Action/No Project. These flow changes would result in no significant impacts to or adverse effects on special-status aquatic species, and no mitigation is required.

- The maximum level of effect from this Alternative A would occur in the San Joaquin River and Mud Slough South, and Salt Slough in the vicinity of the Exchange Contractors’ service area boundaries. This flow reduction of 0-2 cubic feet per second (cfs) would be spread among all of these waterways, depending on the specific pattern of land fallowing.

- Assuming maximum temporary land fallowing under Alternatives B, C, and D, the effects on flows are the same as Alternative A.

In summary, none of the action alternatives would result in adverse effects or potentially significant impacts on biological resources within the Exchange Contractors' service area or the Program area and vicinity.

Socioeconomics

Generally, land fallowing and conservation water transfers have distinct effects on regional economy. Land fallowing generates adverse economic effects due to the lost production value on fallowed lands, which indirectly affects agriculture-support industries, farm labor, and other related sectors. These effects are reduced to some extent in the case of water transfer sales, which bring money back into the regional economy in the form of income to agricultural landowners. These offsetting effects are highest under Alternative D, where transfer prices are assumed to be the highest. Conversely, conservation transfers bring new revenues into the regional economy and generate economic benefits to those industries and labor that support water district operations. In all alternatives, except Alternative D, investment in conservation projects is sufficient to meet the Program's conservation needs; therefore, no additional capital outlays are necessary. In Alternative D, new capital investment would be required, but would be funded through conservation transfer revenues.

The economic tradeoff between land fallowing and conservation water transfers is evident in the No Action/No Project and action alternatives. Under No Action/No Project, where the existing Program would cease, the existing economic benefits supported by water transfers would be foregone. These ongoing benefits are attributed to revenues generated by conservation water transfers, which are realized by the Exchange Contractor districts and recirculated through the local economy as part of ongoing O&M activities; these benefits outweigh the adverse economic effects associated with agricultural land fallowing. As a result, the No Action/No Project alternative would have net adverse effects on the local economy compared to existing conditions.

For the action alternatives, the greatest adverse effects on the regional economy occur in Alternative A where all transfers would be from land fallowing which results in a decline in regional economic activity, with no offsetting economic benefits from conservation water transfers. When conservation transfers are considered in the other alternatives, these adverse effects from land fallowing are offset partially. In fact, the Program is expected to result in net overall benefits on the regional economy in Alternatives C and D, as measured by income and employment levels in the region. In the case of landowner-to landowner transfer, all of the alternatives result in a decline in output and employment levels compared to No Action/No Project, although there is a slight increase in regional income with Alternatives C and D. In these alternatives, conservation transfers are significantly greater than land fallowing transfers demonstrating the strong role that agricultural production has on regional economic conditions. However, when evaluated against existing conditions, the economic effects of the Proposed Program differ. All of the action alternatives would result in adverse socioeconomic effects in the regional economy due primarily to increases in agricultural land fallowing and foregone benefits of the existing Program. Generally, the Proposed Program's potential socioeconomic impacts are considered less than substantial when evaluated in the context of regional economic conditions and the size of the local economy.

In all action alternatives, the analysis conservatively assumed maximum land fallowing of 20,000 acres (50,000 AFY), for the purposes of NEPA/CEQA analyses, so that the potential adverse economic effects/impacts are not understated. In cases where land fallowing plays a smaller role in the water supply portfolio for transfers, the adverse economic effects would be minimized.

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Environmental Justice

In summary, the No Action/No Project Alternative would result in an environmental justice benefit with agricultural land returning to production and an increase in the demand for farm labor once the existing transfer program is terminated. However, from the perspective of the regional economy, the No Action/No Project Alternative would generate adverse effects that could disproportionately affect minority and low-income populations in the region. Similarly, most of the action alternatives would have relatively higher levels of land fallowing (and reduced farm labor) compared to No Action/No Project, thereby adversely affecting the agricultural industry and likely resulting in disproportionately high and adverse economic effects on low income and minority populations. However, these adverse effects would be offset to some degree by the unrealized benefits associated with agricultural production in areas received the water transfer and/or exchange water.

From the perspective of the regional economy, the action alternatives would generally have adverse effects with landowner-to-landowner water transfers, particularly in terms of employment levels, although there are small increases in income levels under Alternatives C and D. Similarly, with water transfer sales, adverse regional effects are expected under Alternatives A and B; but under Alternatives C and D, the Proposed Program would generate regional economic benefits, as measured by both income and employment levels, which could be realized by minority and low-income populations. However, it is not clear the extent to which minority and low-income populations would be affected by changes in regional economic conditions.

2.7.1 Environmentally Superior Alternative

The identification of the environmentally superior alternative is based on both adverse and beneficial effects identified. The land fallowing component of water development results in the greatest adverse effects. Minimizing this method of water development and maximizing water conservation can reduce the mostly small impacts associated with crop idling. Consequently, Alternatives B, C, and D are superior to Alternative A. Alternative D is the superior action alternative in terms of socioeconomic impacts including environmental justice. With no land fallowing under No Action/No Project, potential environmental justice adverse effects are avoided.

Table 2-5
Comparison of Alternatives with Project Purposes

Purpose & Need / Objective Statements	No Action Alternative	Alternative A: 50,000 acre-feet	Alternative B: 88,000 acre-feet	Alternative C: 130,000 acre-feet	Alternative D 150,000 acre-feet
Develop supplemental water supplies from willing sellers in the Exchange Contractors' service area through water conservation measures/tailwater recovery and crop idling/fallowing activities consistent with agency policies.	No – No supplemental supplies would be developed. Reclamation would have less flexibility to maximize use of limited CVP water resources.	Yes – 50,000 from temporary land fallowing only, smaller than in previous years, tailwater recapture continues but for internal use, not for transfer.	Yes – Similar to Program implemented in recent years but with flexibility in water development components.	Yes – 130,000-acre-foot transfer Program larger than previous years overall. Greater potential to maximize water development from all sources and use by all transferees.	Yes – 150,000 acre-foot transfer Program larger than previous years overall. Greatest potential to maximize water development from all sources and use by all transferees.
Assist in providing temporary water supplies to the San Joaquin River Basin and Tulare Lake Basin wildlife refuges consistent with the Incremental Level 4 water quantities for wildlife habitat development.	Yes – Water deliveries to the wildlife refuges would be obtained from other sources, not from the Exchange Contractors.	Yes – Can fulfill up to 62% of refuge acquisition target of 80,000 AFY and can provide supplies similar to those provided since 2005.	Yes – Can fulfill up to 100% of acquisition target of 80,000 AFY and can provide supplies similar to those provided since 2002.	Yes – Can fulfill up to 100% of refuge acquisition target of 80,000 AFY and can provide supplies similar to those provided since 2002.	Yes – Can fulfill up to 100% of refuge acquisition target of 80,000 AFY and can provide supplies similar to those provided since 2002.
Assist CVP repayment and/or water service contractors to obtain additional CVP water for the production of agricultural crops or livestock and/or M&I uses because of water supply shortages or when full contract deliveries cannot otherwise be made.	No – Contractors would have to obtain temporary supplies from other sources or idle land.	Yes – Some of the contractors' water deficits could be met.	Yes – Some of the contractors' water deficits could be met.	Yes – Some of the contractors' water deficits could be met.	Yes – Some of the contractors' water deficits could be met.

Purpose & Need / Objective Statements	No Action Alternative	Alternative A: 50,000 acre-feet	Alternative B: 88,000 acre-feet	Alternative C: 130,000 acre-feet	Alternative D 150,000 acre-feet
Assist SWP (KCWA and SCVWD) and CVP agricultural service and M&I contractors (San Luis Unit, SCVWD, EBMUD, CCWD, PVWMA) to obtain supplemental water supplies	No – Contractors would have to obtain temporary supplies from other sources or idle land. Would not have seasonal flexibility that would maximize efficient use of existing facilities.	Yes – Some of the contractors' water deficits could be met.	Yes – Some of the contractors' water deficits could be met.	Yes – Some of the contractors' water deficits could be met.	Yes – Some of the contractors' water deficits could be met.
Promote seasonal flexibility of deliveries to the Exchange Contractors through exchange with CVP and SWP agricultural service and M&I contractors wherein water would be delivered and then returned at a later date.	No – Contractors would not have seasonal flexibility that would maximize efficient use of existing facilities.	Yes – Some of the contractors' water deficits could be met.	Yes – Some of the contractors' water deficits could be met.	Yes – Some of the contractors' water deficits could be met.	Yes – Some of the contractors' water deficits could be met.

Table 2-6
Comparison of Potential Net Impacts to Selected Resources by Action Alternative Compared to Existing Conditions

Resource	Year Type	Alternative A 50 TAF	Alternative B 88 TAF (38/50)	Alternative C 130 TAF (80/50)	Alternative D 150 TAF (100/50)
Surface Water Supply					
Change in Flows at Vernalis (cfs)					
	Wet	0 to -2	0 to -2	0 to -2	0 to -2
	Above Normal	0 to -2	0 to -2	0 to -2	0 to -2
	Below Normal	0 to -2	0 to -2	0 to -2	0 to -2
	Dry	0 to -2	0 to -2	0 to -2	0 to -2
	Critical	0 to -4	0 to -4	0 to -4	0 to -4
Change in Water Quality at Vernalis (μmhos)					
	Wet	0 t	0 t	0 t	0 t
	Above Normal	0 to 1	0 to 1	0 to 1	0 to 1
	Below Normal	0 to 1	0 to 1	0 to 1	0 to 1
	Dry	0 to 2	0 to 2	0 to 2	0 to 2
	Critical	0 to 1	0 to 1	0 to 1	0 to 1
Change in New Melones Reservoir Storage (AFY)					
	Wet	-268	-268	-268	-268
	Above Normal	-474	-474	-474	-474
	Below Normal	-474	-474	-474	-474
	Dry	-409	-409	-409	-409
	Critical	-42	-42	-42	-42
Change in Delta Supply (AFY)					
	Wet	-489	-489	-489	-489
	Above Normal	-353	-353	-353	-353
	Below Normal	-353	-353	-353	-353
	Dry	-357	-357	-357	-357
	Critical	-799	-799	-799	-799
Groundwater Supply (AFY)					
Reduction in Recharge/Outflow		8,400	8,400	8,400	28,400

Resource	Year Type	Alternative A 50 TAF	Alternative B 88 TAF (38/50)	Alternative C 130 TAF (80/50)	Alternative D 150 TAF (100/50)
Biological Resources					
Special-Status Species and Aquatic Resources					
Change in flows to Mud and Salt Sloughs and San Joaquin River in cfs that could affect habitat for aquatic resources (giant garter snake or fish)		0-2	0-2	0-2	0-2
Socioeconomics					
Change in Output ($ Millions)					
Regional Effects (Landowner to Landowner)		-61.5	-48.8	-34.3	-27.3
Regional Effects (Water Transfer Sales)		-52.2	-38.6	-23.8	-16.7
Labor Income ($ Millions)					
Regional Effects (Landowner to Landowner)		-18.7	-13.6	-7.7	-4.8
Regional Effects (Water Transfer Sales)		-15.8	-10.4	-4.3	-1.5
Employment (Jobs), Total All Areas					
Regional Effects (Landowner to Landowner)		-411	-321	-217	-168
Regional Effects (Water Transfer Sales)		-345	-249	-143	-93

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3.0 Scope of Impact Analysis

Chapter 3 provides an introduction to Chapters 4 through 13, which discuss the affected environment and environmental consequences for specific resources and other environmental concerns. For each section in which resources are evaluated, a regulatory setting is summarized for key requirements that affect the determination of environmental effect/impact. Additional regulatory information pertinent to the proposed water transfer program is included in Chapter 15, Compliance Requirements. This section also identifies the resources not evaluated and explains why they are not evaluated. Chapter 3 also discusses the impacts to the areas that could receive water under the Proposed Program. It identifies the environmental compliance documents prepared for water contract amounts from the CVP and SWP. This section concludes with an explanation of the CEQA/NEPA terminology for impacts and effects.

3.1 Resources to Be Evaluated

Chapters 4 through 13 present analyses of the resources or environmental concerns that could be affected by the No Action/No Project Alternative and the four action/project alternatives under consideration for the Proposed Program for water development alternatives and water acquisition scenarios. The resources listed below were determined to require analysis based on public scoping comments and the judgment of the Exchange Contractors' and Reclamation's NEPA/CEQA practitioners. Their location in the EIS/EIR is as follows:

- Chapter 4 Surface Water Resources
- Chapter 5 Groundwater Resources
- Chapter 6 Biological Resources
- Chapter 7 Land Use and Agriculture
- Chapter 8 Socioeconomics
- Chapter 9 Environmental Justice
- Chapter 10 Indian Trust Assets
- Chapter 11 Air Quality
- Chapter 12 Climate Change/Greenhouse Gases
- Chapter 13 Other Required Disclosures

3.2 Resources Not Evaluated

The following resources were determined to be unlikely to be affected by the Exchange Contractors' Proposed Program and are not evaluated in detail in this EIS/EIR.

3.2.1 Cultural Resources

The Proposed Program's water development activities would not result in any construction or land-altering/ground-disturbing activities beyond normal agricultural practices, including temporary land fallowing, or in any significant changes in reservoir operations that would expose buried resources, if present. Changes in water levels due to water quality releases from New Melones Reservoir (to mitigate for potential effects on water quality at Vernalis) would be within the range of drawdowns experienced in recent years.

3.2.2 Energy

The proposed water development and conveyance activities would not result in substantial use of energy resources. Groundwater development and surface water distribution rely on existing electric pumps. The greatest amount of conservation and tailwater recovery under any action alternative is about 100,000 AFY. Temporary crop idling (up to 20,000 acres in any year) would require soil management practices (such as disking) with similar farm equipment used for crop planting and harvesting.

3.2.3 Geology and Soils

Implementation of the Proposed Program would not involve construction or operation of new facilities that could be located on unstable soils or subject to geologic or seismic hazards. The development and conveyance of water in existing facilities would not increase the exposure of people or structures to geologic or seismic hazards. For the Exchange Contractors' water development component of crop idling on approximately 20,000 acres of land, substantial soil erosion would be avoided with disking and/or planting of a cover crop. However, cover crops would not be irrigated during the transfer years. Idled lands would be rotated and brought back into production.

3.2.4 Hazardous Materials

The 25-Year Water Transfer Program would not increase the use of hazardous materials or create a significant hazard to the public or the environment. Existing agricultural operations may involve the use of pesticides regulated by the California Department of Pesticide Regulation. No new lands would be brought into production, and the use of pesticides would occur commensurate with existing levels of agricultural production in the source and receiving areas for the transfer water. Reductions in agricultural production from temporary land fallowing could result in reductions in pesticide applications.

3.2.5 Noise

Noise impacts are assessed when a proposed action has the potential to generate new or exacerbate existing sources of noise as measured at sensitive receptors (such as residential areas, hospitals, and schools) in the project vicinity. None of the water development measures or water applications by potential users would introduce new or worsen existing noise-generating activities beyond existing refuge and farming operations. No new lands would be brought into agricultural production. Pumps associated with the tailwater recovery and water conveyance facilities are existing facilities and are located primarily in agricultural areas or along existing road right-of-ways.

3.2.6 Mineral Resources

The development of the transfer water and its use in the refuges or by agriculture would not result in the loss of availability of a known mineral resource. Agricultural lands would remain in agricultural use, even lands with crop idling. Agricultural lands in the Exchange Contractors' service area would not be converted to other land uses.

3.2.7 Recreation

The Water Transfer Program would not result in the loss of a recreation resource. No increase in population would result in a substantial deterioration of a recreational facility. The development of transfer water would not result in physical impacts from the construction of recreation facilities.

3.2.8 Utilities and Public Services

The management of refuge and irrigation water occurs separately from M&I water supply, wastewater, solid waste, and other public services and utilities. Any transfers to SCVWD and KCWA under SWP contracts and to EBMUD and CCWD under CVP contracts would be subject to limitations in those contracts and not result in exceedances of contract amounts. Consequently, the action alternatives do not have the potential to place additional demand on existing infrastructure other than CVP and SWP facilities and district conveyance systems. It is the potential water user's responsibility to arrange for use of existing water conveyance and storage facilities from the point of diversion to the point of delivery. Development, conveyance, and use of the water to be transferred does not introduce sufficient new jobs as to attract permanent residents to an area and indirectly affect other public services or the need for services in local communities.

3.2.9 Traffic and Transportation

Transportation/circulation system effects are related primarily to construction of facilities rather than to the ongoing operation of those facilities. No new construction of facilities would occur for the Water Transfer Program. No long-term potential exists for significant changes in traffic within the source area due to tailwater recovery or any other component of water development, as none of the operations are sufficiently labor intensive as to affect local or county roads and highways.

3.2.10 Visual Resources

Visual resource changes are associated with construction of permanent facilities or removal of vegetation as needed for safety and maintenance of facilities. No new facility construction would occur for the Water Transfer Program. No long-term potential exists for significant changes in visual resources within the water development area due to tailwater recovery or any other component of water development, as none of the operations require facilities that would change their visible appearance or character. Temporary land fallowing would not result in permanent changes in land use that could affect the visual character of the Exchange Contractors' service area.

3.3 Water Receiving Areas Analysis

3.3.1 Introduction

As explained in Section 1.2, the Proposed Program is to allow for the annual transfer and/or exchange of CVP substitute water from the Exchange Contractors to the following recipients or "water receiving areas:"

- The RWSP to acquire water supplies (Incremental Level 4) for San Joaquin Valley wildlife refuges and the Tulare Lake Basin wildlife areas
- Other CVP and SWP contractors to meet demands of agricultural and M&I uses

For the wildlife refuges, water deliveries would not exceed the Incremental Level 4 quantities needed for full habitat development (see Section 1.1.1). Water provided for delivery to any and all of the CVP and SWP potential water users must be consistent with their previously negotiated contractual supplies contained in long-term and/or interim agreements with Reclamation (for CVP) and the DWR (for SWP). These deliveries are anticipated to assist in meeting water supply shortages or when full contract deliveries cannot otherwise be made for agriculture and M&I purposes.

For the potential water users to obtain any of their contract supplies, compliance with CEQA and NEPA is required. This section summarizes the environmental analyses contained in other CEQA and NEPA documents in Sections 3.3.2, 3.3.4, 3.3.5, and 3.3.6, which are incorporated by reference into this EIS/EIR. These documents explain the environmental effects of these water users receiving their full contract amounts. To respond to public scoping comments that an analysis of water use be made for various water users, the summary information below is supplemented in some instances to more fully address specific issues raised about perceived impacts such as agricultural drainage, which is addressed in other referenced environmental impact analyses.

Furthermore, BOs by the Service on long-term contract renewals (LTCRs) and interim renewal contracts (IRCs) under the CVP are also identified in Section 3.3.7. A summary of these BOs follows the discussion of the contract renewals.

3.3.2 San Joaquin Valley and Tulare Lake Basin Wildlife Areas

As described in Section 1.1.1, CVPIA Section 3406(d)(2) requires the Secretary of the Interior to provide firm delivery of Level 2 water supplies to the various wetland habitat areas identified in Reclamation's *Report on Refuge Water Supply Investigations* (1989) and *San Joaquin Basin Action Plan/Kesterson Mitigation Plan* (1983). These reports describe water needs and delivery requirements for each wetland habitat area to accomplish stated refuge management objectives.

According to the NEPA and CEQA analyses in the *Refuge Water Supply: Long-Term Water Supply Agreements, San Joaquin River Basin* (Reclamation et al. 2000), water quality is the primary concern related to refuge water:

> "Salts in the return flows could increase salinity concentrations in the San Joaquin River to a level that could exceed current salinity standards in the river as

measured at Vernalis. The Programmatic Environmental Impact Statement (PEIS) analysis assumed a worst-case scenario of discharging all of the return flows during the month of March (p. 3-16)."

Recently, in the Final EA for water transfers to the refuges, the Proposed Action was described as the Exchange Contractors providing a 1-year CVP water transfer of 8,000 acre-feet to help meet Incremental Level 4 water supply needs for the refuges during the last few months of calendar year 2010 (Reclamation 2010c). The *One-Year Acquisition/Transfer of 8,000 Acre Feet of San Joaquin Exchange Contractors Water Authority Water to Meet South of Delta Refuges Incremental Level 4 Water Supply Needs for Water Year 2010, Final Environmental Assessment* determined the water transfers as primarily having a beneficial effect (Reclamation 2010c):

- **Water Resources:** The Proposed Action provides a beneficial effect to wetland habitat areas located within the refuges by providing a water supply of suitable quality on a delivery schedule that meets their needs (p. 7).
- **Land Use**: No land use changes would occur as a result of the Proposed Action (p. 9).
- **Biological Resources**: The Incremental Level 4 water would allow for improved management of the wetland habitat areas to benefit migratory and breeding waterfowl and other water birds. These management changes would improve water quality and habitat value for migrating water birds, which could also improve diversity (pp. 9-10).
- **Cultural Resources**: No ground disturbing activities, including excavation or construction are required to convey the water. This administrative action is not the type of activity that has the potential to affect historic properties pursuant to the regulations at 36 Code of Federal Regulations (CFR) Part 800.3(a)(1) (p. 11).
- **Indian Trust Assets**: The Proposed Action does not have a potential to affect Indian Trust Assets (p. 12).
- **Environmental Justice**: Due to the nature of the Proposed Action, no effects to minority or low-income populations would occur (p. 12).
- **Global Climate Change**: Since the Proposed Action would have no construction element and would use existing facilities within the range of normal operations, it would have no effect on climate change (p. 13).

3.3.3 Background of Long-Term and Interim Renewal Contracts

This section provides an overview of the status of the CVP contract renewal process for the potential participants in the Proposed Program. It is followed by sections providing greater detail on the long-term and interim contract renewals including summaries of the environmental compliance documents incorporated by reference into this EIS/EIR. The documents are organized according to the CVP divisions as follows:

- CVP Water Users North of the Delta (Section 3.3.4)
  - American River Division (EBMUD)
  - Delta Division (CCWD)
- CVP Water Users South of the Delta (Section 3.3.5)
  - West San Joaquin Division (San Luis Unit)
  - Delta Division (DMC Unit)
  - San Felipe Division
  - Friant Division
- SWP Water Users South of the Delta (Section 3.3.6)

On October 30, 1992, the President signed into law the Reclamation Projects Authorization and Adjustment Act of 1992 (Public Law 102-575) that included Title 34, the CVPIA. CVPIA Sections 3404(c) and 3409 stipulate that Reclamation must prepare a PEIS analyzing the direct and indirect impacts and benefits of implementing the CVPIA before renewing long-term CVP water service contracts. The complexity of the analysis associated with the CVPIA PEIS extended its completion until October 1999, with a ROD approved on January 9, 2001.

The PEIS evaluated CVP-wide impacts of LTCRs. As contract renewal negotiations were completed, Reclamation prepared environmental documents that tiered from the PEIS to analyze the local effects of LTCRs at the division, unit, or facility level. In accordance with CVPIA Section 3404(c), Reclamation may execute interim water service contracts. IRCs are undertaken under the CVPIA's authority to provide a bridge between the expiration of the original long-term water service contract and the execution of a new long-term water service contract.

American River Division

Within the American River Division, Reclamation completed long-term environmental documents for most of the division, which includes EBMUD (Reclamation 2007b). The American River LTCR EIS ROD was executed in February 2006, for five of the seven contractors (San Juan Water District, City of Roseville, Placer County Water Agency, El Dorado Irrigation District, and EBMUD). (Although the American River Division has eight contractors, one is a water rights contract with no expiration and is not part of the contract renewal process.) Reclamation has executed contracts with four of the five contractors covered by the ROD. The two of the three not covered by the ROD are still undergoing ESA consultation and awaiting the completion of a BO (Sacramento County Water Agency and Sacramento Municipal Utility District). The current contracts for the American River Division contractors expired in 2011. They have not yet executed a long-term renewal contract.

Delta Division

Within the Delta Division (with 20 water service contracts), Reclamation completed long-term environmental documents for the DMC Unit (as cited in Reclamation 2007b), U.S. Department of Veteran Affairs (as cited in Reclamation 2007b), and CCWD (as cited in Reclamation 2007b), and executed 17 Delta Division long-term renewal contracts in early 2005. In 2005, Reclamation published the *Finding of No Significant Impact for the Long-Term Contract Renewal for the Delta Mendota Canal Unit* (2005c).

Three contractors in the DMC Unit have not yet executed a long-term renewal contract, and their respective existing interim contracts expired on February 29, 2012 (two City of Tracy assignments and a 3-way assignment to PVWMD, SCVWD, and WWD #1). Reclamation is pursuing execution of water service IRCs for the period March 1, 2012, to February 28, 2014) (Reclamation 2012a).

West San Joaquin Division

The CVP West San Joaquin Division includes the San Luis Unit.

In late Fall 2007 due to the fact that the existing San Luis Unit contracts expire between December 2007 and December 2008, with one in February 2024, an IRC EA, entitled *San Luis Unit Water Service Interim Renewal Contracts – 2008–2011* (EA# 07-56) (as cited in Reclamation 2007b), was written and a FONSI was signed in December 2007. The first interim contracts for five of the seven San Luis Unit expiring contracts to be signed were expected to be WWD, City of Avenal, City of Huron, City of Coalinga, and CDFG. Reclamation proposes to execute an IRC beginning February 2012, for 2 years for WWD. Six IRCs for PWD, SLWD, the CDFG, and the cities of Huron, Coalinga, and Avenal were completed in March 2011 for 2 years. The San Luis Unit LTCR EIS is currently on hold and is not expected to be finalized during the preparation of the EIS/EIR for the Exchange Contractors' Proposed Program.

San Felipe Division

On March 28, 2007, the San Felipe Division existing contracts were amended to incorporate some of the CVPIA requirements; however, the LTCRs for this division were not executed. The San Felipe Division contracts expire December 31, 2027. Reclamation continues to work on LTCR environmental documentation for the San Felipe Division as well (Reclamation 2007b).

Friant Division

Reclamation completed LTCR environmental documentation in early 2001 for CVP contracts in the CVP's Friant Division, Hidden Unit, and Buchanan Unit. Twenty-five of the 28 Friant Division long-term contracts were executed between January and February 2001, and the Hidden Unit and Buchanan Unit long-term contracts were executed in February 2001. The Friant Division long-term contracts with the City of Lindsay, Lewis Creek Water District, and City of Fresno were executed in 2005 (Reclamation et al. 2000; Reclamation 2001).

The Cross Valley contractors are seven CVP contractors located on the eastern side of the San Joaquin River among the Friant Division CVP contractors: County of Fresno, County of Tulare, Hills Valley Irrigation District, Kern Tulare Water District, Lower Tule River Irrigation District, Pixley Irrigation District, and Tri-Valley Water District. DWR and/or Reclamation actually pump the Cross Valley contractors' water from the Delta where the water is conveyed in the San Luis Canal and California Aqueduct for delivery into the

Cross Valley Canal. Given conveyance constraints, Reclamation envisioned that the Cross Valley contractors were most likely to obtain their CVP supplies through exchanges involving Arvin-Edison Water Storage District or others, and such arrangements are not transfers subject to CVPIA Section 3405 (a). Reclamation prepared a Final EA in July 2010 to analyze these exchange arrangements of CVP Delta water supplies (up to 128,300 AFY) with Friant Division CVP water supplies and other sources (Reclamation 2010f). Reclamation completed an EA and FONSI on renewal of the Cross Valley contractors CVP water supply on February 29, 2012. The original CVP water service contract was executed in 1976 (Reclamation 2010f).

3.3.4 CVP Water Users North of the Delta

Contra Costa Water District

In 2005, Reclamation adopted the *Finding of No Significant Impact. Long-Term Contract Renewal, Contra Costa Water District, Contra Costa Canal Unit* (Reclamation 2005d). The renewal was for a 40-year term through February 2045. The associated EA (Reclamation 2005e) described the Preferred Alternative as a negotiated position between Alternatives 1 and 2. The No Action Alternative consists of renewing the existing water service contract with the provisions described in the Preferred Alternative of the CVPIA PEIS.

The *Final Environmental Assessment. Long-Term Contract Renewal, Contra Costa Water District* (Reclamation 2005e) determined the impacts would be as follows:

- **Water Resources:** Renewal would not alter the supply or quantity of CVP water assigned to CCWD under its existing water service contract and would not change CVP water operations. The proposed action would have no effect on total water supply or operations of the CVP and no related changes to the environment (pp. 4-2 to 4-3).
- **Economic Resources:** Renewal would have a limited socioeconomic impact, even though water costs could increase. The average residential increase would be less than 1 percent (pp. 4-16 to 4-17).
- **Land Use:** No land use changes would be associated with the LTCR. The contract does not include development of any physical facilities and structures and, therefore, would not have a direct effect on land use. While indirect effects to land use could occur due to growth accommodated by the continued availability of water, these effects are largely governed by the Growth Management Element and Urban Limit in the County’s General Plan. CCWD has no land use management authority (pp. 4-7 to 4-8).
- **Biological Resources:** Reclamation prepared a Biological Assessment (BA) on the Contra Costa Canal Long-Term Water Service Contract Renewal (Reclamation 2004, as cited in Reclamation 2005d). Reclamation’s determination in the BA is that the proposed water service LTCR with CCWD may affect, but it not likely to adversely affect, listed fish species or their critical habitat, listed or proposed wildlife species or their critical habitat, or listed or proposed plant species or their critical habitat (pp. 4-30 to 4-31).

- **Threatened, Endangered Species:** The contract renewal would not change or alter habitat use by, or populations of, species listed or proposed for listing as threatened or endangered that are known to occur or have the potential to occur in the contractors' service area. Therefore, no significant impact would occur to listed species (pp. 4-30 to 4-31).
- **Environmental Justice:** The proposed action would not disproportionately affect any socioeconomic or low-income groups. Renewal of the contracts maintains the socioeconomic conditions in the area by providing water needed for agricultural and other enterprises, thus maintaining employment opportunities (pp. 4-19 to 4-21).
- **Cultural Resources:** The proposed action would not introduce new structures such as dams, canals, or reservoirs, have construction activities, or result in physical changes to the environment, and would therefore not directly affect prehistoric, historic, or traditional cultural properties. Indirect effects to cultural resources would result from the planned growth and development projected permitted by county and community planning jurisdictions (pp. 4-36 to 4-38).
- **Indian Trust Assets:** No ITAs occur within the contractor's service areas. Therefore, no direct or indirect impacts to ITAs are anticipated (p. 4-39).

CCWD could take potential transfer water at any of its four intakes in the Delta: at Rock Slough, on Old River, on Victoria Canal, and at Mallard Slough. CCWD's Future Water Supply Study (CCWD 1996) was evaluated in a program level EIR in 1998 (CCWD 1998). However, that document did not evaluate the effects of specific water transfers that could change CVP operations. To enable a future transfer from the Exchange Contractors, CCWD as a potential water user/transferee north of the Delta would need to complete the analysis. With impacts unknown and not modeled, to enable a future transfer, CCWD would need to complete additional analysis to identify potent impacts. For the purposes of this Water Transfer Program EIS/EIR, however, the impacts from the transfers would be consistent with CVP/SWP contract supplies because the Exchange Contractors would only transfer water to CVP entities that do not exceed their CVP contract maximum. That is, the Exchange Contractors would provide substitute water for CVP supply and would not expand any CVP supply amounts or diversion rates. If CCWD does not receive the necessary permits, NEPA and/or CEQA approval, then the Exchange Contractors would not transfer water to them.

East Bay Municipal Utility District

EBMUD's CVP contract supply is for a maximum of 195,000 acre-feet. In the *Central Valley Project*, *Long-Term Service Contract Renewals*, *American River Division*, *Environmental Impact Statement*, Reclamation renewed its service contract with EBMUD for 40 years (Reclamation 2005f). In this Final EIS on the LTCR, the No Action Alternative assumed renewal of long-term CVP water service contracts in accordance with implementation of CVPIA. Contract assumptions in the No Action Alternative are defined by the current water service contract documents for American River Division contractors, including an amendatory contract for EBMUD. The following effects were assessed and determined to not have substantial effects for the Preferred Alternative, which represented a negotiated position between Alternatives 1 and 2, as explained below:

- **Surface Water Resources, Quality, and Facilities**: CVP operations would be similar to future conditions described in the American River Pump Station EIR/EIS. Flows in American River and storage volumes in Folsom Lake are provided to support steelhead in accordance with recent BOs (p. 4-12).
- **Groundwater Resources and Groundwater Quality**: The CVP water supplies would continue to be used and groundwater conjunctive use programs would be implemented (p. 4-16).
- **Land Use, Demographics, and Sociological Resources**: Growth would continue in Sacramento, Placer, El Dorado, Contra Costa, and Alameda counties, as described in the county general plans and associated environmental documentation (p. 4-22).
- **Central Valley Project Water Supply Costs, Agricultural Economics, and Regional Economics**: CVP water supply costs for this alternative were based upon the Tiered Water Pricing concept in the CVPIA PEIS Preferred Alternative (pp. 4-25 to 4-26).
- **Fishery and Wildlife Resources**: Growth would continue in American River Division service area, as described in the county general plans and associated environmental documentation. The general plans include protection measures for biological resources (pp. 4-36, 4-48 to 4-49).
- **Recreation**: Recreational opportunities would continue as described in the county general plans and associated environmental documentation and CVP water service contractor plans (p. 4-55).
- **Cultural Resources**: Sacramento, Placer, El Dorado, Contra Costa, and Alameda counties are responsible for protection of cultural and historical resources under the current land use plans, as described in the county general plans and associated environmental documentation. The general plans have protection measures for cultural and historic resources (p. 4-62).
- **Indian Trust Assets**: The American River Division does not include Indian Trust Assets that rely upon CVP water (p. 4-64).
- **Air Quality**: Growth would continue in Sacramento, Placer, El Dorado, Contra Costa, and Alameda counties, as described in the county general plans and associated environmental documentation. The general plans include air quality improvement and protection measures (pp. 4-68 to 4-69).
- **Soils**: Sacramento, Placer, El Dorado, Contra Costa, and Alameda counties have adopted land use plans and erosion control plans to protect soil resources in the general plans (p. 4-71).

- **Visual Resources**: Visual resources would continue to change as growth continues in Sacramento, Placer, El Dorado, Contra Costa, and Alameda counties. The general plans include protection measures for visual resources (pp. 4-74 to 4-75).
- **Environmental Justice**: The economies of Sacramento, Placer, El Dorado, Contra Costa, and Alameda counties are extremely vibrant and growing. It is assumed that the high employment and the high cost of living would continue into the future (p. 4-76).
- **Secondary Growth Impacts**: Growth would continue in Sacramento, Placer, El Dorado, Contra Costa, and Alameda counties, as described in the county general plans and associated environmental documentation (p. 4-78).

EBMUD's CVP contract supply is discussed in two additional documents: *Freeport Regional Water Project Draft EIR/EIS* (Reclamation and Freeport Regional Water Authority 2003) and the *Water Supply Management Program (WSMP) 2040* (EBMUD 2009).

The *Freeport Regional Water Project Draft EIR/EIS* (Reclamation and Freeport Regional Water Authority 2003) described the Preferred Alternative as Freeport Intake Facility to Mokelumne Aqueducts—Along the Cosumnes River/Power Inn/Gerber Alignment. The environmental impact analysis focuses on construction impacts. Concerning Hydrology, Water Supply, and Power, the EIR/EIS concluded:

- The Preferred Alternative would have less-than-significant impacts on changes in the Upper Sacramento River basin hydrologic conditions (p. 3-13); the Lower Sacramento River, Delta inflow, and Delta outflow hydrologic conditions (p. 3-14); changes in Mokelumne River basin hydrologic conditions (p. 3-15); changes in South-of-Delta water supply delivery operations (p. 3-18); and hydropower and energy production (p. 3-19).
- In the WSMP, EBMUD described its "Preferred Portfolio" as a mix of rationing, conservation, recycled water, and supplemental supply to meet its 2040 water supply demand. The Preferred Portfolio was analyzed for its environmental impacts, and five alternative portfolios were compared to it. According to the *Draft Program EIR for the WSMP 2040* (EBMUD 2009), the following impacts would occur under the Preferred Portfolio scenario for Hydrology, Groundwater, and Water Quality:
  - The following impacts would be reduced to less-than-significant levels with further site-specific analyses and mitigation measures: degradation of water quality (p. 5.2.A-3); cross-contamination of aquifer zones (p. 5.2.A-3); effects of brine discharge may exceed established water quality objectives and standards (p. 5.2.A-6); recycled water impacts to water quality and public health (p. 5.2.A-9); groundwater quality (pp. 5.2.A-11 and 5.2.A-12); groundwater banking and exchange (pp. 5.2.A-12 and p. 5.2.A-13); groundwater levels (p. 5.2.A-15); surface water runoff (p. 5.2.A-17); permanent land subsidence from groundwater withdrawals (p. 5.2.A-18);

impacts to Sacramento and Delta downstream users (pp. 5.2.A-20 and 5.2.A-21); effects on intakes and outfalls from Regional Desalination intake (p. 5.2.A-21); and long-term impacts to Mokelumne River hydrology (p. 5.2.A-22).

Both the Freeport and WSMP documents indicate that no specific work or analysis on impacts to downstream users from taking water at Freeport under transfers has been performed (EBMUD 2009, p. 5.2.A-20). With impacts unknown and not modeled, it is prudent to conclude a potentially significant impact exists until proven otherwise. To enable a future transfer, the potential water user/transferee north of the Delta would need to complete the analysis. For the purposes of this Water Transfer Program EIS/EIR, however, the impacts from the transfers would be consistent with CVP/SWP contract supplies because the Exchange Contractors would only transfer water to CVP entities that do not exceed their CVP contract maximum. That is, the Exchange Contractors would provide substitute water for CVP supply and would not expand any CVP supply amounts or diversion rates. If EBMUD does not receive the necessary permits, NEPA and/or CEQA approval, then the Exchange Contractors would not transfer water to them.

3.3.5 CVP Water Users South of the Delta

West San Joaquin Division

San Luis Unit

Reclamation published a *Draft EIS for the Long-Term Water Service Contract Renewal for the San Luis Unit*, which includes the Pacheco Water District, PWD, SLWD, and WWD (Reclamation 2005b). The EIS analysis was for contracts extending through February 28, 2045. Although the EIS was not finalized, it provides environmental analyses for the resource areas studied in this EIS. In the EIS, the No Action Alternative assumed renewal of long-term CVP water service contracts in accordance with implementation of CVPIA. Contract assumptions in the No Action Alternative are defined by the current water service contract documents for San Luis Unit contractors, including applicable interim and continuing longer-term contracts. The No Action Alternative and related future conditions acknowledge ongoing environmental trends as a benchmark against which effects resulting from the implementation of the action alternatives (Alternatives 1, 2, and the Preferred Alternative) were compared.

The Preferred Alternative was based upon the final or near-final versions of the long-term water service contracts that had been negotiated between Reclamation and each of the San Luis Unit Contractors. For the purposes of this document, the Preferred Alternative includes a variety of administrative tasks and clarifications regarding the contractor and Reclamation responsibilities under the contracts.

In February 2006, the *Draft, Supplemental Information to the Draft Environmental Impact Statement for the Central Valley Project, West San Joaquin Division, San Luis Unit Long-Term Water Service Contract Renewal* was published particularly to address drainage and land retirement issues (Reclamation 2006a). The Supplemental EIS concluded that under the No Action Alternative the Grassland Drainage Area’s proposed

In-Valley Treatment/Drainage Reuse Facility would occur with or without drainage service from Reclamation and was included in the No Action (pp. A-1 to A-2):

- 4,000 acres of land are proposed for planting with salt-tolerant crops; 2,200 acres have already been planted and another 500 acres are in the process of being planted. Subsurface drainage systems have been installed on a total of 900 planted acres (an additional 300 acres have subsurface drainage but are not planted).
- Without additional funding, the remainder of the 4,000 acres could not be planted, and no additional subsurface drainage systems would be installed.
- In its current condition, the reuse facility can reduce drainage discharge needs by 7,200 acre-feet.

Under the No Action Alternative, the Grassland Drainage Area would be prevented from discharging drainwater after 2009.[1]Also, under the No Action Alternative, Reclamation assumed 109,106 acres of agricultural land would be retired based on the CVPIA Land Retirement, Westlands Settlement Agreement, and Britz Settlement (p. A-2).

In February 2010, Reclamation published the *Finding of No Significant Impact and Final Environmental Assessment for San Luis Unit Water Service Interim Renewal Contracts 2010–2013*. The Final EA (Reclamation 2010d) concluded the following:

- **Water Resources**: Execution of the 11 IRCs will not change contract water quantities from the quantities in the existing contracts, and will not lead to any increased water use. Therefore, no effect on surface water supplies or quality will occur. Since water quantities and deliveries will not change, a shift to groundwater due to the IRCs will not occur (pp. 21-23).
- **Biological Resources**: The amount and timing of storage at CVP reservoirs and flows in rivers and streams that convey CVP water during the 2-year contract period are expected to be similar to the amount and timing of storage and flows under historic CVP operations and will conform with all existing BOs and with regulatory requirements. Renewal of the interim contracts will not cause changes in existing programs to protect biological resources, and programs will continue to be implemented to ensure that no significant impacts to biological resources will occur (pp. 24 to 26).
- **Cultural Resources**: No impacts to cultural resources are expected. The Proposed Action will not result in any changes in water delivery or in the construction of new delivery systems. The Proposed Action does not include any contract provisions that will result in "on-the-ground" changes proposed by the 11 contract renewals. Given the lack of any possible impacts as a result of the Proposed Action, Reclamation concludes that no potential to affect historic properties exists (p. 27).

[1] The Grassland Bypass Project was granted an extension for 2010 to 2019, and a new Use Agreement with Reclamation was signed in December 2009. See Section 1.3.5.

- **Indian Trust Assets**: No physical changes to existing facilities are proposed and no new facilities are proposed. Continued delivery of CVP water under an IRC will not affect any Indian Trust Assets because existing rights will not be affected (p. 28).
- **Land Use**: The interim renewal of the 11 contracts will not provide for additional water supplies that could act as an incentive for conversion of native habitat. Use of contract water for M&I use under the proposed IRCs will not change from the purpose of use specified in the 11 existing contracts. Likewise, the 11 IRCs will not change contract terms or conditions governing the allocation of CVP water during times of limited supply (i.e., drought), so will not provide additional water reliability. Given the 2-year period of the 11 IRCs, no significant impact on land use will occur (pp. 29 to 30).
- **Socioeconomic Resources**: Under the Proposed Action, no potential exists for effects to occur due to tiered pricing since the 11 IRCs are less than 3 years in duration. Renewal of the interim contracts with only minor administrative changes to the contract provisions will not result in a change in contract water quantities or a change in water use. The renewal of the 11 interim contracts will provide continued stability to the agricultural industry within the contractors' service area resulting in beneficial impacts to socioeconomic resources (pp. 31 to 32).
- **Environmental Justice**: Renewal of the IRCs, with only minor administrative changes to the contract provisions, will not result in a change in contract water quantities or a change in water use. The Proposed Action will not cause dislocation, changes in employment, or increase flood, drought, or disease. The Proposed Action will not disproportionately impact economically disadvantaged or minority populations. No changes to existing conditions will occur. Employment opportunities for low-income wage earners and minority population groups will be within historical conditions. Disadvantaged populations will not be subject to disproportionate impacts. Therefore, the Proposed Action will not differ from current conditions and will not be expected to disproportionately affect minority or low income populations. No environmental justice implications will occur from the Proposed Action (pp. 33 to 34).
- **Global Climate Change**: Climate change refers to changes in the global or a regional climate over time. Global climate change is expected to have some effect on the snow pack of the Sierra Nevadas and the run off regime. Current data are not yet clear on the hydrologic changes and how they will affect the San Joaquin Valley. Water allocations are dependent on hydrologic conditions and environmental requirements. Since Reclamation operations and allocations are flexible, any changes in hydrologic conditions due to global climate change will be addressed within Reclamation's operational flexibility and, therefore, surface water resource changes due to climate change will be the same with or without the Proposed Action (p. 34).
- **Cumulative Impacts**: Cumulative impacts result from incremental impacts of a Proposed Action when added to other past, present, and reasonably foreseeable

> future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. To determine whether cumulatively significant impacts are anticipated from the Proposed Action, the incremental effect of the Proposed Action was examined together with impacts from past, present, and reasonably foreseeable future actions in the same geographic area. Because the renewals of interim contracts maintain the status quo of deliverable quantities and CVP operations and, in essence, only change the legal arrangements of a continuing action, they do not contribute to cumulative impacts in any demonstrable manner (pp. 34 to 35).

As stated in the FONSI, Reclamation completed consultation with the Service on these IRC actions. On February 19, 2010, and February 26, 2010, the Service issued BOs 2008-F-0944-2 and 2008-F-0538-3 for the 11 IRCs, which found the Proposed Action to be nonjeopardy and nonmodification of critical habitat. BO 2008-F-0944-2 has an incorrect date stamp; however, it is clear from the context that this BO applies to these contracts. The result of that ESA Section 7 consultation, along with implementation of all applicable requirements ensure that renewal of interim contracts will not result in any significant effect to threatened or endangered species. Reclamation has determined that these interim renewal actions will have no effect upon listed salmonid and sturgeon species within San Luis Unit's service area boundaries. Additionally, Reclamation has determined that these interim renewal actions will have no effects to designated salmonid critical habitat within the San Luis Unit service area (Reclamation 2010d, p. 3).

Also see discussion below under Delta Division for the FONSI for Three Delta Division and Five San Luis Unit Water Service Interim Renewal Contracts 2012-2014 (Reclamation 2012a).

Delta Division

Delta-Mendota Canal Unit

In 2005, Reclamation published the *Finding of No Significant Impact for the Long-Term Contract Renewal for the Delta Mendota Canal Unit* (2005c). This renewal covers the Byron-Bethany Irrigation District (formerly Plain View Water District), the Del Puerto Water District and the Patterson Water District from March 2005 through February 2030. The No Action Alternative assumed that the long-term CVP water service contracts would be renewed for a 25-year period in accordance with the CVPIA's implementation as described in the CVPIA PEIS Preferred Alternative. The CVPIA PEIS Preferred Alternative assumed that most contract provisions would be similar to many of the provisions in the 1997 CVP IRCs, which included contract terms and conditions consistent with applicable CVPIA requirements. In addition, the No Action Alternative assumed tiered pricing provisions and environmental commitments as described in the CVPIA PEIS Preferred Alternative.

The Preferred Alternative was based upon the final negotiated contact language and represented a negotiated position between Alternatives 1 and 2, the "bookends" for the analysis in this EA. Some of the key provisions of the Preferred Alternative include (Reclamation 2005g, pp. 2-23 to 2-24):

- The final negotiated contract assumed that CVP water has been relied upon and considered essential by contractors. It also assumed that the Secretary, through coordination, cooperation, and partnership, will pursue measures to improve water supply.
- The final negotiated contract included provisions for water transfers. It assumed that continuation of water transfers with the rate for transferred water being the transferor's rate for additional or reduced costs related to transfer and adjusted to remove any ability-to-pay-relief.
- The final negotiated contract applied tiered water pricing to 80 percent and above the total contract quantity.
- The final negotiated contract assumed that contracts will be renewed subject to certain conditions for agricultural water and unconditioned for M&I water. Ten years after the date of execution of the contract and every 5 years thereafter during the term of the contract, the Contracting Officer will determine whether the relevant portion of the contract can be converted to a contract under subsection 9(d) of the Reclamation Project Act of 1939, pursuant to the Act of July 2, 1956 (70 Stat 483). Concurrently, the Contracting Officer will also determine whether the relevant portion of this contract could be converted to a contract under subsection 9(c)(1) of the Reclamation Act of 1939.
- The final negotiated contract assumed that the CVP will operate in accordance with existing rules without obligations to operate towards water quality goals.

The *Delta-Mendota Canal Unit. Final Environmental Assessment. Long-Term Contract Renewal* (2005g) that supported the FONSI concluded the following for the Preferred Alternative:

- **Water Resources**: Renewal of the long-term service contract will not change contract water quantities from the quantities in existing contracts and will, therefore, not cause any increased use. Therefore, no effect on surface water supplies or quantity will occur. For the same reason, renewal of the water service contract would not result in any growth-inducing impacts that will increase water demand during the contract's time frame (pp. 3-167 to 3-169).
- **Land Use**: The contract renewal will not provide for additional water supplies that could act as an incentive for the conversion of native habitat for increased acreage of agriculture production, M&I development, or other activities. The amount and types of crops will vary, as they have in the past, according to the annual water allocation and farming practices (pp 3-146 to 3-147).
- **Biological Resources**: The proposed LTCR would continue the deliveries of CVP water to the 17 contractors of the DMC Unit. No new facilities would be constructed (p 3-187).

- **Cultural Resources**: The contract renewal will not directly or indirectly cause ground-disturbing activities (pp. 3-199 to 3-200).
- **Recreation Resources**: The contract renewal will not cause changes in historic CVP operations that determine reservoir shortage or the amount or timing of water deliveries (pp. 3-205 to 3-206).
- **Demographics and Environmental Justice**: Because the contract renewal is essentially maintaining the status quo, it will not have an adverse effect on human health or the environment, as defined by environmental justice policies and directives. The contract renewal will not disproportionately affect any socio-economic conditions in the area by providing water needed for agricultural and other enterprises, thus maintaining employment opportunities (pp. 3-124 to 3-125, 4-1).
- **Indian Trust Assets**: Execution of the water service contract will not affect any Indian Trust Assets because Indian Trust Assets are known within the DMC Unit service area (pp. 4-3 to 4-4).
- **Economic Resources**: Contract renewal will have limited socio-economic impact, even though costs will increase. M&I water users are relatively price inelastic; that is, they change their use of water relatively little in response to even fairly substantial changes in the price of water. Similarly, large scale farming operations are not expected to change relative to changes in water rates. Change of the threshold of a presumption of agricultural use from a 2- to a 5-acre minimum will not significantly affect farmers. Upon documentation of a farming operation, the smaller acreage would qualify for lower agricultural rates (pp. 3-124 to 3-125).
- **Air Quality**: Contract renewal would not result in adverse impacts to air quality. Agricultural land uses would include similar crops and cropping patterns as the existing environment. It was assumed that retired or fallowed lands would naturally revegetate, be grazed by livestock, or be occasionally dryland-farmed (p. 3-152).
- **Soils and Geology**: Contract renewal could result in groundwater levels declining 1 to 3 percent because of the allocation of CVP water to Level 2 refuge water supplies and improved fish and wildlife habitat. As a result of increased groundwater pumping, land subsidence could increase over its present rate. To the extent that CVP deliveries are curtailed in some years, especially in 1 or more successive dry years, groundwater pumping may prove to be more economical than obtaining surface water at the higher tiered price or through transfers. If this becomes the case, groundwater pumping would increase over present levels, especially in service areas that tend to rely heavily on groundwater pumping because of limited, affordable surface water options. As a result, the groundwater levels could decline with no or little recharge, and land subsidence could increase over present rates. Soils may increase in salinity as salts concentrate as a result of an insufficient surface water supply for adequate leaching or poor quality, pumped groundwater (pp. 3-156 to 3-157).

- **Groundwater**: Groundwater levels may decline 1 to 3 percent as a result of the allocation of CVP water to Level 2 refuge water supplies and improved fish and wildlife habitat. As a result, land subsidence could increase over its present rate. Groundwater pumping and land subsidence will continue in the Program area as they have historically. However, to the extent that reduced CVP surface water is delivered, especially in 1 or more successive dry years, groundwater pumping may prove to be more economical than obtaining surface water at the higher tiered price or through transfers. If this becomes the case, groundwater pumping would increase over present levels, especially in service areas that will tend to rely heavily on groundwater pumping because of limited, affordable surface water options. As a result, the groundwater levels could decline with no or little recharge and land subsidence could increase over present rates. In addition, salt loading in soils and shallow groundwater would occur as a result of the application of the lower-quality groundwater. Soil salinity and saline subsurface water tables are being managed to maintain agricultural productivity through a combination of best management practices and the operation of subsurface drainage collection systems. With the reduced CVP water supply projected, drainage would not be expected to increase (pp. 3-160 to 3-161).
- **Visual Resources**: Contract renewal would not result in adverse impacts on visual resources. General cultivated and fallowed acreage patterns would be similar to historical patterns, and agricultural viewsheds would not change. Neither scenic views nor visibility would be adversely impacted (p. 3-208).
- **Public Health**: Contract renewal would not directly result in an increase in mosquito populations or have an adverse impact on public health. The implementation of the contract renewal is not expected to increase flows or the incidence of standing water in project features and, therefore, would not result in an increase in mosquito populations (pp. 3-211 to 3-212).

In addition, the FONSI noted no impacts to threatened and endangered species as concluded in the DMC Unit BA (Reclamation 2003, as cited in Reclamation 2005g):

- **Threatened, Endangered Species**: The proposed LTCR would continue the deliveries of CVP water to the contractors of the DMC Unit. It would not change or alter habitat use by or populations of species listed or proposed for listing as threatened or endangered that are known to occur or have the potential to occur in the DMC Unit service area.

See Section 3.3.7 for discussion of the determinations made in the ESA consultations with the Service and NMFS.

Reclamation drafted an EA in 2004 for the LTCR that included the PVWMA, SCVWD, and WWD Distribution #1 for CVP water (Reclamation 2004b). No Action assumes renewal of long-term CVP water service contracts for a 25-year period in accordance with the CVPIA's implementation as described in the PEIS Preferred Alternative, which assumed that most contract provisions would be similar to many of the provisions in the 1997 CVP IRCs. The Proposed Action represents a negotiated position between

Alternatives 1 and 2. The Draft EA (2004b) stated no significant impacts would occur from the Proposed Action; however, the EA was never finalized and is not incorporated herein by reference.

In February 2012, Reclamation published a FONSI and Final EA for the proposed renewal of interim contracts in the CVP's Delta Division and San Luis Unit for up to 2 years beginning March 1, 2012 (*Finding of No Significant Impact and Final Environmental Assessment, Three Delta Division and Five San Luis Unit Water Service Interim Renewal Contracts 2012-2014 [Reclamation 2012a]*). The San Luis Unit contractors affected by the renewal of the interim contracts are PVWMA, SCVWD, and WWD for the 6,260 AFY previously considered in the 2004 Draft EA. The Proposed Action is to continue the interim contracts to 2014. The water service contracts contain provisions that allow for adjustments resulting from court decisions, new laws, and changes in regulatory requirements imposed through reconsultations. To the extent that additional restrictions are imposed on CVP operations to protect threatened or endangered species, those restrictions will be implemented in the administration of the contracts. As a result, the IRCs will conform to any applicable requirements lawfully imposed under the Federal Endangered Species Act (ESA) or other applicable environmental laws (p. 2). The FONSI is supported by the following findings:

- **Water Resources**: The renewal of interim contracts delivering the same quantities of water that have historically been put to beneficial use will not result in effects on surface water supplies or quality or in any growth-inducing impacts (p. 3).
- **Land Use**: Renewal of these interim contracts will support existing land use and not provide for additional water supplies that could act as an incentive for conversion of native habitat (p. 3).
- **Biological Resources**: The effects of the Proposed Action are substantially similar to those under No Action, so the Proposed Action will not result in substantial changes in natural and semi-natural communities and other land uses that have the potential to occur within the interim renewal contractor's service area (p. 4).
- **Cultural Resources**: With no changes in water delivery or in the construction of new delivery systems, no impacts to cultural resources or to historic properties are expected (p. 5).
- **Indian Sacred Sites**: Neither restriction of access to nor adverse effects to the physical integrity of any sacred sites will occur (pp. 5-6).
- **Environmental Justice**: The Proposed Action will not differ from current conditions and is not expected to disproportionately affect minority or low income populations (p. 6).
- **Socioeconomic Resources**: Renewal of the interim contracts with only minor administrative changes to the contract provisions will not result in a change in contract water quantities or a change in water use (p. 6).

- **Air Quality**: Water delivery will move through existing federal facilities via gravity and electrical pumps s it will under No Action, so there are no impacts to air quality (p. 6).
- **Global Climate Change**: Water delivery will be the same as under No Action, so there will be no direct or indirect effects to climate (p. 6).
- **Cumulative Impacts**: The Proposed Action will maintain the environmental status quo of deliverable quantities and CVP operations, they do not contribute to cumulative impacts (p. 7).

San Felipe Division

For the SCVWD, Reclamation published a FONSI and Final EA that covered the long-term (21-year) groundwater banking of CVP water at the Semitropic Water Storage District (2006b): *Finding of No Significant Impact and Final Environmental Assessment, Santa Clara Valley Water District Long-Term Groundwater Banking Project Storage and Exchange of Central Valley Project Water with Semitropic Water Storage District*. The terms are consistent with SCVWD's long-term contract for banking CVP water. The No Action alternative would not transfer water to the Semitropic Groundwater bank beyond the amount banked in 2005. In the Proposed Action, the SCVWD would deliver up to 100,000 acre-feet of CVP supplies for delivery to the groundwater bank, and SCVWD could recover up to 100,000 acre-feet of water from the bank. In addition, the exchange water would only be used for beneficial purposes; would not be used to place untilled or new lands into production, nor to convert undeveloped land to other uses; would not adversely affect SCVWD operations; and the movement of water would not require the construction of any new water diversion or conveyance facilities, and no introduction of non-CVP water into Federal facilities would occur. The Final EA (2006b) concluded the following:

- **Surface Water Resources**: The Proposed Action would not adversely affect SWP and CVP facilities operations or surface water resources (p. 31).
- **Groundwater Resources**: The Proposed Action does not increase the amount of water to be banked at Semitropic. It would only provide an additional source of water to be banked and would balance out Southern Santa Clara County's contributions with that of Northern Santa Clara County, allowing SCVWD to enhance their groundwater management with greater flexibility of surface water resources (p. 32).
- **Land Use**: No native, untilled, or similar habitats would be disturbed by the Proposed Action; therefore, no effects to land use would occur (p. 32).
- **Biological Resources**: No new disturbances of aquatic ecosystems, including estuarine and freshwater open water or palustrine habitat, riparian habitat, or floodplains would occur. The Proposed Action is unlikely to adversely affect migratory birds, imperiled terrestrial species, unique habitats, or species and habitats protected by Federal or California law, nor would it have the potential to affect any critical habitats or proposed critical habitats in the SCVWD. Semitropic Water Storage District has no critical habitats (p. 33).

- **Cultural Resources**: The proposed banking agreement between the SCVWD and Semitropic has no potential to affect historic properties. No impacts to cultural resources would occur (p. 34).
- **Indian Trust Assets**: Santa Clara County (the location of SCVWD) or Kern County (the location of the Semitropic Water Bank) has no tribal trust assets and, therefore, the Proposed Action would have no impact on Indian Trust Assets (p. 34).
- **Socioeconomic Resources**: The Proposed Action would not cause or facilitate any environmental or socio-economic change over existing conditions in Santa Clara County, Kern County or any other part of the CVP service area. No effects to socioeconomic resources are associated with the Proposed Action (p. 35).
- **Environmental Justice**: The Proposed Action would not cause dislocation, changes in employment, or increase flood, drought, or disease. The Proposed Action would not disproportionately impact economically disadvantaged or minority populations (p. 35).

Reclamation has not completed ESA consultation with the Service on this groundwater banking storage and exchange project. This needs to be completed if SCVWD is to participate in the Proposed Water Transfer Program with use of the groundwater storage facility and water exchange with Semitropic.

Friant Division

The Friant Division is made up of many districts along the southern San Joaquin's East Side, 24 of which are covered in this Proposed Water Transfer Program (see Figure 2-4). In the 2001 *Friant Division Long-Term Contract Renewal, Final Environmental Assessment* (Reclamation 2001), Reclamation assessed the potential adverse effects from water delivery from the CVP to the Friant Division contractors for agriculture, M&I uses for a 25-year time period. The No Action Alternative was defined as renewing existing water service contracts as described by the Preferred Alternative of the PEIS.

The Preferred Alternative was defined as the final contract language and the long-term renewal proposed action that represented a negotiated position between Alternatives 1 and 2. The Preferred Alternative falls between the "bookends" of those alternatives.

The Final EA (Reclamation 2001) that supported the FONSI concluded the following for the Preferred Alternative:

- **Surface Water**: Based on the conjunctive use design of the Friant Division, contractors are expected to continue mixed use of CVP surface water and groundwater, with greater emphasis on groundwater use during dry period when CVP surface water is limited (p. 2-2).
- **Water Supply**: Historic operation of the Friant-Kern Canal, Madera Canal, Millerton Lake, Hensley Lake, and Eastmas Lake will remain the same as relative to historic conditions. The conjunctive use of groundwater and surface water is

not expected to change under the provisions of the long-term contract (pp. 2-2 to 2-3).

- **Groundwater**: During dry conditions, groundwater usage increases in response to decreases in surface water supplies. Contractors return to greater surface water usage after the dry condition end (p. 2-3).
- **Water Quality**: Water quality in the rivers and groundwater of the Friant Division is not anticipated to change significantly from past conditions. Factors that tend to influence water quality, such as agricultural runoff, will be similar to historic conditions. Because groundwater quality is influenced by factors such as deep percolation of applied water, a shift in the quality of applied water may change the groundwater quality (p. 2-4).
- **Fisheries**: Water use is expected to continue as it has using both CVP surface water supplies and groundwater. Groundwater has typically been more important during dry years when CVP water is less available (p. 2-4).
- **Land Use**: The Friant Division contractors account for 40 percent of the irrigated acreage in the six subregions. Changes in irrigated acres are relatively small because of the high percentage of land in the subregions planted in permanent crops and the availability of groundwater as a replacement for decreased CVP supplies (p. 2-5).
- **Biological**: Existing Friant Division management will continue under current conditions. No impacts to vegetation and wildlife are expected, since no additional infrastructure (e.g., dams, increased dam heights, canals, etc.) will be constructed. Additionally, under this alternative, no increase in deliveries and no conversion of existing natural habitat into farmland will occur (pp. 2-5 to 2-6).
- **Recreational**: The operation of CVP facilities does not change and reservoirs and the recreational resources is not changed (p. 2-6).
- **Socioeconomic**: The contract renewal will have a less-than-significant effect on economic resources. The largest variations seen in irrigated acres, gross revenue, net revenue, and employment in the region change with the weather and commodity demands. The change in irrigated acres from an Average Year to a Dry Year decreases by 2 percent. The change in gross revenue between an Average Year to a Dry Year decreases by 1 percent. In Wet Years net income decreases by 1 percent. The change in employment from an Average Year to a Dry Year decreases by less than 1 percent (pp. 2-6 to 2-7).
- **Cultural**: The contract renewal would not result in direct impact to eligible or significant cultural resources. Water apportioned under the contract renewal may be used to alter the use of a landscape, either through inundation, irrigation-related construction, or some other changes that could impact cultural resources. The entities responsible at this level for potential impacts to cultural resources are the counties, except Fresno County, where the contracting agencies – the individual water districts, have the responsibility (p. 2-7).

- **Indian Trust Assets**: No impact would occur to the single Indian Trust Asset, John Davis Rancheria, located in the area of the Friant Division water contractors (Orange Cove Irrigation District) (p. 2-8).
- **Social Conditions**: The operation of CVP facilities does not change and the social conditions are not changed (p. 2-8).
- **Air Quality**: The operation of CVP facilities does not change and air quality does not change (p. 2-8).
- **Geology and Soils**: The operation of CVP facilities does not change and soil and geology resources are not changed (p. 2-8).
- **Visual**: The operation of CVP facilities does not change and visual resources do not change (p. 2-8).

See Section 3.3.7 for a summary of the conclusions contained in the *Biological Opinion on U.S. Bureau of Reclamation Long Term Contract Renewal of Friant Division and Cross Valley Unit Contracts* (Service 2001a).

3.3.6 SWP Water Users South of the Delta

Santa Clara Valley Water District

The long-term contracts for SWP water to the SCVWD were executed prior to the enactment of CEQA in 1970; therefore, no environmental clearance document currently exists. However, CEQA compliance will be required when DWR extends the long-term contracts (Greg Meamber, pers. comm., 2011).

Kern County Water Agency

In 2010, the DWR certified an EIR for the Monterey Amendment for use of SWP water that included the Kern County Water Agency (DWR 2010a): *Final Environmental Impact Report, Monterey Amendment to the State Water Project Contracts (Including Kern Water Bank Transfer) and Associated Actions as Part of a Settlement Agreement (Monterey Plus) SCH #2003011118*. The environmental analysis had four different No Project alternatives, which considered various water transfers scenarios with and without the Monterey Amendment allocations. The preferred project was considered to be the approval of permanent transfers of 130,000 acre-feet of water and retirement of 45,000 acre-feet of SWP long-term water supply contracts. The EIR found that most of the impacts would be reduced to less-than-significant levels, other than the specific impacts as described below:

- **Surface Water Hydrology, Water Quality, and Water Supply:** The proposed project would have less-than-significant or no impacts on the following: flows in the San Joaquin and American rivers (p. 7.1-40); ambient water quality in the Feather, Sacramento, American, and San Joaquin rivers (p. 7.1-41); water quality in the Delta and the San Francisco Bay Estuary (p. 7.1-44); water levels or water quality in Lake Oroville, San Luis Reservoir, Castaic Lake, and Lake Perris (p. 7.1-51); quality of the water supplies for SWP contractors and the water agencies they serve (p. 7.1-54); availability and quality of water supplies for the

Feather River water rights contractors (p. 7.1-55); availability and quality of water to the CVP and its contractors (p. 7.1-57); water quality in Plumas County streams (p. 7.1-61); and the Environmental Water Account (p. 7.1-62).

- **Groundwater Hydrology and Quality:** The proposed project would have a beneficial effect on groundwater levels in Kern County Groundwater Basin (p. 7.2-10).
- **Fisheries Resources:** The proposed project would have less-than-significant or no impact on the following: special-status fish species in the Feather River due to water flow changes (p. 7.3-35); special-status fish species in the American River due to water flow changes (p. 7.3-39); special-status fish species in the Sacramento River due to water flow changes (p. 7.3-40); special-status fish species in the San Joaquin River due to water flow changes (p. 7.3-42); special-status fish species in the Delta due to Delta export changes (p. 7.3-53); special-status fish species in the San Joaquin River due to outflow changes (p. 7.3-75); recreational fisheries in Lake Perris and Castaic Lake (p. 7.3-79); fisheries resources at Lake Oroville (p. 7.3-81); and fisheries at San Luis Reservoir (p. 7.3-82). Impacts to special-status fish species in the San Joaquin River due to water flow changes for the future would require mitigation measures to reduce them to less than significant (p. 7.3-71).
- **Terrestrial Biological Resources:** The proposed project would have less-than-significant or no impacts on the following: special-status terrestrial biological resources in southern San Joaquin Valley portion of Kern and Kings counties as a result of agricultural changes (p. 7.4-21); special-status terrestrial biological resources in southern San Joaquin Valley portion of Kern County (excluding the Kern Fan Element property) due to construction of new groundwater storage facilities (p. 7.4-23); special-status terrestrial biological resources on the Kern Fan Element property due to changes in land use and management (p. 7.4-26); special-status terrestrial biological resources at Castaic Lake (p. 7.4-31); special-status terrestrial biological resources at Lake Perris (p. 7.4-33); special-status terrestrial biological resources at the San Luis Reservoir (p. 7.4-36); special-status terrestrial biological resources along the Feather, American, Sacramento and San Joaquin rivers (p. 7.4-36); and special-status terrestrial biological resources within the Delta (p. 7.4-37). Impacts to the following resources would be reduced to less than significant with implementation of mitigation measures: future impacts to special-status terrestrial biological resources on the Kern Fan Element property due to changes in land use and management (p. 7.4-27). Future impacts to special-status terrestrial biological resources in southern San Joaquin Valley portion of Kern County (excluding the Kern Fan Element property) due to construction of new groundwater storage facilities (p. 7.4-23) and impacts to special-status terrestrial biological resources at Lake Perris (p. 7.4-34) would be significant and unavoidable even with implementation of mitigation measures. The proposed project could benefit special-status terrestrial biological resources in Plumas County as a result of watershed improvement projects (p. 7.4-38).
- **Visual Resources:** The proposed project would have less-than-significant or no impacts on the following: visual resources in the southern San Joaquin Valley

portion of Kern County as a result of agricultural changes (p. 7.5-11); visual resources in southern San Joaquin Valley portion of Kern County (excluding the Kern Fan Element) due to construction of new groundwater storage facilities (p. 7.5-12); visual resources in the Kern Fan Element due to construction of new groundwater storage facilities (p. 7.5-13); visual resources at Castaic Lake and Lake Perris (p. 7.5-14); visual resources at San Luis Reservoir and Lake Oroville (p. 7.5-18); and visual resources in Plumas County as a result of watershed improvement projects (p. 7.5-18). Future visual changes at Castaic Lake and Lake Perris would constitute a significant and unavoidable impact (p. 7.5-15).

- **Agricultural Resources:** The proposed project would have little or no impact on the acreage of irrigated land in the southern San Joaquin Valley in the future. If any land was to be taken out of irrigated production, it would remain in agricultural use as dry farmed or fallow land and would not be converted to urban uses. No Prime, Unique, or Farmland of Statewide Importance would be converted to nonagricultural uses nor would a conflict be created with respect to existing agricultural zoning or Williamson Act contracts as a result of the proposed project (p. 7.6-8).
- **Air Quality:** The proposed project would have less-than-significant impacts on the following: PM_{10} emissions from changes in the amount of agricultural land disturbance occurring in the southern San Joaquin Valley portion of Kern County (p. 7.7-7); PM_{10}, nitrogen oxide, and diesel toxic air contaminant emissions in the southern San Joaquin Valley portion of Kern County (excluding the Kern Fan Element) (p. 7.7-9); air pollutant emissions resulting from the transfer of Kern Fan Element lands (p. 7.7-10); reactive organic gas emissions (p. 7.7-12); vehicle emissions associated with travel to and from the reservoirs (p. 7.7-13); wind-blown particulate emissions (pp. 7.7-14 and 7.7-15); and air pollution emissions from the construction and operation of watershed improvements in Plumas County (p. 7.7-16). Future project impacts from changes in water surface elevations could cause significant and unavoidable impacts on wind-blown particulate emissions (p. 7.7-15).
- **Geology, Soils, and Mineral Resources:** The proposed project would have less-than-significant impacts on the following: rates of erosion in the southern San Joaquin Valley portion of Kern County as a result of changes in agricultural practices (p. 7.8-7); rates of erosion in the southern San Joaquin Valley portion of Kern County (excluding the Kern Fan Element) as a result of construction of new groundwater storage facilities (p. 7.8-8); rates of erosion in the Kern Fan Element from changes in land use (p. 7.8-9); rates of erosion at Castaic Lake and Lake Perris (p. 7.8-10); rates of erosion at San Luis Reservoir and Lake Oroville (p. 7.8-11); and rates of erosion in Plumas County as a result of watershed improvement projects (p. 7.8-12). Future impacts to rates of erosion at Castaic Lake and Lake Perris would be significant and unavoidable (p. 7.8-11).
- **Recreation:** The proposed project would have less-than-significant impacts on the following: recreational resources at Castaic Lake and Lake Perris (p. 7.9-13); and recreational resources at San Luis Reservoir and Lake Oroville (p. 7.9-18). Future impacts to recreational resources at Castaic Lake and Lake Perris would be

significant and unavoidable even with implementation of mitigation measures (p. 7.9-15).

- **Land Use and Planning:** The proposed project would have less-than-significant impacts on changes in land use that physically divide an established community in the southern San Joaquin Valley portion of Kern County (p. 7.10-4).
- **Hazards and Hazardous Materials:** The proposed project would have less-than-significant impacts to exposing workers or the public to previously unidentified hazards or hazardous materials (p. 7.11-6).
- **Noise:** The proposed project would have less-than-significant impacts on the following: noise level changes from the alternation in agricultural practices (p. 7.12-8); noise levels in the southern San Joaquin Valley portion of Kern County (excluding the Kern Fan Element) as a result of construction and operation of new groundwater storage facilities (p. 7.12-12); noise levels in Kern Fan Element as a result of development of new groundwater storage facilities (p. 7.12-13); recreational and traffic noise level changes from water surface elevation changes at Castaic Lake, Lake Perris, Lake Oroville, and San Luis Reservoir (p. 7.12-14 and 7.12-15); and noise level changes in Plumas County from watershed improvement projects (p. 7.12-16).
- **Cultural and Paleontological Resources:** The proposed project would have less-than-significant or no impacts on the following: damage or destroy cultural and paleontological resources in the southern San Joaquin Valley portion of Kern and Kings counties (p. 7.13-17); damage or destroy cultural and paleontological resources in the southern San Joaquin Valley portion of Kern County (excluding the Kern Fan Element) (p. 7.13-19); damage or destroy cultural and paleontological resources in the Kern Fan Element as a result of development of groundwater banks (p. 7.13-21); expose cultural and paleontological resources to damage and/or destruction as a result of water level changes at Castaic Lake and Lake Perris (p. 7.13-23); expose cultural and paleontological resources to damage and/or destruction as a result of water level changes at San Luis Reservoir and Lake Oroville (p. 7.13-24); and damage or destroy cultural and paleontological resources in Plumas County as a result of watershed improvement projects (p. 7.13-25). Significant impacts would be reduced to less than significant with mitigation measures for the following: future impacts to cultural and paleontological resources in the Kern Fan Element as a result of development of groundwater banks (p. 7.13-22); and future impacts to expose cultural and paleontological resources to damage and/or destruction as a result of water level changes at Castaic Lake and Lake Perris (p. 7.13-23). Future impacts would be significant and unavoidable even with implementation of mitigation measures to cultural and paleontological resources in the southern San Joaquin Valley portion of Kern County (excluding the Kern Fan Element) (p. 7.13-19), and cultural and paleontological resources in Plumas County as a result of watershed improvement projects (p. 7.13-26).

- **Public Services and Utilities:** The proposed project would have no impacts to the need for new or expanded government facilities or cause an increase in demand for public services and utilities (p. 7.14-3).
- **Traffic and Transportation:** The proposed project would have less-than-significant or no impacts on the following: traffic and circulation in the southern San Joaquin Valley portion of Kern County (p. 7.15-7); traffic and circulation in the southern San Joaquin Valley portion of Kern County (excluding the Kern Fan Element) as a result of construction and operation of new groundwater banks (p. 7.15-8); traffic and circulation in the Kern Fan Element as a result of construction and operation of percolation ponds (p. 7.15-9); traffic volumes on state and local roadways as a result from recreational use at Castaic Lake, Lake Perris, San Luis Reservoir, and Lake Oroville (p. 7.15-10); and traffic and circulation in Plumas County as a result of construction and operation of watershed improvement projects (p. 7.15-11).
- **Energy:** The proposed project would not increase the demand for energy (p. 7.16-7).

3.3.7 Related Biological Opinions and ESA Consultations

This section summarizes the results of endangered species consultations with the Service on the LTCRs and IRCs and with NMFS as applicable for other related actions such as the Grassland Bypass Project and SLDFR.

Related Actions

Biological Opinion on the Long-Term Central Valley Project and State Water Project Operations Criteria and Plan (OCAP) (NMFS 2004)

The OCAP is a detailed analysis and explanation of the criteria and procedures for conducting combined CVP and SWP operations. Reclamation and DWR conducted endangered species consultations to address the CVP/SWP combined long-term operations leading to the development of BOs on the combined operations of their facilities in 2004. Reclamation was the lead Federal agency and the DWR was the lead state agency for these consultations. Reclamation consulted with the Service and the NOAA Fisheries regarding potential operational impacts to species listed pursuant to the ESA. DWR consulted with CDFG regarding potential operational impacts to species listed pursuant to the California ESA. These BOs have undergone legal challenges since their issuance and have been retracted and rewritten as a result of court rulings.

As part of the ESA Consultation for the OCAP, Reclamation has Prepared a Biological Assessment (BA) Analyzing the Effects of Proposed OCAP Actions

The OCAP BA (Reclamation 2004c) addresses the potential environmental consequences of continuing CVP and SWP operations on listed species and analyzes the effects of proposed operations through 2030. The OCAP BA includes descriptions of the actions, the biology of the listed species, and the modeling of present and future conditions resulting from continuing operations. The OCAP BA addresses the continued CVP and SWP operations on fishery resources including winter-run and spring-run Chinook salmon, Central Valley steelhead, and delta smelt. It also recommends that these documents account for several considerations, including the appropriate levels of development, and operations associated with legal decisions and related water facilities and projects, including those in the CCID and FCWD.

Formal Endangered Species Consultation on the Operations and Maintenance Program Occurring on Bureau of Reclamation Lands within the South-Central California Area Office (Service 2005b)

Reclamation conducted an endangered species consultation on the Operations and Maintenance Program occurring on Reclamation lands within the South-Central California Area Office. This consultation and the associated BO (Service 2005b) address potential impacts on delta smelt, Conservancy fairy shrimp, longhorn fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, valley elderberry longhorn beetle, California red-legged frog, California tiger salamander, blunt-nosed leopard lizard, giant garter snake, California condor, bald eagle, California clapper rail, giant kangaroo rat, salt marsh harvest mouse, San Joaquin kit fox, San Joaquin wooly-threads, succulent owl's clover, Hoover's spurge, Greene's tuctoria, San Joaquin Valley Orcutt grass. The Service determined that the Operations and Maintenance occurring on Reclamation lands within Reclamation's South-Central California Area Office, as proposed, is not likely to jeopardize the continued existence of these species. This BO includes reasonable and prudent measures to minimize incidental take of these species.

The Service also concurred that the proposed action is not likely to adversely affect the vernal pool tadpole shrimp, valley elderberry longhorn beetle, California red-legged frog, California tiger salamander, blunt-nosed leopard lizard, giant garter snake, California condor, bald eagle, California clapper rail, giant kangaroo rat, salt marsh harvest mouse, San Joaquin kit fox, San Joaquin wooly-threads, succulent owl's clover, Hoover's spurge, Greene's tuctoria, and San Joaquin Valley Orcutt grass.

The Service noted that Reclamation had determined that the proposed action would have no effect on large-flowered fiddle neck, Lange's metalmark butterfly, Aleutian Canada goose, California jewelflower, soft bird's-beak, palmate-bracted bird's-beak, Fresno kangaroo rat, Contra Costa wallflower, bay checkerspot butterfly, Contra Costa goldfields, Alameda whipsnake, riparian woodrat, Antioch Dunes evening-primrose, Bakersfield cactus, hairy Orcutt grass, Hartweg's golden sunburst, Keck's checkerbloom, and riparian brush rabbit, and designated critical habitat for large-flowered fiddle neck, valley elderberry longhorn beetle, Fresno kangaroo rat, Contra Costa goldfields, Antioch Dunes evening-primrose, and hairy Orcutt grass.

Biological Opinion for Formal and Early Section 7 Endangered Species Consultation on the Coordinated Operations of the Central Valley Project and State Water Project and the Operational Criteria and Plan to Address Potential Critical Habitat Issues (Service 2005c)

This consultation and the associated BO address potential impacts on the delta smelt and its critical habitat. This BO also concurs that the coordinated operations are not likely to adversely affect the riparian brush rabbit, riparian wood rat, salt marsh harvest mouse, California clapper rail, giant garter snake, California red-legged frog, valley elderberry longhorn beetle, soft bird's beak, and Suisun thistle. The BO also concludes that no additional effects to the bald eagle are expected beyond those addressed in a 1993 BO.

Litigation by environmental organizations and commercial fishermen resulted in the overturning of these BOs issued by the Service for Delta smelt (above) and NMFS for anadromous fish. Operational limitations on the SWP and CVP were imposed by the Court to protect delta smelt (while new BOs were under preparation), although no new limitations were imposed to protect salmon and steelhead. The judicial action had the effect of reducing SWP deliveries through June 2008 by about 500,000 acre-feet. (Wilkinson 2011).

A new delta smelt Biological Opinion was issued by the Service on December 15, 2008 (Service 2008a). A new Biological Opinion for salmon and steelhead (anadromous fish) was issued by NMFS on June 4, 2009 (NMFS 2009). Both of these are "jeopardy opinions" and include additional limitations on water deliveries by both the SWP and CVP and have redirected that water through the Delta for fishery purposes.

Additional litigation by several water user groups has ensued on both BOs. On May 18, 2010, in the salmon cases and, on May 27, 2010, and on December 14, 2010, in the smelt cases, the Federal court issued major opinions dealing with preliminary injunction and summary judgment motions brought by plaintiffs to lift the limitations restricting SWP/CVP pumping. The Court's most recent opinion (December 14, 2010) grants summary judgment overturning the smelt BO and remanding the opinion to the Service. Because the smelt BO is being remanded "without vacature" (the SWP and CVP need the accompanying "incidental take" authorization to operate), additional Court activity to determine interim operational criteria for both projects will occur (Wilkinson 2011).

Reclamation will be preparing an EIS on its implementation of future BOs and developing interim operational criteria for both the CVP and SWP. This operational uncertainty would not constrain the 25-Year Water Transfer Program due to the annual transfer approval process by Reclamation explained in Section 14.3.3.

Formal Consultation on the Proposed San Luis Drainage Feature Re-evaluation; California Least Tern, Giant Garter Snake, and San Joaquin Kit Fox; Fresno, Kings, and Merced Counties, California (Service 2006a)The proposed action includes mitigation measures. This document notes that Reclamation determined that the proposed action would have no effect on Buena Vista Lake shrew, Fresno kangaroo rat, giant kangaroo rat, riparian woodrat, bald eagle, California condor, California red-legged frog, blunt-nosed leopard lizard, vernal pool fairy shrimp and vernal pool tadpole shrimp, valley elderberry longhorn beetle, palmate-bracted bird's-beak, California jewelflower, San Joaquin wooly-threads, and delta smelt and delta smelt critical habitat. The Service concurred that the proposed action is not likely to adversely affect Tipton kangaroo rat and California tiger salamander. The Service concluded that the proposed action is not likely to jeopardize the continued existence of the San Joaquin kit fox, giant garter snake, and California least tern. Critical habitat has not been designated for these species;

therefore, none will be affected. Terms and conditions for the San Joaquin kit fox and California least tern are included in the BO.

Final Biological Opinion, 2010-2019 Use Agreement for the Grassland Bypass Project, Merced and Fresno Counties, California. December 18, 2009 (Service 2009a)

Reclamation and the San Luis and Delta Mendota Water Authority requested formal consultation with the USFWS on the potential effects of the 3rd Used Agreement for the Grassland Bypass Project on San Joaquin kit fox and giant garter snake. In this BO, the Service determined that the proposed action, with its associated conservation measures, was not likely to result in jeopardy to these two species. The BO established several Reasonable and Prudent Alternative and terms and conditions with which Reclamation must comply to be exempt from the prohibitions under Section 9 of the ESA.

Long-Term Contract Renewals

Biological Opinion on U.S. Bureau of Reclamation Long Term Contract Renewal of Friant Division and Cross Valley Unit Contracts (Service 2001a)

The Service prepared this BO to address the proposed renewal by the Reclamation of water service contracts with the CVP's Friant Division and Cross Valley Units for the 25-year period from 2001 through 2026. This BO covers 35 Federally listed species, 4 proposed species, and 3 candidate species.

The Service concluded that the proposed action, as described in this BO, is not likely to jeopardize the following species: Aleutian Canada goose, Bakersfield cactus, bald eagle, blunt-nosed leopard lizard, Buena Vista lake shrew, California condor, California jewelflower, California red-legged frog, California tiger salamander, Colusa grass, Conservancy fairy shrimp, delta smelt, fleshy owl's-clover, Fresno kangaroo rat, giant garter snake, giant kangaroo rat, Greene's tuctoria, hairy Orcutt grass, Hartweg's golden sunburst, Hoover's spurge, Hoover's wooly star, Keck's checker-mallow, Kern mallow, least Bell's vireo, mountain plover, palmate-bracted bird's-beak, Sacramento splittail, San Joaquin adobe sunburst, San Joaquin kit fox, San Joaquin Valley Orcutt grass, San Joaquin wooly-threads, southwest willow flycatcher, Tipton kangaroo rat, valley elderberry longhorn beetle, vernal pool fairy shrimp, and vernal pool tadpole shrimp, or destruction or adverse modification of critical habitat of California condor, delta smelt, Fresno kangaroo rat, southwestern willow flycatcher, or valley elderberry longhorn beetle.

The Service also concluded that the proposed action, described in this opinion, is not likely to adversely affect the bald eagle and California condor.

The Service also concluded that, because of their close proximity, historic range and inclusion in future consultation actions, the riparian brush rabbit and riparian woodrat should continue to be a focus of conservation efforts for this proposed action, if conservation efforts in this project description are determined to be expandable to encompass the needs of these species.

This BO includes required conservation measures.

Conclusion of Consultation on Long Term Renewal of Water Service Contracts in the Delta-Mendota Canal Unit (Service 2005d)

The proposal to list the mountain plover had been withdrawn, so that species is not addressed in this document.

The Service concluded that and determined that the proposed renewal of long-term water service contracts is not likely to adversely affect San Joaquin kit fox, giant garter snake, riparian brush rabbit, riparian wood rat, palmate-bracted bird's beak, and the California red-legged frog, or proposed or designated critical habitat, in 20 water districts: Broadview Water District, Coehlo Family Trust, Eagle Field Water District, Reclamation District # 1606, Fresno Slough Water District, West Stanislaus Irrigation District, James Irrigation District, Patterson Irrigation District, Laguna Water District, Centinella Water District, Tranquility Public Utility District (Mardella/Melvin Hughes Property), San Joaquin National Cemetery, Del Puerto Water District, Mercy Springs Water District (unassigned portion), West Side Irrigation District, Oro Lorna Water District, Banta Carbona Irrigation District, Tranquility Irrigation District, Byron/Bethany Water District (Plain View Water District), and Widren Water District.

The Service concluded that the renewal of CVP water service contracts in the DMC unit may affect, but is not likely to adversely affect, the San Joaquin kit fox and the giant garter snake.

Reinitiation and Amendment of Formal Consultation and Conference on Contra Costa Water District's Future Water Supply Implementation Program (File No. 99-F-0093) for the Renewal of the CVP Long Term Water Service Contract (Service 2005e)

The Service supplemented the conclusion of BO 1-1-99-F-0093 by determining that the proposed action is not likely to jeopardize the continued existence of the California tiger salamander or result in the destruction or adverse modification of proposed critical habitats for the California red-legged frog and the California tiger salamander. The Service also determined that the proposed action will not adversely modify or destroy proposed critical habitat for California red-legged frog and California tiger salamander.

The Service concurred that the execution of a long-term water service contract between the Federal government and CCWD may affect but is not likely to adversely affect the riparian woodrat, riparian brush rabbit, California brown pelican, western snowy plover, bald eagle, Lange's metalmark butterfly, calliope silverspot butterfly, California freshwater shrimp, delta green ground beetle, large-flowered fiddleneck, Contra Costa wallflower, Santa Cruz tarplant, and Colusa grass. The Service also determined that the proposed action is not likely to adversely affect the valley elderberry longhorn beetle and pallid manzanita, because the CCWD service area is outside the species' known range. The Service also concurred that the proposed action may affect, but is not likely to adversely affect, designated critical habitat for Antioch dunes evening-primrose and Contra Costa wallflower. Effects of the proposed action on designated critical habitat for delta smelt were addressed in the July 30, 2004, BO on OCAP. Designated critical habitat for longhorn fairy shrimp, vernal pool tadpole shrimp, vernal pool fairy shrimp, Contra Costa goldfields, Colusa grass, delta green ground beetle, valley elderberry longhorn beetle, Santa Cruz tarplant, and large-flowered fiddleneck does not occur within the action area of this consultation.

In BO 1-1-99-F-0093, the Service concluded that the vernal pool tadpole shrimp, salt marsh harvest mouse, California least tern, California clapper rail, soft bird's-beak, Contra Costa goldfields, San Joaquin kit fox, longhorn fairy shrimp, giant garter snake, vernal pool fairy shrimp, Alameda whipsnake, and California red-legged frog are not likely to be jeopardized by the effects of construction of the multipurpose pipeline, including delivery and application of CVP contract water.

Final Biological Opinion, as Amended, for Long Term Renewal of the CVP Water Service Contract for the East Bay Municipal Utility District (Service 2006b)

The Service determined that the proposed action was not likely to adversely modify proposed critical habitat for the Alameda whipsnake and the California red-legged frog. This document adopts the early consultation on long-term renewal of the EBMUD CVP water contract in the December 24, 2004, BO as the final BO and amends that BO with the conference opinion (stated above) to address potential effects of the action on critical habitats proposed since December 24, 2004.

Confirmation of Early Consultation as the Final Biological Opinion, as Amended for Long Term Renewal of the CVP Service Contract for the East Bay Municipal Utility District (Service 2006c)

This document adopts the early consultation on long-term renewal of the EBMUD CVP water service contract in our December 10, 2004, BO (File Number 1-1-04-0224), as the final BO, and amends that BO with a conference opinion that addresses effects of the action on critical habitats proposed since the December 10, 2004 BO. Specifically, this amendment consists of a conference opinion on proposed critical habitat for the Alameda whip snake and California red-legged frog. The Service concluded that the proposed action is not likely to adversely modify proposed critical habitat for the Alameda whip snake and California red-legged frog.

Interim Renewal Contracts

Section 7 Consultation Biological Opinion on U.S. Bureau of Reclamation Renewal of 54 Interim and 14 Friant Contracts (Service 2000)

This BO addresses the effects of the proposed renewal by Reclamation of 54 interim contracts and the continued delivery of this contracted water to 54 interim contracts and 14 existing interim and Friant Division water service contracts.

The Service concluded that the proposed action, described in this BO, is not likely to jeopardize the following species: Aleutian Canada goose, Bakersfield cactus, blunt-nosed leopard lizard, California jewelflower, Colusa grass, Conservancy fairy shrimp, Delta smelt, El Dorado bedstraw, fleshy owl's-clover, Fresno kangaroo rat, giant garter snake, giant kangaroo rat, Greene's tuctoria, hairy Orcutt grass, Hartweg's golden sunburst, Hoover's spurge, Hoover's wooly star, Keck's checker-mallow, Kern mallow, large-flowered fiddleneck, Layne's butterweed, least Bell's vireo, longhorn fairy shrimp, mountain plover, northern spotted owl, palmate-bracted bird's-beak, Pine Hill ceanothus, Pine Hill flannelbush, Sacramento Orcutt grass, Sacramento splittail, San Joaquin adobe sunburst, San Joaquin kit fox, San Joaquin Valley Orcutt grass, San Joaquin wooly-threads, slender Orcutt grass, southwestern willow flycatcher, Stebbins' morning-glory, riparian brush rabbit, riparian woodrat, Tipton kangaroo rat, valley elderberry longhorn beetle, vernal pool fairy shrimp, and vernal pool tadpole shrimp. The Service also concluded that the proposed action is not likely to adversely affect the Alameda whip snake, bald eagle, California red-legged frog, and California condor.

Section 7 Compliance Under the Endangered Species Act for the Interim Renewal of Specific CVP Water Service Contracts from March 2001 to February 2002 (Service 2001b)

The Service extended the existing IRC BO (2000 Interim Opinion), dated February 29, 2000 (Service File No. 1-1-00-F-0056), for the period March 1, 2001, to February 28, 2002.

Santa Clara Habitat Conservation Plan [and Mercy Springs District Water Assignment] (Service 2002a)

This letter inquires about the status of the proposed Habitat Conservation Plan for Santa Clara County, due to its relevance in analyzing the potential effects of the proposed water assignment and transfer.

Biological Opinion, Interim Water Contract Renewals, March 1, 2002 – February 29, 2004 Central Valley Project (Service 2002b)

This BO is an amendment to the Service's February 29, 2000, BO on Interim Water Contract Renewals (File #1-1-00-F-00 56) on the effects of the proposed action. This amendment addresses the effects of the proposed renewal and the continued delivery by Reclamation of 34 interim contracts and 8 Cross Valley Canal Division water service contracts. The interim water contracts include contractors within the American River Division, Delta Mendota Cana l Unit, Sacramento River Division, Shasta Division, and the Trinity Division.

Species addressed by this BO are Alameda whip snake, bald eagle, bay checkerspot butterfly, blunt-nosed leopard lizard, and California clapper rail. California jewelflower, California red-legged frog, Colusa grass, Conservancy fairy shrimp, delta smelt, El Dorado bedstraw, fleshy owl's-clover, Fresno kangaroo rat, giant garter snake, giant kangaroo rat, Greene's tuctoria, hairy Orcutt grass, Hartweg's golden sunburst, Hoover's spurge, Hoover's woolly star, Keck's checker-mallow, Kern mallow, large-flowered fiddleneck, Layne's butterweed, least Bell's vireo, longhorn fairy shrimp, Metcalf Canyon jewelflower, mountain plover, northern spotted owl, palmate-bracted bird's-beak, Pine Hill ceanothus, Pine Hill flannelbush, Sacramento Orcutt grass, Sacramento splittail, salt marsh harvest mouse, San Joaquin adobe sunburst, San Joaquin kit fox, San Joaquin Valley Orcutt grass, San Joaquin wooly-threads, Santa Clara Valley dudleya, slender Orcutt grass, Stebbins' morning-glory, riparian brush rabbit, riparian woodrat, Tiburon paintbrush, Tipton kangaroo rat, valley elderberry longhorn beetle, vernal pool fairy shrimp, and vernal pool tadpole shrimp.

Changes in this list of species since 2000 were primarily due to the addition of SCVWD to, and the removal of the Friant Division contractors from, the action area. Critical habitat of the threatened marbled murrelet also occurs within the service area of the SCVWD; however, The Service found that the action is not likely to adversely affect the murrelet or its critical habitat, because only a few acres occur, in extreme western Santa Clara County, and they are only on state lands. In 2000, the Service found the interim contracts not likely to adversely affect Alameda whipsnake, bald eagle, California red-legged frog, and California condor. This amendment alters that finding to “may affect” for Alameda whipsnake and California red-legged frog, again due to the change in action area. Both the whipsnake and the frog had critical habitat designated since the 2000 interim BO.

The Service concluded that the proposed action was not likely to jeopardize the species listed above, or destroy or adversely modify designated critical habitat.

Interim Water Contract Renewal Consultation for the Period March 1, 2004 through February 28, 2006 (Service undated)

This BO is a reinitiation and amendment of the Service’s February 29, 2000, BO on Interim Water Contract Renewals, as amended by the BO of February 27, 2002. This second amendment to the February 29, 2000, BO addresses the effects of the proposed renewal of the 42 contracts addressed in the BOs of 2000 and 2002 and 17 new interim contracts, for a maximum 2-year period.

This document records consultation on the proposed renewal of up to 59 interim contracts for up to 2 years including the period between March 1, 2004, and February 28, 2006. These interim contracts fall within the American River Division; Cross Valley Canal Unit; Colusa Basin Drain; Delta Mendota Canal Unit, which includes three partial contract assignments; Sacramento River Division, which includes one partial contract assignment and Feather River Water District; Shasta Division; Trinity Division; and Friant Division.

This BO is a reinitiation and amendment of the Service’s February 29, 2000, BO on Water Service IRCs, as amended by the BO of February 27, 2002.

Species addressed by this BO are Alameda whip snake, bald eagle, bay checkerspot butterfly, blunt-nosed leopard lizard, and California clapper rail. California jewelflower, California red-legged frog, California tiger salamander, Colusa grass, Conservancy fairy shrimp, coyote ceanothus, delta smelt, El Dorado bedstraw, fleshy owl’s-clover, Fresno kangaroo rat, giant garter snake, giant kangaroo rat, Greene’s tuctoria, hairy Orcutt grass, Hartweg’s golden sunburst, Hoover’s spurge, Hoover’s woolly star, Keck’s checker-mallow, Kern mallow, large-flowered fiddleneck, Layne’s butterweed, least Bell’s vireo, longhorn fairy shrimp, Metcalf Canyon jewelflower, mountain plover, northern spotted owl, palmate-bracted bird’s-beak, Pine Hill ceanothus, Pine Hill flannelbush, Sacramento Orcutt grass, Sacramento splittail, salt marsh harvest mouse, San Joaquin adobe sunburst, San Joaquin kit fox, San Joaquin Valley Orcutt grass, San Joaquin wooly-threads, Santa Clara Valley dudleya, slender Orcutt grass, Stebbins’ morning-glory, riparian brush rabbit, riparian woodrat, Tiburon paintbrush, Tipton kangaroo rat, valley elderberry longhorn beetle, vernal pool fairy shrimp, and vernal pool tadpole shrimp.

Changes in this list of species since 2002 included the proposal of the California tiger salamander Distinct Population Segment as a threatened species, final designation of critical habitat for 15 vernal pool species, vacature of critical habitat for the California red-legged frog and Alameda whipsnake, and removal of Hoover's woolly-star and Sacramento splittail from the list of threatened and endangered species.

The Service concluded that that the action, as proposed, is not likely to jeopardize the continued existence of the listed species and is not likely to destroy or adversely modify critical habitat, where designated.

Interim Water Contract Renewal for the Period March 1, 2006 through February 29, 2008 [18 CVP Interim Contract Renewals] (Service 2006d)

This BO is a reinitiation and amendment of the Service's February 29, 2000, BO on Water Service IRCs, as amended by BOs of February 27, 2002, and February 27, 2004. This third amendment to the February 29, 2000, BO addresses the effects of the proposed renewal of 18 of the interim contracts.

The Service concluded that renewal of the interim water contracts is a non-jeopardy Federal action.

After the consultation request for this action was received, The Service issued a no jeopardy BO on long-term renewal of the CVP water service contracts for EI Dorado Irrigation District (January 12, 2006). The Service also concurred that long-term renewal of the CVP water service contract for San Juan Water District was not likely to adversely affect listed species (January 19, 2006). As a result, those contracts are not further addressed in this BO.

The Service concurred that interim renewal of the CVP water service contract for PVWMA (partial assignment from Mercy Springs Water District) is not likely to adversely affect Federally listed species.

The Service determined that approval of interim contracts with the City of Tracy will not result in effects to listed species not anticipated and covered by the permit issued to the City of Tracy, and the BO for the contract assignments.

For SCVWD, this BO addresses Contra Costa goldfields, robust spineflower, and showy Indian clover, western snowy plover, bay checkerspot butterfly, California clapper rail, California least tern, California red-legged frog, California tiger salamander (central population), coyote ceanothus, least Bell's vireo, Metcalf Canyon jewelflower, salt marsh harvest mouse, and Santa Clara Valley dudleya.

For the Cross Valley Unit, this BO addresses blunt-nosed leopard lizard, California jewelflower, California tiger salamander (central population), San Joaquin adobe sunburst, and vernal pool fairy shrimp and critical habitat for the California red-legged frog.

For WWD #1, this BO addresses the blunt-nosed leopard lizard, California jewelflower, giant kangaroo rat, San Joaquin kit fox, and San Joaquin wooly-threads.

For WWD #2, this BO addresses the San Joaquin kit fox.

Consultation on the Interim Renewal of Water Service Contracts with Westlands Water District, California Department of Fish and Game, and the Cities of Avenal, Coalinga, and Huron (Service 2007)

This document records consultation on the execution of 26-month IRCs on Reclamation's behalf and five CVP co-applicants: CDFG's Mendota WA, the cities of Avenal, Coalinga, and Huron, and WWD. The then-current WWD contract was to expire at the end of this year (2007). The other San Luis Unit contracts were to expire at the end of 2008. WWD interim contract would begin on January 1, 2008, and expire on February 28, 2010, and the remaining four interim contracts would begin on January 1, 2009, and expire on February 28, 2011.

This consultation addressed the potential effects of the proposed Federal action to the following species: Buena Vista Lake shrew, Fresno kangaroo rat, giant kangaroo rat, riparian woodrat, California condor, California red-legged frog, California tiger salamander, vernal pool fairy shrimp, vernal pool tadpole shrimp, palmate-bracted bird's beak, valley elderberry longhorn beetle, California clapper rail, Tipton kangaroo rat, blunt-nosed leopard lizard, California least tern, California jewelflower, San Joaquin woolly-threads, giant garter snake, and San Joaquin kit fox. Bald eagle was not considered because it was delisted on July 9, 2007. The effects of water diversion on delta smelt and delta smelt Critical Habitat were being analyzed in the consultation being conducted on the OCAP at that time.

The Service concurred that proposed renewal of interim CVP water service contracts will have no effect on Buena Vista Lake shrew, Fresno Kangaroo rat, giant kangaroo rat, riparian woodrat, bald eagle (delisted), California condor, California red-legged frog, California tiger salamander, vernal pool fairy shrimp, vernal pool tadpole shrimp, palmate bracted bird's beak, valley elderberry longhorn beetle, delta smelt and delta smelt Critical Habitat, and California clapper rail, because either the current range for the species does not extend into the San Luis Unit or no occurrences of the species are known inside the action area that would be affected by the continued delivery of CVP water during the interim contract period.

The Service concluded that the interim renewal of CVP water service contracts may affect, but is not likely to adversely affect, the San Joaquin kit fox, blunt-nosed leopard lizard, California least tern, California jewelflower, San Joaquin woolly-threads, Tipton kangaroo rat, and giant garter snake.

Interim Water Contract Renewal for the Period March 1, 2008 through February 28,2010 for Cross Valley and Delta Division Contractors in San Joaquin, Santa Clara, Tulare, Fresno, Kings, and Kern Counties, California (Service 2008b)

This BO is a reinitiation and amendment of the Service's February 29, 2000, BO on Interim Water Contract Renewals (as amended by BOs of February 27, 2002, February 27, 2004, and February 28, 2006. This third amendment to the February 29, 2000, BO addresses the effects of the proposed renewal of 15 of the contracts addressed in the 2004 opinion for a maximum 2-year period.

Changes since 2006 in the list of species considered include the final listing of the California tiger salamander Distinct Population Segment as a threatened species; final designation of critical habitat for the Central Distinct Population Segment of the California tiger salamander; final designation of critical habitat for 15 vernal pool species; Designation of Critical Habitat for the California Red-Legged Frog, and Special Rule Exemption Associated With Final Listing for Existing Routine Ranching Activities". Since the 2006 BO on IRCs was issued, critical habitat has been proposed for the threatened bay checkerspot butterfly. This proposed critical habitat includes 8 units in the Critical habitat. Units 5 thru 12 are contained in SCVWD's place of use.

The BO addresses species by geographical region, as described below.

The Service concurred that interim renewal of the CVP water service contract for PVWMA (partial assignment from Mercy Springs Water District) is not likely to adversely affect Federally listed species.

The Service determined that approval of interim contracts with the City of Tracy will not result in effects to listed species not anticipated and covered by the permit issued to the City of Tracy, and the BO for the contract assignments.

For SCVWD, the Service also determined that Contra Costa goldfields, robust spineflower, and showy Indian clover have been extirpated from Santa Clara County. The Service determined that the proposed Federal action is not likely to adversely affect the western snowy plover. Other species evaluated for this region are bay checkerspot butterfly, California clapper rail, California least tern, California red-legged frog, California tiger salamander (Central population), coyote Ceanothus, least Bell's vireo, Metcalf Canyon jewelflower, salt marsh harvest mouse, and Santa Clara Valley dudleyi.

For the Cross Valley Unit, this BO addresses blunt-nosed leopard lizard, California jewelflower, California tiger salamander (Central population), San Joaquin adobe sunburst, and vernal pool fairy shrimp and critical habitat for the California red-legged frog.

For WWD #1, this BO addresses the blunt-nosed leopard lizard, California jewelflower, giant kangaroo rat, San Joaquin kit fox, and San Joaquin wooly-threads.

For WWD #2, this BO addresses the San Joaquin kit fox.

The Service concluded that the interim renewal of 15 water service contracts, as proposed, is not likely to jeopardize the continued existence of these species and is not likely to destroy or adversely modify critical habitat of listed vernal pool species, the California red-legged frog, or the central population of the California tiger salamander.

Conclusion of Consultation on the Interim Renewal of Water Service Contracts in the San Luis Water District and Panoche Water District in Merced and Fresno Counties, California (Service 2008c)

The Service concurred that issuance of two IRCs, for SLWD and PWD, for periods of 26 months, beginning on January 1, 2009, may affect, but is not likely to adversely affect, the Federally listed San Joaquin kit fox and giant garter snake or critical habitats designated under the federal ESA.

Consultation on the Renewal of Interim Water Service Contracts for the 24-Month Period from March 1, 2010 through February 29, 2012 for Cross Valley and Delta Division Contractors in San Joaquin, Santa Clara, Tulare, Fresno, Kings, and Kern Counties, California (Service 2010a)

The Service determined that issuing 24-month IRCs for the following contractors would not be likely to adversely affect listed species: City of Tracy (partial assignment from West Side Irrigation District); City of Tracy (partial assignment from Banta Carbona Irrigation District); County of Fresno; Hills Valley Irrigation District; Kern-Tulare Water District; Lower Tule River Irrigation District; Pixley Irrigation District; Tri-Valley Water District; and County of Tulare.

Consultation on the Interim Renewal of Ten Water Service Contracts including Five with Westlands Water District for March 1, 2010 - February 29, 2012; Four Municipal and Industrial Water Service Contracts with Department of Fish & Game, and the Cities of Avenal, Coalinga, and Huron, for March 1, 2011 - February 28,2013, and the 3-Way Partial Assignment from Mercy Springs Water District to Pajaro Valley Water Management Area, Santa Clara Valley Water District, and Westlands Water District for March 1, 2010 - February 29,2012 (Service 2010b)

This BO is a reinitiation of the Service's February 29, 2000, BO on IRCs and the Service's consultations of February 27, 2002, February 27, 2004, February 28, 2006, December 15, 2008, and December 22, 2009. This consultation addresses the effects of the proposed renewal of 10 IRCs in the San Luis Unit and the CVPs' San Felipe Division for a maximum 2-year period. The Service determined that the proposed action will have no effect on the following Federally listed species or critical habitats: Buena Vista Lake shrew, Fresno kangaroo rat, Tipton kangaroo rat, giant kangaroo rat, riparian woodrat, California condor, California red-legged frog, California tiger salamander, vernal pool fairy shrimp, vernal pool tadpole shrimp, palmate-bracted bird's-beak, valley elderberry longhorn beetle, delta smelt, delta smelt critical habitat, and California clapper rail, The bald eagle is not addressed in this BO because it was delisted in 2007.

The Service also determined that the action, as proposed, is not likely to jeopardize the continued existence of the San Joaquin kit fox, giant garter snake, California least tern, and blunt-nosed leopard lizard, California jewelflower, and San Joaquin woolly threads.

Consultation on the Interim Renewal of Water Service Contracts with San Luis Water District and Panoche Water District (Service 2010c)

The Service concurred that issuance of two IRCs, for the SLWD and PWD, for a 24-month period, beginning March 1, 2011, and going through February 28, 2013, may affect, but is not likely to adversely affect the Federally listed San Joaquin kit fox, giant garter snake, and delta smelt, including delta smelt designated critical habitat.

Reclamation has determined that the proposed action will have no effect on the following Federally listed species or critical habitats and is not requesting concurrence with those determinations: San Joaquin woolly-threads, valley elderberry longhorn beetle, longhorn fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, blunt-nosed leopard lizard, California red-legged frog, California tiger salamander, Fresno kangaroo rat, and giant kangaroo rat.

3.4 Effect and Impact Significance Determinations

One of the primary differences between NEPA and CEQA is the way significance is determined and later discussed in environmental documents. Under NEPA, significance is used to determine whether an EIS, or some lower level of documentation, will be required. NEPA requires that an EIS is prepared when the proposed Federal action (project) as a whole has the potential to “significantly affect the quality of the human environment.” The determination of significance is based on context and intensity (§1508.27). Some impacts determined to be significant under CEQA may not be of sufficient magnitude to be determined significant under NEPA. Under NEPA, once a decision to do an EIS is made, it is the magnitude of the impact that is evaluated and no judgment of its significance is deemed important for the text. NEPA does not require that a determination of significance for individual resources be stated in the environmental documents. Once the proposal itself is considered as a whole to have significant effects, all of its specific effects on the environment (whether or not “significant”) must be considered, and mitigation measures must be developed where it is feasible to do so. (§1502.14(f), 1502.16(h), 1508.14 and CEQ’s 40 most asked questions #19a). (NEPA, Public Law 91-190, 42 USC 4231-4347, January 1, 1970, as amended; CEQ Regulations, 40 CFR 1500-1508, 43 FR 55990, November 28, 1978; CEQ Forty Most Asked Questions, 46 FR No. 55, 18026-18038, March 23, 1981 [Reclamation 2012b]).

CEQA, on the other hand, does require an identification of each “significant effect on the environment” resulting from the project and ways to mitigate each significant effect. A significant effect on any environmental resource triggers the preparation of an EIR. Each and every significant effect on the environment must be disclosed in the EIR and mitigated, if feasible. In addition, the CEQA Guidelines list a number of mandatory findings of significance, which also require the preparation of an EIR. No types of actions under NEPA parallel the findings of mandatory significance in CEQA (CEQA Statutes and Guidelines, Association of Environmental Professionals 2012).

For the environmental consequences evaluations, **criteria for determining the significance of the effects** are presented. Significance determinations are made for comparisons of the action alternatives to existing conditions as required for an EIR prepared under CEQA. Comparisons of the action alternatives to No Action/No Project explain the effect without making a significance determination, consistent with Reclamation’s implementation of NEPA. For most of the affected resources, the No

Action/No Project Alternative is equivalent or similar to existing conditions which includes the existing water transfer program.

Each environmental consequences section begins with an **analysis of the No Action and No Project Alternatives**, which are essentially the same and are referred to as No Action/No Project. The No Action/No Project analysis compares this alternative against the existing conditions for that resource or concern. Existing conditions are defined in the affected environment/environmental setting section for each resource and may represent the state of the environment over more than 1 year, including conditions prior to June 2011, to reflect best available information. In most cases, No Action/No Project is equivalent to existing conditions for the development of water for transfer from conservation measures, because what has happened under the existing Program would continue under the reasonably foreseeable future. However, differences between the two baselines that are primarily associated with temporary land fallowing are explained. In most cases, the difference in the amount of temporary land fallowing between existing conditions and No Action/No Project (i.e., 3,200 acres of fallowing for the development of 8,000 AFY of transfer water that would not occur under No Action/No Project) does not substantially affect the discussion of environmental impacts and effects. For surface water resources and socioeconomic conditions, the comparisons to both the existing conditions and No Action/No Project baselines are provided because the differences can be quantified.

The analysis of the **four action alternatives** identifies the effects of **two principal methods of water development** by the Exchange Contractors: conservation/tailwater recovery and temporary land fallowing (e.g., crop idling).

Each section concludes with a **summary of the determinations of environmental impacts** (i.e., adverse effects). The summary contains both abbreviated findings (or statements of the effect) and summary tables. The following language is considered and/or used in the table (and in the text) for CEQA determinations of impact (adverse effect) except for socioeconomic impacts:

- Potentially significant and unavoidable
- Potentially significant
- Less than significant
- No impact[2]

[2] No impact is comparable to no adverse effect where an impact is understood to be negative. Where beneficial effects are identified, the conclusion under CEQA is "no impact" because CEQA terminology does not address positive effects.

For socioeconomic impacts under CEQA (see Section 8.2.1), the following terms are used:

- Substantial
- Less than substantial
- No impact

Significance thresholds for CEQA also include the factors taken into consideration under NEPA to determine the significance of the action in terms of the context and the intensity of its effects. With regard to environmental consequences, CEQA requires that impacts that are regarded as “significant” be identified as such. In this EIS/EIR, for CEQA purposes, “CEQA significance criteria” are set forth by resource area. For all impacts that are identified as potentially significant under CEQA, appropriate mitigation measures are to be identified to reduce the impacts to a less-than-significant level unless the potentially significant impact is a cumulative effect (for which no mitigation is required). For these reasons, identification of impacts as potentially significant under CEQA can be used to identify potentially significant/adverse effects under NEPA in the ROD’s subsequent preparation, and the mitigation measures set forth to address potentially significant impacts for CEQA will also mitigate potentially significant/adverse effects for NEPA. However, given that no potentially significant impacts are identified under CEQA for the Proposed Program, mitigation measures are not required and are not identified in the EIS/EIR.

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4.0 Surface Water Resources

The San Joaquin River Exchange Contractors propose to develop up to 150,000 acre-feet of water developed within their service area through conservation and temporary land fallowing methods to transfer a portion of their CVP supply water to several potential CVP and SWP water users, including the San Joaquin Valley and Tulare Basin wildlife refuges, over a 25-year timeframe, 2014-2038 as explained in Section 2.3. The water could provide a temporary or seasonal water supply within the constraints of their current CVP and SWP contract supplies.

The Exchange Contractors are implementing under the current 2005-2014 Water Transfer Program (see Section 1.1) that allows for the annual transfer of up to 130,000 acre-feet of substitute water (existing Program). Under this existing Program, the Exchange Contractors could develop up to 80,000 acre-feet of water through conservation measures such as tailwater recovery and groundwater pumping, and up to 50,000 acre-feet of water from temporary land fallowing. Development of transfer water under the current 2005–2014 Water Transfer Program and earlier programs is shown in Table 1-1 and in Appendix B (Table 3). In recent years, up to 88,000 acre-feet have been developed from conservation, temporary land fallowing, and groundwater pumping. The existing Program was subject to environmental review and all the project impacts were identified and mitigated (Reclamation and Exchange Contractors 2004).

Under the Proposed Program, the Exchange Contractors would continue the conservation and temporary land fallowing components of the existing Program but expand the transfer options by up to 20,000 acre-feet of conserved water for a total of 150,000 acre-feet. This quantity of water would be developed through 100,000 acre-feet of conserved water and up to a total of 50,000 acre-feet of water from fallowed land. This section provides the environmental setting and an evaluation of the potential for effects from water development actions to affect surface water resources in the Proposed Program area of potential effect or impact (Program area). It is based on the technical report "San Joaquin River Exchange Contractors Water Authority 25-year Water Transfer Program Water Resources Analysis" contained herein as Appendix B.

4.1 Affected Environment/Environmental Setting

The affected environment of the Program area consists of surface water that can be developed for transfer and/or exchange with other water users. Surface water quality and quantity are described below. The affected environment for groundwater is described in Section 5.1.

The affected environment was previously discussed in the EIR/EIS prepared for the existing Program (Reclamation and Exchange Contractors 2004, pp. 4-1 to 4-4). That discussion is incorporated herein by reference. Other documents have also described conditions in the Exchange Contractors' service area relative to development and transfer of water (Reclamation and Exchange Contractors 2007; Reclamation 2009b, 2010g). The development of water through conservation measures and subsequent transfer of that water to other water contractors is an ongoing practice for the Exchange Contractors.

4.1.1 Surface Water Resources

Regional Hydrology

The San Joaquin River is a part of the hydrology of the Exchange Contractors service area. The San Joaquin River has its headwaters in the high Sierra, east of Fresno. The river flows in a westerly direction to Millerton Lake and the Mendota Pool before turning north to flow to the Delta. Several reservoirs in the upper watershed store runoff for use in hydropower production. Millerton Lake, located on the main stem San Joaquin River east of Fresno is an integral part of the Friant Unit of the CVP and provides water supply for the Friant-Kern Canal and the Madera Canal. Millerton Lake provides hydropower, recreation, flood control, and water supply benefits. Reclamation also releases water from Millerton Lake to the San Joaquin River to support the Stipulation of Settlement in NRDC, et al., v. Kirk Rodgers, et al. (Settlement).

The SJRRP was established in 2006 to support the implementation of the Settlement. The Settlement establishes two primary goals: (1) Restoration Goal – To restore and maintain fish populations in "good condition" in the main stem San Joaquin River below Friant Dam to the confluence of the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish; and (2) Water Management Goal – To reduce or avoid adverse water supply impacts on all of the Friant Division long-term contractors that may result from the Interim and Restoration flows provided for in the Settlement. (Reclamation and DWR 2011)

Recently, as part of the SJRRP and consistent with the Settlement, Reclamation began releasing water as "interim flows" to the San Joaquin River for habitat improvement from Friant Dam to the Merced River.

Downstream of Millerton Lake several large and small tributaries contribute flow to the San Joaquin River. The Merced, Tuolumne, and Stanislaus rivers are the largest contributing flows. Prior to 2011, the operators of storage facilities on the three major tributaries and the Exchange Contractors coordinated their operations in April and May to meet the Vernalis Adaptive Management Plan's (VAMP's) flow standards for the San Joaquin River at Vernalis. This program ended in Spring 2011.

San Joaquin River experiences high flows in the winter/spring period and low flows in summer. The San Joaquin River flow at Vernalis near the Delta reflects the regulation of the river and the tributaries, and also instream flow standards (Table 4-1).

Table 4-1
Average Daily flow San Joaquin River at Vernalis (1970-2010)

	Average (cfs)	Max (cfs)	Min (cfs)	Total (acre-feet)
Jan	5,296	54,300	574	325,612
Feb	6,566	41,000	461	364,674
Mar	7,452	44,700	375	458,204
Apr	6,881	41,500	120	409,424
May	6,212	37,300	181	381,939
Jun	4,348	42,300	67	258,697
Jul	2,635	25,100	56	162,042
Aug	1,872	11,100	65	115,128
Sep	2,264	12,000	111	134,745
Oct	2,805	14,500	218	172,497
Nov	2,342	14,400	88	139,368
Dec	3,360	25,700	434	206,620

Note:
Data from USGS gage: San Joaquin River at Vernalis, gage number 11303500

New Melones Reservoir is located on the Stanislaus River and is part of the CVP. It is operated for water supply, instream fishery protection, recreation, and at times to meet water quality and flow standards in the Delta. Reclamation operates the reservoir to the 2009 BO and the Interim Plan for Operation (Appendix B). Using forecasts of runoff and current storage in the reservoir, Reclamation allocates water to meet water rights, CVP contracts, and fish and water quality objectives in the Stanislaus River and at Vernalis.

Water for the DMC is diverted from the Delta at the federal C.W. “Bill” Jones (Jones) Pumping Plant. The diverted flow can either be delivered directly to contractors through the DMC or through the O’Neill Forebay and into San Luis Reservoir or the San Luis Canal. From San Luis Reservoir, the water can be reregulated back into the CVP system. The DMC has an initial capacity of 4,600 cfs but because of physical constraints it operates at a lesser capacity. Also in the Delta is the SWP Harvey O. Banks Delta Pumping Plant, which diverts water into the California Aqueduct.

Exchange Contractors’ Service Area

Orestimba, Los Banos, and Garzas creeks, and Salt and Mud sloughs add flow to the San Joaquin River from the western side within the Exchange Contractors’ service area. These tributaries are small relative to the Stanislaus, Tuolumne, and Merced rivers on the eastern side.

Groundwater accretions occur to the San Joaquin River from the upslope land along the eastern and western sides of the valley. The State Board has estimated that the average groundwater accretion in the 20-mile reach from Lander Avenue to Orestimba Creek is about 13 cfs. Groundwater accretions result from movement of shallow groundwater toward the river. This groundwater is supported by percolation of applied irrigation water, seepage from unlined canals and on-farm distribution systems, and seepage from tailwater. Deep percolation of applied water to the underlying groundwater aquifer does not always have a connection with the river. Some of the land in the Exchange Contractors' service area does not connect with the river. (Appendix B)

Water Supply Deliveries

The Exchange Contractors deliver water to 240,000 acres of irrigated land, in the San Joaquin Valley, along the San Joaquin River. The Exchange Contractors historically diverted their water from the San Joaquin River. In 1939, they entered into contracts with Reclamation to exchange their river water for CVP water delivered from the DMC and/or other works or sources of supply (called substitute water). The execution of these contracts allowed for the construction of Friant Dam, Pursuant to the Exchange Contract, the Exchange Contractors receive 840,000 AFY, and in years designated as critical, they receive 650,000 acre-feet. The Exchange Contractors normally divert the water from the DMC and Mendota Pool, with occasional flood flows occurring on the San Joaquin River and North Fork Kings River. Water is delivered to customer turnouts, and wheeling is provided to the wildlife refuges. See Appendix B (Section 2.1) for a detailed explanation of the Exchange Contractors' water deliveries, transfers, and operations.

Tailwater from individual farms, if any, will appear in district facilities that serve as both supply and conveyance facilities. The development of tailwater recovery systems allows the water ponding on the surface at the end of fields and/or leaving a farm to be collected and integrated into the Exchange Contractors' water supply system.

Groundwater pumping by member districts is used to supplement the substitute water supply and to improve operational flexibility and control in the delivery system. It is an integral part of the water system.

Water supply deliveries from the DMC vary by month and by water year. During the summer irrigation period, deliveries are higher than in the winter. Historic deliveries are shown for the period 1984-2010 in Table 4-2 below. Deliveries are smallest in December and January, and peak in July.

Water Supply Exchanges with Reclamation

The Exchange Contractors have managed the tailwater recapture of the existing Program with the express purpose of (1) provide more efficient use of the irrigation water within the Exchange Contractors' service area, (2) manage drainage water, (3) provide drought contingency supply, and (4) when conditions permit, provide water for transfer.

Table 4-2
Statistics for Historic (1984-2010) Exchange Contractors' Water Supply Deliveries

	Average (acre-feet)	Maximum (acre-feet)	Minimum (acre-feet)
Jan	4,763	13,979	59
Feb	29,296	58,401	3,298
Mar	56,105	86,465	26,549
Apr	61,914	92,646	8,191
May	99,075	137,355	29,483
Jun	132,399	157,616	90,258
Jul	157,703	192,203	125,470
Aug	141,001	175,519	106,320
Sep	61,927	84,592	29,647
Oct	40,154	83,340	15,827
Nov	14,856	32,635	593
Dec	44,053	18,849	0
Total	803,775	854,091	631,952

Source: Appendix B (Table 1).

The Exchange Contractors' water transfer program began in 1993 wherein water developed within the Exchange Contractors boundaries has been transferred to other water agencies and entities. The transfers have included 1-year transfers and multiyear programs. The water available for the transfers has primarily come from conservation measures, land fallowing, and tailwater recovery programs. Revenues from the transfers have been used by the Exchange Contractors to fund, among other items, additional conservation projects both agency-wide and on-farm drainage projects and water quality improvement projects. The Exchange Contractors have transferred varying amounts of water to the combination of wildlife refuges, agricultural users, and urban water users.

Under the existing 10-Year Program, the Exchange Contractors develop sources of water that offset the need for CVP deliveries from the DMC. The sources of developed water are mentioned above. This developed water can then be delivered to other CVP contractors or wildlife refuges. Methods of developing water for existing Program transfer and/or exchange include:

- **Evaporation/seepage of tailwater:** reducing the amount of water lost to the atmosphere or ground associated with runoff to the end of fields through collection of runoff in tailwater recapture facilities, and improvements in irrigation efficiencies that reduce deep percolation
- **Runoff spills to nondistrict lands:** capturing the water leaving the districts' boundaries as overland flow to nondistrict lands
- **Discharge to Mud/Salt Sloughs:** reducing the amount of surface water that escapes to San Joaquin River-connected streams, developed by installing tailwater recapture pumps
- **Tailwater recovery upstream of Sack Dam:** capturing tailwater occurring in CCC that exits back to the San Joaquin River below Mendota Dam

- **Groundwater substitution:** Implement District pumping of groundwater to offset substitute supply deliveries from Reclamation (not included in the Proposed Program)
- **Temporary Land Fallowing:** engage in temporary land fallowing (crop idling) to reduce water demand

The tailwater recovery systems use a series of low-lift pumps to move water from the end of fields or collection ditches back into the distribution system, thereby offsetting CVP deliveries or supplementing supplies to the Exchange Contractors. The Exchange Contractors have invested in over 250 low-lift stations for the purpose of tailwater recapture, for their own use, or to facilitate water transfers. In recent years the total amount of reuse developed by these facilities has ranged upward to over 150,000 acre-feet (Appendix B [Table 5]).

A summary of transfers (exchanges within the existing Program and other programs) is shown in Table 4-3.

Table 4-3
Historic Exchange Contractor Water Transfers

	Current Program & Predecessor Programs	Other Transfers	Total Transfers
	(acre-feet)	(acre-feet)	(acre-feet)
1993	18,000	0	18,000
1994	0	0	0
1995	25,000	2,596	27,596
1996	30,348	2,100	32,448
1997	40,000	12,160	52,160
1998	0	0	0
1999	60,000	1,260	61,260
2000	64,500	1,360	65,860
2001	64,500	5,786	70,286
2002	65,634	6,414	72,048
2003	71,637	7,402	79,039
2004	80,210	10,900	91,110
2005	80,595	1,483	82,048
2006	80,000	0	80,000
2007	80,228	6,841	87,069
2008	85,158	15,071	100,229
2009	88,132	23,661	111,793
2010	84,695	10,798	95,493

Other transfers include water actions for VAMP, Warren Act, etc.
Source: Appendix B (Table 2)

The existing Program and the associated impacts have been described in an EIR/EIS (Reclamation and Exchange Contractors 2004). A potential impact of concern for water deliveries and water quality is the effect of the transfers on the flow of the San Joaquin River. The existing Program analysis showed that only a portion of tailwater recovery projects would affect San Joaquin River flow, and to a small extent land fallowing would affect flow. The other methods of developing water are unconnected with the San Joaquin River flow. Although potentially changes in flow exist because of the tailwater recovery, the analysis conducted for the previous EIR/EIS found that no significant impacts would result. Furthermore, as part of the monitoring of water development activity for potential impacts, an annual tracking of the existing Program activities relative to San Joaquin River flow, New Melones storage, and CVP water supply in the Delta is performed. This monitoring and reporting procedure considers the action of developing the water and the subsequent change in river flow, and if the resultant change affected the releases from New Melones Reservoir to meet Delta standards. The procedure also analyzes the existing Program's potential to affect water CVP water supplies. Annually, Reclamation has reviewed the tracking reports and not found a water supply impact associated with the existing 10-Year Program. (Appendix B)

Water Quality

The water quality of the San Joaquin River is variable, depending on the location, time of year, and the contributing sources of inflows. Water quality is monitored at Vernalis, where the San Joaquin River enters the Delta and other sites within the watershed. At Vernalis the quality and volume of flow depends on several factors, including the contribution of flows from the Stanislaus, Tuolumne, and Merced rivers, and the contribution of agricultural return flows. Typically, the higher the San Joaquin River flow at Vernalis, the better the water quality entering the Delta. At times New Melones Reservoir is operated to maintain compliance to Vernalis water quality objectives. The average monthly electrical conductivity (EC) at Vernalis is shown in Table 4-4.

Table 4-4
Electrical Conductivity Measured for San Joaquin River at Vernalis for 2000-2010

	Average (µmhos)	Maximum (µmhos)	Minimum (µmhos)
Jan	707	961	198
Feb	697	948	319
Mar	682	966	198
Apr	444	601	128
May	321	462	95
Jun	463	679	110
Jul	543	638	359
Aug	567	658	367
Sep	559	690	358
Oct	480	600	297
Nov	669	763	569
Dec	707	871	262

Note: data from USGS gage: San Joaquin River at Vernalis, gage number 11303500
µmhos = microhoms
Source: Appendix B (Table 7)

4.1.2 Regulatory Setting

Water Quality and Flow Objectives at Vernalis

Vernalis on the San Joaquin River is the primary regulatory compliance point for the San Joaquin River and represents the location where the San Joaquin River enters the Delta. Flows at Vernalis are periodically controlled according to State Board D-1641, inclusive of the VAMP (plan ended in 2011). During the period of VAMP operations, the flows on the San Joaquin River at Vernalis are maintained at levels up to 7,000 cfs during April and May. During other periods during February through June, and now subsequent to VAMP, other State Board D-1641 flow requirements apply.

Appendix B (Section 2.2.1.1) provides information on recorded flow at Vernalis since year 2000 (Table 6), and the record of EC for the same period (Table 7).

Water quality objectives on the San Joaquin River at Vernalis are 700 microSiemens per centimeter (μS/cm) EC during April through August and 1,000 μS/cm EC in other months. If problematic, the water quality and flow requirements at Vernalis are maintained by releasing additional water from New Melones Reservoir. However, flow objectives might be violated during some years due to water supply shortage at New Melones Reservoir. Since issuance of D-1641, no water quality violations have occurred.

The depiction of flow and quality conditions for the San Joaquin River at Vernalis, by year-type, was synthesized by review of the recent historical records and several computer generated simulations of San Joaquin River operations. Appendix B (Table 8) depicts recent (existing conditions) flow conditions for the San Joaquin River at Vernalis for each of the year-types used in this analysis. Appendix B (Table 9) reflects the results of that same analysis for the depiction of recent (existing conditions) water quality conditions at Vernalis. The historical records and depictions include the recognition of water quality and flow objectives and conditions at Vernalis, which at times include specific releases from New Melones Reservoir for objectives.

Reclamation currently operates New Melones Reservoir to the 2009 BO with guidance from the Interim Plan of Operations. Based on a forecast of annual water supply, including reservoir storage, Reclamation allocates releases among water rights settlement holders, CVP contractors, and fish and water quality objectives. Included in the operations are releases for water quality and flow objectives at Vernalis.

Changes in the flow or quality of the San Joaquin River upstream of the Stanislaus River (upstream) can at times affect the releases from New Melones Reservoir to the lower Stanislaus River. This effect occurs when Reclamation is making specific releases to the Stanislaus River for the purpose of meeting objectives at Vernalis. The previously cited studies of San Joaquin River operations were reviewed to provide an indication of the months, by year-type, when New Melones Reservoir releases are projected to occur for either water quality or flow objectives at Vernalis. Recent records for the operation of New Melones Reservoir were also reviewed. The results are shown in Appendix B (Tables 10 and 11) for periods when releases are projected to be needed specifically for water quality and flow objectives at Vernalis, respectively.

South of Delta Exports

Water development projects dependent upon Delta waterways include the CVP's C.W. "Bill" Jones Pumping Plant (Jones Pumping Plant), the SWP's Harvey O. Banks Delta Pumping Plant (Banks Pumping Plant), and the Contra Costa Canal. The Jones Pumping Plant and Banks Pumping Plant convey water from the Delta to a system of canals and reservoirs for agriculture, municipal and industrial (M&I), and environmental uses in the San Joaquin Valley; the San Francisco Bay Area (Bay Area), along the Central Coast; and portions of Southern California. Delta flows and quality are influenced by the interaction of tributary inflows, tides, in-Delta diversions, channel hydrodynamics, and water management actions including operations to meet regulatory requirements. The Delta also provides habitat for numerous plant, animal, and fish species, including several threatened or endangered species. The Delta serves as a migration path for all Central Valley anadromous species returning to their natal rivers to spawn. The condition of the Delta ecosystem and presence of several threatened or endangered fish species, most notably the delta smelt and Chinook salmon, have led to recent requirements that substantially limit water exports at times (Reclamation 2011c; (WEF 1995). A number of agreements exist between the CVP and SWP operators regarding how they are to meet shared responsibilities for in-basin flow and water quality requirements in the Delta. (Appendix B [Section 2.3])

The Proposed Program's water transfers have the potential to affect inflows to the Delta from the San Joaquin River, and these increases or decreases can affect or be neutral to the water supplies of the CVP and SWP. Inflow-related export constraints of D-1641 and assumed BOs control CVP/SWP export operations.

4.2 Environmental Consequences

Potential effects on surface water resources that are relevant to this EIS/EIR are the effects resulting from how the transfer water is developed in the Exchange Contractors' service area. This section evaluates impacts to surface water quality and flows, water supplies and relevant water operations. Key issues discussed below are impacts to San Joaquin River water quality and quantity of flow from conservation/tailwater recovery, and subsequent operation of New Melones Reservoir. Also, effects on changes to Delta water supply and changes in consumptive use are identified. Effects resulting from the use of the water outside of the Exchange Contractors' service area, by wildlife refuges, agriculture, and urban water users (transfer area) consistent with their CVP and SWP contracts and CVPIA requirements (for the wildlife refuges) are addressed in Section 3.3 based on other environmental compliance documents.

The results presented in this section are based on the analyses provided in Appendix B, "San Joaquin River Exchange Contractors Water Authority 25-year Water Transfer Program Water Resources Analysis." A summary of potential impacts/effects and mitigation (and/or monitoring) is provided at the end of this section, with a more complete discussion of mitigation requirements under the annual transfer approval process provided in Section 14 of this EIS/EIR.

Appendix B provides a detailed analysis of potential changes in the flow and quality in the San Joaquin River at Vernalis caused by the direct actions of the Exchange Contractors in developing transfer water. The model results presented in Appendix B, Section 4, quantify the magnitude of the changes in flow and quality in the San Joaquin River as well as potential changes in storage in New Melones Reservoir as indirect effects. Results are also developed to identify the potential changes in Delta supply to the CVP and SWP. This section of the EIS/EIR summarizes the analysis presented in Appendix B to meet NEPA and CEQA requirements and practices for environmental documents. The reader is referred to Appendix B for additional details on the background for the analysis (including historical information) as well as the specific results.

4.2.1 Key Impact and Evaluation Criteria

CEQA Guidelines define the types of hydrology and water quality impacts to be analyzed in an environmental document. A hydrologic impact is said to occur if the action would:

a) Violate any water quality standards or waste discharge requirements.

b) Otherwise substantially degrade water quality.

c) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).

d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site.

e) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site.

f) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.

g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map.

h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows.

i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.

j) Inundation by seiche, tsunami, or mudflow.

The Proposed Program does not construct new facilities or bring new land into production. Rather it is the activities involved in implementing a 25-year program to develop conserved and temporary crop idling water for transfer and/or exchange, and is based on the continuation of previous water transfer programs by the Exchange Contractors with some changes to past practices, i.e., no groundwater pumping to make water available for transfer. In addition, modifications to irrigation practices because of the Proposed Program would occur on-farm or within district facilities. The water supply within the district boundaries and conveyance facilities is managed for irrigation of crops and water deliveries; it is not combined with a stormwater collection and disposal system. No habitable structures are constructed for this Proposed Program; and, therefore, delineated flood hazard zones do not apply. Impact criteria e) through i) are not relevant to this project and, therefore, are not considered further. Impact criterion c) is discussed in Groundwater Resources Section 5.2.1 of this EIS/EIR.

Of the above CEQA impact criteria, items a), b), and d) will be discussed in this EIR/EIS.

- The Exchange Contractors do not have waste discharge requirements, so the analysis under criterion a) will focus on only the potential to exceed existing water quality standards at Vernalis on the San Joaquin River or affect operations to meet those standards.
- Criterion b) will also be discussed as part of this water quality impact statement, within a context of surface water quality within the streams and sloughs within and near the boundaries of the Exchange Contractors.
- For this analysis, altering the drainage pattern (criterion d) was considered broadly as any Project-related change in hydrologic conditions in the San Joaquin River and its tributaries that could affect releases from, and therefore storage in, New Melones Reservoir, or the availability of exportable CVP/SWP water supply in the Delta. The Proposed Program would not alter natural drainage patterns or otherwise create new runoff. Therefore, criterion d) will be discussed as four potential impact statements: potential impact to water quality standards at Vernalis, potential impact to Vernalis flow standards; potential impact to New Melones storage; and potential impact to Delta CVP/SWP water supplies.

Potential effects of the Proposed Program were addressed through modeling of the proposed water development actions. Modeling techniques for simulating tailwater recovery, land fallowing, and other actions are discussed in detail in Appendix B.

CEQA Significance Levels

Violation of Water Quality Standards at Vernalis. This criterion is based on a numerical exceedance against a standard. The impacts described below are projected based on modeling simulations that assume compliance to water quality standards through the operation of New Melones Reservoir. Therefore, the effects of the Proposed Program are based on whether the modeling shows that the hydrologic modifications of the Proposed Program are large enough to suggest an exceedance of the standard. In practical terms, an exceedance would not occur because Reclamation would release water from New Melones Reservoir to meet the standard. So this criterion is actually a measure of the potential for any of the alternatives to trigger a change in release of water from New Melones Reservoir.

Violation of Flow Standards at Vernalis. Like the criterion for evaluating water quality standards, the impact of flow modifications upon meeting flow standards will be assessed, and the effects on New Melones Reservoir operations in meeting those standards.

Change in Flow and Quality in Localized Streams. In the vicinity of the Exchange Contractors' service area, the Proposed Program would cause changes in the flow of immediate, local streams that receive tailwater from the Exchange Contractors. These flow changes are addressed in Biological Resources Section 6.2.1, and the analysis is in subsequent sections covering effects on aquatic species.

Change in New Melones Storage, Releases, and Water Deliveries. This impact relates to the storage in New Melones and releases from New Melones that could affect the Delta Inflow or San Joaquin River flow. Changes in storage in New Melones could affect the allocation of deliveries to CVP Stanislaus River contractors. Significance will be identified by potential impact to allocations made to these CVP customers.

Change in Delta CVP/SWP Water Supplies. This impact relates to the amount of water simulated entering the Delta for CVP or SWP management and the amount ultimately available for export as a function of the export standards in the Delta. Impacts will not necessarily be causative of a change in exports, but instead may affect reservoir conditions within the CVP/SWP Projects, which can then affect water supply.

4.2.2 Environmental Impacts and Mitigation

The alternatives being evaluated range from a smaller version of the existing Program (approximately 50,000 acre-feet), continuing the existing Program based on historically experienced transfers (88,000 acre-feet), fully exercising the existing Program (up to 130,000 acre-feet), and expanding the existing Program by 20,000 acre-feet of conserved water (up to 150,000 acre-feet of developed water). All of the alternatives have excluded the development of groundwater for purposes of transfers under the Proposed Program.

The potential hydrologic effects of the Proposed Program are evaluated through the use of a spreadsheet model and the use of CalSim II model results (Appendix B). The model accounts for changes in flow in the San Joaquin River attributable to the change in flow resulting from implementing the proposed actions and elements (components). All of the analyses are performed with a monthly time-step (January to December) with certain additional analyses to address the April and May periods of a year. Hydrologic modeling assumptions and results are presented in their entirety in Appendix B. The hydrologic analysis produces five different snapshots of San Joaquin River hydrology based on year-types within the San Joaquin River basin (Wet, Above Normal, Below Normal, Dry, and Critical as defined for the San Joaquin River Basin by the State Board). The primary hydrologic output is the flow and water quality at Vernalis and effects to New Melones Reservoir operations.

The discussion herein begins with background information on the components of the Proposed Program and the existing conditions baseline before proceeding to the effects/impacts analysis of the No Action/No Project Alternative and Alternatives A though D.

Background for Analysis of Alternatives

Prior to conducting the environmental impact analysis, this section presents key assumptions related to program elements and existing conditions, and assumptions about future conditions that are relevant to the analysis of the No Action/No Project Alternative.

Existing Conditions

The existing conditions environmental setting of the San Joaquin River basin is described above in Sections 4.1.1 and 4.1.2. D-1641 and the recent BOs are assumed to affect the operations of New Melones Reservoir and establish flow and water quality objectives at Vernalis. Delta operations are also assumed to reflect operations consistent with recent BOs.

The Exchange Contractors are developing water supplies under the existing Program by implementing several conservation measures. The conservation components used for development of transfer water under the existing Program would continue into the reasonably foreseeable future irrespective of the Proposed Program. These components would occur under the No Action/No Project Alternative and/or under the action alternatives. The existing conditions baseline for the CEQA analysis of environmental impacts assumes that water developed under the existing Program includes (Appendix B [Table 20]):

- 15,000 acre-feet of water developed through reductions in seepage and evaporation of tailwater
- 14,000 acre-feet of water developed through reductions of spills to nondistrict lands
- Over 40,000 acre-feet of water developed through recovery of tailwater otherwise discharged to Mud and Salt sloughs or other San Joaquin River-connected watercourses
- Almost 8,000 acre-feet of recovered tailwater developed that otherwise would discharge to the San Joaquin River above Sack Dam
- Over 8,000 acre-feet developed through temporary land fallowing
- A varying amount developed through groundwater substitution used largely for capacity to maintain deliveries within the Exchange Contractors' service area

While groundwater substitution has been part of the existing Program and existing conditions, it is not proposed to be used under the Proposed Program to develop water for transfer.

Program Components for the Alternatives

The alternatives were simulated based on the total developed water and the Proposed Program components used to develop the water. Alternative A reflects a smaller level of developed water than the existing Program and assumes only land fallowing. Alternative B has a similar volume of developed water as the existing Program in recent years (88,000 acre-feet). It is assumed that Alternative B ranges from a tailwater recovery/land fallowing split 80,000 acre feet/8,000 acre-feet to a focus of land fallowing (50,000 acre-feet) like Alternative A and the remainder from tailwater recovery (50,000 acre-feet/38,000 acre-feet). Alternative C reflects the maximum transfer level of the existing Program (Reclamation and Exchange Contractors 2004) with the land fallowing maximized at 50,000 acre-feet, similar to Alternative A and conservation providing 80,000 acre-feet. Finally, Alternative D is the same as Alternative C (130,000 acre-feet) with an additional 20,000 acre-feet of conserved water from deep percolation recovery. The No Action/No Project Alternative does not include any use of the water development components for purposes of transfer, and assumes a decrease in the amount (8,000 acre-feet) of land fallowing occurring by the Exchange Contractors, which is included in existing conditions. The structure of the alternatives is summarized in Table 4-5.

Table 4-5
Summary of the Components of Alternatives

Alternative	Total Water Developed for Transfer	Water Source (acre-feet)		
		Tailwater Recovery	Temporary Land Fallowing	Deep Percolation Recovery
No Action/No Project	0	0	0	0
Alternative A	50,000	0	50,000	0
Alternative B[1]	88,000 88,000	80,000 38,000	8,000 50,000	0 0
Alternative C	130,000	80,000	50,000	0
Alternative D	150,000	80,000	50,000	20,000

[1] Alternative B was modeled with two scenarios, both totaling 88,000 acre-feet.

The components of water to be developed for transfer are described as follows.

Tailwater Recapture

The tailwater recapture component of the existing Program and Proposed Program recovers water that would otherwise exit the control or use of the Exchange Contractors. The Exchange Contractors have been developing conserved water through tailwater recapture during the existing Program, and its predecessor programs. Examples of efforts have included the capture of discharge from community ditches and drainage systems that would otherwise exit the boundaries of the Exchange Contractors. These flows would often be captured for use on nondistrict lands that are downslope of the Exchange

Contractors service area and upslope of the San Joaquin River. That water was typically fully depleted by plant consumptive use or evaporation and deep percolation before it reached the river. In other instances, tailwater would ultimately escape the customers' on-farm and community systems to Salt Slough, Mud Slough, and other conveyances and would reach the San Joaquin River. These pathways are discussed further in Appendix B. Up to the early 1990s, some tilewater drainage (shallow percolation) and tailwater were intermingled as they left the Exchange Contractors' boundaries. Today, most of the tilewater and tailwater are separated and the tailwater is now part of the tailwater recapture program.

Temporary Land Fallowing

Temporary land fallowing requires an Exchange Contractor customer to withhold irrigation water from land that would otherwise be irrigated, normally for an entire irrigation season. A computation of water that would otherwise have been consumptively used during irrigation of a designated parcel of land is made, and this foregone consumptive use portion of applied water becomes transferrable to another district.

Conservation of Deep Percolation

This component of water is derived from water that has historically deep percolated below the root zone from the on-farm application of water and deep percolation of seepage from canals. The new conservation actions would be restricted to FCWD, CCID, and SLCC and would include water that is not already collected as tailwater or that would represent subsurface seepage to the river. This component of transfer water would primarily involve the conversion from surface to sprinkler irrigation to micro or micro/sprinkler systems or to drip irrigation where a reduction in applied water would occur and deep percolation and seepage from canals is reduced.

Table 4-6 below shows the maximum amounts proposed under the action alternatives and the amount of developed water included in existing conditions.

Table 4-6
Existing Conditions and Maximums under Program Alternatives for Developed Water (acre-feet)

Component	Included in Existing Conditions	Maximum Evaluation
Tailwater Recapture		
Reduction in seepage and evaporation of groundwater	15,000	15,000
Reduction in spills to nondistrict lands	14,000	14,000
Reduction in discharges to San Joaquin River above Sack Dam	7,700	7,700
Reduction in discharges to San Joaquin River	43,300	43,300
Tailwater Total	**80,000**	**80,000**
Temporary Land Fallowing	8,000	50,000
Deep Water Percolation / Applied water efficiency	0	20,000
Total	**88,000**	**150,000**

Future Conditions for No Action/No Project Alternative

The sections below explain the approach to the evaluation of the No Action/No Project Alternative, based on Appendix B. It identifies assumptions on plans and projects included in the modeling for the San Joaquin River. The two components of the No Action/No Project Alternative illustrate the existing condition without the substantial flows from the SJRRP and the future conditions with the SJRRP flows.

The reasonably foreseeable No Action/No Project Alternative reflects the existing condition with the addition of anticipated water management changes in the future associated with approved projects and programs as well as projects that are terminating.

- The VAMP Vernalis flow requirements ended in Spring 2011 and has not been updated or replaced. D-1641 flow objectives for Vernalis are assumed to be required, applicable to Reclamations' operation of New Melones Reservoir.
- Grassland Bypass Project discharges would continue to diminish in accordance with its approved permit.
- The SJRRP is a major addition to the existing conditions for the depiction of the No Action/No Project Alternative. This component of hydrology assumes releases from Millerton Lake that result in substantial San Joaquin River flow from Friant Dam to the Merced River. This additional flow will result in the introduction of high quality water from Millerton Lake to the river. This water will travel to the Merced River where it will combine with Merced River inflows and then flow to the Delta, combining with Tuolumne and Stanislaus rivers along the way. Reclamation will somewhat modify the New Melones operation because of the presence of the improved water quality and flow in the river.
- A minor difference in the San Joaquin River conditions as compared to existing conditions would occur due to the removal of the effects caused by the currently occurring 8,000 acre-feet of transfer water developed by temporary land fallowing. The effect of removing the temporary land fallowing would be an increase in tailwater return flows from the lands that have been assumed to be fallowed.

The No Action/No Project Alternative is the baseline for analysis of environmental effects of Alternatives A through D under NEPA.

Consumptive Use

When water is developed by the Exchange Contractors through tailwater recovery and conservation, no increase or decrease in Exchange Contractor consumptive use would occur, only the source from which they provide for the consumptive use may change. Future use of tailwater conservation programs would offset the use of deep well aquifer pumping within the Exchange Contractors' service area and in general improve the quality of water applied. When the transferred water is used to irrigate lands that would otherwise have been fallowed due to the lack of supply in a year, then consumptive use in the tranferees' area would increase; however, the transferee can only receive transfers up to the amount for which its CVP contract amount is deficient. Therefore, no increase in consumptive use occurs when compared to irrigation under full CVP contract entitlements. When temporary crop idling/land fallowing is employed by the Exchange Contractors, a decrease in their consumptive use would occur due to the decrease in planted area. If the water developed by fallowing is used to irrigate lands that would have otherwise been fallowed (due to CVP contract shortage), no net increase in consumptive use would occur, and total consumptive use may be less than that associated with full CVP contract entitlements.

Modeling Approach

The potential hydrologic effects of the transfer program are evaluated through the use of a spreadsheet model. The model accounts for changes in flow in the San Joaquin River attributable to changes in flow due to the development of water for the transfer or the occurrence of the No Action/No Project Alternative. The model accounts for hydrologic processes over a 12-month period from January of a year through December. This length of trace reflects the nexus of the period when water will be developed and be made available by the Exchange Contractors, January through December of a year. It is also coincident with the accounting year for the exchange contract. Five different snapshots of San Joaquin River hydrology are evaluated. Each snapshot reflects a different year-type within the San Joaquin River basin: wet, above normal, below normal, dry and critical.

Model simulations were performed to assess the effects of each alternative on the river hydrology, New Melones reservoir storage and releases, and Delta inflow and export potential in the CVP and SWP systems compared to existing conditions and No Action. Relative to water quality and flow at Vernalis, the effects of the Proposed Program are assessed by estimating potential changes on flow and water quality, and the affects to meeting flow and quality objectives.

No Action/No Project Alternative

The No Action/No Project Alternative analysis discusses the existing conditions in 2011 as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services (CEQA Guidelines Section 15126.6 (e) (2)). It assumes the continued development of water through operation of the existing conservation/tailwater recapture facilities in the existing Program as explained above. However, the water developed would not offset CVP substitute water and be transferred but rather used within the Exchange Contractors' service area.

Absent the transfer program, the Exchange Contractors would request, take delivery of, and use their full CVP water entitlement. Water developed by their conservation and tailwater recapture programs is a less costly water supply than pumping available groundwater resources. Therefore, under the No Action/No Project Alternative the Exchange Contractors would continue to operate their tailwater recapture facilities (described earlier to historically reach over 150,000 AFY) to the extent previously used during periods in which transfers were occurring. The reused tailwater that would no longer facilitate a transfer would be integrated into the Exchange Contractors' water supply and reduce deep well groundwater pumping that currently helps meet irrigation demands. The Exchange Contractors would not modify their operations relative to the San Joaquin River, as their supply operations would merely shift from groundwater pumping (with no hydrologic connection to the San Joaquin River) back to the DMC. Varying groundwater pumping from the aquifer does not affect San Joaquin River hydrology.

As just explained, the No Action/No Project Alternative contains the conservation/tailwater recovery components of the existing Program but the water is not used for transfer purposes; however, the alternative does not include the temporary land fallowing of recent years, which is included in the existing Program. The fallowing is not included because of the absence of a water transfer program. The adjustment of the San Joaquin River hydrology of existing conditions to reflect the removal of the historical fallowing under the existing Program is negligible (less than 0.1 cfs), and is described in detail in Appendix B (Sections 3.2.2.1 and 3.2.2.2).

Beyond the Exchange Contractors' service area, the No Action/No Project Alternative includes reasonably foreseeable adopted plans and programs affecting the San Joaquin River. The program explicitly included in the modeling is the implementation of the SJRRP flows from Millerton Lake. The No Action/No Project setting was projected, with the analysis described in Appendix B (Sections 2.2 and 2.3), and the results illustrated in Appendix B (Section 2.2.2.1, Table 12 [San Joaquin River flow], Table 13 [San Joaquin River water quality], Section 2.2.2.2, Tables 14 and 15 [Operational requirements of New Melones releases]), and discussed in Appendix B (Section 2.3.2) regarding Delta conditions. A comparison of the No Action/No Project Alternative to existing conditions is described in Appendix B (Section 4.5).

For CEQA purposes the No Action/No Project Alternative is compared to existing conditions to illustrate what would be reasonably expected to occur in the foreseeable future if the project were not approved. For NEPA purposes, the No Action/No Project Alternative serves as the baseline of comparison for the action alternatives. Following is a summary of the comparison between the No Action/No Project Alternative and existing conditions. Information included in the comparison identifies the hydrologic depiction of the No Action/No Project setting.

The existing condition flow at Vernalis is shown in Table 4-7 along with the projected flow at Vernalis for the No Action/No Project Alternative. The projected change in flow between the two settings is also shown and is the result of SJRRP flows. Increased flow occurs almost all the time with the most noticeable increases occurring during March and April consistent with the period of large increased flows provided by the SJRRP. The estimated changes include the influence on flows attributed to the New Melones Project reacting to flow and water quality changes in the San Joaquin River upstream of the Stanislaus River's confluence. During some circumstances, in wetter years, decreases in San Joaquin River flows may occur due to the different operation of Friant Dam for SJRRP flows, for instance the refilling of storage at Friant Dam that did not occur in existing conditions. Table 4-8 illustrates changes in water quality at Vernalis under existing conditions and the No Action/No Project Alternative. Commensurate with additional flow in the San Joaquin River originating from the upper San Joaquin River will be an improvement in water quality. This depiction of water quality assumes the construction of a bypass channel to route flows around the Mendota Pool. Negative values in Table 4-8 indicate an improvement in water quality.

Table 4-7
Simulated Average Monthly Flow for San Joaquin River at Vernalis

Existing Condition (cfs)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet	6,550	10,700	13,050	10,850	11,600	11,050	7,700	3,500	3,450	3,500	2,650	2,950
Above Normal	4,050	6,250	6,250	5,400	5,050	2,850	1,950	2,000	2,400	2,900	2,350	2,350
Below Normal	2,350	3,000	2,900	3,550	3,500	2,000	1,500	1,500	1,900	2,400	2,100	2,100
Dry	2,300	2,500	2,350	2,700	2,700	1,450	1,250	1,350	1,750	2,150	1,900	1,900
Critical	1,800	2,050	1,750	1,800	1,800	1,000	900	900	1,350	1,550	1,650	1,650
No Action/No Project Alternative (cfs)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet	6,450	10,250	13,300	12,850	11,850	11,400	7,750	3,500	3,500	3,600	2,850	3,000
Above Normal	4,150	6,250	7,050	7,900	5,100	2,900	1,950	2,000	2,450	3,000	2,550	2,450
Below Normal	2,450	3,100	3,600	5,000	3,500	2,050	1,500	1,500	1,950	2,450	2,300	2,200
Dry	2,450	2,600	3,100	3,500	2,750	1,500	1,250	1,350	1,800	2,200	2,100	1,950
Critical	1,950	2,150	2,250	1,950	1,800	1,000	900	900	1,350	1,550	1,800	1,750
Change in Conditions (cfs)												
Wet	-100	-450	250	2,000	250	350	50	0	50	100	200	50
Above Normal	100	0	800	2,500	50	50	0	0	50	100	200	100
Below Normal	100	100	700	1,450	50	50	0	0	50	50	200	100
Dry	150	100	750	800	50	50	0	0	50	50	200	50
Critical	150	100	500	150	0	0	0	0	0	0	150	100

Table 4-8
Simulated Average Monthly Electrical Conductivity for San Joaquin River at Vernalis

Existing Condition (µmhos)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet	600	425	350	275	275	375	475	425	450	450	550	750
Above Normal	725	525	500	400	375	550	600	550	550	500	600	825
Below Normal	825	875	850	450	475	600	650	600	600	550	675	850
Dry	850	925	925	525	550	650	675	625	600	575	675	850
Critical	900	975	975	625	625	675	675	675	650	700	725	875
No Action/No Project Alternative (µmhos)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet	600	425	350	250	250	375	475	425	450	450	525	730
Above Normal	700	525	450	350	375	550	600	550	550	500	575	800
Below Normal	800	850	750	375	475	600	650	600	600	550	650	825
Dry	800	900	800	450	550	650	675	625	600	575	650	825
Critical	850	950	875	625	625	675	675	675	650	700	700	850
Change in Conditions (µmhos)												
Wet	0	0	0	-25	-25	0	0	0	0	0	-25	-20
Above Normal	-25	0	-50	-50	0	0	0	0	0	0	-25	-25
Below Normal	-25	-25	-100	-75	0	0	0	0	0	0	-25	-25
Dry	-50	-25	-125	-75	0	0	0	0	0	0	-25	-25
Critical	-50	-25	-100	0	0	0	0	0	0	0	-25	-25

The differences in the San Joaquin River conditions described above are associated with the superposition of SJRRP flows alone compared to the results of modeled existing conditions. **Any change identified in the No Action/No Project Alternative will substantially be due to the effects of the SJRRP flow assumption.** The magnitude of that action overwhelms the separate effect of the other difference in setting including the fallowing assumption. However, the effect of removing the temporary land fallowing would be an increase in tailwater return flows from the lands that have been assumed to be fallowed.

The estimated difference in San Joaquin River conditions due to this “no fallowing for transfer” adjustment would be minimal. The temporary land fallowing assumed in the existing conditions is only 8,000 acre-feet. Based on a review of historical fallowing under the existing Program, and employing the same calculation protocols used for estimating the incremental loss of tailwater return flows from the action of increasing fallowing, the removal of fallowing from the settings would result in less than about 0.1 cfs of increased tailwater flow in a month.

The method to illustrate conditions of required releases from New Melones Project for Vernalis flow and water quality objectives is described in Appendix B (Sections 2.2.1.2 and 2.2), with results described in Appendix B (Section 4.5). The periods when releases would be required for either flow or water quality compliance needs are illustrated for existing conditions and the No Action/No Project Alternative, and are illustrated for a “high control” and a “low control” condition. The analysis is performed for two different sets of assumed circumstances concerning controlling operating criteria for New Melones Reservoir. The first analysis assumes high control circumstances; that is, an assumption that Vernalis water quality and flow releases from New Melones Reservoir occur often and are associated with lesser flow and water quality conditions in the San Joaquin River (in any year type). These conditions correspond to assuming the “Max” control conditions developed for Appendix B (Tables 10 and 11) for New Melones Reservoir operations. The second analysis assumes low control circumstances, representing an assumption of less controlled (less frequent) conditions for each parameter, and the results are also shown in Appendix B (Tables 10 and 11). The same form of results is provided for the No Action/No Project Alternative in Appendix B (Tables 14 and 15).

The Vernalis flow requirements occur for the period February through June. In the No Action/No Project Alternative, periods of required releases from New Melones Reservoir for Vernalis flow objectives are reduced during late winter and early spring due to the effect of increased flows from the SJRRP. Required releases during late spring (e.g., last half of May) and June remain needed. The frequency of required releases for compliance to Vernalis flow objectives for both existing conditions and the No Action/No Project Alternative is shown in Table 4-9.

Concerning required releases from New Melones Project Vernalis water quality objective compliance, results show periods of required releases from New Melones Reservoir are reduced during winter and early spring due to the dilution effect of SJRRP flows. Required releases during late spring (e.g., last half of May) and the summer remain needed. The frequency of required releases for compliance to water quality objectives at Vernalis for existing conditions and the No Action/No Project Alternative is shown in Table 4-10.

Table 4-9
Periods of Required Releases for Vernalis Flow Objectives

Existing Conditions (Low Control)														
	Jan	**Feb**	**Mar**	**Apr1**	**Apr2**	**May1**	**May2**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet														
Above Normal							X		“X” Periods of required releases in No Action/No Project Alt “0” Additional Periods of required releases in Existing Conditions					
Below Normal					0		X							
Dry					X		X							
Critical					X		X							
No Action/No Project Alternative (Low Control)														
	Jan	**Feb**	**Mar**	**Apr1**	**Apr2**	**May1**	**May2**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet				0	0	0	X							
Above Normal		X	0	0	0	X	X	X						
Below Normal		X	0	X	X	X	X	X						
Dry		X	0	X	0	X	X	X						
Critical				X	X	X	X							

Table 4-10
Periods of Required Releases for Vernalis Water Quality Objectives

Existing Conditions (High Control)														
	Jan	**Feb**	**Mar**	**Apr1**	**Apr2**	**May1**	**May2**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet														
Above Normal														
Below Normal														
Dry														
Critical			0	0			X							
No Action/No Project Alternative (High Control)														
	Jan	**Feb**	**Mar**	**Apr1**	**Apr2**	**May1**	**May2**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet														
Above Normal														
Below Normal		X	0	0			X							
Dry		X	0	0			X							
Critical	0	X	X	X			X	X	X	X				

Apr1 generally represents the first half period of April and Apr2 the second half period of April. May1 generally represents the first half period of May and May2 the second half period of May

Although almost nondetectable, New Melones Reservoir operations would be affected by the increase in tailwater resulting from the removal of existing Program fallowing within the alternative. During Vernalis flow or quality controlled periods, New Melones Reservoir operations would increase releases when water quality controlled during January through March, and during June through August of critical years, and would decrease releases during February through June when Vernalis flow controls. The change in release would amount to no more than about 0.2 cfs in any month either positive or negative, commensurate with the flow differences described above. The annual effect alone upon New Melones Reservoir storage is an almost undetectable gain (maximum of about 30 acre-feet) in storage in any year type. Effects upon New Melones Reservoir operations due to the addition of SJRRP flows within the alternative would be a reduction in releases and a gain in storage due to a lesser need to provide flows for compliance to Vernalis flow and quality objectives.

The SJRRP flows would affect inflows to the Delta from the San Joaquin River, mostly adding flow (Table 4-7). Appendix B identifies that the 82-year annual average additional flow in the San Joaquin River upstream of the Stanislaus River confluence would increase by about 160,000 acre-feet. While the estimation procedure used for the primary analysis of the Proposed Program alternatives (involving relatively small differences in flow rates and water quality within the San Joaquin River) is adequate for evaluating the Proposed Program alternatives, estimating the change in Delta water supply conditions due to the large differences in flow and water quality attributable to the SJRRP is beyond the capability of the tools used for this analysis. The analysis of export constraints and Delta outflow control is described in Appendix B (Sections 2.3.1 and 2.3.2) for existing conditions and the No Action/No Project Alternative. Several additional refined assumptions and modeling analysis would be required to quantitatively estimate the effect of the SJRRP flows and the other changes associated with the No Action/No Project Alternative. Items such as the assumptions for a long-term operating plan for the New Melones Project including operational/allocation considerations for Stanislaus River water users, and instream flow and Vernalis flow and water quality objectives including BOs would be required. A plan for the operation of the CVP/SWP under evolving BOs would also be required. Such plans do not currently exist. However, it can be concluded that under current operation objectives the addition of flow from the SJRRP will provide additional water to the Delta, some of which will be available for export or other use by the CVP and SWP. Additional inflow from the San Joaquin River during the summer, fall and early winter (June through December) will typically occur during Delta “balanced conditions,” which could add to CVP/SWP water supplies. During other periods of the year (January through May), including some Decembers, additional San Joaquin River inflow will typically increase allowable exports.

Impact SW-1: Water Quality Standards at Vernalis

Reclamation is responsible for water quality compliance at Vernalis, with or without the Exchange Contractors’ Proposed Program. However, the No Action/No Project Alternative provides a neutral effect or betterment of water quality at Vernalis.

Concerning the incremental change due to the removal of fallowing under the No Action/No Project Alternative, Appendix B (Table 24) presents the water quality assumed associated with tailwater based on the quality of flows at Sand Dam and Boundary Drain. The addition of tailwater (described earlier as less than 0.1 cfs in a month) from fallowing that would not occur under the alternative slightly lessens water quality at the Exchange Contractors' service area boundary. The quality associated with this increase in flow is assumed to be worse than water quality at Vernalis; therefore, when water quality objectives are not controlling the resulting water quality at Vernalis would be slightly worse than in existing conditions. During periods when water quality objectives are controlling at Vernalis, water quality would remain the same.

However, the entirety of the No Action/No Project Alternative (overall effect) includes the occurrence of SJRRP flows from Millerton Lake, and the addition of this flow provides a neutral effect or betterment of water quality at Vernalis. Under CEQA, no impact would occur to meeting water quality standards at Vernalis due to the No Action/No Project Alternative. The small increase in agricultural return flows would have a less than significant impact on factors affecting water quality at Vernalis and overall leads to no impact to water quality.

Impact SW-2: Flow Standards at Vernalis

Reclamation is responsible for flow compliance at Vernalis, with or without the Exchange Contractors' Proposed Program. However, the No Action/No Project Alternative provides a neutral effect or betterment of flow conditions at Vernalis.

Concerning the incremental element of change due to the removal of fallowing under the No Action/No Project Alternative tailwater from the Exchange Contractors would increase, described earlier as approximately less than 0.1 cfs in a month. Also, the occurrence of SJRRP flows from Millerton Lake provides additional flow from the San Joaquin River upstream of the Stanislaus River confluence. When Vernalis flow requirements are not controlling, a neutral effect or betterment of flow at Vernalis will occur. When Vernalis flow requirements are controlling, flow at Vernalis will remain neutral to existing conditions. Under CEQA, no impact would occur to meeting flow standards at Vernalis. A small increase in flow would be attributable to the reduction of fallowing, and a large increase in flow would be due to implementation of the SJRRP, both leading to no impact at Vernalis.

Impact SW-3: Change in New Melones Storage, Releases and Water Deliveries

New Melones Reservoir operations could be affected by changes in San Joaquin River flow and quality due to the No Action/No Project Alternative. The small hydrologic changes (storage or flows) described above that are associated with the removal of land fallowing within this alternative suggest that neither the San Joaquin River hydrology nor the New Melones Reservoir operation would be affected by this component of the No Action/No Project Alternative. Therefore, New Melones Reservoir storage would not change relative to the existing conditions, and no reductions would occur in water supplies from New Melones. The effect of additional flows from the SJRRP within the alternative would be a reduction in releases and a gain in storage due to a lesser need to provide flows for compliance to Vernalis flow and quality objectives. Such gains in New Melones Reservoir water supply would provide an improvement in water supplies to all purposes. Under CEQA, no impact would occur to New Melones Reservoir storage and water supplies as a result of the No Action/No Project Alternative.

Impact SW-4: Change in Delta CVP/SWP Water Supplies

Flows from the San Joaquin River to the Delta under the No Action/No Project Alternative would change in comparison to flows described for existing conditions. Changes in flow into the Delta due to the removal of the fallowing component only and for the entirety of components within the alternative would be the same as those described for flows at Vernalis. The increases in flow would arrive into the Delta and could be neutral to the operation of the CVP and SWP, or increase their water supplies. During Delta balanced conditions, the CVP and SWP could manage the increased inflow through export increases or adjusted reservoir releases. When export levels are constrained by inflow-flow ratios, increase flow from the San Joaquin River will allow greater exports. For additional flows from the San Joaquin River that do not lead to operational adjustments by the CVP and SWP, additional Delta outflow will occur. Under CEQA, the No Action/No Project could increase CVP/SWP water supplies. Consequently, no impact would occur to CVP/SWP water supplies as a result of the No Action/No Project.

Alternative A: 50,000 Acre-Feet

Alternative A involves only temporary land fallowing to develop water for transfers. The Exchange Contractors would develop up to 50,000 acre-feet of water for transfer during any type of water year under the Exchange Contract.

Under the existing conditions, 8,000 acre-feet of temporary land fallowing water occurs. Alternative A incorporates an additional 42,000 acre-feet of water developed through temporary land fallowing, with 500 acre-feet not connected to San Joaquin River hydrology (i.e., water originating from FCWD); and the remaining 41,500 acre-foot increment would be developed within CCID and SLCC, partially from lands assumed to be connected to San Joaquin River hydrology. The effect on San Joaquin River hydrology occurs as land is fallowed, reducing the irrigated acres and associated tailwater drainage, some of which would escape to the San Joaquin River.

When compared to the No Action/No Project Alternative, which does not include any of the existing Program temporary land fallowing, Alternative A incorporates development of the full 50,000 acre-feet of temporary land fallowing, 5,500 acre-feet developed within FCWD and the remaining 44,500 acre-feet developed within CCID and SLCC.

Alternative A would decrease tailwater runoff to the San Joaquin River. The analysis is presented in Appendix B (Section 4) and the results summarized below. As described in the No Action/No Project Alternative summary above, the analysis is performed for two different sets of assumed circumstances concerning controlling operating criteria for New Melones Reservoir and the Delta. The first analysis assumes high control circumstances; that is, an assumption that Vernalis water quality and flow releases from New Melones Reservoir occur often and are associated with lesser flow and water quality conditions in the San Joaquin River. The high control analysis also assumes a greater number of periods of balanced Delta flow. These conditions correspond to assuming the “Max” control conditions developed for Appendix B (Tables 10 and 11) for New Melones Reservoir operations, and Appendix B (Tables 17 and 18) for Delta operations. The second study assumes low control circumstances, representing an assumption of less controlled conditions for each New Melones Reservoir and Delta parameter.

The existing flow at Vernalis is shown in Tables 4-11A and 4-12A along with the projected flow at Vernalis for Alternative A, for each of the high and low control conditions. The projected change in flow is also shown. Tables 4-11B and 4-12B show the projected flow at Vernalis for the No Action/No Project Alternative, and the comparison of flow at Vernalis for Alternative A, for each of the high and low control conditions.

Only a portion of the land used for fallowing would have a connection to San Joaquin River hydrology, and from those lands for each acre-foot of water developed by the Exchange Contractors, only a small portion of that water diminishes flow from the river. Therefore, this alternative results in a relatively small effect to Vernalis flows. Certain months (e.g., May of all years in the high control conditions) show no change in flow due to the New Melones Reservoir releases being controlled by flow criteria at Vernalis. Thus, a decrease in runoff from the Exchange Contractors is counteracted with an additional release from New Melones Reservoir, thereby leaving Vernalis flow neutral to the transfer. During certain other months, when New Melones Reservoir operations are maintaining required water quality conditions at Vernalis (e.g., June of a critical year), the flow change at Vernalis is the combination of both the effects of the Exchange Contractors developing the transfer water and the counteraction by New Melones Reservoir releasing less dilution flow to maintain the water quality conditions at Vernalis. The differences in results between the high control and low control condition are due to differences in assumed controlling criteria under each condition. Water quality may control operations in a particular month under the high control condition, while flow may control in that month under the low control condition.

Flows would decrease in the San Joaquin River upstream of the Stanislaus River confluence between 0 and 2 cfs depending upon the month of the year (see Appendix B [Table 26]). After reaction to New Melones Reservoir operations the flow at Vernalis would decrease between 0 and 4 cfs depending upon the month of the year, the year type, and the controlling criteria of New Melones operations. These potential changes in flow are small, if not-measureable, compared to existing or projected flow at Vernalis, which is at a minimum during critical years of at least 900 cfs.

Tables 4-13A and 4-14A illustrate water quality and changes at Vernalis under existing conditions and Alternative A for each high and low control condition. Tables 4-13B and 4-14B show the projected water quality at Vernalis for the No Action/No Project Alternative, and the comparison of water quality at Vernalis for Alternative A, for each of the high and low control conditions. Water quality at Vernalis would change due to fallowing under Alternative A. Water quality changes at Vernalis trend with the changes in flow at Vernalis. The water quality associated with the flows affected by temporary land fallowing is assumed to have the same water quality as tailwater recapture. Since this quality is worse than the melded water quality at Vernalis, the removal of runoff by the Exchange Contractors would improve water quality at Vernalis. For those months with no change in water quality but with a change in flow, New Melones Reservoir releases are maintaining the water quality objective at Vernalis. Water quality is projected to improve between 0 and 2 µmhos in a month, affecting existing water quality that generally ranges between 275 and 900 µmhos.

New Melones Reservoir operations would be affected by the decrease in tailwater resulting from Alternative A. The method to illustrate conditions of required releases from New Melones Reservoir for Vernalis flow and water quality objectives is described in Appendix B (Sections 2.2.1.2 and 2.2), with results described in Appendix B (Section 4.1). With existing conditions as a baseline, the potential changes in the net releases from New Melones Reservoir, for either Vernalis water quality or flow purposes, are shown in Table 4-15A for each of the high and low control conditions. Contrasted with the No Action/No Project Alternative, the potential changes in the net releases from New Melones Reservoir, for either Vernalis water quality or flow purposes, are shown in Table 4-15B for each of the high and low control conditions. The values are depicted as a change in New Melones Reservoir storage, and can be directly equated to changes in flow to the lower Stanislaus River at Goodwin Reservoir. Negative values indicate a decrease in storage and an increase in flow to the lower Stanislaus River.

The changes shown in Tables 4-15A and 4-15B reflect releases from New Melones Reservoir that would be required to counter the effect of developing the transfer water. These changes reflect Reclamation maintaining Vernalis flow and quality conditions at assumed Vernalis objective compliance levels. Accumulated changes in New Melones Reservoir storage vary by year type, but the change in storage within a year is projected to be a decrease of less than 500 acre-feet, and could be an increase in storage. The potential changes in flow to the lower Stanislaus River mirror the changes in the New Melones storage. The change in flow ranges from an increase of 3 cfs during many Aprils and Mays (for flow objectives at Vernalis) to a decrease of up to 2 cfs during June in a critical year. However, when a reduction in flow is calculated, the reduction may not actually occur because another release objective may require the continuation of some level of that release. These changes would occur to an existing storage in New Melones Reservoir greater than 1,000,000 acre-feet and releases to the Stanislaus River that are typically greater than 250 cfs.

The development of transfer water would affect inflows to the Delta from the San Joaquin River. With existing conditions as a baseline, the total net effect to Delta water supply is shown in Table 4-16A for each of the high and low control conditions. Contrasted with the No Action/No Project Alternative, the potential changes in the net Delta water supply are shown in Table 4-16B for each of the high and low control conditions. The decrease in net supply ranges from about 350 to 525 acre-feet in noncritical years, to about 850 acre-feet during a critical year. These changes occur due to the development of the transfer water and also include reactions in New Melones Reservoir releases to changes in the river system.

Over the past several years the Federal BOs issued under the ESA for the operation of the CVP and SWP in the Delta have become more and more restrictive leading to additional constraints on Delta pumping. The Service's BO includes requirements from December to June for an adaptively managed flow restriction for the average Old River and Middle River (OMR) flow. The flow restriction can begin as early as December 1 and is intended to protect delta smelt at various life stages. The Old/Middle River flow target is dependent on delta smelt survey information with the flow target achieved primarily by managing CVP and SWP exports. NMFS' BO also added an Old/Middle River requirement for the listed species under its BO, which is assumed to be met by the Service's requirements. The NMFS' BO also additionally constrained exports during April and May through a Vernalis flow to export ratio requirement, effectively reducing exports to 1,500 cfs during the period except during extremely wet San Joaquin River conditions.

The method of estimating the potential effect of the water development components of transfers upon CVP/SWP allowable exports is described in Appendix B (Section 4.1), and uses assumptions for allowable exports based on flow ratios. Using existing conditions as a baseline, Table 4-17A illustrates the estimation of change in allowable exports by the CVP/SWP assuming metrics are applied to the estimated change in Vernalis flows caused by developing water for the transfers. Contrasted to the No Action/No Project Alternative, comparable information is provided in Table 4-17B. No computed effects occur during July through November due to assuming no constraints occur, and during December no estimated changes in Vernalis flows occur due to the development of transfer water. Tables 4-17A and 17B illustrate a potential reduction in allowable exports ranging up to a maximum of approximately 400 acre-feet. The potential effects may not occur in some instances in some years if the particular export constraint is not actually controlling export operations due to such a circumstance as health and safety pumping establishing an absolute level of export regardless of San Joaquin River flow. The estimates serve as an illustration of a conservatively high estimate of potential effect, and are in comparison to approximately 5,000,000 acre-feet of average annual export pumping by the CVP/SWP. These potential effects could at times be inclusive of or sometimes be additive to the potential supply effects shown for the CVP/SWP Delta water supply effect shown in Tables 4-16A and 4-16B.

Impact SW-1: Water Quality Standards at Vernalis

Reclamation is responsible for water quality compliance at Vernalis, with or without the Exchange Contractors' Proposed Program. Alternative A would decrease tailwater runoff flow in the San Joaquin River and an assumed associated load for salinity. That removal of flow and load would decrease the amount of dilution flow required from New Melones Reservoir to comply with water quality requirements at Vernalis and, thus, increase the ability of Reclamation to comply with water quality objectives, a positive effect. (However, the removal of tailwater runoff flow in Alternative A will increase the need for releases for flow standards at Vernalis, thus increasing competition for the New Melones Reservoir water supply used for compliance with both objectives.). During periods when water quality does not control at Vernalis, Alternative A will improve water quality at Vernalis when compared to existing conditions (Tables 4-13A and 4-14A), or when compared to the No Action/No Project Alternative (Tables 4-13B and 4-14B).

Although stated to have an effect by analysis, the removal of tailwater due to Alternative A fallowing (described earlier as approximately up to 2 cfs in a month, equitable to about 120 acre-feet in a month) is small, if not practicably indiscernible within the hydrology and operation of the San Joaquin River, where flow in the San Joaquin River at Vernalis has historically been greater than 900 cfs in the typical worst case circumstance during critical years. Under CEQA, no impact would occur to meeting water quality standards at Vernalis due to Alternative A. The small decrease in agricultural return flows would have no impact on factors affecting water quality at Vernalis.

Impact SW-2: Flow Standards at Vernalis

The flow in the San Joaquin River at Vernalis would be reduced by development of transfer water through land fallowing. As discussed above concerning water quality affects, Alternative A results in a small diminishment of flow in the San Joaquin River, and at times New Melones Reservoir operations would react to those changes. During those times, the flow at Vernalis will remain the same as conditions that would occur without the transfer. During periods when flow standards at Vernalis are not controlling, Vernalis flow would be reduced by up to 4 cfs compared to existing conditions (Tables 4-11A and 4-12A) or compared to No Action/No Project Alternative conditions (Tables 4-11B and 4-12B), depending upon the month, the year type, and New Melones release control condition.

Although stated to have an effect by analysis, the removal of tailwater due to Alternative A temporary land fallowing (described earlier as an effect of approximately up to 2 cfs in a month, equitable to about 120 acre-feet in a month), and a resultant decrease of flow at Vernalis up to approximately 4 cfs in a month is small, if not practicably indiscernible within the hydrology and operation of the San Joaquin River, where flow in the San Joaquin River at Vernalis has historically been greater than 900 cfs in the typical worst case circumstance during critical years. Under CEQA, no impact would occur to meeting flow standards at Vernalis due to Alternative A. The small decrease in agricultural return flows would have a less than significant impact on factors affecting flow at Vernalis.

Impact SW-3: Change in New Melones Storage, Releases and Water Deliveries

New Melones Project operations would be affected by changes in San Joaquin River flow and quality due to Alternative A. The small hydrologic changes (storage or flows) described Tables 4-15A and 4-15B above are associated with reaction by New Melones Reservoir operations to comply with flow and water quality objectives at Vernalis. The annual storage change could amount to a maximum decrease of less than 500 acre-feet, or storage could slightly increase is some circumstances. The monthly changes in releases are projected to be small (described as ranging from a monthly potential increase of 3 cfs to a decrease of 2 cfs), if not indiscernible within the operations of New Melones Reservoir. Therefore, these changes would cause no reductions in water supplies from New Melones. Under CEQA, small to no reductions would occur to New Melones Reservoir storage. No impact would occur to water supplies as a result of Alternative A.

Table 4-11A
Simulated Average Monthly Flow for San Joaquin River at Vernalis

Existing Condition (cfs)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wet	6,550	10,700	13,050	10,850	11,600	11,050	7,700	3,500	3,450	3,500	2,650	2,950
Above Normal	4,050	6,250	6,250	5,400	5,050	2,850	1,950	2,000	2,400	2,900	2,350	2,350
Below Normal	2,350	3,000	2,900	3,550	3,500	2,000	1,500	1,500	1,900	2,400	2,100	2,100
Dry	2,300	2,500	2,350	2,700	2,700	1,450	1,250	1,350	1,750	2,150	1,900	1,900
Critical	1,800	2,050	1,750	1,800	1,800	1,000	900	900	1,350	1,550	1,650	1,650
Alternative A – High Control (cfs)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wet	6,550	10,699	13,049	10,850	11,600	11,048	7,698	3,498	3,449	3,499	2,650	2,950
Above Normal	4,050	6,250	6,250	5,400	5,050	2,850	1,948	1,998	2,399	2,899	2,350	2,350
Below Normal	2,350	3,000	2,900	3,550	3,500	2,000	1,498	1,498	1,899	2,399	2,100	2,100
Dry	2,300	2,500	2,350	2,699	2,700	1,450	1,248	1,348	1,749	2,149	1,900	1,900
Critical	1,800	2,049	1,749	1,800	1,800	996	897	897	1,349	1,549	1,650	1,650
Change in Conditions (cfs)												
Wet	0	-1	-1	0	0	-2	-2	-2	-1	-1	0	0
Above Normal	0	0	0	0	0	0	-2	-2	-1	-1	0	0
Below Normal	0	0	0	0	0	0	-2	-2	-1	-1	0	0
Dry	0	0	0	-1	0	0	-2	-2	-1	-1	0	0
Critical	0	-1	-1	0	0	-4	-3	-3	-1	-1	0	0

Table 4-11B
Simulated Average Monthly Flow for San Joaquin River at Vernalis

No Action/No Project Alternative (cfs)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet	6,450	10,250	13,300	12,850	11,850	11,400	7,750	3,500	3,500	3,600	2,850	3,000
Above Normal	4,150	6,250	7,050	7,900	5,100	2,900	1,950	2,000	2,450	3,000	2,550	2,450
Below Normal	2,450	3,100	3,600	5,000	3,550	2,050	1,500	1,500	1,950	2,450	2,300	2,200
Dry	2,450	2,600	3,100	3,500	2,750	1,500	1,250	1,350	1,800	2,200	2,100	1,950
Critical	1,950	2,150	2,250	1,950	1,800	1,000	900	900	1,350	1,550	1,800	1,750
Alternative A – High Control (cfs)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet	6,450	10,249	13,299	12,848	11,850	11,398	7,748	3,498	3,499	3,599	2,850	3,000
Above Normal	4,150	6,250	7,049	7,898	5,100	2,900	1,948	1,998	2,449	2,999	2,550	2,450
Below Normal	2,450	3,100	3,599	5,000	3,550	2,050	1,498	1,498	1,949	2,449	2,300	2,200
Dry	2,450	2,600	3,099	3,500	2,750	1,500	1,248	1,348	1,799	2,199	2,100	1,950
Critical	1,950	2,149	2,249	1,950	1,800	996	897	897	1,349	1,549	1,800	1,750
Change in Conditions (cfs)												
Wet	0	-1	-1	-2	0	-2	-2	-2	-1	-1	0	0
Above Normal	0	0	-1	-2	0	0	-2	-2	-1	-1	0	0
Below Normal	0	0	-1	0	0	0	-2	-2	-1	-1	0	0
Dry	0	0	-1	0	0	0	-2	-2	-1	-1	0	0
Critical	0	-1	-1	0	0	-4	-3	-3	-1	-1	0	0

Table 4-12A
Simulated Average Monthly Flow for San Joaquin River at Vernalis

Existing Condition (cfs)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet	6,550	10,700	13,050	10,850	11,600	11,050	7,700	3,500	3,450	3,500	2,650	2,950
Above Normal	4,050	6,250	6,250	5,400	5,050	2,850	1,950	2,000	2,400	2,900	2,350	2,350
Below Normal	2,350	3,000	2,900	3,550	3,500	2,000	1,500	1,500	1,900	2,400	2,100	2,100
Dry	2,300	2,500	2,350	2,700	2,700	1,450	1,250	1,350	1,750	2,150	1,900	1,900
Critical	1,800	2,050	1,750	1,800	1,800	1,000	900	900	1,350	1,550	1,650	1,650
Alternative A – Low Control (cfs)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet	6,550	10,699	13,049	10,848	11,598	11,048	7,698	3,498	3,449	3,499	2,650	2,950
Above Normal	4,050	6,249	6,249	5,398	5,049	2,848	1,948	1,998	2,399	2,899	2,350	2,350
Below Normal	2,350	2,999	2,899	3,549	3,499	1,998	1,498	1,498	1,899	2,399	2,100	2,100
Dry	2,300	2,499	2,349	2,699	2,699	1,448	1,248	1,348	1,749	2,149	1,900	1,900
Critical	1,800	2,049	1,749	1,798	1,798	998	898	898	1,349	1,549	1,650	1,650
Change in Conditions (cfs)												
Wet	0	-1	-1	-2	-2	-2	-2	-2	-1	-1	0	0
Above Normal	0	-1	-1	-2	-1	-2	-2	-2	-1	-1	0	0
Below Normal	0	-1	-1	-1	-1	-2	-2	-2	-1	-1	0	0
Dry	0	-1	-1	-1	-1	-2	-2	-2	-1	-1	0	0
Critical	0	-1	-1	-2	-2	-2	-2	-2	-1	-1	0	0

Table 4-12B
Simulated Average Monthly Flow for San Joaquin River at Vernalis

No Action/No Project Alternative (cfs)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet	6,450	10,250	13,300	12,850	11,850	11,400	7,750	3,500	3,500	3,600	2,850	3,000
Above Normal	4,150	6,250	7,050	7,900	5,100	2,900	1,950	2,000	2,450	3,000	2,550	2,450
Below Normal	2,450	3,100	3,600	5,000	3,550	2,050	1,500	1,500	1,950	2,450	2,300	2,200
Dry	2,450	2,600	3,100	3,500	2,750	1,500	1,250	1,350	1,800	2,200	2,100	1,950
Critical	1,950	2,150	2,250	1,950	1,800	1,000	900	900	1,350	1,550	1,800	1,750
Alternative A – Low Control (cfs)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet	6,450	10,249	13,299	12,848	11,848	11,398	7,748	3,498	3,499	3,599	2,850	3,000
Above Normal	4,150	6,249	7,049	7,898	5,099	2,898	1,948	1,998	2,449	2,999	2,550	2,450
Below Normal	2,450	3,099	3,599	4,999	3,549	2,048	1,498	1,498	1,949	2,449	2,300	2,200
Dry	2,450	2,599	3,099	3,499	2,749	1,498	1,248	1,348	1,799	2,199	2,100	1,950
Critical	1,950	2,149	2,249	1,948	1,798	998	898	898	1,349	1,549	1,800	1,750
Change in Conditions (cfs)												
Wet	0	-1	-1	-2	-2	-2	-2	-2	-1	-1	0	0
Above Normal	0	-1	-1	-2	-1	-2	-2	-2	-1	-1	0	0
Below Normal	0	-1	-1	-1	-1	-2	-2	-2	-1	-1	0	0
Dry	0	-1	-1	-1	-1	-2	-2	-2	-1	-1	0	0
Critical	0	-1	-1	-2	-2	-2	-2	-2	-1	-1	0	0

Table 4-13A
Simulated Average Monthly Electrical Conductivity for San Joaquin River at Vernalis

Existing Condition (µmhos)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet	600	425	350	275	275	375	475	425	450	450	550	750
Above Normal	725	525	500	400	375	550	600	550	550	500	600	825
Below Normal	825	875	850	450	475	600	650	600	600	550	675	850
Dry	850	925	925	525	550	650	675	625	600	575	675	850
Critical	900	975	975	625	625	675	675	675	650	700	725	875
Alternative A – High Control (µmhos)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet	600	425	350	275	275	375	475	425	450	450	550	750
Above Normal	725	525	500	400	375	549	600	550	550	500	600	825
Below Normal	825	875	850	449	474	599	650	600	600	550	675	850
Dry	850	925	925	524	549	648	675	625	600	575	675	850
Critical	900	975	975	624	624	675	675	675	650	700	725	875
Change in Conditions (µmhos)												
Wet	0	0	0	0	0	0	0	0	0	0	0	0
Above Normal	0	0	0	0	0	-1	0	0	0	0	0	0
Below Normal	0	0	0	-1	-1	-1	0	0	0	0	0	0
Dry	0	0	0	-1	-1	-2	0	0	0	0	0	0
Critical	0	0	0	-1	-1	0	0	0	0	0	0	0

Table 4-13B
Simulated Average Monthly Electrical Conductivity for San Joaquin River at Vernalis

No Action/No Project Alternative (µmhos)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet	600	425	350	250	250	375	475	425	450	450	525	730
Above Normal	700	525	450	350	375	550	600	550	550	500	575	800
Below Normal	800	850	750	375	475	600	650	600	600	550	650	825
Dry	800	900	800	450	550	650	675	625	600	575	650	825
Critical	850	950	875	625	625	675	675	675	650	700	700	850
Alternative A – High Control (µmhos)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet	600	425	350	250	250	375	475	425	450	450	525	730
Above Normal	700	525	450	350	374	549	599	549	550	500	575	800
Below Normal	800	850	750	374	474	599	650	600	600	550	650	825
Dry	800	900	800	449	549	648	675	625	600	575	650	825
Critical	850	950	875	624	624	675	675	675	650	700	700	850
Change in Conditions (µmhos)												
Wet	0	0	0	0	0	0	0	0	0	0	0	0
Above Normal	0	0	0	0	-1	-1	0	0	0	0	0	0
Below Normal	0	0	0	-1	-1	-1	0	0	0	0	0	0
Dry	0	0	0	-1	-1	-2	0	0	0	0	0	0
Critical	0	0	0	-1	-1	0	0	0	0	0	0	0

Table 4-14A
Simulated Average Monthly Electrical Conductivity for San Joaquin River at Vernalis

Existing Condition (µmhos)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet	600	425	350	275	275	375	475	425	450	450	550	750
Above Normal	725	525	500	400	375	550	600	550	550	500	600	825
Below Normal	825	875	850	450	475	600	650	600	600	550	675	850
Dry	850	925	925	525	550	650	675	625	600	575	675	850
Critical	900	975	975	625	625	675	675	675	650	700	725	875
Alternative A – Low Control (µmhos)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet	600	425	350	275	275	375	475	425	450	450	550	750
Above Normal	725	525	500	400	375	550	600	550	550	500	600	825
Below Normal	825	875	850	449	474	600	650	600	600	550	675	850
Dry	850	925	925	524	549	649	675	625	600	575	675	850
Critical	900	975	975	624	624	674	674	674	650	700	725	875
Change in Conditions (µmhos)												
Wet	0	0	0	0	0	0	0	0	0	0	0	0
Above Normal	0	0	0	0	0	0	0	0	0	0	0	0
Below Normal	0	0	0	-1	-1	0	0	0	0	0	0	0
Dry	0	0	0	-1	-1	-1	0	0	0	0	0	0
Critical	0	0	0	-1	-1	-1	-1	-1	0	0	0	0

Table 4-14B
Simulated Average Monthly Electrical Conductivity for San Joaquin River at Vernalis

No Action/No Project Alternative (µmhos)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet	600	425	350	250	250	375	475	425	450	450	525	730
Above Normal	700	525	450	350	375	550	600	550	550	500	575	800
Below Normal	800	850	750	375	475	600	650	600	600	550	650	825
Dry	800	900	800	450	550	650	675	625	600	575	650	825
Critical	850	950	875	625	625	675	675	675	650	700	700	850
Alternative A – Low Control (µmhos)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Wet	600	425	350	250	250	375	475	425	450	450	525	730
Above Normal	700	525	450	350	375	550	599	549	550	500	575	800
Below Normal	800	850	750	375	474	599	650	600	600	550	650	825
Dry	800	900	800	449	549	649	675	625	600	575	650	825
Critical	850	950	875	624	624	674	674	674	650	700	700	850
Change in Conditions (µmhos)												
Wet	0	0	0	0	0	0	0	0	0	0	0	0
Above Normal	0	0	0	0	0	0	0	0	0	0	0	0
Below Normal	0	0	0	0	-1	-1	0	0	0	0	0	0
Dry	0	0	0	-1	-1	-1	0	0	0	0	0	0
Critical	0	0	0	-1	-1	-1	-1	-1	0	0	0	0

Table 4-15A
Change in Storage in New Melones Reservoir

Change in Conditions Compared to Existing Conditions – High Condition (acre-feet)													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Wet	0	0	0	-131	-137	0	0	0	0	0	0	0	-268
Above Normal	0	-30	-41	-131	-137	-136	0	0	0	0	0	0	-474
Below Normal	0	-30	-41	-131	-137	-136	0	0	0	0	0	0	-474
Dry	0	-30	-41	-66	-137	-136	0	0	0	0	0	0	-409
Critical	9	16	19	-131	-137	76	57	49	0	0	0	0	-42
Change in Conditions Compared to Existing Conditions – Low Condition (acre-feet)													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Wet	0	0	0	0	0	0	0	0	0	0	0	0	0
Above Normal	0	0	0	0	-66	0	0	0	0	0	0	0	-66
Below Normal	0	0	0	-66	-66	0	0	0	0	0	0	0	-132
Dry	0	0	0	-66	-66	0	0	0	0	0	0	0	-132
Critical	0	0	19	6	-3	0	0	0	0	0	0	0	22

Table 4-15B
Change in Storage in New Melones Reservoir

Change in Conditions Compared to No Action/No Project Alternative – High Condition (acre-feet)													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Wet	0	0	0	0	-147	0	0	0	0	0	0	0	-147
Above Normal	0	-32	0	0	-147	-146	0	0	0	0	0	0	-324
Below Normal	0	-32	0	-141	-147	-146	0	0	0	0	0	0	-465
Dry	0	-32	0	-145	-147	-146	0	0	0	0	0	0	-470
Critical	0	18	29	-141	-147	82	61	52	0	0	0	0	-45
Change in Conditions Compared to No Action/No Project Alternative – Low Condition (acre-feet)													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Wet	0	0	0	0	0	0	0	0	0	0	0	0	0
Above Normal	0	0	0	0	-71	0	0	0	0	0	0	0	-71
Below Normal	0	0	0	-70	-71	0	0	0	0	0	0	0	-141
Dry	0	0	0	-70	-71	0	0	0	0	0	0	0	-141
Critical	0	0	29	6	-3	0	0	0	0	0	0	0	32

Table 4-16A
Change in CVP/SWP Delta Water Supply

Change in Conditions Compared to Existing Conditions – High Condition (acre-feet)													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Wet	0	0	0	0	0	-136	-142	-135	-32	-36	-8	0	-489
Above Normal	0	0	0	0	0	0	-142	-135	-32	-36	-8	0	-353
Below Normal	0	0	0	0	0	0	-142	-135	-32	-36	-8	0	-353
Dry	0	0	-4	0	0	0	-142	-135	-32	-36	-8	0	-357
Critical	-19	-46	-64	0	0	-212	-198	-184	-32	-36	-8	0	-799
Change in Conditions Compared to Existing Conditions – Low Condition (acre-feet)													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Wet	0	0	0	0	0	-136	-142	-135	-32	-36	-8	0	-489
Above Normal	0	0	0	0	0	-136	-142	-135	-32	-36	-8	0	-489
Below Normal	0	0	0	0	0	-136	-142	-135	-32	-36	-8	0	-489
Dry	0	0	0	0	0	-136	-142	-135	-32	-36	-8	0	-489
Critical	0	0	0	0	0	-136	-142	-135	-32	-36	-8	0	-489

Table 4-16B
Change in CVP/SWP Delta Water Supply

Change in Conditions Compared to No Action/No Project Alternative – High Condition (acre-feet)													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Wet	0	0	0	0	0	-146	-152	-145	-35	-39	-8	0	-525
Above Normal	0	0	0	0	0	0	-152	-145	-35	-39	-8	0	-379
Below Normal	0	0	0	0	0	0	-152	-145	-35	-39	-8	0	-379
Dry	0	0	-48	0	0	0	-152	-145	-35	-39	-8	0	-427
Critical	-11	-50	-77	0	0	-228	-213	-197	-35	-39	-8	0	-857
Change in Conditions Compared to No Action/No Project Alternative – Low Condition (acre-feet)													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Wet	0	0	0	0	0	-146	-152	-145	-35	-39	-8	0	-525
Above Normal	0	0	0	0	0	-146	-152	-145	-35	-39	-8	0	-525
Below Normal	0	0	0	0	0	-146	-152	-145	-35	-39	-8	0	-525
Dry	0	0	0	0	0	-146	-152	-145	-35	-39	-8	0	-525
Critical	0	0	-29	-6	3	-146	-152	-145	-35	-39	-8	0	-557

Table 4-17A
Change in CVP/SWP Allowable Export

Change in Conditions Compared to Existing Conditions – High Condition (acre-feet)													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Wet	-5	-15	-22	0	0	-68						0	-110
Above Normal	-5	0	-2	0	0	0						0	-7
Below Normal	-5	0	-2	0	0	0						0	-7
Dry	-5	0	-2	-33	0	0						0	-40
Critical	-9	-23	-32	0	0	-106						0	-170
Change in Conditions Compared to Existing Conditions – Low Condition (acre-feet)													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Wet	-5	-15	-22	-33	-34	-68						0	-177
Above Normal	-5	-15	-22	-33	-18	-68						0	-161
Below Normal	-5	-15	-22	-22	-23	-68						0	-155
Dry	-5	-15	-22	-33	-35	-68						0	-178
Critical	-5	-15	-32	-137	-134	-68						0	-391

Table 4-17B
Change in CVP/SWP Allowable Export

Change in Conditions Compared to No Action/No Project Alternative – High Condition (acre-feet)													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Wet	-5	-16	-24	-35	0	-73						0	-153
Above Normal	-5	0	-24	-35	0	0						0	-65
Below Normal	-5	0	-24	0	0	0						0	-29
Dry	-5	0	-24	2	0	0						0	-27
Critical	-5	-25	-39	0	0	-114						0	-183
Change in Conditions Compared to No Action/No Project Alternative – Low Condition (acre-feet)													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Wet	-5	-16	-24	-35	-37	-73						0	-190
Above Normal	-5	-16	-24	-35	-19	-73						0	-172
Below Normal	-5	-16	-24	-23	-25	-73						0	-166
Dry	-5	-16	-24	-35	-38	-73						0	-191
Critical	-5	-16	-39	-147	-144	-73						0	-423

Impact SW-4: Change in Delta CVP/SWP Water Supplies

Flows from the San Joaquin River to the Delta under Alternative A would change in comparison to flows described for existing or No Action/No Project Alternative conditions. Changes in flow into the Delta due to fallowing could decrease the Delta water supply within a range of 350 to 525 acre-feet in noncritical years, to about 850 acre-feet in a critical year (Tables 4-16A and 4-16B). Changes (decreases) to flow at Vernalis could cause a reduced allowable export at the CVP/SWP export facilities, which could be a part of the overall Delta impact to the CVP/SWP. The reduced flow at Vernalis could affect allowable export by up to approximately 400 acre-feet depending upon year type (Tables 4-17A and 4-17B). Although stated to have an effect by analysis, the removal of tailwater due to Alternative A fallowing (described earlier as approximately up to 2 cfs in a month, equitable to about 120 acre-feet in a month) is small, if not practicably indiscernible within the hydrology and operation of the San Joaquin River and the Delta, where exports by the CVP/SWP have historically averaged over 5,000,000 AFY. Consequently, no adverse effect would occur on CVP/SWP water supplies. Under CEQA, a less-than-significant impact would occur to CVP/SWP water supplies as a result of Alternative A.

Alternative B

Alternative B is similar to the existing Program except the Exchange Contractors would provide up to 88,000 acre-feet of water during any noncritical Exchange Contract year through a combination of conservation and temporary land fallowing sources. The conservation measures include those components of tailwater recapture previously described affecting evaporation and seepage to groundwater, water discharged to nondistrict lands, water discharged to the San Joaquin River, and tailwater discharged above Sack Dam. These components of conservation account for up to 80,000 acre-feet of the total developed supply. Temporary land fallowing would contribute up to 8,000 acre-feet of developed water.

Flexibility exists in how the 88,000 acre-feet of water are developed. Therefore, this alternative was evaluated under two scenarios. The first scenario is described above, assuming 80,000 acre-feet developed through conservation programs and 8,000 acre-feet developed through fallowing. The second scenario assumes that the transfer maximizes temporary land fallowing and provides the remainder of the transfer through conservation including tailwater recapture. Under this scenario, 38,000 acre-feet is developed through conservation programs, and up to 50,000 acre-feet through temporary land fallowing.

Under the first scenario, transfer water would be developed through the conservation and tailwater recapture (80,000 acre-feet) components and temporary land fallowing (8,000 acre-feet) currently embedded in the recent operations, and evident in existing conditions. This scenario would be a continuation of operations already experienced. In a comparison to existing conditions, the San Joaquin River hydrology, New Melones Project operations, and Delta water supply would show no change.

Contrasted to the No Action/No Project Alternative, this first scenario would also incorporate 80,000 acre-feet of conservation and tailwater recapture and, as explained previously, the river would see no difference in hydrology or operation. However, when using the No Action/No Project Alternative as the basis of comparison, the 8,000 acre-feet of developed through fallowing would appear as an increment of change. Appendix B (Section 4.2 and Attachment 1) describes and illustrates the change in hydrology and operations due to the incremental 8,000 acre-feet of transfer. The change (reduction) in San Joaquin River flow leaving the proximity of the Exchange Contractors is less than 0.2 cfs, an order of magnitude less than previously illustrated for Alternative A. All of the other hydrologic effects of this scenario of Alternative B are also at least an order of magnitude less than the effects identified for Alternative A.

Under the second scenario, an increment of additional temporary land fallowing would be developed for the transfer. When using existing conditions as a baseline, achieving a 50,000 acre-feet component of temporary land fallowing, for which 8,000 acre-feet of temporary land fallowing water already exists in the existing conditions, an additional 42,000 acre-feet of water would be developed through temporary land fallowing. As described for Alternative A, 500 acre-feet of the incremental water would be developed within FCWD and the remaining 41,500 acre-feet of water would be developed within CCID and SLCC, partially from lands assumed to be connected to San Joaquin River hydrology. The results of comparing this scenario to existing conditions would be the same as the results described for comparing Alternative A to existing conditions. The effect of changing the amount of conservation and tailwater recapture between alternatives does not affect San Joaquin River hydrology, and the characteristics of the fallowing component of this scenario of Alternative B are the same as those evaluated in Alternative A.

When contrasted to the No Action/No Project Alternative, this second scenario recognizes an incremental development of 50,000 acre-feet of water through temporary land fallowing, with 5,500 acre-feet of water developed within FCWD and the remaining 44,500 acre-feet developed within CCID and SLCC. The results of comparing this scenario to the No Action/No Project Alternative would be the same as the results described for comparing Alternative A to the No Action/No Project Alternative. The effect of changing the amount of conservation and tailwater recapture between alternatives does not affect San Joaquin River hydrology, and the characteristics of the fallowing component of this scenario of Alternative B are the same as those evaluated in Alternative A.

Impact SW-1: Water Quality Standards at Vernalis

Under CEQA, the changes in water quality of the San Joaquin River under Alternative B range from no change to changes equal to those that occur in Alternative A. No impact would occur on factors affecting water quality at Vernalis.

Impact SW-2: Flow Standards at Vernalis

Under CEQA, the changes in flow to the San Joaquin River under Alternative B range from no change to changes equal to those that occur in Alternative A. The impact on factors affecting flow at Vernalis is less than significant.

Impact SW-3: Change in New Melones Storage, Releases and Water Deliveries

Under CEQA, the changes in flow to the San Joaquin River under Alternative B and the resultant changes in New Melones Reservoir storage and releases range from no change to changes equal to those that occur in Alternative A. No impact would occur to water supplies.

Impact SW-4: Change in Delta CVP/SWP Water Supplies

Under CEQA, the changes in flow to the San Joaquin River under Alternative B and the resultant changes in CVP/CWP Delta water supplies range from no change to changes equal to those that occur in Alternative A. A less-than-significant impact would occur to CVP/SWP water supplies.

Alternative C

Alternative C develops up to 130,000 acre-feet of water annually during any noncritical Exchange Contract year. Under this alternative, up to 80,000 acre-feet of water is developed through conservation and up to 50,000 acre-feet of water is developed through temporary land fallowing.

This alternative is representative of the adopted transfer plan for the existing Program, although not yet fully implemented to this level. Up to 130,000 acre-feet of water would be developed and transferred. Water would be developed through 80,000 acre-feet from conservation programs including tailwater recapture already in the existing setting conditions, and through 50,000 acre-feet from temporary land fallowing.

Contrasted to existing conditions, for which 8,000 acre-feet of water developed by temporary land fallowing is already included, an additional 42,000 acre-feet of water would be developed through temporary land fallowing with the same characteristics as described for Alternative A. The 80,000 acre-feet of water developed through components of water conservation and tailwater recapture exist within existing conditions. Therefore, the results of comparing this scenario to existing conditions would be the same as the results described for comparing Alternative A and Alternative B to existing conditions. The effect of changing the amount of conservation and tailwater recapture between alternatives does not affect San Joaquin River hydrology.

When contrasted to the No Action/No Project Alternative, this alternative recognizes an incremental development of 50,000 acre-feet of water through temporary land fallowing, with 5,500 acre-feet of water developed within FCWD and the remaining 44,500 acre-feet developed within CCID and SLCC. The results of comparing this alternative to the No Action/No Project Alternative would be the same as the results described for comparing Alternative A or the second scenario of Alternative B to the No Action/No Project Alternative.

Impact SW-1: Water Quality Standards at Vernalis

Under CEQA, the changes in water quality of the San Joaquin River under Alternative C range from no changes to changes equal to those that occur in Alternative A, and no impact would occur.

Impact SW-2: Flow Standards at Vernalis

Under CEQA, the changes in flow to the San Joaquin River under Alternative C range from no change to changes equal to those that occur in Alternative A, and the impact is less than significant.

Impact SW-3: Change in New Melones Storage, Releases and Water Deliveries

Under CEQA, the changes in flow to the San Joaquin River under Alternative C and the resultant changes in New Melones Reservoir storage and releases range from no change to changes equal to those that occur in Alternative A, and no impact would occur to water supplies.

Impact SW-4: Change in Delta CVP/SWP Water Supplies

Under CEQA, the changes in flow to the San Joaquin River under Alternative C and the resultant changes in CVP/CWP Delta water supplies range from no change to changes equal to those that occur in Alternative A, and a less-than-significant impact would occur to water supplies.

Alternative D

Alternative D expands upon the Alternative C setting (130,000 acre-feet) with an additional 20,000 acre-feet developed from conservation measures not already considered in the other alternatives. These additional measures include the reduction of deep percolation by decreasing applied water by using micro and micro/sprinkler technology, or a reduction in seepage from canals to deep percolation. Alternative D represents the maximum level of water transfer of all the alternatives.

This alternative would develop 130,000 acre-feet of water similarly to Alternative C plus a new increment of conserved water (20,000 acre-feet) that would be derived from water that has historically deep percolated below the root zone from on-farm applications of water or from canal seepage. This water is not currently recovered by well pumping within the Exchange Contractors' boundaries nor is it presently collected and recirculated within the Exchange Contractors' service area within the other conservation programs. This water does not affect the San Joaquin River via subsurface flow.

Varying the groundwater aquifer storage in the Exchange Contractors' service area by reducing the amount of deep percolation would not alter San Joaquin River hydrology. The only effect on San Joaquin River hydrology, New Melones Reservoir operations and Delta water supply would be associated with the additional increment of temporary land fallowing component (compared to existing or No Action/No Project Alternative conditions). The effects would be the same as described for Alternative A, Alternative B and Alternative C. These effects occur as an increment of irrigated acreage is reduced due to land fallowing and then less tailwater runoff occurs.

Impact SW-1: Water Quality Standards at Vernalis

Under CEQA, the changes in water quality of the San Joaquin River under Alternative D range from no change to changes equal to those that occur in Alternative A, and no impact would occur.

Impact SW-2: Flow Standards at Vernalis

Under CEQA, the changes in flow to the San Joaquin River under Alternative D range from no change to changes equal to those that occur in Alternative A, and the impact on factors affecting flow at Vernalis is less than significant.

Impact SW-3: Change in New Melones Storage, Releases and Water Deliveries

Under CEQA, the changes in flow to the San Joaquin River under Alternative D and the resultant changes in New Melones Reservoir storage and releases range from no change to changes equal to those that occur in Alternative A, and no impact would occur to water supplies.

Impact SW-4: Change in Delta CVP/SWP Water Supplies

Under CEQA, the changes in flow to the San Joaquin River under Alternative D and the resultant changes in CVP/CWP Delta water supplies range from no change to changes equal to those that occur in Alternative A, and a less-than-significant impact would occur to water supplies.

4.2.3 Cumulative Effects

The cumulative impact analysis examines the incremental impact of the Proposed Program when added to other related past and reasonably foreseeable future projects to determine if individually minor effects could add up to a significant cumulative effect.

The Proposed Program would occur in an environment where other changes to the movement of water in the San Joaquin Valley will also be occurring.

- Small water transfers between water districts are not an issue for surface water quality and flows in the San Joaquin River because they do not involve new conveyance or CVP/SWP contract amendments. Limited water supplies are transferred in small amounts (usually less than 20,000 acre-feet) among districts to make best use of available supplies in water years when full contract deliveries cannot be made.
- The Grassland Bypass Project is being extended to 2019 to allow more time for treatment of agricultural drainage with reductions in direct discharges to the San Luis Drain, which empties into Mud Slough North, over the period 2010 to 2019. This water has poor quality but both the volume of the discharge and the selenium loads and salts are reduced and subsequently eliminated by December 31, 2019. This elimination will have the effect of improving water quality of water at Vernalis but also reducing the flows. Existing flow of 6 cfs during some months of the year would be substantially eliminated by the end of 2019.
- Substantial releases of high quality water from Millerton Lake under the SJRRP have begun. Interim flows began October 1, 2009, with releases ranging from 350 cfs to 1,600 cfs, with a maximum flow of 1,300 cfs reaching the Chowchilla Bifurcation Structure. Flows continued into 2010 (for water year 2011) and are planned to continue until full restoration flows can be implemented. Full restoration flows would range from 117,000 to 674,000 AF annually based on water year hydrology. Recirculation of some of these flows from westside to

eastside Friant Division districts is planned, which would affect CVP and joint CVP/SWP operations.

- Other potential water conservation projects are of smaller scale than the Grassland Bypass Project. At this time, the North Grasslands Water Conservation and Water Quality Control Project is under study. Quantities of water involved as well as impacts to the San Joaquin River are unknown.

The cumulative effects of this Proposed Program with the reasonably foreseeable plans and projects are not significant. The volumes of water described in the model simulations that could result from changing the return flows to the San Joaquin River are small relative to the total water moving through the south-of-Delta CVP system (both with and without the substantial flows under the SJRRP). These incremental small effects are not sufficient to trigger a cumulative impact to San Joaquin River water quality and flows at Vernalis or to storage in New Melones or CVP/SWP water supplies. All future projects will have to operate such that they do not cause a violation of flow or water quality standards at Vernalis, or reduce available water supplies to CVP and SWP water users.

4.2.4 Impact and Mitigation Summary

Table 4-18 presents a summary of the impacts and effects of No Action/No Project and Alternatives A through D compared to existing conditions for CEQA impacts. No potentially significant impacts occur under CEQA.

The beneficial effects to San Joaquin River conditions identified under No Action/No Project are associated with the superposition of SJRRP flows alone compared to the results of modeled existing conditions. **Any change identified in the No Action/No Project Alternative is substantially due to the effects of the SJRRP flow assumptions.** The magnitude of SJRRP flows overwhelms the separate effect of the other components of No Action/No Project including the “no temporary fallowing” assumption associated with no transfer program. However, the effect of removing the temporary land fallowing would be an increase in tailwater return flows from the lands that have been assumed to be fallowed. The estimated difference in San Joaquin River conditions due to this “no fallowing for transfer” adjustment would be minimal. The temporary land fallowing assumed in the existing conditions is only 8,000 acre-feet, with 5,000 acre-feet not in hydrologic connectivity with the San Joaquin River. Using the same calculation protocols used for estimating the incremental loss of tailwater return flows from the action of increasing fallowing, a reduction of an annual 3,000 acre-feet due to fallowing would result in about 1 cfs of increased tailwater flow in a month. In the absence of the SJRRP flows, this 1 cfs effect is so small as to be practically “no effect” or “no impact” to the flows to the San Joaquin River and Delta.

Table 4-18
Summary Comparison of Surface Water Impacts of Alternatives and Mitigation Measures

Environmental Concern		Alternative	Impact Before Mitigation	Mitigation Measures	After Mitigation	
					Impact	Effect
Surface Water						
SW-1	Water Quality Standards at Vernalis	No Action	N	not applicable	–	–
		A	N	not required	–	–
		B	N	not required	–	–
		C	N	not required	–	–
		D	N	not required	–	–
		Cumulative	N	not required	–	–
SW-2	Flow Standards at Vernalis	No Action	N	not applicable	–	–
		A	LTS	not required	–	–
		B	LTS	not required	–	–
		C	LTS	not required	–	–
		D	LTS	not required	–	–
		Cumulative	N	not required	–	–
SW-3	Change in New Melones Storage, Releases, and Water Deliveries	No Action	N	not applicable	–	–
		A	N	not required	–	–
		B	N	not required	–	–
		C	N	not required	–	–
		D	N	not required	–	–
		Cumulative	N	not required	–	–
SW-4	Changes in Delta CVP/SWP Water Supplies	No Action	N	not applicable	–	–
		A	LTS	not required	–	–
		B	LTS	not required	–	–
		C	LTS	not required	–	–
		D	LTS	not required	–	–
		Cumulative	N	not required	–	–

CEQA:
N = no impact
LTS = less than significant
PS = potentially significant
PSU = potentially significant and unavoidable

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5.0 Groundwater Resources

This section discusses the groundwater resources that could be affected by the development of water for transfer and/or exchange under the proposed 25-Year Water Transfer Program (Proposed Program).

5.1 Affected Environment/Environmental Setting

The focus of this section is on existing conditions of groundwater resources within the Exchange Contractors' service area where the water is being developed for transfer from conservation measures and temporary land fallowing. However, it also provides the regional context for these groundwater conditions.

5.1.1 Groundwater Resources

Information on groundwater conditions is taken substantially from *Groundwater Conditions and Water Transfers in the Exchange Contractors' Service Area West of the San Joaquin River* by Kenneth D. Schmidt and Associates (KDSA), included as Appendix D. Appendix D relies on an earlier report prepared by KDSA for CCID in 1997 (KDSA 1997a). This information from KDSA is supplemented with material taken from Appendix B, San Joaquin River Exchange Contractors Water Authority 25-Year Water Transfer Program Water Resources Analysis, by Daniel Steiner.

Regional Setting

The San Joaquin River Hydrologic Region contains two entire groundwater basins and part of the San Joaquin Valley Groundwater Basin, which continues south into the Tulare Lake Hydrologic Region. The San Joaquin Valley Groundwater Basin is divided into nine subbasins in this region. The region is heavily groundwater reliant. Within the region, groundwater accounts for about 30 percent of the annual supply used for agricultural and urban purposes. Groundwater use in the region accounts for about 18 percent of statewide groundwater use for agricultural and urban needs (DWR 2003).

Groundwater resources in the San Joaquin Valley are associated with the San Joaquin Valley Regional Groundwater Basin, a subunit of the Central Valley Groundwater Basin. This regional groundwater basin is the largest in California and extends approximately from the Delta south to Bakersfield. Much of the western portion of the valley is underlain by the Corcoran Clay, which generally lies at depths between 100 and 400 feet below the surface. The Corcoran Clay divides the basin sediments into unconfined to semiconfined (above the Corcoran Clay) and confined (below the Corcoran Clay) aquifers. Other local clay layers are present above the Corcoran Clay and have local impacts on groundwater conditions. Under predevelopment conditions, groundwater flow in the San Joaquin Valley was from the foothills of the Coast Ranges and Sierra Nevada toward the trough of the valley (the topographic low). Extensive groundwater development in the central and southern portion of the valley, however, has modified the natural flow pattern and created cones of depressions in major pumping areas.

As explained in Appendix D, the Corcoran Clay is a regional, laterally extensive, confining bed beneath much of the western side of the San Joaquin Valley. Regionally, this clay has been used to separate an upper aquifer from an underlying lower aquifer.

Water-level maps have been prepared for both aquifers. In general, groundwater in the upper aquifer in the southern part of the area flows from the Exchange Contractors' service area west of the San Joaquin River into Madera County. North of Highway 152, groundwater in the upper aquifer usually flows toward the San Joaquin River. Some of this groundwater is consumed by evapotranspiration, and the remainder contributes to streamflow in the river.

The direction of groundwater flow is generally downward from the upper aquifer to the lower aquifer, except near the northern end of the CCID service area. Groundwater in the lower aquifer south of Highway 152 flows to the south or southwest, and out of the Exchange Contractors' service area. In much of the area north of Highway 152, groundwater in the lower aquifer moves upward and toward the San Joaquin River.

Groundwater pumping in the San Joaquin Valley varies seasonally, and most groundwater is withdrawn during the spring-summer growing season. Although groundwater in the lower aquifer is widely tapped in the PWD, WWD, and in the western part of Madera County, little pumpage from this aquifer occurs in the Exchange Contractors' service area west of the San Joaquin River. Thus, most of the pumpage in this service area is from the upper aquifer.

Land subsidence in the region has resulted from excessive pumpage of groundwater from the lower aquifer. As explained in Appendix D, the land surface can subside when water levels in confined aquifers decline and interbedded fine-grained confining beds are compacted. Subsidence begins when the water surface in the aquifer falls below a certain threshold level. The rate of subsidence depends on how far water levels fall below that level, how long they remain there, and the characteristics of the sediments. Grain size, sorting, and the clay mineral type are the most important sediment characteristics. Observations in the San Joaquin Valley indicate that subsidence began when water levels dropped more than about 100 feet below the earliest measured levels. Water-level declines in excess of 100 feet began in the 1940s, when pumpage increased significantly from deep wells tapping the lower aquifer.

The U.S. Geological Survey measured subsidence in the part of the service areas south of Los Banos between 1926 and 1972. Subsidence ranged from 1 to 12 feet in the part of the area south of Los Banos. Since 1972, much less information is available on land subsidence in most of the area than for the previous decades. Even though little pumpage from the lower aquifer has occurred in the Exchange Contractors' service area, subsidence has occurred due to lower aquifer pumpage in adjoining areas (Appendix D).

Subsidence has generally been monitored along major canals and along Highway 152. In addition, compaction and land subsidence have been monitored at three compaction recorders. One is near Russell Avenue and the DMC and the other two are near Mendota.

The western San Joaquin Valley region has drainage problems caused partly by shallow clay layers of low permeability that limit downward flow of deep percolation. Areas with little groundwater pumping for irrigation because of poor water quality or other factors are prone to being drainage problem areas. In addition, elevated concentrations of salinity, selenium, and boron exist in the shallow groundwater due to leaching from soils and alluvium that are derived from the Coast Range and from accumulated salts in the root zones of irrigated cropland.

East of the San Joaquin River, the valley is underlain by deposits from the Sierra Nevada. The shallow groundwater generally is of low salinity, and water levels are deeper.

Concerning groundwater quality, Appendix D describes the upper aquifer and the lower aquifer as follows:

- In the upper aquifer, bicarbonate-type groundwater is predominant where recharge has been from the intermittent streams with the largest drainage basins, namely, Del Puerto, Orestimba, San Luis, and Los Banos creeks. The total dissolved solids (TDS) concentrations in groundwater of the bicarbonate type often ranged from about 400 to 600 milligrams per liter (mg/L), and increased in the downgradient direction, from west to east. However, better quality groundwater is present in the upper aquifer to the east, where recharge from the San Joaquin River and Mendota Pool are significant. The central and southern parts of the Exchange Contractors' service area have areas of sulfate-type groundwater. Part of the Grassland Water District, east of Gustine and around Dos Palos, is underlain by a chloride-type groundwater. Sodium chloride type groundwater extends from near Mendota northward to Dos Palos.
- Transitional types of water (bicarbonate-sulfate and sulfate-bicarbonate) exist, such as near Gustine, and they represent mixtures of water from various sources. In the vicinity of Los Banos, most of the transitional type groundwater is sulfate-chloride and bicarbonate-sulfate, but near the San Joaquin River it is chloride-bicarbonate in type. The TDS concentrations in the transitional type groundwater range from about 400 to 4,200 mg/L.
- The chemical quality of the groundwater in the lower aquifer in the area is less well known than that of the upper aquifer. In general, for the area north of Los Banos and much of the western part of the rest of the CCID, TDS concentrations in groundwater below the Corcoran Clay are less than those in groundwater above the Corcoran Clay. However, experience in Dos Palos, Los Banos, the SLCC service area, Firebaugh, and Mendota indicates that higher TDS groundwater is present below the Corcoran Clay near the San Joaquin River. High concentrations of hydrogen sulfide, iron, and manganese are present in groundwater of the lower

aquifer in some areas, particularly where reducing conditions[1] are present (KDSA 1997a).

Exchange Contractors' Service Area

Subsurface Geologic Conditions

The Corcoran Clay lies beneath the entire CCID, except for a small area near Cottonwood Road and CCID's western boundary. The shallowest depth to the top of the clay is about 50 feet near Santa Nella. North of Fresno County, the clay is deepest near Newman, Gustine, and Los Banos, where the top is more than 250 feet deep. The top of the Corcoran Clay is commonly about 200 feet near the San Joaquin River in the area north of Fresno County. The top of the clay deepens to the south in the area, and ranges from about 400 to 450 feet deep near Mendota. In most of Fresno County, the top of the clay is generally deeper to the south and west, and the depths are the greatest in the service area. The Corcoran Clay is less than 20 feet thick in the area northwest of Newman and over 80 feet thick northeast of Newman. The Corcoran Clay is thickest in two areas. Northwest of Volta and south of Dos Palos, near the DMC, the clay is more than 120 feet thick. The clay averages about 60 feet thick near Mendota and much of the San Joaquin River.

Water Levels

Appendix D discusses the direction of groundwater flow, long-term water-level trends, and groundwater overdraft. In the upper aquifer for Spring 2006, groundwater was moving into the service area from the west. In Spring 2006 a groundwater divide existed east of Dos Palos. South of Highway 152, groundwater was flowing northeast and into Madera County. North of Highway 152, groundwater was moving northerly and toward the San Joaquin River from both sides of the river.

Water-level fluctuations in confined aquifers are generally much greater than those in unconfined aquifers. Based on water-level depths and fluctuations shown on the hydrographs, the lower aquifer appears to be confined throughout the Exchange Contractors' service area. Although the upper aquifer is apparently unconfined over much of the study area, some local confinement occurs. One example is near Mendota, where fine-grained flood-basin deposits (the A-clay) are present at shallow depth. In this area, deposits between about 100 and 250 feet in depth are normally confined, whereas the top of the Corcoran Clay is about 450 feet deep or well below these deposits. The confinement in the upper aquifer is indicated to be most pronounced near the trough of the valley, where shallow confining layers are more common, and to the south, where the Corcoran Clay is generally deeper. West of the San Joaquin River, the predominant trend in this portion of the Exchange Contractors' service area is a long-term constancy of water levels. No long-term groundwater overdraft is indicated for the upper or lower aquifers (Appendix D).

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[1] Reduction/oxidation processes affect the chemical quality of groundwater in all aquifers.

As explained in Appendix B, groundwater pumpage for the existing Program has been identified. Prior to and since 2000, groundwater has provided, in varying amounts, a supplemental supply for the Exchange Contractors. Groundwater is not a direct source of transfer supply. Instead, it is part of the Exchange Contractors' total supply and is used to meet both capacity and quantity demands. Table 5-1 shows historical groundwater pumpage by the Exchange Contractors since 1997, which includes all water pumped from wells owned by the members and managed under their Assembly Bill (AB) 3030 plans. The values below do not include groundwater pumping from private wells in the service area or from adjoining areas.

Table 5-1
Groundwater Pumping by Exchange Contractors, 1997–2010

Year	TAF	Year	TAF	Year	TAF
1997	34,935	2002	68,237	2007	98,372
1998	1,133	2003	59,405	2008	70,703
1999	36,671	2004	74,482	2009	70,798
2000	63,130	2005	32,539	2010	25,122
2001	65,383	2006	9,624		

TAF = total acre-feet

Lateral Groundwater Flow

The total lateral groundwater outflow from the upper aquifer in the Exchange Contractors' service area was 96,000 AFY as of Spring 2006. This value was 19,000 AFY less than the value (115,000 AFY) previously calculated (in 1997) for normal conditions. For 2006 conditions, it was estimated the lateral outflow exceeded the lateral inflow by 21,000 AFY, which was 15,000 AFY less than that estimated previously for normal conditions (Appendix D).

KDSA calculated the amount of groundwater moving to the northeast in the upper aquifer out of the Exchange Contractors' service area under normal conditions. For the area south of Highway 152, this amount was about 72,000 AFY (Appendix D).

Land Subsidence

Since 1972, much less information is available on land subsidence than for the previous decades. Some information is available for the settling of some canals and other features. The DMC and Outside Canal have required extensive repairs due to subsidence, and the repair or replacement of Mendota Dam is being considered. Up to 12 feet of subsidence were recorded by 1972 along some parts of the Outside Canal, and an additional 2 feet were reported by 1994. Subsidence along the DMC was the greatest near Russell Avenue, where a number of lower aquifer wells are present. Since 1975, compaction and subsidence rates have been relatively small except during drought periods. Compaction rates decreased after deliveries from the San Luis Canal/California Aqueduct began in

1968 as pumpage for water supply was subsequently reduced. Compaction rates increased during the 1976–77 droughts, the 1987–92 droughts, and the recent drought. Near Russell Avenue, 93 percent of the measured compaction during 1958–1982 was in strata below the top of the Corcoran Clay (Appendix D).

Pumping from the lower aquifer in the Crows Landing-Newman area could explain subsidence in the area, but no specific subsidence monitoring programs have been in effect in this area, except for canal surveys. The partial submergence of Anderson Road Bridge over the Main Canal indicates at least a foot of subsidence just south of Orestimba Creek (Appendix D).

Groundwater Quality

Because the DMC water has been the substantial source used by the Exchange Contractors for irrigation for decades, the quality of this water has influenced groundwater quality in the upper aquifer throughout the Exchange Contractors' service area. In Table 5-2, DMC water has the following electrical conductivity (EC), which is a measure of salts present (i.e., the conversion from EC to TDS is about x0.69 for this water) for the period 2000–2010 at Check 21 (where DMC water is released to Mendota Pool).

Table 5-2
Check 21 Average Monthly Electrical Conductivity

DMC Check 21 Water Quality EC - micromhos/cm at 25°C												
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
2000	493	553	540	609	573	496	440	461	399	332	335	378
2001	492	529	631	726	640	618	588	491	445	364	505	640
2002	598	575	615	630	590	621	517	469	435	333	465	580
2003	600	569	645	623	560	588	487	481	303	253	357	366
2004	513	551	566	556	551	544	469	468	438	365	379	475
2005	537	540	737	620	588	472	454	521	268	323	366	410
2006	373	518	543	519	490	491	615	683	532	324	334	326
2007	316	380	510	399	599	530	484	458	472	350	466	563
2008	507	533	582	705	595	646	558	543	559	413	518	610
2009	509	493	790	899	875	700	590	567	583	336	473	558
2010	551	521	617	792	715	618	707	484	332	288	354	480

Source: USBR CVO Records. Available at http://www.usbr.gov/mp/cvo/

The districts maintain standards for wells or drainage relifts pumping into the canal distribution systems. In CCID for example, the standards are well head or relift specific and must also meet a water quality in the canal of 700 EC and no selenium sufficient to increase canal concentrations above user requirements.

Electrical conductivities ranging from 700 to 3,000 micromhos per centimeter (micromhos/cm) cause a slight to moderate restriction in irrigation practices. Conductivities exceeding 3,000 micromhos/cm severely restrict irrigation of most crops (Appendix D).

Appendix D reports that for the upper aquifer, groundwater with EC levels of less than 1,200 µmhos/cm at 25°C was present in areas recharged by the larger westside streams, from Los Banos Creek to near Crows Landing. Relatively low EC levels were also found along the eastern side of the area near the San Joaquin River, from south of Highway 152 to near Mendota.

Intermediate electrical conductivities (1,200 to 1,800 micromhos/cm) were associated with the smaller westside drainages and in an area adjacent to the area of low EC groundwater near the San Joaquin River (Appendix D).

Electrical conductivities greater than 1,800 micromhos/cm were in the following areas: (1) areas recharged by creeks south of Los Banos Creek, (2) an area of poor quality groundwater southwest of Mendota, (3) at the downslope ends of westside alluvial fans in T8S/R9E and T9S/R9E, and (4) in an area northeast of Los Banos. These higher EC levels were probably caused by historical evaporation of shallow groundwater in those areas (Appendix D). Groundwater quality issues within the Exchange Contractors' service area occur mainly in or near urban areas. In general, concentrations of inorganic chemicals in water from the City of Los Banos wells have been below the maximum contaminant levels. Arsenic concentrations in water from the city well have caused it to be on standby. However, the new MCL proposed to be developed for hexavalent chromium appears to be a considerable problem. In the City of Gustine, groundwater quality has been suitable for public supply. High-salinity groundwater is present northeast of Gustine. Shallow drainage wells in the upper aquifer near Gustine indicate high nitrate, boron, chloride, and TDS concentrations. In the City of Newman, groundwater quality has generally been suitable for public supply, but high nitrates are of concern. A high-salinity area was noted northeast of Newman, and iron has been found to exceed the maximum contaminant level in two northeasternmost wells. High nitrate concentrations have been found in some well samples north and northwest of Newman and between Newman and Gustine. High iron and manganese concentrations have been detected in groundwater samples collected from wells in Firebaugh and Mendota. Groundwater in these communities is treated to remove iron and manganese. The City of Dos Palos developed a surface-water supply due to poor upper and lower aquifer groundwater quality. The Exchange Contractors also report that localized areas west and southwest of their boundaries contain poor-quality groundwater (KDSA 1997b).

Studies by the U.S. Geological Survey have identified high concentrations of the following inorganic chemicals in shallow groundwater that were associated with agricultural drainage: TDS, selenium, boron, nitrate, molybdenum, and several other trace metals (Deverel et al 1984). At present these constituents are of most concern in terms of the handling and/or reuse of agricultural drainwater. In general, these constituents were present in Coast Range (westside) alluvial fan deposits and were leached to shallow groundwater from irrigation deep percolation. In their AB 3030 plan, the Exchange Contractors have committed to a program of sampling every 5 years to monitor potential changes in water quality (Exchange Contractors 2008).

Appendix D concludes that the northeasterly migration of high-salinity groundwater in the upper aquifer is due to the increased northeasterly water level slope, which has been partly caused by water level declines in western Madera County, particularly in irrigated areas without surface water supplies. It is also affected by the combination of a lack of drainage for San Luis Unit lands and rising groundwater levels in those areas.

EC levels in water from CCID wells in the Mendota-Firebaugh area have generally increased since 1959. Rates of increase in EC have generally been greater during periods of heavy pumping, compared to periods of little pumpage. More groundwater from west of the wells (upgradient) appears to be pumped in drought periods, and more downward leakage of shallow high TDS groundwater occurs. For the area between Firebaugh and Dos Palos, a similar pattern is evident since 1959 (Appendix D).

For the Los Banos area, historical data for the CCID wells are limited, but no large changes in EC are indicated. For the Gustine-Newman areas, EC levels of water from several wells have increased since 1968, but the increases appear to be less than in the Firebaugh-Mendota area. Part of these increases is likely due to downward flow of poor quality shallow groundwater, particularly when water levels are significantly lowered in the underlying strata.

Surface Water – Groundwater Interaction

In general, the most important sources of groundwater recharge are deep percolation of excess applied irrigation water (including tailwater) and canal seepage. Additional sources are streamflow seepage and groundwater inflow.

As described in the hydrologic analysis in Appendix B, an inefficiency in on-farm water use practice occurs when waters pond at the tail end of fields, accumulate in drainage collection sloughs, or drain to nondistrict lands that do not have an immediate or direct hydraulic connectivity with Mud or Salt sloughs or the San Joaquin River. The effect of reusing this component of tailwater may cause diminishment of deep percolation to groundwater or less water lost to the atmosphere as evaporation and plant transpiration. Concerning diminishment of deep percolation, as described earlier, the upper aquifer of the Exchange Contractors' service area generally is different in the northern and southern areas. In the northern area, groundwater flows towards the river. Most of the groundwater in the southeastern portion of the Exchange Contractors' service area does not flow into the San Joaquin River. Instead, this groundwater largely migrates to the northeast, under the San Joaquin River into Madera County because of the groundwater depression in that area.

Groundwater accretions to the San Joaquin River only appear to begin at a location near Lander Avenue Bridge, and then generally increase as the river proceeds downstream. The State Board's Technical Committee Report estimated the occurrence of accretion flow to the San Joaquin River through an analysis that considered, among other factors, the effect of groundwater water surface elevation adjacent to the river. Results of the analysis indicate the total groundwater accretion to the San Joaquin River below Lander Avenue to Orestimba Creek amounts to an annual average of 13 cfs, inclusive of groundwater accretion and depletion from both sides of the river (Appendix B). This amount is much less than the groundwater flowing towards the river. Because of the shallow depth of groundwater near the river, much of the groundwater is consumed by evapotranspiration.

The soils on most of the western side of the valley are derived from marine sediments and are high in salts and trace elements. Irrigation of these soils has mobilized some of these constituents and facilitated their movement into the shallow groundwater. Since the 1950s, much of this irrigation has been with imported water, resulting in rising groundwater levels and increasing soil salinity. Where agricultural drains have been installed to control rising water tables, drainwater frequently contains high concentrations of salts and trace elements. Most of this drainwater is being managed under the Grassland Bypass Project (see Section 1.3.5). Only a small portion (approximately 28,000 acres) of the Exchange Contractors' service area (240,000 acres) is located within an area experiencing subsurface drainage problems. Both CCID and FCWD are participating in the Grassland Bypass Project (through 2019) to manage agricultural drainage on the portions of their service areas with problem water being generated.

Generally the districts deliver to the growers a blend of surface water, recovered tailwater, and well water for irrigation purposes. The surface water quality standards are set in the Exchange Contract; it is usually the best quality and the major proportion of the blend. The recovered tailwater is generally of better quality than the well water. The districts adhere to water quality standards that are applied at each well head, at each return pump station, and to the canal just downstream of the site. These standards serve to protect both groundwater quality and soil resources to maintain agricultural production on a wide range of crops within the Exchange Contractors' service area.

5.1.2 Regulatory Setting

Groundwater Management Act of 1992 (AB 3030)

The Groundwater Management Act of 1992 (AB 3030) applies to groundwater usage by the Exchange Contractors. This act establishes a voluntary program whereby local water agencies may establish programs for managing their groundwater resources. The Exchange Contractors adopted an initial Groundwater Management Plan in October 1997 (Exchange Contractors 1997) and then revised and adopted an updated plan in April 2008 (Exchange Contractors 2008). The plan commits the Exchange Contractors to keeping records of groundwater pumping and conducting periodic monitoring of groundwater levels and quality throughout their service area.

Fresno County

Fresno County regulates the extraction and transfer of groundwater within the county under Fresno County Ordinance Code, Title 14, Chapter 3. Fresno County and the

Exchange Contractors have a MOU that exempts the Exchange Contractors from regulation of groundwater resources within Fresno County under certain conditions. Fresno County and the Exchange Contractors agree that agricultural production is vital to the county and that groundwater, used conjunctively with surface water, is essential for continued agricultural production. The MOU specifically exempts the Exchange Contractors from newly adopted Fresno County Ordinance Code Title 14, Chapter 3, in accordance with code Section 14.03.05E. Fresno County recognizes that the Exchange Contractors' management, protection, and control of groundwater resources are consistent with Title 14, Chapter 3; therefore, the MOU exempts the Exchange Contractors from this code requirement (Fresno County and Exchange Contractors 2001).

5.2 Environmental Consequences

Key issues for the analysis of the Proposed Program are the potential for impacts/effects to groundwater resources from tailwater recovery and other conservation measures and temporary land fallowing that could affect groundwater recharge and outflows. No proposed groundwater pumping or other direct withdrawals of groundwater are proposed to develop transfer water under the Proposed Program.

5.2.1 Key Impacts and Evaluation Criteria

Because the Proposed Program does not include groundwater substitution, meaning the direct withdrawal of groundwater for internal use to make water available for transfer (as under the existing Program), no effect on land subsidence would occur. Groundwater levels are not an issue because no direct pumping of groundwater for transfer would affect well levels in the Exchange Contractors' service area. Furthermore, the Proposed Program would not change the Exchange Contractors' use of groundwater in quantity or frequency. The issues are focused on effects of the alternatives on groundwater recharge, groundwater flow, and groundwater quality.

The CEQA Guidelines Appendix G section on Hydrology and Water Quality asks whether the project would:

b. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?

f. Otherwise substantially degrade water quality?

Furthermore, the following issues have been raised during public scoping:

- Effects on groundwater and soil salinity
- Effects of applied tailwater with elevated EC levels

To address concerns about potential impacts and their significance on groundwater resources in the Exchange Contractors' service area and vicinity, the following issues are evaluated for the No Action/No Project and the four action alternatives:

- Would significant changes occur to groundwater levels and/or flow patterns in the Exchange Contractors' service area?
- Would the amount of flow of existing poor-quality groundwater from the south and west to the northeast be measurably increased?
- Would the quality of groundwater be substantially degraded?

5.2.2 Environmental Impacts and Mitigation

The analysis of impacts is focused on the two components of water development: conservation and crop idling/temporary land fallowing.

Water conservation refers to the practice of recovering applied irrigation water after it drains from a field and before it leaves the Exchange Contractors' service area. For this analysis, conserved water is the sum of four components: evaporation and seepage, reduction of runoff spills to nondistrict lands, recovery of tailwater discharge to Mud and Salt sloughs, and water recovered upstream of Sack Dam (Appendix B). Of them, the evaporation and seepage to groundwater from tailwater and reduction of runoff spills are considered to be potential sources of recharge to groundwater. Evaporation and seepage refers to water that ponds in the low ends of fields after being applied to crops. Some of this tailwater evaporates, some is consumptively used by vegetation other than crops, and the rest infiltrates to the groundwater basin.

Crop idling/temporary land fallowing would reduce the amount of water applied to acreage within the Exchange Contractors' service area. Some of this water would have been lost to evaporation and consumptive use by crops, and some would have been recovered as tailwater; the balance would have contributed to groundwater recharge. Thus, a potential exists for reduced groundwater recharge due to crop idling. The maximum volume of water that would be made available through land fallowing is 50,000 acre-feet annually, which translates to approximately 20,000 acres fallowed (at an average of 2.5 acre-feet of consumptive use per acre). Based on the California Polytechnic University at San Luis Obispo water budget adopted by the Exchange Contractors, each acre of irrigated farmland generates approximately 0.5 acre-foot of deep percolation.

For both NEPA and CEQA analyses contained herein, the baseline for determining the severity or significance of impacts is existing conditions. Existing conditions include the 2005-2014 Water Transfer Program, which has developed water from groundwater substitution as shown in Appendix B, Table 3. Appendix B, Table 3 also indicates the following for 2009 and 2010:

- 14,300 acre-feet of water developed from evaporation/seepage to groundwater
- 13,300 acre-feet from reductions in spills to on-district lands

- 8,100 acre-feet in 2009 and 4,700 acre-feet in 2010 from temporary land fallowing

For the water conservation measures affecting groundwater recharge, a small portion of the 27,600 AFY would represent actual groundwater recharge. The incremental decrease in groundwater recharge (deep percolation) from the crop idling of 3,240 acres in 2009 was 1,620 acre-feet; for 1,880 acres in 2010 it was a decrease of 940 acre-feet (based on the average annual consumptive use of 2.5 acre-feet of applied water per acre and 0.5 acre-foot per acre of deep percolation).

For the hydrologic analysis in Appendix B, the “included in existing conditions” baseline for developed water (Table 20) assumes the following:

- 15,000 acre-feet for reductions in evaporation and seepage to groundwater
- 14,000 acre-feet for reductions in spills to nondistrict lands
- 8,000 acre-feet for temporary land fallowing

No Action/No Project

Under No Action/No Project, the Exchange Contractors would continue to operate their tailwater recapture facilities to the extent previously used, integrate the recaptured water into their water supply, and reduce deep well groundwater pumping that currently helps meet irrigation demands.

Impact GW-1: Groundwater Balance

Water development by the Exchange Contractors from conservation and tailwater recapture programs is less expensive than groundwater pumping. Therefore, the Exchange Contractors would continue to utilize their facilities to the extent previously used under the existing Program. Recovered tailwater would be integrated into the Exchange Contractors’ water supply. Groundwater inflows and outflows would remain the same when compared to existing conditions.

In the absence of the existing Program and with no new Program, water would not be developed from temporary land fallowing. Groundwater pumping of the past would continue in the future for internal use, not for any groundwater substitution. A reduction of 3,200 acres of fallowing (8,000 acre-feet applied water/2.5 acre-feet per acre consumptive use) would occur with an associated 1,600 acre-feet of deep percolation (0.5 acre-foot per irrigated acre), resulting in a small increase in groundwater recharge (direct effect). This groundwater recharge of 1,600 AFY would contribute to the outflow of poor quality groundwater towards Madera County (indirect effect). The small increase in groundwater recharge from deep percolation would have a less-than-significant impact to groundwater outflows under CEQA.

Impact GW-2: Groundwater Quality

The concern is whether the continued application of up to 80,000 acre-feet of conservation and recovered tailwater on District lands under No Action/No Project would degrade groundwater quality in the upper aquifer beneath the Exchange Contractors' service area (direct effect) or affect outflows of existing poor quality groundwater to the northeast (indirect effect). Appendix B, Table 24 presents the water quality associated with tailwater based on the quality of flows at Sand Dam and Boundary Drain. The tailwater is mixed with water from other sources (mostly surface water and some groundwater) such that it would not affect the productivity of the affected lands or result in substantial degradation of the upper aquifer, which is used by the Exchange Contractors as part of their water supply (as shown in Table 5-1). The recovered tailwater is generally of better quality than the groundwater used in the same area under existing conditions. Under CEQA, a less-than-significant impact to groundwater quality would occur from the reuse of tailwater within the Exchange Contractors' service area.

Alternative A: 50,000 Acre-Feet

Up to 50,000 AFY of water would be developed entirely from temporary land fallowing. No conservation to make water available for transfer would occur, but conservation water would be used internally with less reliance on groundwater pumping for water supply.

Impact GW-1: Groundwater Balance

Existing conditions include 8,000 AFY that is made available for transfer due to temporary land fallowing. Of the additional 42,000 AFY of water to be developed from temporary land fallowing under Alternative A, potentially 500 AFY would originate in the FCWD (added to the 5,000 acre-feet that is not connected hydrologically to the river), and the remaining 41,500 AFY would be developed from lands assumed to be hydrologically connected to the river (added to the 3,000 acre-feet). The additional 42,000 AFY of water from crop idling would result in 16,800 acres fallowed and 8,400 AFY of reductions in deep percolation. Half of this acreage (8,400 acres) could be located in the upstream area (south of Highway 152), which could result in a reduction in deep percolation to groundwater of 4,200 AFY. In effect, Alternative A would decrease groundwater outflow to the northeast and into Madera County by about 4,200 AFY. Because of the poor quality (high TDS concentrations) of most of this groundwater, this reduction in outflow is not considered a substantial impact or adverse effect but rather a beneficial effect. The remaining 4,200 AFY of reduction in deep percolation also reduces the amount of poor quality groundwater that would have flowed north and been consumed by evapotranspiration or contributed to streamflow. The reduction in deep percolation would result in no impact to groundwater under CEQA.

Impact GW-2: Groundwater Quality

The focus of this impact is on groundwater quality within the Exchange Contractors' service area. Assuming maximum development of water from temporary land fallowing, the reduction in deep percolation to groundwater of 8,400 acre-feet would not substantially reduce groundwater quality, which is already high in TDS concentrations in some portions of the Program area. Under CEQA, the impact to existing poor quality groundwater is less than significant. To the extent that the temporary land fallowing would occur on portions of the Exchange Contractors' service area with poor quality agricultural drainage being managed under the Grassland Bypass Project (i.e., within the Grassland Drainage Area), the temporary cessation of irrigation would result in a temporary reduction in the production of problem drainwater and a reduction in drainage requiring treatment at the San Joaquin River Valley Quality Improvement Project managed by the Grassland Area Farmers.

Alternative B: 88,000 Acre-Feet

Up to 88,000 AFY of water would be developed through a combination of conservation and temporary land fallowing. This alternative could involve a range of 8,000 to 50,000 AFY of water developed from temporary land fallowing. The remaining water (38,000 to 80,000 acre-feet) would be from tailwater recycling and recapture that would not influence groundwater. In terms of the impacts to groundwater, this alternative would be similar to No Action/No Project (and existing conditions) for the conservation component (i.e., no change). For the land fallowing component, Alternative B would be no different than Alternative A, if the maximum amount of land fallowing occurred (8,400 acre-feet of total reduced deep percolation, 4, 200 acre-feet in the upstream area). If the minimum amount of land fallowing occurred, then only 1,600 acre-feet of reduced recharge would occur (similar to existing conditions).

Impact GW-1: Groundwater Balance

The maximum conservation/tailwater recovery component would be similar to No Action/No Project and result in no change to groundwater inflows/outflows. If less than 80,000 acre-feet of conservation water is developed for transfer, then the Exchange Contractors would develop water for internal use to replace reliance on groundwater. Should water developed from temporary land fallowing be greater than the 8,000 acre-feet developed at present (and a reduction in recharge and outflow of 1,600 acre-feet), then the effect ranges from no effect/no impact to approaching the beneficial effects (4,200 acre-foot reduction in outflow to the northeast) identified under Alternative A. Under CEQA, no impact to groundwater would occur.

Impact GW-2: Groundwater Quality

As with No Action/No Project, up to 80,000 acre-feet of tailwater is mixed with water from other sources such that it has not affected the productivity of the affected lands or resulted in degradation of the upper aquifer, which is used by the Exchange Contractors as part of their water supply (as shown in Table 5-1). As with Alternative A, assuming maximum development of water from temporary land fallowing (50,000 acre-feet), the reduction in deep percolation to groundwater of 8,400 acre-feet overall, would not substantially degrade groundwater quality; and under CEQA, the impact to groundwater quality would be less than significant.

Alternative C: 130,000 Acre-Feet

Up to 130,000 AFY of water would be developed: up to 50,000 AFY would be from temporary land fallowing and up to 80,000 AFY from conservation, including tailwater recapture. The analysis focuses on the maximum development of water from each component. Under the maximum amount of land fallowing, the total reduction in deep percolation is 8,400 AFY.

Impact GW-1: Groundwater Balance

The maximum conservation/tailwater recovery component would be similar to No Action/No Project and result in no change to groundwater levels and inflows/outflows. For impacts to groundwater from the maximum temporary land fallowing, this alternative would be the same as Alternative A (i.e., would decrease the flow of poor quality groundwater to the northeast into Madera County by about 4,200 AFY). Under CEQA, no impact to groundwater would occur.

Impact GW-2: Groundwater Quality

As with Alternative B, up to 80,000 acre-feet of tailwater would be mixed with water from other sources (mostly surface water) such that it has not affected the productivity of the affected lands or resulted in substantial degradation of the upper aquifer, which is used by the Exchange Contractors as part of their water supply. As with Alternative A, assuming maximum development of water from temporary land fallowing (50,000 acre-feet), the reduction in deep percolation to groundwater of 8,400 acre-feet would not substantially degrade groundwater quality. Under CEQA, the impact to groundwater quality would be less than significant.

Alternative D: 150,000 Acre-Feet

Up to 130,000 AFY of water would be developed as identified under Alternative C. However, an additional 20,000 AFY of this water would be conserved by additional reductions in irrigation applications and a subsequent decrease in deep percolation of this amount of water, which is of better quality than the existing groundwater. This alternative would result in a total reduction in groundwater recharge of up to 28,400 AFY (i.e., 20,000 AFY plus 8,400 AFY). This would result in a reduction of outflow to the northeast of up to 50 percent or 14,200 AFY in the area upstream (south) of Highway 152. The remaining reduction in deep percolation of 14,200 acre-feet would reduce outflow of poor quality groundwater toward the San Joaquin River that would have been consumed by evapotranspiration or become streamflow.

KDSA calculated the amount of groundwater moving to the northeast out of the Exchange Contractors' service area under normal conditions, which captures the greatest potential impact or effect. For the area south of Highway 152, this amount was about 72,000 AFY (Appendix D). Thus Alternative D would reduce the normal quantity of poor quality groundwater outflow to the northeast by about 20 percent over time.

Impact GW-1: Groundwater Balance

Reductions in deep percolation and groundwater outflow to the north and northeast of up to 28,400 AFY would be larger than with Alternatives A, B, and C due to the source of the additional conservation water. This reduction in recharge would be substantial. However, because this reduction also reduces over time the outflow of poor quality groundwater to the north and northeast, the overall effect is beneficial. Under CEQA, there would be no impact to groundwater balance between inflow and outflow.

Impact GW-2: Groundwater Quality

Within the Exchange Contractors' service area, the issue is whether the reduction in deep percolation to groundwater of up to 28,400 acre-feet of conserved/fallowing water would substantially affect groundwater quality. In general, this applied water would be of better chemical quality than existing groundwater. However, the reduction in applied water is not enough to substantially affect water quality in the upper part of the upper aquifer because of the size of the aquifer. For example, assuming most of the land fallowing and water conservation activity occurred in an area from Mendota to Highway 152, about 120,000 acres would be involved (or about half of the Exchange Contractors' service area). Assuming 180 feet of saturation (within the upper 200 feet of the aquifer) and 12 percent specific yield, the volume of water in the upper aquifer under the 120,000 acres would be 2,600,000 acre-feet. The reduction in deep percolation of 28,400 acre-feet of better quality water would not substantially degrade the quality of groundwater in the upper portion of the upper aquifer. Under CEQA, the impact to existing poor quality groundwater would be less than significant.

5.2.3 Cumulative Effects

Other groundwater pumping projects have been approved in the Program area and vicinity. The Exchange Contractors have two members (FCWD and CCID) who engage in a long-term water transfer project involving groundwater pumping, conservation other than tailwater recovery, and potentially temporary land fallowing to make up to 20,000 AFY of substitute water available for transfer and to manage drainwater production and control shallow groundwater levels (Reclamation and Exchange Contractors 2007). Other long-term projects in the Program area and vicinity to manage shallow groundwater levels include the San Luis Drainage Feature Re-evaluation (SLDFR) which includes the Grassland Bypass Project for the Northerly Area (Reclamation 2007a). Furthermore, Reclamation participates in annual water exchange agreements of up to 25,000 AFY for the period 2005-2015 with the Mendota Pool Group wherein groundwater is pumped from non-CVP deep and shallow wells located adjacent to the Mendota Pool into the Mendota Pool to make up for the annual shortfall in the contract water to be delivered via the CVP. Both CCID and FCWD engaged on a one-year transfer in 2010 of up to 20,500 acre-feet and 5,000 acre-feet, respectively, of well water and free up CVP water under the Exchange Contract to be delivered to transfer recipient districts via the DMC and/or San Luis Canal (Reclamation 2010g).

Although the Proposed Program's incremental impacts/effects on groundwater resources appear to be less than significant or minimal for all alternatives, changes in the practices of other water users in the San Joaquin River Basin could affect groundwater levels and inflows/outflows. Increased groundwater pumping by water users other than the Exchange Contractors, who are within the San Joaquin River Basin, could alter groundwater supply and flow patterns. If users to the west of the Exchange Contractors' service area greatly increased their long-term use of groundwater, the total inflow available to the Exchange Contractors could be reduced. This situation could reduce the amount of subsurface outflow leaving the service area. However, this is considered unlikely given the groundwater conditions in most of the area west of the Exchange Contractors' service area.

Groundwater in some areas to the east of the Exchange Contractors' service area is in an overdraft condition. If users to the east increase their groundwater pumping, groundwater gradients and, therefore, flow amounts to the northeast could increase, which in turn would increase the rate of subsurface flow leaving the Exchange Contractors' service area. This flow is largely poor quality water.

Regionally, the water districts' AB 3030 groundwater management plans combined with county plans would minimize the potential for a cumulatively significant effect on groundwater supply (levels, inflows, outflows) and groundwater quality from existing projects and groundwater users, and the incremental impact of the Proposed Program action alternatives is insignificant or not cumulatively considerable. The *Update on Groundwater Conditions in the San Joaquin River Exchange Contractors' Service Area* (February 2008) was prepared for the Exchange Contractors' updated AB 3030 Groundwater Management Plan (February 2008). The update analyzed data collected under the AB 3030 plan relative to water-level elevations and direction of groundwater flow, water level trends within nine different subareas updates to known aquifer characteristics, changes to groundwater inflow and outflow due to changing conditions within neighboring areas, and groundwater quality.

This plan also provided a monitoring and management plan to deal with yearly groundwater demands, and to meet conjunctive use requirements to supplement the Exchange Contract surface water. This plan addresses future proposed surface water and groundwater substitution transfers, neighboring districts pumping of groundwater into the DMC (to supplement shortages caused by recent drought and Delta regulatory restrictions), migration of poor quality groundwater, and potential urban groundwater pumpage.

Boyle Engineering Consultants and KDSA (2008) completed an Integrated Regional Water Management Plan for Madera County. Included in this plan are measures to help decrease groundwater overdraft in Madera County.

The cumulative impact on groundwater quality of the Exchange Contractors' proposed activities of development of conservation/tailwater recapture water and temporary land fallowing combined with (1) specific drainage management projects such as the regional Grassland Bypass Project and SLDFR, (2) the interim and long-term CVP contract renewals, (3) other groundwater pumping for water transfer projects described above, and (4) the ongoing refuge water management program is not substantial. All of these other plans and projects have been, or will continue to be, addressed in separate NEPA (and CEQA) documents as appropriate. Furthermore, the incremental impact of the Exchange Contractors' Proposed Program is insignificant because the water development activity is similar to past practices for most of the action alternatives. The use of transfer water by the CVP/SWP contractors would cover, in part, projected deficits in CVP/SWP water deliveries. The Grassland Bypass Project extended to 2019 considers the production of agricultural drainage consistent with CVP contract supplies and subject to Waste Discharge Requirements. Funding by Reclamation for the current pilot study for the Phase 3 treatment is indicative of Reclamation's intention to meet its obligations under the San Luis Act and recent court decisions on the provision of drainage service.

5.2.4 Impact and Mitigation Summary

In summary, No Action/No Project would result in a small increase in groundwater recharge of 1,600 AFY that would increase outflow of poor quality groundwater with a less-than-significant impact and have no impact o groundwater quality. Alternatives A, B, and C assuming maximum land fallowing and compared to existing conditions, would result in a reduction in groundwater recharge of up to 8,400 AFY. In contrast, Alternative D would result in up to a 28,400 AFY reduction in groundwater recharge from both fallowing and an increase in conservation. Table 5-3, Summary Comparison of Groundwater Impacts of Alternatives and Mitigation Measures, presents the impact significance conclusions under CEQA for all of the alternatives. No mitigation is required.

Table 5-3
Summary Comparison of Groundwater Impacts of Alternatives and Mitigation Measures

Environmental Concern	Alternative	Impact Before Mitigation	Mitigation Measures	Impact After Mitigation
Groundwater				
GW-1 Groundwater Balance	No Action	LTS	not applicable	–
	A	N	not required	–
	B	N	not required	–
	C	N	not required	–
	D	N	not required	–
	Cumulative	N	not required	–
GW-2 Groundwater Quality	No Action	N	not applicable	–
	A	LTS	not required	–
	B	LTS	not required	–
	C	LTS	not required	–
	D	LTS	not required	–
	Cumulative	LTS	AB 3030 groundwater management plans, Madera County IRWMP	LTS

CEQA:
N = no impact PS = potentially significant
LTS = less than significant PSU = potentially significant and unavoidable

6.0 Biological Resources

Chapter 6 evaluates the potential for the Proposed Program's water development activities of conservation and temporary land fallowing to affect special-status species and the terrestrial and aquatic habitats that support these species in the Program area.

6.1 Affected Environment/Environmental Setting

6.1.1 Resources

This section briefly describes the terrestrial and aquatic biological resources for the Exchange Contractors' proposed 25-Year Water Transfer Program.

This section describes current land uses and wildlife habitats that could be affected by the Program alternatives and existing conditions in the Exchange Contractors' service area. Much of the land in the areas addressed by this Program is currently used for various agricultural purposes. Undeveloped lands on the valley floor are now restricted to small habitat patches that are fragmented and isolated from each other. Other habitats found in the Exchange Contractors' service area include riparian communities and rangelands. The adjacent Volta WA includes wetlands and alkali sink areas.

Land Use, Vegetation Communities, and Wildlife Habitat within the Exchange Contractors' Service Area

The Exchange Contractors' service area consists of intensively farmed croplands and graded and maintained farm roads. Drainage canals may support some vegetation, including patches of cattails. However, these canals are subject to regular vegetation maintenance activities and do not develop extensive freshwater marsh habitat.

Agricultural lands in Exchange Contractors' service area provide limited wildlife habitat due to intensive cultivation of the fields and maintenance of the farm roads and the canals and drains.

Pastures can provide habitat roosting and foraging habitat for shorebirds, as well as nesting habitat for ground-nesting birds. Pastures can provide forage for seed-eating birds and small mammals. Raptors, including red-tailed hawks (*Buteo jamaicensis*) and white-tailed kites (*Elanus leucurus*), may prey on available small mammals.

Limited fringes of riparian habitat consisting primarily of willow (*Salix* spp.) thickets with occasional cottonwoods (*Populus* spp.) are present in some areas of the Exchange Contractors service area, such as along the bank edges of the San Joaquin River, Orestimba Creek, Garzas Creek, and San Luis Creek, as well as Salt and Mud sloughs.

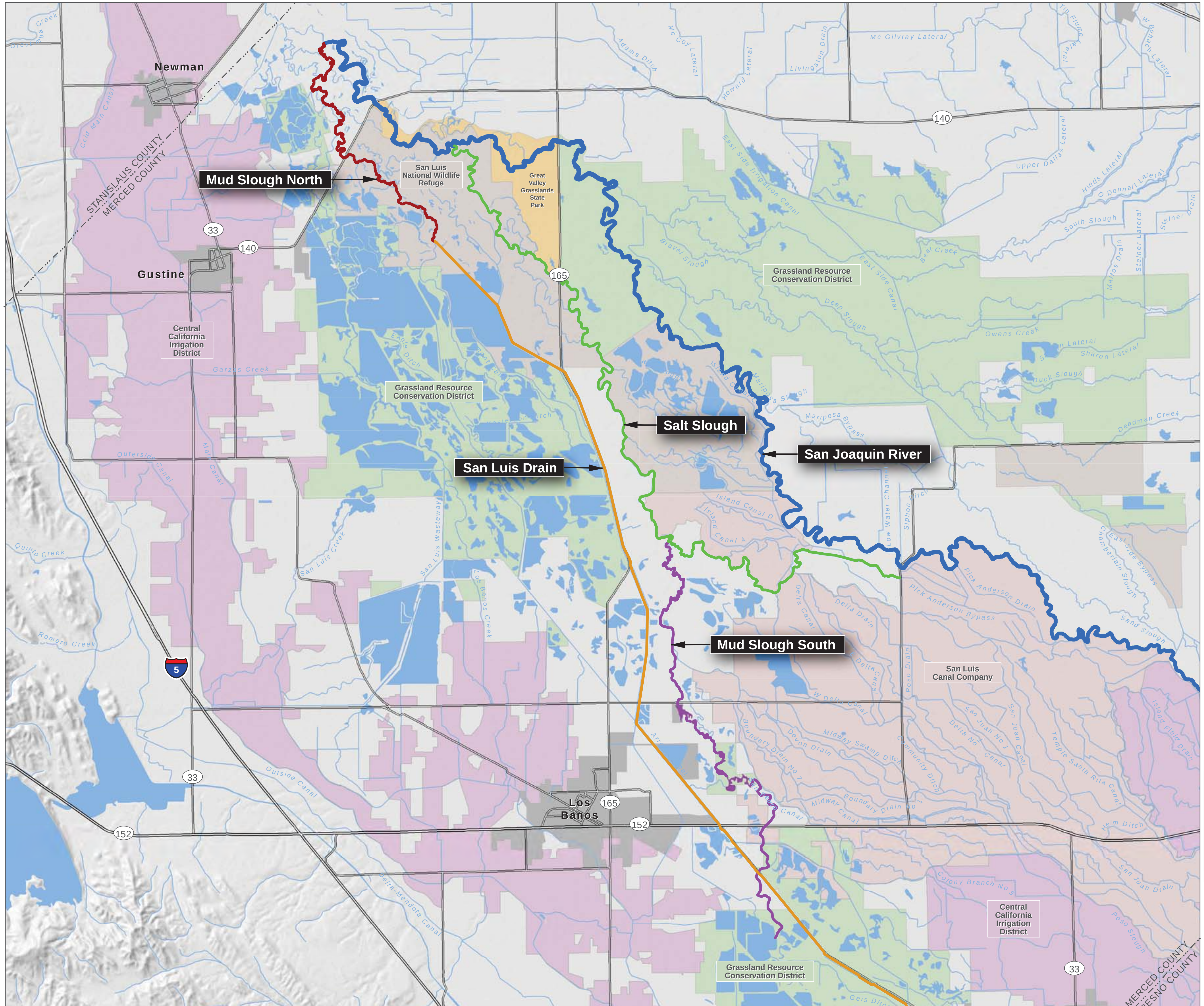
Riparian vegetation provides foraging, roosting, and nesting habitat for a variety of species, including raptors and songbirds. The riparian habitat in the area is narrow, which reduces the quality it provides. Riparian habitat in these areas is not expected to be affected by the Program alternatives.

Managed marshes are present in the Volta WA adjacent to some CCID lands. The marshes and alkali sink areas in the Volta WA provide habitat for a variety of bird species, including waterfowl, shorebirds, and wading birds. This area may also provide habitat for the giant garter snake (*Thamnophis gigas*). This area is not expected to be affected by the Proposed Program.

Aquatic habitat in or adjacent to the Exchange Contractors’ service area is provided by Salt and Mud sloughs, as well as the San Joaquin River and a small few tributaries (see Figure 6-1, Waterways in Program Area and Vicinity). Many canals cross the Exchange Contractors’ service area, providing aquatic habitat of limited value, due to lack of habitat complexity associated with canal maintenance practices. These tributaries all contribute to the flow of the San Joaquin River.

Under existing conditions, the San Joaquin River downstream of the Merced River serves as a migration corridor and seasonal rearing habitat for fall-run Chinook salmon. Primary habitat for these species is found on the Stanislaus, Tuolumne, and Merced rivers. Levees confine the river on both sides and have limited the extent of available floodplain, wetland, or shaded riverine habitat. On the western side, broad alluvial river channels and floodplains connect to the San Joaquin, but water from these streams rarely reaches the San Joaquin. Virtually all land adjacent to the river is under intensive agricultural development (Reclamation and Authority 2009). Many other species also use this portion of the river, although the fish community is highly altered because of changes in flow and habitat associated with water and land development over the last 100 years and the introduction of numerous invasive species. Between the Merced River and Mendota Pool, the river hydrology and habitat have been even more highly altered. A list of species potentially occurring in the Program area is provided in Table E-1 in Appendix E.

Mud and Salt sloughs are tributaries to the San Joaquin River that receive drainage from within their watersheds. It must be noted that there are two Mud Sloughs in the Program area vicinity (Figure 6-1). Mud Slough South is a tributary to Salt Slough and drains a portion of the project area. Mud Slough North receives drainage from the Grassland Drainage Area via the San Luis Drain. These two Mud Sloughs are not connected. The San Joaquin River in the vicinity of the Program area has a variety of aquatic habitats including slow-moving backwaters with emergent vegetation and shallow tule beds and deep pools of slow-moving water in the main river (Moyle 1976). The natural habitat and water quality of the San Joaquin River and Mud and Salt sloughs is highly modified by the addition of canals and agricultural drainwater (Saiki 1998). These additions have resulted in poorer quality water (accumulations of salt, trace elements, and nutrients) downstream of Mud Slough North. These effects are discussed in detail in the Grassland Bypass Project Final EIS/R (Reclamation and Authority 2009).



EXCHANGE CONTRACTORS

25-YEAR WATER TRANSFER PROGRAM

Waterways in Program Area and Vicinity

FIGURE 6-1

LEGEND

SAN JOAQUIN RIVER
EXCHANGE CONTRACTORS
WATER AUTHORITY

Central California Irrigation District

San Luis Canal Company

MANAGED LANDS

Grassland Resource Conservation District

National Wildlife Refuge

State Park

EXCHANGE CONTRACTORS
PROMINENT DRAINAGES

Mud Slough North

Mud Slough South

Salt Slough

San Luis Drain

San Joaquin River

County Boundary

City / Town

Other Rivers

Cardno ENTRIX

0 0.5 1 2 3 4
Scale in Miles

Map Date:
10 | 12 | 11

Map Projection:
Universal Transverse Mercator (UTM)
North American Datum of 1983 (NAD83)
Zone 10 North
Linear Unit: Meter

Data Sources:
Water District Boundaries:
U.S. Bureau of Reclamation

Federal Lands:
U.S. Department of Fish and Wildlife

Map Use:
The producer of this map assumes no responsibility for the risks, dangers, and liability that may result from the reader's use of the map.

A list of fish species likely to occur in the Program area and vicinity is provided in Table E-2 in Appendix E. The species list includes those species reported by Saiki (1998) as part of an ecological assessment of the Grassland Bypass Project along with those from other studies focusing on the presence, interactions, and distribution of native species found within the San Joaquin River Basin (Brown and Moyle 1993; Saiki 1984). The most common species in and adjacent to Exchange Contractors' service area are nonnative species, including inland silverside, green sunfish, fathead minnow, and western mosquitofish. The most abundant species were bluegill, redear sunfish, largemouth bass, threadfin shad, goldfish, red shiner, common carp, and black bullhead. None of these common or abundant fish are native to California. Other native fish species that may reside within the Program area and its immediate vicinity include Sacramento blackfish, prickly sculpin, Sacramento sucker, hitch, hardhead, Sacramento pikeminnow, and tule perch.

The decline of native fish species in the San Joaquin River Basin is well documented and can be traced to historical disturbances that occurred in most of the watersheds throughout the basin. The resultant populations of introduced species evident in the Program area parallels what has been shown to occur in similar habitats elsewhere in the basin (Brown and Moyle 1993).

Aquatic habitat conditions existing within the Program area are degraded and more favorable to introduced species. Introduced species exhibit opportunistic life history traits (broad environmental tolerances, high fecundity, early sexual maturation, long reproductive season, omnivorous diet, and relatively short life span) that help them survive in conditions where less tolerant native species cannot (Brown 1998). The fish species observed in the Program area are tolerant to a wide range of environmental conditions and have shown resilience to those conditions and the ability to sustain their populations through natural reproduction.

Special-Status Species

Fifty-six special-status species have reported occurrences in the near vicinity of the Exchange Contractors' service area (CDFG 2011). An additional five species are considered to be potentially present in the Exchange Contractors' service area or to be affected by Program actions (Service 2011). These species include 23 plants, 5 invertebrates, 7 fish, 4 amphibians, 5 reptiles, 9 birds, and 8 mammals. A list of these special-status species and an evaluation of their potential to occur is provided in Appendix E, Table E-1.

The only habitat types that are in the water development area are agricultural. As explained further below, these lands do not provide much if any habitat for special-status species. Agricultural development, with its associated changes in vegetation structure from the historic state, its frequent ground disturbance, irrigation, pesticide use, and loss of microtopographic relief from laser leveling, has already eliminated habitat for most of these species from the area. No special-status plants are expected to be affected by the Proposed Program. None of the invertebrate species are expected to occur in locations affected by any of the Program alternatives. One of the amphibian species, three of the reptile species, four of the bird species, and seven of the mammal species also are not expected to be affected by any of the Program alternatives. These species are not discussed further.

Species that could be affected by Program actions include aquatic or semiaquatic species and terrestrial species that forage extensively in agricultural areas. Aquatic and semiaquatic species include Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), delta smelt (*Hypomesus transpacificus*), Central Valley steelhead (*Oncorhynchus mykiss*), Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*), green sturgeon (*Acipenser medirostris*), hardhead (*Mylopharodon conocephalus*), Sacramento splittail (*Pogonichthys macrolepidotus*), California tiger salamander (*Ambystoma californiense*), California red-legged frog (*Rana draytonii*), western spadefoot (*Spea hammondii*), western pond turtle (*Emys marmorata*), and giant garter snake (*Thamnophis gigas*). Avian species that may forage in the water development areas are Swainson's hawk (*Buteo swainsoni*), tricolored blackbird (*Agelaius tricolor*), mountain plover (*Charadrius montanus*), northern harrier (*Circus cyaneus*), and burrowing owl (*Athene cunicularia*). Depending on the crops cultivated in any particular year, limited foraging habitat for the San Joaquin kit fox (*Vulpes macrotis mutica*) is present in the water development areas.

Fish

Steelhead Trout

Steelhead trout (*Oncorhynchus mykiss*) is one of the principal anadromous salmonids in the Sacramento-San Joaquin river and delta system. Steelhead trout (steelhead) in the action area are part of the Central Valley Distinct Population Segment. This species is known to occur in tributaries to the San Joaquin River, believed to include the Merced River. This statement is based on numerous observations of *O. mykiss* on the Merced River over the years, NMFS rulemaking that all *O. mykiss* below the lowest impassable barrier are steelhead. Additionally, steelhead are identified in the SJRRP as a species that will likely benefit from the restoration actions. This segment is Federally listed as threatened (Federal Register 2006a). Critical habitat has been designated for steelhead (Federal Register 2006a), but the water development area does not include a critical habitat area.

Both steelhead and Chinook live in the ocean and migrate to their natal streams to spawn. Steelhead, unlike Chinook salmon (below), do not always die after spawning, but may return to the ocean and spawn in later years. Adult females excavate nests (redds) and lay their eggs in coarse gravels in the riffles. Water passes through the gravel aerating the eggs and newly hatched fry (alevins). Survival of developing eggs is dependent on streamflow, gravel quality, and silt load. After the yolk sac is absorbed, fry emerge from the gravels to rear. Rearing steelhead remain in the stream until they are 1 to 3 years old then migrate downstream to the ocean. When juveniles enter the estuarine environment, they undergo a physiological change called smoltification where they become adapted to the marine environment. After 1 to 2 years in the ocean, steelhead return again to natal streams to spawn. The adult diet consists primarily of fish. While in freshwater, juveniles are opportunistic drift feeders, which take a wide variety of terrestrial and aquatic insects and some crustaceans.

No California Natural Diversity Data Base (CNDDB) occurrences of steelhead trout are recorded within a 10-mile radius of the water development area (CDFG 2012). The Hills Ferry Barrier located on the San Joaquin River just upstream of the mouth of the Merced River precludes adult steelhead from entering the San Joaquin River above this during September through December, but they may enter the immediate Program area from January through June, as the barrier is removed at the end of January. Habitat for this species in the water development area does not exist under current conditions. With successful implementation of the SJRRP, the San Joaquin River within the water development area would be expected to provide migratory habitat for upstream and downstream migrant steelhead and potential seasonal rearing habitat during the cooler portions of the year.

Spring-Run Chinook Salmon

The spring-run Chinook salmon (*Oncorhynchus tshawytscha*) is Federally and state listed as threatened (Federal Register 1999a; CDFG 2011). Critical habitat has been designated for spring-run Chinook salmon (Federal Register 2005a), but the water development area does not include a critical habitat area.

Spring-run Chinook salmon are primarily found in four tributaries to the Sacramento River, Butte, Big Chico, Deer, and Mill creeks. These fish enter the Sacramento River between February and June. They move upstream and enter tributary streams from February through July. Spring-run Chinook ascend into the headwaters and hold in pools until they spawn, starting as early as mid-August and ending in mid-October. Emergence of juvenile fish starts in early November and continues through the following April. These juveniles emigrate from the tributaries as fry from mid-November through June. However, some fish remain in the stream until the following October and emigrate as "yearlings," usually with the onset of storms starting in October through the following March (CDFG 2006).

Spring-run Chinook used the upper reaches of the San Joaquin River historically, but have not done so since the completion of Friant Dam in 1949. No CNDDB occurrences of Chinook salmon are recorded within a 5-mile radius of the area of the water development area (CDFG 2012). No habitat for this species is present in the water development area. However, as explained in Section 1.3.2, the SJRRP will be improving the San Joaquin River through and in the vicinity of the Exchange Contractors' service area to reestablish a migration corridor for spring-run and fall-run Chinook salmon and steelhead, and habitat for other native fish species. Interim flows began in Fall 2009 and will continue until full restoration flows occur, which depends upon completion of facilities and environmental compliance requirements.

Hardhead

Hardhead (*Mylopharodon conocephalus*) are identified as a species of concern, specifically on the Class 3-Watch List, by CDFG (Moyle et al. 1995). They are not listed as threatened or endangered by either the state or Federal governments.

Hardhead are large, omnivorous, freshwater cyprinids found in undisturbed portions of larger low- to mid-elevation streams and some reservoirs throughout the Central Valley and the foothills on the western side of the Sierra Nevada. They prefer well-oxygenated water with summer water temperatures in excess of 20°C and deep pools (greater than 1 meter deep) with a sand-gravel-boulder substrate and slow water velocities. Hardhead are rarely found in environments that have well-established centrarchid populations or environments that have been heavily impacted by man (Moyle 2002). Spawning occurs throughout the spring and early summer when adult hardhead (3 years or older) are thought to migrate into tributaries to lay eggs over gravel beds in riffles, runs, or the heads of pools (Moyle 2002).

The early life history of the hardhead is not well known. Presumably, larval and post larval hardhead remain along stream edges in dense cover of flooded vegetation or fallen branches, before moving into deeper habitats or are swept downstream into main rivers and perhaps concentrate in low-velocity areas near the mouth of rivers (Moyle 2002).

Hardhead were not observed in the Program area by Sakai (1998), and habitat conditions there do not appear to be conducive to this species, but they could be present. Hardhead have been reported to occur within 5 miles of the Program area (CDFG 2012).

Sacramento Splittail

The Sacramento splittail (*Pogonichthys macrolepidotus*)(splittail) was Federally listed as threatened on February 8, 1999 (Federal Register 1999b), and delisted on September 22, 2003 (Federal Register 2003). On October 7, 2010, the Service again found that the species did not warrant listing under the Federal ESA (Federal Register 2010). The splittail is listed as a species of special concern (Class 1: Qualify as threatened) by the State of California (Moyle et al. 1995).

Splittail live in freshwater and some estuarine systems in California. Splittail were historically found as far north as Redding on the Sacramento River and as far south as the site of Friant Dam on the San Joaquin River (Rutter 1908).

Splittail usually spawn on submerged vegetation in temporarily flooded upland and riparian habitat. Larval splittail are commonly found in shallow, vegetated areas near spawning habitat. Larvae eventually move into deeper and more open-water habitat as they grow and become juveniles (DWR and Reclamation 2005). Developing juveniles migrate downstream to shallow, brackish water, year-round rearing grounds from March through August.

The splittail is primarily associated with sloughs and rivers in the Delta, but may occur within the Program area sporadically, especially in high flow years. Splittail were caught in Mud and Salt sloughs in June 1998, an El Niño year (Beckon et al. 1999; URS 2001, both cited in Reclamation and Authority 2009). Splittail have been reported to occur within 5 miles of the Program area (CDFG 2012).

Several other listed species occur in the Delta, but not in the San Joaquin River. These species could be affected by flow changes in the Delta, but based on the magnitude of these changes described in Chapter 4, Surface Water, these changes are inconsequential (well within flow measurement error) and would have no effect on winter-run Chinook salmon, delta smelt (*Hypomesus transpacificus*), or green sturgeon (*Acipenser medirostris)*.

Amphibians

California Tiger Salamander

The California tiger salamander (CTS) (*Ambystoma californiense*) was Federally listed as threatened on September 3, 2004 (Federal Register 2004). The CTS is also a California species of special concern (CDFG 2011). A critical habitat determination was published for the CTS on September 22, 2005 (Federal Register 2005b), but no critical habitat is present in the water development area.

The CTS' historical range includes the Central Valley from Colusa County south to Tulare or Kern County and coastal valleys from Sonoma County south to Santa Barbara County (Shaffer et al. 1993). The CTS has very strict habitat requirements that must be met for it to complete its life cycle. Historically, it bred in playa pools and other temporary ponds (Shaffer et al. 1993), although intermittent streams may have occasionally been used (Zeiner et al. 1988). Today, many of the known populations breed in stock ponds associated with cattle operations, but populations also utilize remaining playa pools in the Central Valley and coastal valleys (Federal Register 2004).

The CTS occurs in grasslands and open oak woodland that provide suitable upland refugial habitat (i.e., summer retreats) and/or breeding habitats. CTS spend the majority of their lives underground in larger rodent burrows and other subterranean refugia. The CTS emerges from its upland refugial sites for only a few nights each year during the rainy season to migrate to its breeding ponds. Seasonal playa pools or fishless artificial impoundments such as stock ponds provide suitable breeding habitat. Eggs hatch within a few weeks and the larvae develop over a period of weeks and typically transform to become juveniles in late spring or early summer. Larvae feed on aquatic invertebrates. Juveniles usually migrate to rodent burrows and, like the adults, sometimes emerge on suitable nights to feed. Individuals, or the entire population, may forego reproduction for 1 or more years if conditions are not suitable, such as years of low rainfall (Shaffer et al. 1993; Jennings and Hayes 1994). Adult and juvenile individuals of the species feed mainly on terrestrial invertebrates.

Because the CTS may migrate as much as 1.25 miles from its underground retreats to breeding ponds, unobstructed migration corridors are critical to this animal's survival (Brode 1997). Breeding ponds and streams also need to hold water at least until the month of May to allow time for larvae to fully metamorphose.

CNDDB records for CTS (CDFG 2012) include 10 occurrences within 5 miles of the Exchange Contractors' service area. All of these occurrences are either on wildlife refuges and the Great Valley Grasslands State Park, or are associated with stock ponds outside the Exchange Contractors' service area. The croplands that will be managed under the Program alternatives do not provide habitat for this species.

California Red-Legged Frog

The California red-legged frog (CRLF) (*Rana draytonii*) was Federally listed as a threatened species on May 20, 1996 (CDFG 2011). The CRLF is also a California species of special concern (CDFG 2011). Critical habitat was designated for the CRLF on March 13, 2001, including 31 critical habitat units (Federal Register 2001). Critical habitat was remanded and partially vacated by DC District court effective November 6, 2002. A revision of the boundaries of the critical habitat areas was designated on April 13, 2006 (Federal Register 2006b). The water development area is not located within a critical habitat area.

A recovery plan for this species was completed in 2002 (Service 2002c), but no core units are in the vicinity of the water development area.

Historically, the CRLF occurred in coastal mountains from Sonoma County south to northern Baja California, and along the foothills of the Central Valley from about Shasta County south to Kern County (Jennings and Hayes 1994). Currently, this species generally only occurs in the coastal portions of its historic range; it is apparently extinct in most of southern California south of Ventura County.

CRLF are generally confined to aquatic habitats, such as streams, ponds and hillside seeps that maintain pool environments or saturated soils throughout the summer months. This frog typically occurs in areas of low-velocity streamflow having pools 2 to 3 feet deep with adjacent dense emergent or riparian vegetation (Jennings and Hayes 1988). Adult frogs move seasonally between their egg-laying sites and foraging habitat, but generally rarely move large distances from their aquatic habitat. Riparian habitat containing willows (*Salix* spp.) and emergent vegetation such as cattails (*Typha* spp.) are preferred CRLF habitats, though not necessary for this species to be present. CRLF populations may be reduced in size in some ponds with nonnative predators such as bullfrogs (*Rana catesbeiana*), centrarchid fish species (such as green sunfish (*Lepomis cyanellus*), or black bass (*Micropterus* sp.), and signal and red swamp crayfish (*Pacifastacus leniusculus* and *Procambarus clarkii*, respectively).

CRLF breed from November to April, depending on locality. Egg masses averaging 500 to 2,000 ova are attached to submersed vegetation (Jennings and Hayes 1994). Eggs hatch within 6 to 14 days, and metamorphosis generally occurs between June and September.

A CRLF occurrence has been reported within 5 miles of the water development area (CDFG 2012). This occurrence was at a farm stock pond in grazing land west of the Exchange Contractors' service area. No habitat for this species is present in the lands of the water development area. While the irrigation canals could provide habitat for this species if sufficiently dense riparian/wetland vegetation developed, canal maintenance appears to preclude the development of adequate habitat. Similarly, the adjacent wildlife refuges and WAs do not currently support CRLF.

Western Spadefoot

The western spadefoot (*Spea hammondii*) is a California species of special concern (CDFG 2011). This toad is primarily found in California, from the vicinity of Redding (Shasta County) south into northwestern Baja California, Mexico (Jennings and Hayes 1994). The range within California is west of the Sierra Nevada and of the southern deserts.

This species is almost entirely terrestrial, using water only for breeding. Adults spend up to 8 to 9 months aestivating in burrows in loose soil (Jennings and Hayes 1994). The adults emerge following rains from fall to late spring. Eggs are usually attached to plant stems or debris in temporary rain pools, although pools in ephemeral streams may be used occasionally. Hatching and larval development can occur rapidly, depending on temperature and food availability. The presence of predators, such as fish, bullfrogs, and crayfish, may cause reproductive failure (Jennings and Hayes 1994).

CNDDB records for this toad (CDFG 2012) include 6 occurrences within 5 miles of the Exchange Contractors' service area. All of these occurrences are on wildlife refuges or the Great Valley Grasslands State Park. The croplands that will be managed under the Program alternatives do not provide habitat for this species.

Reptiles

Giant Garter Snake

The giant garter snake (*Thamnophis gigas*), Federally and state-listed as threatened (CDFG 2011), is the largest member of the garter snake family, reaching lengths of over 5 feet. A draft recovery plan for this species was completed in 1999 (Miller at al. 1999). No critical habitat has been designated or proposed for the giant garter snake.

Endemic to the Central Valley, this semiaquatic snake occurs along sloughs, ponds, low gradient streams, and irrigation/drainage canals with open basking sites and uplands for winter hibernation retreats (Service 2009a). Giant garter snakes are typically active between April and October. However, recent data indicate that they may remain active late into fall (Wylie 1999). Most giant garter snakes are in winter retreats (hibernaculae) above the ordinary high water line by November, where they remain until the following spring. The snake feeds primarily on small fish, frogs, and tadpoles.

Occurrence in Program area: Until recently, no post-1980 records of the giant garter snake existed south of Stockton. However, since the mid-1990s, a few occurrences of this snake have been reported at the Mendota Wildlife Refuge and along the Los Banos Creek (CDFG 2012). From 1995 to 2006, the CDFG, Service, and several other agencies conducted surveys for giant garter snakes in the San Joaquin Valley between Crows

Landing and Mendota. Survey methods included trapping, capturing by hand, and visual observations. These surveys are described in the BO for the Grassland Bypass Project (Service 2009a) and summarized in Table 6-1, which is taken directly from the BO. These surveys have observed giant garter snake in low numbers, primarily in Volta WA and in the Los Banos Creek corridor within Grassland Water District (i.e., Grassland Resource Conservation District). Giant garter snakes have also been observed occasionally in the south Grasslands wetlands.

Table 6-1
Giant Garter Snakes in the Program Vicinity

Year	Mendota Pool	Grasslands Wetlands	Volta WA	Los Banos Creek	Reference
1995	2	2 (1 roadkill, 1 visual)[1]	Not sampled	Not sampled	Hansen 1996
1998	Not sampled	1[2]	3	7	Wylie 1998
1999	Not sampled	3 (1 live capture, 2 road- kills)[3]	8	6	Beam et al. 1999
		2[4]			Sparks 2000
2000	Not sampled	1[5]	0	Not sampled	Dickert 2002; 2005
2001	14		0	Not sampled	
		0[6]			Dickert 2003
2003	Not sampled		30 live, 1 dead	0[7]	Sloan 2005
2004	Not sampled	0[8] (visual surveys only)	13	Not sampled	
					CDFG 2006a
2006	Not sampled	0[9]			Hansen 2007
2006		1[10]	7	Not sampled	Hansen 2008a
2007	0		Not sampled	7	Hansen 2008b
2008	1	0[11]	Not sampled	4	
		Not sampled	15	3	

Source: Service 2009a (all references as cited therein)

[1] South Grasslands south of the city of Los Banos.

[2] South Grasslands near Canal 1, south of Highway 152.

[3] Live snake captured near Agatha Canal in South Grasslands. One roadkill found on Santa Fe Grade Road, and the other roadkill on Mallard Road near Agatha Canal in South Grasslands.

[4] Klamath duck club adjacent to Mud Slough south of Los Banos WA, south of Henry Miller Road and north of Highway 152.

[5] South Grasslands in Canal 1, south of Highway 152.

[6] Trapping conducted at Los Banos WA.

[7] Trapping conducted at China Island WA near drainage-impacted Mud Slough North.

[8] Visual surveys conducted in both North and South Grasslands.

[9] Trapping conducted at Los Banos WA.

[10] Junction of Agatha Canal and Poso Drain.

[11] Trapping conducted throughout the San Luis NWR Complex and South Grasslands.

Separate from the surveys above, both a male and female were captured in 2000 in Mud Slough South, 3 miles east northeast of Los Banos (CDFG 2012). Mud Slough South is a distinct waterway from Mud Slough North that connects the San Luis Drain to the San Joaquin River. More recent CNDDB records, in 2001 and 2006, recorded in the Delta Ranch and Ingomar quadrangles, respectively, have exact locations suppressed due to location sensitivity. This species is reported to occur in Mud and Salt sloughs, as well (Reclamation and Authority 2009 [Grassland Bypass Project EIS/R]).

Habitat requirements for giant garter snake are described by Service as follows:

- Giant garter snakes feed primarily on small fishes, tadpoles, and frogs. Habitat requirements consist of (1) adequate water during the snake's active season (early-spring through mid-fall) to provide food and cover; (2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season; (3) grassy banks and openings in waterside vegetation for basking; and (4) higher elevation uplands for cover and refuge from flood waters during the snake's dormant season in the winter.
- Although some prey items may be present in canal water, much of the Exchange Contractors' service area does not offer appropriate habitat for giant garter snake (Service 2006e). The canal sides and levees are continuously maintained and kept free of vegetation. A minor amount of emergent vegetation grows in the canals but it is meager and inadequate for basking and cover. In most of the service area, upland areas near the canals are not appropriate for cover and refuge as they are highly managed to prevent vegetation or encroachment by burrowing creatures. Surrounding agricultural lands are also managed and are clean of native vegetation. However, limited stands of native vegetation are present adjacent to agricultural fields that are bordered by the San Joaquin River or by unaltered reaches of streams such as Orestimba Creek, Garzas Creek, Mud Slough, or Salt Slough.
- Giant garter snakes successfully utilize rice fields north of the Delta, although use of rice fields has not been documented in the San Joaquin Valley. On average, rice production occurs on approximately 1.3 percent (3,009 acres) of the total crop acreage in the Exchange Contractors' service area (see Section 7.1.1). However, the acreage of land in rice production varies from year to year (ranging from 2,149 to 3,542 acres in the last 5 years), primarily due to changes in market prices for this commodity. Total acres planted with rice have fluctuated by as much as 40 percent in the past 10 years. A review of fallowing records from 2008 to 2010 indicates that only one parcel fallowed during that period had been planted in rice in any of the preceding 3 years, and that parcel represented about one-fifth of the land fallowed in that year.
- The likelihood is low that giant garter snakes can subsist in the Exchange Contractors' water development area. Rice acreage represents a very small proportion of the total acreage within the service area, 3,009 acres out of 240,000 total acres. These parcels are spread over a wide area and separated by other crops that do not provide habitat for this species. These parcels are not adjacent to the refuges or natural waterways that might provide habitat for giant garter snake.

> Finally, in contrast to rice production in other areas of the state, these rice fields do not provide consistent habitat from year to year due to crop rotation patterns (see Section 7.1.1).

Western Pond Turtle

Western pond turtle (*Emys marmorata*) is a California species of special concern (CDFG 2011). This turtle is found in much of California, west of the Sierra-Cascade crest in ponds, lakes, streams, and other permanent freshwater bodies of water below 5,250 feet in elevation. This species is uncommon in high gradient streams most likely due to low water temperatures, high current velocity, and low food resources, which may limit their local distribution (Holland 1994).

Females leave the aquatic environment and seek upland areas to lay their eggs, constructing a nest at least 10 to 12 centimeters deep to deposit the eggs. These nests may be found up to 0.3 mile away from the aquatic habitats (CDFG 2012; Holland 1994). Aquatic habitats with adequate vegetative cover and exposed basking sites containing logs, rocks, and banks are heavily utilized (Zeiner et al. 1988).

Several CNDDB records exist for the western pond turtle within 5 miles of the Exchange Contractor' service area (CDFG 2012). Most of these occurrences are at wildlife refuges. The croplands that will be managed under the Program alternatives may have transitory usage by western pond turtles where adjacent canals exist.

Birds

Swainson's Hawk

Swainson's hawk (*Buteo swainsoni*) is state-listed as threatened. In California, this species is restricted to portions of the Central Valley and Great Basin regions where suitable nesting and foraging habitat is still available. Central Valley populations are densest from Colusa County to San Joaquin County and are considered sparse in Fresno County (CDFG and UC Davis 2005).

Swainson's hawk requires large, open grasslands with abundant prey in association with suitable nest trees. Suitable foraging areas include native grasslands or lightly grazed pastures, alfalfa and other hay crops, and certain grain and row croplands. The majority of Swainson's hawk territories in the Central Valley are associated with riparian systems adjacent to suitable foraging habitats. Swainson's hawk often nests peripherally to riparian systems, but also uses lone trees or groves of trees in agricultural fields and rangelands. Valley oak, Fremont cottonwood, walnut, and large willow with an average height of about 60 feet are the most commonly used nest trees in the Central Valley. Breeding occurs late March to late August, with peak activity from late May through July (Zeiner et al. 1990a).

Multiple records exist of Swainson's hawk nests within 5 miles of the Exchange Contractors' service area, particularly along the San Joaquin River.

Tricolored Blackbird

The tricolored blackbird (*Agelaius tricolor*) is a California species of special concern (CDFG 2008). Most of the breeding population can be found throughout the Central Valley and at Toledo Pit in Riverside County, although small nesting colonies have been found locally in Oregon, Washington, Nevada, and coastal Baja, California. Major wintering concentrations are located in and around the Delta and coastal areas, including Monterey and Marin counties (Beedy 2008).

The tricolored blackbird is a colonial species that nests above water or ground in freshwater marsh vegetation such as cattails, tules, and blackberry thickets. This blackbird may also nest in the canopies of willows (Beedy 2008). Requirements for breeding sites are accessibility to open water, a protected nesting substrate, and a foraging area with insect prey within a few miles of the colony (CDFG 2012). Foraging habitat for this species in all seasons includes pastures, agricultural fields, and dry seasonal pools with occasional foraging ground in riparian scrub, marsh boarders, and grassland habitats. Tricolored blackbirds typically leave their wintering areas in late March and early April for breeding locations in Sacramento County and throughout the San Joaquin Valley (Beedy and Hamilton 1997; Beedy 2008).

The emergent vegetation and willows found in scattered locations along creeks and along irrigation canals in the Exchange Contractors' service area may provide nesting habitat for the tricolored blackbird. However, potential nesting habitat found in many of these areas is narrow and sparse and probably does not provide adequate protection to support a breeding population. Multiple records exist of tricolored blackbird within 5 miles of the Exchange Contractors' service area, particularly in the neighboring wildlife refuges.

Mountain Plover

The mountain plover (*Charadrius montanus*) is a California species of special concern (CDFG 2011). The plover breeds in the interior states of Montana, Wyoming, Colorado, New Mexico, and from the Texas Panhandle east to Nebraska and west to Oklahoma. This plover does not breed in California; however, it does winter in central and southern California and southern Arizona southward into Mexico. Primary wintering areas in California are in the Central and Imperial valleys from the months of September to mid-March with peak numbers during December through February (Hunting and Edson 2008).

The mountain plover is one of the few shorebirds that live in dry regions away from water, preferring short-grass prairies and dry, lowland areas that are flat and nearly devoid of vegetation. Wintering plovers most frequently utilize fallow, grazed, or burned sites with average vegetation heights of less than 6 centimeters (Hunting and Edson 2008). However, mountain plovers are also known to forage on man-made landscapes such as sod farms, freshly plowed fields, and newly sprouted grain fields (CDFG 2012).

Annual grasslands and agricultural fields in the Exchange Contractors' service area may provide suitable wintering habitat for mountain plovers. Three CNDDB records of this plover are in or within 5 miles of the Exchange Contractors' service area (CDFG 2012). Two of these records are in the San Joaquin River Water Quality Improvement Project drainage reuse area, representing observations from monitoring surveys conducted over the last 10 years.

Northern Harrier

The northern harrier (*Circus cyaneus*) is a California species of special concern (CDFG 2011). This hawk is a permanent resident of northeastern California, coastal California, and the Central Valley, preferring open habitats such as grasslands, meadows, desert sinks, and fresh and saltwater emergent wetlands (Zeiner et al. 1990a). This species is a widespread winter resident where suitable habitat is available.

The breeding season for the northern harrier extends from April to September, and nesting typically takes place on the ground in shrubby vegetation at the edges of marshes or along rivers and lakes. This species may also nest in grasslands, grain fields, and sagebrush flats. The northern harrier forages in low flights over open ground, feeding primarily on voles and other small mammals. However, this hawk will also prey on birds, frogs, reptiles, crustaceans, insects, and even (rarely) on fish (Zeiner et al. 1990a).

Annual grasslands and agricultural fields in the Exchange Contractors' service area may provide foraging habitat for the northern harrier.

Burrowing Owl

The burrowing owl (*Athene cunicularia*) is a California species of special concern (CDFG 2011). Burrowing owls range throughout most of the interior western United States, southern Canada, the Central Valley of California, Southern California, throughout Mexico into Central America, and along the western half of Florida. This owl is a year-round resident in the Central Valley, San Francisco Bay region, Carrizo Plain, and Imperial Valley in the State of California (Gervais et al. 2008).

The burrowing owl is primarily a grassland species, but has adapted to landscapes highly altered by man. Basic habitat requirements for the burrowing owl are open, dry, gently rolling to flat grasslands, scrublands, road and railway rights-of-way, open urban habitats (i.e., airfields, open canals, ditches, drains, and golf courses), and agricultural lands (Gervais et al. 2008). This owl nests and roosts in animal burrows commonly excavated by the ground squirrel, but may also utilize burrows dug by a badger, coyote, or fox. Breeding season for this owl occurs from March to August, but can begin as early as February through December.

Nonnative grasslands and pastures provide potential nesting habitat for burrowing owl, and fallowed land may provide potential habitat. Several CNDDB records exist for the burrowing owl within 5 miles of the Exchange Contractors' service area (CDFG 2012).

Mammals

San Joaquin Kit Fox

The San Joaquin kit fox (*Vulpes macrotis mutica* = kit fox) is Federally listed as endangered and is state-listed as threatened (CDFG 2011). This species is included in the Recovery Plan for Upland Species in the San Joaquin Valley (Service 1998). No critical habitat has been designated or proposed for the San Joaquin kit fox.

Description and Distribution: This species is found in arid regions of the southern half of the state. Kit fox live primarily in the lowlands of the San Joaquin Valley of California, but are also known to occur in several counties in the coast mountain ranges including Santa Barbara, San Luis Obispo, Monterey, San Benito, Santa Clara, Contra Costa and Alameda counties. This fox species is usually found in open grassland and shrubland communities, but has also been observed on the edges of orchards that border grassland or shrubland plant communities. Cover is provided by dens that are dug in open, level areas with loose-textured, sandy, and loamy soils (Zeiner et al. 1990b). Pups are born in dens excavated in open, level areas with loose-textured soils. Most pups are born February through April. Pups are weaned at about 4 to 5 months. Much of the habitat for the kit fox has been eliminated by agriculture.

This fox species relies on subterranean dens for breeding and escape cover from potential predators. Natal and pupping dens occur in areas with solitary or multiple den openings. Both adults care for pups until they are about 4 to 5 months old at which time family bond begin to dissolve. Dens are excavated in loose-textured soils, generally in areas with low to moderate relief. Kit fox will also utilize existing burrows excavated by rabbits, ground squirrels, badgers (*Taxidea taxus*), and on occasion will use man-made structures for denning such as well casings, culverts, and abandoned pipelines. Typically, dens are small enough to discourage easy predation by coyotes (*Canis latrans*) and red fox (*Vulpes vulpes*).

Agricultural lands are generally not suitable for long-term occupation by kit foxes due to frequent ground disturbance, pesticide use and the presence of coyotes and red foxes, although lands adjacent to natural habitats may be used for occasional foraging (Warrick et. al. 2007). The lack of systematic large-scale surveys limits knowledge of the kit fox's status in the water development area (Service 2009a). Recent surveys of specific parcels of public lands in the vicinity suggest that the kit fox is either absent, occurs only intermittently, or occurs at extremely low densities. Extant populations of San Joaquin kit fox occupy the Coast Range foothills west of the water development area, and remnant populations may exist in the Sierra Nevada foothills at the eastern side of the San Joaquin Valley (Service 2009a).

CNDDB occurrences exist of kit fox within 5 miles of the area of the water development area (CDFG 2012). Limited foraging habitat for this species may be provided by croplands in the water development area.

6.1.2 Regulatory Setting

Federal Endangered Species Act

The Federal ESA defines “endangered” species as those in danger of extinction throughout all or a significant portion of their range. A “threatened” species is any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Additional special-status species include “candidate” species and “species of concern.” Candidate species are those for which the Service, or NOAA Fisheries if applicable, has enough information on file to propose listing as endangered or threatened. “Species of concern” are those for which listing is possibly appropriate, but for which the Service or NOAA Fisheries lacks sufficient information to support a listing proposal. A species that has been “delisted” is one whose population has met its recovery goal target and is no longer found to be in jeopardy of extinction. These agencies also may designate Critical Habitat for listed species.

Federally listed species may be addressed for a proposed project in one of two ways: (1) a non-Federal government entity may resolve potential adverse impacts to species protected under Federal ESA Section 10, or (2) a Federal lead agency regulates a proposed project in accordance with Federal ESA Section 7. Section 7 defines a process for the Federal lead agency to consult with the responsible Federal resource agency (the Service or NOAA Fisheries), to determine whether the Proposed Water Transfer Program is likely to adversely affect species that are listed or proposed for listing. The Section 7 process typically requires the preparation of a BA by the Federal lead agency followed by the preparation of BO by the responsible Federal resource agency. Consultation under Section 7 is limited to projects with a Federal nexus. Other projects that may result in take or harm of a Federally listed species require a Section 10 permit from the Service and/or NOAA Fisheries. The Section 10 process typically requires the project proponent to prepare a Habitat Conservation Plan. A permit is issued by the Service and/or NOAA Fisheries once it is approved.

California Endangered Species Act

The California ESA and the Native Plant Protection Act authorize the California Fish and Game Commission to designate endangered, threatened, and rare species and to regulate the taking of these species (California Fish and Game Code Sections 2050–2098). California ESA defines “endangered” species as those whose continued existence in California is jeopardized. State-listed “threatened” species are those not presently threatened with extinction, but which may become endangered if their environments change or deteriorate. Protection of special-status species is detailed in Fish and Game Code Sections 2050 and 2098. In addition to recognizing three levels of endangerment, CDFG can provide interim protection to candidate species while they are being reviewed by the Fish and Game Commission. Formal consultation must be initiated with CDFG for projects that may have an adverse effect on a state-listed species in accordance with the state lead agency.

Fish and Game Code Section 2080 prohibits the taking of state-listed plants and animals. CDFG also has the authority to designate state endangered and rare plants and provide specific protection measures for identified populations under the Native Plant Protection Act of 1977. CDFG also designates “fully protected” or “protected” species as those that may not be taken or possessed without a permit from the Fish and Game Commission and/or CDFG. Species designated as fully protected or protected may or may not be listed as endangered or threatened.

CDFG also maintains a list of animal “Species of Special Concern,” most of which are species whose breeding populations in California may face extirpation. Although these species have no legal status, CDFG recommends consideration of them during analysis of the impacts of proposed projects to protect declining populations and avoid the need to list them as endangered in the future.

CDFG’s implementation of California ESA has created a program that is similar in structure to, but different in detail from, the Service program implementing Federal ESA.

Fish and Wildlife Coordination Act (FWCA)

This act establishes a general policy that fish and wildlife conservation will receive equal consideration with other project purposes and will be coordinated with other features of water resources development projects. To accomplish this policy, FWCA Section 2(b) establishes that preconstruction planning on project development will be coordinated with the Service, The FWCA authorizes the Service and state agencies responsible for fish and wildlife resources to investigate proposed Federal actions that would impound, divert, deepen, or otherwise control or modify a stream or waterbody and to make mitigation and enhancement recommendations to the involved Federal agency. According to the act, “Recommendations … shall be as specific as practicable with respect to features recommended for wildlife conservation and development, lands to be utilized or acquired for such purposes, the results expected, and shall describe the damage to wildlife attributable to the project and the measures proposed for mitigating or compensating for these damages.”

Magnuson-Stevens Fisheries Act

The Amended Magnuson-Stevens Fishery Conservation and Management Act, also known as the Sustainable Fisheries Act (Public Law 104-297), requires all Federal agencies to consult with the Secretary of Commerce on activities, or proposed activities, authorized, funded, or undertaken by that agency that may adversely affect Essential Fish Habitat. The Essential Fish Habitat provisions of the Sustainable Fisheries Act are designed to protect fisheries habitat from being lost due to disturbance and degradation.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 (16 United States Code [USC] 703–711) makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 CFR Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR 21). Disturbance that causes nest abandonment and/or loss of reproductive effort (e.g., killing or abandonment of eggs or young) may be considered a "take" and is potentially punishable by fines and/or imprisonment.

Executive Order 11990 (Protection of Wetlands)

Executive Order 11990 (Protection of Wetlands) requires Federal agencies to take actions to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands when undertaking Federal activities and programs. Any agency considering a proposal that might affect wetlands must evaluate factors affecting wetland quality and survival. These factors should include the proposal's effects on the public health, safety, and welfare due to modifications in water supply and water quality; maintenance of natural ecosystems and conservation of flora and fauna; and other recreational, scientific, and cultural uses.

6.2 Environmental Consequences

The focus of this section is on the potential for impacts or effects to terrestrial and aquatic species from actions to make water available for transfer. It also addresses whether changes would occur in water supply to the adjacent Federal and state wildlife refuges that are among the potential water users of the Proposed Program. Effects of providing Incremental Level 4 water supplies to the wildlife refuges on the surface water resources are discussed in Section 3.3.2.

6.2.1 Key Impact and Evaluation Criteria

The following discussion evaluates potential impacts and effects in the Exchange Contractors' service area and vicinity. Potential effects in the water transfer receiving areas have been addressed in documents discussed in Section 3.3. Potential biological effects related to water transfer receiving areas also have been addressed in other documents that are incorporated here by reference and discussed in Section 3.3.7, including BOs and consultation reports on related actions dealing with CVP Operations, San Luis Drainage Feature Re-evaluation, Grassland Bypass Project 2010-2019, CVP Long-Term Contract Renewals, and CVP Interim Contract Renewals:

- *Formal Endangered Species Consultation on the Operations and Maintenance Program Occurring on Bureau of Reclamation Lands within the South-Central California Area Office* (Service 2005b)
- *Biological Opinion on the Long-Term Central Valley Project and State Water Project Operations Criteria and Plan (OCAP) (NMFS 2004) and Biological Assessment* (Reclamation 2004c)
- *Biological Opinion for Formal and Early Section 7 Endangered Species Consultation on the Coordinated Operations of the Central Valley Project and*

State Water Project and the Operational Criteria and Plan to Address Potential Critical Habitat Issues (Service 2005c)

- – *Delta smelt Biological Opinion issued by the Service on December 15, 2008* (Service 2008a)
- – *Biological Opinion for salmon and steelhead (anadromous fish) issued by NMFS on June 4, 2009* (NMFS 2009)

- *Formal Consultation on the Proposed San Luis Drainage Feature Re-evaluation; California Least Tern, Giant Garter Snake, and San Joaquin Kit Fox; Fresno, Kings, and Merced Counties, California* (Service 2006a)
- *Final Biological Opinion, 2010-2019 Use Agreement for the Grassland Bypass Project, Merced and Fresno Counties, California. December 18* (Service 2009a)
- *Biological Opinion on U.S. Bureau of Reclamation Long Term Contract Renewal of Friant Division and Cross Valley Unit Contracts* (Service 2001a)
- *Conclusion of Consultation on Long Term Renewal of Water Service Contracts in the Delta-Mendota Canal Unit* (Service 2005d)
- *Reinitiation and Amendment of Formal Consultation and Conference on Contra Costa Water District's Future Water Supply Implementation Program (File No. 99-F-0093) for the Renewal of the CVP Long Term Water Service Contract* (Service 2005e)
- *Final Biological Opinion, as Amended, for Long Term Renewal of the CVP Water Service Contract for the East Bay Municipal Utility District* (Service 2006b)
- *Confirmation of Early Consultation as the Final Biological Opinion, as Amended for Long Term Renewal of the CVP Service Contract for the East Bay Municipal Utility District* (Service 2006c)
- *Section 7 Consultation Biological Opinion on U. S. Bureau of Reclamation Renewal of 54 Interim and 14 Friant Contracts* (Service 2000)
- *Section 7 Compliance Under the Endangered Species Act for the Interim Renewal of Specific CVP Water Service Contracts from March 2001 to February 2002* (Service 2001b)
- *Santa Clara Habitat Conservation Plan [and Mercy Springs District Water Assignment]* (Service 2002a)
- *Biological Opinion, Interim Water Contract Renewals, March 1, 2002 - February 29, 2004 Central Valley Project* (Service 2002c)
- *Interim Water Contract Renewal Consultation for the Period March 1, 2004 through February 28, 2006* (Service undated)
- *Interim Water Contract Renewal for the Period March 1, 2006 through February 29, 2008 [18 CVP Interim Contract Renewals]* (Service 2006d)

- *Consultation on the Interim Renewal of Water Service Contracts with Westlands Water District, California Department of Fish and Game, and the Cities of Avenal, Coalinga, and Huron* (Service 2007)
- *Interim Water Contract Renewal for the Period March 1, 2008 through February 28,2010 for Cross Valley and Delta Division Contractors in San Joaquin, Santa Clara, Tulare, Fresno, Kings, and Kern Counties, California* (Service 2008b)
- *Conclusion of Consultation on the Interim Renewal of Water Service Contracts in the San Luis Water District and Panoche Water District in Merced and Fresno Counties, California* (Service 2008c)
- *Consultation on the Renewal of Interim Water Service Contracts for the 24-Month Period from March 1, 2010 through February 29, 2012 for Cross Valley and Delta Division Contractors in San Joaquin, Santa Clara, Tulare, Fresno, Kings, and Kern Counties, California* (Service 2010a)
- *Consultation on the Interim Renewal of Ten Water Service Contracts including Five with Westlands Water District for March 1, 2010 - February 29, 2012; Four Municipal and Industrial Water Service Contracts with Department of Fish & Game, and the Cities of Avenal, Coalinga, and Huron, for March 1, 2011 - February 28,2013, and the 3-Way Partial Assignment from Mercy Springs Water District to Pajaro Valley Water Management Area, Santa Clara Valley Water District, and Westlands Water District for March 1, 2010 - February 29, 2012* (Service 2010b)
- *Consultation on the Interim Renewal of Water Service Contracts with San Luis Water District and Panoche Water District* (Service 2010c)

The Proposed Program is evaluated in accordance with the Biological Resources section of the CEQA Environmental Checklist Appendix G. Several of the topics represented by questions from the checklist are not affected by the Proposed Program or are discussed elsewhere in this EIS/EIR, as explained below.

Significant biological resource impacts from the Proposed Program could occur if the project would have an adverse effect on a Federally or state-listed species, or on species proposed for listing. Significant impacts could also occur if:

b) The project would have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the CDFG or Service.

Riparian habitat in the Exchange Contractors' service area is found only along portions of the San Joaquin River and a few unchannelized reaches of streams outside of the croplands. Neither the No Action/No Project Alternative nor any of the action alternatives would result in impacts to this habitat.

d) The project interferes substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impedes the use of native wildlife nursery sites.

The Exchange Contractors' service area contains no native wildlife nursery sites. Wildlife movement through the area would not be affected by the No Action/No Project Alternative or any of the action alternatives. The project is not expected to result in any impairment to the migration of any fish species.

e) The project conflicts with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

The Exchange Contractors' service area contains no resources subject to such jurisdiction.

f) The project conflicts with the provisions of an adopted Habitat Conservation Plan; Natural Community Conservation Plan; or other approved local, regional, or state Habitat Conservation Plan.

No such plans apply to lands in the Exchange Contractors' service area that will be managed under the No Action/No Project Alternative or any of the action alternatives.

Two environmental issues from the checklist are of potential concern and are addressed in the impact analysis below. The following criteria for impacts on agricultural resources and land uses have been considered as follows:

a) The project would have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFG or Service.

No special-status plant or invertebrate species or habitat for such species is expected to occur in the lands that would be managed under the No Action/No Project Alternative or any of the action alternatives. However, several sensitive aquatic species could occur in areas affected by changes in flows resulting from this project. These potential effects are discussed below:

c) The project would have a substantial adverse effect on Federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

Federally protected wetlands in the Exchange Contractors' service area vicinity are not present in the croplands that are potentially subject to irrigation and/or temporary fallowing. However, wetlands are present in nearby wildlife refuges that would receive transfer water from this project, as well as in the San Joaquin River and its tributaries that may receive agricultural return flows. Potential effects on these wetlands are discussed below.

6.2.2 Environmental Impacts and Mitigation

The impacts of No Action/No Project and action alternatives analyzed in this section are based on incremental effects relative to existing conditions, which include the existing Program.

No Action/No Project Alternative

The No Action/No Project Alternative would result in the termination of the existing Program on February 28, 2014 (through Water Year 2013), thereby resulting in no transfers or exchange of water from the Exchange Contractors to any potential water users. However, the Exchange Contractors would continue to develop water from tailwater recovery, consistent with past practices, for their own use (not for transfer) throughout their service area (i.e., water development area). Temporary land fallowing to develop water for transfer and use outside the Exchange Contractors' service area would cease. Runoff from the Exchange Contractor's service area to adjacent watersheds would remain similar to existing conditions. However, the limited and temporary habitat provided by previously fallowed land (under existing conditions) would be offset by the foraging habitat provided by the fully farmed croplands. Further assumptions of the No Action/No Project Alternative are listed in Section 2.2.

Impact BIO-1: Effects on Special-Status Fish Species

Flows in the San Joaquin River are anticipated to increase under the No Action/No Project Alternative as a result of the SJRRP in most months and under most water supply conditions. These flow effects would be most substantial in the March and April, when flow pulses are provided under the SJRRP to provide upstream and downstream migration opportunities for anadromous salmonids. These SJRRP flow pulses are expected to benefit these species by allowing them to move into areas upstream of Highway 41,[1] where suitable conditions for spawning and rearing are being developed for anadromous salmonids. In months other than March and April, flows in the San Joaquin River under the No Action/No Project Alternative would remain the same or increase slightly (less than 10 percent). Small reductions in flow could occur during January and February in wet years. These reductions represent less than 5 percent of the total flow during those hydrologic conditions. These small flow changes are unlikely to appreciably affect habitat for fish and aquatic species. Splittail may also benefit from these elevated flows to some extent. Splittail prefer to spawn in flooded habitats along the margins of rivers. To the extent that these higher flows provide additional frequency and sufficient duration of inundation of such habitats, splittail reproduction and early survival may be increased. (These changes also would occur if the Proposed Program is implemented.)

Under the No Action/No Project Alternative, current practices of land fallowing to make about 8,000 acre-feet of water available for transfer would cease. Discontinuation of this practice would result in flows increasing by up to about 1 cfs in the San Joaquin River, which is not measurable in practical terms. This small increase in flow would not affect

[1] Gravelly Ford is located upstream of Mendota Pool and the Program Area.

habitat for aquatic species or their populations. Under CEQA, the No Action/No Project Alternative would have no impact on special-status fish species.

Impact BIO-2: Effects on Special-Status Amphibian Species

Under the No Action/No Project Alternative, no land fallowing would occur to accommodate water transfers, and the 3,200 acres of land currently fallowed under existing conditions would return to irrigated agricultural use, primarily in alfalfa, corn, cotton, oats, and tomato production. Therefore, the No Action/No Project Alternative, compared with existing conditions, could result in additional land in irrigated crops. (However, land fallowing for other purposes could continue to occur.) Because the agricultural lands within the Exchange Contractors' service area do not provide suitable habitat for special-status amphibians, the modification of fallowing practices would not affect these species. Irrigation canals in the water development area provide limited to no habitat for special-status amphibian species. Under CEQA, no impact is expected.

CTSs are currently found in the various wildlife refuges and state WAs located along the river. A portion of the Incremental Level 4 water used by these refuges is the result of water transfers from the Exchange Contractors. Under the No Action/No Project Alternative, these transfers would no longer occur and the refuges would obtain Incremental Level 4 water from other sources. Because no changes would occur in water supply to the refuges, no impact on CTS would occur at the refuges under CEQA.

Impact BIO-3: Effects on the Giant Garter Snake

Giant garter snakes are currently found in the various wildlife refuges located along the river. A portion of the Incremental Level 4 water used by these refuges is the result of water transfers from the Exchange Contractors. Under the No Action/No Project Alternative, these transfers would no longer occur, and the refuges would obtain Incremental Level 4 water from other sources (see assumptions in Section 2.2.1). Because no changes would occur in water supply to the refuges, no effect on giant garter snake would occur at the refuges.

Land fallowing would not occur for the purposes of making water available for transfers, as it does under existing conditions. Land fallowing for other purposes would continue to occur as it does under existing conditions. While rice field use by giant garter snake has not been documented in the Program area vicinity, this species is known to use rice fields north of the Delta as habitat. Other types of crops do not provide suitable habitat and are unlikely to be used by giant garter snakes. Under CEQA, the No Action/No Project Alternative would result in no direct impacts to giant garter snakes and no impacts to habitat for this species.

Impact BIO-4: Effects on the Western Pond Turtle

Under the No Action/No Project Alternative, no land fallowing would occur to accommodate water transfers, and the 3,200 acres of land currently fallowed under existing conditions would return to irrigated agricultural use, primarily in alfalfa, corn, cotton, oats, and tomato production. Therefore, the No Action/No Project Alternative, compared with existing conditions, would result in additional land in irrigated agricultural production. (However, land fallowing for other purposes could continue to occur.) Because the existing land fallowing is rotated to avoid idling the same land in up to 3 consecutive years, fallowed lands provide limited habitat for the western pond turtle. The return to agricultural use of these lands also provides limited habitat for the western pond turtle. Limited, temporary habitat provided by fallowed lands would likely be reduced, but would be replaced by the limited habitat provided by farming those acres. No impact is expected under CEQA.

Impact BIO-5: Effects on Special-Status Bird Species

Under the No Action/No Project Alternative, no land fallowing would occur to develop water for transfers, and the 3,200 acres of land currently fallowed under existing conditions would return to irrigated agricultural use, primarily in alfalfa, corn, cotton, oats, and tomato production. Therefore, the No Action/No Project Alternative, compared with existing conditions, would result in additional land in irrigated agricultural production. (However, land fallowing for other purposes could continue to occur.) Because the existing land fallowing is rotated to avoid idling the same land in up to 3 consecutive years, fallowed lands provide limited foraging habitat for the Swainson’s hawk, tricolored blackbird, mountain plover, northern harrier, and burrowing owl. The agricultural use of these lands also provides limited habitat for these species.

No direct impacts to the Swainson’s hawk, tricolored blackbird, mountain plover, northern harrier, and burrowing owl would occur. No impacts to Swainson’s hawk nesting habitat would occur. Limited, temporary foraging habitat provided by existing fallowed lands would likely be reduced, but would be replaced by the limited foraging habitat provided by farming those acres. Under CEQA, no impact is expected.

Impact BIO-6: Effects on the San Joaquin Kit Fox

Under the No Action/No Project Alternative, no land fallowing would occur to accommodate water transfers, and the 3,200 acres of land currently fallowed under existing conditions would return to irrigated agricultural use, primarily in alfalfa, corn, cotton, oats, and tomato production. Therefore, the No Action/No Project Alternative, compared with existing conditions, would result in additional land in irrigated agricultural production. (However, land fallowing for other purposes could continue to occur.) Because the existing land fallowing is rotated to avoid idling the same land in consecutive years, fallowed lands provide limited habitat for the San Joaquin kit fox. The agricultural use of these lands also provides limited habitat for the San Joaquin kit fox.

No direct impacts to the San Joaquin kit fox would occur. Limited, temporary habitat for the San Joaquin kit fox provided by existing fallowed lands would likely be reduced, but would be replaced by the limited habitat provided by farming those acres. Under CEQA, no impact is expected.

Impact BIO-7: Effects on Wetlands

The various wildlife refuges and state WAs in the vicinity of the Exchange Contractors' service area include substantial wetland areas, and wetlands are also present along the San Joaquin River and its tributaries. A portion of the Incremental Level 4 water used by the refuges and WAs is the result of water transfers from the Exchange Contractors. Under the No Action/No Project Alternative, these transfers would no longer occur and the refuges would obtain Incremental Level 4 water from other sources. Under CEQA, no direct impacts to wetlands would occur. Because no changes would occur in water supply to the refuges, no impact on wetlands would occur at the refuges.

The No Action/No Project Alternative, compared with existing conditions, would result in additional land in irrigated agricultural production from a reduction in land fallowing. The removal of 3,200 acres from being fallowed means 8,000 acre-feet of water would be consumptively used by crops. Of this 8,000 acre-feet, 5,000 acre-feet (2,000 acres assumed within FCWD) is not hydrologically connected to the San Joaquin River and would not result in return flows. The remaining 3,000 acre-feet (1,200 acres assumed within CCID and SLCC) are estimated to be partially connected and may produce return flows during the irrigation season (April through August) estimated at less than 1 cfs at the Exchange Contractors' service area boundary. At other times of the year, no change would occur from no return flows. Therefore, agricultural return water flow to the San Joaquin River from various tributaries could be greater under the No Action/No Project Alternative by less than 1 cfs (Appendix B, pages 49, 68, and 69). The effect of this very small amount of return flow, which would be of lower quality than either surface water deliveries or existing river conditions, is not substantial. Under CEQA, the impact to wetlands on the San Joaquin River or its tributaries from an increase in agricultural return flows of less than 1 cfs is less than significant.

Alternative A: 50,000 Acre-Feet

Alternative A would develop for transfer up to 50,000 AFY of water from the Exchange Contractors' service area to receiving districts/wildlife refuges, in any type of water year under the Exchange Contract and with all of the water developed from crop idling and temporary land fallowing. This transfer would require an estimated 20,000 acres of land fallowing (an increase of 20,000 acres compared to No Action/No Project), which represents an increase of 16,800 acres relative to the existing Program (with 3,200 acres). Fallowed land would be rotated to avoid idling the same land in consecutive years. No conservation water transfers would occur, but the Exchange Contractors would continue past practices and develop the conserved water including tailwater for their own use.

Impact BIO-1: Effects on Special-Status Fish Species

An additional 42,000 acre-feet of water would be made available for transfer by land fallowing under Alternative A. All other water conservation and tailwater recovery measures would be the same as under existing conditions. The additional land fallowing would have some minor effects on flow levels in the adjoining waterways potentially including Mud Slough South, Salt Slough and the San Joaquin River. As described in Section 4.2.1.1 (Surface Water Resources) and Appendix B, this alternative would result in flow reductions of up to 2 cfs in the San Joaquin River before any New Melones Reservoir adjustment (Appendix B, Table 26). These decreases would occur in April through August, the primary irrigation season. In the remaining months, decreases would be less than 1 cfs. Adding in the New Melones adjustments, flows would remain the same or decrease by a maximum of 4 cfs at Vernalis (Appendix B, Table 27). During the months of March through August, flows at Vernalis typically range from 900 to 1,800 cfs even in critically dry years. Thus, the flow reduction resulting from Alternative A is less than 0.5 percent, and no impact would be expected on aquatic resources in the Delta.

The maximum level of effect from this Alternative A would occur in the San Joaquin River and Mud Slough South, and Salt Slough in the vicinity of the Exchange Contractors' service area boundaries. This flow reduction of up to 2 cfs would be spread among all of these waterways, depending on the specific pattern of land fallowing.

The average daily flows for these waterways are shown by month in Tables 6-2 and 6-3. The flows shown in Table 6-2 reflect the flows in the San Joaquin River upstream of the confluence of Salt Slough. The flows downstream of Salt Slough would be the sum of the flows in Tables 6-2 and 6-3. These are the flows that would be present downstream as far as the confluence of Mud Slough North. Note that flows after October 2009 include interim flows from the SJRRP, whereas these flow releases were not made prior to this time.

The flows shown in Table 6-3 are the flows in Salt Slough near Highway 165 and reflect the combined flows of Salt Slough and Mud Slough South. These flows are relatively evenly divided between the two sloughs (D. Steiner, pers. comm., 2011). Flow in these sloughs is not affected by the SJRRP.

Hydrologic analysis indicates that none of the fallowed lands would drain directly to the San Joaquin River (D. Steiner, pers. comm., 2011), so impacts there would occur downstream of the confluence of Salt Slough. Based on the average flows in these waterways and assuming an even division of flow between Mud and Salt sloughs, the largest reduction in flow would be 3 percent at the driest time of year (September) under the driest conditions (2008). Under average flows in September, the reduction would be less than 2 percent. These reductions would be even smaller in the San Joaquin River, as the effect would occur downstream of Salt Slough and, thus, occur to the combined flow of Salt Slough and the San Joaquin River. Flows in the San Joaquin River at this time of year would also be augmented by about 50 cfs by the SJRRP in the future, so an overall net increase in flow in the San Joaquin River would occur.

Table 6-2
San Joaquin River Flow near Stevenson (cfs)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2004	27	83	128	6	11	16	16	13	4	14	24	100
2005	2,227	1,093	1,088	399	1,657	1,614	90	45	12	20	40	106
2006	670	122	739	1,2565	10,602	6,114	699	168	50	30	53	63
2007	34	113	116	34	19	27	31	27	14	12	7	10
2008	333	438	85	15	12	5	6	5	8	17	53	27
2009	18	127	86	12	13	17	3	5	9	19	46	52
2010	274	225										
Average	**471**	**324**	**386**	**1,958**	**2,052**	**1,299**	**141**	**47**	**17**	**19**	**37**	**59**

Source: CDEC Station SJS accessed October 11, 2011

Table 6-3
Average Monthly Flow in Salt Slough (cfs)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2004							144	131	90	105	177	122
2005	302	431	470	247	237	142	202	176	147	133	180	198
2006	332	337	454	1,444	1,035	668	220	184	99	160	206	136
2007	216	263	277	148	151	142	139	96	77	113	118	129
2008	192	216	266	151	127	115	112	89	63	66	122	75
2009	67	170	209	136	120	122	137	111	79	120	161	109
2010	168	234	507	304	186	196	178	191	117	145	215	284
2011	678	384	884	1,181	511	409	357	238	186			
Average	**279**	**290**	**440**	**516**	**338**	**256**	**188**	**152**	**106**	**120**	**168**	**150**

Source: CDEC Station SSH, accessed October 10, 2011

Flow reductions in the San Joaquin River could affect spring-run and fall-run Chinook salmon (introduced as part of the SJRRP), steelhead (taking advantage of the improved conditions provided by the SJRRP), splittail, and hardhead. Salmonids would only be present during the cooler portions of the year, when flows are higher and so would not be affected by these minor flow reductions (less than 1 percent). Splittail and hardhead are more likely to be present during the drier times of year and, thus, would have a greater potential to be affected. However, the Program-related flow changes are so small, even under the worst-case scenarios described above, that these species would not be affected by these reductions. Splittail are unlikely to be present except possibly in wet years (Moyle 2002) and, therefore, would experience almost no reduction in habitat as flow levels in the waterways would be higher. Hardhead are unlikely to be present at all, due to poor habitat and the presence of introduced bass and sunfish (Moyle 2002). This reduction in habitat would not be important at the population level, as this area represents a small area of poor quality habitat in these species' entire range.

Under the SJRRP implementation, barriers are to be constructed across the mouths of Mud Slough North and Sand Slough to prevent anadromous salmonids from entering these sloughs once populations become reestablished in the San Joaquin River. The sensitive fish species that may occur in these sloughs would be splittail and hardhead, although these species would likely also be precluded from entering these channels by the fish barriers. In Salt Slough, the flow reductions are small enough that no effects are likely to occur to either species.

Alternative A would result in minimal reductions in flow in waterways within and adjacent to the Exchange Contractors' service area and to downstream waterways. These flow reductions would not substantially affect habitat and would have a less-than-significant impact on sensitive fish species under CEQA.

Impact BIO-2: Effects on Special-Status Amphibian Species

As described above for Impact BIO-1, Alternative A, decreases of up to 2 cfs would occur in April through August in the San Joaquin River. In the remaining months decreases would be 1 cfs or less. However, the Program-related flow changes are so small, even under the worst-case scenarios described above, that habitat for CTS on the wildlife refuges and state WAs would not be affected by these reductions. Incremental Level 4 water deliveries to the wildlife refuges would continue, either through water purchases from the Exchange Contractors under the Proposed Program or from other water users. Because the agricultural lands within the Exchange Contractors' service area do not provide suitable habitat for special-status amphibians, the modification of fallowing practices to increase temporary land fallowing by as much as 16,800 acres would not affect these species. Irrigation canals in the water development area provide limited to no habitat for special-status amphibian species. Alternative A would result in small flow changes to aquatic habitat. They would result in a less-than-significant impact to special-status amphibian species and their habitat under CEQA.

Impact BIO-3: Effects on the Giant Garter Snake

In the Program area vicinity, giant garter snakes are likely to occur in the wildlife refuges when water is present, or in the waterways around the refuges, including Salt and Mud sloughs. This alternative may reduce the amount of water available for transfer from the Exchange Contractors to the refuges. This Incremental Level 4 water would be obtained from the Exchange Contractors under the Proposed Program or from other sources and, therefore, no reduction in habitat would occur. Alternative A would have no effect on water deliveries to the refuges.

The reduction of flows in the San Joaquin River, Salt Slough, and Mud Slough would not be substantial as these reductions would be small (<2 cfs). Under a worst-case scenario, this amount would correspond to a 6 percent reduction in the total flow under the driest conditions, if all of the flow reduction occurred in a single channel (see Impact BIO-1). As such, these waterways would continue to provide suitable habitat for prey species for giant garter snake, as well as the same migratory corridors that currently exist. Giant garter snake may utilize these waterways occasionally, but they are not primary habitat for this species (Service 2009b). Under CEQA, these changes in flow would have a less-than-significant impact on giant garter snakes and their habitat.

Fallowing of land has the potential to affect habitat for giant garter snake. While rice field use by giant garter snake has not been documented in the Program area vicinity, this species is known to use rice fields north of the Delta as habitat. Other types of crops do not provide suitable habitat and are unlikely to be used by giant garter snakes. Rice is not the most likely crop to be fallowed, because it has a lower consumptive water use than other crops and, thus, would not make as much water available for transfer as would other crops. A review of fallowing records from 2008 to 2010 indicates that only one parcel fallowed during that period had been planted in rice in any of the preceding 3 years, and that parcel represented about one-fifth of the land fallowed in that year. Most land fallowing is expected to occur in the southern CCID area, in areas not adjacent to the refuges where giant garter snake is known to occur. Consequently, land fallowing is not likely to substantially affect giant garter snake; under CEQA, the impact on giant garter snake habitat is less than significant.

Impact BIO-4: Effects on the Western Pond Turtle

Alternative A would transfer up to 50,000 AFY of water from the Exchange Contractors' service area, requiring the fallowing of an estimated 20,000 acres of land (compared to No Action/No Project), and an increase of 16,800 acres from the existing Program. (However, land fallowing for other purposes could continue to occur.) Because land fallowing is rotated to avoid idling the same land in up to 3 consecutive years, fallowed lands provide limited habitat for the western pond turtle. The agricultural use of these lands also provides limited habitat for the western pond turtle. Under CEQA, the impact is less than significant.

As described above for Impact BIO-1, Alternative A, decreases of 0-2 cfs would occur in April through August in the San Joaquin River downstream of Salt Slough. In the remaining months decreases would be 1 cfs or less. The Program-related flow changes are so small, even under the worst-case scenarios described above, that aquatic habitat for the western pond turtle would not be affected by these reductions. Under CEQA, the impact is less than significant.

Impact BIO-5: Effects on Special-Status Bird Species

Alternative A would transfer up to 50,000 AFY of water from the Exchange Contractors' service area, requiring the fallowing of up to an estimated 20,000 acres of land, an increase of 16,800 acres from the existing Program. (However, land fallowing for other purposes could continue to occur.) Because land fallowing is rotated to avoid idling the same land in up to 3 consecutive years, fallowed lands provide limited habitat for Swainson's hawk, tricolored blackbird, mountain plover, northern harrier, and burrowing owl. The agricultural use of these lands also provides limited habitat for Swainson's hawk, tricolored blackbird, mountain plover, northern harrier, and burrowing owl. No direct impacts to Swainson's hawk, tricolored blackbird, mountain plover, northern harrier, and burrowing owl would occur. No impacts to Swainson's hawk nesting habitat would occur. The limited foraging habitat provided by croplands for these species would be reduced**.** Additional, but limited, temporary habitat would be provided by fallowed lands. Under CEQA, no impact is expected.

Impact BIO-6: Effects on the San Joaquin Kit Fox

Alternative A would transfer up to 50,000 AFY of water from the Exchange Contractors' service area, requiring the fallowing of up to an estimated 20,000 acres of land, an increase of 16,800 acres from the existing Program. (However, land fallowing for other purposes could continue to occur.) Because land fallowing is rotated to avoid idling the same land in up to 3 consecutive years, fallowed lands provide limited habitat for the San Joaquin kit fox. The agricultural use of these lands also provides limited habitat for the San Joaquin kit fox. No direct impacts to the San Joaquin kit fox would occur. The limited habitat provided by croplands for this species would be reduced**.** Additional, but limited, temporary habitat would be provided by fallowed lands. Under CEQA, no impact is expected.

Impact BIO-7: Effects on Wetlands

As described above for Impact BIO-1, Alternative A, decreases of 0-2 cfs would occur in April through August in the San Joaquin River downstream of Salt Slough. In the remaining months decreases would be 1 cfs or less. The Program-related flow changes are so small, even under the worst-case scenarios described above, that wetlands on the wildlife refuges, state WAs, the San Joaquin River, and its tributaries would not be affected by these reductions. No direct impacts to wetlands would occur. Small flow changes to aquatic habitat would result in a less-than-significant impact to wetlands under CEQA.

Alternative B: 88,000 Acre-Feet

Alternative B would provide up to 88,000 acre-feet of water during any noncritical Exchange Contract year through a combination of conservation and crop idling/land fallowing, with a maximum of 50,000 AFY to come from temporary crop idling/land fallowing on up to 20,000 acres, an increase of up to 16,800 acres compared to existing conditions. Assuming full development of fallowed land water, the remaining 38,000 AFY made available for transfer would come from a combination of tailwater and other conservation opportunities already in place. As much as 80,000 acre-feet could be developed from conservation/tailwater recovery with only 8,000 acre-feet from land fallowing.

Impact BIO-1: Effects on Special-Status Fish Species

Under Alternative B, the Exchange Contractors could make as much water available for transfer as they have in recent years. The primary difference between this alternative and existing conditions is that up to 50,000 acre-feet could be made available through land fallowing, as compared to 8,000 acre-feet under the existing Program. No effect on fish species would occur relative to the existing conditions, if the mix of water from conservation measures and land fallowing remains similar. If the maximum amount of land fallowing is implemented, then the effects would be similar to those under Alternative A. Based on the maximum potential effect of 16,800 acres of land fallowing, these flow reductions would not substantially affect habitat.

Alternative B could result in minimal reductions in flow in Program area waterways and downstream waterways. The extent of these reductions would depend on the amount of land fallowing that occurred in any year and the location of the fallowed lands. Based on the maximum potential effect of Alternative B, these flow reductions would have a less-than-significant impact on sensitive fish species under CEQA.

Impact BIO-2: Effects on Special-Status Amphibian Species

The primary difference between Alternative B and existing conditions is that up to 50,000 acre-feet could be made available through land fallowing, as compared to 8,000 acres under the existing Program. No effect of this alternative relative to the existing conditions would occur if the mix of water from conservation measures and land fallowing remains similar. If the maximum amount of land fallowing is implemented, then the effects would be similar to those under Alternative A.

Because the agricultural lands within the Exchange Contractors' service area do not provide suitable habitat for special-status amphibians, the modification of fallowing practices to increase temporary land fallowing by as much as 16,800 acres would not affect these species. Irrigation canals in the water development area provide limited to no habitat for special-status amphibian species. Alternative B would result in small flow changes to aquatic habitat, which would result in a less-than-significant impact to special-status amphibian species and their habitat under CEQA.

Impact BIO-3: Effects on the Giant Garter Snake

Alternative B would make about the same amount of water available for transfer as occurs under existing conditions. This alternative would not result in a change the available Incremental Level 4 water supplies for the refuges.

Alternative B could result in similar amounts of land fallowing as described under Alternative A, with the same effects. Alternative B would have no effect on water deliveries to the refuges. This alternative would result in small changes in flow in the San Joaquin River and its tributaries. These changes would have a less-than-significant impact on giant garter snakes and their habitat under CEQA.

Impact BIO-4: Effects on the Western Pond Turtle

Alternative B would provide up to 88,000 acre-feet of water during any year through a combination of conservation and crop idling/land fallowing Because land fallowing is rotated to avoid idling the same land in up to 3 consecutive years, fallowed lands provide limited habitat for the western pond turtle. The agricultural use of these lands also provides limited habitat for the western pond turtle. Water conservation would not impact terrestrial habitat for the western pond turtle.

Similar to Alternative A for agricultural return flows, decreases of 0-2 cfs under Alternative B would occur in April through August in the San Joaquin River. In the remaining months decreases would be 1 cfs or less. However, the Program-related flow changes are so small, even under the worst-case scenarios described above, that aquatic habitat for the western pond turtle would not be affected by these reductions. Alternative B would result in small flow changes to aquatic habitat, which would result in a less-than-significant impact to western pond turtle and its habitat under CEQA.

Impact BIO-5: Effects on Special-Status Bird Species

Alternative B would provide up to 88,000 acre-feet of water during any year through a combination of conservation and crop idling/land fallowing. Because land fallowing is rotated to avoid idling the same land in up to 3 consecutive years, fallowed lands provide limited habitat for Swainson’s hawk, tricolored blackbird, mountain plover, northern harrier, and burrowing owl. The agricultural use of these lands also provides limited habitat for bird species, and water conservation would not affect habitat for Swainson’s hawk, tricolored blackbird, mountain plover, northern harrier, and burrowing owl. No direct impacts to Swainson’s hawk, tricolored blackbird, mountain plover, northern harrier, and burrowing owl would occur. No impacts to Swainson’s hawk nesting habitat would occur. The limited foraging habitat provided by croplands for these species would be reduced. Additional, but limited, temporary habitat would be provided by fallowed lands. No impact is expected under CEQA.

Impact BIO-6: Effects on the San Joaquin Kit Fox

Alternative B would provide up to 88,000 acre-feet of water during any year through a combination of conservation and crop idling/land fallowing. Because land fallowing is rotated to avoid idling the same land in up to 3 consecutive years, fallowed lands provide limited habitat for the San Joaquin kit fox. The agricultural use of these lands also provides limited habitat for the San Joaquin kit fox. Water conservation would not affect habitat for the San Joaquin kit fox. No direct impacts to the San Joaquin kit fox would occur, and no impact would occur under CEQA.

Impact BIO-7: Effects on Wetlands

The primary difference between Alternative B and existing conditions is that up to 50,000 acre-feet could be made available through land fallowing, as compared to 8,000 acres under the existing Program. No effect from this alternative on wetlands would occur relative to the existing conditions if the mix of water from conservation measures and land fallowing remains similar. If the maximum amount of land fallowing is implemented, then the effects would be similar to those under Alternative A. No direct impacts to wetlands would occur. Alternative B would result in small flow changes to aquatic habitat, which would result in a less-than-significant impact to wetlands under CEQA.

Alternative C: 130,000 Acre-Feet

Alternative C makes available up to 130,000 acre-feet of water annually during any noncritical Exchange Contract year, similar to the maximum level of water transfer allowed under the existing Program. Under this alternative, up to 80,000 acre-feet of water is made available through conservation, including tailwater recovery, and a maximum of 50,000 acre-feet of water would come from temporary crop idling/land fallowing.

Impact BIO-1: Effects on Special-Status Fish Species

Under existing conditions, the Exchange Contractors have already developed up to 80,000 acre-feet of water for transfer using conservation, so there would be no effect from these conservation measures relative to the existing condition. The amount of land fallowing would increase under Alternative C to the same level as discussed for Alternative A with the same effect on agricultural return flows. As such, the effects of Alternative C on special-status fish species would be the same as described for Alternative A. Alternative C would result in minimal reductions in flow in Program waterways and downstream waterways. These flow reductions would not substantially affect habitat and would have a less-than-significant impact to sensitive fish species under CEQA.

Impact BIO-2: Effects on Special-Status Amphibian Species

Alternative C would be the same as existing conditions with regard to water made available from conservation measures. This alternative would increase the amount of water made available from land fallowing and result in small reductions in agricultural return flows, to the same extent as Alternative A, and would have the same effects on aquatic habitat. Alternative C would result in small flow changes to aquatic habitat, which would result in a less-than-significant impact on habitat for special-status amphibians under CEQA.

Impact BIO-3: Effects on the Giant Garter Snake

Alternative C would be the same as existing conditions with regard to water made available from conservation measures and would have no change in Incremental Level 4 water deliveries to the wetlands (because Reclamation could purchase water for the refuges under the Proposed Program or from other sources) and, therefore, would have no effect on giant garter snake in these areas. It would increase the amount of water made available from land fallowing and result in small decreases in agricultural return flows to the San Joaquin River and its tributaries/waterways to the same degree as envisioned in Alternative A, and as such would have the same effects on giant garter snake and their habitat. Alternative C's small effect on flows would have a less-than-significant impact on giant garter snakes and their habitat under CEQA.

Impact BIO-4: Effects on the Western Pond Turtle

Alternative C makes available up to 130,000 acre-feet of water annually during any year through conservation, including tailwater recovery, and temporary crop idling/land fallowing. Because land fallowing is rotated to avoid idling the same land in up to 3 consecutive years, fallowed lands provide limited habitat for the western pond turtle. The agricultural use of these lands also provides limited habitat for the western pond turtle. Water conservation would not affect terrestrial habitat for the western pond turtle. Small changes in agricultural return flows from land fallowing are similar to Alternative A, i.e., a less-than-significant impact under CEQA.

Impact BIO-5: Effects on Special-Status Bird Species

Alternative C makes available up to 130,000 acre-feet of water annually during any year through conservation, including tailwater recovery, and from temporary crop idling/land fallowing. Because land fallowing is rotated to avoid idling the same land in consecutive years, fallowed lands provide limited habitat for Swainson's hawk, tricolored blackbird, mountain plover, northern harrier, and burrowing owl. The agricultural use of these lands also provides limited habitat for these bird species. Water conservation would not affect habitat for Swainson's hawk, tricolored blackbird, mountain plover, northern harrier, and burrowing owl and under CEQA would have no impact to these species.

Impact BIO-6: Effects on the San Joaquin Kit fox

Alternative C makes available up to 130,000 acre-feet of water annually during any year through conservation, including tailwater recovery, and temporary crop idling/land fallowing. Because land fallowing is rotated to avoid idling the same land in up to 3 consecutive years, fallowed lands provide limited habitat for the San Joaquin kit fox. The agricultural use of these lands also provides limited habitat for the San Joaquin kit fox. Water conservation would not affect habitat for the San Joaquin kit fox. Under CEQA, no impact would occur to San Joaquin kit fox.

Impact BIO-7: Effects on Wetlands

Alternative C would be the same as existing conditions for wetlands with regard to water made available from conservation measures. This alternative would increase the amount of water made available from land fallowing to the same extent as Alternative A and would have the same effects on wetlands from small changes to flows, which under CEQA is a less-than-significant impact to wetlands.

Alternative D: 150,000 Acre-Feet

Alternative D expands the existing Program and Alternative C with a maximum transfer of 150,000 acre-feet. The additional 20,000 acre-feet made available for transfer would come from conservation activities, rather than temporary land fallowing/crop idling. Because the capacity of existing conservation activities is about 80,000 acre-feet, new conservation projects would be implemented to generate the incremental water required under this alternative and would exclude new tailwater recovery. These new measures include the lining of canals and implementation of on-farm irrigation or district conveyance system improvements that would not have a hydrologic effect on the San Joaquin River. As with the other action alternatives, a maximum of 20,000 acres could be fallowed under Alternative D.

Impact BIO-1: Effects on Special-Status Fish Species

The additional 20,000 acre-feet of water made available for transfer under this alternative relative to Alternative C would come via conservation measures that would not include tailwater recovery and would have no hydrologic effects in the San Joaquin River. Therefore, this alternative would not cause additional effects on special-status fish species beyond those described for Alternative C. The effects of land fallowing to create additional transfer water would be the same as for Alternative A. Under CEQA, Alternative D would result in minimal reductions in flow in Program waterways and downstream waterways. These flow reductions would not substantially affect habitat and would have a less-than-significant impact to sensitive fish species.

Impact BIO-2: Effects on Special-Status Amphibian Species

The additional 20,000 acre-feet of water made available for transfer under Alternative D relative to Alternative C would come from conservation measures that would not include tailwater recovery and would have no hydrologic effects in the San Joaquin River. This alternative would not cause additional effects on special-status amphibians beyond those described for Alternative C. The effects of land fallowing to create additional transfer water would be the same as for Alternative A. Under CEQA, Alternative D would result in small flow changes to aquatic habitat that would result in a less-than-significant impact on special-status amphibians and their habitat.

Impact BIO-3: Effects on the Giant Garter Snake

The additional 20,000 acre-feet of water made available for transfer under this alternative relative to Alternative C would come via conservation measures that would not include tailwater recovery and would have no hydrologic effects in the San Joaquin River. This alternative would not cause additional effects on giant garter snake beyond those described for Alternative C. The effects of land fallowing to create additional transfer water would be the same as for Alternative A. Under CEQA, these small changes in flow in the San Joaquin river and its tributaries would have a less-than-significant impact on giant garter snakes and their habitat.

Impact BIO-4: Effects on the Western Pond Turtle

Alternative D expands the existing Program with a maximum transfer of 150,000 acre-feet. As with the other action alternatives, a maximum of 20,000 acres could be fallowed under Alternative D. This alternative would not cause additional effects on western pond turtle beyond those described for Alternative C. The effects of land fallowing on agricultural return flows would be the same as for Alternative A. Because land fallowing is rotated to avoid idling the same land in up to 3 consecutive years, fallowed lands provide limited habitat for the western pond turtle. The agricultural use of these lands also provides limited habitat for the western pond turtle. Water conservation would not affect terrestrial habitat for the western pond turtle. Alternative D would result in small flow changes to aquatic habitat that would result in a less-than-significant impact to western pond turtle and its habitat under CEQA.

Impact BIO-5: Effects on Special-Status Bird Species

Alternative D expands the existing Program with a maximum transfer of 150,000 acre-feet. As with the other action alternatives, a maximum of 20,000 acres could be fallowed under Alternative D. The additional 20,000 acre-feet made available for transfer would come from conservation activities. Because land fallowing is rotated to avoid idling the same land in up to 3 consecutive years, fallowed lands provide limited habitat for Swainson's hawk, tricolored blackbird, mountain plover, northern harrier, and burrowing owl. The agricultural use of these lands also provides limited habitat for these bird species. Water conservation would not affect habitat for Swainson's hawk, tricolored blackbird, mountain plover, northern harrier, and burrowing owl. Under CEQA, no impact to special-status bird species would occur from Alternative D.

Impact BIO-6: Effects on the San Joaquin Kit Fox

As explained above for Impact BIO-5, Alternative D expands the existing Program with a maximum transfer of 150,000 acre-feet. Because land fallowing is rotated to avoid idling the same land in up to 3 consecutive years, fallowed lands provide limited habitat for the San Joaquin kit fox. The agricultural use of these lands also provides limited habitat for the San Joaquin kit fox. Water conservation would not affect habitat for the San Joaquin kit fox. Under CEQA, no impacts to San Joaquin kit fox would occur from Alternative D.

Impact BIO-7: Effects on Wetlands

The additional 20,000 acre-feet of water made available for transfer under Alternative D relative to Alternative C would come via conservation measures that would not include tailwater recovery and would have no hydrologic effects in the San Joaquin River. This alternative would not cause additional effects on wetlands beyond those described for Alternative C. The effects of land fallowing to create additional transfer water would be the same as for Alternative A. Alternative D would result in small flow changes to aquatic habitat, which would result in a less-than-significant impact to wetlands under CEQA.

6.2.3 Cumulative Effects

The analysis of impacts to aquatic and terrestrial biological resources addresses several types of impacts including effects associated with reducing or eliminating agricultural production due to land fallowing and or dryland farming and the effects of water conservation on water quality in the Exchange Contractors' service area and agricultural return flows to the San Joaquin River and its tributaries within the Program area vicinity.

The Proposed Water Transfer Program's potential small effects on flows in Mud Slough South, Salt Slough, and the San Joaquin River downstream of the confluence with Salt Slough were considered cumulatively with the Grassland Bypass Project and other water conservation, discharge reductions, and water transfer activities occurring within the region, as all of these actions could affect flows in the waterways within and adjacent to the Exchange Contractors' service area. The Grassland Bypass Project provided mitigation to reduce the impacts of the San Joaquin River Water Quality Improvement Project's drainage reuse area to nesting birds. This project also creates potential habitat for giant garter snake. None of the other projects and activities were found to have significant effects on flow, or flow-related habitat, in and of themselves, but the combined effect of these other projects is considered here.

The Proposed Program occurs in a regional context in which the following factors affect streamflows:

- Substantially reduced water availability
- Regulatory requirements to increase water use efficiency
- Regulatory requirements to reduce the amount of naturally occurring elements such as selenium and boron, farm chemicals including pesticides and herbicides, and other constituents from agricultural runoff

The agricultural community has responded to these challenges and has substantially increased the efficiency with which irrigation water is used and has reduced runoff containing constituents as required by regulatory authorities. To meet these regulatory requirements, however, less water is allowed to run off the farms and into Mud Slough South, Salt Slough, other waterways and, ultimately, the San Joaquin River, which provide aquatic habitat in the San Joaquin Valley. These combined water conservation and water quality improvement efforts have the potential to contribute to the cumulative loss of habitat for aquatic species. However, less-than-significant decreases in aquatic habitat from the Program alternatives and from the regulatory and conservation measures cumulatively are not likely to be significant because of the offsetting effects of the RWSP and SJRRP. The RWSP will provide water to enhance the aquatic habitat in the wildlife refuges in the region, including the adjacent Grassland Resource Conservation District. These incremental Level 4 water supplies (up to 116,065 AFY) are obtained from the Exchange Contractors and/or other willing sellers, as explained in Section 1.2.1, to meet the water supply needs for full habitat development. Additional aquatic habitat will also be created in the region by the SJRRP, which will result in increased flows in the San Joaquin River (except perhaps in Reach 4B) during the drier times of year.

In summary, the cumulative effect of regulatory efforts such as reduction in loads and the consequent reduction in flow discharged through Mud and Salt sloughs, together with the possible slight increase in flows due to the No Action/No Project Alternative or the slight decrease in flows due to the action alternatives, and the ongoing enhancement of aquatic habitat in the San Joaquin Valley through the RWSP (combined with careful management of those resources by the individual wildlife refuge managers) and the SJRRP is not significant. As described in this section, increased land fallowing resulting from implementation of the action alternatives would result in relatively minor impacts to terrestrial biological resources, if any. As a result, the Proposed Program would not have a cumulative effect on terrestrial biological resources in the region.

6.2.4 Impact and Mitigation Summary

Land in Exchange Contractors' service area that would be affected by Program alternatives is agricultural. However, the land fallowed would either be dryland farmed or maintained in a manner to preserve its agricultural integrity and viability, and fallowing on any one parcel would only be temporary.

The alternatives presented herein would result in minor decreases in flows in the San Joaquin River and its tributaries of 0 to 2 cfs. These flow changes would result in no significant impacts to special-status aquatic species, and no mitigation is required.

In summary, none of the action alternatives would result in potentially significant impacts on biological resources within the Exchange Contractors' service area or the Program area and vicinity. Table 6-4 summarizes the impacts of the No Action/No Project and action alternatives on biological resources under CEQA. The existing conditions set the baseline against which the alternatives are evaluated for CEQA.

Table 6-4
Summary Comparison of Biological Resources Impacts of Alternatives and Mitigation Measures

Environmental Concern		Alternative	Impact Before Mitigation	Mitigation Measures	Impact After Mitigation
Biological Resources					
BIO-1	Effects on special-status fish species	No Action	N	not applicable	--
		A	LTS	not required	--
		B	LTS	not required	--
		C	LTS	not required	--
		D	LTS	not required	--
		Cumulative	LTS	not required	--
BIO-2	Effects on special-status amphibian species	No Action	N	not applicable	--
		A	LTS	not required	--
		B	LTS	not required	--
		C	LTS	not required	--
		D	LTS	not required	--
		Cumulative	LTS	not required	--
BIO-3	Effects on the giant garter snake	No Action	N	not applicable	--
		A	LTS	not required	--
		B	LTS	not required	--
		C	LTS	not required	--
		D	LTS	not required	--
		Cumulative	LTS	not required	--
BIO-4	Effects on the western pond turtle	No Action	N	not applicable	--
		A	LTS	not required	--
		B	LTS	not required	--
		C	LTS	not required	--
		D	LTS	not required	--
		Cumulative	LTS	not required	--
BIO-5	Effects on special-status bird species	No Action	N	not applicable	--
		A	N	not required	--
		B	N	not required	--
		C	N	not required	--
		D	N	not required	--
		Cumulative	N	not required	--
BIO-6	Effects on the San Joaquin kit fox	No Action	N	not applicable	--
		A	N	not required	--
		B	N	not required	--
		C	N	not required	--
		D	N	not required	--
		Cumulative	N	not required	--
BIO-7	Effects on wetlands	No Action	N	not applicable	--
		A	LTS	not required	--
		B	LTS	not required	--
		C	LTS	not required	--
		D	LTS	not required	--
		Cumulative	LTS	not required	--

CEQA:
N = no impact
LTS = less than significant
PS = potentially significant
PSU = potentially significant and unavoidable

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7.0 Land Use and Agriculture

This section evaluates the potential land use and agricultural impacts of the Exchange Contractors' proposed 25-year Water Transfer Program. The focus here is on the potential effects associated with increases in agricultural land fallowing and implementation of new water conservation projects as required to meet the requirements for water to be transferred under the Program alternatives.

7.1 Affected Environment/Environmental Setting

This section describes current land uses that could be affected by the Program alternatives and represents existing conditions in the Exchange Contractors' service area. The primary land use in the Exchange Contractors' service area is agriculture, which is the focus of this section.[1] The topics covered here include existing agricultural conditions focusing on cropping patterns, information on "Important Farmland" as identified by the California Department of Conservation, and Williamson Act contracts. From a land use planning perspective, information is also provided on current zoning and general plan designations at the regional level. Collectively, this information provides context to the analysis of agricultural and land use impacts presented in Section 7.2. The data used to characterize existing agricultural land uses in the Program area are based on a variety of state and local sources.

More specific to the Proposed Program, this section also presents information on the applicable agricultural land fallowing policies specific to the Exchange Contractors' member districts as it relates to land management requirements. Lastly, it includes the analysis of existing land use and agricultural impacts attributed to the existing Program, which represents the baseline against which the Proposed Program is evaluated under CEQA.

For each topic covered in this section, information is presented at both the regional and local levels. Member districts of the Exchange Contractors include FCWD, CCID, SLCC, and CCC. The four agencies are located within Stanislaus, Merced, Madera, and Fresno counties. Information covering the four-county region is presented to provide context to agricultural land uses found within the Exchange Contractors' service area. Following each regional discussion, agricultural land use information specific to the Exchange Contractors' service area is also presented to the extent data are available.

[1] The Exchange Contractors' service area has other land uses, including some limited residential development, primarily in conjunction with agricultural operations; however, the Proposed Program would not affect these uses because none of the water development activities occur in residential area and, therefore, are excluded from further consideration.

7.1.1 Agricultural Land Use and Cropping Patterns

Agriculture is one of the primary land uses within the four-county region and Exchange Contractors' service area and is an important component of the local and regional economies.

Four-County Region

The four-county region is located in the San Joaquin Valley of California, an area characterized by highly productive agricultural land. A wide range of agricultural crops are produced in the four-county region. For this analysis, crops were organized into the following categories: alfalfa (including seed), cotton, field crops, permanent crops,[2] melons, vegetables, grains, rice, and pasture/hay/forage. Current cropping patterns in the four-county region are presented in Table 7-1. On average, nearly 4.7 million acres of land were in crop production annually in the four-county area between 2005 and 2009. Pasture/hay/forage is the largest single crop group grown in the area (by acres), covering nearly 2.5 million acres and accounting for 52.3 percent of total farmland, followed by permanent crops (19.9 percent) and field crops (9.5 percent).

Table 7-1
Annual Average Crop Acreage in the Four-County Area (2005-2009)

Crop Group	Acres	Percent of Acres
Alfalfa hay and seed	249,246	5.3%
Cotton	184,690	3.9%
Other field crops	445,689	9.5%
Permanent crops (fruits, nuts, trees, vines)	931,613	19.9%
Melons	36,950	0.8%
Vegetables	302,309	6.4%
Grains	79,139	1.7%
Rice	7,977	0.2%
Pasture/hay/forage	2,453,924	52.3%
TOTAL	**4,691,537**	**100.0%**

Source: U.S. Department of Agriculture, National Agricultural Statistics Service 2006-2010

Land in farms consists primarily of agricultural land used for pasture, grazing, or crop production. Table 7-2 shows the total number of farms, amount of land in farms, average size of farms, and total harvested cropland for each county in the region (as of 2002). As shown, Fresno County had the greatest number of farms (6,281), the greatest amount of land in farms (over 1.9 million acres), and the greatest amount of harvested cropland (almost 1.1 million acres). Merced County had the smallest number of farms (1,780), the smallest amount of land in farms (over 682,000 acres), and the smallest amount of harvested cropland (nearly 315,000 acres); however, it did have the largest average size of farms (383 acres). In total, the four-county region contained nearly 15,300 farms, which represents over 19 percent of the statewide total and the average farm size is

[2] Fruit, nuts, trees, and vines are characterized as permanent crops.

slightly less than the statewide average. The total harvested cropland in the four-county area was over 2.2 million acres, which represented over 26 percent of the total harvested cropland in the state.

Table 7-2
Number, Land Area, and Average Size of Farms in the Four-County Region, 2002

County	Number of Farms	Land In Farms (Acres)	Average Size of Farms (Acres)	Harvested Cropland
Fresno	6,281	1,928,865	307	1,078,900
Merced	1,780	682,486	383	314,715
Madera	2,964	1,006,127	339	479,156
Stanislaus	4,267	789,853	185	347,750
Four-County Region (Subtotal)	**15,292**	**4,407,331**	**288**	**2,220,521**
State	**79,631**	**27,589,027**	**346**	**8,466,321**

Source: California Department of Finance, Statistical Abstract. 2009

Exchange Contractors' Service Area

Within the Exchange Contractors' service area, the existing predominant land use is agriculture. The lands the Exchange Contractors serve are capable of producing a wide variety of annual and permanent crops. Table 7-3 shows the cropping patterns within the Exchange Contractors' service area. Alfalfa is the largest single crop grown in the area, accounting for 27.6 percent of total acreage. Grains, excluding rice production, are the second largest crop in the area and account for 22.2 percent of total acreage. Rice production occurs on 3,009 acres, accounting for 5.5 percent of total acreage in grains and 1.3 percent of total cropland acreage in the Exchange Contractors' Service Area. Total acres planted in rice over the last 5 years were the highest in 2010 (3,562 acres) and lowest in 2008 (2,149 acres). Although rice production is not a leading crop in the context of the Exchange Contractors' service area, local production of rice does account for approximately 38 percent of total production in the four-county region. Permanent crops are the third largest crop group, accounting for 8.2 percent of total acreage. (No comparable data exist on the number, land area, and average size of farms in the Exchange Contractors' service area.)

Table 7-3
Annual Average Crop Acreage in the Exchange Contractors' Service Area (2006-2010)

Crop Group	Acres	Percent of Acres
Alfalfa hay and seed	64,534	27.6%
Cotton	44,715	19.1%
Other field crops	10,586	4.5%
Permanent crops (fruits, nuts, trees, vines)	19,143	8.2%
Melons	5,007	2.1%
Vegetables	23,929	10.2%
Grains	51,959	22.2%
Rice	3,009	1.3%
Pasture/hay/forage	7,828	3.3%
Fallow	3,007	1.3%
TOTAL	**233,717**	**100.0%**

Source: White, pers. comm., 2011b

Land Fallowing

Land fallowing within the Exchange Contractors' service area has occurred due to district-to-district water transfers initiated by individual farmers. The following acres have been fallowed under the existing Program since 2005 as reported in Appendix B (Table 22):

Year	Acres
2005	305
2006	0
2007	101
2008	2,283
2009	3,342
2010	1,929

The amount of water transferred through fallowing under the existing Program is limited to the consumptive use portion of the water applied to the parcel of land to be fallowed. That water use is computed by averaging the consumptive use of the crops grown on the parcel during the previous 3 years. Each transfer proposal identifies the "crop history" of the parcel, and the acreages listed above have included lands that have supported crops such as alfalfa, cotton, tomatoes, corn, beets, melons, pasture and rice. While the crop history of a parcel is used for the determination of transferable water, it is not necessarily a determination of what crop might have been planted in the year of fallowing. (That question is unanswerable and moot.) For instance, for the 2010 transfer year listed above, the 3-year crop history for parcels that were fallowed included previous years of rice plantings: for 2010 up to 408 acres in a year during the 3-year previous history.[3] For the parcels included in the transfer of 2010, fallowing only occurred on 189 acres of land

[3] Rice is the example selected because it was identified as a crop of concern by the Service during public scoping.

during the immediately preceding year. For the existing Program, only the 2010 transfer had any fallowed parcel associated with a history of rice planting within a 3-year period prior to fallowing. However, the history of a parcel does not necessarily signify what crop would not be grown during the year of transfer.

7.1.2 Farmland Designations

The California Department of Conservation, as part of its Farmland Mapping and Monitoring Program (FMMP), classifies land across the state into a range of agricultural land use categories based on technical soil ratings and current land use. Land considered to be "Important Farmland" consists of four farmland designations: Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance. Table 7-4 presents a description of the FMMP mapping categories, which are defined, in part, by information from the U.S. Department of Agriculture.

Table 7-4
Farmland Designations (Farmland Mapping and Monitoring Program)

Important Farmland	Description
Prime Farmland	The best combination of physical and chemical features able to sustain long-term agricultural production.
Farmland of Statewide Importance	Similar to Prime but with minor shortcomings such as greater slopes or less ability to store soil moisture.
Unique Farmland	Farmland of lesser quality soils used for production of the state's leading agricultural crops.
Farmland of Local Importance	Land of importance to the local agricultural economy as determined by each county's board of supervisors or local advisory committee.
Other	
Grazing Land	Land with existing vegetation suited for livestock grazing.
Urban and Built-up Land	Land occupied by structures used for residential, industrial, commercial, institutional, transportation yards, cemeteries, airports, golf courses, landfills, water or sewer treatment, or other developed purposes.
Other Land	Land not included in any other mapping category. Often including low-density rural developments like brush, timber, or wet lands that are not suitable for livestock. Strip mines, borrow pits, small bodies of water, and vacant and nonagricultural land surrounded on all sides by urban development.
Water	Perennial bodies of water that are 40 acres or larger.

Source: California Department of Conservation 2011a

Prime Farmland consists of soils that are best suited to producing food, seed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the production of sustained high yields of crops. Unique Farmland includes land used for production of the state's major crops on soils not qualifying for prime or statewide importance. This land is usually irrigated, but may include nonirrigated fruits and vegetables as found in some climatic zones in California. No specific statewide criteria for Farmland of Statewide or Local Importance are available other than the lands must have been irrigated within the past 3 years and have a good combination of physical and chemical features, but have minor shortcomings such as greater slopes or with less ability to hold and store moisture. Farmland of Statewide and Local Importance also include those lands of agricultural importance to the local economy, as defined by each county's local advisory committee and adopted by its board of supervisors.

Four-County Region

The four-county region contains substantial amounts of Important Farmland, which is consistent with the region's highly productive agricultural land base. As shown in Table 7-5, the greatest amount of land is designated as Prime Farmland (over 1.3 million acres) and Farmland of Statewide Importance (over 706,000 acres), with land in Fresno County alone accounting for nearly 53 and 62 percent of these totals, respectively. Total Important Farmland in the four-county area is over 2.7 million acres, accounting for over 22 percent of the Important Farmland within the state.

Table 7-5
Important Farmland in the Four-County Area, 2008

Farmland Designation Category	Total Acreage					
	Fresno County	**Merced County**	**Madera County**	**Stanislaus County**	**Four-County Total**	**State of California**
Prime Farmland	693,173	270,644	97,490	256,165	**1,317,472**	**5,249,119**
Farmland of Statewide Importance	439,020	150,874	85,136	31,448	**706,478**	**2,683,574**
Unique Farmland	94,177	103,992	163,974	81,368	**443,511**	**1,335,390**
Farmland of Local Importance	149,906	67,984	16,142	31,159	**265,191**	**3,120,280**
Total Important Farmland	1,376,276	593,494	362,742	400,140	**2,732,652**	**12,388,363**

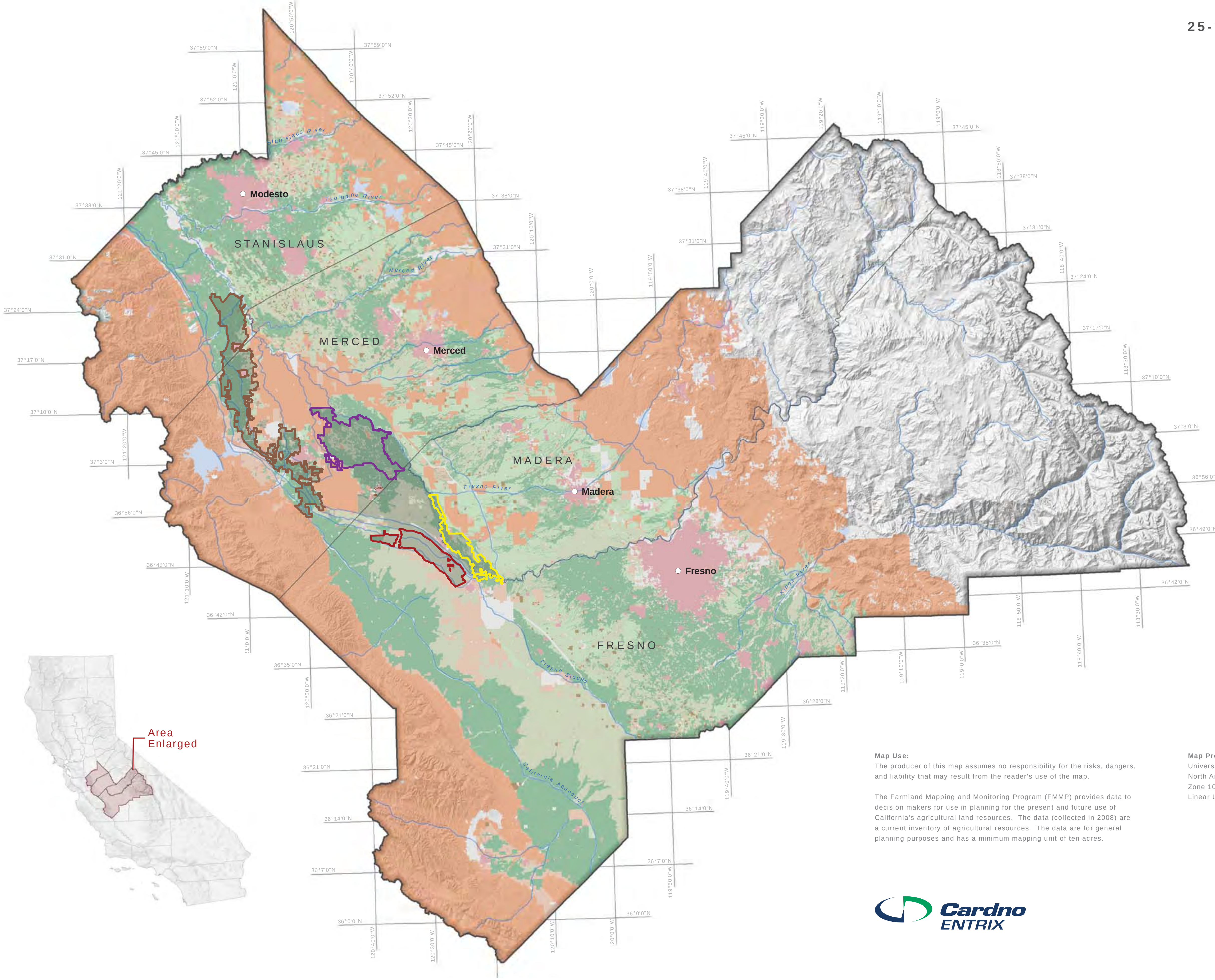
Source: California Department of Conservation 2011b

Exchange Contractors' Service Area

Each of the four Exchange Contractors' districts contains Important Farmland in their respective service areas (see Figure 7-1). As shown in Table 7-6, over 222,600 acres were classified as Important Farmland in the Exchange Contractors' service area, which accounts for approximately 95 percent of land in agricultural production (including fallowed lands). The majority of Important Farmland is classified as Prime Farmland (59 percent) followed by Farmland of Statewide Importance (36 percent). Unique Farmland and Farmland of Local Importance, combined, account for 5.3 percent of the total.

EXCHANGE CONTRACTORS
25-YEAR WATER TRANSFER PROGRAM
Designated Farmland

FIGURE 7 1



LEGEND

SAN JOAQUIN RIVER
EXCHANGE CONTRACTORS
WATER AUTHORITY

- Central California Irrigation District
- Columbia Canal Company
- Firebaugh Canal Water District
- San Luis Canal Company

STATE OF CALIFORNIA
FARMLAND MAPPING AND MONITORING PROGRAM

- Prime Farmland
- Farmland of Statewide Importance
- Unique Farmland
- Farmland of Local Importance
- Urban & Built-Up Land
- Grazing Land
- Confined Animal Agriculture
- Non-Agricultural & Natural Vegetation
- Water

- County Boundary
- City / Town
- River

0 5 10 20
Scale in Miles

1 Inch = 15 Miles

Map Use:
The producer of this map assumes no responsibility for the risks, dangers, and liability that may result from the reader's use of the map.

The Farmland Mapping and Monitoring Program (FMMP) provides data to decision makers for use in planning for the present and future use of California's agricultural land resources. The data (collected in 2008) are a current inventory of agricultural resources. The data are for general planning purposes and has a minimum mapping unit of ten acres.

Map Projection:
Universal Transverse Mercator (UTM)
North American Datum of 1983 (NAD83)
Zone 10 North
Linear Unit: Meter

Cardno ENTRIX

Map Date:
10 | 12 | 11

Map Grid:
Latitude/Longitude

Data Sources:
Water District Boundaries:
U.S. Bureau of Reclamation

Farmland Mapping and Monitoring Program:
State of California, Department of Conservation, Division of Land Resource Protection, Farmland Mapping and Monitoring Program, 2008.

Table 7-6
Important Farmland in the Exchange Contractors' Service Area, 2008

Land Use Category	Total Acreage	
	Exchange Contractors' Service Area	Percentage of Total
Prime Farmland	130,860	58.8%
Farmland of Statewide Importance	80,042	36.0%
Unique Farmland	8,894	4.0%
Farmland of Local Importance	2,807	1.3%
Total Acreage	**222,604**	**100%**

Source: California Department of Conservation 2011b

7.1.3 Williamson Act

Agricultural lands in California may be protected under the California Land Conservation Act, commonly called the Williamson Act. Local governments can enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use for a minimum of 10 years. Landowners receive substantially reduced property tax assessments in return for enrollment under Williamson Act contracts. Property tax assessments of Williamson Act-contracted land are based on the generated income of the land as opposed to the potential market value of the property (California Department of Conservation 2010). In 1998 the Williamson Act was augmented with the creation of the Farmland Security Zone, which offers greater property tax reduction in return for a minimum of 20-year contracts.

Four-County Region

Statewide, over 14 million acres are enrolled in Williamson Act contracts. Much of the farmland in the four-county area is also under contracts. As shown in Table 7-7, in 2008 over 3.0 million acres were enrolled in Williamson Act contracts in the four-county region, which represent nearly 22 percent of the statewide total. By county, Fresno had the greatest amount of land enrolled with nearly 1.5 million acres, accounting for about 47.5 percent of the four-county total.

Table 7-7
Four-County Williamson Act Contracts, 2008

County	Total Acreage		
	Prime Farmland	**Nonprime Farmland**	**Total**
Fresno	980,096	485,287	1,465,383
Merced	253,336	202,314	455,650
Madera	199,893	276,250	476,143
Stanislaus	291,340	398,727	690,067
Four-County Area Total	**1,724,665**	**9,301,748**	**3,087,243**
State of California	**4,774,839**	**9,301,748**	**14,076,587**

Source: California Department of Conservation 2010

The state provides support to local governments for participation in the Williamson Act by providing partial replacement of foregone local property tax revenues. In 2008, Fresno County received almost $5.3 million, Madera County received over $1.3 million, Merced County received over $1.4 million, and Stanislaus County received almost $1.5 million in subvention payments (California Department of Conservation 2010).

Exchange Contractors' Service Area

The extent of Williamson Act participation within the Exchange Contractors' service area is uncertain; however, based on the agricultural character of the region and countywide patterns referenced above, it is likely that a substantial proportion of land in the service area is under Williamson Act contract.

7.1.4 Land Use Planning

Land use planning in the Exchange Contractors' service area is guided by the zoning ordinances and general plans of Fresno, Madera, Merced, and Stanislaus counties. The zoning ordinances govern current land use, including specific allowable land uses and property development standards, while general plans provide the broad land use designations for overall type and intensity of use and the framework for future land use within each county with a typical planning horizon of 15 to 25 years.

Zoning

Zoning regulates the location of land uses and the development standards to which new development must be built. The purposes of establishing zoning designations are to ensure that neighboring land uses are compatible with one another and to regulate and protect the uses in which land may be placed. Every parcel covered by zoning regulations generally has a unique zoning designation. Each zoning designation contains specific regulations controlling the uses of land; density of population/structures; use, location, and dimensions of structures; open space/setback requirements; and access considerations.

Zoning regulations are site specific and county specific. Each county in the four-county region has its own set of zoning regulations. These regulations are applied when land is initially developed or redeveloped through permitting requirements. The zoning on most parcels within the Exchange Contractors' service area is assumed to be "agricultural" in nature. In general, agricultural zoning is designed to support and enhance agriculture land use, related activities, and open spaces in unincorporated areas. The general descriptions of agricultural zoning in the four-county region are summarized in Table 7-8.

Table 7-8
Four-County Agricultural Zoning Summary

County	Zoning Designations
Fresno	• The "AE" District is intended to be an exclusive district for agriculture and for those uses which are necessary and an integral part of the agricultural operation. This district is intended to protect the general welfare of the agricultural community from encroachments of nonrelated agricultural uses which by their nature would be injurious to the physical and economic well-being of the agricultural district. • The "AL" District is a limited agricultural district. It is intended to protect the general welfare of the agricultural community by limiting intensive uses in agricultural areas where such uses may be incompatible with, or injurious to, other less intensive agricultural operations. The District is also intended to reserve and hold certain lands for future urban use by permitting limited agriculture and by regulating those more intensive agricultural uses which, by their nature, may be injurious to nonagricultural uses in the vicinity or inconsistent with the express purpose of reservation for future urban use.
Merced	• General Agricultural (A-1) Zone. The purpose of the general agricultural zone (A-1) is to provide for areas for more intensive farming operations dependent on higher quality soils, water availability and relatively flat topography, and agricultural commercial and/or industrial uses dependent on proximity to urban areas or location in sparsely populated low traffic areas. Parcels smaller than forty (40) acres down to a minimum of twenty (20) acres can be considered where agricultural productivity of the property will not be reduced. • General Agricultural (A-1-40) Zone. The purpose of the general agricultural zone (A-1-40) is to provide areas where the forty (40) acre minimum parcel size of the zone allows for the widest variety of farming operations including agricultural commercial/industrial uses which are dependent on medium to higher quality soils, water availability and larger parcel sizes away from urban areas. • Exclusive Agricultural (A-2) Zone. The purpose of the exclusive agricultural zone (A-2) is to allow for considerably expanded agricultural enterprises, due mainly to the requirement of larger size land parcels which are more economically suitable to support farming activities occurring in the area. The one hundred sixty (160) acre minimum parcel size of the zone allows for farming and ranching operations and a variety of open space functions that are typically less dependent on soil quality and water for irrigation and are often connected more with foothill and wetlands locations, grazing and pasture land and wildlife habitat and recreational areas.
Madera	• AR-5 Agricultural, Rural, Five Acre District. • ARE-20 Agricultural Rural, Exclusive Twenty Acre District. • AEX-20 Agricultural Exclusive, Twenty Acre District. • ARE-40 Agricultural Rural, Exclusive Forty Acre District. • AEX-40 Agricultural, Exclusive Forty Acre District. • ARE-80, 160, 320, 640 Agricultural, Rural, Exclusive, 80 to 640 Acre District. • ARV-20 Agricultural, Rural, Valley, Twenty Acre District. • ARF Agricultural, Rural, Foothills District.

County	Zoning Designations
Stanislaus	• A-2 General Agricultural District regulations are designed to support and enhance agriculture as the predominant land use in the unincorporated areas of the county. These district regulations are also intended to protect open-space lands pursuant to Government Code Section 65910. The A-2 General Agricultural District regulations are specifically established to ensure that all land uses are compatible with agriculture and open space, including natural resources management, outdoor recreation and enjoyment of scenic beauty.

Sources: Fresno County 2004; Madera County 2011; Merced County 2011; Stanislaus County 2008.

General Plan

Each county and city in the state is required by California Government Code Section 65300 to have a comprehensive, long-term general plan for the physical development of the county or city. Mandatory and optional elements of the general plan that have bearing on the action alternatives are land use, agriculture, fish and wildlife habitat, water resources, open space, and conservation.

This section summarizes key goals and policies contained in the general plans for the four counties in the Program area. The goals and policies of each county relevant to the Proposed Program are summarized in Table 7-9.

Table 7-9
County General Plan Policy Summary

County	Goals and Objectives
Fresno	• Implement agricultural land preservation programs to ensure long-term conservation of viable agricultural operations. Examples of programs to be considered include: conservation easements, dedication incentives, new and continued Williamson Act contracts, Farmland Security Act contracts, The California farmland conservancy program, agricultural education programs, zoning regulations, agricultural mitigation fee program, urban growth boundaries, transfer of development rights, purchase of development rights, and agricultural buffer policies (LU-A.15). • Accept Williamson Act contracts on all designated agricultural land subject to location, acreage, and use limitations established by the County provided that the County receives full subvention payments as a partial replacement of local property tax revenue forgone as a result of participation. All land under control shall comply with the requirements of the California Land Conservation Act (LU-A.16). • Encourage land improvement programs to increase soil productivity in areas containing lesser quality agricultural soils (LU-A.17). • Encourage landowners to participate in programs that reduce soil erosion and increase soil productivity (LU-A.18). • Adopt and support policies and programs that seek to protect and enhance surface water and groundwater resources critical to agriculture (LU-A.19).

County	Goals and Objectives
Merced	• Improve the financial viability of the agricultural sector (AG Goal 1). • Conserve productive agricultural lands (AG Goal 2). • Manage water resources to the benefit of the agricultural community (AG Goal 4). • Conservation of productive agricultural and other valuable open space lands (LU Goal 7). • Conservation of productive agricultural and other valuable rural and to urban uses minimized (LU Objective 7.A). • A rural environment which achieves a balance between agricultural and other open space resource values (LU Goal 8). • Rural areas are appropriately designated to meet the agricultural, grazing, wildlife habitat, recreational, natural resource, and other open space needs of the county (LU Objective 8.A).
Madera	• The county shall discourage the conversion of prime agricultural land to urban uses unless an immediate and clear need can be demonstrated that indicates a lack of land for nonagricultural uses (5.A.2). • The county shall encourage continued and, where possible, increase agricultural activities on lands designated for urban development (5.A.6). • The county shall encourage agricultural soil conservation practices such as crop rotation, cover crops, and coordinated disking times to reduce wind erosion (5A.7). • The county shall actively encourage enrollments of agricultural lands in its Williamson Act program, particularly on the edges of new growth areas (5.A.12). • The county shall ensure that land use regulations do not arbitrarily restrict potential agricultural-related enterprises which could provide supplemental sources of income for farm operators (5.A.19).
Stanislaus	• Ensure designated Agriculture shall be restricted to uses that are compatible with agricultural practices, including natural resources management, open space, outdoor recreation, and enjoyment of scenic beauty (Policy 2). • Limit new areas for urban development (as opposed to expansion of existing areas) to less productive agricultural areas (Policy 10). • Uses shall not be permitted to intrude into or be located adjacent to an agricultural area if they are detrimental to continued agricultural usage of the surrounding area (Policy 14). • Promote and protect Agriculture as the primary industry of the County (Policy 16). • Any decision by the Board of Supervisors of the County of Stanislaus to approve the redesignation or rezoning of land from an agriculture or open space use to a residential use shall require, and be contingent upon, approval by a majority vote of the County voters at a general or special local election (Policy 25 A).

Sources: Fresno County 2010; Madera County 1995; Merced County 2000; Stanislaus County 1994.

7.1.5 Regulatory Setting

The regulatory environment as it applies to agricultural and land use resources includes County Zoning Ordinances, County General Plans, and the Williamson Act; these regulations are addressed above. In addition, the Exchange Contractors and each member district maintain specific policies related to agricultural land fallowing and water transfers. Below is a summary of applicable policies, focusing on land management requirements on fallowed land.

Policies Regarding Land Fallowing in the Exchange Contractors' Service Area

Entities within the Exchange Contractors' service area may fallow land for the purpose of transferring water to another entity. Land fallowing rules and requirements are outlined for each member district below:

Columbia Canal Company (CCC 1993)

- Fallowed land will not be used to grow irrigated crops, although nonirrigated crops may be grown thereon.
- Land fallowed for the purpose of water transfers may not pump groundwater for the purpose of crop production.
- The transferor must agree to fallow the land to which the transferred water would have been delivered for each crop year in which the transfer was made.
- The transferor agrees that while the land is fallowed that it will be kept clear of weeds or noxious plant life so that the same will not be allowed to go to seed.

Central California Irrigation District (CCID 1993)

- Landowner agrees to fund the study and monitor for fallowing impacts and guarantee that fallowing will not impact other growers and landowners within the District and will not result in permanent abandonment of irrigation upon fallowed lands.
- Landowners who fallow lands for water transfer purposes cannot pump groundwater above their "fair share of the safe yield."
- Landowners receiving the transferred water and the Recipient District demonstrate that the Landowner will not be dependent upon the transferred water supply at the end of the 1-year term of the proposed transfer.
- Landowners are required to maintain fallowed land in such a condition that noxious weeds and pests are not permitted to become established.
- No crops may be grown on the fallowed lands at any time during the calendar year during which the fallowing transfer will take place.
- Fallowed land for water transfers are required to restrict noxious weeds, comply with air pollution requirements, and to avoid dust or similar detrimental conditions to neighboring land.
- The landowner must demonstrate that at the end of the term of the proposed transfer (1 year), the recipient will not be dependent upon future transfers.

Firebaugh Canal Water District (FCWD undated)

- District approval of water transfers are required to demonstrate that the transfer does not reasonably impact the ability of neighboring lands to continue to farm and cultivate crops without the fallowing land creating noxious weeds, dust, insect or disease conditions that may impact those neighboring lands.
- The District will not approve any water transfer proposal that involves pumping of groundwater in critical water years.

San Luis Canal Company (SLCC 2009a, b)

- No transfers of surface water without fallowing the land to which such surface supply would have been delivered will be approved.
- No irrigation water from any source can be applied between January 1 and December 31 of the water transfer year in question. The fallowed land can have a planted crop, yet such crop will be unable to be irrigated by any source in the time frame mentioned above.

7.1.6 Land Use Effects Under Existing Water Transfer Program

The Proposed Program must be considered in the context of existing conditions (as of June 2011), which serves as the baseline for the CEQA analyses. The baseline includes an active Water Transfer Program that is set to expire in 2014. Below is a summary of the existing Program and related assumptions, which provide the basis for estimating baseline land use impacts.

- Average annual volume of water transfer (2006-2010): 83,600 AFY
  (2009): 88,100 AFY
- Source of water transfer
  - Existing conservation projects (e.g., irrigation systems, facility lining, and pumping and conveyance improvements): 80,000 AFY
  - Agricultural land fallowing: 8,000 acre-feet(3,200 acres)[4]

Conversion of Important Farmland

Under the existing Program, up to 3,200 acres (in 2009) of farmland has historically been fallowed annually in the Exchange Contractors' service area as part of the existing Transfer Program. It is assumed that the representative crops fallowed include alfalfa, corn, cotton oats, and tomatoes.[5] Considering that approximately 95 percent of the service area is designated as Important Farmland, it is anticipated that the majority of fallowed land is classified as Important Farmland. Generally, lands participating in the existing Program are rotated to avoid consecutive years of fallowing and are managed to retain agricultural viability, including potentially being dryland farmed. Other land management and maintenance measures include disking and weed control, which also are designed to maintain the long-term agricultural viability of the land. Under these circumstances, the fallowed land is considered to retain its agricultural value and future agricultural use is not precluded; therefore, it is not considered a conversion to nonagricultural uses.

Conflict with Williamson Act Contract

The extent of fallowed land that is under Williamson Act contract is not known, but could be substantial based on the agricultural character of the area and representative trends at the county level. The fallowed land taken out of production has been managed to retain

[4] Assumes 2.5 acre-feet of irrigation water required per acre (non-critical year).
[5] Based on the top five annual crops in the Exchange Contractors' service area (by acres).

its commercial and long-term agricultural viability. Therefore, under the existing Program, the 3,200 acres of fallowed land is anticipated to be in compliance with Williamson Act contract requirements.

Zoning and General Plan Consistency

Current and future land use in the Exchange Contractors' service area is guided by each county's zoning ordinance and general plan. Most of the 3,200 acres of farmland that has been fallowed (to produce water for transfer) is zoned for agriculture or open space. Similarly, future land uses prescribed under the applicable general plans in the Exchange Contractors' service area are primarily agricultural in nature. The zoning and general plan designations are designed to promote and protect agriculture in the region. Land fallowing with ongoing land maintenance activities does not involve the conversion of land to urban uses and is maintained for future agricultural production; therefore, the existing Program is not in conflict with any of the zoning or general plans in the four-county region. Existing and future conservation projects are assumed to be developed in a manner that is consistent with existing zoning regulations and all applicable land use permits (if any are required) have been or will be obtained.

7.2 Environmental Consequences

This section presents the analysis of Program impacts on agricultural resources and land uses and evaluates the Program's consistency with applicable land use plans.

7.2.1 Key Impact and Evaluation Criteria

The Proposed Program is evaluated in accordance with the Agricultural Resources and Land Use and Planning sections of CEQA Environmental Checklist Appendix G. Several of the topics represented by questions from the checklist are not affected by the Proposed Program or are discussed elsewhere in this EIS/EIR, as explained below:

- Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220[g]), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104[g])?

  The Exchange Contractors' service area contains no forest land or timberland.

- Result in the loss of forest land or conversion of forest land to nonforest use?

  The Exchange Contractors' service area contains no forest land or timberland.

- Physically divide an established community?

  The Exchange Contractors' service area does not involve any new development or structures that would fragment the existing agricultural landscape.

- Conflict with any applicable habitat conservation plan or natural community conservation plan?

  The discussion of habitat conservation plans or natural community conservation plans is presented in Section 6.2.1, Biological Resources.

Several environmental issues from the checklist are of potential concern and are addressed in the impact analysis below. The following criteria/thresholds of significance for discussion of impacts on agricultural resources and land uses have been considered as follows. Would the Program:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use?
- Conflict with existing zoning for agricultural use, or a Williamson Act contract?
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to nonagricultural use or conversion of forest land to nonforest use?
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?

7.2.2 Environmental Impacts and Mitigation

The impacts of the No Action/No Project and action alternatives analyzed in this section are based on incremental effects relative to the existing Program. Effects of the action alternatives relative to the No Action/No Project Alternative are also discussed.

No Action/No Project Alternative

The No Action/No Project Alternative would result in the termination of the existing Program on February 28, 2014 (through Water Year 2013), thereby resulting in no transfers or exchange of water from the Exchange Contractors to any potential water users. Temporary land fallowing to develop water for use outside the Exchange Contractors' service area would cease. Further assumptions of the No Action/No Project Alternative are listed in Section 2.2.

Impact LU-1: Conversion of Important Farmland

Under the No Action/No Project Alternative, no land fallowing would occur to accommodate water transfers, and the 3,200 acres of land currently fallowed under existing conditions would return to irrigated agricultural use. The primary crops that would return to production would likely include alfalfa, corn, cotton, oats, and tomatoes on land predominantly designated as Important Farmland under the FMMP; although other annual crops could be subject to fallowing. Therefore, the No Action/No Project Alternative would result in an additional 3,200 acres of land in irrigated agricultural production compared with existing conditions. Lastly, lands currently designated as Important Farmland would retain their designation, and no conversion of Important Farmland would occur. No impact is anticipated under CEQA.

Impact LU-2: Conflict with Williamson Act Contract

Under the No Action/No Project Alternative, no land fallowing would occur and approximately 3,200 acres of land that historically have been fallowed would return to irrigated agricultural use, including lands that are under Williamson Act contract. Because these lands would return to traditional agricultural practices and would resume commercial viability, their use would be consistent with the goals and objectives of the Williamson Act relative to land fallowing practices under existing conditions and would remain in compliance with current Williamson Act Contracts. No impact would occur under CEQA.

Impact LU-3: Zoning and General Plan Consistency

Under the No Action/No Project Alternative, no land fallowing would occur and land historically fallowed would return to irrigated agricultural use, which is consistent with applicable zoning and general plan land use designations. No impact is anticipated under CEQA.

Alternative A: 50,000 Acre-Feet

Alternative A would transfer up to 50,000 acre-feet of water from the Exchange Contractors' service area to receiving districts, with all of the water developed from crop idling and temporary land fallowing. Water transfers under this alternative would require an estimated 20,000 acres of land fallowing. Under the existing Program, approximately 8,000 acre-feet are derived from land fallowing on approximately 3,200 acres. Fallowed land would be rotated to avoid idling the same land for more than three years. No conservation water transfers would occur.

Impact LU-1: Conversion of Important Farmland

Alternative A would result in fallowing up to 20,000 acres of agricultural land in the Exchange Contractors' service area, which is 20,000 acres greater than the No Action/No Project Alternative where no land fallowing would occur and an increase of 16,800 acres relative to existing conditions. Because nearly all of the land in the Exchange Contactors service area is designated as Important Farmland under the FMMP, the proposed land fallowing program would likely occur on such lands. Two main land use options on fallowed land exist: (1) complete cessation of agricultural production or (2) dryland farming. With no agricultural production, fallowed land would be subject to routine land maintenance activities (e.g., disking and weed control) per the land fallowing policies implemented by the four Exchange Contractors' districts (see Section 7.1.5). This maintenance would allow the land to retain its agricultural value and long-term agricultural viability; therefore, it is not considered a conversion to nonagricultural use. Similarly, with dryland farming, the land would continue in active agricultural production, albeit at lower economic value, and the agriculture character of the land would be retained. Under both scenarios, the land would not be converted to urban uses and the land would be "reserved" for future agricultural production, including irrigated agriculture in future years, as the land for transfer cannot be fallowed for more than three consecutive years. With the nature of agricultural production shifting temporarily on fallowed lands in the service area, the farmland designation under the FMMP could change to reflect the change to non-irrigated farmland; however, due to the temporary nature of land fallowing on any one parcel, such a shift is unlikely, and if it did occur, land would likely remain designated as another Important Farmland category, e.g., "Farmland of Local Importance." Because land subject to temporary crop idling would be maintained in a manner suitable for dryland farming in the short term and/or for irrigated agriculture in the long term, no permanent conversion of Important Farmland to non-agricultural uses would occur. Because no permanent land use conversion would occur on the additional 16,800 acres of land subject to temporary land fallowing compared to existing conditions, no impact would occur with Alternative A under CEQA. Under NEPA, Alternative A would not result in a permanent conversion of 20,000 acres of fallowed land to non-agricultural uses compared to future No Action/No Project conditions.

Impact LU-2: Conflict with Williamson Act Contract

Land uses and improvements on lands enrolled in Williamson Act contracts are limited to commercial agriculture or uses determined to be compatible or incidental to commercial agriculture. All fallowed lands in the Exchange Contractors' service area would be maintained in a manner suitable for dryland farming in the short term and/or irrigated agriculture in the long term. In addition, because these lands would not be developed for uses other than agriculture, no permanent land use conversion would preclude future agricultural use. Instead, one anticipated use on these lands, namely dryland farming, is considered a form of commercial agriculture and would allow the commercial viability of lands to be retained, which is consistent with Williamson Act contracts. If land is not dryland farmed, it would be maintained in a manner suitable for future agricultural production. In either case, the shift from irrigated agriculture on a temporary basis would be compatible with commercial agriculture in the long term. Accordingly, no conflict with the provisions of Williamson Act contracts would occur in the Exchange Contractors' service area.

In summary, under Alternative A, the additional 16,800 acres of land that would be fallowed relative to existing conditions would retain its long-term commercial agricultural viability; therefore, no conflict would occur with the provisions of Williamson Act contracts in the Exchange Contractors' service area. No impact would occur under CEQA. Similarly, under NEPA, the 20,000 acres of land that would be fallowed relative to future No Action/No Project conditions would not conflict with the provisions of Williamson Act contracts in the Exchange Contractors' service area with Alternative A.

Impact LU-3: Zoning and General Plan Consistency

Current and future land use in the Exchange Contractors' service area is guided by each county's zoning ordinance and general plan. Most of the properties in the service area are zone for agriculture or open space. These zoning and general plan designations are generally intended to promote agriculture in the region, and anticipated land uses under the action alternatives (i.e., land fallowing with ongoing land maintenance activities and/or dryland farming) are consistent with this intent and not explicitly prohibited under these designations. In addition, because the action alternatives do not involve the conversion of land to urban uses, opportunities would remain for future agricultural production.

In summary, temporary fallowing of an additional 16,800 acres of agricultural land relative to existing conditions under Alternative A would not conflict with the goals, objectives, and policies of the applicable zoning regulations and general plans; no impact would occur under CEQA. Similarly, under NEPA, temporary fallowing on 20,000 acres of land relative to future No Action/No Project conditions would not conflict with the goals, objectives, and policies of the applicable zoning regulations and general plans with Alternative A.

Alternative B: 88,000 Acre-Feet

Alternative B would provide up to 88,000 acre-feet of water during any year through a combination of conservation and crop idling/land fallowing, with a maximum of 50,000 acre-feet to come from temporary crop idling/land fallowing on 20,000 acres. A range in the combination of conservation and crop idling/land fallowing would occur. For an 88,000 acre-feet program, up to 80,000 acre-feet could occur from the remaining program occurring from temporary crop idling/land fallowing. On the other end of the combination, 50,000 acre-feet could occur from temporary crop idling/land fallowing with the remaining 38,000 acre-feet acre-feet made available for transfer would come from a combination of tailwater and other conservation opportunities already in place.

Impact LU-1: Conversion of Important Farmland

Alternative B would result in the temporary land fallowing on up to 20,000 acres of agricultural land in the Exchange Contractors' service area. The maximum extent of land fallowing is the same under all of the action alternatives and, therefore, the impacts would be the same as those described under Impact LU-1 for Alternative A.

Impact LU-2: Conflict with Williamson Act Contract

Alternative B would result in the temporary land fallowing on up to 20,000 acres of agricultural land in the Exchange Contractors' service area. The maximum extent of land fallowing is the same under all of the action alternatives and, therefore, the impacts would be the same as those described under Impact LU-2 for Alternative A.

Impact LU-3: Zoning and General Plan Consistency

Alternative B would result in the temporary land fallowing on up to 20,000 acres of agricultural land in the Exchange Contractors' service area. The maximum extent of land fallowing is the same under all of the action alternatives and, therefore, the impacts would be the same as those described under Impact LU-2 for Alternative A.

Alternative C: 130,000 Acre-Feet

Alternative C makes available up to 130,000 acre-feet of water annually during any noncritical Exchange Contract year similar to the maximum level of water transfer allowed under the existing Program. Under this alternative, up to 80,000 acre-feet of water is made available through conservation, including tailwater recovery, and a maximum of 50,000 acre-feet of water would come from temporary crop idling/land fallowing.

Impact LU-1: Conversion of Important Farmland

Alternative C would result in the temporary land fallowing on up to 20,000 acres of agricultural land in the Exchange Contractors' service area. The maximum extent of land fallowing is the same under all of the action alternatives and, therefore, the impacts would be the same as those described under Impact LU-1 for Alternative A.

Impact LU-2: Conflict with Williamson Act Contract

Alternative C would result in the temporary land fallowing on up to 20,000 acres of agricultural land in the Exchange Contractors' service area. The maximum extent of land fallowing is the same under all of the action alternatives and, therefore, the impacts would be the same as those described under Impact LU-2 for Alternative A.

Impact LU-3: Zoning and General Plan Consistency

Alternative C would result in the temporary land fallowing on up to 20,000 acres of agricultural land in the Exchange Contractors' service area. The maximum extent of land fallowing is the same under all of the action alternatives and, therefore, the impacts would be the same as those described under Impact LU-3 for Alternative A.

Alternative D: 150,000 Acre-Feet

Alternative D expands the existing Program with a maximum transfer of 150,000 acre-feet. The additional 20,000 acre-feet made available for transfer would come from conservation activities, rather than temporary land fallowing/crop idling. Because the capacity of existing conservation activities is about 80,000 acre-feet, new conservation projects would be implemented to generate the incremental water required under this alternative. These measures include the lining of canals and implementation of on-farm irrigation or district conveyance system improvements that would not have a hydrologic effect on the San Joaquin River. As with the other action alternatives, a maximum of 20,000 acres could be fallowed under Alternative D.

Impact LU-1: Conversion of Important Farmland

Alternative D would result in the temporary land fallowing on up to 20,000 acres of agricultural land in the Exchange Contractors' service area. The maximum extent of land fallowing is the same under all of the action alternatives and, therefore, the impacts would be the same as those described under Impact LU-1 for Alternative A.

Impact LU-2: Conflict with Williamson Act Contract

Alternative D would result in the temporary land fallowing on up to 20,000 acres of agricultural land in the Exchange Contractors' service area. The maximum extent of land fallowing is the same under all of the action alternatives and, therefore, the impacts would be the same as those described under Impact LU-2 for Alternative A.

Impact LU-3: Zoning and General Plan Consistency

Alternative D would result in the temporary land fallowing on up to 20,000 acres of agricultural land in the Exchange Contractors' service area. The maximum extent of land fallowing is the same under all of the action alternatives and, therefore, the impacts related to agricultural lands would be the same as those described under Impact LU-3 for Alternative A.

In addition, under Alternative D, additional water conservation projects would be implemented to generate the incremental 20,000acre-feet to be made available for water transfer. All projects would secure the necessary permits and would be designed in a manner to be consistent with existing zoning and general plan designations.

7.2.3 Cumulative Effects

The analysis of land use impacts addresses several types of impacts including effects associated with reducing or eliminating agricultural production due to land fallowing and or dryland farming. Such issues include conversion of Important Farmland, conflicts with current Williamson Act contracts, and zoning and general plan consistency. Of these, the cumulative analysis focuses on regional effects attributable to land fallowing and dryland farming.

The cumulative effect of the action alternatives are considered in the context of other regional agricultural issues such as drought, environmental restrictions, and economic recession. Recent droughts have reduced the amount of water available for redistribution throughout the state. Many farm operations in the Central Valley faced reduced or eliminated water supplies, which required fallowing hundreds of thousands of acres (Gorman 2009). The recent recession has created unprecedented government budget shortfalls, which virtually eliminated subvention payments to counties for lands enrolled in Williamson Act contracts (California Department of Conservation 2010). The drought and recession combo helped create record high unemployment in the Central Valley, which has reduced demand for housing and other nonagricultural land uses. Over the long term, drought conditions, the regulatory environment, and the economy will change such lands that in agricultural production in the region will change from year to year.

As described in this section, implementation of any of the action alternatives would result in relatively minor land use impacts, if at all. As a result, the Proposed Program would not have a cumulative effect on agricultural or other types of land uses in the region.

7.2.4 Impact and Mitigation Summary

The Exchange Contractors' service area is heavily dependent on agriculture. In general, land fallowing to accommodate water transfers in such an area could have effects on agricultural land uses. However, because the land fallowed would either be dryland farmed or maintained in a manner to preserve its agricultural integrity and viability, and fallowing on any one parcel would only be temporary, no anticipated impacts to land use are associated with the Proposed Program.

Table 7-10 summarizes the impacts of the No Action/No Project and action alternatives on land use. The existing conditions set the baseline against which the alternatives are evaluated for CEQA. With no impacts for any of the action alternatives, no mitigation is required.

Table 7-10
Summary Land Use Impacts of Alternatives and Mitigation Measures

Environmental Concern		Alternative	Impact Before Mitigation	Mitigation Measures	Impact After Mitigation
Land Use and Agriculture					
LU-1	Conversion of Important Farmland	No Action	N	not applicable	--
		A	N	not required	--
		B	N	not required	--
		C	N	not required	--
		D	N	not required	--
		Cumulative	N	not required	--
LU-2	Conflict with Williamson Act Contract	No Action	N	not applicable	--
		A	N	not required	--
		B	N	not required	--
		C	N	not required	--
		D	N	not required	--
		Cumulative	N	not required	--
LU-3	Zoning and General Plan Consistency	No Action	N	not applicable	--
		A	N	not required	--
		B	N	not required	--
		C	N	not required	--
		D	N	not required	--
		Cumulative	N	not required	--

CEQA:
N = no impact
PS = potentially significant
LTS = less than significant
PSU = potentially significant and unavoidable

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8.0 Socioeconomics

This section evaluates the potential socioeconomic impacts of the Exchange Contractors' proposed 25-Year Water Transfer Program. Economic information is included in this EIS/EIR to meet NEPA requirements for analysis of social and economic impacts as part of the human environment. In the context of CEQA, this information illustrates the close relationship between potential physical effects on agricultural land uses and regional economic conditions.[1] This section is organized as follows:

- Section 8.1, Affected Environment/Environmental Setting, presents an overview of socioeconomic conditions in the Program area and describes the regional economic benefits attributed to existing agricultural production. It also outlines the economic effects associated with the existing Water Transfer Program the Exchange Contractors are currently implementing.
- Section 8.2, Environmental Consequences, addresses (1) evaluation criteria used to evaluate the Proposed Program's anticipated socioeconomic impacts; (2) analysis of socioeconomic impacts, organized by the various Program alternatives; (3) cumulative impacts on socioeconomic resources; and (4) summary of economic impacts.

This section is based primarily on the attached technical report that evaluates the Proposed Program's socioeconomic impacts with a focus on regional economic effects (Appendix F). The technical report provides in-depth information on the methodology and assumptions used to analyze socioeconomic impacts, as well as a comprehensive set of results and tables. This section summarizes pertinent information from the technical report and incorporates this information into the comparative framework required for NEPA and CEQA. The detailed tables covering baseline data and results are not repeated here, but instead are referred to where appropriate. All monetary values are presented in 2011 dollars unless noted otherwise.

In addition, this section is closely related to several other sections in this EIS/EIR. First, the economic analysis presented here is based largely on changes in agricultural production outlined in Chapter 7.0, Land Use and Agriculture, which focuses on physical effects on agricultural land uses, while this section focuses on associated changes in economic value and operating costs and revenues at both the farm and district level. Second, this section provides key demographic and economic information that is used to evaluate potential environmental justice impacts in Chapter 9.0, Environmental Justice.

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[1] Section 8.2.1 presents additional information on the inclusion of economic information under CEQA.

8.1 Affected Environment/Environmental Setting

This section describes existing socioeconomic conditions, in the Program area and the socioeconomic resources that could be affected by the Proposed Program. The socioeconomic parameters covered here include regional demographics and economic indicators of social well-being and an overview of the structure of the regional economy. Due to the strong connection between the Proposed Program and the agricultural industry, this section also quantifies the value and regional economic benefits of existing agricultural production in the region, including the Exchange Contractors' service area. This information is intended to provide context to the analysis of socioeconomic impacts presented in Section 8.2. In addition, the existing Program's economic effects are presented, which serve as the baseline against which the Proposed Program's potential impacts are evaluated. The data used to describe existing socioeconomic conditions in the Program area are based on a variety of Federal, state, and local sources, as cited in Appendix F.

8.1.1 Socioeconomics Study Area

The Proposed Program's direct economic impacts, including land fallowing and water district operations, are concentrated in the Exchange Contractors' service area, which covers approximately 240,000 acres across portions of Stanislaus, Merced, Madera, and Fresno counties. For this study, the socioeconomic analysis focuses on potential impacts in this four-county area, which captures many of the economic linkages between activities in the Exchange Contractors' service area and the rest of the regional economy, such as a well-established agriculture-support industry and labor force. Accordingly, the information presented at the beginning of this section covers the entire four-county region, followed by information on agricultural economics specific to the Exchange Contractors' service area, including economic information on the existing Program. As described in Section 3.3, the impact analysis addresses only those effects related to the water transfer areas within the Exchange Contractors' service area; economic impacts in those districts receiving the transferred water are not addressed in this section.

8.1.2 Four-County Region

Demographics and Socioeconomic Indicators

This section provides an overview of the demographic and other socioeconomic characteristics of the four-county region. Topics addressed include population, unemployment, per-capita income, and poverty rates. Information on the racial and ethnic composition of the local population is presented in Chapter 9.0, Environmental Justice.

Population

The four-county region represents a substantial component of the Central Valley's population base, with nearly 1.9 million people residing in the four counties in 2010 (see Appendix F, Table F-1). Most of this population is concentrated in the northern (Stanislaus County) and southern (Fresno County) portions of the study area, with population levels at 530,600 and 954,000 people, respectively. Population levels are substantially lower in Merced County (258,500) and Madera County (153,700). Population growth in the region has been steady over the past 2 decades at approximately

1.9 percent annually. Madera County has experienced the greatest rate of population growth among the four counties.

Moving forward, population in the four-county region is projected to increase from nearly 1.9 million in 2010 to 3.6 million by 2040, a total increase of over 88 percent (see Appendix F, Table F-2). The rate of population growth is expected to decrease over time, with the greatest amount of growth expected to occur in the short term, between 2010 and 2020, at 2.7 percent annually. Among counties, Madera and Merced are projected to experience the most growth.

Much of the agricultural land served by the Exchange Contractors is located in unincorporated areas of the four-county region, which tend to be sparsely populated. However, several incorporated cities are in proximity to agricultural activity in the study area: Firebaugh and Mendota (in Fresno County), Dos Palos and Los Banos (in Merced County), Madera (Madera County), and Modesto and Turlock (in Stanislaus County).

Unemployment

Local unemployment figures are a common indicator of social and economic well-being within a community. Unemployment in the study area has fluctuated since 1990, falling from 12.0 percent in 1990 to 9.4 percent in 2000 and subsequently rising to 17.2 percent in 2010 (see Appendix F, Table F-6). Among counties, current unemployment rates range between 15.6 percent (in Madera County) and 18.9 percent (Merced County). Historically, regional unemployment has been substantially higher than statewide figures, illustrating a less diversified economy in terms of industries and labor force.

Income Measures

Per-capita, median household income, and poverty rates represent other economic indicators of social well-being. In 2008, per-capita personal income in the four-county study area (on a weighted average basis) was approximately $30,500 per year. Across counties, per-capita income was highest in Stanislaus County ($31,700), followed by Fresno County ($31,100), Merced County ($28,000), and Madera County ($26,900). All four counties had per-capita income levels lower than the statewide average of $43,900 per year. At the household level, median income in the study area ($47,400 annually) is about 22 percent lower than the statewide figure ($60,400 annually) based on 2009 data.

Poverty rates represent the percentage of an area's total population living at or below the poverty threshold established by the U.S. Census Bureau. Based on average income levels for the period 2005 to 2009, the weighted poverty rate in the study area was approximately 19.1 percent, which is higher than the statewide rate of 13.2 percent. The poverty rate in individual counties was highest in Merced (21.1 percent), followed by Fresno (20.9 percent), Madera (18.0 percent), and Stanislaus (15.1 percent).

Economic Base

This section describes the structure of the regional economy, focusing on employment and income across industries. This information is especially relevant because it defines key industries, including agriculture, which may be affected by the Proposed Program.

The following sections build on this discussion, focusing on regional economic activity attributed directly to agricultural activity that is supported, in part, by water supplies delivered by the Exchange Contractors.

Employment and Major Industries

Data on total and industry employment provide important insights into the size, strength, and diversity of a local economy. In total, the four-county region supported 827,400 part- and full-time jobs in 2008, which represents growth of approximately 10.7 percent (or nearly 80,000 jobs) since 2000 (see Appendix F, Table F-4). Overall, the largest concentration of jobs in 2008 was in Fresno County, while the smallest was in Madera County, although the latter has had the highest job growth rate among the four counties.

Data on employment by industry in the four-county study area demonstrate that the regional economy is generally diverse. Overall, the largest sector in the regional economy was Services, which employed over 320,000 people and accounted for nearly 39 percent of the job base in 2008 (see Appendix F, Table F-5). Other key sectors include Federal and state/local government (15.6 percent of the total job base) and Wholesale and Retail Trade (13.4 percent). In 2008, farm employment in the study area provided over 42,000 jobs accounting for 5.1 percent of the study area total. Although farm employment in the regional economy is relatively low, the importance of agriculture must take into account the large network of agriculture-support business present in the regional economy.

At the county level, Fresno County provided the greatest number of farm jobs (about 20,300, or 4.5 percent of total county employment); however, on a proportional basis, farming in Merced and Madera counties was more important, accounting for 8.3 and 7.9 percent of the county job totals, respectively. Within parts of the Exchange Contractors' service area, the figures are substantially higher because of the agricultural concentration of those subregions. As indicated above, indirectly, agriculture also provides numerous jobs in those industries that supply inputs to farming operations (e.g., farm machinery and fertilizers) and industries that are reliant on agricultural commodities (e.g., food processing plants); these economic linkages are discussed in greater detail below.

Personal Income

Total personal income in the four-county region in 2008 was $40.2 billion (see Appendix F, Table F-7). Among the study area counties, Fresno had the highest personal income ($20.7 billion) and Madera County had the lowest ($2.7 billion). In real terms, total income in the region increased by nearly 28 percent between 1990 and 2000, but has fallen by over 10 percent between 2000 and 2008, with the largest declines in Stanislaus and Fresno counties.

Earnings by industry (a component of total personal income) provide insight on the strength of key sectors in the regional economy. In addition, the measure of earnings by industry is more relevant than total personal income for evaluating the Proposed Program's potential impacts on the local economy because it focuses on wages/salaries of employees and proprietor's (or business) income and excludes factors such as transfer payments that are unlikely to be affected by the Program. The Government sector had the highest level of earnings with over $8.0 billion, which accounted for over 21 percent of all earnings in the study area (see Appendix F, Table F-8).

Agricultural Economics

Agriculture is the primary industry affected by the Proposed Program. The agricultural industry is important in providing crops for final consumption in the local area and other national and international markets and supporting the local dairy and food processing industries. It also generates substantial economic benefits across agriculture-support and other related industries. Existing agricultural production and values at the farm level, as well as the regional economic importance of agriculture, are presented below for the four-county region.

Farmgate Production Values

The farmgate value of crop production represents one measure of the direct economic effect of the agricultural industry. The four-county region had an average of nearly 4.7 million acres in agricultural production with a farmgate value of $7.3 billion between 2005 and 2009 (see Appendix F, Table F-9).[2] Permanent crops (i.e., fruits, nuts, trees, and vines) and vegetables had the highest values, at $4.4 billion and $1.6 billion, respectively. Pasture/hay/forage, which represented over half of the production acreage, only accounted for about 1.6 percent of total production value in the region. The average production value in the four-county region was $1,552 per acre.

Regional Economic Benefits of Agriculture

The importance of agriculture to the region extends beyond the farm level. Agricultural production sets in motion a series of "ripple" effects throughout the local economy based on interindustry linkages, which collectively affect total output (or production), employment, and income levels in the region. The regional importance of the agricultural industry is estimated based on input-output modeling using the IMPLAN economic model. In addition to the direct value of agricultural crop production in the four-county region, approximately $7.3 billion per year, interindustry linkages (indirect effects) and household spending patterns (induced effects) generate an additional $2.8 billion in output in the four-county regional economy for a total of nearly $10.1 billion per year (see Appendix F, Table F-11). The direct labor income supported by existing agricultural production is an estimated $1.7 billion, and over $2.8 billion in total. The direct and total employment effects of existing agricultural production in the four-county area are approximately 40,200 and 72,200 jobs, respectively. It is clear that the agricultural industry represents a key economic driver in the region.

8.1.3 Exchange Contractors' Service Area

The role of agriculture is even more pronounced within the Exchange Contractors' service area. This section addresses the economic benefits of agricultural production in the service area, as well as the economic effects attributed to the existing Program.

[2] For more information on cropping patterns, refer to Chapter 7.0, Land Use and Agriculture.

Agricultural Economics

Farmgate Production Values

In the Exchange Contractors' service area, approximately 230,700 acres of land have been in agricultural production, on average, between 2006 and 2010 (excluding fallowed land). The total annual value of crops grown in the Exchange Contractors' service area under existing conditions is estimated at $397.5 million, which is equivalent to about $1,723 per acre (see Appendix F, Table F-10). The value of crops grown locally varies substantially, ranging from about $230/acre for pasture/hay/forage to almost $5,200/acre for melons. Permanent crops represent only 8.2 percent of land in production, but have an annual value of $86.7 million, accounting for nearly 22 percent of total farmgate value. The largest crop produced (based on acres) is alfalfa with an average value of roughly $1,250 per acre.

Regional Economic Benefits of Agriculture

Farmers in the Exchange Contractors' service area purchase large amounts of seed, feed, fertilizer, chemicals, farm machinery, and other inputs for their operations. These inputs are produced both within and outside the four-county region. Farmers also utilize such specialized services as soil testing, planting, harvesting, and farm management. All of these factors of production and input services are attributable to and a reflection of the size and importance of the economy that has built up around agricultural production in the Exchange Contractors' service area. As a result, the regional economic effects attributable to crop production in the service area are substantial. Based on 2006–2010 data, agricultural production within the service area generated $397.5 million and $546.5 million in direct and total output, $74.8 million and $131.7 million in direct and total labor income, and 2,073 and 3,620 direct and total jobs, respectively, in the four-county study area (see Appendix F, Table F-12).

Economic Effects of Existing Water Transfer Program

The Proposed Program must be considered in the context of existing conditions (as of June 2011), which serves as the baseline for the CEQA analysis. The NEPA analysis includes comparison to No Action/No Project. The existing conditions baseline includes an active Water Transfer Program that is set to expire in 2014. Below is a summary of the existing Program and related assumptions, which provide the basis for estimating baseline socioeconomic impacts, as well as an overview of the Program's associated economic effects:

- Average annual volume of water transfer (2006–2010): 83,600 AFY
(2009): 88,132 AFY
  - Transfer to wildlife refuges: 30,000 AFY
  - Transfer to South-of-Delta CVP agricultural users: 51,300 AFY
  - Transfer to and M&I users: 2,300 AFY
- Source of water transfer
  - Existing conservation projects (e.g., tailwater recovery, irrigation systems, facility lining, and pumping and conveyance improvements): 80,000 AFY

- Maximum yield from existing conservation projects: 80,000 AFY
- Agricultural land fallowing: 8,000 AFY (3,200 acres)[3]

Agricultural Production Values (Land Fallowing)

On average, about 3,200 acres of farmland have been fallowed annually under the existing Program. Representative fallowed crops include alfalfa, corn, cotton, oats, and tomatoes with a weighted average production value of $1,446 per acre. Based on these figures, the value of foregone crop production on fallowed land is estimated at over $4.6 million per year. This amount includes foregone revenue of approximately $1.5 million in alfalfa, $496,000 in corn, $1.3 million in cotton, $179,000 in oats, and $1.1 million in tomatoes.

Farm-Level Costs and Income (Land Fallowing)

Under existing conditions, net-farm income on fallowed lands is foregone by agricultural operators participating in the existing Program. In addition, because all water transfers involving agricultural land fallowing are landowner-to-landowner transfers (i.e., no exchange of money), no revenues are generated by land fallowing water transfers under existing conditions. In addition, landowners that fallow land and transfer water are responsible for water transfer costs that further reduce income levels.

Ancillary costs associated with land fallowing water transfers include payments for water that is transferred (at the applicable water rate in each district), consultant costs to quantify water yields on fallowed land, water transportation/conveyance costs to the Exchange Contractors and receiving districts, and Program administration costs.[4] It is estimated that the total cost incurred by landowners to participate in the land fallowing program is about $99/acre-foot, which includes water rate payments of about $9/acre-foot on average across all Exchange Contractors' districts. Using these figures, the costs associated with transferring 8,000 acre-feet of irrigation water annually under existing conditions total approximately $720,000 (excluding water rate payments),[5] which represents a reduction in net revenue realized at the farm level. The majority of these costs, approximately $560,000, are attributed to payments to receiving water districts to transport the water, which represents money leaving the local economy. The other costs are directly or indirectly paid to Exchange Contractors' districts and/or other local industries, thereby representing a transfer from one local entity to another with little effect on regional economic activity.

In addition, agricultural operators forego the net returns on agricultural lands that they fallow. For this study, the net return to agricultural production in the local area is assumed to be approximately $448/acre, which is equivalent to existing water transfer pricing for initial flex water ($179.38/acre-foot) multiplied by an assumed 2.5 acre-feet/acre of applied water. Based on this estimate, agricultural operators who have

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[3] Assumes 2.5 acre-feet of irrigation water required per acre

[4] In addition, landowners typically undertake active land management activities on fallowed land, such as disking for noxious weed control, to ensure the continued viability of the land and minimize soil erosion. These costs are noted here, but they have not been quantified as part of this cost analysis.

[5] Water rate payments are excluded from the analysis because they are paid irrespective of whether land is fallowed.

fallowed land under the existing Program realize an additional loss of over $1.4 million in net operating income. Considering both direct fallowing cost and foregone revenues, the total cost to agricultural operators is over $2.2 million annually.

District-Level Costs and Income (Water Conservation)

The Exchange Contractors earn revenues based on the transfer of conservation water. Under existing conditions, approximately 80,000 AFY of conservation water is transferred from the Exchange Contractors' service area. Based on estimated average price for transferred water, approximately $228/acre-foot under existing conditions, the Exchange Contractors realize about $18.2 million in total revenues for water transfers on an annual basis. Theoretically, this money is used to fund ongoing district operations, including repayment of capital on previously implemented conservation projects with a yield of up to approximately 80,000 AFY, which equals existing levels of conservation water transfers. It is assumed that all of water transfer revenue is expended locally generating additional benefits in the regional economy.

Regional Economic Effects

The existing Program's regional economic effects are based primarily on reductions in crop production and related land fallowing costs, conservation transfer revenues, and associated spending patterns. Total economic impacts attributed to land fallowing include losses of $6.2 million in output, $1.4 million in labor income, and 39 jobs within the four-county economy. Under existing conditions, where all water transfers from land fallowing are landowner-to-landowner, no offsetting economic benefits are attributed to transfer revenues. In fact, additional economic impacts are associated with water conveyance costs (paid to receiving water districts) that leave the region, resulting in reductions in household spending levels in the local economy. Specifically, land fallowing expenditures yield an addition decline of about $387,000 in total output, $122,000 in labor income, and about three jobs.

Conversely, the revenues generated by conservation water transfers implemented at the district level generate economic benefits in the four-county economy. It is estimated that the existing Program brings in approximately $18.2 million in new revenues that are expended locally by the Exchange Contractors' districts. These expenditures generate an increase in total output of nearly $26.7 million, $10.9 million in labor income, and support 190 jobs in the regional economy.

In summary, the existing Program's net economic effect on regional economic conditions is positive as the benefits (from conservation transfer revenues) outweigh the adverse effects (from agricultural production losses). From a regional perspective, the net economic benefits generated in the four-county economy include an incremental increase of $20.1 million in output value, $9.4 million in labor income, and about 148 total jobs annually (see Appendix F, Table F-18).

8.1.4 Regulatory Environment

No regulations are directly applicable to socioeconomic resources.

8.2 Environmental Consequences

This section evaluates the potential socioeconomic effects (both benefits and costs) associated with the action alternatives being considered under the Proposed Program, as well as the No Action/No Project Alternative. The action alternatives involve variations in the amount (50,000-150,000 AFY) and source of developed water (agricultural land fallowing and conservation) made available for transfer. The No Action/No Project Alternative would result in the cessation of the existing Program. The analysis does not cover socioeconomic impacts in the service areas of districts and agencies that would receive the transferred water (i.e., “receiving areas”); the effects of how the water would be used are addressed primarily in other environmental documents and are summarized in Section 3.3 of this EIS/EIR.

8.2.1 Key Impact and Evaluation Criteria

Socioeconomic resources are treated differently under NEPA and CEQA. NEPA requires analysis of social and economic impacts as part of the human environment (where applicable); however, no standard significance criteria for socioeconomic impacts exist under NEPA.

Under CEQA, no requirement exists to consider the social and economic effects of a project.[6] However, the CEQA Guidelines state that economic or social information may be included in an EIR, although such effects should not be treated as significant impacts on the environment (Section 15131); therefore, determination of significance for economic impacts is not required. Further, an EIR may trace the chain of cause and effect from economic to environmental impacts focusing on the resultant physical change in the environment [Section 15131(a)]. In the Proposed Program’s context, the economic impacts of restricting agricultural production on fallowed land are not expected to result in additional physical environmental impacts, such as those associated with conversion to urban uses since land fallowing would be temporary. However, under CEQA, social and economic effects can be used to determine the significance of environmental impacts resulting from a project physical change [Section 15131(b)]. Further explained, if a project results in a physical environmental change, the related economic or social effects can be used to determine whether that physical change would be significant. In the Proposed Program’s context, socioeconomic effects can be used to evaluate the significance of changes in agricultural land uses. Because physical changes in the environment (i.e., land fallowing and loss of agricultural production) would result in social and economic effects on the regional economy, the economic information presented in this section can be used in determining whether these physical effects would be significant. Lastly, economic factors can also be considered by public agencies in deciding whether changes in a project are feasible to reduce or avoid the significant effects on the environment [Section 15131(c)].

[6] CEQA does require an evaluation of population and housing per CEQA Guidelines Appendix G. Impacts related to population and housing have been considered, but eliminated from further consideration in this EIS/EIR (see Section 3.2).

As explained above, thresholds of significance for socioeconomic resources are not required and determinations of significance cannot be made. However, for this project, the following criteria area used to evaluate the magnitude of socioeconomic impacts and effects. Would the Proposed Program result in:

- Substantial loss in the value of agricultural production relative to region-wide conditions?
- Substantial changes in farm-level costs and income incurred by agricultural operators in the Exchange Contractors' Service Area?
- Substantial changes in operating costs and income incurred by Exchange Contractors' member districts?
- Substantial reduction in regional economic activity (output, jobs, and income) in the four-county economy?

For conclusions under CEQA, the following analyses will indicate if the impact (i.e., adverse effect) is substantial or not. No conclusions are made under NEPA within this EIS/EIR, but conclusions will be addressed in the subsequent Record of Decision (ROD).

8.2.2 Environmental Impacts and Mitigation

Proposed water transfers would involve both water made available through conservation actions and land fallowing, and each would generate a range of direct economic impacts affecting local agricultural landowners and operations of the Exchange Contractors' districts. In the context of land fallowing, the actions incorporated in the alternatives would affect crop production values, as well as farm-level income based on Program-related expenses and water transfer revenues. Water transfers accommodated by conservation activities would affect operating revenues at the individual district level based on transfer revenues and capital investment requirements.

The direct effects described above would have "ripple" effects throughout the regional economy based on changes in the final demand for the goods and services and economic linkages and interdependencies among industries. The changes in final demands are utilized to compute regional economic impacts, measured by indirect and induced changes in economic output (or production), labor income, and employment. Regional economic effects would be concentrated primarily in the agricultural production sector; however, other sectors would also be affected, including agriculture-support industries that provide inputs from goods and services to farms in the Exchange Contractors' service area. In addition, various water-related industries that support the implementation of conservation projects and ongoing district operations would realize economic impacts.

The methods used to evaluate the Proposed Program's economic impacts are detailed in the socioeconomics technical report (Appendix F). The socioeconomic effects presented here represent average annual impacts that could occur over the 25-year Program timeframe (beginning in 2014) and are based on maximum volumes of water that could be developed for transfer and/or exchange under the Proposed Program. The actual volume of water that would be developed in any one year is unknown and may be significantly less than permitted volumes; therefore, the impact estimates in this report represent theoretical maximum values. Although the Program would extend over 25 years, for this analysis, no discounting of future benefits would occur.

The following impact/effects analysis for socioeconomic resources is based on the information presented in Tables 8-1 through 8-4B, which provide a comparative analysis of socioeconomic impacts/effects under existing conditions, the No Action/No Project Alternative, and Alternatives A through D.

No Action/No Project/No Project Alternative

Under the No Action/No Project Alternative, the existing Program currently in place through February 28, 2014 (Water Year 2013), would be discontinued and no water transfers would occur from the Exchange Contractors' service area thereafter. As such, no agricultural land fallowing would occur and no *new* conservation projects would be implemented to develop water to accommodate the demand for water transfers. Conservation water from existing projects and programs would not be used for water transfers, but instead would increase water supply reliability within the Exchange Contractors' service area through groundwater recharge and a reduction in current groundwater pumping quantities.

Impact SOC-1: Agricultural Production Values (Land Fallowing)

The No Action/No Project Alternative would result in no transfer or exchange of water from the Exchange Contractors' service area. Consequently, temporary land fallowing would not be needed and no loss of agricultural production value on fallowed lands would occur after the existing Program expires. In fact, approximately 3,200 acres of cropland (generating 8,000 AFY) that has been historically fallowed would be placed back into production. Returning this land to production would generate an increase in farmgate production value in the Exchange Contractors' service area relative to existing conditions, estimated at approximately $4.6 million annually (see Table 8-1). As a result, no impact would be associated with agricultural production values under CEQA.

Table 8-1
Fallowed Land Acreage and Gross Production Value under Water Transfer Program

Alternative	Fallowed Acres	Average Production Value (per acre)	Production Value on Fallowed Land ($million)	Change Relative to Existing Conditions ($million)	Change Relative to No Action ($million)
Existing Conditions	3,200	$1,446	-$4.6	N/A	-$4.6
No Action/No Project	0		$0.0	$4.6	N/A
Alternative A	20,000		-$28.9	-$24.3	-$28.9
Alternative B	20,000		-$28.9	-$24.3	-$28.9
Alternative C	20,000		-$28.9	-$24.3	-$28.9
Alternative D	20,000		-$28.9	-$24.3	-$28.9

N/A = Not Applicable

Table 8-2A
Gross and Net Revenues for Land Fallowing Water Transfers (Landowner-to-Landowner Transfers)

Alternative	Transferred Water (acre-feet)	Water Transfer Price ($/acre-foot)	Fallowing Transfer Revenue (Gross) ($million)*	Foregone Crop Revenue (Net) ($million)	Fallowing Expenses ($million)	Net Farm Revenue ($million)	Change Relative to Existing Conditions ($million)	Change Relative to No Action ($million)
Existing Conditions	8,000	N/A	N/A	$1.4	$0.7	-$2.2	N/A	-$2.2
No Action/ No Project	0	N/A	N/A	$0.0	$0.0	$0.0	$2.2	N/A
Alternative A	50,000	N/A	N/A	$9.0	$4.5	-$13.5	-$11.3	-$13.5
Alternative B	50,000	N/A	N/A	$9.0	$4.5	-$13.5	-$11.3	-$13.5
Alternative C	50,000	N/A	N/A	$9.0	$4.5	-$13.5	-$11.3	-$13.5
Alternative D	50,000	N/A	N/A	$9.0	$4.5	-$13.5	-$11.3	-$13.5

N/A = Not Applicable
*Only applicable to land fallowing water transfer sales

Table 8-2B
Gross and Net Revenues for Land Fallowing Water Transfers (Water Transfer Sales)

Alternative	Transferred Water (acre-feet)	Water Transfer Price ($/acre-foot)	Fallowing Transfer Revenue (Gross) ($million)*	Foregone Crop Revenue (Net) ($million)	Fallowing Expenses ($million)	Net Farm Revenue ($million)	Change Relative to Existing Conditions ($million)	Change Relative to No Action ($million)
Existing Conditions	8,000	N/A	$0.0	$1.4	$0.7	-$2.2	N/A	-$2.2
No Action/ No Project	0	N/A	$0.0	$0.0	$0.0	$0.0	$2.2	N/A
Alternative A	50,000	$297	$14.8	$9.0	$4.5	$1.4	$3.5	$1.4
Alternative B	50,000	$330	$16.5	$9.0	$4.5	$3.0	$5.2	$3.0
Alternative C	50,000	$343	$17.2	$9.0	$4.5	$3.7	$5.9	$3.7
Alternative D	50,000	$347	$17.4	$9.0	$4.5	$3.9	$6.1	$3.9

N/A = Not Applicable
*Only applicable to land fallowing water transfer sales

Table 8-3
Conservation Water Transfer Revenues

Alternative	Conserved Water Transfers (acre-feet)	Water Transfer Price ($/acre-foot)	Total Transfer Revenue ($million)	Change Relative to Existing Conditions ($million)	Change Relative to No Action ($million)
Existing Conditions	80,000	$228	$18.2	N/A	$18.2
No Action/No Project	0	N/A	$0.0	-$18.2	N/A
Alternative A	0	$218	$0.0	-$18.2	$0.0
Alternative B	38,000	$228	$8.6	-$9.6	$8.6
Alternative C	80,000	$232	$18.5	$0.3	$18.5
Alternative D	100,000	$233	$23.3	$5.1	$23.3

N/A = Not Applicable

Table 8-4A
Summary of Regional Economic Effects (Landowner-to-Landowner Transfers)[1,2,3,4]

Alternative	Total Economic Impacts (Annual)			Change Relative to Existing Conditions			Change Relative to No Action		
	Output ($million)	Labor Income ($million)	Employment (Jobs)	Output ($million)	Labor Income ($million)	Employment (Jobs)	Output ($million)	Labor Income ($million)	Employment (Jobs)
Existing Conditions	$20.1	$9.4	148	N/A	N/A	N/A	$20.1	$9.4	148
No Action/ No Project	$0.0	$0.0	0	-$20.1	-$9.4	-148	$0.0	$0.0	0
Alternative A	-$41.4	-$9.4	-263	-$61.5	-$18.7	-411	-$41.4	-$9.4	-263
Alternative B	-$28.7	-$4.2	-173	-$48.8	-$13.6	-321	-$28.7	-$4.2	-173
Alternative C	-$14.2	$1.7	-69	-$34.3	-$7.7	-217	-$14.2	$1.7	-69
Alternative D	-$7.3	$4.5	-20	-$27.3	-$4.8	-168	-$7.3	$4.5	-20

N/A = Not Applicable

1 Based on IMPLAN modeling for the four-county study area (Fresno, Madera, Merced, and Stanislaus)

2 Values reported in 2011 dollars

3 Based on maximum land fallowing permitted under each alternative

4 Excludes agricultural benefits in receiving districts, which may be located in four-county study area; therefore, impact estimates may be overstated

Table 8-4B
Summary of Regional Economic Effects (Water Transfer Sales)[1,2,3,4]

Alternative	Total Economic Impacts (Annual)			Change Relative to Existing Conditions			Change Relative to No Action		
	Output ($million)	Labor Income ($million)	Employment (Jobs)	Output ($million)	Labor Income ($million)	Employment (Jobs)	Output ($million)	Labor Income ($million)	Employment (Jobs)
Existing Conditions[5]	$20.1	$9.4	148	N/A	N/A	N/A	$20.1	$9.4	148
No Action/ No Project	$0.0	$0.0	0	-$20.1	-$9.4	-148	$0.0	$0.0	0
Alternative A	-$32.1	-$6.4	-197	-$52.2	-$15.8	-345	-$32.1	-$6.4	-197
Alternative B	-$18.6	-$1.0	-101	-$38.6	-$10.4	-249	-$18.6	-$1.0	-101
Alternative C	-$3.7	$5.0	5	-$23.8	-$4.3	-143	-$3.7	$5.0	5
Alternative D	$3.4	$7.9	55	-$16.7	-$1.5	-93	$3.4	$7.9	55

N/A = Not Applicable

[1] Based on IMPLAN modeling for the four-county study area (Fresno, Madera, Merced, and Stanislaus)

[2] Values reported in 2011 dollars

[3] Based on maximum land fallowing permitted under each alternative

[4] Excludes agricultural benefits in receiving districts, which may be located in four-county study area; therefore, impact estimates may be overstated

[5] Existing conditions reflect landowner-to-landowner transfers only

Impact SOC-2: Farm-Level Costs and Income

Under the No Action/No Project Alternative, revenues associated directly with water transfers would not change because all land fallowing transfers to date have been landowner-to-landowner with no exchange of funds. At the farm-level, however, an increase in gross revenues for agricultural operators would be associated with the return of agricultural land to production (see Impact SOC-1), which would be offset to some degree by typical farm production costs (e.g., seed and fertilizer) that otherwise would not be realized with land fallowing. The net operating income on farmland returned to production would likely be comparable to that earned in the region. For this study, the net return to agricultural production in the local area is assumed to be approximately $448/acre.[7] Based on this estimate, agricultural operators who have fallowed land under the existing Program would realize an increase in net operating income of over $1.4 million per year without the Program. In addition, under No Action/No Project, the other expenses incurred by farmers for land fallowing (i.e., consultant costs, water conveyance costs, and administrative costs) totaling about $90/acre-foot would no longer apply, resulting in an incremental cost savings of about $720,000 annually. In total, net income to farmers under the No Action/No Project Alternative would increase by nearly $2.2 million per year relative to existing conditions (see Tables 8-2A and 8-2B). Conceptually, these benefits would be offset to some degree by the unrealized benefits associated with water transferred to other land holdings receiving the water; however, the net economic effect is unknown. Therefore, under CEQA, no impact on farm-level costs and income would occur in the Exchange Contractors' service area.

Impact SOC-3: District-Level Costs and Income (Water Conservation)

Similarly, the Exchange Contractors' districts would not engage in transfer of conservation water to other CVP contractors and wildlife refuges under No Action/No Project, thereby resulting in a reduction in transfer revenues and costs. Based on conservation water transfers of about 80,000 AFY, approximately $18.2 million in foregone transfer revenues would occur if the existing Program expired (see Table 8-3). No incremental cost savings would occur from deferred investment costs because existing conservation infrastructure has been adequate to meet the demand for transfers and no additional capital investment in conservation projects would be necessary. As a result, member districts would have less money to fund ongoing operations and maintenance activities resulting in less localized spending and a decrease in regional economic benefits associated with such expenditures. Under CEQA, the impact from foregone conservation water transfer revenues on net operating income of Exchange Contractors' member districts would be substantial.

Impact SOC-4: Regional Economic Effects

Without an active Water Transfer Program, the net benefits on regional economic conditions under the existing Program would be foregone. These foregone benefits are attributed to conservation water transfer revenues, which outweigh the adverse effects associated with land fallowing. Overall, the No Action/No Project Alternative would result in losses of $20.1 million in total output value, $9.4 million in total labor income,

[7] Estimated to be equivalent to existing water transfer pricing for initial flex water ($179.38/AF) multiplied by an assumed 2.5 AF/acre of applied water.

and about 148 total jobs annually in the four-county economy relative to existing conditions (see Tables 8-4A and 8-4B). These effects are minor when evaluated in the context of the size of the regional economy, which supports over 827,000 jobs and nearly $37.6 billion in labor earnings annually. Consequently, with cessation of the existing Program under the No Action/No Project Alternative, the impact on the regional economy due to foregone water transfer revenues (which outweigh the regional benefits of increased agricultural production) would be less than substantial under CEQA.

Alternative A: 50,000 Acre-Feet

Under Alternative A, up to 50,000 AFY would be transferred and/or exchanged from the Exchange Contractors' service area to other CVP/SWP contractors and wildlife refuges. All of the water would be derived from agricultural land fallowing, which could occur in any type of water year under the Exchange Contract. No transfer of water developed from conservation projects would occur. Under all of the action alternatives, including Alternative A, up to 20,000 acres of farmland would be temporarily fallowed, which represents about 8.5 percent of all cropland in the Exchange Contractors' service area.

Impact SOC-1: Agricultural Production Values (Land Fallowing)

Relative to existing conditions, where approximately 3,200 acres have been fallowed historically, this alternative would involve additional land fallowing on approximately 16,800 acres, mainly alfalfa, corn, cotton, oats, and tomatoes. The remaining cropland in the service area would remain in agricultural production subject to typical crop rotations and cropping patterns. The incremental change in value associated with reduced crop output with land fallowing under Alternative A is estimated at over $28.9 million per year compared to No Action/No Project, which is $24.3 million higher than existing conditions, and would have ripple effects throughout the regional economy (see Table 8-1). This change represents about 6.1 percent of the total value of agricultural production in the Exchange Contractors' service area. Under CEQA, the loss in agricultural production values under Alternative A represents a less-than-substantial impact.

Impact SOC-2: Farm-Level Costs and Income (Land Fallowing)

Under the Proposed Program, water transfers supported by land fallowing can occur as (1) landowner-to-landowner transfers or (2) sale of transferred water. In both scenarios, water transfers from land fallowing could affect farm-level cost and income and related socioeconomic conditions in the region. With the former, an agricultural landowner in the Exchange Contractors' service area fallows land and transfers the water to himself/herself in another district. In this case, no sale of the water occurs and no money exchanges hands except for typical land fallowing expenses. With the latter, water developed from land fallowing would be transferred to interests in the receiving areas based on agreed sales price. The Exchange Contractors and receiving area districts would administer such sales, although the net revenues (after fallowing expenses) would be passed through to the landowner.

In the case of landowner-to-landowner transfers, agricultural operators would not realize any revenues for the water transferred, similar to existing conditions. However, the transferor would be responsible for all applicable costs associated with land fallowing transfers, which are common to all of the action alternatives; these costs generally include

(1) payment for the water to the respective water district at the applicable water rate, (2) consultant costs to calculate the amount of water the fallowing generates, (3) fees to the Exchange Contractors for transporting/conveying the water, and (4) transportation/conveyance charges incurred by the receiving district.[8] In total, these costs are estimated at approximately $99/acre-foot and include water rate payments of about $9/acre-foot,[9] which is paid irrespective of whether the water is used on farm or transferred; therefore, the incremental cost of land fallowing is about $90/acre-foot. Based on the maximum volume of water transfers from land fallowing under all action alternatives (50,000 AFY), fallowing-related expenses are estimated at $4.5 million annually, approximately $3.8 million higher than existing conditions. In addition, the agricultural operator would forego the net return on land that is fallowed, estimated at $448/acre. The foregone operating revenue under all action alternatives totals nearly $9.0 million compared to No Action/No Project, which is about $7.5 million higher relative to existing conditions. The net effect on farmers varies; however, depending on whether water transfers are landowner-to-landowner or water transfer sales.

With landowner-to-landowner transfers, the total cost to agricultural operators participating in the land fallowing program, including fallowing expenses and foregone revenues, would be $13.5 million under Alternative A compared to No Action/No Project. When compared to $2.2 million in total costs under existing conditions, this amount represents an increase in costs of $11.3 million annually (see Table 8-2A); this difference equates to a decrease in net farm income in the Exchange Contractors’ service area. Conceptually, these adverse effects would be offset to some degree by the economic benefits associated with water transferred to other land holdings receiving the water; the net economic benefit is unknown. Under CEQA, less-than-substantial impacts would be attributed to an increase in farm-level costs under the scenario of landowner-to-landowner water transfers with Alternative A.

With water transfer sales; however, agricultural operators would realize a new source of revenue. For this analysis, it is assumed that farmers would fallow their land voluntarily if the price was sufficient to at least offset average net profits they receive for the crops grown on the land. More likely, a higher price would be required to provide an incentive to participate in the land fallowing program. This price is assumed to be set at the highest transfer price under existing contracts (corresponding to a 0 percent agricultural service allocation). Under Alternative A, this price is about $297/acre-foot. Based on these values, gross revenues to farmers for transferred water are estimated to be about $14.8 million annually over the Program’s life. Taking into account fallowing-related expenses of approximately $4.5 million per year, net revenues associated with land fallowing are an estimated $10.3 million annually. These revenues must be balanced with the foregone net return on land being fallowed, estimated at nearly $9.0 million per year, resulting in a positive net return under Alternative A of roughly $1.4 million per year at the farm level compared to No Action/No Project (see Table 8-2B). This positive return

[8] In addition, landowners typically undertake active land management activities on fallowed land, such as disking for noxious weed control, to ensure the continued viability of the land and minimize soil erosion. These costs are noted here, but they have not been quantified as part of this cost analysis.

[9] Represents weighted average water rate across the four Exchange Contractors’ member districts.

is higher than existing conditions, which has a negative return of -$2.2 million due to the fact that no transfer revenues are generated; the difference in net farm revenues between Alternative A and existing conditions is +$3.5 million. Under CEQA, no impact would be attributed to a change in farm-level costs under the scenario of water transfer sales with Alternative A.

Impact SOC-3: District-Level Costs and Income (Water Conservation)

Under Alternative A, no conservation water transfers would occur (all transfers would be from agricultural land fallowing). As a result, the Exchange Contractors would not realize any revenues and cost associated with conservation water and no related benefits would occur in the regional economy similar to No Action/No Project where no Program is in place. Based on conservation water transfers of about 80,000 AFY under existing conditions, approximately $18.2 million in foregone transfer revenues accruing to the Exchange Contractors would be realized under this alternative (see Table 8-3). Instead, water yields from existing conservation projects would serve to augment water supply reliability in the Exchange Contractors' service area and no new capital investment in conservation projects would be required. From a regional perspective, member districts would have less money to fund ongoing operations and maintenance activities and a decrease in regional economic benefits would be associated with reductions in spending. Under CEQA, the impact from foregone conservation water transfer revenues to Exchange Contractors' member districts would be substantial with Alternative A.

Impact SOC-4: Regional Economic Effects

As described under existing conditions, the primary drivers of regional economic effects associated with the Proposed Program are changes in agricultural production (land fallowing), land fallowing costs, and water transfer revenues. (No regional effects are associated with conservation water transfers under Alternative A as these types of transfers are not part of this alternative.) Overall, Alternative A would have an adverse effect on the regional economy primarily due to losses in agricultural production and related spending, which is common to all action alternatives. Considering landowner-to-landowner transfers only with no offsetting transfer revenues, the total economic impacts (incorporating ripple effects in the regional economy) include annual losses of $41.4 million in output, $9.4 million in labor income, and 263 jobs in the four-county economy compared to No Action/No Project. Compared to existing conditions, where regional economic benefits are generated by the existing Program, these adverse effects are even more pronounced, a decrease of $61.5 million in total output value, $18.7 million in total labor income, and 411 total jobs (see Table 8-4A).

If agricultural water transfers were available for sale, transfer revenues would help to offset some of these impacts, but the net effect would still be negative. In this case, the total effects in the four-county economy are annual losses of $32.1 million in output, $6.4 million in labor income, and 197 jobs compared to No Action/No Project. Compared to existing conditions, Alternative A would result in a decrease of $52.2 million in total output value, $15.8 million in total labor income, and 345 total jobs (see Table 8-4B). Under both scenarios (i.e., landowner-to-landowner transfers and water transfer sales), the regional economic impacts anticipated under Alternative A are minor when evaluated in the context of the size of the regional economy. Under either scenario, the impact on the regional economy from Alternative A (primarily due to increased land fallowing and foregone conservation water transfer revenues) would be less than substantial relative to existing conditions under CEQA.

Alternative B: 88,000 Acre-Feet

Up to 88,000 AFY would be transferred from the Exchange Contractors' service area to other CVP/SWP contractors and wildlife refuges under Alternative B. Flexibility exists in the development of 88,000 AFY for transfer; up to 80,000 AFY can come from conservation and up to 50,000 AFY can come from land fallowing. For the purposes of the economic evaluation, it is assumed that 50,000 acre-feet would be derived from agricultural land fallowing and 38,000 acre-feet would come from conservation activities. With these assumptions, approximately 20,000 acres of farmland would be temporarily fallowed, an increase of 16,800 acres relative to existing conditions.

Impact SOC-1: Agricultural Production Values (Land Fallowing)

Under Alternative B, the incremental change in value of foregone crop production with land fallowing is estimated at over $28.9 million per year compared to No Action/No Project where no land fallowing occurs, which is $24.3 million higher relative to existing conditions; this amount is comparable to all action alternatives (see Table 8-1). This increase in production losses represents about 6.1 percent of the total value of agricultural production in the Exchange Contractors' service area. Under CEQA, a less-than-substantial impact would be associated with losses in agricultural production values under Alternative B.

Impact SOC-2: Farm-Level Costs and Income

Under Alternative B, the effects on farm-level costs and income would be comparable to those described above for Alternative A. In fact, in the case of landowner-to-landowner transfers, the effects would be the same – an overall increase in farm-level costs for those agricultural operators participating in the land fallowing program, which includes foregone crop revenues and fallowing expenses. Specifically, total costs associated with land fallowing would be an estimated $13.5 million under Alternative B compared to No Action/No Project. When compared to $2.2 million in total costs under existing conditions, this amount represents an increase in costs of $11.3 million annually, which equates to a decrease of net farm income in the Exchange Contractors' service area (see Table 8-2A). Similarly, these adverse effects would likely be offset to some degree by the economic benefits associated with water transferred to other land holdings receiving water; the net economic effect is unknown. Alternative B would result in a less-than-substantial impact under CEQA attributed to an increase in farm-level costs with landowner-to-landowner water transfers.

Similar effects are also expected in the case of water transfer sales except that revenues would be generated, which represents a new source of income for farmers. Under Alternative B, the price of transfer water from land fallowing is assumed to be $330/acre-foot, which would generate $16.5 million in gross revenue and $12.0 million in net revenue after deducting fallowing-related costs of approximately $4.5 million. However, agricultural operators participating in the Program would forego revenues associated with production on fallowed land, estimated at $9.0 million annually. The net effect is a positive return under Alternative B of roughly $3.0 million per year at the farm level compared to No Action/No Project. This positive return is higher than the negative return of -$2.2 million under existing conditions where no sale revenues are generated (see Table 8-2B); the difference in net farm revenues between Alternative B and existing conditions is +$5.2 million. Therefore, Alternative B would result in no impact under CEQA attributed to changes in farm-level costs in the case of water transfer sales.

Impact SOC-3: District-Level Costs and Income (Water Conservation)

Under Alternative B, the Exchange Contractors would continue to receive revenues from the sale of conserved water provided not only to other CVP contractors and wildlife refuges, but also to SWP contractors. It is assumed that 38,000 acre-feet of conservation water would be transferred from the Exchange Contractors' service area annually under Alternative B at an average price of $228/acre-foot. Based on these values, the Exchange Contractors would realize approximately $8.6 million in water transfer revenues compared to No Action/No Project where no conservation transfer revenues would be realized, which is nearly $9.6 million less than revenue levels realized under existing conditions (see Table 8-3). This money would likely be used to fund ongoing district operations, including repayment of capital on previously implemented conservation projects, which would generate additional benefits in the regional economy albeit at lower levels than under existing conditions. In addition, water yields from existing conservation projects are sufficient to cover water conservation targets under this alternative; therefore, no new capital investment in conservation projects would be required Under CEQA, the impact from foregone conservation water transfer revenues to Exchange Contractors' member districts would be substantial under Alternative B.

Impact SOC-4: Regional Economic Effects

Alternative B would result in losses in agricultural production with fallowing of up to 20,000 acres of farmland, which would generate adverse effects on the regional economy through interindustry linkages with the agricultural sector. These effects would be partially offset by conservation water transfer revenues for approximately 38,000 AFY, although the extent of such transfers would be less than existing conditions.

In the scenario where all land fallowing transfers would be landowner-to-landowner, the Proposed Program's total economic impacts include annual losses of $28.7 million in output, $4.2 million in labor income, and 173 jobs in the four-county economy compared to No Action/No Project. Compared to existing conditions, Alternative B would result in a relative decrease of $48.8 million in total output value, $13.6 million in total labor income, and 321 total jobs (see Table 8-4A). Under CEQA, the impact on the regional economy from Alternative B (primarily due to increased land fallowing and a reduction in conservation water transfer revenues) would be less than substantial relative to existing conditions in the case of landowner-to-landowner transfers. With sales of water developed from land fallowing, the related transfer revenues would generate additional regional economic benefits, but the net effect on the regional economy is negative. In this scenario, total effects in the four-county economy are annual losses of $18.6 million in output, nearly $1.0 million in labor income, and 101 jobs compared to No Action/No Project. Compared to existing conditions, Alternative B would result in a decrease of $38.6 million in total output value, $10.4 million in total labor income, and 249 total jobs (see Table 8-4B). Under CEQA, the impact on the regional economy from Alternative B (primarily due to increased land fallowing and a reduction in conservation water transfer revenues) would be less than substantial relative to existing conditions in the case of water transfer sales. Under both scenarios (i.e., landowner-to-landowner transfers and water transfer sales), the regional economic impacts anticipated under Alternative B are minor when evaluated in the context of the size of the regional economy.

Alternative C: 130,000 Acre-Feet

Under Alternative C, a total of up to 130,000 AFY would be transferred from the Exchange Contractors' service area to other CVP/SWP contractors and wildlife refuges from a combination of land fallowing and conservation. Specifically, up to 50,000 acre-feet and 80,000 acre-feet would come from agricultural land fallowing and conservation activities, respectively. Based on these figures, up to 20,000 acres of farmland would be temporarily fallowed under Alternative C, an increase of 16,800 acres relative to existing conditions.

Impact SOC-1: Agricultural Production Values (Land Fallowing)

The incremental change in value of foregone crop production with land fallowing is estimated at over $28.9 million per year compared to No Action/No Project, which is $24.3 million higher than existing conditions, similar to all action alternatives (see Table 8-1). This increase in production losses represents about 6.1 percent of the total value of agricultural production in the Exchange Contractors' service area. Under CEQA, a less-than-substantial impact would be associated with losses in agricultural production values under Alternative C.

Impact SOC-2: Farm-Level Costs and Income

Under Alternative C, the effects on farm-level costs and income would be comparable to those described above for Alternative A. In fact, in the case of landowner-to-landowner transfers, the effects would be the same. An overall increase would occur in farm-level costs for those agricultural operators participating in the land fallowing program. Specifically, net costs would be an estimated $13.5 million under Alternative C compared to No Action/No Project. When compared to $2.2 million in total costs under existing conditions, this amount represents an increase in costs of $11.3 million annually, resulting in a decrease of net farm income in the Exchange Contractors' service area (see Table 8-2A). Similarly, these adverse effects would likely be offset to some degree by the economic benefits associated with water transferred to other land holdings receiving water. Alternative C would result in a less-than-substantial impact under CEQA attributed to an increase in farm-level costs with landowner-to-landowner water transfers.

Similar effects are also expected in the case of water transfer sales except that revenues would be generated, which represents a new source of income for farmers. Under Alternative C, the price of transfer water from land fallowing is assumed to be $343/acre-foot, which would generate $17.2 million in gross revenue and $12.7 million in net revenue after deducting fallowing-related costs of approximately $4.5 million. Also, foregone revenues would occur from agricultural production on fallowed land, estimated at $9.0 million annually. The net effect is a positive return under Alternative C of roughly $3.7 million per year at the farm level compared to No Action/No Project (see

Table 8-2B). This positive return is higher than existing conditions, which has a negative return of -$2.2 million because no sale revenues are generated; the difference in net farm revenues between Alternative C and existing conditions is +$5.9 million. Therefore, Alternative C would result in no impact under CEQA attributed to changes in farm-level costs with water transfer sales.

Impact SOC-3: District-Level Costs and Income (Water Conservation)

Alternative C calls for up to 80,000 acre-feet of conservation water transfers. Assuming an average price of $232/acre-foot, the Exchange Contractors would realize approximately $18.5 million in water transfer revenues compared to No Action/No Project where no conservation transfer revenues would be realized. This amount is slightly greater than existing transfer revenues of $18.2 million annually, an increase of approximately $0.3 million (see Table 8-3). These revenues would likely be used to fund ongoing district operations, including repayment of capital on previously implemented conservation projects, which would generate additional benefits in the regional economy. Further, because the required 80,000 acre-feet of conservation water to be made available for transfer under Alternative C is equivalent to the water yield from existing conservation projects, no new capital investment in conservation projects would be required. Under CEQA, no impact on conservation water transfer revenues to Exchange Contractors' member districts would occur under Alternative C.

Impact SOC-4: Regional Economic Effects

Under Alternative C, in the scenario where all land fallowing transfers would be landowner-to-landowner, the Proposed Program's total economic impacts in the four-county economy include annual losses of $14.2 million in output and 69 jobs compared to No Action/No Project; however, total labor income would increase slightly by $1.7 million annually indicating a shift to higher-paying jobs (see Table 8-4A). Compared to existing conditions; however, Alternative C would result in a relative decrease in all three measures, including losses of $34.3 million in total output value, $7.7 million in total labor income, and 217 total jobs. Under CEQA, Alternative C would result in an impact on the regional economy relative to existing conditions (primarily due to increased land fallowing); this impact would be less than substantial for landowner-to-landowner transfers. With sales of agricultural water, the four-county economy would experience a loss of $3.7 million in annual output, but an increase of $5.0 million in labor income and 5 jobs compared to No Action/No Project. However, compared to existing conditions, Alternative C would result in a decrease of $23.8 million in total output value, $4.3 million in total labor income, and 143 total jobs (see Table 8-4B). Under CEQA, Alternative C would result in an impact on the regional economy relative to existing conditions; this impact would be less than substantial for water transfer sales. Under both scenarios (i.e., landowner-to-landowner transfers and water transfer sales), the regional economic effects anticipated under Alternative C are minor when evaluated in the context of the size of the regional economy.

Alternative D: 150,000 Acre-Feet

Alternative D would provide up to 150,000 AFY for transfer from the Exchange Contractors' service area to other CVP/SWP contractors and wildlife refuges from a combination of land fallowing and conservation. Up to 50,000 acre-feet would come from agricultural land fallowing resulting in up to 20,000 acres of farmland being temporarily fallowed, an increase of 16,800 acres relative to existing conditions. The remaining 100,000 acre-feet would come from conservation activities, including new conservation projects that would yield an additional 20,000 AFY of conservation water to achieve conservation targets. Alternative D represents the alternative with maximum quantity of water transfer by adding an additional increment of conservation water.

Impact SOC-1: Agricultural Production Values (Land Fallowing)

The incremental change in value of foregone crop production with land fallowing is estimated at over $28.9 million per year compared to No Action/No Project, which is $24.3 million higher than existing conditions, similar to all action alternatives (see Table 8-1). This increase in production losses represents about 6.1 percent of the total value of agricultural production in the Exchange Contractors' service area. Under CEQA, a less-than-substantial impact would be associated with losses in agricultural production values under Alternative D.

Impact SOC-2: Farm-Level Costs and Income

Under Alternative D, the effects on farm-level costs and income would be comparable to those described above for Alternative A. In fact, in the case of landowner-to-landowner transfers, the effects would be the same. An overall increase in farm-level costs would occur for those agricultural operators participating in the land fallowing program. Specifically, net costs would be an estimated $13.5 million under Alternative D compared to No Action/No Project. When compared to $2.2 million in total costs under existing conditions, this amount represents an increase in costs of $11.3 million annually, resulting in a decrease of net farm income in the Exchange Contractors' service area (see Table 8-2A). Similarly, these adverse effects would likely be offset to some degree by the economic benefits associated with water transferred to other land holdings receiving the water. Alternative D would result in a less-than-substantial impact under CEQA attributed to an increase in farm-level costs with landowner-to-landowner water transfers.

Similar effects are also expected in the case of water transfer sales except that revenues would be generated, which represents a new source of income for farmers. Under Alternative D, the price of transfer water from land fallowing is assumed to be $347/acre-foot, which would generate almost $17.4 million in gross revenue and $12.9 million in net revenue after deducting fallowing-related costs of approximately $4.5 million. Also, foregone revenues would occur from agricultural production on fallowed land, estimated at $9.0 million annually. The net effect is a positive return under Alternative D of roughly $3.9 million per year at the farm level compared to No Action/No Project. This positive return is higher than the negative return of -$2.2 million under existing conditions where no sale revenues are generated (see Table 8-2B); the difference in net farm revenues between Alternative D and existing conditions is +$6.1 million. Therefore, Alternative D would result in no impact under CEQA attributed to changes in farm-level costs with water transfer sales.

Impact SOC-3: District-Level Costs and Income (Water Conservation)

Under Alternative D, up to 100,000 acre-feet of conservation water would be made available for transfer. The average price for transferred water is $233/acre-foot under this alternative, which would generate approximately $23.3 million annually in water transfer revenues for the Exchange Contractors compared to No Action/No Project where no conservation transfer revenues would be realized. This amount is about $5.1 million greater than existing transfer revenues of $18.2 million annually (see Table 8-3). These revenues would likely be used to fund ongoing district operations, including repayment of capital on previously implemented conservation projects, which would generate additional benefits in the regional economy.

Unlike the other alternatives, however, Alternative D requires new capital investment in water conservation projects. The conservation water target under Alternative D is 100,000 AFY, which exceeds the water yield from existing conservation projects by about 20,000 AFY. As a result, the Exchange Contractors' districts would need to invest in new conservation projects to meet target levels. Representative projects would include installation of drip irrigation and regulating reservoirs to more efficiently manage water deliveries. Based on cost information developed by Exchange Contractors' districts, it is estimated that the cost of conservation projects under consideration is about $905/acre-foot. The estimated total investment in new conservation projects is about $18.1 million, which would be expended over an approximate 10-year timeframe, or about $1.8 million per year; this amount represents an incremental cost to the Exchange Contractors' districts relative to existing conditions and No Action/No Project. It is anticipated that revenues from conservation water transfers (about $23.3 million per year) would be sufficient to cover all capital investment requirements. Under CEQA, no impact on conservation water transfer revenues to Exchange Contractors' member districts would occur under Alternative D.

Impact SOC-4: Regional Economic Effects

Alternative D would generally have a net adverse effect on the regional economy with landowner-to-landowner transfers. The total economic impacts include an annual loss of $7.3 million in total output and 20 jobs compared to No Action/No Project; however, the Program would generate an increase in $4.5 million in labor income. Compared to existing conditions, however, Alternative D would generate an impact on the regional economy considering all three measures, including a relative decrease of $27.3 million in total output value, $4.8 million in total labor income, and 168 total jobs (see Table 8-4A). Under CEQA, Alternative D would result in an impact on the regional economy relative to existing conditions with landowner-to-landowner transfers; this impact would be less than substantial. In the case of water transfer sales, the total effects in the four-county economy include annual increases of $3.4 million in output, $7.9 million in labor income, and 55 jobs compared to No Action/No Project. Compared to existing conditions, Alternative D would result in a decrease of $16.7 million in total output value, $1.5 million in annual labor income, and 93 total jobs (see Table 8-4B). Under CEQA, Alternative D would result in an impact on the regional economy relative to existing conditions with water transfer sales; this impact would be less than substantial. Under both scenarios (i.e., landowner-to-landowner transfers and water transfer sales), the regional economic effects anticipated under Alternative D are minor when evaluated in the context of the size of the regional economy.

8.2.3 Cumulative Effects

The socioeconomic impact analysis addresses several types of impacts, including effects associated with changes in agricultural production levels (due to land fallowing), farm-level impacts (i.e., impacts on agricultural operators participating in the land fallowing program), district-level impacts (i.e., impacts on Exchange Contractors' operating costs and revenues), and the associated regional economic effects anticipated in the four-county region. Of these impacts, the cumulative analysis focuses on regional economic effects attributed to land fallowing. The other types of impacts are specific to operations of individual landowners and districts, for which information is not readily available to evaluate cumulative effects.

The Proposed Program's cumulative economic effects must be considered in the context of the regional economic impacts of land fallowing occurring elsewhere in the region. Due to large fluctuations in available agricultural water supplies and declining soil quality, the number of acres in agricultural production has been substantially reduced in Central Valley over the past several years, including land the four-county region evaluated as part of this analysis. Declines in agricultural production adversely affect regional economic conditions, including losses in jobs and income to local residents. These adverse effects are realized not only in the agricultural sector, including agricultural landowners and farm workers, but also have ripple effects throughout other agriculture-support industries and the overall economy. Declining agricultural production is one contributing factor to the high unemployment rate in the four-county region, which stood at 17.2 percent in 2010, up from 9.4 percent in 2000.

As described in this section, the Proposed Program's implementation would result in relatively minor economic impacts when considered in the context of the regional economy. The greatest impacts would occur under Alternative A, with a loss of about 263 jobs and $9.4 million in labor income in the four-county region annually; these effects are more pronounced when compared to existing conditions, where the existing Program is generating economic benefits, primarily attributed to new revenues from conservation water transfers. Potential economic and fiscal impacts at the local level are expected to be more severe based on the dependence of local economies on the agricultural sector and direct effects on agricultural operators and farm workers. When considered in the context of these other economic drivers occurring elsewhere in the region, such as declines in the housing market, the Program's incremental economic impacts are cumulatively considerable and would likely exacerbate the current economic downturn affecting the Central Valley, including Fresno, Madera, Merced and Madera counties, as well as local agriculturally dependent communities in the Program area, such as the city of Mendota. Accordingly, the Program's cumulative economic impact is substantial in the short term. Over the long term, the cumulative impact is moderated by economic growth.

8.2.4 Impact and Mitigation Summary

Table 8-5 presents a summary comparison of impacts under CEQA relative to existing conditions. This table includes a summary of the impacts for the four impact criteria with Criterion 2 separated into distinct "landowner-to-landowner" and "water transfer sales" components. Neither CEQA nor NEPA has mitigation requirements for impacts or effects on socioeconomic resources.

Generally, land fallowing and conservation water transfers have distinct effects on regional economy. Land fallowing generates adverse economic effects due to the lost production value on fallowed lands, which indirectly affects agriculture-support industries, farm labor, and other related sectors. These effects are mitigated to some extent in the case of water transfer sales, which bring money back into the regional economy in the form of income to agricultural landowners. These offsetting effects are highest under Alternative D, where transfer prices are assumed to be the highest. Similarly, conservation transfers bring new revenues into the regional economy and generate economic benefits to those industries and labor that support water district operations. In all alternatives, except Alternative D, investment in conservation projects is sufficient to meet the Program's conservation needs; therefore, no additional capital outlays are necessary. In Alternative D, new capital investment would be required, but would be funded through conservation transfer revenues.

The economic tradeoff between land fallowing and conservation water transfers is evident in the No Action/No Project and action alternatives. Under No Action, where the existing Program would cease, the existing economic benefits supported by water transfers would be foregone. These ongoing benefits are attributed to revenues generated by conservation water transfers, which are realized by the Exchange Contractor districts and recirculated through the local economy as part of ongoing O&M activities; these benefits outweigh the adverse economic effects associated with agricultural land fallowing. As a result, the No Action/No Project alternative would have a net adverse effects on the local economy compared to existing conditions.

In the context of the action alternatives, the greatest adverse effects on the regional economy occur in Alternative A where all transfers would be from land fallowing, which results in a decline in regional economic activity, with no offsetting economic benefits from conservation water transfers. When conservation transfers are considered in the other alternatives, these adverse effects from land fallowing are offset partially. In fact, the Program is expected to result in net overall benefits on the regional economy in Alternatives C and D (in the case of water transfer sales), as measured by income and employment levels in the region. In the case of landowner-to-landowner transfer, all of the alternatives result in a decline in output and employment levels compared to No Action, although there is a slight increase in regional income with Alternatives C and D. With Alternatives C and D, conservation transfers are significantly greater than land fallowing transfers and represent a primary driver of regional economic benefits.

However, when evaluated in the context of CEQA, the economic effects of the Program differ. Under CEQA, all of the action alternatives would result in adverse socioeconomic effects in the regional economy when compared to existing conditions due primarily to increases in agricultural land fallowing and foregone benefits of the existing Program. Generally, the Proposed Program's potential socioeconomic impacts are considered less than substantial when evaluated in the context of regional economic conditions and the size of the local economy.

Table 8-5
Summary Comparison of Socioeconomic Impacts of Alternatives and Mitigation Measures

Environmental Concern		Alternative	Impact Before Mitigation	Mitigation Measures	Impact After Mitigation
SOC-1	Agricultural Production Value	No Action/ No Project	N	Not applicable	--
		A	LS	Not applicable	--
		B	LS	Not applicable	--
		C	LS	Not applicable	--
		D	LS	Not applicable	--
		Cumulative	S	Not applicable	--
SOC-2A	Net Farm-Level Costs and Income (Landowner-to-Landowner Transfers)	No Action/ No Project	N	Not applicable	--
		A	LS	Not applicable	--
		B	LS	Not applicable	--
		C	LS	Not applicable	--
		D	LS	Not applicable	--
		Cumulative	--	Not applicable	--
SOC-2B	Net Farm-Level Costs and Income (Water Transfer Sales)	No Action/ No Project	N	Not applicable	--
		A	N	Not applicable	--
		B	N	Not applicable	--
		C	N	Not applicable	--
		D	N	Not applicable	--
		Cumulative	--	Not applicable	--
SOC-3	District-Level Costs and Income	No Action/ No Project	S	Not applicable	--
		A	S	Not applicable	--
		B	LS	Not applicable	--
		C	N	Not applicable	--
		D	N	Not applicable	--
		Cumulative	--	Not applicable	--
SOC-4A	Regional Economic Effects (Landowner-to-Landowner Transfers)	No Action/ No Project	LS	Not applicable	--
		A	LS	Not applicable	--
		B	LS	Not applicable	--
		C	LS	Not applicable	--
		D	LS	Not applicable	--
		Cumulative	--	Not applicable	--
SOC-4B	Regional Economic Effects (Water Transfer Sales)	No Action/ No Project	LS	Not applicable	--
		A	LS	Not applicable	--
		B	LS	Not applicable	--
		C	LS	Not applicable	--
		D	LS	Not applicable	--
		Cumulative	--	Not applicable	--

CEQA:
N = no impact
LS = less than substantial
S = substantial

9.0 Environmental Justice

Executive Order (EO) 12898 requires each Federal agency to achieve environmental justice as part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects, including social or economic effects, of programs, policies, and activities on minority populations and low-income populations of the United States. The EPA's Office of Environmental Justice defines environmental justice as follows:

> *"The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, State, local, and tribal programs and policies."*
> *(U.S. D[epartment] O[f] E[nergy] 1997)*

The purpose of the environmental justice analysis is to determine whether disproportionately high and adverse environmental and economic effects would be realized by minority and/or low-income populations with implementation of the Proposed Water Transfer Program (Proposed Program). To facilitate this analysis, information on the demographic and social characteristics of the study area has been collected, which is used to determine the extent to which minority and/or low-income populations exist in the Program area. In conjunction with this information, the anticipated impacts associated with agricultural land fallowing, water conservation projects, and associated water transfers under the Program alternatives are considered in the context of how they would affect environmental justice populations of concern. This section is closely related to Chapter 8, Socioeconomics, which provides key demographic and economic information.

9.1 Affected Environment/Environmental Setting

This section describes the demographic characteristics of populations potentially affected by the Proposed Program, which serves as the foundation of the environmental justice analysis. Because environmental justice focuses on minority and low-income populations, topics addressed include race and ethnicity and relevant economic indicators of social well-being, including income and poverty and unemployment. Information on the demographic and social characteristics of affected populations in the region is compared to that in California, which is used as the reference population.

9.1.1 Study Area

The analysis focuses on the Exchange Contractors' service area where crop idling/temporary land fallowing would occur. The Exchange Contractors' service area covers portions of Fresno, Merced, Madera, and Stanislaus counties. Because potential socioeconomic effects have been evaluated at the regional level, the environmental justice analysis considers potential impacts for the entire four-county region. As described in Section 3.3, the impact analysis addresses only those effects attributed to the development of water for transfers from within the Exchange Contractors' service area; environmental justice impacts in those districts receiving the transferred water are not addressed in this section.

9.1.2 Social and Demographic Charcteristics

In order to determine whether environmental justice effects could occur with implementation of the Proposed Program, the social and demographic characteristics of the study area are evaluated to determine if any environmental justice communities concern exist. The determination of whether environmental justice communities of concern are present in the Program area is based on the comparison of select social and demographic parameters for the four-country region relative to the state of California, which serves as the reference population. If the minority or low-income populations are meaningfully greater in the region relative to this reference population, then an environmental justice community of concern is assumed to be present.

Race and Ethnicity

Information on race and ethnicity is used to determine whether any minority populations could be affected by the Proposed Program. Information on race and ethnicity was collected from the U.S. Census Bureau for the four-county region.[1] Minority populations include the following categories of race: African American/Black; Alaskan /American Native; Asian; Native Hawaiian/Pacific Islander; and Other/Multi-Race; as well as those residents of Hispanic/Latino ethnicity.

Table 9-1 shows the racial and ethnic composition of the four-county area. As shown, the largest group is Hispanic/Latino, which represents 48.9 percent of the total population. In comparison to statewide figures, the four-county area has a proportionately higher Hispanic population (48.9 percent versus 37.6 percent in California). The large Hispanic population is representative of the large migrant workforce that serves the agricultural industry driving the economy in the four-county area. In fact, Hispanics made up more than two-thirds (67.9 percent) of the agricultural labor force in California, but only about one-third (33.5 percent) of the state's nonagricultural labor force in 2008 (EDD 2008). In terms of other minorities, the population in four-county area is characterized contains smaller percentages of Black/African Americans (3.9 percent), Asians (7.1 percent) and Multi/Other races (2.3 percent) compared statewide averages. Conversely, the four-county area has slightly more American Indian/Alaska Natives (0.6 percent) than the

[1] Based on 2010 Census data, which relied on self-identification of racial/ethnic categories by respondents

state (0.4 percent). Taking into consideration the racial and ethnic background of the four-county area and local agricultural workforce, which includes a relatively large Hispanic/Latino community, the region represents an environmental justice community of concern particularly due to the strong link between minority farm workers and the agricultural industry, which could be affected by changes in water transfers.

Table 9-1
Race and Ethnicity in the Four-County Area, 2010

County	White	Black/ African American	American Indian/ Alaska Native	Asian	Native Hawaiian/ Pacific Islander	Multi-Race or Other	Hispanic/ Latino
Fresno	32.7%	4.8%	0.6%	9.3%	0.1%	2.0%	50.3%
Merced	31.9%	3.4%	0.4%	7.1%	0.2%	2.0%	54.9%
Madera	38.0%	3.3%	1.2%	1.7%	0.1%	2.0%	53.7%
Stanislaus	46.7%	2.5%	0.6%	4.8%	0.6%	2.9%	41.9%
Four-County Area (Total)[1]	**37.0%**	**3.9%**	**0.6%**	**7.1%**	**0.3%**	**2.3%**	**48.9%**
State of California	**40.1%**	**5.8%**	**0.4%**	**12.8%**	**0.3%**	**2.8%**	**37.6%**

Source: U.S. Census Bureau, Census 2010

[1]Represents an average for four-county area, weighted by population

Income and Poverty

Low-income populations in the Proposed Program area are identified by several socioeconomic parameters, including per-capita income, median household income, and poverty status.[2] Per-capita income, median household income, and poverty rates in the four-county area are presented in Table 9-2. As shown, the weighted per-capita and median household income levels in the region, $30,502 and $47,376, respectively, are lower than statewide levels. Specifically, median household income in the four-county area is almost 22 percent lower than in the state, and per-capita income levels are over 30 percent lower. As expected, poverty rates have similar results. The percentage of persons below the poverty level in the four-county area is 19.1 percent, substantially higher than the statewide average of 13.2 percent. These trends also hold for the agricultural workforce, which comprise a significant proportion of the local population. In 2008, nearly half (48.6 percent) of California's agricultural workers reported annual family income of less than $35,000, which is substantially higher than 21.0 percent for

[2] Poverty status is based on the definition prescribed by the Federal Office of Management and Budget. Families and persons are below the poverty level if their total family income or unrelated individual income was less than the poverty threshold specified for the applicable family size, age of householder, and number of related children present under age 18 years. For persons not in families, poverty status is determined by their income in relation to the appropriate poverty threshold. The 2011 poverty threshold for a family of four persons it is $22,350; and for a family of eight persons it is $37,630 (U.S. Department of Health and Human Services 2011)

nonagricultural workers (EDD 2008). Based on the relatively-low income levels supported in the four-county area, the region is also considered to be an environmental justice community of concern from an economic perspective.

Table 9-2
Income and Poverty in the Four-County Area

County	Income ($)		Percent Below Poverty Level, All Persons (2005–2009)
	Per Capita Income (2008)	Median Household Income (2005–2009)	
Fresno	$31,111	$46,230	20.9%
Merced	$28,003	$43,848	21.1%
Madera	$26,880	$46,083	18.0%
Stanislaus	$31,673	$51,529	15.1%
Four-County Area (Total)[1]	**$30,502**	**$47,376**	**19.1%**
State of California	**$43,853**	**$60,392**	**13.2%**

Sources: U.S. Department of Commerce, Bureau of Economic Analysis 2011; U.S. Census Bureau, American Community Survey 2005-2009

[1]Represents an average for four-county area, weighted by population

Unemployment

Another socioeconomic indicator providing insight on the economic well-being of the population is unemployment.[3] Unemployment rates in the four-county area are presented in Table 9-3. The unemployment rate in the region was 17.4 percent, substantially higher than the statewide unemployment rate of 12.4 percent.

Table 9-3
Labor Force and Unemployment in the Four-County Area, 2010

County	Civilian Labor Force	
	Total	Unemployment Rate
Fresno	438,400	16.8%
Merced	107,300	18.9%
Madera	545,700	17.2%
Stanislaus	66,900	15.6%
Four-County Area (Total)[1]	**1,158,300**	**17.4%**
State of California	**18,176,200**	**12.4%**

Sources: California Employment Development Department 2011

[1]Represents an average for four-county area, weighted by population

[3] The employed civilian labor force is composed of civilians 16 years old and older who were either “at work” or “with a job, but not at work” during the reference week. It includes those who worked 15 hours or more as unpaid workers in a family farm or business.

9.1.3 Regulatory Setting

Federal

EO 12898, dated February 11, 1994, and Title VI of the Civil Rights Act of 1964 (Title VI) require federal actions to address environmental justice in the context of minority and low-income populations. In addition, definitions of minority and low-income areas were established on the basis of the Council on Environmental Quality's (CEQ's) *Environmental Justice Guidance Under the Environmental Policy Act* of December 10, 1997. CEQ's Guidance states that "minority populations should be identified where either (a) the minority population of the affected area exceeds 50 percent or (b) the population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographical analysis." The CEQ further adds that "the selection of the appropriate unit of geographical analysis may be a governing body's jurisdiction, a neighborhood, a census tract, or other similar unit that is chosen so as not to artificially dilute or inflate the affected minority population."

The CEQ Guidelines do not specifically provide parameters to define low-income populations. For this study, the assumptions set forth in the CEQ Guidelines for identifying and evaluating impacts on minority populations are used to identify and evaluate impacts on low-income populations. More specifically, low-income populations are assumed to be present in an area if their percentage of the population is meaningfully greater than that in the general population.

State

California State Government Code Section 65040.12(e) defines environmental justice as "*the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation and enforcement of environmental, regulations and policies*."

California EPA is the public agency that implements the state's environmental justice programs. California EPA is required to "*promote enforcement of all health and environmental statues within its jurisdiction in a manner that ensures the fair treatment of people of all races, cultures, and income levels, including minority populations and low income populations of the state.*"

Local

No specific local regulations regarding environmental justice exist.

9.2 Environmental Consequences

This section addresses potential environmental justice impacts from implementation of the Proposed Program. Consideration of environmental justice is a Federal requirement based on EO 12898; CEQA has no corresponding requirement and, therefore, no conclusions for CEQA are presented.

9.2.1 Environmental Concerns and Evaluation Criteria

The main issue in the context of environmental justice is whether implementation of the action alternatives or the No Action/No Project Alternative would result in adverse environmental or economic impacts that fall disproportionately on low-income or minority populations in the Program area. For this analysis, and based on the federal guidance and professional judgment, the following criteria are used to evaluate potential impacts and their magnitude:

- Are minority and/or low-income communities disproportionately subject to environmental, human health, or economic impacts?
- Are affected resources used by a minority or low-income community?
- Do the resources used for the project support subsistence living?

Information presented in Section 9.1 was used to identify whether minority and low-income populations exist in the Proposed Program area. Based on this analysis, minority populations (namely Hispanics/Latinos) in the four-county area have been determined to be an environmental justice community of concern. In addition, the region, collectively, is characterized by low-income levels and high poverty rates. The methods used to determine if these communities would bear disproportionate environmental and economic effects of the Proposed Program are based on the magnitude and location of potential impacts and the manner in which such impacts could potentially affect these communities. No human health or environmental effects would be associated with water transfers that would disproportionately affect environmental justice communities of concern. In addition, no resources are affected that support subsistence living. However, potential socioeconomic effects of the Proposed Program would directly affect farm operations and workers and result in changes in regional economic activity; therefore, the focus of the environmental justice impact analysis is on agricultural and socioeconomic impacts. The assessment of environmental justice impacts is primarily qualitative, but considers pertinent economic effects that may be quantified.

9.2.2 Environmental Impacts and Mitigation

This section describes the potential impacts to environmental justice communities of concern organized by alternative. The primary impacts of the action alternatives that factor in the environmental justice analysis are associated with crop idling/temporary land fallowing, which changes the quantity of agricultural land in production and related economic activity in the regional economy. The economic effects of the action alternatives are discussed in more detail in Chapter 8.0, Socioeconomics, and Appendix F.

No Action/No Project Alternative

The No Action/No Project Alternative would result in the termination of the existing Water Transfer Program, and the Exchange Contractors would not develop water for potential transfer to any potential water users at the conclusion of the existing Program in 2014 (through water year 2013).

Impact EJ-1: Impacts on Environmental Justice from Agricultural Land Fallowing

Under the No Action/No Project Alternative, no land would be fallowed to accommodate water transfers, and approximately 3,200 acres of land fallowed under the existing Program would return to irrigated agricultural use. Therefore, compared with existing conditions, the No Action/No Project Alternative would result in an increase in agricultural production. Expansion in the agricultural sector would result in a minor increase in demand for farm labor (approximately 23 jobs) and labor income (approximately $785,000 annually), thereby improving the long-term viability of agricultural operations in the region, which provide an expansive job base and generate income for local agricultural workers. Because the agricultural labor force predominantly consists of farm workers, many of which are of Hispanic origin and generally are part of the low-income population in the region, an increase in agricultural production would likely generate economic benefits for minority and low-income populations in the region. Therefore, no disproportionately high and adverse effects on minority and low-income populations would occur in the Exchange Contractors’ service area under the No Action/No Project Alternative.

Impact EJ-2: Impacts on Environmental Justice from Changes in Regional Economic Activity

Under the No Action/No Project Alternative, changes in regional economic activity in the four-county area are driven by both increased agriculture production (beneficial effect) and decreases in water transfer revenues (adverse effect) relative to existing conditions. Overall, the net effect on regional economic activity is negative with losses in conservation water transfer revenues and related operations spending outweighing the benefits from increased agricultural production. Specifically, the net effect would be an estimated decline of approximately $9.4 million in labor income and 148 jobs in the four-county region. As demonstrated above, this region has a relatively high proportion of minority and low-income residents, which could realize some portion of these adverse economic effects due to declines in regional economic activity. However, these effects are considered minor in the context of the size and diversity of the regional economy, and further, it is difficult to ascertain the extent to which these impacts would be realized by minority and/or low-income populations. Based on impacts on regional economic conditions, disproportionately high and adverse effects on minority and low-income populations in the region could occur under the No Action/No Project Alternative.

Alternative A: 50,000 Acre-Feet

Water transfers under Alternative A, totaling 50,000 AFY, would be exclusively derived from agricultural land fallowing. Relative to existing conditions, land fallowing requirements would increase, while transfers of conservation water would be eliminated.

Impact EJ-1: Impacts on Environmental Justice from Agricultural Land Fallowing

Under all of the action alternatives, including Alternative A, up to 50,000 AFY would be made available for transfer through agricultural land fallowing on approximately 20,000 acres in the Exchange Contractors' service area. The amount of land subject to fallowing would increase by about 16,800 acres relative to existing conditions and would be 20,000 acres greater than future No Action/No Project conditions where no land fallowing would occur. By fallowing agricultural land, crop production levels would decrease, primarily affecting annual crops, thereby reducing the demand for farm labor. It is estimated that the direct effects on workers in the agricultural sector include losses of nearly $4.9 million in labor income annually and 142 jobs compared to the No Action/No Project Alternative. Because many farm workers working in the Exchange Contractor service area are of Hispanic/Latino origin, these adverse effects would likely fall disproportionately on a minority population under all of the action alternatives.

Impact EJ-2: Impacts on Environmental Justice from Changes in Regional Economic Activity

Alternative A would result in a decline in regional economic activity due to decreases in agricultural production relative to the No Action/No Project Alternative; no transfer revenues for conservation water would occur. In the four-county area, total labor income is expected to decline by up to $9.4 million annually and approximately 263 jobs would be lost relative to future No Action/No Project conditions with landowner-to-landowner transfers. In the scenario where agricultural water transfers are sales, these adverse effects on the regional economy are offset partially due to an influx of transfer revenues accruing to local farmers and related expenditure patterns; however, an adverse effect on regional economic conditions would still occur. While the direct economic impacts would primarily occur in the agricultural sector, the regional economic impacts are more widespread, affecting a wide range of industries, including agricultural-support and other water-related industries. As such, the regional economic impacts would affect a cross-section of the local population, which has a relatively high proportion of minority and low-income residents as described above. However, it is difficult to predict the extent to which these adverse effects would be realized by minority and/or low-income populations living in the region. As a result of impacts on regional economic conditions, disproportionately high and adverse effects on minority and low-income populations in the region could occur under Alternative A.

Alternative B: 88,000 Acre-Feet

Under Alternative B, water made available for transfer would be developed jointly from agricultural land fallowing (up to 50,000 AFY) and water conservation projects for the balance not due to land fallowing (38,000 AFY). Compared to existing conditions, the

Proposed Program would result in an increase in water development from land fallowing and decrease in development of conservation water.

Impact EJ-1: Impacts on Environmental Justice from Agricultural Land Fallowing

Under Alternative B, up to 20,000 acres of land would be fallowed to accommodate the Proposed Program relative to the No Action/No Project Alternative. This fallowing would result in a decline in agricultural production and demand for farm labor, including many farm workers of Hispanic/Latino origin. As a result, disproportionate impacts on minority and low-income populations would likely occur, which is comparable under all action alternatives (see Impact EJ-1 under Alternative A for more information).

Impact EJ-2: Impacts on Environmental Justice from Changes in Regional Economic Activity

Alternative B would result in adverse economic impacts in the four-county region as a result of declines agricultural production, which is offset partially by an increase in conservation water transfer revenues relative to the No Action/No Project Alternative. In total, labor income is expected to decrease by up to $4.2 million annually and approximately 173 jobs would be lost relative to future No Action/No Project conditions when considering landowner-to-landowner transfers of agricultural water; with water transfer sales, the adverse impacts on regional economic conditions are smaller. These regional economic impacts extend beyond the agricultural sector and affect a wide range of industries and a cross-section of the local population, which is characterized by a relatively high proportion of minority and low-income residents. However, it is difficult to predict the extent to which these adverse impacts due to a decline in regional economic conditions would be realized by minority and/or low-income populations living in the region. Consequently, Alternative B could have disproportionately high and adverse effects on minority and low-income populations in the region.

Alternative C: 130,000 Acre-Feet

Alternative C makes available up to 130,000 AFY of water annually, with up to 88,000 AFY of water made available through conservation (similar to existing conditions) and up to 50,000 AFY of water made available through crop idling/temporary land fallowing (an increase of 42,000 AFY relative to existing conditions).

Impact EJ-1: Impacts on Environmental Justice from Agricultural Land Fallowing

Alternative C would result in land fallowing on up to 20,000 acres, relative to the No Action/No Project Alternative, to accommodate the Proposed Program. This fallowing would result in a decline in agricultural production and demand for farm labor, including many farm workers of Hispanic/Latino origin. As a result, disproportionate impacts on minority and low-income populations would likely occur; which is considered an adverse environmental justice effect, comparable under all action alternatives (see Impact EJ-1 under Alternative A for more information).

Impact EJ-2: Impacts on Environmental Justice from Changes in Regional Economic Activity

Alternative C would result in offsetting effects from land fallowing (and related losses in agricultural production) and conservation water transfers, which attract new revenues to the region. Considering landowner-to-landowner transfers, total labor income is expected to increase slightly by $1.7 million annually, while approximately 69 jobs would be lost in the four-county economy relative to the future No Action/No Project conditions. In the case of water transfer sales, Alternative C would generate regional economic benefits as measured by both labor income (+5.0 million annually) and employment (+5 jobs). With landowner-to-landowner transfers, the small decline in regional employment would affect a wide range of industries and, therefore, a cross-section of the local population, which has a relatively high proportion of minority and low-income residents as described above. However, it is difficult to predict the extent to which these adverse impacts would be realized by minority and/or low-income populations living in the region. As a result, Alternative C could have disproportionately high and adverse effects on minority and low-income populations associated with a decline in regional economic activity. Conversely, with water transfer sales, Alternative C would benefit to minority and/or low-income residents.

Alternative D: 150,000 Acre-Feet

Alternative D expands upon Alternative C with an additional 20,000 AFY from additional conservation measures not already considered in the other alternatives. Compared to existing conditions, land fallowing would increase and an expansion of water conservation projects would be implemented by the Exchange Contractors.

Impact EJ-1: Impacts on Environmental Justice from Agricultural Land Fallowing

Under Alternative D, up to 20,000 acres of land would be fallowed to accommodate the Proposed Program relative to the No Action/No Project Alternative. This fallowing would result in a decline in agricultural production and demand for farm labor, including many farm workers of Hispanic/Latino origin. As a result, disproportionate impacts on minority and low-income populations would likely occur, which is comparable under all action alternatives (see Impact EJ-1 under Alternative A for more information).

Impact EJ-2: Impacts on Environmental Justice from Changes in Regional Economic Activity

Under Alternative D, the regional economic benefits associated with the conservation water transfers partially offset the adverse effects associated with agricultural land fallowing. In the four-county area, total labor income is expected to increase by up to $4.5 million annually; however, approximately 20 jobs would be lost compared to No Action/No Project when considering landowner-to-landowner transfers. With water transfer sales, the regional economy benefits in terms of both income (+$7.9 million) and employment levels (+55 jobs). With landowner-to-landowner transfers, the small decline in regional employment and increase in income levels would affect multiple industries and the general population in the local area, which has a relatively high proportion of minority and low-income residents as described above. However, the extent to which this alternative would affect employment levels of minority and low-income populations is not known. Alternative D could have disproportionately high and adverse effects on minority and low-income populations associated with a decline in regional economic activity. Conversely, with water transfer sales, Alternative D would benefit to minority and/or low-income residents.

9.2.3 Cumulative Effects

The cumulative effects of the Proposed Program on environmental justice considerations in the local area and region are difficult to evaluate. Land fallowing has generally increased in the region due to recent drought conditions and trends in water transfers exporting water outside the region. At the same time, the regional economy has been adversely affected by the statewide economic recession as evidenced by relatively high unemployment rates. Both the statewide impacts on the agricultural industry and overall poor performance of the regional economy have been especially difficult for minority and low-income populations living in the region. These adverse effects would be exacerbated by the Proposed Program where disproportionately high and adverse effects are expected to be realized by minority and low-income populations under certain alternatives. Therefore, the Proposed Program's incremental adverse effects on environmental justice communities of concern are expected to result in an adverse cumulative environmental justice impact.

9.2.4 Impact and Mitigation Summary

In summary, the No Action/No Project Alternative would result in an environmental justice benefit with agricultural land returning to production and an increase in the demand for farm labor once the existing transfer program is terminated. However, from the perspective of the regional economy, the No Action/No Project Alternative would generate adverse effects that could disproportionately affect minority and low-income populations in the region.

Similarly, most of the action alternatives would have relatively higher levels of land fallowing (and reduced farm labor) compared to No Action/No Project, thereby adversely affecting the agricultural industry and likely resulting in disproportionately high and adverse economic effects on low income and minority populations. However, these adverse effects would be offset to some degree by the unrealized benefits associated with agricultural production in areas received the transfer and/or exchange water. From the perspective of the regional economy, the action alternatives would generally have adverse effects with landowner-to-landowner water transfers, particularly in terms of employment levels, although there are small increases in income levels under Alternatives C and D. Similarly, with water transfer sales, adverse regional effects are expected under Alternatives A and B; but under Alternatives C and D, the Proposed Program would generate regional economic benefits, as measured by both income and employment levels, which could be realized by minority and low-income populations. However, it is not clear the extent to which minority and low-income populations would be affected by changes in regional economic conditions. In those cases where high and disproportionate effects are realized by minority and low-income populations, no mitigation requirements are required for environmental justice under NEPA.

10.0 Indian Trust Assets

10.1 Affected Environment/Environmental Setting

This chapter discusses the Indian Trust Assets (ITAs) in the region and Program area, and includes a discussion of the regulatory framework associated with ITAs. For this resource, the region is the San Francisco Bay and central California: Alameda, Contra Costa, Fresno, Kern, Kings, Madera, Merced, Monterey, San Benito, Santa Clara, San Joaquin, Stanislaus, and Tulare counties. Refer to Figure 2-1 for a depiction of the Program area.

The project proposed by the Exchange Contractors is to transfer up to 130,000 acre-feet of substitute water (a maximum of 80,000 acre-feet of developed water from conservation measures, including tailwater recovery, and groundwater pumping and a maximum of 50,000 acre-feet from temporary land fallowing) annually from the Exchange Contractors. The water available as described above for transfer and/or exchange of substitute water to either the refuges, CVP contractors for existing M&I, and/or agricultural areas, and other potential SWP contractors for agricultural and/or M&I uses, or to some combination of these users.

The duration of the Proposed Program is for 25 consecutive years beginning March 1, 2014, through February 28, 2039 (Reclamation water service contract years 2014–2038). Activities by the Exchange Contractors would occur during their calendar years 2014–2038, specifically January 1, 2014, through December 31, 2038.

10.1.1 Regulatory Setting

ITAs are legal interests in property held in trust by the U.S. for Federally recognized Indian tribes or individual Indians. An Indian trust has three components: (1) the trustee, (2) the beneficiary, and (3) the trust asset. ITAs can include land, minerals, Federally reserved hunting and fishing rights, Federally reserved water rights, and in-stream flows associated with trust land. Beneficiaries of the Indian trust relationship are Federally recognized Indian tribes with trust land; the U.S. is the trustee. By definition, ITAs cannot be sold, leased, or otherwise encumbered without approval of the U.S. The characterization and application of the U.S. trust relationship have been defined by case law that interprets Congressional acts, executive orders, and historic treaty provisions.

The Federal government, through treaty, statute, or regulation, may take on specific, enforceable fiduciary obligations that give rise to a trust responsibility to Federally recognized tribes and individual Indians possessing trust assets. Courts have recognized an enforceable Federal fiduciary duty with respect to Federal supervision of Indian money or natural resources, held in trust by the Federal government, where specific treaties, statutes, or regulations create such a fiduciary duty.

Consistent with President William J. Clinton's 1994 memorandum, "Government-to-Government Relations with Native American Tribal Governments," Reclamation assesses the effect of its programs on tribal trust resources and Federally recognized tribal governments. Reclamation is tasked to actively engage Federally recognized tribal governments and consult with such tribes on government-to-government level when its actions affect ITAs (Federal Register, Vol. 59, No. 85, May 4, 1994, pages 22951–22952). Interior's Departmental Manual Part 512.2 ascribes the responsibility for ensuring protection of ITAs to the heads of bureaus and offices (Interior 1995). Interior is required to "protect and preserve Indian trust assets from loss, damage, unlawful alienation, waste, and depletion" (Interior 2000). It is Interior's general policy to perform its activities and programs in such a way as to protect ITAs and avoid adverse effects whenever possible. Reclamation complies with procedures contained in Departmental Manual Part 512.2 guidelines, which protect ITAs. Reclamation carries out its activities in a manner that protects trust assets and avoids adverse impacts when possible. When Reclamation cannot avoid adverse impacts, it will provide appropriate mitigation or compensation. Reclamation is responsible for assessing whether the transfer of up to 130,000 acre-feet of substitute water (a maximum of 80,000 acre-feet of developed water from conservation measures, including tailwater recovery, and groundwater pumping and a maximum of 50,000 acre-feet from temporary land fallowing) annually from the Exchange Contractors. has the potential to affect ITAs. Reclamation will comply with procedures contained in Departmental Manual Part 512.2 guidelines, which protect ITAs.

10.1.2 Indian Trust Assets In or Adjacent to the Project Area

The identification of ITAs within the Exchange Contractors' service area (i.e. water development area) as well as those located 2 miles outside of the water development area was facilitated through Reclamation's Mid-Pacific Region. During October 2003, Mr. Patrick Welch, who is the coordinator for that office's ITA database, examined Reclamation's geographical information system coverages for ITAs. These coverages were created in the mid-1990s in support of the CVPIA EIS. The coverages depict Indian lands in California and include reservations, rancherias, and public domain allotments (PDAs). Reservations and rancherias are lands held in trust by the federal government for federally recognized Indian tribes. PDAs are small tracts of land that are owned by Indian individuals and are frequently held in trust as well.

The proposed Exchange Contractors' 25-year Water Transfer Program 2014–2038 involves member districts that would develop water. The search conducted by Reclamation concluded that no ITAs are located within the water development area.

10.2 Environmental Consequences

This section addresses the concern of whether any ITA, including PDAs, would be adversely affected or beneficially affected by any of the alternatives under consideration. Types of actions that could affect ITAs and PDAs include interference with the exercise of a reserved water right, degradation of water quality where a water right exists, impacts to fish and wildlife where a hunting or fishing right exists, or noise near a land asset where it adversely impacts uses of the reserved land.

10.2.1 Key Impact and Evaluation Criteria

To address environmental consequences related to ITAs, the following issues are evaluated to determine potential impacts and their level of significance:

- Are ITAs present in or adjacent to the water development area?
- If an ITA was present, would any of the alternatives under consideration impede, change, or potentially benefit current activities within the ITA?

10.2.2 Environmental Impacts and Mitigation

None of the water development areas contain ITAs. The only potential for adverse effects to ITAs would be within or adjacent to water development area where the transfer water could affect existing uses. The evaluation of these receiving areas is addressed in other environmental compliance documents incorporated by reference in Section 3.3.

No Action/No Project Alternative

Because no ITAs are located in the water development area, no ITAs would be affected by this alternative.

Alternative A: 50,000 Acre-Feet

Under this alternative a potential would exist for reduction in available water in the water development area through conservation or crop idling (i.e., temporary land fallowing). No ITAs are located within or adjacent to the water development areas, so no impacts to ITAs would occur in these areas.

Alternative B: 88,000 Acre-Feet

Under this alternative a potential would exist for reduction in available water in the water development area only through crop idling/temporary land fallowing, which would free up water for transfer to the recipient areas. No ITAs are located within or adjacent to the water development areas, so no impacts to ITAs would occur in these areas.

Alternative C: 130,000 Acre-Feet

Under this alternative all available transfer water would be developed through conservation (including tailwater recovery) and crop idling/temporary land fallowing. No ITAs are located within or adjacent to the water development area, so no impacts to ITAs would occur in these areas.

Alternative D: 150,000 Acre-Feet

Alternative D would provide up to 150,000 acre-feet for transfer from the Exchange Contractors' service area to other CVP/SWP contractors and wildlife refuges from a combination of land fallowing and conservation. Up to 50,000 acre-feet would come from agricultural land fallowing. The remaining 100,000 acre-feet would come from conservation activities, including new conservation projects that would yield an additional 20,000 acre-feet of conservation water to achieve conservation targets from such new projects as canal lining and on-farm irrigation system improvements, not from additional tailwater recovery. Alternative D represents the alternative with maximum quantity of water transfer by adding an additional increment of conservation water.

No ITAs are located within or adjacent to the water development area, so no impacts to ITAs would occur in the Exchange Contractors' service area.

Cumulative Effects

No conflicts would occur with any Indian lands and the four water districts in the water development areas. Given that no Indian lands exist within the Exchange Contractor's service area, no effect to ITAs would occur as a result of implementing any of the action alternatives. Because no effects would occur to ITAs, no incremental effects would occur from the proposed water development and transfer, and, therefore, no cumulative effects would occur to ITAs.

10.2.3 Impact and Mitigation Summary

For each of the alternatives, No Action/No Project and Alternatives A through D, no impacts would occur to ITAs. With no impacts, no mitigation is required.

11.0 Air Quality

This section discusses the air quality resources that could be affected by the development of water for transfer and/or exchange under the Proposed Program.

11.1 Affected Environment/Environmental Setting

This section briefly describes the air quality setting for the Exchange Contractors' proposed 25-Year Water Transfer Program and identifies the environmental effects of the alternatives. Climate change and greenhouse gases are discussed in Chapter 12.

11.1.1 Climate and Weather

The primary factors affecting local air quality are the locations of air pollutant sources and the amounts of pollutants emitted. However, meteorological and topographical conditions are also important. Atmospheric conditions such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants.

As shown on Figure 2-1 (Chapter 2, Alternatives), the Program area is located in the San Joaquin Valley. Climatologically, the summer weather pattern for this area is dominated by a semipermanent, subtropical high-pressure area that covers the eastern Pacific and the majority of California. The annual rainfall in the Program area averages 6 to 8 inches, with 90 percent of the amount falling between November and April.

11.1.2 Existing Air Quality

As noted above, topography and climate affect the level of regional air pollution. The relatively long and narrow San Joaquin Valley provides almost no escape for pollution. The setting of the San Joaquin Valley, coupled with high temperatures and inversions that create additional natural barriers to pollution dispersion, creates difficulties in meeting California and Federal air quality standards. In addition, rapid population growth, the presence of two major interstate highways, and a diversity of urban and rural sources have a negative impact on regional air quality. Based on the information presented in California Air Resources Board's (CARB's) *California Almanac of Emissions and Air Quality – 2009 Edition* (available at http://www.arb.ca.gov/aqd/almanac/almanac09/pdf/chap409.pdf), emission levels in the San Joaquin Valley Air Basin have decreased since 1990 with the exception of PM_{10}, which has remained relatively unchanged. Emission decreases are for the most part the result of motor vehicle controls and reductions in evaporative and fugitive emissions.

The Exchange Contractors' service area and the locations of potential receivers cover a number of air quality management districts. However, all potential impacts to air quality as a result of the Proposed Program would affect the development area and no potential impacts to air quality would occur in the vicinity of potential receivers. Therefore, ambient air quality conditions are focused in the development area, contained within the San Joaquin Valley.

11.1.3 Current Sources of Air Pollution – Project Area

Air quality in the San Joaquin Valley is not dominated by emissions from one large urban area. Instead, a number of moderately sized urban areas are located throughout the valley. On-road vehicles are the largest contributor to carbon monoxide emissions, as well as a large contributor to nitrogen oxide emissions. A large portion of the stationary source reactive organic carbon gas emissions is fugitive emissions from oil and gas production operations. PM_{10} emissions primarily result from paved and unpaved roads, agricultural operations, and waste burning (CARB 2009).

11.1.4 Sensitive Receptors

Certain population groups are considered more sensitive to air pollution and odors than others; in particular, children, elderly, and acutely ill and chronically ill persons, especially those with cardiorespiratory diseases such as asthma and bronchitis. Sensitive receptors (land uses) indicate locations where such individuals are typically found, namely schools, daycare centers, hospitals, convalescent homes, residences of sensitive persons, and parks with active recreational uses, such as youth sports.

Persons engaged in strenuous work or physical exercise also have increased sensitivity to poor air quality. Residential areas are considered more sensitive to air quality conditions than commercial and industrial areas, because people generally spend longer periods of time at their residences, resulting in greater exposure to ambient air quality conditions. Recreational uses such as parks are also considered sensitive, due to the greater exposure to ambient air quality conditions and because the presence of pollution detracts from the recreational experience.

The water development portions of the Program site are located in sparsely populated rural (agricultural) areas within the small communities within the Exchange Contractor's service area. No project activity would affect air quality in the vicinity of sensitive receptors.

11.1.5 Regulatory Environment

Standards

Both the California and Federal governments have established health-based Ambient Air Quality Standards for the following six air pollutants: ozone, particulate matter (particulate matter 10 microns or less in diameter [PM_{10}] and particulate matter 2.5 microns or less in diameter [$PM_{2.5}$]), carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. The State of California has also established standards for hydrogen sulfide, sulfates, and visibility-reducing particles. These standards were established to ensure an adequate margin of safety to protect the public health.

California Ambient Air Quality Standards and National Ambient Air Quality Standards, together with the effects potentially resulting from emissions that exceed those standards, are listed in Table 11-1.

Table 11-1
Applicable California and Federal Ambient Air Quality Standards

Air Pollutant	State Standard (Concentration/ Averaging Time)	Federal Primary Standard (Concentration/ Averaging Time)	Most Relevant Effects
Ozone	0.09 ppm, 1-hr avg 0.07 ppm, 8-hr avg	0.08 ppm, 8-hr avg	• Short-term exposures: pulmonary function decrements and localized lung edema in humans and animals, and risk to public health implied by alterations in pulmonary morphology and host defense in animals • Long-term exposures: risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans • Vegetation damage • Property damage
Carbon monoxide	20 ppm, 1-hr avg 9.0 ppm, 8-hr avg	9 ppm, 8-hr avg 35 ppm, 1-hr avg	• Aggravation of angina pectoris and other aspects of coronary heart disease • Decreased exercise tolerance in persons with peripheral vascular disease and lung disease • Impairment of central nervous system functions • Possible increased risk to fetuses
Nitrogen dioxide	0.18 ppm, 1-hr avg 0.03 ppm, annual arithmetic mean	0.10 ppm, 1-hr avg 0.053 ppm, annual arithmetic mean	• Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups • Risk to public health implied by pulmonary and extrapulmonary biochemical and cellular changes and pulmonary structural changes • Contribution to atmospheric discoloration
Sulfur dioxide	0.25 ppm, 1-hr avg 0.04 ppm, 24-hr avg	0.75 ppm, 1-hr avg 0.50 ppm, 3-hr avg	• Bronchoconstriction accompanied by symptoms that may include wheezing, shortness of breath, and chest tightness during exercise or physical activity in persons with asthma

Air Pollutant	State Standard (Concentration/ Averaging Time)	Federal Primary Standard (Concentration/ Averaging Time)	Most Relevant Effects
Suspended particulate matter (PM_{10})	50 µg/m^3, 24-hr avg 20 µg/m^3, annual arithmetic mean	150 µg/m^3, 24-hr avg	• Excess deaths from short-term exposures and exacerbation of symptoms in sensitive patients with respiratory disease • Excess seasonal declines in pulmonary function, especially in children • Increased risk of premature death from heart or lung diseases in elderly
Suspended particulate matter ($PM_{2.5}$)	No separate standard for 24-hr avg 12 µg/m^3, annual arithmetic mean	35 µg/m^3, 24-hr avg 15 µg/m^3, annual arithmetic mean	
Sulfates	25 µg/m^3, 24-hr avg	No Federal standard	• Decrease in ventilatory function • Aggravation of asthmatic symptoms • Aggravation of cardiopulmonary disease • Vegetation damage • Degradation of visibility • Property damage
Lead	1.5 µg/m^3, 30-day avg	1.5 µg/m^3, calendar quarter 0.15 µg/m^3, rolling 3-month avg	• Increased body burden • Impairment of blood formation and nerve conduction
Hydrogen sulfide	0.03 ppm, 1-hr avg	No Federal standard	• Nuisance odor (rotten egg smell), headache, and breathing difficulties in higher concentrations
Visibility-reducing particles	Visibility of 10 miles or more at relative humidity less than 70 percent, 8-hr avg	No Federal standard	• Visibility impairment on days when relative humidity is less than 70 percent
Vinyl chloride	0.01 ppm, 24-hr avg.	No Federal standard	

Sources: South Coast Air Quality Management District 2005; CARB 2011

µg/m^3 = microgram(s) per cubic meter
hr avg = hour average
ppm = part(s) per million

Attainment Status

The area for development of water under the action alternatives, including Fresno, Madera, Merced, and Stanislaus counties, is contained within the San Joaquin Valley Air Pollution Control District (SJVAPCD). Recipients of the water would include wetland habitat areas in Merced, Fresno, Tulare, and Kern counties. Agricultural and/or M&I water users that would benefit from the potential transfers are located in Stanislaus, San Joaquin, Merced, Madera, Fresno, San Benito, Santa Clara, Tulare, Kern, Kings, Contra Costa, Alameda, Monterey, and Santa Cruz counties. All Exchange Contractors, wetland habitat areas, and agricultural/M&I water users are shown on Figure 2-4 (Chapter 2, Alternatives). For the purposes of air quality analysis, attainment status is reviewed for

SJVAPCD only, as no impacts to air quality would occur in areas receiving water directly or benefits from the receipt of water.

Table 11-2 provides the SJVAPCD's ozone and particulate matter California and Federal attainment statuses. With respect to all other Ambient Air Quality Standards (i.e., carbon monoxide, nitrogen oxide, sulfur oxide, sulfates, lead, hydrogen sulfide, visibility-reducing particles, and vinyl chloride), the affected areas are considered to be unclassified or in attainment.

Table 11-2
San Joaquin Valley Air Basin California and Federal Attainment Status Classifications

8-hour State Ozone Standard Attainment Status	8-hour Federal Ozone Standard Attainment Status	1-hour State Ozone Standard Attainment Status	State PM_{10} Standard Attainment Status	Federal $PM_{2.5}$ Standard Attainment Status	State $PM_{2.5}$ Standard Attainment Status
Nonattainment	Extreme Nonattainment	Severe Nonattainment	Nonattainment	Nonattainment	Nonattainment

Source: SJVAPCD 2011

The SJVAPCD requested that EPA reclassify the San Joaquin Valley as an "extreme" nonattainment area for purposes of the Federal ozone standard. The effects of the reclassification would be the inclusion of more stationary sources in the Federal Title V program and an increase in emission offset ratios for new or modified sources in the San Joaquin Valley.[1] The San Joaquin Valley was reclassified as an "extreme" nonattainment area as of May 17, 2004.

The SJVAPCD has also released its plan for attaining the Federal ambient standard for large particulates (PM_{10}). The new plan contains 11 control measures covering agricultural sources of particulates, cotton gins, agricultural dryers, oil field equipment, wineries, and other sources. Participation in the Agricultural Conservation Management Program commits agricultural operations to file a plan with the SJVAPCD to explain how they will use best management practices (BMPs) to reduce emissions from unpaved roads, unpaved vehicle/equipment traffic areas, land preparation, harvest, and other sources (including windblown PM_{10} coming from other areas). The BMPs include:

- Practices that reduce or eliminate the need to disturb the soil
- Practices that protect the soil from wind erosion
- Equipment modifications that reduce PM_{10} emissions

[1] On November 13, 2003, the Regional Administrator for EPA Region 9 signed a final rule returning the Title V Operating Permit program to 34 California air districts. As a result of this rule, EPA will not issue any Title V permits to agricultural sources, since the 34 air districts have the authority to issue Title V Permits to major agricultural stationary sources beginning on January 1, 2004.

- The application of water or dust suppressants in off-field high-traffic areas
- The reduction of speed or access on unpaved roads and parking areas
- Alternative practices to waste burning
- The reduction of pesticide applications

Individual operations will be free to choose the measures that best fit their operation. Although the plan does not contain specific emission reduction targets, the new regulation associated with the plan will contain an enforcement mechanism (California Environmental Insider 2003).

In July 2006, the EPA proposed redesignation for the San Joaquin Valley Air Basin to a PM_{10} attainment area as it has attained the Federal PM_{10} standard from 2003 to 2005. This redesignation was approved in October 2006 and became official in September 2008 as the EPA approved the SJVAPCD PM_{10} Maintenance Plan.

Rule 4550 (May 2004) includes land preparation/cultivation PM_{10} fugitive dust control measures such as conservation irrigation, conservation tillage, cover crops, land fallowing, and other activities. Land fallowing is defined as temporary or permanent removal from production that eliminates entire operation/passes or reduces activities. Therefore, land fallowing is a dust control measure that would benefit air quality (SJVAPCD 2004).

11.2 Environmental Consequences

This section addresses whether air quality would be impacted by No Action/No Project and the action alternatives. The action alternatives involve multiple sources of and amounts of developed water. The Exchange Contractors propose to develop water from an existing and, in one case, an expanded conservation program, and from crop idling/temporary land fallowing. The action alternatives analysis focuses on the methods of development of the water to be transferred and/or exchanged, as discussed in Chapter 2, Alternatives, rather than on the potential water users/receivers. The air quality effects of how the water is used are addressed primarily in other environmental documents and are summarized previously in this EIS/EIR in Section 3.3.

11.2.1 Key Impact and Evaluation Criteria

Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied on to make the following determinations. Would the project:

- Conflict with or obstruct implementation of the applicable air quality plan?
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation?

- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable Federal or California ambient air quality standard (including release of emissions that exceed quantitative thresholds for ozone precursors)?
- Expose sensitive receptors to substantial pollutant concentrations?
- Create objectionable odors affecting a substantial number of people?

Existing Conditions Baseline for Analysis

Existing conditions for the Exchange Contractors' service area in the San Joaquin Valley reflect the current environment of the system that includes the following actions:

- The recent transfers of water by the Exchange Contractors (80,000 to 88,000 acre-feet, see Table 1-1), which includes up to 3,200 acres of land fallowing.
- The curtailment of water deliveries due to ongoing regulatory actions and requirements (as discussed in Chapter 1) under the existing Program.
- Interim flows under the SJRRP which began October 1, 2009.
- The Grassland Bypass Project in which a substantial amount of the monies received from the sale of water under the transfers by Firebaugh Canal Water District (FCWD) and the portion of those proceeds attributable to conservation within the Camp l3 area of Central California Irrigation District (CCID) are invested in developing water quality control measures for reducing uncontrolled discharges of salt, selenium, and boron to the San Joaquin River and further control of those constituents in drainwater by treatment including application to land areas.

11.2.2 Environmental Impacts and Mitigation

No Action/No Project Alternative

The No Action/No Project Alternative would result in no transfer or exchange of water from the Exchange Contractors to any potential water users at the conclusion of the existing Program on February 28, 2014 (through Water Year 2013). The Exchange Contractors would recover and reuse within their own operations the water previously transferred and generate approximately the same amount of tailwater flows. The tailwater would be integrated into the Exchange Contractors' water supply and likely increase direct recharge of groundwater and reduce groundwater pumping that currently helps meet irrigation demands and capacity constraints. No temporary land fallowing would occur to develop water for use outside the Exchange Contractors' service area. Further assumptions of the No Action/No Project Alternative are listed in Chapter 2, Alternatives, Section 2.2.

Impact AQ-1: Increased Fugitive Dust Emissions

Under the No Action/No Project Alternative no fallowing of land would occur for the water transfer, and the land recently fallowed under existing conditions (3,200 acres) would return to traditional irrigated agricultural use. Therefore, the No Action/No Project Alternative, compared with existing conditions, would result in less fugitive dust emissions as no fallowed land would require maintenance to control noxious weeds or planting with a cover crop. However, lands would return to traditional irrigated agricultural practices potentially resulting in increased fugitive dust from crop planting, maintenance and harvesting, as these uses are more energy intensive. No fugitive dust emissions would occur to (1) conflict with or obstruct implementation of the applicable air quality plan, (2) violate any air quality standard or contribute substantially to an existing or projected air quality violation, (3) result in a cumulatively considerable net increase of particulate matter (for which the region is nonattainment), or (4) expose sensitive receptors to substantial fugitive dust concentrations. Under CEQA, the impact from fugitive dust emissions would be less than significant.

Impact AQ-2: Increased Combustion Emissions

Under the No Action/No Project Alternative no fallowing of land would occur for the water transfer and the land would return to traditional irrigated agricultural use, primarily for row crops. The No Action/No Project Alternative, compared with existing conditions, would result in fewer combustion emissions as no fallowed land would require maintenance. However, these lands would return to traditional irrigated agricultural practices, potentially resulting in increased combustion emissions from equipment used for crop planting, maintenance, and harvesting, as these uses are more energy intensive. Groundwater pumping could increase under No Action, resulting in increased combustion emissions for any fuel-powered pumps used rather than electric pumps. No combustion emissions would occur to (1) conflict with or obstruct implementation of the applicable air quality plan, (2) violate any air quality standard or contribute substantially to an existing or projected air quality violation, (3) result in a cumulatively considerable net increase of ozone or its precursors (for which the region is nonattainment), or (4) expose sensitive receptors to substantial ozone or ozone precursor concentrations. Under CEQA, the impact from combustion emissions would be less than significant.

Impact AQ-3: Increase in Objectionable Odors

Under the No Action/No Project Alternative no fallowing of land would occur for the water transfer and the land would return to traditional irrigated agricultural use, including potential application of pesticides and fertilizers, potentially resulting in increased objectionable odors. Fuel-powered pumps could produce objectionable odors. However, California ultralow sulfur diesel fuel with a maximum sulfur content of 15 ppm by weight is expected to be used in all diesel-powered equipment, which minimizes emissions of sulfurous gases (sulfur dioxide, hydrogen sulfide, carbon disulfide, and carbonyl sulfide). The use of this fuel on irrigated agricultural lands would prevent objectionable odors. Similar chemicals, vehicles, and equipment are currently being used within the Exchange Contractors' service area on areas proposed for the development of water. Under CEQA, the impact from objectionable odors would be less than significant.

Alternative A: 50,000 Acre-Feet

Alternative A is the smallest level of Program implementation considered as an action alternative. All of the water would be developed from crop idling/temporary land fallowing but could occur in any type of water year. Of the maximum amount of 50,000 acre-feet in a year, 8,000 acre-feet has been developed from land fallowing in recent years, while 42,000 acre-feet would be additional water development not yet experienced.

Impact AQ-1: Increase in Fugitive Dust Emissions

Assuming a transferable quantity of 2.5 AFY, the maximum amount of land to be temporarily idled/fallowed is approximately 20,000 acres, 8.3 percent of the irrigable land (240,000 acres) in the Exchange Contractors' service area. The affected land would be rotated to avoid idling the same land in consecutive years. Land subject to temporary crop idling is normally disked for weed control or planted with a cover crop, which is subsequently disked. These soil management practices, including compliance with SJVAPCD Rule 4550, serve to minimize dust, erosion and loss of topsoil, and the development of noxious weeds. The Exchange Contractors, as well as member districts (CCID, San Luis Canal Company (SLCC), FCWD, and Columbia Canal Company [CCC]) have implemented policies on land fallowing to conserve soil resources (Exchange Contractors 2004, 2005a, b, c; CCID 2007; SLCC 2009a, b; FCWD 2004; CCC 1993). In addition, crop idling in the source area could be offset by reductions in land fallowing in the agricultural areas receiving the water, especially in critical years.

Depending on the amount of land fallowed, Alternative A could result in increased fugitive dust emissions compared with existing conditions from the equipment necessary for maintenance activity required for fallowed land. However, the increased fallowed land would also result in a decrease in fugitive dust compared with existing conditions (land under production) from the implementation of soil management practices designed to minimize dust and from vegetation anchoring from a cover crop. Therefore, fugitive dust emissions generated under fallowed land maintenance would not (1) conflict with or obstruct implementation of the applicable air quality plan, (2) violate any air quality standard or contribute substantially to an existing or projected air quality violation, (3) result in a cumulatively considerable net increase of particulate matter (for which the region is nonattainment), or (4) expose sensitive receptors to substantial fugitive dust concentrations. Under CEQA, the impact from fugitive dust emissions would be less than significant.

Impact AQ-2: Increased Combustion Emissions

Land subject to temporary crop idling is normally disked for weed control or planted with a cover crop, which is subsequently disked. Disk control and any other maintenance activities requiring fueled equipment would result in combustion emissions within the fallowed lands. Depending on the amount of land fallowed, Alternative A could result in increased combustion emissions compared with existing conditions from the equipment necessary for maintenance activity required for fallowed land. However, under existing conditions, that land would be subject to traditional irrigated agricultural use and combustion emissions may be greater for the planting, maintenance, and harvesting activities, which are more energy intensive uses. Therefore, any short-term or long-term generation of combustion emissions would not (1) conflict with or obstruct implementation of the applicable air quality plan, (2) violate any air quality standard or contribute substantially to an existing or projected air quality violation, (3) result in a cumulatively considerable net increase of ozone or its precursors (for which the region is nonattainment), or (4) expose sensitive receptors to substantial ozone or ozone precursor concentrations. Under CEQA, the impact from combustion emissions would be less than significant.

Impact AQ-3: Increase in Objectionable Odors

Weed control on fallowed lands would primarily be accomplished by disking but also may include application of herbicides which could have an odor. This potential herbicide use would be short term and temporary. Vehicles and agricultural equipment required for maintenance of fallowed land may produce odors from exhaust, although equipment required would be less than for traditionally irrigated agricultural lands. California ultralow sulfur diesel fuel with a maximum sulfur content of 15 ppm by weight is expected to be used in all diesel-powered equipment, which minimizes emissions of sulfurous gases (sulfur dioxide, hydrogen sulfide, carbon disulfide, and carbonyl sulfide). The use of this fuel would prevent objectionable odors. Few sensitive receptors exist in the agricultural areas affected. Similar chemicals, vehicles, and equipment are currently being used on land under production that would come out of production for the development of water. Under CEQA, the impact from objectionable odors would be less than significant.

Alternative B: 88,000 Acre-Feet

Alternative B is an intermediate level of program implementation similar to the level of implementation currently underway. For this action alternative, the Exchange Contractors would provide up to 88,000 acre-feet of water during any noncritical Exchange Contract Year through a combination of conservation and crop idling/land fallowing sources.

Conservation measures are defined as tailwater recapture, recovery of irretrievable losses, and reductions in operational spills for up to 80,000 acre-feet of the total developed supply. The facilities to accomplish this level of conservation are already in place including lined canals, drip irrigation systems, and electric motors for tailwater recapture. This scenario of a maximum of 80,000 acre-feet from conservation and temporary land fallowing would contribute up to 8,000 acre-feet of developed water for a total of 88,000 acre-feet.

Flexibility exists in the development of 88,000 acre-feet of water for transfer. The Exchange Contractors have indicated the availability of up to 50,000 acre-feet of water from temporary crop idling/land fallowing as discussed further under Alternative A above. This source of water in combination with tailwater and other conservation opportunities can provide flexibility in the decision of transfer water source. For example, if 50,000 acre-feet were developed through conservation and tailwater recovery programs, up to 38,000 acre-feet would be developed from crop idling/land fallowing.

Impact AQ-1: Increase in Fugitive Dust Emissions

Land subject to temporary crop idling is normally disked for weed control or planted with a cover crop, which is subsequently disked. These soil management practices, including compliance with SJVAPCD Rule 4550, serve to minimize dust, erosion and loss of topsoil, and the development of noxious weeds. The Exchange Contractors, as well as member districts (CCID, SLCC, FCWD, and CCC) have implemented policies on land fallowing to conserve soil resources ((Exchange Contractors 2004, 2005a, b, c; CCID 2007; SLCC 2009a, b; FCWD 2004; CCC 1993), as well as policies on conservation measures to maximize water availability and minimize drainage discharges from the service areas ((Exchange Contractors 2004, 2005a; FCWD 2004; CCC 1993). In addition, crop idling in the source area could be offset by reductions in land fallowing in the agricultural areas receiving the water, especially in critical years.

If the amount of land fallowed under Alternative B equals the amount of land currently being fallowed (3,200 acres), the amount of fugitive dust emitted from maintenance activity would not change. If less land was fallowed than in recent years, fewer fugitive dust emissions would result compared with existing conditions as maintenance activity would be reduced. All maintenance activity would be conducted with the implementation of soil management practices designed to minimize dust and from vegetation anchoring from the idle crops and/or cover crop. If the land fallowing was the maximum 20,000 acres as evaluated under Alternative A, then additional fugitive dust emissions would occur from maintenance activities but they would be less than what occurs with existing row crop production, which is more energy intensive. Therefore, fugitive dust emissions generated under fallowed land maintenance would not (1) conflict with or obstruct implementation of the applicable air quality plan, (2) violate any air quality standard or contribute substantially to an existing or projected air quality violation, (3) result in a cumulatively considerable net increase of particulate matter (for which the region is nonattainment), or (4) expose sensitive receptors to substantial fugitive dust concentrations. Under CEQA, the impact from fugitive dust emissions would be less than significant.

Additional water available for transfer under Alternative B would also come from existing conservation measures such as tailwater recapture, recovery of irretrievable losses, and reductions in operational spills from existing facilities such as lined canals, drip irrigation systems, and electric motors for tailwater. These conservation measures would not result in fugitive dust emissions.

Impact AQ-2: Increased Combustion Emissions

Land subject to temporary crop idling is normally disked for weed control or planted with a cover crop, which is subsequently disked. Disk control and any other maintenance activities requiring fueled-equipment would result in combustion emissions within the fallowed lands. If the amount of land fallowed under Alternative B equals the amount of land currently being fallowed and the amount of combustion emissions from maintenance activity would not change. If less land was fallowed than in recent years, fewer combustion emissions would result compared with existing conditions as maintenance activity would be reduced. However, under existing conditions, that land would be subject to traditional irrigated agricultural use and combustion emissions may be greater for the planting, maintenance, and harvesting activities, which are more energy intensive uses. Therefore, any short-term or long-term generation of combustion emissions would not (1) conflict with or obstruct implementation of the applicable air quality plan, (2) violate any air quality standard or contribute substantially to an existing or projected air quality violation, (3) result in a cumulatively considerable net increase of ozone or its precursors (for which the region is nonattainment), or (4) expose sensitive receptors to substantial ozone or ozone precursor concentrations. Under CEQA, the impact from combustion emissions would be less than significant.

Additional water available for transfer under Alternative B would also come from existing conservation measures such as tailwater recapture, recovery of irretrievable losses, and reductions in operational spills from existing facilities such as lined canals, drip irrigation systems, and electric motors for tailwater. These conservation measures would not result in combustion emissions.

Impact AQ-3: Increase in Objectionable Odors

Weed control on fallowed lands would primarily be accomplished by disking but also may include application of herbicides which could have an odor. This potential herbicide use would be short term and temporary. Vehicles and agricultural equipment required for maintenance of fallowed land may produce odors from exhaust. California ultralow sulfur diesel fuel with a maximum sulfur content of 15 ppm by weight is expected to be used in all diesel-powered equipment, which minimizes emissions of sulfurous gases (sulfur dioxide, hydrogen sulfide, carbon disulfide, and carbonyl sulfide). The use of this fuel would prevent objectionable odors. Similar chemicals, vehicles, and equipment are currently being used on lands proposed for the development of water.

If the maximum amount of land were fallowed under Alternative B it would equal the amount of land currently being fallowed and the amount of objectionable odors from maintenance activity would not change. If less land was fallowed than in recent years, fewer objectionable odors would result compared with existing conditions as maintenance activity would be reduced. However, under existing conditions, that land would be subject to traditional irrigated agricultural use and objectionable odors may be greater for the planting, maintenance, and harvesting activities. However, minimal sensitive receptors exist and any equipment would be expected to use low-sulfur fuel. Under CEQA, the impact from objectionable odors would be less than significant.

Additional water available for transfer under Alternative B would also come from existing conservation measures such as tailwater recapture, recovery of irretrievable losses, and reductions in operational spills from existing facilities such as lined canals, drip irrigation systems, and electric motors for tailwater. These conservation measures would not result in objectionable odors.

Alternative C: 130,000 Acre-Feet

Alternative C makes available up to 130,000 acre-feet of water annually during any noncritical Exchange Contract year similar to the level of maximum transfer contemplated by the Exchange Contractors under the existing 10-Year (2005–2014) Water Transfer Program. Under this alternative, up to 80,000 acre-feet of water is developed through conservation, including tailwater recovery, and up to 50,000 acre-feet of water is developed through crop idling/temporary land fallowing.

Impact AQ-1: Increase in Fugitive Dust Emissions

Land subject to temporary crop idling is normally disked for weed control or planted with a cover crop, which is subsequently disked. These soil management practices, including compliance with SJVAPCD Rule 4550, serve to minimize dust, erosion and loss of topsoil, and the development of noxious weeds. The Exchange Contractors, as well as member districts (CCID, SLCC, FCWD, and CCC) have implemented policies on land fallowing to conserve soil resources (Exchange Contractors 2004, 2005a, b, c; CCID 2007; SLCC 2009a, b; FCWD 2004; CCC 1993), as well as policies on conservation measures to maximize water availability and minimize drainage discharges from the service areas (Exchange Contractors 2004, 2005a; FCWD 2004; CCC 1993). In addition, crop idling in the source area could be offset by reductions in land fallowing in the agricultural areas receiving the water, especially in critical years.

If the amount of land fallowed under Alternative C equals the amount of land currently being fallowed (3,200 acres), the amount of fugitive dust emitted from maintenance activity would not change. If less land was fallowed than in recent years, fewer fugitive dust emissions would result compared with existing conditions as maintenance activity would be reduced. All maintenance activity would be conducted with the implementation of soil management practices designed to minimize dust and from vegetation anchoring from the idle crops and/or cover crop. If the land fallowing was the maximum 20,000 acres as evaluated under Alternative A, then additional fugitive dust emissions would occur from maintenance activities but they would be less than what occurs with existing row crop production which is more energy intensive. Therefore, fugitive dust emissions generated under fallowed land maintenance would not (1) conflict with or obstruct implementation of the applicable air quality plan, (2) violate any air quality standard or contribute substantially to an existing or projected air quality violation, (3) result in a cumulatively considerable net increase of particulate matter (for which the region is nonattainment), or (4) expose sensitive receptors to substantial fugitive dust concentrations. Under CEQA, the impact from fugitive dust emissions would be less than significant.

Additional water available for transfer under Alternative C would also come from existing conservation measures such as tailwater recapture, recovery of irretrievable losses, and reductions in operational spills from existing facilities such as lined canals, drip irrigation systems, and electric motors for tailwater. These conservation measures would not result in fugitive dust emissions.

Impact AQ-2: Increased Combustion Emissions

Land subject to temporary crop idling is normally disked for weed control or planted with a cover crop, which is subsequently disked. Disk control and any other maintenance activities requiring fueled-equipment would result in combustion emissions within the fallowed lands. If the amount of land fallowed under Alternative C equals the amount of land currently being fallowed and the amount of combustion emissions from maintenance activity would not change. If less land was fallowed than in recent years, fewer combustion emissions would result compared with existing conditions as maintenance activity would be reduced. However, under existing conditions, that land would be subject to traditional irrigated agricultural use and combustion emissions may be greater for the planting, maintenance, and harvesting activities, which are more energy intensive uses. Therefore, any short-term or long-term generation of combustion emissions would not (1) conflict with or obstruct implementation of the applicable air quality plan, (2) violate any air quality standard or contribute substantially to an existing or projected air quality violation, (3) result in a cumulatively considerable net increase of ozone or its precursors (for which the region is nonattainment), or (4) expose sensitive receptors to substantial ozone or ozone precursor concentrations. Under CEQA, the impact from combustion emissions would be less than significant.

Additional water available for transfer under Alternative C would also come from existing conservation measures such as tailwater recapture, recovery of irretrievable losses, and reductions in operational spills from existing facilities such as lined canals, drip irrigation systems, and electric motors for tailwater. These conservation measures would not result in combustion emissions.

Impact AQ-3: Increase in Objectionable Odors

Weed control on fallowed lands would primarily be accomplished by disking but also may include application of herbicides which could have an odor. This potential herbicide use would be short term and temporary. Vehicles and agricultural equipment required for maintenance of fallowed land may produce odors from exhaust. California ultralow sulfur diesel fuel with a maximum sulfur content of 15 ppm by weight is expected to be used in all diesel-powered equipment, which minimizes emissions of sulfurous gases (sulfur dioxide, hydrogen sulfide, carbon disulfide, and carbonyl sulfide). The use of this fuel would prevent objectionable odors. Similar chemicals, vehicles, and equipment are currently being used on sites proposed for the development of water. Depending on the amount of land fallowed, Alternative C could result in odors from equipment necessary for maintenance activity required for fallowed land. However, minimal sensitive receptors exist and equipment would be expected to use low-sulfur fuel. Under CEQA, the impact from objectionable odors would be less than significant.

Additional water available for transfer under Alternative C would also come from existing conservation measures such as tailwater recapture, recovery of irretrievable losses, and reductions in operational spills from existing facilities such as lined canals, drip irrigation systems, and electric motors for tailwater. These conservation measures would not result in objectionable odors.

Alternative D: 150,000 Acre-Feet

Alternative D expands upon Alternative C's 130,000 acre-feet (from existing conservation and crop idling) with an additional 20,000 acre-feet from additional conservation measures not already considered in the other alternatives. These new measures include the lining of canals and implementation of on-farm irrigation or district conveyance system improvements that would not have a hydrologic effect on the San Joaquin River. Alternative D represents the maximum water transfer by adding an additional increment of conservation water.

Some of the additional conservation measures would require the short-term use of construction equipment for implementation, as well as long-term use of energy for new measures. Short-term construction activity would include operation of equipment such as excavators, backhoes, dozers, graders, and trucks for canal lining, pipeline installation, regulating reservoirs, and canal automation structures. Long-term energy use would include electric motors for pressurizing new drip and sprinkler irrigation systems and for operating recirculation systems and regulating reservoirs. None of the long-term energy use would increase air quality emissions. Overall, power use is expected to increase. However, following commencement of the regulating reservoirs and water delivery systems and the offset of reducing low lift return flows and pumping requirements, power use may be equal or only result in a negligible increase (Chedester, pers. comm., 2011).

Impact AQ-1: Increase in Fugitive Dust Emissions

The affected fallowed land (up to 20,000 acres) would be rotated to avoid idling the same land in three consecutive years. Land subject to temporary crop idling is normally disked for weed control or planted with a cover crop, which is subsequently disked. These soil management practices, including compliance with SJVAPCD Rule 4550, serve to minimize dust, erosion and loss of topsoil, and the development of noxious weeds. The Exchange Contractors, as well as member districts (CCID, SLCC, FCWD, and CCC) have implemented policies on land fallowing to conserve soil resources (Exchange Contractors 2004, 2005a, b, c; CCID 2007; SLCC 2009a, b; FCWD 2004; CCC 1993), as well as policies on conservation measures to maximize water availability and minimize drainage discharges from the service areas (Exchange Contractors 2004, 2005a; FCWD 2004; CCC 1993). In addition, crop idling in the source area could be offset by reductions in land fallowing in the agricultural areas receiving the water, especially in critical years.

Depending on the amount of land fallowed, Alternative D could result in increased fugitive dust emissions compared with existing conditions from the equipment necessary for maintenance activity required for fallowed land, as well as for infrastructure projects necessary for the increased transfer of water. However, the increased fallowed land would also result in a decrease in fugitive dust compared with existing conditions from the implementation of soil management practices designed to minimize dust and from vegetation anchoring from the idle crops and/or cover crop.

Other water developed for transfer under Alternative D would come from conservation measures such as recovery of irretrievable losses, and reductions in operational losses from existing facilities such as lined canals and drip irrigation systems plus the new conservation measures. These conservation measures would not result in fugitive dust emissions. If additional water conservation measures were to be implemented, fugitive dust emissions would be generated from the use of short-term construction equipment, but not from any long-term uses. However, as stated above, overall energy use (including fuel use in equipment) is expected to decrease following implementation of infrastructure projects. Therefore, any short-term or long-term generation of fugitive dust emissions would not (1) conflict with or obstruct implementation of the applicable air quality plan, (2) violate any air quality standard or contribute substantially to an existing or projected air quality violation, (3) result in a cumulatively considerable net increase of particulate matter (for which the region is nonattainment), or (4) expose sensitive receptors to substantial fugitive dust concentrations. Under CEQA, the impact from fugitive dust emissions would be less than significant.

Impact AQ-2: Increased Combustion Emissions

Land subject to temporary crop idling is normally disked for weed control or planted with a cover crop, which is subsequently disked. Disk control and any other maintenance activities requiring fueled-equipment would result in combustion emissions within the fallowed lands.

Depending on the amount of land fallowed, Alternative D could result in increased combustion emissions compared with existing conditions from the equipment necessary for maintenance activity required for fallowed land. However, under existing conditions, that land would be subject to traditional irrigated agricultural use and combustion emissions may be greater for the planting, maintenance, and harvesting activities, as these uses are more energy intensive.

Other water available for transfer under Alternative D would come from conservation measures such as tailwater recapture, recovery of irretrievable losses, and reductions in operational spills from existing facilities such as lined canals, drip irrigation systems, and electric motors for tailwater plus the new conservation measures. These conservation measures would not result in combustion emissions. If additional water conservation measures were to be implemented, combustion emissions would be generated from the use of short-term construction equipment, but not from any long-term uses. However, as stated above, overall energy use (including fuel use in equipment) is expected to decrease following implementation of infrastructure projects. Therefore, any short-term or long-term generation of combustion emissions would not (1) conflict with or obstruct implementation of the applicable air quality plan, (2) violate any air quality standard or contribute substantially to an existing or projected air quality violation, (3) result in a cumulatively considerable net increase of ozone or its precursors (for which the region is nonattainment), or (4) expose sensitive receptors to substantial ozone or ozone precursor concentrations. Under CEQA, the impact from combustion emissions would be less than significant.

Impact AQ-3: Increase in Objectionable Odors

Weed control on fallowed lands would primarily be accomplished by disking but also may include application of herbicides which could have an odor. This potential herbicide use would be short term and temporary. Vehicles and agricultural equipment required for maintenance of fallowed land may produce odors from exhaust. California ultralow sulfur diesel fuel with a maximum sulfur content of 15 ppm by weight is expected to be used in all diesel-powered equipment, which minimizes emissions of sulfurous gases (sulfur dioxide, hydrogen sulfide, carbon disulfide, and carbonyl sulfide). The use of this fuel would prevent objectionable odors. Similar chemicals, vehicles, and equipment are currently being used on sites proposed for the development of water. Additional water available for transfer under Alternative D would come from conservation measures such as recovery of irretrievable losses, and reductions in operational losses from existing facilities such as lined canal and drip irrigation systems. These conservation measures would not result in objectionable odors.

Depending on the amount of land fallowed, Alternative D could result in odors from equipment necessary for maintenance activity required for fallowed land, as well as from short-term use of construction equipment to expand the infrastructure for conservation measures. However, minimal sensitive receptors exist and equipment would be expected to use low-sulfur fuel. Under CEQA, the impact from objectionable odors would be less than significant.

11.2.3 Cumulative Effects

Under the action alternatives varying amounts of Exchange Contractors' land could be idled to provide up to the maximum amount of water under Alternative D. During the Project timeframe, whether the water year type would be critical or noncritical is not known, and any land that is idled one year would likely be brought back into production the next. Conservation measures such as drip irrigation systems, canal lining, regulating reservoirs and tailwater recapture would also be implemented under the action alternatives. These increases include the use of existing infrastructure (all alternatives), as well as newly proposed infrastructure for Alternative D.

At issue is the potential for dust, combustion emissions, and objectionable odors from agricultural operations to contribute to decreased air quality, which in turn could (1) conflict with a local air quality plan, (2) violate an air quality standard or contribute to an air quality violation, (3) result in a cumulatively considerable net increase of ozone or its precursors (for which the region is nonattainment), or (4) expose sensitive receptors to substantial ozone or ozone precursor concentrations.

Land subject to temporary crop idling is normally disked for weed control or planted with a cover crop, which is subsequently disked. These soil management practices serve to minimize dust, erosion and loss of topsoil, and the development of noxious weeds. In addition, crop idling in the source area could be offset by reductions in land fallowing in the agricultural areas receiving the water, especially in critical years. Thus, while land idling could occur under each of the action alternatives, the impacts from soil management practices would be similar to or less than ongoing impacts from lands managed for crops and would not be considered cumulatively significant. The Exchange Contractors, as well as member districts (CCID, SLCC, FCWD, and CCC) have implemented policies on land fallowing to conserve soil resources (Exchange Contractors 2004, 2005a, b, c; CCID 2007; SLCC 2009a, b; FCWD 2004; CCC 1993).

Newly proposed conservation measures under Alternative D would require the short-term use of construction equipment for implementation, as well as long-term use of energy for new measures. Overall, power use is expected to increase. However, following commencement of the regulating reservoirs and water delivery systems and the offset of reducing low lift return flows and pumping requirements, power use may be equal or only result in a negligible increase (Chedester, pers. comm., 2011). The Exchange Contractors (Exchange Contractors, as well as member districts (FCWD and CCC) have implemented policies on conservation measures to maximize water availability and minimize drainage discharges from the service areas (Exchange Contractors 2004, 2005a; FCWD 2004; CCC 1993).

Additionally, most air districts in California assume that if project-level emissions do not exceed significance thresholds, and no closely related project exists, then a project would not have a cumulatively considerable impact on air quality. Related projects are listed in Section 1.3. However, very few potential emissions are associated with the action alternatives and the likelihood of simultaneous project execution on a daily maximum basis is small. Notwithstanding off-site emissions, the Proposed Program's onsite emissions would nevertheless be below significance thresholds for criteria pollutant emissions. The incremental impacts on local air quality due to the Proposed Program's would not be individually significant nor would they be cumulatively considerable. Therefore, cumulative impacts on air quality in the project vicinity would be less than significant.

11.2.4 Impact and Mitigation Summary

The action alternatives do not result in significant changes over existing conditions. No potentially significant impacts would occur to air quality, so no mitigation is required.

Table 11-3 summarizes the impacts of the No Action/No Project Alternative and the action alternatives on air quality under CEQA compared to existing conditions.

Table 11-3
Summary Comparison of Air Quality Impacts of Alternatives and Mitigation Measures

Environmental Concern		Alternative	Impact Before Mitigation	Mitigation Measures	Impact After Mitigation
AQ-1	Increased Fugitive Dust Emissions	No Action	LTS	not applicable	-
		A	LTS	not required	-
		B	LTS	not required	-
		C	LTS	not required	-
		D	LTS	not required	-
		Cumulative	N	not required	-
AQ-2	Increased Combustion Emissions	No Action	LTS	not applicable	-
		A	LTS	not required	-
		B	LTS	not required	-
		C	LTS	not required	-
		D	LTS	not required	-
		Cumulative	N	not required	-
AQ-3	Increase in Objectionable Odors	No Action	LTS	not applicable	-
		A	LTS	not required	-
		B	LTS	not required	-
		C	LTS	not required	-
		D	LTS	not required	-
		Cumulative	N	not required	-

CEQA:
N = no impact
LTS = less than significant
PS = potentially significant
PSU = potentially significant and unavoidable

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12.0 Climate Change/Greenhouse Gases

Climate change and GHG emissions analysis is now required for compliance with CEQA based on CEQA guidelines amendments approved in December 2009. NEPA Guidelines have also changed to require consideration of GHG emission and climate change.

12.1 Affected Environment/Environmental Setting

This section briefly describes the greenhouse gas (GHG) and climate change setting for the Exchange Contractors' proposed 25-Year Water Transfer Program and identifies the environmental effects of the alternatives. Air Quality is discussed in Chapter 11.

The environmental setting for GHG emissions and climate change is larger than the immediate Program area. The sections below describe the context for climate change as being the Earth and the properties of GHGs to affect global climate change.

12.1.1 Common Greenhouse Gases

GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (Health and Safety Code Section 38505[g]). The most common GHG that results from human activity is CO_2, followed by CH_4 and N_2O (Governor's Office of Planning and Research 2008). The three most common GHGs (CO_2, CH_4, and N_2O) and their potential environmental effects are described below.

Carbon Dioxide

In nature, carbon is cycled between various atmospheric, oceanic, land biotic, marine biotic, and mineral reservoirs. Atmospheric CO_2 is part of this global carbon cycle. CO_2 concentrations in the atmosphere increased from 278 ppm by volume in preindustrial times to 365 ppm by volume in 1998, a 31 percent increase. The Intergovernmental Panel on Climate Change (IPCC) notes that "this concentration has not been exceeded during the past 420,000 years, and likely not during the past 20 million years. The rate of increase over the past century is unprecedented, at least during the past 20,000 years." The IPCC definitively states "the present atmospheric CO_2 increase is caused by anthropogenic emissions of CO_2" (EPA 2011).

Global Warming Potential (GWP) is a quantified measure of the globally averaged relative radiative forcing impacts of a particular GHG. It is defined as the cumulative radiative forcing both direct and indirect effects integrated over a period of time from the emission of a unit mass of gas relative to a reference gas. CO_2 is the reference gas with a GWP of unity (1). Carbon dioxide equivalents (CO_2e) are calculated by summing the products of mass GHG emissions by species times their respective GWP coefficients (EPA 2011).

Methane

CH_4 is primarily produced through anaerobic decomposition of organic matter in biological systems. Agricultural processes such as wetland rice cultivation, enteric fermentation in animals, and the decomposition of animal wastes emit CH_4, as does the decomposition of municipal solid wastes. CH_4 is also emitted during the production and distribution of natural gas and petroleum, and is released as a byproduct of coal mining and incomplete fossil fuel combustion. Atmospheric CH_4 concentrations have increased by about 150 percent since preindustrial times, although the rate of increase has been declining. The IPCC has estimated that slightly more than half of the current CH_4 flux to the atmosphere is from human activities such as agriculture, fossil fuel use, and waste disposal. The GWP coefficient of CH_4 is 21 (EPA 2011).

Nitrous Oxide

Anthropogenic sources of N_2O emissions include agricultural soils, especially the use of synthetic and manure fertilizers; fossil fuel combustion, especially from mobile combustion; adipic (nylon) and nitric acid production; wastewater treatment and waste combustion; and biomass burning. The atmospheric concentration of N_2O has increased by 16 percent since 1750, from a preindustrial value of about 270 to 314 parts per billion in 1998, a concentration that has not been exceeded during the last thousand years. The GWP coefficient of N_2O is 310 (EPA 2011).

12.1.2 Climate Change

The American Meteorological Society refers to climate change as any systematic change in the long-term statistics of climate elements (such as temperature, pressure, or winds) sustained over several decades or longer. The Society also indicates that climate change may be due to natural external forcing, such as changes in solar emission or slow changes in the Earth's orbital elements, natural internal processes of the climate system, or anthropogenic forcing. The climate system can be influenced by changes in the concentration of various GHGs in the atmosphere that affect the Earth's absorption of radiation (American Meteorological Society 2010).

In its *Inventory of U.S. Greenhouse Gas Emissions and Sinks*: *1990–2008*, EPA (2010) provides summary information on the work of the United Nations Framework Convention on Climate Change and the IPCC (1990–2007); key information from that report is summarized below.

The United Nations Framework Convention on Climate Change (2010) defined climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods." In its Second Assessment Report (1995) of the science of climate change, the IPCC concluded that "human activities are changing the atmospheric concentrations and distributions of GHGs and aerosols. These changes can produce a radiative forcing by changing either the reflection or absorption of solar radiation, or the emission and absorption of terrestrial radiation." Building on this conclusion, the IPCC Third Assessment Report (2001) asserted that "concentrations of atmospheric GHGs and their radiative forcing have continued to increase as a result of human activities."

The IPCC reports that the global average surface temperature of the Earth has increased by between 1.1± 0.4 Fahrenheit (°F) (0.6± 0.2 degrees Celsius [°C]) over the 20th century. This value is about 0.27°F (0.15°C) larger than that estimated by the Second Assessment Report, which reported for the period up to 1994, "owing to the relatively high temperatures of the additional years (1995 to 2000) and improved methods of processing the data."

While the Second Assessment Report concluded, "the balance of evidence suggests that there is a discernible human influence on global climate," the Third Assessment Report more directly connects the influence of human activities on climate. IPCC concluded that, "In light of new evidence and taking into account the remaining uncertainties, most of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas concentrations."

In its most recent report (Fourth Assessment Report), IPCC (2007) stated that warming of the Earth's climate is unequivocal and that warming is very likely attributable to increases in atmospheric GHGs caused by human activities. IPCC further stated that changes in many physical and biological systems, such as increases in global temperatures, more frequent heat waves, rising sea levels, coastal flooding, loss of wildlife habitat, spread of infectious disease, and other potential environmental impacts are linked to changes in the climate system, and that some changes might be irreversible.

Tables 12-1 and 12-2 show aggregated U.S. and California CO_2e emissions for all fossil fuel combustion, respectively. As shown below, California accounts for about 7.2 percent of fossil fuel CO_2e emissions in the U.S. annually.

12.1.3 Regulatory Environment

The following paragraphs describe the laws and regulations governing GHG emissions. However, Government Code 53091(d) states: "(d) Building ordinances of a county or city shall not apply to the location or construction of facilities for the production, generation, storage, treatment, or transmission of water, wastewater, or electrical energy by a local agency." Thus, ordinances do not strictly apply to Exchange Contractors' water transfer projects, and the Proposed Program does not propose any construction of new facilities beyond weir observation measures.

Currently, no local, state, or Federal regulatory standards relate to GHG emissions from temporary sources such as construction-only projects with no quantifiable long-term operational emissions. Summaries of principal California and Federal GHG statutes and programs are presented below.

Table 12-1
Estimated Annual U.S. GHG Emissions from Fuel Combustion

Summary Year	CO_2 e	
	million tonnes	**million tons**
2000	5,671	6,251
2001	5,597	6,170
2002	5,635	6,211
2003	5,702	6,285
2004	5,764	6,354
2005	5,814	6,409
2006	5,710	6,294
2007	5,811	6,405
2008	5,615	6,189
2009	5,254	5,791

Source: EPA 2011
1 short ton = 1.1023 metric tonne

Table 12-2
Estimated Annual California GHG Emissions from Fuel Combustion

Summary Year	CO_2 e	
	million tonnes	**million tons**
2000	397	438
2001	412	454
2002	410	452
2003	408	450
2004	418	461
2005	409	451
2006	406	448
2007	412	454
2008	408	450

Source: CARB 2010a
[1] short ton = 1.1023 metric tonne

Federal Programs – U.S. Environmental Protection Agency

In response to the FY 2008 Consolidated Appropriations Act (HR 2764; Public Law 110-161), the EPA has issued 40 CFR Part 98, which requires reporting of GHG emissions from large sources and suppliers in the U.S. Part 98 is intended to collect accurate and timely emissions data to inform future policy decisions. Under Part 98, suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tonnes or more per year of GHGs are required to submit annual reports to EPA. Part 98 was published in the Federal Register (www.regulations.gov) on October 30, 2009, under Docket ID No. EPA-HQ-OAR-

2008-0508-2278. Part 98 became effective December 29, 2009. This action included reporting requirements for 31 of the 42 source categories listed in the April 10, 2009, proposed rule. However, since the Proposed Program is not a stationary source, the new Federal reporting rule would not apply.

Council on Environmental Quality Draft NEPA Guidelines

In February 2010 the CEQ issued its Draft NEPA *Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions*, which proposed that NEPA projects must consider potential impacts of GHG emissions as well as climate change. The Guidance Memorandum addresses two related issues: (1) the treatment of GHG emissions that may directly or indirectly result from the proposed Federal action and (2) the analysis of potential climate change impacts upon the proposed Federal action.

While the CEQ did not establish thresholds for long-term Federal actions with direct emissions below 25,000 metric tons per year of CO_2e, it encouraged Federal agencies to consider whether the resulting emissions should be evaluated similar to actions over 25,000 metric tons. Again, CEQ does not propose this as a threshold of significance, but as an indicator of a minimum level of GHG emissions justifying a discussion in the NEPA analysis for agency actions involving direct emissions of GHGs.

State Programs

Global Warming Solutions Act

The Global Warming Solutions Act of 2006 (AB 32) codifies California's goal of reducing statewide emissions of GHGs to 1990 levels by 2020. This reduction will be accomplished through an enforceable statewide cap on global warming emissions that will be phased in starting in 2012 to achieve maximum technologically feasible and cost-effective GHG emission reductions. To effectively implement the cap, AB 32 directs the CARB to develop appropriate regulations and establish a mandatory reporting system to track and monitor global warming emissions levels.

At present, neither CARB nor any other state agency has promulgated enforceable rules or regulations that define a significant source of GHG emissions. In addition, no enforceable facility-specific emission limitations or caps for GHG emissions exist, either statewide or at the local Air Pollution Control District or Air Quality Management District level. Thus, no present state or local regulatory mechanism determines whether a project advances or hinders California's GHG reduction goals; no statewide standards of significance for GHG impacts have been established under CEQA (California Air Pollution Control Officers Association 2008).

On September 25, 2009, CARB adopted the AB 32 Cost of Implementation Fee Regulation (Health and Safety Code 38597). The Office of Administrative Law approved the regulation on June 17, 2010, and it became effective on July 19, 2010. For the first year of the fee program, CARB will administratively provide compliance flexibility and will not enforce reporting and fee requirements until after the passage of the state budget for fiscal year 2010-11. Until the budget is enacted and CARB provides detailed compliance criteria, facilities subject to the regulation do not need to pay fees or report information required by the regulation. However, since the Proposed Program is not an affected facility (i.e., not a stationary source), the AB 32 fee regulation would not apply (CARB 2010b).

Assembly Bill 939

California AB 939, known as the Integrated Waste Management Act of 1989, was enacted due to increasing waste stream volumes and decreasing landfill capacities in the state. As a result of AB 939, the California Integrated Waste Management Board was created. A disposal reporting system with its oversight was established, and facility and program planning was required. AB 939 mandated that sanitation districts (jurisdictions) meet diversion goals of 25 percent by 1995 and 50 percent by 2000, primarily through recyclables collection and green waste compositing. AB 939 also established an integrated framework for program implementation, solid waste planning, and solid waste facility and landfill compliance.

Senate Bill 1368

California Senate Bill (SB) 1368 adds Sections 8340 and 8341 to the Public Utilities Code (effective January 1, 2007) with the intent "to prevent long-term investments in power plants with GHG emissions in excess of those produced by a combined-cycle natural gas power plant" with the aim of "reducing emissions of GHGs from the state's electricity consumption, not just the state's electricity production." SB 1368 provides a mechanism for reducing the GHG emissions of electricity providers, both in and out of state, thereby assisting CARB in meeting its mandate under AB 32, the Global Warming Solutions Act of 2006.

Senate Bill 97

California SB 97 directs the Office of Planning and Research to prepare, develop, and transmit to the Resources Agency CEQA guidelines for the feasible mitigation of GHG emissions or their effects by July 1, 2009. The Resources Agency is required to certify or adopt those guidelines by January 1, 2010. SB 97 also protects, for a short time, certain projects funded by the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006, or the Disaster Preparedness and Flood Protection Bond Act of 2006 (Proposition 1B or 1E) from claims of inadequate analysis of GHG as a legitimate cause of action. This latter provision was repealed on January 1, 2010.

Senate Bill 375

California SB 375 aims to reduce GHG emissions by curbing sprawl, because the largest sources of GHG emissions in California are passenger vehicles and light trucks. SB 375 provides emission reduction goals for which regions can plan, integrates disjointed planning activities, and provides incentives for local governments and developers to follow new conscientiously planned growth patterns. SB 375 enhances CARB's ability to reach AB 32 goals by requiring metropolitan planning organizations to include defined sustainable community strategies in their regional transportation plans for the purpose of reducing GHG emissions, aligns planning for transportation and housing, and creates specified incentives for the implementation of the strategies.

Senate Bills 1078 and 10

California SB 1078 was signed into legislation in 2002 and required California load serving entities to procure 20 percent of their retail customer load with renewable energy by the year 2017. Four years later (2006), SB 10 accelerated the 20 percent renewable deadline to 2010.

Executive Order S-20-04

On July 27, 2004, Governor Arnold Schwarzenegger signed Executive Order S-20-04 committing the state to aggressive action to reduce state-owned building electricity usage by retrofitting, building, and operating the most energy and resource efficient buildings by taking all cost-effective measures described in the Green Building Action Plan with the goal of reducing grid-based energy purchases by 20 percent by 2015. This order also directed the California Public Utilities Commission to support a campaign to improve commercial building energy efficiency to help achieve the 20 percent goal and to develop a benchmarking methodology.

Executive Order S-3-05

On June 1, 2005, Governor Arnold Schwarzenegger signed Executive Order S-3-05, which established GHG emission reduction targets: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; by 2050, reduce GHG emissions to 80 percent below 1990 levels.

Executive Order S-13-08

On November 14, 2008, Governor Arnold Schwarzenegger signed Executive Order S-20-04 directing the California Resources Agency, in cooperation with the DWR, the California Energy Commission, California's coastal management agencies, and the Ocean Protection Council to request that the National Academy of Sciences convene an independent panel to complete the first California Sea Level Rise Assessment Report by December 1, 2010. As part of this effort, the Resources Agency is to create an independent sea level rise science and policy committee made up of state, national, and international experts and to hold public workshops to gather policy-relevant information.

California Department of Water Resources

In January 2010, the DWR established its *Guidance for Quantifying Greenhouse Gas Emissions and Determining the Significance of their Contribution to Global Climate Change for CEQA Purposes* (DWR 2010b). DWR developed this guidance, along with its contemporary, Addressing Climate Change in CEQA Documents, to promote a consistent approach to climate change assessment for its staff and consultants on projects where DWR is involved as an agency. It is also intended to ensure compliance with the newest CEQA Guideline amendments approved in December 2009.

Local Programs

San Joaquin Air Pollution Control District

The SJVAPCD has jurisdiction over most air quality matters in San Joaquin Valley Air Basin and implements specific programs and regulations required by the Federal and California Clean Air Acts. As a public agency, the SJVAPCD takes an active part in the intergovernmental review process under CEQA, and assists governmental agencies and project proponents in facilitating air quality analysis methodologies, applicable rules, and mitigation if applicable. The SJVAPCD has not officially adopted a significance threshold for generation of GHGs by water transfer projects to assess the level at which a project's incremental contribution is considered cumulatively considerable. However, in December 2009, the SJVAPCD adopted their *Guidance for Valley Land-Use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA*. In this guidance, the SJVAPCD recommends that quantification of GHG emissions be conducted for development projects that are required to conduct an EIR and do not implement best performance standards (BPSs). BPSs are considered the most cost effective achieved-in practice means of reducing or limiting GHG emissions from a GHG emissions source. Projects implementing BPSs in accordance with this guidance would be determined to have a less-than-significant individual and cumulative impact on global climate change and would not require project-specific quantification of GHG emissions (SJVAPCD 2009).

Thus, no GHG significance thresholds apply to the Proposed Program.

12.2 Environmental Consequences

This section addresses whether climate change or GHGs would be significantly impacted by any one of the action alternatives. The action alternatives involve multiple sources of developed water and multiple users of that water. The Exchange Contractors propose to develop water from an expanded conservation program and crop idling/temporary land fallowing. The action alternatives are designed based on how the water is developed. As discussed previously, the analysis focuses on the development of the water for transfer, rather than the potential receivers of the water, and as discussed in Chapter 2. Alternatives, Section 2.3, the effects of how the water is used are addressed primarily in other environmental documents and summarized in this EIS/EIR (see Section 3.3).

12.2.1 Key Impact and Evaluation Criteria

This technical report addresses the following standards of significance as based on CEQA Guidelines Appendix G, which is taken into account under California DWR Guidance. Would the project:

- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

- Conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?

Existing Conditions Baseline for Analysis

Existing conditions for the Exchange Contractors' service area in the San Joaquin Valley reflect the current environment of the system that includes the following actions:

- The recent transfers of water by the Exchange Contractors (80,000 to 88,000 acre-feet, see Table 1-1), which includes up to 3,200 acres of land fallowing.
- The curtailment of water deliveries due to ongoing regulatory actions and requirements (as discussed in Chapter 1) under the existing Program.
- Interim flows under the SJRRP, which began October 1, 2009.
- The Grassland Bypass Project, in which a substantial amount of the monies received from the sale of water under the transfers by FCWD and the portion of those proceeds attributable to conservation within the Camp l3 area of CCID are invested in developing water quality control measures for reducing uncontrolled discharges of salt, selenium, and boron to the San Joaquin River and further control of those constituents in drainwater by treatment including application to land areas.

12.2.2 Environmental Impacts and Mitigation

No Action/No Project Alternative

The No Action/No Project Alternative would result in no transfer or exchange of water from the Exchange Contractors to any potential water users at the conclusion of the existing Program on February 28, 2014 (through Water Year 2013). The Exchange Contractors would recover and reuse within their own operations the water previously transferred and generate approximately the same amount of tailwater flows. The reused tailwater would be integrated into the Exchange Contractors' water supply and likely increase direct recharge of groundwater and reduce groundwater pumping that currently helps meet irrigation demands and capacity constraints. Land fallowing under the existing Program would not occur. Further assumptions of the No Action/No Project Alternative are listed in Chapter 2.0, Alternatives, Section 2.2.

Impact CC-1: Increase in Greenhouse Gas Emissions

Under the No Action/No Project Alternative no fallowing of land for the water transfer would occur, and the land recently fallowed under existing conditions (3,200 acres) would return to traditional irrigated agricultural use. Therefore, the No Action/No Project Alternative, compared with existing conditions, would result in fewer GHG emissions as no fallowed land would require maintenance to control noxious weeds or planting with a cover crop. However, lands would return to traditional irrigated agricultural practices potentially resulting in increased GHGs from the more intensive use of equipment required for crop planting, maintenance, and harvesting. Carbon sequestration potential would not differ substantially between vegetation retained/cover crop planted on fallowed land and new crops planted on irrigated land. Under CEQA, the impact from GHG emissions would be less than significant.

Impact CC-2: Conflicts with Greenhouse Gas Reduction Plans

As discussed under Impact CC-1 under the No Action/No Project Alternative above, no fallowing of land for the water transfer would occur, and the land recently fallowed under existing conditions (3,200 acres) would return to traditional irrigated agricultural use. Therefore, the No Action/No Project Alternative, compared with existing conditions, would result in fewer GHG emissions as no fallowed land would require maintenance to control noxious weeds or planting with a cover crop. However, lands would return to traditional irrigated agricultural practices potentially resulting in increased GHGs from the more intensive use of equipment required for crop planting, maintenance, and harvesting. As no substantial GHG emissions would be generated under the No Action/No Project Alternative, no potential conflict would occur with plans to reduce or mitigate GHGs. Under CEQA, the impact from GHGs on reduction plans would be less than significant.

Alternative A: 50,000 Acre-Feet

Alternative A is the smallest level of Program implementation considered as an alternative. All of the water would be developed from crop idling/temporary land fallowing but could occur in any type of water year. Of the maximum amount of 50,000 acre-feet in a year, 8,000 acre-feet has occurred in recent years, while 42,000 acre-feet would be additional water development not yet experienced.

The maximum available water for transfer is up to 50,000 acre-feet from crop idling/temporary land fallowing. Any or all of the available water could be provided to the refuges, agriculture, and M&I users subject to the limitations identified in Section 2.3.2 and the effects analysis in Section 3.3.

Impact CC-1: Increase in Greenhouse Gas Emissions

Assuming a transferable quantity of 2.5 acre-feet per acre, the maximum amount of land to be temporarily idled/fallowed is approximately 20,000 acres, 8.3 percent of the irrigable land (240,000 acres) in the Exchange Contractors' service area. The affected land would be rotated to avoid idling the same land in consecutive years. Land subject to temporary crop idling is normally disked for weed control or planted with a cover crop, which is subsequently disked. The Exchange Contractors, as well as member districts (CCID, SLCC, FCWD, and CCC) have implemented policies on land fallowing to conserve soil resources (Exchange Contractors 2004, 2005a, b, c; CCID 2007; SLCC 2009a, b; FCWD 2004; CCC 1993). Disk control and any other maintenance activities requiring fueled equipment would result in GHG emissions within the fallowed lands.

Depending on the amount of land fallowed, Alternative A could result in increased GHG emissions compared with existing conditions from fuel use in the equipment necessary for maintenance activity required for fallowed land. However, under existing conditions, that land would be subject to traditional irrigated agricultural use and GHG emissions may be greater for the planting, maintenance, and harvesting activities, which are more energy intensive. Under CEQA, the impact from GHG emissions would be less than significant.

Long-term carbon sequestration from land fallowing would be negligible as any carbon sequestered during the fallowing period would be released each year when the land was transitioned back to traditional irrigated agricultural practices. Additionally, carbon sequestration potential would not differ substantially between vegetation retained/cover crop planted on fallowed land and new crops planted on irrigated land.

Impact CC-2: Conflicts with Greenhouse Gas Reduction Plans

As discussed under Impact CC-1 for Alternative A, land subject to temporary crop idling is normally disked for weed control or planted with a cover crop, which is subsequently disked. Disk control and any other maintenance activities requiring fueled equipment would result in GHG emissions within the fallowed lands.

Depending on the amount of land fallowed, Alternative A could result in increased GHG emissions compared with existing conditions from the equipment necessary for maintenance activity required for fallowed land; however, GHGs would still occur under existing conditions from equipment required for planting, maintenance, and harvesting activity. GHG emissions generated under Alternative A would not have the potential to conflict with or be inconsistent with plans to reduce or mitigate GHGs. Proposed activities are not explicitly addressed in existing plans to reduce or mitigate GHGs; therefore, they would not be in conflict with or inconsistent with those plans as they would not preclude the attainment of the goals or objectives of applicable plans. Under CEQA, the impact from GHGs on reduction plans would be less than significant.

Alternative B: 88,000 Acre-Feet

Alternative B is an intermediate level of Program implementation similar to the level of implementation currently underway. For this action alternative, the Exchange Contractors would develop up to 88,000 acre-feet of water during any noncritical Exchange Contract year through a combination of conservation/tailwater recovery and crop idling/land fallowing sources. Conservation measures are defined as tailwater recapture using electric pumps, recovery of irretrievable losses, and reductions in operational spills for up to 80,000 acre-feet of the total developed supply. Temporary land fallowing would contribute up to 8,000 acre-feet of developed water.

Flexibility exists in the development of 88,000 acre-feet of water for transfer. The Exchange Contractors have indicated the availability of up to 50,000 acre-feet of water from temporary crop idling/land fallowing. This source of water in combination with tailwater and other conservation opportunities can provide flexibility in the decision of transfer water source. For example, if 50,000 acre-feet were developed through conservation activities, up to 38,000 acre-feet would be developed from crop idling/land fallowing.

Any or all of the available water could be provided to the refuges, agriculture, and M&I users subject to the limitations identified in Section 2.3.2 and the effects analysis in Section 3.3.

Impact CC-1: Increase in Greenhouse Gas Emissions

Assuming a transferable quantity of 2.5 acre-feet per acre, the maximum amount of land to be temporarily idled/fallowed is approximately 20,000 acres, 8.3 percent of the irrigable land (240,000 acres) in the Exchange Contractors' service area. The affected land would be rotated to avoid idling the same land in 3 consecutive years. Land subject to temporary crop idling is normally disked for weed control or planted with a cover crop, which is subsequently disked. The Exchange Contractors, as well as member districts (CCID, SLCC, FCWD, and CCC) have implemented policies on land fallowing to conserve soil resources (Exchange Contractors 2004, 2005a, b, c; CCID 2007; SLCC 2009a, b; FCWD 2004; CCC 1993), as well as policies on conservation measures to maximize water availability and minimize drainage discharges from the service areas (Exchange Contractors 2004, 2005a; FCWD 2004; CCC 1993). Disk control and any other maintenance activities requiring fueled equipment would result in GHG emissions within the fallowed lands.

If the amount of land fallowed under Alternative B equals the amount of land currently being fallowed (3,200 acres), the amount of GHG emissions resulting from maintenance activity would not change. If less land was fallowed than in recent years, fewer GHG emissions would result compared with existing conditions as maintenance activity would be reduced. If the land fallowing was the maximum 20,000 acres evaluated under Alternative A, then additional GHG emissions from maintenance activities would occur but they would likely be less than what occurs with existing row crop production including planting, maintenance, and harvesting equipment requirements, which are more intensive energy uses. Water available for transfer under Alternative B would also come from conservation activities such as tailwater recapture using electric pumps, recovery of irretrievable losses, and reductions in operational spills from existing facilities such as lined canals and drip irrigation systems. These conservation measures would result in indirect GHG emissions from the energy usage, but would be less emissive overall than traditional agricultural practices that would occur under existing conditions. Under CEQA, the impact from GHG emissions would be less than significant.

Long-term carbon sequestration from land fallowing would be negligible as any carbon sequestered during the fallowing period would be released each year when the land was transitioned back to traditional irrigated agricultural practices. Additionally, carbon sequestration potential would not differ substantially between vegetation retained or cover crop planted on fallowed land and new crops planted on irrigated land.

Impact CC-2: Conflicts with Greenhouse Gas Reduction Plans

As discussed under Impact CC-1 above for Alternative B, land subject to temporary crop idling is normally disked for weed control or planted with a cover crop, which is subsequently disked. Disk control and any other maintenance activities requiring fueled equipment would result in GHG emissions within the fallowed lands.

If the amount of land fallowed under Alternative B equals the amount of land currently being fallowed (3,200 acres), the amount of GHG emissions resulting from maintenance activity would not change. If less land was fallowed than in recent years, fewer GHG emissions would result compared with existing conditions as maintenance activity would be reduced. If the land fallowing was the maximum 20,000 acres evaluated under Alternative A, then additional GHG emissions from maintenance activities would occur but they would likely be less than what occurs with existing row crop production including planting, maintenance, and harvesting equipment requirements. Additional water developed for transfer under Alternative B would also come from conservation measures such as tailwater recapture, recovery of irretrievable losses, and reductions in operational spills from existing facilities such as lined canals, drip irrigation systems, and electric motors for tailwater. These conservation measures would result in indirect GHG emissions from the energy usage, but would be less emissive overall than traditional agricultural practices that would occur under existing conditions. GHG emissions generated under Alternative B would not have the potential to conflict with or be inconsistent with plans to reduce or mitigate GHGs. Proposed activities are not explicitly addressed in existing plans to reduce or mitigate GHGs; therefore, they would not be in conflict with or inconsistent with those plans as they would not preclude the attainment of the goals or objectives of applicable plans. Under CEQA, the impact from GHGs on reduction plans would be less than significant.

Alternative C: 130,000 Acre-Feet

Alternative C develops up to 130,000 acre-feet of water annually during any noncritical Exchange Contract year similar to the level of maximum transfer contemplated by the Exchange Contractors under the existing 10-Year (2005–2014) Water Transfer Program. Under this alternative, up to 80,000 acre-feet of water is developed through conservation, including tailwater recovery, and up to 50,000 acre-feet of water is developed through crop idling/temporary land fallowing. Any or all of the available water could be provided to the wildlife refuges, agriculture, and M&I users subject to the limitations identified in Sections 2.3.2 and the effects analysis in Section 3.3.

Impact CC-1: Increase in Greenhouse Gas Emissions

Assuming a transferable quantity of 2.5 acre-feet per acre, the maximum amount of land to be temporarily idled/fallowed is approximately 20,000 acres, 8.3 percent of the irrigable land (240,000 acres) in the Exchange Contractors' service area. The affected land would be rotated to avoid idling the same land in consecutive years. Land subject to temporary crop idling is normally disked for weed control or planted with a cover crop, which is subsequently disked. The Exchange Contractors, as well as member districts (CCID, SLCC, FCWD, and CCC) have implemented policies on land fallowing to conserve soil resources (Exchange Contractors 2004, 2005a, b, c; CCID 2007; SLCC 2009a, b; FCWD 2004; CCC 1993), as well as policies on conservation measures to maximize water availability and minimize drainage discharges from the service areas

(Exchange Contractors 2004, 2005a; FCWD 2004; CCC 1993). Disk control and any other maintenance activities requiring fueled equipment would result in GHG emissions within the fallowed lands.

If the amount of land fallowed under Alternative C equals the amount of land currently being fallowed (3,200 acres), the amount of GHG emissions resulting from maintenance activity would not change. If less land was fallowed than in recent years, fewer GHG emissions would result compared with existing conditions as maintenance activity would be reduced. If the land fallowing was the maximum 20,000 acres evaluated under Alternative A, then additional GHG emissions from maintenance activities would occur but they would likely be less than what occurs with existing row crop production including planting, maintenance, and harvesting equipment requirements, which are more energy intensive.

Up to 80,000 AFY of water available for transfer under Alternative C would also come from conservation measures such as tailwater recapture using electric pumps, recovery of irretrievable losses, and reductions in operational spills from existing facilities such as lined canals and drip irrigation systems. These conservation measures would result in indirect GHG emissions from the energy usage, but would be less emissive overall than traditional agricultural practices that would occur under existing conditions. Under CEQA, the impact from GHG emissions would be less than significant.

Long-term carbon sequestration from land fallowing would be negligible as any carbon sequestered during the fallowing period would be released each year when the land was transitioned back to traditional irrigated agricultural practices. Additionally, carbon sequestration potential would not differ substantially between vegetation retained or cover crop planted on fallowed land and new crops planted on irrigated land.

Impact CC –2: Conflicts with Greenhouse Gas Reduction Plans

As discussed under Impact CC-1 above for Alternative C, land subject to temporary crop idling is normally disked for weed control or planted with a cover crop, which is subsequently disked. Disk control and any other maintenance activities requiring fueled equipment would result in GHG emissions within the fallowed lands.

If the amount of land fallowed under Alternative C equals the amount of land currently being fallowed (3,200 acres), the amount of GHG emissions resulting from maintenance activity would not change. If less land was fallowed than in recent years, fewer GHG emissions would result compared with existing conditions as maintenance activity would be reduced. If the land fallowing was the maximum 20,000 acres evaluated under Alternative A, then additional GHG emissions from maintenance activities would occur but they would likely be less than what occurs with existing row crop production including planting, maintenance, and harvesting equipment requirements. Additional water available for transfer under Alternative C would also come from conservation measures such as tailwater recapture, recovery of irretrievable losses, and reductions in operational spills from existing facilities such as lined canals, drip irrigation systems, and electric motors for tailwater. These conservation measures would result in indirect GHG emissions from the energy usage, but would be less emissive overall than traditional agricultural practices that would occur under existing conditions. GHG emissions generated under Alternative C would not have the potential to conflict with or be inconsistent with plans to reduce or mitigate GHGs. Proposed activities are not explicitly addressed in existing plans to reduce or mitigate GHGs; therefore, they would not be in conflict with or inconsistent with those plans as they would not preclude the attainment of the goals or objectives of applicable plans. Under CEQA, the impact from GHGs on reduction plans would be less than significant.

Alternative D: 150,000 Acre-Feet

Alternative D expands upon Alternative C water of 130,000 acre-feet (from conservation and crop idling) with an additional 20,000 acre-feet from additional conservation measures not already considered in the other alternatives. These measures include the lining of canals and implementation of on-farm irrigation or district conveyance system improvements that would not have a hydrologic effect on the San Joaquin River. Alternative D represents the maximum water transfer by adding an additional increment of conservation water.

Some of the additional conservation measures would require the short term use of construction equipment for implementation, as well as long term use of energy for new measures. Short-term construction activity would include operation of equipment such as excavators, backhoes, dozers, graders, and trucks for canal lining, pipeline installation, regulating reservoirs, and canal automation structures. Long-term energy use would include electric motors for pressurizing new drip and sprinkler irrigation systems and for operating recirculation systems and regulating reservoirs. Overall, power use is expected to increase. However, following commencement of the regulating reservoirs and water delivery systems and the offset of reducing low lift return flows and pumping requirements, power use may be equal or only result in a negligible increase (Chedester, pers. comm., 2011).

Impact CC-1: Increase in Greenhouse Gas Emissions

Assuming a transferable quantity of 2.5 acre-feet per acre, the maximum amount of land to be temporarily idled/fallowed is approximately 20,000 acres, 8.3 percent of the irrigable land (240,000 acres) in the Exchange Contractors' service area. The affected land would be rotated to avoid idling the same land in consecutive years. Land subject to temporary crop idling is normally disked for weed control or planted with a cover crop, which is subsequently disked. The Exchange Contractors, as well as member districts (CCID, SLCC, FCWD, and CCC) have implemented policies on land fallowing to conserve soil resources (Exchange Contractors 2004, 2005a, b, c; CCID 2007; SLCC 2009a, b; FCWD 2004; CCC 1993), as well as policies on conservation measures to maximize water availability and minimize drainage discharges from the service areas (Exchange Contractors 2004, 2005a; FCWD 2004; CCC 1993). Disk control and any other maintenance activities requiring fueled equipment would result in GHG emissions within the fallowed lands.

If the amount of land fallowed under Alternative D equals the amount of land currently being fallowed (3,200 acres), the amount of GHG emissions resulting from maintenance activity would not change. If less land was fallowed than in recent years, fewer GHG emissions would result compared with existing conditions as maintenance activity would be reduced. If the land fallowing was the maximum 20,000 acres evaluated under Alternative A, then additional GHG emissions from maintenance activities would occur but they would likely be less than what occurs with existing row crop production including planting, maintenance, and harvesting equipment requirements. Water developed for transfer under Alternative D would also come from conservation measures such as tailwater recapture using electric pumps, recovery of irretrievable losses, and reductions in operational spills from existing facilities such as lined canals and drip irrigation systems. These conservation measures would result in indirect GHG emissions from the energy usage, but would be less emissive overall than traditional agricultural practices that would occur under existing conditions. If additional water conservation measures were required, GHGs would be generated directly from the use of short-term construction equipment and indirectly from the use of long-term electricity. However, as stated above, overall energy use is expected to decrease following implementation of infrastructure projects. Under CEQA, the impact from GHG emissions would be less than significant.

Long-term carbon sequestration from land fallowing would be negligible as any carbon sequestered during the fallowing period would be released each year when the land was transitioned back to traditional irrigated agricultural practices. Additionally, carbon sequestration potential would not differ substantially between vegetation retained or cover crop planted on fallowed land and new crops planted on irrigated land.

Impact CC-2: Conflicts with Greenhouse Gas Reduction Plans

As discussed under Impact CC-1 above for Alternative D, land subject to temporary crop idling is normally disked for weed control or planted with a cover crop, which is subsequently disked. Disk control and any other maintenance activities requiring fueled equipment would result in GHG emissions within the fallowed lands.

If the amount of land fallowed under Alternative D equals the amount of land currently being fallowed (3,200 acres), the amount of GHG emissions resulting from maintenance activity would not change. If less land was fallowed than in recent years, fewer GHG emissions would result compared with existing conditions as maintenance activity would be reduced. If the land fallowing was the maximum 20,000 acres evaluated under Alternative A, then additional GHG emissions from maintenance activities would occur but they would likely be less than what occurs with existing row crop production including planting, maintenance, and harvesting equipment requirements.

Water developed for transfer under Alternative D would also come from conservation measures such as tailwater recapture, recovery of irretrievable losses, and reductions in operational spills from existing facilities such as lined canals, drip irrigation systems, and electric motors for tailwater recapture. These conservation measures would result in indirect GHG emissions from the energy usage, but would be less emissive overall than traditional agricultural practices that would occur under existing conditions. If additional water conservation measures were implemented (new canal lining, irrigation system, and conveyance improvements), GHGs would be generated directly from the use of short-term construction equipment and indirectly from the use of long-term electricity. However, as stated above, overall energy use is expected to decrease following implementation of infrastructure projects. GHG emissions generated under Alternative D would not have the potential to conflict with or be inconsistent with plans to reduce or mitigate GHGs. Proposed activities are not explicitly addressed in existing plans to reduce or mitigate GHGs; therefore, they would not be in conflict with or inconsistent with those plans as they would not preclude the attainment of the goals or objectives of applicable plans. Under CEQA, the impact from GHGs on reduction plans would be less than significant.

12.2.3 Cumulative Effects

Scientific consensus concurs that global climate change will increase the frequency of heat extremes, heat waves, and heavy precipitation events. Currently accepted models predict that continued GHG emissions at or above current rates will induce more extreme climate changes during the 21st century than were observed during the 20th century. A warming of about 0.2°C per decade is projected. Even if the concentrations of all GHGs and aerosols are kept constant at year 2000 levels, a further warming of about 0.1°C per decade is expected. A faster temperature increase will lead to more dramatic, and more unpredictable, localized climate extremes. Other likely direct effects of global warming include an increase in the areas affected by drought, an increase in tropical cyclone activity and higher sea level, and the continued recession of polar ice caps. Already some identifiable signs exist that global warming is taking place. In addition to substantial ice loss in the Arctic, the top 7 warmest years since the 1890s have been after 1997 (IPCC 1990–2007).

The overall effect of global climate change will be of social and economic losses. The poor who do not have the resources to adapt to a change in climate would likely disproportionately shoulder these negative effects. Some of the main ecosystem changes anticipated are that biodiversity of terrestrial and freshwater ecosystems could be reduced and that the ranges of infectious diseases would likely increase.

Cumulative impacts can be assessed in a qualitative manner by determining if the Project, in conjunction with other projects in the vicinity, would have the potential to contribute to a long-term cumulative impact on climate change. Given that GHG emissions and climate change are global issues, a statewide framework or cumulative approach for consideration of environmental impacts may be most appropriate. Virtually every project in the state of California, as well as those outside the state, would have GHG emissions.

Program actions would generate some GHG emissions but would not conflict with present regulations. No potentially significant impact or adverse affect would occur as a result of the Proposed Program, and no mitigation is required. Even if mitigation were implemented, the Project would generate GHG emissions and incrementally contribute to climate change.

When Program emissions are viewed in combination with global emissions levels that are contributing to the existing cumulative impact on global climate change, the incremental contribution of the Program emissions would not be cumulatively considerable because they would be negligible compared to inventories (see Tables 12-1 and Table 12-2 above) Therefore, the Proposed Program would not have a cumulatively considerable impact on global climate change.

12.2.4 Impact and Mitigation Summary

The action alternatives do not result in significant changes over existing conditions. No significant impacts would occur to GHGs and climate under CEQA, so no mitigation is required.

Table 12-3 summarizes the impacts of the No Action/No Project Alternative and the action alternatives on GHG emissions and reduction plans. The existing conditions set the baseline against which the alternatives are evaluated for CEQA.

Table 12-3
Summary Comparison of Climate Change/Greenhouse Gases Impacts of Alternatives and Mitigation Measures

Environmental Concern		Alternative	Impact Before Mitigation	Mitigation Measures	Impact After Mitigation
CC-1	Increase in GHG emissions	No Action	LTS	not applicable	--
		A	LTS	not required	--
		B	LTS	not required	--
		C	LTS	not required	--
		D	LTS	not required	--
		Cumulative	N	not required	--
CC-2	Conflicts with GHG reduction plans	No Action	LTS	not applicable	--
		A	LTS	not required	--
		B	LTS	not required	--
		C	LTS	not required	--
		D	LTS	not required	--
		Cumulative	N	not required	--

CEQA:
N = no impact
LTS = less than significant
PS = potentially significant
PSU = potentially significant and unavoidable

13.0 Other Required Disclosures

This section addresses other potential effects as required by CEQA and/or NEPA: relationship between short-term uses and maintenance of long-term productivity, irreversible or irretrievable commitment of natural resources, unavoidable adverse impacts, and growth-inducing effects. These other effects focus on the water development actions but also address use of the transfer water as appropriate.

13.1 Relationship between Short-Term Uses and Maintenance of Long-Term Productivity

The relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity of the affected resources (identified below) for the four action alternatives (annual transfers of up to 50,000, 88,000, 130,000, and 150,000 acre-feet to one or more CVP/SWP contractors and/or Federal and state wildlife refuges) is described below. At issue is whether short-term effects are counterbalanced by long-term effects.

Short-term effects are associated with the potential for (1) water development sources to vary on an annual basis between conservation and temporary land fallowing components (for Alternatives B, C, and D)and (2) water users to change on an annual basis, e.g., refuges receiving water one year but possibly not the next or receiving substantially different quantities than before. These effects occur within a highly managed system of surface and groundwater resources, and they occur on an annual basis (short term) but potentially over a long period (25 years).

However, the maintenance of long-term resource productivity benefits of improved water quality on the San Joaquin River ecosystem, protection and enhancement of biological resources, efficient management of surface and groundwater resources, and/or maintenance of agricultural production in receiving areas outweigh short-term adverse effects on individual resources and the local economy. The productivity benefits for some resources may come at the expense of other resources (agricultural land fallowing versus wetland habitat enhancement). Because the proposed water transfers involve a range of water users, any of the uses (refuge enhancement, agricultural production, and/or limited M&I uses) could occur in any particular year and vary from one year to the next.

The short-term uses of water and their effects associated with the four action alternatives are addressed below by resource category.

13.1.1 Surface Water Resources

The potential for the water transfer to change on an annual basis, from how the water is developed and how it is used, results in a range of short-term impacts:

- Flows would decrease in the San Joaquin River upstream of the Stanislaus River confluence between 0 and 2 cfs depending upon the month of the year. After reaction to New Melones Reservoir operations, the flow at Vernalis would decrease between 0 and 4 cfs depending upon the month of the year and the year type. These potential changes in flow are small, if not-measureable, compared to existing and projected flow at Vernalis which is at a minimum during critical years of at least 900 cfs.
- Water quality changes at Vernalis trend with changes in flow at Vernalis. The water quality associated with the flows affected by temporary land fallowing is assumed to have the same water quality as tailwater recapture. Since this quality is worse than the melded water quality at Vernalis, the removal of runoff by the Exchange Contractors would improve water quality at Vernalis between 0 and 2 µmhos in a month. There are no short term impacts.
- The annual storage change in New Melones Reservoir could amount to a maximum decrease of less than 500 acre-feet. The monthly changes in releases are projected to be small (described as ranging from a monthly potential increase of 3 cfs to a decrease of 3 cfs), if not indiscernible within the operations of New Melones Reservoir. Therefore, these changes would cause no reductions in water supplies from New Melones.
- Changes in flow into the Delta due to fallowing could decrease the Delta water supply within a range of 350 to 525 acre-feet in noncritical years, to about 850 acre-feet in a critical year. Changes (decreases) to flow at Vernalis could cause a reduced allowable export at the CVP/SWP export facilities which could be a part of the overall Delta impact to the CVP/SWP. The reduced flow at Vernalis could affect allowable export by up to approximately 400 acre-feet depending upon year type. Although stated to have an effect by analysis, the removal of tailwater due to temporary land fallowing (described earlier as approximately up to 2 cfs in a month, equatable to about 100 acre-feet in a month) is small, if not practicably indiscernible within the hydrology and operation of the San Joaquin River and the Delta, where exports by the CVP/SWP have historically averaged over 5,000,000 AFY.
- Increases in consumptive use by agricultural and out-of-basin water users if water is used to increase productivity rather than to replace other sources, and by the wildlife refuges from expanded irrigation to produce food for wildlife

13.1.2 Groundwater Resources

Short-term effects from water development by the Exchange Contractors on groundwater inflows and outflows due to maximum temporary land fallowing would be an annual loss of 8,400 acre-feet. With additional conservation water development under Alternative D this reduction in deep percolation/groundwater recharge increases to 28,400 acre-feet. The greatest short-term impact occurs with water developed from new conservation (not tailwater recovery), followed by crop idling. However, the effects are less than significant under CEQA. The reduction in deep percolation reduces the migration of poor quality groundwater to the northeast. Other changes to groundwater quality are not significant under CEQA.

The reduction in applied water is not enough to substantially affect water quality in the upper part of the upper aquifer because of the size of the aquifer.

13.1.3 Biological Resources

The short-term impacts/effects on special-status species and wetlands are less than significant or minimal. They are related primarily to reductions in agricultural runoff to local sloughs and waterways and then the San Joaquin River. The maximum level of effect from this Alternative A would occur in the San Joaquin River and Mud Slough South, and Salt Slough in the vicinity of the Exchange Contractors' service area boundaries. This flow reduction of 0-2 cfs could be spread among all of these waterways, depending on the specific pattern of land fallowing. Based on the average flows in these waterways, even assuming all of the flow reduction occurred in a single waterway under median flow conditions, the reduction in flow would be a maximum of 19 percent of the average daily flow in August in the San Joaquin River upstream of the Salt Slough Confluence. Assuming an even division of flow between Mud and Salt sloughs, the largest reduction in flow would be 3 percent at the driest time of year (September) under the driest conditions (similar to year 2008). In actuality, this reduction in flows would be divided among these waterways, making the reduction in habitat even smaller.

13.1.4 Land Use and Agriculture

There are no short term impacts to land use and county general plans and policies. Lands that would be temporarily fallowed would not be converted to urban uses and the land would be "reserved" for future agricultural use, including irrigated agriculture in future years since land cannot be fallowed in consecutive years. Because the nature of agricultural production would shift temporarily, the farmland designation under the Farmland Mapping and Monitoring Program could shift to Farmland of Local Importance, another Important Farmland category, reflecting the change to nonirrigated farmland. However, due to the temporary nature of land fallowing on any one parcel, such a shift is unlikely. In summary, land subject to temporary crop idling would be maintained in a manner suitable for dryland farming in the short term and/or for irrigated agriculture in the long term, and no conversion of Important Farmland to nonagricultural uses would occur. The shift from irrigated agriculture on a temporary basis would be compatible with commercial agriculture in the long term. Accordingly, no conflict with the provisions of Williamson Act contracts or with county general plans would occur in the Exchange Contractors' service area.

13.1.5 Socioeconomics

The economic tradeoff between land fallowing and conservation water transfers is evident in the action alternatives. The greatest adverse effects on the regional economy occur in Alternative A where all transfers would be from land fallowing. When conservation transfers are considered in Alternatives B, C, and D, these adverse effects are offset partially. In summary, all of the action alternatives would result in adverse socioeconomic effects in the regional economy due primarily to increases in agricultural land fallowing when compared to existing conditions. Generally, the Proposed Program's potential socioeconomic impacts are considered minor or a "minimal effect" when evaluated relative to regional economic conditions. Furthermore, to the extent that the transfer water is used for agricultural purposes by other districts, the effects on the regional economy are further minimized.

13.1.6 Environmental Justice

Small short-term effects occur to the region and would be experienced by the Hispanic/Latino community if croplands are idled to develop the water and the transfer water is not used for agricultural production. Taking into consideration the racial and ethnic background of the four-county area and local agricultural workforce, which includes a relatively large Hispanic/Latino community, the region represents an environmental justice community of concern particularly due to the strong link between minority farm workers and the agricultural industry, which could be affected by changes in water transfers. All of the action alternatives would increase land fallowing (and reduce farm labor) and adversely affect the regional economy in the short term, which could have disproportionate effects on minority and/or low income populations. However, these adverse effects would be offset to some degree by the unrealized benefits associated with agricultural production in areas receiving the transfer and/or exchange water.

13.1.7 Indian Trust Assets

No short-term effects to Indian Trust Assets would occur.

13.1.8 Air Quality

For temporary land fallowing in the Exchange Contractors' service area, soil management practices to minimize dust would minimize the potential for air quality degradation in the San Joaquin Valley.

13.1.9 Climate Change/Greenhouse Gases

Land subject to temporary crop idling is normally disked which would result in GHG emissions. If the maximum land fallowing (20,000 acres) occurred, then additional GHG emissions from maintenance activities would result but they would likely be less than what occurs with existing row crop production including planting, maintenance, and harvesting equipment requirements. Short-term GHG emissions would not be significant.

13.2 Irreversible or Irretrievable Commitments of Natural Resources

Irreversible commitments are those that either directly or indirectly cause the use of natural resources so that they cannot be restored or returned to their original condition. Irreversible decisions affect renewable resources such as soils, wetlands, and waterfowl habitats. They are considered irreversible because their implementation would affect a resource that has deteriorated such that renewal takes extensive time or financial resources or because they would destroy the resource.

Irretrievable commitments of natural resources mean the decision would result in loss of production or use of the resource. They represent opportunities forgone for a substantial period of time that the resource cannot be used.

For all of the action alternatives, these potential irreversible and irretrievable effects are associated with consumptive use of water resources in the areas receiving the transfer and/or exchange water, which depends upon the ultimate water user. For the Exchange Contractors' development of water for transfer, consumptive use in the source area would decrease.

13.3 Unavoidable Adverse Effects

Unavoidable impacts/adverse effects are environmental consequences of an action that cannot be avoided, either by changing the nature of the action or through mitigation if the action is undertaken. None of the action alternatives' direct or indirect effects are unavoidable.

13.4 Growth-Inducing Effects

Growth-inducing effects fall under the category of potential indirect effects. Indirect effects occur later in time or farther away in distance but are still reasonably foreseeable. Growth-inducing projects remove obstacles to population growth or encourage and facilitate other activities that could stimulate future growth.

Sections 7.2 and 8.2 discuss the effects of the action alternatives on agricultural land use and the regional economy and employment. Changes in agricultural land use include up to approximately 20,000 acres of land with crop idling to develop the water, and all four alternatives include options for agriculture to use the water. None of the activities would result in agricultural land being converted to nonagricultural or urban use. The effects on income and employment are not substantial and, therefore, are not expected to stimulate demand for housing and local services.

Furthermore, all of the transfers to agricultural and M&I water users would not exceed their CVP and SWP contractual supplies. They would be transfers to alleviate shortages of CVP and SWP water. For agricultural water users, no new lands would be brought into production. The M&I purchasers of Exchange Contractors' transfer water would be SCVWD, EBMUD, CCWD, and PVWMA for CVP supplies; and SCVWD and KCWA for SWP supplies. Sales to these agencies would be limited to amounts listed in Table 2-2.

Even if multiyear agreements were to provide this water, it would not support new urban development or agricultural production beyond that considered in the agencies' needs assessment for their CVP and SWP contract supplies. It would not be used to meet unmet demands or to exceed contract supplies. Therefore, the transfers and/or exchanges would not be growth-inducing.

13.5 Environmentally Preferred/Superior Alternative

Based on information contained in this Draft EIS/EIR and comments received during the public review period, Reclamation and the Exchange Contractors will identify the environmentally preferred alternative for the Final EIS/EIR.

As reported in Section 2.7, Summary Comparison of Alternatives, no one alternative is clearly environmentally preferred or superior. Rather, the environmentally preferred alternative depends on the resource or environmental concern under evaluation for impacts and benefits. No Action/No Project avoids the impacts associated with land fallowing but does not have the benefits to some resources that would occur with some of the action alternatives.

- To the extent that water from conservation is relied upon, and temporary land fallowing is reduced, the minimal impacts/effects on surface water resources and aquatic habitat associated with Alternatives, A, B, C, and D are reduced.
- The reductions in groundwater recharge are highest under Alternative D and result in reductions in outflow of poor quality groundwater to the east which is a beneficial effect.
- For the action alternatives, the greatest adverse effects on the regional economy occur in Alternative A where all transfers would be from land fallowing which results in a decline in regional economic activity, with no offsetting economic benefits from conservation water transfers. When conservation transfers are considered in the other alternatives, these adverse effects from land fallowing are offset partially. In fact, the Program is expected to result in net overall benefits on the regional economy in Alternatives C and D, as measured by income and employment levels in the region.
- The No Action/No Project Alternative would result in an environmental justice benefit with agricultural land returning to production and an increase in the demand for farm labor once the existing transfer program is terminated. However, from the perspective of the regional economy, the No Action/No Project Alternative would generate adverse effects that could disproportionately affect minority and low-income populations in the region. Similarly, most of the action alternatives would have relatively higher levels of land fallowing (and reduced farm labor) compared to No Action/No Project, thereby adversely affecting the agricultural industry and likely resulting in disproportionately high and adverse economic effects on low income and minority populations. However, these adverse effects would be offset to some degree by the unrealized benefits associated with agricultural production in areas received the water transfer and/or exchange water.

14.0 Mitigation Monitoring and Reporting Program

14.1 Introduction

The requirement for a mitigation monitoring or reporting program is introduced in Section 15091 of Title 14, California Code of Regulations, Chapter 3, Guidelines for Implementation of the California Environmental Quality Act. This section directs the public agency approving or carrying out the proposed project (San Joaquin River Exchange Contractors Water Authority [Exchange Contractors]) to make specific written findings for each significant impact identified in the EIR. When making the required findings, the agency will also adopt a program for reporting on or monitoring the changes that it has either required in the project or made a condition of approval to avoid or substantially lessen significant environmental effects. These mitigation measures must be fully enforceable through permit conditions, agreements, or other measures.

Section 15097 was added to the CEQA Guidelines on October 23, 1998. It requires the public agency to adopt a program for monitoring or reporting on the revisions that it has required in the project and the measures it has imposed to mitigate or avoid significant environmental effects. Reporting or monitoring responsibilities may be delegated to another public agency or private entity. However, until mitigation measures have been completed, the lead agency (the Exchange Contractors) remains responsible for ensuring that implementation of the mitigation measures occurs in accordance with the program.

The Exchange Contractors may choose whether its program will monitor mitigation, report on mitigation, or both.

- Reporting generally consists of a written compliance review that is presented to the decision-making body or authorized staff person. A report may be required at various stages during project implementation or upon completion of the mitigation measure. It is suited to projects that have readily measurable or quantitative mitigation measures or that already involve regular review.
- Monitoring is generally an ongoing or periodic process of project oversight. It is suited to projects with complex mitigation measures that are expected to be implemented over a period of time.

This proposed mitigation program consists of a summary of impacts (Section 14.2) for the Proposed Water Transfer Program, Alternatives A through D for the Draft EIS/EIR, followed by a description of the mitigation program and principal mitigation monitoring activities (Section 14.3). The mitigation monitoring program for the Draft EIS/EIR is recommended to be a “reporting program” similar to the current reporting program on annual water transfers and covering other mitigation measures (if required). The implementation action required, the timing required for implementation, and the agency responsible for ensuring that the action occurs are discussed in Section 14.3. The compliance monitoring plan is outlined in Section 14.4, followed by other environmental commitments (carried forward from the environmental impact analyses) in Section 14.5.

14.2 Impact Summary

The EIS/EIR identifies no potentially significant impacts or adverse effects to physical and biological resources; all adverse effects are less than significant impacts. The EIS/EIR does identify substantial impacts to socioeconomic resources. Direct effects on crop production values, farm-level income, and district operating revenues have “ripple effects” throughout the regional economy. However, the economic analysis is focused on the Exchange Contractors’ water development activities and not the resulting economic benefits associated with water transferred to other lands receiving the water. These benefits would offset the adverse effects to some degree. The greatest adverse effects or impacts on the regional economy occur under Alternative A where all transfers would be from land fallowing and are not offset from water transfer sales which are the highest under Alternative D.

The hydrologic impact analyses look at the effects of water development by the Exchange Contractors on the San Joaquin River, New Melones Reservoir storage and deliveries, and Delta water supplies. There were only “no effects/impacts” or “less than significant impacts/minimal effects” on surface water resource from continuation of the Proposed Program with modifications from previous programs. There were no potentially significant impacts to water resources. However, the Exchange Contractors will continue to monitor both surface water and groundwater resources to avoid the development of substantial adverse effects.

14.3 Mitigation and Monitoring

The primary mechanism for monitoring groundwater resources is implementation of the Exchange Contractors’ *Updated AB 3030 Groundwater Management Plan* (KDSA 2008) which provides for conjunctive use of surface and groundwater to meet peak crop water demands during June, July, and August. Well pumpage in each district is measured annually and estimated for both upper and lower aquifers. Water-level elevation maps are prepared every 5 years with the upper aquifer map completed in Spring 2006. Water quality is evaluated from samples taken at least every 5 years from both aquifers (KDSA 2008). Even though transfers will not be through groundwater pumping, monitoring of groundwater will continue.

Monitoring of small effects to the San Joaquin River flows and surface water supplies to avoid substantial effects is proposed to continue using Reclamation’s transfer approval process. This annual accounting process evaluates if any actual water supply impacts occurred from the current water transfer and through mutual agreement determines if any limitations on the sources of water developed by the Exchange Contractors as well as any limitations on the disposition of water by the parties to whom the transfer is made in a subsequent year. The requirements of the transfer approval process will continue to provide for three objectives:

- No significant impact to the CVP as a whole
- No significant impact to the Federal investment in the CVP
- No significant impact to the affected environment

Reclamation is responsible, through the transfer approval process, for ensuring that the transfer is consistent with the transfer requirements, the mitigation requirements, and any applicable monitoring requirements.

14.3.1 Mitigation Responsibilities

The Exchange Contractors will be responsible for mitigation of impacts caused by the manner in which water is made available for transfer, to the extent such impacts are identified through the AB 3030 Plan requirements and the analysis and transfer approval process described herein. The United States and the refuge entities (Service, CDFG, Grasslands Water District, pursuant to their water supply contracts with Reclamation) will be responsible for mitigation of impacts caused by the use and management of water on the wildlife areas. Reclamation expects that operations of New Melones in accordance with the 2009 BO and Interim Plan for Operation (Reclamation 1997b), and future BOs and operations plans will make any additional mitigation unnecessary. However, the refuges will still be subject to applicable requirements to address water quality impacts from use of water on the refuges pursuant to their water supply contracts with Reclamation, and their obligations under the San Joaquin River Salinity Management Plan, State Water Resources Control Board discharge requirements, or other applicable requirements. Transfers to CVP and SWP agriculture and M&I contractors will not result in deliveries of water in excess of full contract amounts, and therefore, adverse impacts are not anticipated beyond those identified and analyzed in long-term contract renewal and interim renewal environmental documentation.

14.3.2 Previous Transfer Monitoring

The previous 5-Year and the existing 10-Year Water Transfer Programs have not identified significant impacts to the San Joaquin River. The hydrologic analysis performed in 1999 and used each year was based on different refuge operational assumptions and hydrology assumptions. Since that time, the San Joaquin River hydrology and refuge models have been updated and new information, assumptions and revised models were used for the Draft EIS/EIR for the proposed program for 2005 to 2014. In addition to analysis, the 2000–2004 transfer approval process included several measures to address adverse impacts to the CVP and other legal users of water if they were to occur. These measures are the basis of the mitigation program for the existing 2005–2014 Program.

As reported in Appendix B (Section 2.1.2), a hydrologic analysis of the transfers upon San Joaquin River hydrology and CVP water supply has varied from year to year as a consequence of the components used to develop the transfer water, the volume developed, the pattern of development, the disposition of the water, and the hydrologic and operational state of the San Joaquin River and Sacramento-San Joaquin River Delta. After each year, a post-assessment of the transfer occurs. Analysis of the potential effects of the transfers involves estimating the linkage between the past year's development of transfer water (e.g., tailwater recapture) and San Joaquin River hydrology. It was concluded in previous analysis that tailwater recapture is the primary component that could directly affect San Joaquin River hydrology. It is assumed that a portion of temporary land fallowing could affect San Joaquin River hydrology to a minor extent.

In summary, the year-by-year transfer approval process with Reclamation addresses the previous year's potential effect on CVP supplies and New Melones Reservoir operation, and to date no net water supply impact has occurred (Appendix B, Section 2.1.2). This year-by-year process of accounting of the previous year's actions ensures that even if there are new requirements to address within CVP operations based on future Biological Opinions and other system changes, that the Proposed 25-Year Water Transfer Program for 2014-2038 can be adaptively managed to avoid impacts.

14.3.3 Proposed Transfer Program Mitigation/ Monitoring Process

The following mitigation measures and monitoring procedures were implemented for the 2005–2014 Water Transfer Program and are proposed to continue for the 2014–2038 Program by the Exchange Contractors.

1. Although not precluding the establishment of multi-year transfers, the amount of and methods of a transfer from the Exchange Contractors will be reviewed by Reclamation on an annual basis. At the beginning of each calendar year (February–March), the Exchange Contractors will prepare a "pre-forecast" of the upcoming water transfer to identify the size of the upcoming transfer and any possible concerns based on known hydrology at that point for the water year. This pre-forecast is submitted to Reclamation. The quantity, sources (tailwater recovery, conservation, crop idling/land fallowing), and recipients of the transfer water will be identified in each year's proposed transfer. The effect of the transfer will be estimated based upon an analysis of: (a) the current year's hydrologic forecast, and (b) the current year's CVP operations plan, including, if necessary, a forward-looking forecast of exports and reservoir storage operations.

2. After the completion of the transfers, the Exchange Contractors will prepare a "post-transfer" analysis that incorporates the transfers and the recorded hydrology to estimate the transfer's effects upon New Melones Reservoir and the Delta. The analyses will extend from the current calendar year through February of the following year.

3. For each year of transfer, a mutual agreement will be reached by Reclamation and the Exchange Contractors as to the quantity, sources, and recipients of the transfer water and the methods and timing of developing and delivering the transfer water. Reclamation will review and approve the analysis on the calculation of the impact, if any.

4. If, based on the post-transfer analysis, Reclamation determines that a significant impact to the usable Delta water supply has occurred that is not likely to be reversed or compensated for by hydrologic conditions, then the CVP will make the SWP whole through a mutually agreed-upon accounting protocol consistent with the Coordinated Operations Agreement.

5. If effects not anticipated result from the water development action of the Exchange Contractors as determined by the immediate post transfer analysis, the Exchange Contractors will implement appropriate mitigation measures including future year annual adjustments. Because the extent of any significant effect resulting from water development may not be known in the year of the transfer, the Exchange Contractors will not be responsible for mitigation of impacts to the CVP/SWP, including impacts, if any, to carryover storage, in the year of the transfer. However, mitigation measures for impacts to New Melones Reservoir, or other CVP water supply operations, including upstream carryover storage, will be resolved during the transfer review process in the following year, or in the subsequent year in which the effects are identified and measured. The focus will be the recent transfer year under review and the adjustment to be considered will only include adjustments to future transfers.

6. The Exchange Contractors and Reclamation believe that, except for extraordinary conditions, no significant adverse impacts on carryover storage in New Melones Reservoir are likely. However, adverse impacts may occur to upstream storage (Shasta and Folsom) during the period of transfer. The annual transfer review requirements will identify those impacts and will include measures as described above to reduce those impacts on the CVP to a less-than-significant level from future transfers.

7. If Incremental Level 4 deliveries exacerbate water quality conditions in the San Joaquin River to the point of triggering a water quality release from New Melones Reservoir, Reclamation and/or the refuges will mitigate such impacts through refuge management practices or other mechanisms available to Reclamation and the refuge management agencies, such as reservation of Incremental Level 4 acquisitions for dilution purposes, provided, however, that the Exchange Contractors will not be required to provide mitigation water because of these conditions.

The compliance monitoring plan for the 25-Year Water Transfer Program would be based on the format of reports currently submitted on an annual basis and is discussed in the following section.

14.4 Compliance Monitoring Plan

The compliance monitoring plan for the 25-Year Water Transfer Program would be based on the reports currently submitted on an annual basis. The Exchange Contractors submit annual reports to Reclamation prior to the annual transfer and after the transfer is quantified. At the beginning of each calendar year (February–March), the Exchange Contractors prepare a “pre-forecast” of the upcoming water transfer to identify the size of the upcoming transfer and any possible concerns based on known hydrology at that point for the water year. This pre-forecast is submitted to Reclamation (Central Valley Project Operations and Mid-Pacific Regional Office). Shortly after the completion of the transfer in a year, the Exchange Contractors prepare a post-transfer analysis that incorporates the transfer and the actual hydrologic occurrences of the year to determine the specific changes in hydrology and impacts to New Melones Reservoir and the Delta. The post-transfer analysis extends from the current calendar year of the transfer through February of the following year. Any impact issues with respect to CVP operations that would need to be addressed (and how they would be addressed) are identified and resolved.

The post-transfer analysis is an accounting of the actual transfer and its impacts to flows and water supply. It has been implemented for the 1999–2004 transfers and the 2005–2013 transfers, and would continue for the proposed 2014–2038 transfers.

14.5 Other Mitigation and Environmental Commitments

Environmental commitments that will be carried out as part of the implementation of the Proposed Program/preferred alternative are identified above in Section 14.3.3.

In addition, the Exchange Contractors will continue to manage groundwater pumping in accordance with their AB 3030 plans to result in no net long-term depletion of groundwater over the 25-year life of the Proposed Water Transfer Program. Past groundwater management has been effective, so impacts to groundwater supply from expanded conservation actions are not significant and benefit groundwater quality through reductions in outflow of poor quality groundwater.

15.0 Compliance Requirements

The alternatives under consideration would be subject to a variety of regulatory compliance actions that are in place to safeguard the environment. Table 15-1 provides a quick reference to the regulatory compliance actions that may apply to each of the alternatives. Many of the regulatory compliance actions would require Reclamation, the Exchange Contractors, or water purchaser to obtain the applicable approvals, or ensure that they are obtained.

Table 15-1
Federal, State, and Local Compliance Actions, Legislation, Requirements, Regulations, Permits, Licenses, and Approvals That May Be Necessary for the Exchange Contractors' 25-Year Water Transfer Program

Compliance Action	Regulatory Agency
Environmental Compliance Regulations	
California Environmental Quality Act	State
National Environmental Policy Act	Federal
Biological Resource Legislation and Requirements	
Fish and Wildlife Coordination Act	Federal, State
Migratory Bird Treaty Act	Federal
Federal Endangered Species Act	Federal
California Endangered Species Act	State
Magnuson-Stevens Fishery Conservation and Management Act	Federal
Executive Order 11990 (Protection of Wetlands)	Federal
Hydrology-Related Requirements, Permits, and/or Approvals	
Surface Water Rights and Compliance	State
Groundwater Rights and Management and Compliance	Federal, State, Local
Bureau of Reclamation's Interim Guidelines for Implementation of Water Transfers Under Title XXXIV of Public Law 102-575	Federal
Delta Protection Act of 1959	State
Anti-Degradation Policy	State
San Joaquin River Settlement Act, PL 111-11	Federal
Land Use Requirements and Regional, County, and Local Requirements, Permits, and/or Approvals	
California County Permits	Local
State, Areawide, and Local Plan and Program Consistency	State, Local
Coordination with related Federal, State, and Local Programs	Federal, State, Local
Additional Environmental Legislation and Requirements	
Federal Water Project Recreation Act	Federal
Executive Order 12898 (Environmental Justice)	Federal
Indian Trust Assets	Federal
Executive Order 13007 (Indian Sacred Sites on Federal Land)	Federal
American Indian Religious Freedom Act	Federal
Farmland Protection Policy Act and Farmland Preservation	Federal
Federal Agricultural Improvement and Reform Act of 1996 and 1985 Food Security Act	Federal

The following sections describe the regulatory compliance actions identified in Table 15-1 in greater detail.

15.1 Environmental Compliance Regulations

CEQA and NEPA apply to actions that a state or Federal agency may undertake directly, approve by issuing a permit or other authorization, or fund wholly or in part. CEQA requires the preparation on an EIR for major state and local actions significantly affecting the quality of the physical and social environment. The NEPA requirements are similar to the CEQA requirements in that they require an EIS be prepared for all major Federal actions with significant environmental effects. The CEQA regulations encourage the preparation of joint environmental documents to reduce duplication of analysis and paperwork. Both CEQA and NEPA require that an agency considers the environmental effects of its actions at the earliest point in time in which the analysis is meaningful. CEQA and NEPA are intended to inform decision makers and the public of the environmental consequences of the proposed action, provide an analysis of alternatives, and ensure consideration of mitigation options. Under both statutes, the environmental documentation and analysis are circulated for public review and comment before a final document is completed and before a decision is made to approve the proposed action or other alternative. A combined EIS/EIR has been prepared with Reclamation as the lead agency under NEPA and the Exchange Contractors as the lead agency under CEQA.

- **CEQA Compliance:** The Draft EIR document has been written to facilitate state and local agencies using the document to meet their CEQA obligations.
- **NEPA Compliance:** The Draft EIS document is being circulated for public review. Following the Final EIS and signature of the ROD, Reclamation will have fully complied with NEPA.

15.2 Biological Resource Legislation and Requirements

Both the state and Federal governments have enacted biological resource legislation and requirements to ensure that projects do not needlessly harm these resources. The major biological resource legislation's applicable to the alternatives under consideration are discussed below.

15.2.1 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act, as amended, provides an opportunity for the "appropriate wildlife agencies" (the Service or NMFS [now NOAA Fisheries]) to consult on Federal water development projects or on non-Federal projects that require a Federal permit or license. The agencies are provided the opportunity to conduct surveys and investigations to determine the potential damage to fish and wildlife resources with project implementation and to identify the mitigation measures that should be undertaken. The findings are incorporated into an official Section 2(b) report.

Similarly, Sections 13450 et seq. of the California Fish and Game Code provide opportunities for CDFG to report its recommendations for wildlife conservation and development, indicate the expected results, and describe the damage to wildlife attributable to the project and the measures proposed for mitigating or compensating for these damages. These provisions, however, do not apply to fish in irrigation canals or works, or to mammals destroyed or birds killed while damaging crops.

Compliance: The Service, NOAA Fisheries, and CDFG will have an opportunity to provide input through public scoping, review of the EIS/EIR and consultations directly with the lead agencies. See Sections 16.1 and 16.2.

15.2.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 (16 USC 703–711) provides protection to migratory birds whose welfare is a Federal responsibility. This act makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 CFR Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR 21). Disturbance that causes nest abandonment and/or loss of reproductive effort (e.g., killing or abandonment of eggs or young) may be considered a “take” and is potentially punishable by fines and/or imprisonment.

Compliance: Water that would be transferred to wetlands and wildlife refuges would benefit migratory birds by providing additional habitat.

15.2.3 Federal Endangered Species Act

ESA, as amended (16 USC 1536), establishes a national program for the conservation of threatened and endangered species of fish, wildlife, and plants and the preservation of the ecosystems upon which they depend. ESA Section 7(a)(2) requires Federal agencies to consult with the Service and/or NOAA Fisheries on any activities that may affect any species listed as threatened or endangered. These potential effects require initiation of the Section 7 consultation process.

Compliance: A list of Federal and state threatened, endangered, proposed, candidate, rare, species of concern, and/or species of special concern that may occur in the Exchange Contractors’ service area has been requested from the Service and NOAA Fisheries. Preliminary lists have been prepared for inclusion in this EIS/EIR as Appendix E. Pursuant to ESA Section 7, information that is normally included in a Biological Assessment addressing potential adverse effects on listed and proposed species has been incorporated into this EIS/EIR. Based on Reclamation’s effects determination, formal consultation with the Service and NOAA Fisheries may be requested in compliance with Section 7.

15.2.4 California Endangered Species Act

California ESA is similar to Federal ESA. CDFG’s implementation of California ESA has created a program that is similar in structure to, but different in detail from, the Service program implementing Federal ESA.

Compliance: A list of state threatened, endangered, proposed, candidate, rare, species of concern, and/or species of special concern that may occur in the project area is included in this EIS/EIR as Appendix E. Review of this list will be requested from CDFG. Information addressing potential impacts on listed and proposed species has been incorporated into this EIS/EIR, as appropriate, which has been provided to CDFG for their analysis and comment.

15.2.5 Magnuson-Stevens Fishery Conservation and Management Act

This act requires all Federal agencies to consult with NOAA Fisheries on all actions or proposed actions, permitted, funded, or undertaken by an agency, that may adversely affect essential fish habitat (EFH), defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Only species managed under a Federal fishery management plan are covered. Species for which this act applies are Sacramento River winter-run salmon, Central Valley spring-run salmon, Central Valley fall/late fall-run salmon, and Central Valley steelhead. Consultation generally requires that an EFH Assessment be prepared and submitted to NOAA Fisheries. Information that is normally included in an EFH Assessment may be incorporated into the NEPA document.

Compliance: This act does not apply to the San Joaquin River upstream of the Merced River. None of the action alternatives would affect the species subject to this act.

15.2.6 Executive Order 11990 (Protection of Wetlands)

EO 11990 (Protection of Wetlands) requires Federal agencies to take actions to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands when undertaking Federal activities and programs. Any agency considering a proposal that might affect wetlands must evaluate factors affecting wetland quality and survival. These factors should include the proposal's effects on the public health, safety, and welfare due to modifications in water supply and water quality; maintenance of natural ecosystems and conservation of flora and fauna; and other recreational, scientific, and cultural uses.

Compliance: Water that would be transferred to wetlands and wildlife refuges would benefit wetland resources. Because no changes would occur in water supply to the wildlife refuges, no effect on wetlands would occur at the refuges. No direct effects to wetlands would occur from water development. The effect to wetlands and aquatic habitat on the San Joaquin River or its tributaries from a small decrease in agricultural return flows is minimal. This flow reduction of 3-9 cfs would be spread among all of these water ways, depending on the specific pattern of land fallowing.

15.3 Hydrology-Related Requirements, Permits, and/or Approvals

15.3.1 Surface Water Rights and Compliance

Applies to all projects that involve any change to surface water rights and/or existing diversions, and no changes to existing water rights, for the CVP, including authorized points of diversion or rediversion, places of use, or purposes of use, would be needed under existing permit terms and conditions, current State Board practices and regulations, and existing provisions of the California Water Code.

15.3.2 Groundwater Rights and Management and Compliance

Actions may be subject to a county ordinance, approval by a local agency or district, or the terms of judicial adjudication, if they involve (1) the use, replenishment, transfer, or sale of groundwater; (2) the use of a groundwater basin for storage; or (3) the construction, abandonment, or destruction of a well. See Section 15.4.1 for a discussion of Fresno County's MOU with the Exchange Contractors.

Compliance: The Proposed Program does not include a groundwater substitution component. All groundwater management within the Exchange Contractors' service area is subject to AB 3030 (Costa), the Groundwater Management Act of 1992. The Exchange Contractors have an updated AB 3030 Plan that manages all groundwater pumping based on annual conditions. In this manner, conservation proposed under the Program that could affect groundwater recharge to a measurable extent would be managed according to this Plan (KDSA 2008). However, there is the potential for an adverse effect on groundwater recharge from the land fallowing and some conservation measures (excluding tailwater recovery).

15.3.3 Bureau of Reclamation's Interim Guidelines for Implementation of Water Transfers under Title XXXIV of Public Law 102-575 (Water Transfer)

Reclamation's *Interim Guidelines for Implementation of Water Transfers Under Title XXXIV of Public Law 102-575* (Water Transfer) address all water transfers equitably, to provide for a more efficient and effective use of the water supply developed by the CVP and to provide greater flexibility to water users in transferring water developed by the CVP. Section 3405(a) of Public Law 102-575 authorizes all individuals or districts who receive CVP water under water service or repayment contracts, water rights settlement contracts, or exchange contracts to transfer, subject to certain conditions, all or a portion of the water subject to such contracts to any California water user or agency, state or Federal agency, Indian tribe, or private nonprofit organization for CVP purposes or any purpose recognized as beneficial under state law (Reclamation 1993).

Compliance: All transfers implemented in accordance with Section 3405(a) will be deemed to be a beneficial use of water for purposes of Section 8 of the Reclamation Act of 1902 (32 Stat. 390; 43 USC 372). In addition, all transfers implemented in accordance with Section 3405(a) will be consistent with state law. Long-term transfers will also be subject to all subsequent state laws enacted during the period of the transfer. Long-term transfers will be those transfers for a period or periods of more than one year with the maximum period being limited by the term of the CVP contract under which the transfer is being made (Reclamation 1993).

15.3.4 Delta Protection Act of 1959

The Delta Protection Act of 1959 requires adequate water supplies for multiple uses (for example, agriculture, industry, urban, and recreation) within the Delta and for export.

Various water quality and flow objectives have been established by the State Board and the Regional Board since the passing of this act.

Compliance: Water supply impacts to the Delta (measured at Vernalis on the San Joaquin River) would be insignificant. Changes in flow into the Delta, due to land fallowing and subsequent reductions in return flows, could decrease the Delta water supply within a range of 1,350 to 1,850 acre-feet in noncritical years to about 3,050 acre-feet in a critical year (Section 4.4.2). Modeling results show the removal of tailwater from maximum amount of land fallowing to be up to 9 cfs or 500 acre-feet in a month. When compared to historical exports by the CVP/SWP that have averaged over 5,000,000 AFY, this small effect results in no adverse effect on CVP/SWP supplies. For monitoring of even small effects to flow and the water supplies, see measures contained in the transfer approval process (see Section 14).

15.3.5 Anti-Degradation Policy

The State Board's Resolution 68-16 (commonly referred to as the State Board's Anti-Degradation Policy) requires the State Board to regulate all "activities and factors which may affect the quality of the waters of the state" such that they "attain the highest water quality which is reasonable." The policy further states the project must meet the specific requirement that it be "consistent with the maximum benefit to the people of the state, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies."

Compliance: Water quality issues for surface water deal with slight improvement to water quality in the San Joaquin River from the removal of tailwater due to increased land fallowing. For groundwater, the blending of recaptured tailwater with surface water supplies for irrigation within the Exchange Contractors' service area is of better quality than blending with available groundwater supplies. Reductions in outflows of poor quality groundwater are also an improvement over existing conditions.

15.4 Land Use Requirements and Regional, County, and Local Requirements, Permits, and/or Approvals

Both the Federal and state governments have enacted land use and regional, county, and local legislation and requirements to ensure that projects do not needlessly harm the environment. These major requirements are discussed below.

15.4.1 County Regulatory Compliance

Local regulatory compliance would include actions that involve Williamson Act compliance. The Williamson Act program enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use. The minimum term for contracts is 10 years, but the contract automatically renews on each anniversary date of the contract. Landowners receive reduced property tax assessments in return for enrollment under Williamson Act contract.

Fresno County and the Exchange Contractors and its member agencies have an MOU that exempts the Exchange Contractors from regulation of groundwater resources within Fresno County. Fresno County and the Exchange Contractors agree that agricultural production is vital to the county and that groundwater, used conjunctively with surface water, is essential for continued agricultural production. The MOU specifically exempts the Exchange Contractors from the newly adopted Title 14, Chapter 3 of the Fresno County Ordinance Code, in accordance with Section 14.03.05E. Fresno County recognizes that the Exchange Contractors' management, protection, and control of groundwater resources are consistent with Title 14, Chapter 3; therefore, the MOU exempts the Exchange Contractors from this code requirement (Fresno County and Exchange Contractors 2001).

15.4.2 State, Areawide, and Local Plan and Program Consistency

Agencies must consider the consistency of a proposed action with approved state and local plans and laws. Given the extremely large number of state and local jurisdictions within the study area, not all of the individual plans and laws were reviewed. In accordance with EO 12372, the environmental documents are being prepared with input from the Cooperating Agencies and Consulting Agencies. During the NEPA and CEQA review periods, the environmental documents will be circulated to the appropriate state agencies and to the state Clearinghouse to satisfy review and consultation requirements.

15.4.3 Coordination with Related Federal, State, and Local Programs

Reclamation will conduct a formal coordination process to identify other programs that could significantly affect the assumptions, implementation, or effectiveness of the proposed project. Programs may include the following:

- The Westside Integrated Resources Plan
- Various CVP yield improvement studies
- Land retirement studies and implementation
- San Luis Drainage Feature Re-evaluation Drainage Program implementation
- Grassland Bypass Project and related studies
- All components of the San Joaquin River Restoration Program, as described in the San Joaquin River Settlement Act and related Stipulation for Settlement, including but not limited to Restoration Flow releases and measures taken for the protection, recirculation, and recapture of Restoration Flows.

15.5 Additional Environmental Legislation and Requirements

During the NEPA and CEQA environmental documentation process, the following additional environmental legislation and/or requirements are addressed.

15.5.1 Federal Water Project Recreation Act

Section 4(f) of the Federal Water Project Recreation Act establishes requirements applicable to water resource projects affecting Section 4(f) lands. Under this act, a Federal agency may not assist the construction of a water resources project that would have a direct and adverse effect on Section 4(f) lands. If the project would affect these lands or unreasonably diminish the scenic, recreational, and fish and wildlife values present in the area, such activities should be undertaken in a manner that would minimize adverse effects and should be developed in consultation with the appropriate Federal agency having administrative responsibility (e.g., National Park Service).

Compliance: Transfer of water to wetland areas and wildlife refuges would encourage wildlife use and could provide recreational value, which would be in compliance with this act.

15.5.2 Executive Order 12898 (Environmental Justice)

EO 12898 requires each Federal agency to achieve environmental justice as part of its mission, by identifying and addressing disproportionately high and adverse human health or environmental effects, including social and economic effects, of its programs, policies, and activities on minority populations and low-income populations of the United States.

Compliance: No significant adverse effects would occur to environmental justice from the action alternatives because socioeconomic effects are not substantial under CEQA. Adverse effects under NEPA may be partially offset by use of the transfer water within the affected four-county study area or other water receiving areas.

15.5.3 Indian Trust Assets

The United States Government's trust responsibility for Indian resources requires Reclamation and other agencies to take measures to protect and maintain trust resources. These responsibilities include taking reasonable actions to preserve and restore tribal resources. ITAs are legal interests in property and rights held in trust by the United States for Indian tribes or individuals. Indian reservations, Rancherias, and allotments are common ITAs.

Compliance: No ITAs are located in the districts that would supply the transfer water. All of the alternatives would be in compliance with this legislation.

15.5.4 Executive Order 13007 (Indian Sacred Sites on Federal Land)

EO 13007 provides that in managing Federal lands, each Federal agency with statutory or administrative responsibility for management of Federal lands will, to the extent practicable and as permitted by law, accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and avoid adversely affecting the physical integrity of such sacred sites.

Compliance: Federal lands are not involved in the Proposed Water Transfer Program.

15.5.5 American Indian Religious Freedom Act

The American Indian Religious Freedom Act applies to all actions that are located on Federal land, sponsored by a Federal agency, or funded with Federal monies; and that could involve adverse effects on the observance of traditional Native American religions.

Compliance: The alternatives would not involve adverse effects on the observance of traditional Native American religions.

15.5.6 Farmland Protection Policy Act and Farmland Preservation

Two policies require Federal agencies to include assessments of the potential effects of a project on prime and unique farmland. These policies are the Farmland Protection Policy Act of 1981, and the Memoranda on Farmland Preservation, dated August 30, 1976, and August 11, 1980, respectively, from the CEQ. Under requirements set forth in these policies, Federal agencies must determine these effects before taking any action that could result in converting designated prime or unique farmland for nonagricultural purposes. If implementing a project would adversely affect farmland preservation, the agencies must consider alternatives to lessen those effects. Federal agencies also must ensure that their programs, to the extent practicable, are compatible with state, local, and private programs to protect farmland. The Natural Resources Conservation Service is the Federal agency responsible for ensuring that these laws and policies are followed.

Compliance: The temporary idling of up to 16,800 additional acres of land would not significantly affect prime and unique farmland.

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16.0 Consultation and Coordination

This section reviews agency consultation and coordination performed by Reclamation and the Exchange Contractors that occurred prior to and during preparation of this Draft EIS/EIR.

16.1 Federal Agencies Coordination

Federal agencies were involved with Reclamation and the Exchange Contractors in the development of this EIS/EIR through specific consultations. This section explains how these consultations occurred and the agencies involved. NEPA requires that Reclamation consult with Federal cooperating agencies. For the Proposed 25-Year Water Transfer Program for the San Joaquin River Exchange Contractors Water Authority, 2014-2038, the cooperating Federal agency is the Service. In addition, written comments to the Notice of Preparation were received from EPA Region IX, and the National Park Service Partnerships Program.

16.1.1 Fish and Wildlife/Endangered Species Coordination

U.S. Fish and Wildlife Service

ESA Section 7(a)(2) requires Federal agencies to consult with the Service and/or NOAA Fisheries on any activities that may affect any Federally listed or proposed species. If potential effects to listed or proposed species or their designated critical habitat are identified, these effects will require the initiation of the Section 7 process.

Reclamation and the Service have met to initiate informal consultation for this Proposed Water Transfer Program, initially on August 25, 2011, and then again on September 12, 2011, January 18, 2012, and March 13, 2012. The Service will be providing information regarding the presence of any Federally listed or proposed species and critical habitat that may occur with the action area. Environmental concerns listed in their response to public scoping for the EIS/EIR were discussed at these meetings along with information on the Proposed Program compared to previous transfer programs. The preferred alternative is to be identified as the Final EIS/EIR is being completed, and Reclamation will complete the appropriate level of ESA compliance with the Service and NOAA Fisheries.

The Service and NOAA Fisheries have been provided copies of the Draft EIS/EIR for review and comment, and responses will be included in the Final EIS/EIR and ROD. Any necessary consultation will be completed prior to the signing of the ROD.

16.2 State Agencies Coordination

State and local agencies were involved with Reclamation and the Exchange Contractors in the development of this Draft EIS/EIR through specific consultations. This section explains how these consultations occurred and the agencies that were involved. For the Water Transfer Program for the San Joaquin River Exchange Contractors Water Authority, 2014-2038, responsible State agencies are CDFG and DWR.

CEQA requires that the Lead Agency must formally consult with responsible and trustee agencies, and this coordination was initiated with a Notice of Preparation of an EIS/EIR sent directly to several State agencies. The State Clearinghouse distributed the Notice of Preparation to state responsible and trustee agencies as well (SCH# 2011061057). Three State agencies commented during the public scoping period, June 16 through July 15, 2011, under CEQA and July 6 through August 10, 2011, under NEPA.

The primary tool for state agency coordination is the preparation of a Draft EIS/EIR for review by state agencies coordinated through the State Clearinghouse. Section 15.4 lists all agencies and individuals receiving the document directly from the Exchange Contractors; however, additional state agencies such as the Department of Food and Agriculture received a copy from the State Clearinghouse.

16.2.1 California Department of Fish and Game

CDFG will be consulted during the review of the EIS/EIR. CDFG biologists will be consulted pursuant to the California ESA.

16.2.2 California Department of Water Resources

Consultations with DWR have focused on environmental analysis needed to facilitate future water transfers involving SWP facilities. These will require additional consultations with DWR by the potential water user/transferee. Arrangements with DWR for transfers and exchanges involving SWP facilities are the responsibility of the individual district acquiring water from the Exchange Contractors.

16.3 Public Involvement/Public Scoping Meeting

The public involvement process began June 15, 2011, with the issuance of a Notice of Preparation of a Joint EIS/EIR on the 25-Year Water Transfer Program for the San Joaquin River Exchange Contractors Water Authority, 2014-2038. A Notice of Intent was published on July 6, 2011, in the *Federal Register*. The notices announced one public scoping meeting for July 13, 2011, and requested that comments on the content of the EIS/EIR be submitted by August 10, 2011. Comments addressed the following concerns: project description, water quality/hydraulics/water supply, groundwater, biological resources, economics, agricultural land use, and cumulative impacts. Comments were received from the following organizations: Service, EPA, National Park Service, State Department of Transportation, Native American Heritage Commission, State Board, Central Delta Water Agency, Friant Water Authority, South Delta Water Agency, Stanislaus County, and San Joaquin Tributaries Association.

16.4 Distribution List

The list of agencies, organizations, and individuals that were mailed a copy of the Notice of Preparation and/or a Notice of Availability of a Draft EIS/EIR is provided below and on the following pages.

Al Vargas
California Dept. of Water Resources
IRWM Division
901 P Street
Sacramento, CA 95814

Alan Weaver
Fresno County Dept. of Public Works and Planning
2220 Tulare Street
Fresno, CA 93721

Albert Lopez
Alameda County
Planning Director
224 W. Winton, Room 111
Hayward, CA 94544

Alex Hildebrand
South Delta Water Agency
23442 South Hays Road
Manteca, CA 95336

Alicia Forsythe
U.S. Bureau of Reclamation
SJRRP
2800 Cottage Way, MP-170
Sacramento, CA 95825-1898

Allan D. Inman
Merced County Mosquito Abatement District
PO Box 909
Merced, CA 95341

Allen Short
Modesto Irrigation District
1231 Eleventh Street
Modesto, CA 95352

Anastasia Leigh
U.S. Bureau of Reclamation
Environmental Affairs
2800 Cottage Way, MP-150
Sacramento, CA 95825-1898

Andrew Gordus
California Dept. of Fish & Game
San Joaquin Valley and Southern Sierra Region
1234 East Shaw Avenue
Fresno, CA 93710

Ann K. Barnett
Kern County Clerk
1115 Truxtun Avenue
Bakersfield, CA 93301-4639

Anna G. Eshoo
U.S. Congress, California
14th District
205 Cannon House Office Building
Washington, DC 20510

Arnold Barcellos
A-Bar Ag Enterprises
17755 South Ward Road
Los Banos, CA 93635

Barbara Boxer
United States Senate
112 Hart Senate Office Building
Washington, DC 20510

Barbara Goodwin
Council of Fresno County Governments
Metropolitan Planning Organization
2100 Tulare Street, Suite 611
Fresno, CA 93721

Becky Sheehan
California Farm Bureau Federation
2300 River Plaza Drive
Sacramento, CA 95833

San Joaquin River Exchange Contractors Water Authority

Bill Cook
California Dept. of Fish & Game
18110 Henry Miller Road
Los Banos, CA 93635

Bill DuBois
California Farm Bureau Federation
Governmental Affairs Division
1127 11th Street, Suite 626
Sacramento, CA 95814

Bill Jennings
California Sportfishing Protection Alliance
3536 Rainier Avenue
Stockton, CA 95204

Brad Hubbard
U.S. Bureau of Reclamation
Resources Management Division
2800 Cottage Way, MP-410
Sacramento, CA 95825-1898

Bruce Laclerque
Pajaro Valley Water Management Agency
36 Brennan Street
Watsonville, CA 95076

Carlton D. Moore, Interim Director
California Dept. of Boating and Waterways
2000 Evergreen Street, Suite 100
Sacramento, CA 95815-3896

Carol Sachs
U.S. Environmental Protection Agency
Region IX, Environmental Review Office
75 Hawthorne Street, CED-2
San Francisco, CA 94105-3901

Cay Goude
U.S. Fish & Wildlife Service
2800 Cottage Way, W-2605
Sacramento, CA 95825

CEQA Coordinator
California Dept. of Parks and Recreation
1416 9th Street, Room 1405
Sacramento, CA 95814

Charlene Renteria
Merced County Library
2100 O Street
Merced, CA 95340-3637

Chase Hurley
San Luis Canal Company
General Manager
11704 W. Henry Miller Road
Dos Palos, CA 93620

Chris White, General Manager
Central California Irrigation District
PO Box 1231
Los Banos, CA 93635

Chrystal L. Meier
San Joaquin Valley Air Pollution Control District
Environmental Review Office
1990 East Gettysburg Avenue
Fresno, CA 93726

Chuck Kinney
Kings County
Deputy Director - Planning
1400 West Lacey Boulevard
Hanford, CA 93230

Cindy Pollsom
California Urban Water Agencies
455 Capitol Mall, Suite 705
Sacramento, CA 95814

Dale Garrison
California Dept. of Fish & Game
18110 Henry Miller Road
Los Banos, CA 93635

Dan Lungren
U.S. Congress, California 3rd District
2313 Rayburn House Office Building
Washington, DC 20510

Dan Nelson
San Luis & Delta-Mendota Water Authority
PO Box 2157, 842 Sixth Street
Los Banos, CA 93635

Dan Wade
Tranquility Irrigation District
General Manager
PO Box 487
Tranquility, CA 93668

Daniel B. Steiner
Consulting Engineer
PO Box 2175
Granite Bay, CA 95746

Daniel Russel
U.S. Fish & Wildlife Service
2800 Cottage Way
Sacramento, CA 95825

Danny Locke
D.T. Locke Ranch, Inc.
PO Box 126
Firebaugh, CA 93622

Dante John Nomellini
PO Box 1461
Stockton, CA 95201

Dave Cory
Camp 13 Drainers
PO Box 576
Dos Palos, CA 93620

David Guy
Northern California Water Association
455 Capitol Mall, Suite 335
Sacramento, CA 95814-4496

David Hardt
Kern-Pixley National Wildlife Refuge Complex
PO Box 670
Delano, CA 93216

David L. Wegner
Sr. Democratic Staff
Subcommittee on Water Res. & Environment
Committee on Transportation & Infrastructure
B-375 Rayburn House Office Building
Washington, DC 20510

Deb Self
Baykeeper
785 Market Street, Suite 850
San Francisco, CA 94103

Dennis Barry
Contra Costa County
Director of Community Development
651 Pine Street, 4th Floor North Wing
Martinez, CA 94553-0095

Dennis Cardoza
U.S. Congress, California 18th District
1010 10th Street, Suite 5800
Modesto, CA 95354

Dennis Falaschi
Panoche Water and Drainage District
52027 West Althea Avenue
Firebaugh, CA 93622

Dennis W. Westcot
San Joaquin River Group Authority
716 Valencia Avenue
Davis, CA 95616-0153

Devin Nunes
U.S. Congress, California 18th District
264 Clovis Avenue, Suite 206
Clovis, CA 93612

Diane Rathmann
Linneman Law Offices
PO Box 156
1820 Marguerite Street
Dos Palos, CA 93620

Dianne Feinstein
United States Senate
Fresno District Office
331 Hart Senate Office Building
Washington, DC 20510

Director
Santa Clara County Planning Department
70 West Hedding Street
East Wing, Seventh Floor
San Jose, CA 95110

Director
Alameda County Clerk
1106 Madison Street
Oakland, CA 94607

Director
California State Library
914 Capitol Mall, Suite E-29
Sacramento, CA 95814-4802

Director
California State Library
914 Capitol Mall, Suite E-29
Sacramento, CA 95814-4802

Director
California Waterfowl Association
4630 Northgate Boulevard, Suite 150
Sacramento, CA 95834

San Joaquin River Exchange Contractors Water Authority

Director
Central Valley Project Water Association
15211 I Street
Sacramento, CA 95814

Director
Contra Costa County Clerk
PO Box 350
Martinez, CA 94553

Director
Council of Fresno County Governments
Attn: CEQA Environmental Review
2035 Tulare Street, Suite 201
Fresno, CA 93721

Director
Fresno County Public Library Government Publications
2420 Mariposa Street
Fresno, CA 93721-2204

Director
Kings County Clerk
County Clerk/Recorder
1400 W. Lacey Blvd.
Hanford, CA 93230

Director
Merced County Public Library
1312 South 7th Street
Los Banos, CA 93635-4757

Director
San Benito County Planning & Building Inspection Serv.
3324 Southside Road
Hollister, CA   95023

Director
Santa Cruz County Planning Dept.
701 Ocean Street, 4th Floor
Santa Cruz, CA 95060

Director
Stanislaus County Library
1500 I Street
Modesto, CA 95354

Director
State Clearinghouse
Office of Planning and Research
1400 10th Street, Room 121
Sacramento, CA 95814

Director
Tulare Basin Wetlands Association
PO Box 628
Wasco, CA 93280

Director
Tulare County RMA Planning Branch
Government Plaza
5961 South Mooney Boulevard
Visalia, CA 93277

Director
U.S. Bureau of Reclamation
Denver Office Library
PO Box 25007, Mail Code 84-27960
Denver, CO 80225-0007

Director
U.S. Bureau of Reclamation
Mid-Pacific Regional Office Library
2800 Cottage Way
Sacramento, CA 95825

Director
University of California, Davis
Peter J. Shields Library
Documents Department
100 Northwest Quad
Davis, CA 95616-5292

Doris Matsui
U.S. Congress, California 5th District
222 Cannon House Office Bldg.
Washington, DC 20510

Doug Denton
California Department of Water Resources
Northern District
2440 Main Street
Red Bluff, CA 96080

Doug Feremenga
Metropolitan Water District
PO Box 54153
Los Angeles, CA 90054

Doug Kleinsmith
U.S. Bureau of Reclamation
Environmental Affairs
2800 Cottage Way, MP-152
Sacramento, CA 95825-1898

Doug Mosebar
San Joaquin Farm Bureau Federation
PO Box 8444
Stockton, CA 95208

Dwight Sanders
California State Lands Commission
Environmental Planning and Management
100 Howe Avenue, Suite 100 South
Sacramento, CA 95825-8202

Ed Petry
291 Fleming Street
Mendota, CA 93640

Eric Johnston
Merced Sun-Star
3033 North G Street
Merced, CA 95340

Eric N. Robinson
Kronick, Moskovitz, Tiedemann & Girard
Attorneys at Law
400 Capitol Mall, 27th Floor
Sacramento, CA 95814

Erma Clowers
U.S. Bureau of Reclamation
SCCAO, Water Contracting
1243 N Street
Fresno, CA 93727

Felicia Marcus
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105-3901

Florence M. LaRiviere
Citizens Committee to Complete the Refuge
453 Tennessee Lane
Palo Alto, CA 94306

Frances Mizuno
San Luis & Delta-Mendota Water Authority
PO Box 35F, Route 1
Byron, CA 94514-9614

Gail Cismowski
California Regional Water Quality Control Board
Central Valley Region
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670-6114

Gail Pellerin
Santa Cruz County Clerk
701 Ocean Street
Santa Cruz, CA 95060

Garth Hall
East Bay Municipal Utility District
PO Box 24055
Oakland, CA 94623

Gary Bobker
The Bay Institute
695 DeLong Avenue, Suite 100
Novato, CA 94945

Gary Stern
NOAA Fisheries Service
777 Sonoma Avenue, Room 325
Santa Rosa, CA 95402

General Manager
City and County of San Francisco
Public Utilities Commission
1155 Market Street, 11th Floor
San Francisco, CA 94103

George Delgado
PO Box 663
Firebaugh, CA 93622

George Miller
U.S. Congress, California
7th District
2205 Rayburn House Office Building
Washington, DC 20515-0507

Glenn Brown
Luhdorff & Scalmanini
500 First Street
Woodland, CA 95695

Greg Thomas
Natural Heritage Institute
100 Pine Street, Suite 1550
San Francisco, CA 94111

Guy Masier
California Department of Water Resources
3310 El Camino Avenue, Suite 300
Sacramento, CA 95821

Hamilton Candee
Altshuler Berzon LLP
177 Post Street, Suite 300
San Francisco, CA 94108

Hans Kreutzberg
California Department of Parks and Recreation
Office of Historic Preservation
PO Box 942896
Sacramento, CA 94296-0001

Hanspeter Walter
Kronick, Moskovitz, Tiedemann & Girard
Attorneys at Law
400 Capitol Mall, 27th Floor
Sacramento, CA 95814

Heather Cooley
Pacific Institute
654 13th Street, Preservation Park
Oakland, CA 94612

Heidi Rooks
California Dept. of Water Resources
Division of Environmental Services
3251 S Street
Sacramento, CA 95816

Honorable Anthony J. Cannella
California State Senate 12th District
State Capitol, Room 3048
Sacramento, CA 95814

Honorable Anthony J. Cannella
California State Senate
12th District, Merced District Office
1640 N Street, Suite 210
Merced, CA 95340

Honorable Cathleen Galgiani
California State Assembly 17th District
31 East Channel Street, Suite 306
Stockton, CA 95202

Honorable Henry T. Perea
California State Assembly 31st District
2550 Mariposa Mall, Room 5031
Fresno, CA 93721

Honorable Linda Halderman
California State Assembly 29th District
6245 North Fresno Street, Suite 106
Fresno, CA 93710

Honorable Michael J. Rubio
California State Senate 16th District
2550 Mariposa Mall, Suite 2016
Fresno, CA 93721

Honorable Tom Berryhill
California State Senate 14th District
State Capitol, Room 3076
Sacramento, CA 95814

Jack G. Thomson
Tulare Basin Wetlands Association
2000 Ash Road, Suite 3
Bakersfield, CA 93309

Jackie Speier
U.S. Congress, California 12th District
211 Cannon House Office Building
Washington, DC 20510

James Beck
Kern County Water Agency
General Manager
3200 Rio Mirada Drive
Bakersfield, CA 93308

James L. Nickel, President
San Luis Canal Company
PO Box 60679
Bakersfield, CA 93306

Jan Lee
East Bay Municipal Utility District
PO Box 24055
Oakland, CA 94623

Janet Laurain
Adams, Brodwell, Joseph & Cardoza
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080

Jeanne Gambino
URS Corporation
1333 Broadway, Suite 800
Oakland, CA 94612

Jeff A. Halstead
Kings River Conservation District Chief
Environmental Division
4886 East Jensen Avenue
Fresno, CA 93725

Jeff Bryant, General Manager
Firebaugh Canal Water District
2412 South Palace Road
Mendota, CA 93640

Jeff Cataneo
San Benito County Water District
PO Box 899
Hollister, CA 95024-0899

Jeff Denham
U.S. Congress, California 19th District
1040 East Herndon, Suite 201
Fresno, CA 93720

Jeff Single
California Dept. of Fish & Game
San Joaquin Valley and Southern Sierra Region
1234 East Shaw Avenue
Fresno, CA 93710

Jerry McNerney
U.S. Congress, California 11th District
1210 Longworth House Office Bldg.
Washington, DC 20510

Jerry Mensch
California Dept. of Fish & Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Jerry O'Banion
Merced County Board of Supervisors
2222 M Street
Merced, CA 95340

Jesse Brown
Merced County Association of Governments
369 West 18th Street
Merced, CA 95340-4801

Jim Costa
U.S. Congress, California 20th District
855 M Street, Suite 940
Fresno, CA 93721

Jim McCurry
Britz Farming
PO Box 725
Firebaugh, CA 93622

Jim O'Banion, President
Central California Irrigation District
15775 S. Indiana Avenue
Dos Palos, CA 93620

Joan Maher
Santa Clara Valley Water District
Imported Water Program Manager
5750 Almaden Expressway
San Jose, CA 95118-5614

Joanne Karlton
California Dept. of Parks and Recreation
31426 Gonzaga Road
Gustine, CA 95322

Joe Dillon
NOAA Habitat Conservation Division
777 Sonoma Avenue, Room 325
Santa Rosa, CA 95404

Joe Paul Gonzales
San Benito County Clerk
440 5th Street, Room 206
Hollister, CA 95023

John Garamendi
U.S. Congress, California 10th District
228 Cannon House Office Bldg.
Washington, DC 20510

John Herrick
South Delta Water Agency
4255 Pacific Avenue, Suite 2
Stockton, CA 95207

John Sweigard
Merced Irrigation District
PO Box 2288
Merced, CA 95344-0288

Joseph C. McGahan
Summers Engineering, Inc.
P O Box 1122
Hanford, CA 93230

Joseph L. Campbell
Contra Costa Water District
General Manager
PO Box H20
Concord, CA 94524

Joy Winckel
U.S. Fish & Wildlife Service
2800 Cottage Way, W-2605
Sacramento, CA 95825

Karen D. Adams
Merced County Clerk
2222 M Street
Merced, CA 95340

Karen Ross
California Dept. of Food & Agriculture
1220 N Street, Suite 400
Sacramento, CA 95814

Karna E. Harrigfeld
Herum, Crabtree, Brown, Dyer, Zolezzi, and Terpstra
2291 West March Lane, Suite B100
Stockton, CA 95207

Kenneth W. Blakemore
San Joaquin County
Recorder/County Clerk
44 N. San Joaquin Street, Suite 260
Stockton, CA 95202

Kerrie McCants
Fresno County Planning Department
Development Services Manager
2220 Tulare Street, Suite 800
Fresno, CA 93721

Kevin Kauffman
Stockton East Water District
General Manager
PO Box 5157
Stockton, CA 95201

Kevin McCarthy
U.S. Congress, California 22nd District
326 Cannon House Office Bldg.
Washington, DC 20510

Kim Forrest
San Luis Wildlife Refuge
947 West Pacheco Boulevard, Suite C
Los Banos, CA 93635

Kirk Ford, Director
Stanislaus County Planning Department
1010 10th Street, Suite 3400
Modesto, CA 95354

Krystel Bell
U.S. Army Corps of Engineers
Regulatory Division
650 Capitol Mall, Suite 5-200
Sacramento, CA 95814

Larry Meyers
California Native American Heritage Commission
915 Capitol Mall, Room 364
Sacramento, CA 95814

Larry Norris
Natural Resources Conservation Service
3530 West Orchard Court
Visalia, CA 93277

Lee Lundrigan
Stanislaus County Clerk
PO Box 1008
Modesto, CA 95353

Les Grober
State Water Resources Control Board
Division of Water Rights
PO Box 2000
Sacramento, CA 95812-2000

Linda Vida-Sunnen
University of California, Berkeley
Water Resources Center Archives
410 O'Brien Hall
Berkeley, CA 94720-1718

Lisa Hanf
U. S. Environmental Protection Agency
Region 9, Office of Federal Activities (CMD-3)
75 Hawthorne Street
San Francisco, CA 94105

Lorelei H. Oviatt, Director
Kern County Planning & Community Development
2700 M Street, Suite 100
Bakersfield, CA 93301-2370

Louis Moore
U.S. Bureau of Reclamation
Public Affairs Office
2800 Cottage Way, MP-140
Sacramento, CA 95825-1898

Manager
San Francisco Public Library
Government Documents Department
100 Larkin Street
San Francisco, CA 94102

Marc Sazaki
California Energy Commission
1516 9th Street, Mail Stop 40
Sacramento, CA 95814-5512

Margit Aramburu, Executive Director
Delta Protection Commission
PO Box 530
Walnut Grove, CA 95690

Maria Rea
NOAA Fisheries Service
650 Capitol Mall, Suite 8-300
Sacramento, CA 95814-4708

Mark A. Grossi
Fresno Bee
1626 E Street
Fresno, CA 93786-0001

Mark Fink
Santa Clara County Public Library
10800 Torre Avenue
Cupertino, CA 95014-3254

Mark J. Madison
City of Stockton
Department of Municipal Utilities
2500 Navy Drive
Stockton, CA 95206-1191

Martin McIntyre
San Luis Water District
PO Box 2135
Los Banos, CA 93635

Mary Osteen
California Farm Bureau Federation
2300 River Plaza Drive
Sacramento, CA 95833

Michael M. Honda
U.S. Congress, California 15th District
1713 Longworth House Office Building
Washington, DC 20510

Mike Gardner, Chief of Operations
Grassland Water District
22759 South Mercey Springs Road
Los Banos, CA 93635

Mike Jewell
U.S. Army Corps of Engineers
Regulatory Division
650 Capitol Mall, Suite 5-200
Sacramento, CA 95814

Mike Novo
Monterey County Planning Department
1678 W. Alisal Street, 2nd Floor
Salinas, CA 93901

Mike Stearns, President
Firebaugh Canal Water District
47375 West Dakota Avenue
Firebaugh, CA 93622

Mike Thompson
U.S. Congress, California 1st District
231 Cannon House Office Bldg.
Washington, DC 20510

Monty Schmitt
Natural Resources Defense Council
111 Sutter Street, 20th Floor
San Francisco, CA 94104

Nadell Gayou
California Department of Water Resources
Environmental Review Unit
PO Box 942836
Sacramento, CA 94236-0001

Nancee Murray
California Department of Fish & Game
Legal Affairs Division
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Nicole Kaneko, Chief of Staff
Office of Senator Barbara Boxer
1700 Montgomery Street, Suite 240
San Francisco, CA 94111

Norman L. Allinder, Planning Director
Madera County Planning Department
2037 West Cleveland Avenue, MSG
Madera, CA 93637

Pablo R. Arroyave
U.S. Bureau of Reclamation
Regional Director's Office
2800 Cottage Way, E-1603
Sacramento, CA 95825-1898

Pam O'Quin
California Research Bureau
California State Library
PO Box 942837
Sacramento, CA 94237-0001

Pamela Buford
California Regional Water Quality Control Board
Central Valley Region
1685 E Street
Fresno, CA 93706

Patricia S. Port
U. S. Department of the Interior
Office of Environmental Policy and Compliance
1111 Jackson Street, Suite 520
Oakland, CA 94607

Paul A. Fillebrown, Interim Director
Merced County Planning Department
2222 N Street
Merced, CA 95340

Paul Dabbs
California Department of Water Resources
Statewide Planning Branch
PO Box 942836
Sacramento, CA 94236-0001

Paul Friesema, Professor
Environmental Policy and Culture Program
227 Scott Hall, Northwestern University
601 University Place
Evanston, IL 60208-1006

Paul Fujitani
U.S. Bureau of Reclamation
Central Valley Project Operations
3310 El Camino Ave., Suite 300
Sacramento, CA 95821

Paul Minasian
Minasian, Meith, Soares, Sexton & Cooper LP
PO Box 1679
Oroville, CA 95965-1679

Paul Olmstead
Sacramento Municipal Utility District
PO Box 15380
Sacramento, CA 95852-1830

Paula J. Landis
California Department of Water Resources
San Joaquin District
3374 East Shields Avenue
Fresno, CA 93726

Pete Stark
U.S. Congress, California 13th District
239 Cannon House Office Building
Washington, DC 20510

Rachel Reed
Trust for Public Land Western Region
116 New Montgomery, Suite 300
San Francisco, CA 94105

Randy Houk, General Manager
Columbia Canal Company
6770 Avenue 7 1/2
Firebaugh, CA 93622

Raymond Carlson
Griswold, LaSalle, Cobb, Dowd & Gin LLP
111 East Seventh Street
Hanford, CA 93230

Rebecca Martinez
Madera County Clerk
200 West 4th Street
Madera, CA 93637

Regina Alcomendras
Santa Clara County
Office of the Clerk/Recorder
70 West Hedding Street
East Wing, First Floor
San Jose, CA 95110

Rena Ballew
U.S. Bureau of Reclamation
SCCAO
1243 N Street
Fresno, CA 93727

Richard Denton
Richard Denton & Associates
6667 Banning Drive
Oakland, CA 94611

Rick Ortega, General Manager
Grassland Water District
22759 South Mercey Springs Road
Los Banos, CA 93635

Rob Tull
CH2M Hill
2485 Natomas Park Drive, Suite 600
Sacramento, CA 95833

Robert F. Bowman
Tulare Basin Wetlands Association
3141 Avenue 136
Corcoran, CA 93212

Roland P. Hill
Tulare County
Clerk/Recorder
221 South Mooney Boulevard
Visalia, CA 93291

Ron Jacobsma
Friant Water Authority
854 North Harvard Avenue
Lindsay, CA 93247

Roy Catania, President
Columbia Canal Company
10302 Avenue 7 1/2
Firebaugh, CA 93622

Roy Thomas
26535 Carmel Rancho Boulevard
Carmel, CA 93923

Rudy Schnagl
California Regional Water Quality Control Board
Central Valley Region
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670-6114

Sam Farr
U.S. Congress, California 17th District
1126 Longworth House Office Building
Washington, DC 20510

Scott Jercich
California Department of Water Resources
California State Water Projects Analysis Office
PO Box 942836
Sacramento, CA 94236-0001

Shane Hunt, MP Regional Liaison
U.S. Bureau of Reclamation
1849 C Street, NW
MIP 9642020
Washington, DC 20240-0001

Sherry Gomez
Kern County Library
701 Truxtun Avenue
Bakersfield, CA 93301

Stephen Hill
California State Parks
31426 Gonzaga Road
Gustine, CA 95322-9737

Stephen L. Vagnini
Monterey County
Assessor/Clerk/Recorder
PO Box 570
Salinas, CA 93902-0570

Steve Brueggeman
California Department of Fish & Game
Mendota Wildlife Area
PO Box 37
Mendota, CA 93640

Steve Chedester, Executive Director
San Joaquin River Exchange Contractors Water Authority
541 H Street
Los Banos, CA 93635

Steve Knell
Oakdale Irrigation District
1205 East F Street
Oakdale, CA 95361

Steve Lanich
Office of Congressman George Miller, Resources Committee
2205 Rayburn House Office Building
Washington, DC 20515

Susan Hootkins
Senior Consultant, Planning and Water Resources
Cardno ENTRIX
2300 Clayton Road, Suite 200
Concord, CA 94520

Susan Jones
U.S. Fish & Wildlife Service
2800 Cottage Way, W-2605
Sacramento, CA 95825

Susan LaCompte
Redfern Ranches
14664 North Brannon
Dos Palos, CA 93620

Teresa Geimer
California Dept. of Water Resources
California State Water Projects Analysis Office
PO Box 942836
Sacramento, CA 94236-0001

San Joaquin River Exchange Contractors Water Authority

Terry Erlewine
State Water Contractors
11221 L Street, Suite 1050
Sacramento, CA 95814

Thomas Birmingham
Westlands Water District
PO Box 6056
Fresno, CA 93703

Thomas Filler
Transfers Office Chief, IRWM Division
California Dept. of Water Resources
901 P Street
Sacramento, CA 95814

Thomas Graff
Environmental Defense Fund
123 Mission Street, 28th Floor
San Francisco, CA 94105

Thomas Greci
Madera Irrigation District
12152 Road 28 1/4
Madera, CA 93637-9199

Thomas M. Gau, Director
San Joaquin County Dept. of Public Works
1810 East Hazelton Avenue
Stockton, CA 95205

Tim Donahue
Sierra Club
San Francisco Bay Chapter, Delta Group
2412 Cambridge Drive
Antioch, CA 94509

Tim O’Laughlin
O’Laughlin & Paris
PO Box 9259
Chico, CA 95927

Tim Rust
U.S. Bureau of Reclamation
Resources Management Division
2800 Cottage Way, MP-410
Sacramento, CA 95825-1898

Tom McClintock
U.S. Congress, California 4th District
428 Cannon House Office Bldg.
Washington, DC 20510

Victor E. Salazar
Fresno County Clerk
2221 Kern Street
Fresno, CA 93721

W.G. Morgan
Contra Costa County Farm Bureau
Contra Costa Resource Conservation
District
6040 Morgan Territory Road
Clayton, CA 94517

Waldo Holt
San Joaquin Audubon
PO Box 7755
Stockton, CA 95267

Wally Herger
U.S. Congress, California 2nd District
242 Cannon House Office Building
Washington, DC 20510

William G. Miller
Natural Resource Strategic Services
2251 Ralston Road
Sacramento, CA 95821

William G. Pipes
Geomatrix, Inc.
1281 East Alluvial, Suite 101
Fresno, CA 93720

William R. Nicholson, Assistant Director
Merced County Planning Department
2222 M Street
Merced, CA 95340

Zach Simmons
U.S. Army Corps of Engineers
Regulatory Division
650 Capitol Mall, Suite 5-200
Sacramento, CA 95814

Zoe Lofgren
U.S. Congress, California 16th District
1401 Longworth House Office Building
Washington, DC 20510

17.0 List of Preparers

The following personnel were directly involved in preparation of the EIS/EIR:

17.1 Bureau of Reclamation

Timothy Rust	Fish and Wildlife Program Manager
Bradley Hubbard	Natural Resources Specialist, Resources Management Division
Erma Clowers	Repayment Specialist
Patricia L. Rivera	Native American Affairs Program Manager

17.2 Exchange Contractors

Steve Chedester	Executive Director, Project Manager
Joann White	Assistant Project Manager
Christopher White	Central California Irrigation District
Randy Houk	Columbia Canal Company
Jeff Bryant	Firebaugh Canal Water District
Chase Hurley	San Luis Canal Company

17.3 Other Preparers and Reviewers

Technical and support personnel from Cardno ENTRIX, URS Corporation, and other consultants that were involved in document preparation are listed in Table 17-1.

Table 17-1
Technical and Support Staff

Preparers	Degree(s)/Years of Experience	Expertise
Cardno ENTRIX		
Ayala, Chelsea	BA, Environmental Studies, Minor, Geology, California State University, Sacramento 18 years	Air Quality and GHGs
Brice, Doug	BS, Geography, Emphasis in GIS and Environmental Planning 12 years	Geographic Information System
Dillon, Reinhold	MA, English MA, Medieval History & Literature BA, History 28 years	Technical Editor
Duane, Paul	PhD, Agricultural Economics MS, Agricultural Economics BS, Agricultural Management 32 years	Socioeconomics, Environmental Justice

Preparers	Degree(s)/Years of Experience	Expertise
Eschen, Iris	Desktop publishing specialist, creating, revising, formatting, and producing documents 32 years	Production Supervisor
Graf, Cody	MA, Economics, University of Nevada, Reno BA, Economics 4 years	Land Use, Socioeconomics, Environmental Justice
Haise, Carrie	MS, Textiles and Clothing, UC Davis BA, Family and Consumer Services, San Francisco State University 15 years	Assistant Technical Editor
Hootkins, Susan	MUP, Urban and Regional Planning BA, Human Biology 38 years	CEQA/NEPA Compliance
Kremin, Darcy	MA, Urban and Environmental Policy, Tufts University BA, Geography/ Environmental Studies and Political Science, University of California, Los Angeles 14 years	Land Use and Planning, and Policy Compliance
Lebednik, Gretchen	MS, Botany BA (with honors), Environmental Biology 32 years	Biological Resources
Pavich, Steve	MS, Agricultural and Resource Economics, Oregon State University BA, Economics, University of California, Davis 17 years	Socioeconomics, Environmental Justice
Wise, Larry	MA, Marine Biology, San Francisco State University BS, Marine Biology and Limnology, San Francisco State University 20 years	Aquatic Resources
Wisheropp, Paul	MS, Civil Engineering (Water Resources), Colorado State University BS, Environmental Engineering, Humboldt State University 31 years	Water Resources
URS Corporation		
Gambino, Jeanne	BS, Civil Engineering, Rose-Hulman Institute of Technology 12 years	Water Resources
Mineart, Philip	MS, Civil Engineering BS, Environmental Resources 27 years	Water Resources
Other Consultants		
Schmidt, Kenneth D.	PhD, Hydrology MS, Hydrology BS, Geology 43 years	Groundwater Resources
Steiner, Daniel B.	BS, Civil Engineering 31 years	Surface Water Resources

18.0 References

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Bureau of Reclamation (Reclamation). 1998a. Cooperative Agreement Between the United States of America and the San Luis Canal Company for Conveyance of Wildlife Refuge Water Supplies.

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