FINAL Environmental Assessment

One-Year Recapture of San Joaquin River Restoration Flows at Patterson Irrigation District and/or Banta-Carbona Irrigation District

SAN JOAQUIN RIVER
RESTORATION PROGRAM

July 2016

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List of Abbreviations and Acronyms

µS/cm	microsiemens per centimeter
2013 Water Rights Order	State Water Resources Control Board Division of Water Rights Order Approving Change and Instream Flow Dedication, October 21, 2013
2016 Water Rights Order	State Water Resources Control Board Division of Water Rights Order Approving Temporary Transfer of up to 76,069 Acre-feet of Water from the U.S. Department of the Interior, Bureau of Reclamation to Friant Water Contractors, March 23, 2016
Act	San Joaquin River Restoration Settlement Act
AF	acre-feet
BCID	Banta-Carbona Irrigation District
CAA	Clean Air Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CNDDB	California Natural Diversity Database
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
D-1641	State Water Resources Control Board Water Right Decision 1641
Delta	Sacramento–San Joaquin River Delta
DMC	Delta-Mendota Canal
DWR	California Department of Water Resources
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Federal Endangered Species Act
FWCA	Fish and Wildlife Coordination Act
GHG	greenhouse gas
ITA	Indian Trust Assets

M&I	municipal and industrial
MBTA	Migratory Bird Treaty Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NRDC	Natural Resources Defense Council
NRHP	National Register of Historic Places
PEIS/R	Program Environmental Impact Statement/ Report
PID	Patterson Irrigation District
Recirculation EA	Final Recirculation of Recaptured Water Year 2013-2017 San Joaquin River Restoration Program Flows Environmental Assessment, April 2013
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
Restoration Flows	San Joaquin River Restoration Flows
ROD	Record of Decision
Settlement	Stipulation of Settlement in NRDC, et al., v. Kirk Rodgers, et al.
SJRRP	San Joaquin River Restoration Program
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SWP	State Water Project
SWRCB	California State Water Resources Control Board
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service

Definitions

Central Valley Project (CVP): The United States, acting through the U.S. Department of the Interior, Bureau of Reclamation (Reclamation), has constructed and is operating the Central Valley Project, California, for diversion, storage, carriage, distribution and beneficial use, for flood control, irrigation, municipal, domestic, industrial, fish and wildlife mitigation, protection and restoration, generation and distribution of electric energy, salinity control, navigation and other beneficial uses, of water of the Sacramento River, the American River, the Trinity River, and the San Joaquin River and their tributaries.

Class 1 Water: The supply of water stored in or flowing through Millerton Lake which, subject to the contingencies described in the water service or repayment contracts will be available for delivery from Millerton Lake and the Friant-Kern and Madera Canals as a dependable water supply during each Contract Year.

Class 2 Water: The supply of water which can be made available subject to the contingencies described in the water service or repayment contracts for delivery from Millerton Lake and the Friant-Kern and Madera Canals in addition to the supply of Class 1 water. Because of its uncertainty as to availability and time of occurrence, such water will be undependable in character and will be furnished only if, as, and when it can be made available as determined by the Contracting Officer.

CVP Water: All water that is developed, diverted, stored, or delivered by the Secretary of the Interior in accordance with the statutes authorizing the CVP and in accordance with the terms and conditions of water rights acquired pursuant to California Law.

Friant Division: The main features of this division are: Friant Dam, Millerton Lake, Friant-Kern Canal, and Madera Canal, all constructed and owned by the Reclamation.

Friant Division Long-Term Contractor Service Area: The area to which a Friant Division Long-Term Contractor is permitted to provide CVP Water under its contract.

Friant Division Long-Term Contractors or Friant Contractors: All public agencies that have executed long-term water service or repayment contracts with the United States Department of the Interior, Reclamation for water service from the Friant Division of the CVP.

Recapture: Actions taken to divert Restoration Flows from the San Joaquin River or the Sacramento-San Joaquin River Delta (Delta), pursuant to the Stipulation of Settlement in *NRDC et. al., v. Rogers et. al.*, 2006, for the benefit of Friant Division long-term contractors in a manner consistent with provisions stipulated in Paragraph 16 of said settlement.

Recirculation Water: Water made available to Friant Division long-term contractors from recaptured Restoration Flows. These supplies are to be developed according to the provisions of Paragraph 16(a), which directs the Secretary of the Interior to develop and

implement a plan for recirculation, recapture, reuse, exchange, or transfer of Restoration Flows for the purpose of reducing or avoiding water supply impacts resulting from implementation of the Restoration Goal.

Water Contract Year: Water Year shall mean the period from and including March 1 of each calendar year through the last day of February of the following calendar year.

1.0 Introduction

This Environmental Assessment (EA) analyzes the affected environment and environmental effects of recapturing San Joaquin River Restoration Flows (Restoration Flows) at Patterson Irrigation District (PID) and/or Banta-Carbona Irrigation District (BCID) to the Central Valley Project (CVP) for a period of up to one year, from the date of the approved State Water Resources Control Board (SWRCB) Division of Water Rights Order Approving Temporary Transfer of up to 76,069 Acre-feet of Water from the U.S. Department of the Interior, Bureau of Reclamation (Reclamation) to Friant Water Contractors, March 23, 2016 (2016 Water Rights Order). Therefore, this EA covers recapturing Restoration Flows at PID and/or BCID from March 23, 2016 through March 22, 2017. For more information on the 2016 Water Rights Order, see Section 1.5, "2016 Water Rights Order."

This EA analyzes only the recapture of Restoration Flows. This EA does not cover the recirculation of this recaptured water within CVP facilities, SWP, and private facilities (e.g., San Luis Reservoir) to the Friant Contractors, as this is covered in the *Recirculation of Recaptured Water Year 2013-2017 San Joaquin River Restoration Program Flows Environmental Assessment, April 2013* (Recirculation EA). The Recirculation EA analyzed the potential environmental impacts of recirculating recaptured Interim and Restoration Flows for a five-year period utilizing existing conveyance facilities and without the addition of new facilities to recapture or recirculate released Restoration Flows from Friant Dam. The Finding of No Significant Impact was released for the Recirculation EA in April 2013.

This section describes the background of the San Joaquin River Restoration Program (SJRRP) and facilities used for recapturing Restoration Flows.

1.1 Background

In 1988, a coalition of environmental groups, led by the Natural Resources Defense Council (NRDC), filed a lawsuit challenging the renewal of long-term water service contracts between the United States and CVP Friant Division (Friant Division). After more than 18 years of litigation a settlement was reached, *NRDC, et al., v. Kirk Rodgers, et al.* (Settlement). On September 31, 2006, the Settling Parties, including NRDC, Friant Water Users Authority (now represented by the Friant Water Authority), and the U.S. Departments of the Interior and Commerce, agreed on the terms and conditions of the Settlement, which was subsequently approved by the U.S. Eastern District Court of California on October 23, 2006. The Settlement establishes two primary goals:

- **Restoration Goal** – To restore and maintain fish populations in "good condition" in the main stem 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.

- **Water Management Goal** – To reduce or avoid adverse water supply impacts on all of the Friant Contractors that may result from the Interim Flows and Restoration Flows provided for in the Settlement.

The planning and environmental review necessary to implement the Settlement is authorized under Section 3406(c)(1) of the Central Valley Project Improvement Act (Public Law 102-575) and the San Joaquin River Restoration Settlement Act (Act), included in Public Law 111-11, the Omnibus Public Land Management Act of 2009. The Secretary of the Interior is authorized and directed to implement the terms and conditions of the Settlement through the Act. The SJRRP is implementing the Settlement. The Settlement identifies the need for a plan for recirculation, recapture, reuse, exchange or transfer of Restoration Flows to reduce or avoid impacts to Friant Contractors. There is currently an interim plan in place, and a long term plan is being developed.

To achieve the Restoration Goal, the Settlement calls for releases of water from Friant Dam to the confluence of the Merced River (referred to as Restoration Flows), a combination of channel and structural modifications along the San Joaquin River below Friant Dam, and reintroduction of Chinook salmon. Restoration Flows are specific volumes of water to be released from Friant Dam during different year types, according to Exhibit B of the Settlement. To achieve the Water Management Goal, the Settlement calls for recirculation, recapture, reuse, exchange, or transfer of the Restoration flows to reduce or avoid impacts to water deliveries to all of the Friant Division long-term contractors caused by the Restoration flows. In addition, the Settlement establishes a Recovered Water Account and recovered water program to make water available to all of the Friant Division long-term contractors who provide water to meet Restoration flows, to reduce or avoid the impact of the Restoration flows on such contractors.

This is a one-year Water Management Goal action to reduce or avoid impacts to Friant Contractors while Reclamation is preparing the Long-term Recapture and Recirculation of Restoration Flows Environmental Impact Statement (EIS) for the SJRRP. In July 2015 Reclamation published a Notice of Intent to prepare an EIS to identify a set of alternatives for the recapture and recirculation of Restoration Flows to long-term contractors of the Friant Division of the CVP.

1.2 Recapture Facilities

This section briefly describes the PID and BCID facilities to be used to recapture Restoration Flows in the lower San Joaquin River (see Figure 1-1). For additional information on conveyance facilities, see the section titled “Water Resources” in Section 3, “Affected Environment and Environmental Consequences.”

PID and BCID are located along the San Joaquin River downstream from the Restoration Area. PID’s San Joaquin River screened diversion facility consists of seven pumps with a total diversion capacity of approximately 195 cubic feet per second (cfs). PID’s distribution system includes a 40 cfs connection to the Delta-Mendota Canal (DMC).

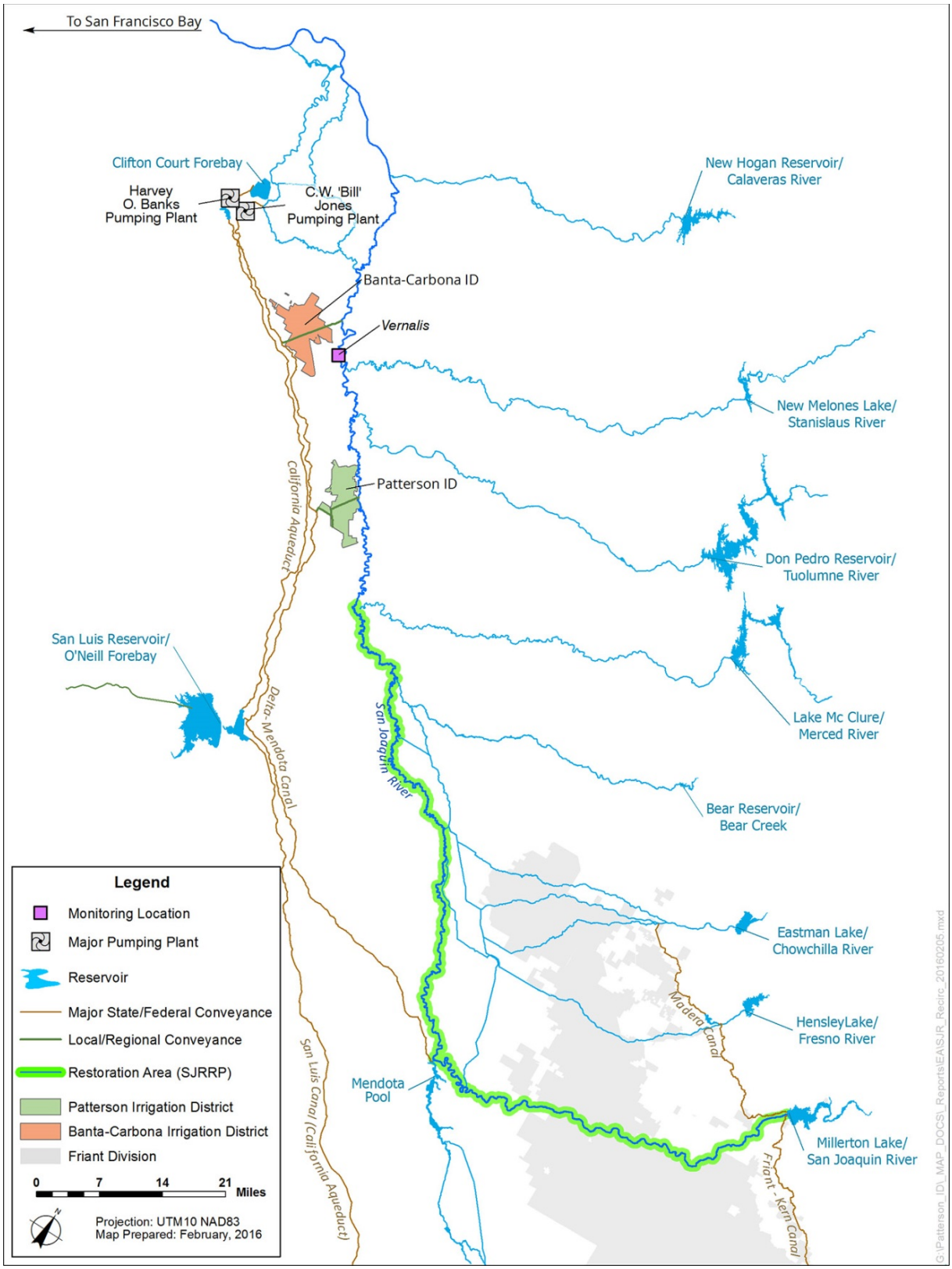

Figure 1-1.
Vicinity Map

1.3 Incorporation of Related Environmental Documents

This EA incorporates the affected environment and environmental analysis in the SJRRP Program Environmental Impact Statement/Environmental Impact Report (PEIS/R). The SJRRP PEIS/R was finalized in July 2012 and the corresponding Record of Decision (ROD) was issued on September 28, 2012 (Reclamation 2012a and 2012b). The SJRRP PEIS/R and ROD analyzed at a project-level the reoperation of Friant Dam to release Interim and Restoration Flows to the San Joaquin River, making water supplies available to Friant Division long-term contractors at a pre-established rate, and the recapture of Interim and Restoration Flows at existing facilities within the Restoration Area (defined as the San Joaquin River between Friant Dam and the Merced River) and in the Sacramento-San Joaquin River Delta (Delta). The SJRRP PEIS/R and ROD also include program-level actions, which were analyzed at the level of detail available, but may require the completion of additional environmental analysis, as appropriate as planning and design efforts progress. The program-level analysis evaluated the actions identified in the Settlement using a potential range of future construction and management actions to bracket the probable range of effects, which allows for an informed analysis of system-wide and cumulative impacts resulting from implementing the entirety of the Settlement. Some of the program-level actions identified in the SJRRP PEIS/R include the recapture of Restoration Flows at existing facilities on the San Joaquin River downstream from the Merced River.

This EA incorporates by reference the following information from the SJRRP PEIS/R:

- **Chapter 3.0 – Considerations for Describing the Affected Environment and Environmental Consequences** – This EA incorporates the analysis and assumptions of the Study Area for the SJRRP PEIS/R, the explanation of significance criteria, impact comparisons, impact levels, and mitigation measures.

- **Chapter 4.0 – Air Quality** – This EA incorporates the analysis performed to assess impacts related to program-level actions, which would include stationary sources associated with the recapture of water. The assessment of impacts and ultimate determinations, all being less than significant for the operation of the SJRRP, are also incorporated.

- **Chapter 5.0 – Biological Resources – Fisheries** – This EA incorporates the analysis and material from the SJRRP PEIS/R, which includes the quantitative and qualitative assessments of aquatic species impacts as a result of the implementation of the SJRRP, specifically related to physical processes such as water temperatures, water quality, flow patterns, fish habitat conditions, pollutant discharge and mobilization, turbidity, diversions and entrainment, predation, and food web support in the Delta. The assessment of impacts and determinations are also incorporated.

- **Chapter 6.0 – Biological Resources – Vegetation and Wildlife** – This EA incorporates the analysis performed in the SJRRP PEIS/R related to the assessment of sensitive species and habitats in or near the project area, including

the CVP/State Water Project (SWP) water service areas. The incorporated material includes the investigation of the impacts of the SJRRP on the alteration of riparian habitat, changes in invasive plant abundance and distribution, or alteration of special-status plant species or habitats between the Merced River and the Delta or in the Delta.

- **Chapter 7.0 – Climate Change and Greenhouse Gas Emissions** – This EA incorporates by reference the discussion of potential changes related to the implementation of the SJRRP. National Environmental Policy Act (NEPA) and California Environmental Quality Act standards related to climate change analysis varies greatly and the SJRRP PEIS/R analysis incorporates the more stringent State of California measures to analyze and model greenhouse gas (GHG) emissions. For project-level actions analyzed in the SJRRP PEIS/R, it was found that there would be potentially significant and unavoidable impacts related to increased flow releases, which in turn could cause additional traffic from recreational visitors driving to the San Joaquin River and also by increased groundwater pumping and changes in the CVP/SWP energy generation and consumption. This is related to a long-term impact of the SJRRP's flow releases, which could result in an increased use of groundwater pumps due to changes in surface water availability. While 80-90 percent of groundwater pumps in the Friant Division are electric, the remaining additional diesel-powered pumping could result in increased GHG emissions. The impacts on GHG emissions from project-level implementation of operations and the discussion of recapture of flows through the existing facilities in the Restoration Area and the Delta are also incorporated by reference from the SJRRP PEIS/R into this document.

- **Chapter 12.0 – Hydrology – Groundwater** – The entirety of the SJRRP PEIS/R chapter is incorporated into this EA. The chapter describes current and historical conditions and explains the aquifer regions surrounding the San Joaquin River, many of which suffer from groundwater overdraft, land subsidence, and water quality concerns. This EA also incorporates the discussion related to changes and impacts associated with implementation of the SJRRP in relation to changes in groundwater levels and quality in the CVP/SWP water service areas. Generally, both groundwater levels and groundwater quality impacts are anticipated to be potentially significant and unavoidable in association with the reduction of water supply to the Friant Division long-term contractors. This EA addresses a temporary one year action that may contribute to abating additional groundwater pumping within the Friant Division. The action alternatives in this EA would work to limit or reduce land subsidence that is addressed in the SJRRP PEIS/R.

- **Chapter 13.0 – Hydrology – Surface Water Supplies and Facilities Operations** – This EA incorporates by reference the entirety of this SJRRP PEIS/R chapter. This chapter outlines operations for water deliveries, storage, and other relevant information related to the CVP and SWP and impacts from implementation of the SJRRP. The chapter defines impacts related to Delta operations and their interrelation to the SJRRP at a project-level of analysis.

- **Chapter 14.0 – Hydrology – Surface Water Quality** – This EA incorporates by reference the entirety of this SJRRP PEIS/R chapter. This chapter describes the environmental setting and environmental consequences of implementing the SJRRP. Of particular relevance to this EA is the analysis performed in this chapter related to impacts on water quality in the CVP/SWP water service areas and in the San Joaquin River from the Merced River to the Delta. All impacts for these factors associated with the implementation of the SJRRP were determined to be less than significant or less than significant and beneficial.

- **Chapter 16.0 – Land Use Planning and Agricultural Resources** – This EA incorporates by reference the analysis performed to support the findings in Impact LUP- 8: Substantial Diminishment of Agricultural Land Resource Quality and Importance Because of Altered Water Deliveries. As described in this EA, no long-term changes are anticipated as a result of this temporary one year action.

- **Chapter 26.0 – Cumulative Impacts** – This EA incorporates by reference the discussion of the effects of the SJRRP in relation to past, present, and reasonably foreseeable future actions, specifically in the CVP/SWP water service area. This includes discussion of planned actions associated with the collective CALFED Water Resources Projects, other water resource projects, resource management plans and programs, and the related impact analysis from the SJRRP on cumulative air quality, fisheries, vegetation and wildlife, groundwater, surface water supplies and facilities operations, surface water quality, and land use planning.

The SJRRP PEIS/R addresses the potential recapture of Restoration Flows at several diversion locations, including existing facilities at the PID facility between the Tuolumne and Merced River confluences and BCID facility downstream from the Stanislaus confluence. Recapture is subject to availability of Restoration Flows and the available capacity of the districts' facilities within the CVP and/or the SWP storage and conveyance facilities, including the California Aqueduct, DMC, San Luis Reservoir, and related pumping facilities. Available capacity is capacity that is remaining after all statutory and contractual obligations are satisfied to existing water service or supply contracts, exchange contracts, settlement contracts, transfers, or other agreements involving or intended to benefit CVP/SWP contractors served through CVP/SWP facilities.

1.4 Relation of Action Alternatives to Settlement

The Water Management Goal of the Settlement and Act includes a requirement for the development and implementation of a plan for recirculation, recapture, reuse, exchange or transfer of Restoration Flows for the purpose of reducing or avoiding impacts to water deliveries to all of the participating Friant Contractors. Paragraph 16 of the Settlement states:

16. In order to achieve the Water Management Goal, immediately upon the Effective Date of this Settlement, the Secretary, in consultation with the Plaintiffs and Friant Parties, shall commence activities pursuant to applicable law and provisions of this Settlement to develop and implement the following:

(a) A plan for recirculation, recapture, reuse, exchange or transfer of the Interim Flows and Restoration Flows for the purpose of reducing or avoiding impacts to water deliveries to all of the Friant Contractors caused by the Interim Flows and Restoration Flows. The plan shall include provisions for funding necessary measures to implement the plan. The plan shall:

(1) ensure that any recirculation, recapture, reuse, exchange or transfer of the Interim Flows and Restoration Flows shall have no adverse impact on the Restoration Goal, downstream water quality or fisheries;

(2) be developed and implemented in accordance with all applicable laws, regulations and standards. The Parties agree that this Paragraph 16 shall not be relied upon in connection with any request or proceeding relating to any increase in Delta pumping rates or capacity beyond current criteria existing as of the Effective Date of this Settlement;

(3) be developed and implemented in a manner that does not adversely impact the Secretary's ability to meet contractual obligations existing as of the Effective Date of this Settlement; and

(4) the plan shall not be inconsistent with agreements between the United States Bureau of Reclamation and the California Department of Water Resources existing on the Effective Date of this Settlement, with regard to operation of the CVP and State Water Project.

This EA analyzes the environmental effects of recapture of Restoration Flows at PID and/or BCID.

1.5 2016 Water Rights Order

On March 23, 2016, the SWRCB Division of Water Rights approved the petition for temporary change in Reclamation's water rights on the San Joaquin River to allow a transfer of up to 76,069 acre-feet (AF) of dedicated instream flows (Restoration Flows) previously stored in Millerton Reservoir and/or taken under control at Friant Dam pursuant to direct diversion rights. The approval allows for Restoration Flows to be rediverted through the PID and BCID screened facilities into the DMC for reuse by CVP

contractors through direct delivery, exchange, and/or transfer. The order also granted the request to modify the Net Delta Outflow Index (NDOI) consistent with the purpose of the transfer.

The 2016 Water Rights Order addresses the overview of the proposed temporary change, criteria for approving the temporary transfer per Water Code Section 1725, and procedures for the SWRCB petition process including the denial of a request for a hearing.

As summarized below, the SWRCB found the transfer involves only an amount of water that would have been consumptively used or stored in absence of the temporary change; the temporary change will not injure any legal users of the water; and the temporary change will not have an unreasonable effect on fish, wildlife or other instream beneficial uses. See Appendix D for the complete 2016 Water Rights Order.

1.5.1 Temporary Transfer Involves Water that Would Have Been Consumptively Used or Stored

The SWRCB found that Reclamation's petition for transfer met the consumptive use requirement of Water Code Section 1725. The definition "consumptively used" under Water Code Section 1725, includes "the amount of water which has been consumed through use by evapotranspiration, has percolated underground, or has been otherwise removed from use in the downstream water supply as a result of the diversion."

The SWRCB found that, in the absence of the transfer, the water would be diverted by Reclamation at other locations for consumptive use, as authorized under Reclamation's water rights, or permanently removed from the use as a result of entering the ocean (saline sink). Furthermore, all Restoration Flows that are released from Friant Dam and dedicated for instream use in accordance with the terms and conditions of the SWRCB Water Rights Order Approving Change and Instream Flow Dedication, October 21, 2013 (2013 Water Rights Order) would have either remained in storage or have been directly diverted at Friant Dam for delivery to and consumptive use by the Friant Division CVP contractors. The SWRCB also found that the water will in fact be used for the protection and enhancement of instream beneficial uses held in trust for the benefit of the people of the state.

1.5.2 No Injury to Other Legal Users of the Water

The SWRCB found that the temporary change would not injure any legal user of the water during any potential hydrologic condition that the SWRCB determines is likely to occur during the proposed change, through significant changes in water quantity, water quality, timing of diversion or use, consumptive use of the water, or reduction in return flows (Water Code, Section 1727(b)(1)).

The SWRCB stated that the Water Rights Division authorized instream flow dedication to facilitate implementation of the SJRRP by the 2013 Water Rights Order. The 2013 Water Rights Order includes a condition specifically stating that the approved change in no way modifies the obligations and rights under the San Joaquin River Exchange Contract and other contracts. The conditions of the 2013 Water Rights Order remain in

force and effect. The SWRCB found that the petitioned change is only to add recapture at PID and BCID and has no bearing on whether or not Restoration Flows will pass through the Restoration Area. Therefore, it was found that the temporary change petition does not alter any existing obligations and requirements.

Regarding Delta flow requirements, the 2016 Water Rights Order states that License 1986 and Permits 11885, 11886, and 11887 are not currently conditioned on achieving San Joaquin River flow objectives. Pursuant to Water Code section 1727, subdivision (e), the SWRCB shall not deny, or place conditions on, a temporary change to avoid or mitigate impacts that are not caused by the temporary change. Therefore, the SWRCB found that the temporary transfer should not be conditioned to meet the Vernalis objectives or any other request submitted that is outside the scope of consideration of the petitions.

1.5.3 No Unreasonable Effect on Fish, Wildlife, or Other Instream Beneficial Uses

The SWRCB found that the proposed change would not unreasonably affect fish, wildlife, or other instream beneficial uses (Water Code Section 1727(b)(2)).

The SWRCB found that the transfer should not increase fish stranding beyond an amount that would otherwise occur absent the transfer.

The SWRCB found that water quality impacts due to changes in the electrical conductivity (EC) in the DMC would be less than significant given the maximum amount of 105 cfs of recaptured flows introduced into the DMC and wide fluctuation that occur in the DMC at this time.

The SWRCB found that the percentage of rediversion at PID and BCID is minimal compared to the average monthly San Joaquin River flow at Vernalis and would not have a significant impact on water quality or fisheries in the south Delta. Fall-run salmon that pass the Merced River, straying past the Hills Ferry into Reach 5 of the Restoration Area can do so independent of Restoration Flows.

In addition, the SWRCB agreed with Reclamation's approach of considering simulated average monthly modeled flow at Vernalis since Vernalis is the compliance location for flow and water quality under D-1641 and the data at the Patterson gage is unreliable. Therefore, the SWRCB concluded that recaptured flows would not have a significant impact on water quality at Vernalis in the south Delta.

1.6 Need for the Proposal

The purpose of the proposed alternatives in this EA are to implement the provisions of the Settlement pertaining to the Water Management Goal by providing mechanisms to ensure that recapture of Restoration Flows occurs on the lower San Joaquin River at existing facilities at PID and/or BCID. The action is needed to avoid or reduce potential

water supply impacts to Friant Contractors from implementation of the SJRRP, in accordance with the Settlement.

2.0 Alternatives

2.1 No Action Alternative

The No Action Alternative, sometimes referred to as the future no action condition, considers the continued implementation of the SJRRP Preferred Alternative (Alternative C1), as analyzed in the SJRRP PEIS/R and described in the 2012 ROD. The No Action Alternative includes the reoperation of Friant Dam to release Restoration Flows to the San Joaquin River, making water supplies available to Friant Division long-term contractors at a pre-established rate, and the recapture of Restoration Flows at existing facilities within the Restoration Area and in the Delta. These actions are analyzed at a project-level in the SJRRP PEIS/R.

The No Action Alternative also includes both the release and recapture of Restoration Flows, including constructing new infrastructure to increase pumping capacity along the San Joaquin River below the Merced River confluence for the direct recapture of Restoration Flows, and infrastructure to convey recaptured flows to the DMC or California Aqueduct. Before completion of new pumping capacity on the river, recapture of Restoration Flows would occur in the Delta and/or at existing facilities along the river below the Merced River confluence at existing pumping facilities owned and operated by CVP contractors. Recapture of up to 1,000 cfs at new and/or existing facilities along the river below the Merced River confluence is analyzed at a program-level in the SJRRP PEIS/R.

Paragraph 13 and Exhibit B of the Settlement specify measurement of Restoration Flows on the San Joaquin River at Friant Dam, Gravelly Ford, below Chowchilla Bifurcation Structure, below Sack Dam, at the top of Reach 4B, and at the Merced River confluence. Reclamation shall monitor these locations for the purpose of tracking protected Restoration Flows pursuant to Condition 5 of the 2013 Water Rights Order. Reclamation will also monitor flows in the Eastside Bypass using gages near El Nido and below the Mariposa Bypass. Figure 2-1 shows existing gages with flow sensors on the San Joaquin River and tributaries within the Restoration Area. Monitoring of flows and determination of losses shall be consistent with the Restoration Flow Guidelines. Additional manual measurements during flow events and periodic gage monitoring may be performed, as necessary, to better determine losses.

Paragraph 16(a)(1) of the Settlement provides that recapture and recirculation of Restoration Flows “shall have no adverse impact on the Restoration Goal, downstream water quality or fisheries,” Because recapture within the Restoration Area could prevent the Restoration Flow targets from being met, recapture within the Restoration Area would occur only if necessary to avoid interfering with in-channel construction activities associated with the Restoration Goal, to avoid potential material adverse impacts from groundwater seepage or for other emergency actions to avoid immediate adverse impacts, consistent with SJRRP PEIS/R page 2-30.

The No Action Alterative represents the NEPA baseline, against which the impacts of the action alternatives (identified below) are compared.

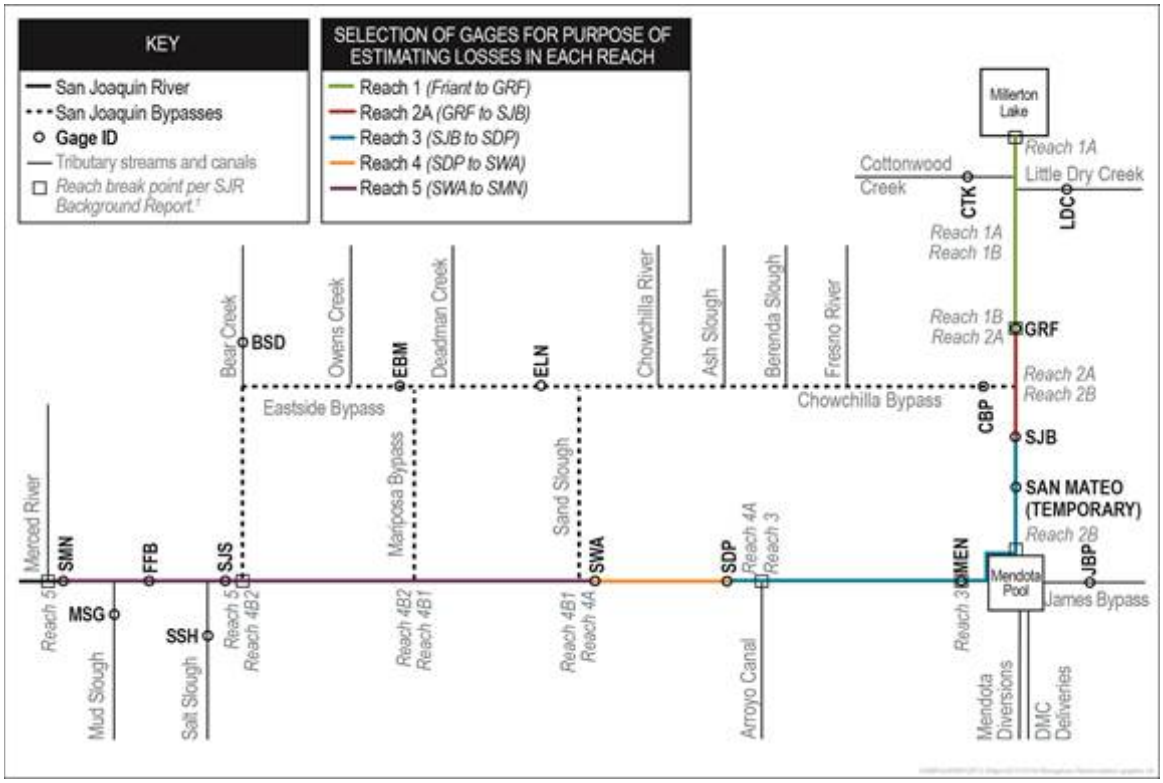

Figure 2-1.
Flow Gaging Stations in the Restoration Area

2.2 Action Alternatives

This EA evaluates three proposed alternatives for recapture of Restoration Flows along the San Joaquin River downstream from the Merced River confluence at the following locations: (1) PID, (2) BCID, or (3) PID and BCID, limited by the anticipated availability of Restoration Flows and the indicated maximum capability for instantaneous recapture of those flows (PID [40 cfs] and BCID [65 cfs]). Restoration Flows that are not recaptured at PID or BCID would be available for recapture either in the Restoration Area or in the Delta; these actions are covered at a project-level in the SJRRP PEIS/R and, therefore, are not evaluated in this document.

The action alternatives evaluated in this EA are essentially subsets of the No Action Alternative (SJRRP Preferred Alternative [Alterative C1]) being implemented in phases as constraints in the system (e.g., existing channel capacity restrictions) are removed. As mentioned above in the No Action Alternative description, the SJRRP Selected Alternative (Alterative C1) includes recapture of up to 1,000 cfs at new and/or at existing facilities along the river below the Merced River confluence.

Recapture at existing facilities along the river below the Merced River confluence was evaluated at a program-level in the SJRRP PEIS/R. This EA evaluates, at a project-level, action alternatives that recapture Restoration Flows at existing PID, BCID, or PID/BCID facilities at rates of up to 40 cfs, 65 cfs, or 105 cfs, respectively.

Diversions at PID and BCID may be limited by several factors that can reduce the total daily recapture of Restoration Flows from the San Joaquin River for delivery to the DMC. Constraints include the availability and pattern of Restoration Flow releases from Friant Dam, allowable diversions (e.g., holding contracts) and losses between Friant Dam and PID or BCID, and the ability of PID and BCID to make capacity available for use in recapturing Restoration Flows. Many of these factors are subject to considerable uncertainty, and could limit the ability to recapture Restoration Flows at any time.

The diversion capacities identified in the alternatives represent the anticipated constraints based on: the capacities of the fish screens and pumping facilities in the San Joaquin River; conveyance capacities between the screened facilities and the DMC; and the prioritization of these facilities for meeting in-district water uses before being made available for recapture of Restoration Flows. This would limit the diversion of Restoration Flows in the San Joaquin River to the rates of flow that could be instantaneously passed through each district for delivery into the DMC. Although both districts may have the physical capacity to capture more and exchange their CVP supplies in the DMC for recaptured Restoration Flows from the San Joaquin River, the alternatives in this EA would not include such operations. Because these physical capacity constraints do not consider other limitations, such as the availability of Restoration Flows, the associated monthly and annual pumping volumes for each action alternative, as discussed below, are unlikely to be met in full. However, these pumping volumes represent the upper bound for diversions during each month in the year, and thereby represent the upper bound of potential environmental effects associated with the recapture of Restoration Flows at PID and BCID.

In addition to achieving the project purpose and underlying need as described in Section 1, the action alternatives would provide valuable information about using existing San Joaquin River diversion facilities to recapture Restoration Flows. To verify that the action has no adverse impact on the Restoration Goal, downstream water quality, or fisheries, consistent with Paragraph 16(a)(1), Reclamation will implement a recapture monitoring plan. The plan includes monitoring Restoration Flows and lower San Joaquin River flows and water quality. Reclamation will coordinate weekly with PID and BCID, or more frequently during Restoration Flow changes, to forecast and track availability and recapture of Restoration Flows. In support of the Restoration Goal and fisheries, Reclamation will monitor existing flow gages along the lower San Joaquin River (see Figure 2-2) to validate that recapture is having no impact on flow connectivity. In support of downstream water quality, Reclamation will monitor temperature and EC at existing San Joaquin River gages (see Figure 2-3), and install temporary data loggers or take weekly manual samples downstream from PID (Alternatives A and C) and/or BCID (Alternatives B and C) when recapture is taking place. These monitoring activities would be common to all action alternatives.

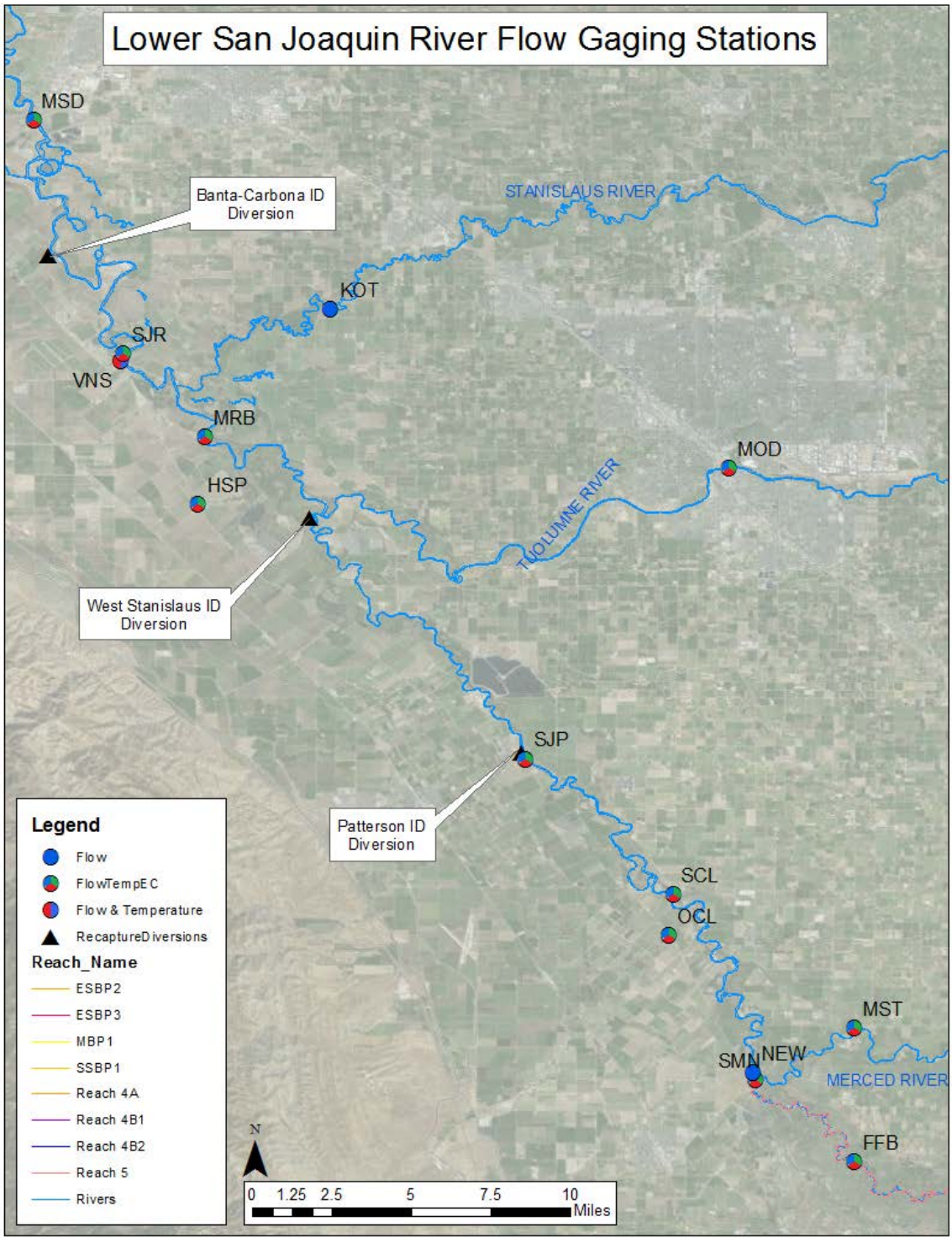

Figure 2-2.
Flow Gaging Stations in the Lower San Joaquin River and Tributaries

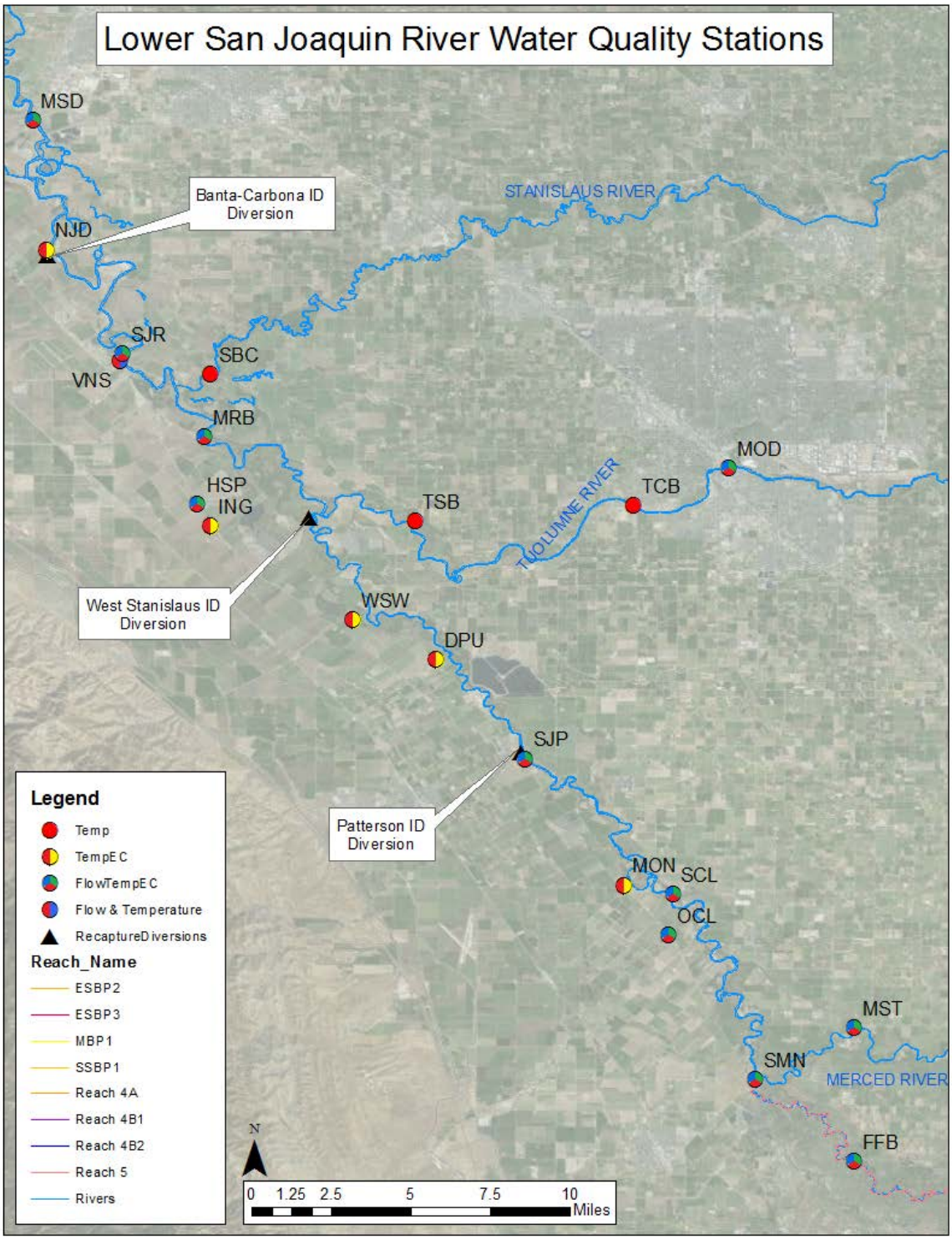

Figure 2-3.
Water Quality Stations in the Lower San Joaquin River and Tributaries

The action alternatives will be subject to the following parameters:

- No native or untilled land (fallow for three consecutive years or more) will be cultivated with the water involved in this action.
- The ultimate purpose of water use will be agricultural, municipal, and/or groundwater recharge.
- The recapture of Restoration Flows will be limited to existing supply and will not increase overall consumptive use.
- The recapture of Restoration Flows will not lead to any land conversion.
- The recapture of Restoration Flows will comply with all applicable Federal, State, Local or Tribal laws or requirements imposed for the protection of the environment and Indian Trust Assets (ITAs).
- The recapture of Restoration Flows will not alter the flow regime of streams, creeks, ponds, pools, wetlands, etc.

The action alternatives do not include construction or modification of facilities.

2.2.1 Alternative A – Recapture at Patterson Irrigation District

Under Alternative A, Reclamation would enter into a one-year agreement with PID for the recapture of up to 28,979 AF of Restoration Flows. This temporary action would occur for a period of up to one year, from March 23, 2016 through March 22, 2017, as defined in the 2016 Water Rights Order. The 2016 Water Rights Order provided Reclamation the appropriate SWRCB approval for the temporary diversion of Restoration Flows from the San Joaquin River at PID's screened diversion facility on the San Joaquin River (SWRCB 2016). There would be no expansion of use of PID's existing water rights or operations beyond existing biological opinions. The areas defined within this action are currently within the CVP place-of-use. PID would divert Restoration Flows from the San Joaquin River using their existing screened diversion facility, subject to the availability of capacity in PID's system.

These diverted Restoration Flows would be conveyed through PID facilities to the DMC at the expense of Reclamation and/or Friant Contractors. Restoration Flows diverted into the DMC would then be conveyed through the DMC to the San Luis Unit facilities for recirculation to the Friant Contractors. As mentioned previously, the recirculation of the Restoration Flows was analyzed in the Recirculation EA and is not evaluated in this EA.

The maximum potential for recapture of Restoration Flows under Alternative A is summarized in Table 2-1. PID would implement the recapture and conveyance of Restoration Flows only to the extent that doing so would not reduce the ability of PID to meet the water demands of its growers or increase PID's cost of water service consistent with PID's ability and costs to meet those demands. The instantaneous diversion rate of Restoration Flows is limited by the 40 cfs pumping capacity up to the DMC, since PID

has no appreciable storage within the district. Pumping from the San Joaquin River in excess of the 40 cfs limit would be to satisfy PID's agricultural demands and governed by PID's existing water rights, and is not analyzed in this EA.

Table 2-1.
Maximum Monthly PID Restoration Flow Recapture Potential

Month	Maximum Potential Diversion and Delivery into the DMC (acre-feet)
January	2,460
February	2,241
March	2,460
April	2,380
May	2,460
June	2,380
July	2,460
August	2,460
September	2,380
October	2,460
November	2,380
December	2,460
Total	**28,979**

Note:
Does not consider available DMC capacity, or the availability of Restoration Flows at PID's diversion facility at any point in time nor any downtime/maintenance or PID capacity constraints. Volumes based on the continuous use of PID's proposed 40 cubic feet per second instantaneous pumping capacity limitation.

Key:
DMC = Delta-Mendota Canal
PID = Patterson Irrigation District

2.2.2 Alternative B – Recapture at Banta-Carbona Irrigation District

Under Alternative B, Reclamation would enter into a one-year agreement with BCID for the recapture of up to 47,090 AF of Restoration Flows. This temporary action would occur for a period of up to one year, from March 23, 2016 through March 22, 2017, as defined in the 2016 Water Rights Order.

Similar to the PID recapture, BCID would divert Restoration Flows from the San Joaquin River using their existing screened diversion facility, subject to the availability of capacity in BCID's system. These diverted Restoration Flows would be conveyed through BCID's facilities to the DMC at the expense of Reclamation and/or Friant Contractors. Restoration Flows diverted into the DMC would then be conveyed through the DMC to the San Luis Unit facilities for recirculation to the Friant Contractors. As mentioned previously, the recirculation of the Restoration Flows was analyzed in the Recirculation EA and is not evaluated in this EA.

In the 2016 Water Rights Order, the SWRCB stated that the proposed transfer operations with recapture at BCID would be outside the current assumptions of D-1641. The 2016 Water Rights Order stated that if transfer waters enter the Delta at Vernalis but are subsequently rediverted at BCID, this flow would not be calculated as a Delta export, even though it qualifies. This can be resolved by subtracting BCID recaptured flows from the inflow part of the D-1641 equation. Accordingly, the following term was added to the 2016 Water Rights Order to reflect the modification to the NDOI calculation for

this transfer, "[d]uring the times that water is being rediverted at the BCID facility pursuant to this temporary transfer order, San Joaquin River flows used to inform conditions in D-1641 will be reduced by the quantity of water rediverted by the BCID facility pursuant to this temporary transfer order."

The potential for recapture of Restoration Flows under Alternative B is summarized in Table 2-2. BCID would implement the recapture and conveyance of Restoration Flows only to the extent that doing so would not reduce the ability of BCID to meet the water demands of its growers or increase BCID's cost of water service consistent with BCID's ability and costs to meet those demands. The diversion rate of Restoration Flows is limited by the instantaneous 65 cfs pumping capacity up to the DMC, since BCID has no appreciable storage within the district. Pumping from the San Joaquin River in excess of the 65 cfs limit would be to satisfy BCID's agricultural demands and would be governed by BCID's existing water rights, and is not analyzed in this EA.

Table 2-2.
Maximum Monthly BCID Restoration Flow Recapture Potential

Month	Maximum Potential Diversion and Delivery into the DMC (acre-feet)
January	3,997
February	3,642
March	3,997
April	3,868
May	3,997
June	3,868
July	3,997
August	3,997
September	3,868
October	3,997
November	3,868
December	3,997
Total	**47,090**

Note:
Does not consider available DMC capacity, or the availability of Restoration Flows at BCID's diversion facility at any point in time nor any downtime/maintenance or BCID capacity constraints. Volumes based on the continuous use of BCID's proposed 65 cubic feet per second instantaneous pumping capacity limitation.
Key:
BCID = Banta-Carbona Irrigation District
DMC = Delta-Mendota Canal

2.2.3 Alternative C – Recapture at Patterson Irrigation District and Banta-Carbona Irrigation District

Under Alternative C, Reclamation would enter into a one-year agreement with PID and BCID for the recapture of up to 76,069 AF of Restoration Flows. As with the previously described action alternatives, this temporary action would occur for a period of up to one year, from March 23, 2016 through March 22, 2017, and include modification to the NDOI as defined in the 2016 Water Rights Order.

Alternative C would operate as an aggregate of Alternative A and Alternative B. Alternative C would use the same diversions and conveyances as the previously

described alternatives. There would be no expansion of use of PID and BCID's existing water rights.

The potential for recapture of Restoration Flows under Alternative C is summarized in Table 2-3. PID and BCID would implement the recapture and conveyance of Restoration Flows only to the extent that doing so would not reduce their ability to meet the water demands of their growers or increase their cost of water service consistent with their ability and costs to meet those demands. The diversion rate of Restoration Flows is limited by the PID's 40 cfs and BCID's 65 cfs instantaneous pumping capacity up to the DMC, since PID and BCID have no appreciable storage within the districts. Pumping from the San Joaquin River in excess of the instantaneous 105 cfs limit would be to satisfy PID and BCID's agricultural demands and would be governed by PID and BCID's existing water rights, and is not analyzed in this EA.

Table 2-3.
Maximum Monthly PID and BCID Restoration Flow Recapture Potential

Month	Maximum Potential Diversion and Delivery into the DMC (acre-feet)
January	6,456
February	5,883
March	6,456
April	6,248
May	6,456
June	6,248
July	6,456
August	6,456
September	6,248
October	6,456
November	6,248
December	6,456
Total	**76,069**

Note:

Does not consider available DMC capacity, or the availability of Restoration Flows at PID and BCID's diversion facility at any point in time nor any downtime/maintenance or PID and BCID capacity constraints. Volumes based on the continuous use of PID and BCID's proposed 105 cubic feet per second instantaneous pumping capacity limitation.

Key:

BCID = Banta-Carbona Irrigation District
DMC = Delta-Mendota Canal
PID = Patterson Irrigation District

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3.0 Affected Environment and Environmental Consequences

This section provides an overview of the physical environment and existing conditions that could be affected by the alternatives consistent with NEPA guidelines. The resource discussion in this section evaluates the potential impacts of the No Action Alternative and the proposed action alternatives. As described above, the action alternatives in this EA are essentially subsets of the No Action Alternative (SJRRP Selected Alternative [Alterative C1]) being implemented in phases as constraints in the system (e.g., existing channel capacity restrictions) are removed; therefore, the action alternative impacts evaluated in this EA reflect the impacts under the No-Action Alternative (SJRRP Preferred Alternative [Alternative C1]), but to a lesser degree.

The affected environment condition assumptions consist of the existing physical environmental conditions as of October 2015. Therefore, the affected environment includes the existing releases and recapture of Restoration Flows on the San Joaquin River between Friant Dam and the confluence of the Merced River. In 2016, the SJRRP will have the necessary easements in place to allow Restoration Flows up to 300 cfs through the Restoration Area downstream from Sack Dam to the Merced River confluence, allowing Restoration Flows to connect all the way to the Merced River confluence for the first time.

As stated above, this EA does not cover the recirculation of water recaptured at PID and/or BCID, as this is covered in the Recirculation EA. The Recirculation EA analyzes the potential environmental impacts of recirculating recaptured Interim and Restoration Flows for a five-year period utilizing existing conveyance facilities and without the addition of new facilities to recapture or recirculate released Restoration Flows from Friant Dam.

This EA discusses the affected environment on both a large regional scale as well as at a smaller district level, as appropriate. Water resources (groundwater, regional hydrology, etc.) are addressed at the regional scale and at the district level for district specific facilities.

The action alternatives would have no impact on the following resource categories as compared to the No Action Alternative, and therefore they are not further analyzed in this EA.

- **Air Quality** – SJRRP PEIS/R Chapter 4, "Air Quality," assesses the program-level impacts to air quality. The program-level impacts evaluated in the PEIS/R applicable to the action alternatives evaluated in this EA were determined to be less than significant as the action alternatives would not include any construction activities and would be utilizing existing pumps. Therefore, the action alternatives would not result in a substantial increase in long-term regional or local emissions. Emissions from the action alternatives would not be anticipated to violate air quality standards, contribute substantially to an existing or projected air quality

violation, or conflict with or obstruct implementation of Air Resources Board and San Joaquin Valley Air Pollution Control District air planning efforts.

- **Biological Resources** – SJRRP PEIS/R Chapter 5, "Biological Resources – Fisheries," assesses the program-level impacts in Impact FSH-1 through FSH-14. The program-level impacts applicable to the action alternatives in this EA were determined to be less than significant. Specifically, the effect on fisheries is less than significant on diversions and entrainment in the lower San Joaquin River (Impact FSH-12) and water temperatures in the lower San Joaquin River (Impact FSH-14). Additionally, on page 104 of the September 18, 2012 SJRRP Biological Opinion, NMFS concluded that "[r]ecapture at existing facilities on the San Joaquin River that will not require structural modifications, are screened to NMFS fish criteria, have undergone ESA consultation regarding the facilities operations, are unlikely to cause any additional impacts to listed species." Operations of these facilities under the action alternatives would fall within the current operational requirements at each diversion, so additional impacts to listed species will not occur from diversion operations as proposed in the action alternatives analyzed in the EA.

  Reclamation obtained a list of sensitive biological communities in the PID and BCID areas from the California Natural Diversity Database (CNDDB) on October 13, 2015 (Attachment A), and a list of species listed as threatened or endangered under the Federal Endangered Species Act (ESA) potentially occurring in the project area from the U.S. Fish and Wildlife Service (USFWS) on October 13, 2015 (Attachment B). Reclamation verified in July 2016 there have been no changes to the list. Because there would be no land disturbance or land use changes associated with the action alternatives, and any potential water transfer would occur within the bounds of the previously referenced existing biological opinions and environmental analyses, there would be no effect to vegetation and wildlife including ESA listed species, critical habitats, or species protected by the Migratory Bird Treaty Act (MBTA). The action alternatives evaluated in this EA would not have any long term impacts to water supply or water quality, therefore it can be assumed that anadromous and Delta fish species, and their designated critical habitat, would not be affected by the action alternatives. Furthermore, in the 2016 Water Rights Order, the SWRCB found that the proposed change would not unreasonably affect fish, wildlife, or other instream beneficial uses (Water Code Section 1727(b)(2)).

- **Climate Change and Greenhouse Gas** – SJRRP PEIS/R Chapter 7, "Climate Change and Greenhouse Gas Emissions," assesses the program-level impacts to climate change and GHG emissions. The program-level impacts evaluated in the PEIS/R applicable to the action alternatives evaluated in this EA were determined to be less than significant as the action alternatives are one-year actions and would not result in a substantial increase in long-term regional or local emissions. The action alternatives would not add to the global inventory of gases that would contribute to global climate change and would not result in increases in GHG emissions. Additionally, the action alternatives would be temporary and occur

over one year, and thus would not be affected by long term effects of climate change.

- **Cultural Resources** – SJRRP PEIS/R Chapter 8, "Cultural Resources," assesses the program-level impacts to cultural resources. The action alternatives would be undertakings as defined in Section 301(7) of the National Historic Preservation Act (NHPA) and subject to Section 106 review. The actions as described above would not modify existing facilities, and would not have the potential to cause effect to historic properties if they are present. The SJRRP PEIS/R Chapter 8, "Cultural Resources," states "[i]mplementation of the Settlement is not anticipated to cause impacts to cultural resources in the Delta or in CVP/SWP service areas. Therefore, these areas were eliminated from detailed environmental analysis." All program-level impacts for cultural resources were considered less than significant with mitigation. For this EA, the recapture of water as described in the action alternatives would occur through existing facilities or within current water service area boundaries, without modification to existing facilities, construction of new facilities, or change in land use, thus the recapture of the Restoration Flows has no potential to cause effects on historic properties pursuant to 36 CFR Part 800.3(a)(1).

- **Indian Trust Assets** – SJRRP PEIS/R Chapter 15, "Indian Trust Assets," assesses the program-level impacts to ITAs. The SJRRP PEIS/R states that no program-level impacts would occur to ITAs caused by program alternatives and analysis would be required for subsequent site-specific project-level actions. There are no known ITAs within the PID or BCID service area boundaries and the action alternatives in this EA would occur through existing facilities or within current water service area boundaries, without modification to existing facilities, construction of new facilities, or change in land use, thus would have no impacts to ITAs.

- **Land Use and Agricultural Resources** –SJRRP PEIS/R Chapter 16, "Land Use Planning and Agricultural Resources," assesses the program-level impacts to land use and agricultural resources. The program-level impacts applicable to the action alternatives in this EA were determined to be less than significant as the action alternatives described in this EA would not result in any land conversion, and no land fallowing or habitat restoration would be deferred as a result of the recapture of only one year of Restoration Flows. No new lands would be brought into agricultural production as a result of the actions. Existing land use is agricultural and this is not expected to change as a result of the implementation of alternatives. The alternatives would not provide a long-term or reliable supply to support long-term land use changes.

3.1 Water Resources

3.1.1 Affected Environment

This section discusses the affected environment for the following water resources: hydrology – groundwater, hydrology – surface water supplies and facilities operations, and hydrology – water quality.

Hydrology – Groundwater

San Joaquin River Hydrologic Region The San Joaquin River Hydrologic Region covers approximately 9.7 million acres and includes all of Calaveras, Tuolumne, Mariposa, Madera, San Joaquin, and Stanislaus counties, most of Merced and Amador counties, and parts of Alpine, Fresno, Alameda, Contra Costa, Sacramento, El Dorado, and San Benito counties. The region is heavily reliant on groundwater. Change in groundwater elevations between spring 2005 and spring 2010 show that most areas in the San Joaquin Valley have exhibited groundwater elevation declines; however, some areas in the southern part of the region have experienced groundwater-level declines in excess of 60 feet. Groundwater elevations, according to available spring 2010 data, show cones of groundwater depression as much as 50 feet below mean sea level in the northern portion of the San Joaquin Valley (DWR 2015).

Tulare Lake Hydrologic Region The Tulare Lake Hydrologic Region covers approximately 10.9 million acres and includes all of Kings and Tulare counties and most of Fresno and Kern counties. The extensive use of groundwater has historically caused subsidence of the land surface along the west and south end of the San Joaquin Valley. Depth to groundwater and groundwater elevation contours using spring 2010 data show that many parts of the southern San Joaquin Valley groundwater levels were at depths exceeding 650 feet below ground surface. Additionally, the change in groundwater elevations between spring 2005 and spring 2010 show that many areas of the southern San Joaquin Valley experienced groundwater elevation declines in excess of 60 feet (DWR 2015).

Hydrology – Surface Water Quality

San Joaquin River Flow and water quality standards on the San Joaquin River are set by the D-1641 and Reasonable and Prudent alternatives from the 2008 NMFS Biological Opinion. These standards specify flow conditions that must be met between the months of February and June, with a pulse in October.

Flows in the San Joaquin River below the Merced River confluence to the Delta are controlled in large part by releases from reservoirs, located on the tributary systems, including the Merced, Tuolumne, and Stanislaus rivers, to satisfy contract deliveries and instream flow requirements. The hydrology and hydraulics of the San Joaquin River downstream from the Restoration Area return to a more natural state because there is no extensive flood bypass system, and there is continuous tributary flow from the Merced, Tuolumne, and Stanislaus rivers.

Water quality in various segments of the San Joaquin River below Friant Dam to the Merced River confluence is degraded because of low flow and discharges from

agricultural and wildlife areas. Below its confluence with the Merced River, San Joaquin River water quality generally improves at successive confluences with east side rivers draining the Sierra Nevada, particularly at confluences with the Merced, Tuolumne, and Stanislaus rivers. In the relatively long reach between the Merced and Tuolumne rivers, mineral concentrations tend to increase because of inflows of agricultural drainage water, other wastewaters, and poor quality groundwater accretion.

As stated in the SJRRP PEIS/R, the release of Restoration Flows will improve the success of meeting these flow standards. The water quality benefits from the Restoration Flows result from the dilution effects from freshwater inflow from the upper San Joaquin River to the lower San Joaquin River. As described in the SJRRP PEIS/R Chapter 14, "Hydrology – Surface Water Quality," (Section 14.1.3, page 14-35), potential surface water quality effects within the San Joaquin River from the Merced River to the Delta, including effects from the recapture of Restoration Flows, would not trigger additional violations of existing water quality standards or substantial water quality changes that would adversely affect beneficial uses, or have substantive impacts on public health.

Sacramento-San Joaquin Delta Water quality in the Delta is highly variable temporally (timing) and spatially (location) and is a function of complex circulation patterns that are affected by inflows, pumping and drainage for Delta agricultural operations and exports, operation of flow control structures, and tidal action. The existing water quality problems of the Delta system may be categorized as presence of toxic materials, eutrophication and associated fluctuations in dissolved oxygen, presence of suspended sediments and turbidity, salinity, and presence of pathogenic bacteria (SWRCB 1999). The north Delta tends to have better water quality primarily because of inflow from the Sacramento River. The quality of water in the west Delta is strongly influenced by tidal exchange with San Francisco Bay; during low-flow periods, seawater intrusion results in increased salinity. In the south Delta, water quality tends to be poorer because of the combination of inflows of poorer water quality from the San Joaquin River, agricultural discharges from Delta islands, and effects of diversions that can sometimes increase seawater intrusion from San Francisco Bay.

Hydrology – Surface Water Supplies and Facilities Operations

Patterson Irrigation District PID is located near the City of Patterson, in Stanislaus County, California along the San Joaquin River downstream from the Merced River (Figure 1-1). PID holds a pre-1914 water right to divert water from the San Joaquin River, and diverts water at an existing facility under this right. Under the pre-1914 water right, PID has the authority and right under California law to divert the water it needs from the San Joaquin River, as long as it is put to beneficial use. The irrigation season for PID occurs from March through September. PID seldom diverts water from October through February. As a result of a settlement reached between PID and Reclamation (Reclamation) for the construction of Friant Dam and partial obstruction of natural flow from the San Joaquin River, PID receives 6,000 AF per year of water, referred to as Replacement Water, from Reclamation via the DMC (Reclamation 2009). PID also has a contract with Reclamation for 16,500 AF per year of CVP water (agricultural entitlement). The district currently receives between 80 to 90 percent of its water supply

from the San Joaquin River. The remaining supply comes from groundwater, recirculation projects, and the CVP.

PID's San Joaquin River diversion facility consists of seven pumps with a total diversion capacity of approximately 195 cubic feet per second (cfs). The diversion facility was rehabilitated and a fish screen facility constructed in 2011. The screen was designed to meet or exceed the design criteria of NMFS for salmonids. The river diversion delivery system is automated for demand control on the Main Canal. PID currently operates their diversion pump system through an Allen-Bradley IntelliCENTER control system and through a Supervisory Control and Data Acquisition System (ESA 2006).

PID's distribution system includes approximately four miles of main canal system connecting the San Joaquin River diversion facility to the DMC, and approximately 52 miles of lateral delivery canals. The main canal lift system includes approximately four miles of concrete-lined open channel, and six pump stations capable of moving water into five separate canal lift segments (see Figure 3-1). The pump stations range in capacity from 195 cfs to 40 cfs, and include 35 electrically driven pumps ranging in size up to 350 horsepower. The main canal system is automated; each pump station operating on downstream level control to maintain water levels in each canal segment, limiting operational spills. PID's distribution system includes a 40 cfs connection into the DMC.

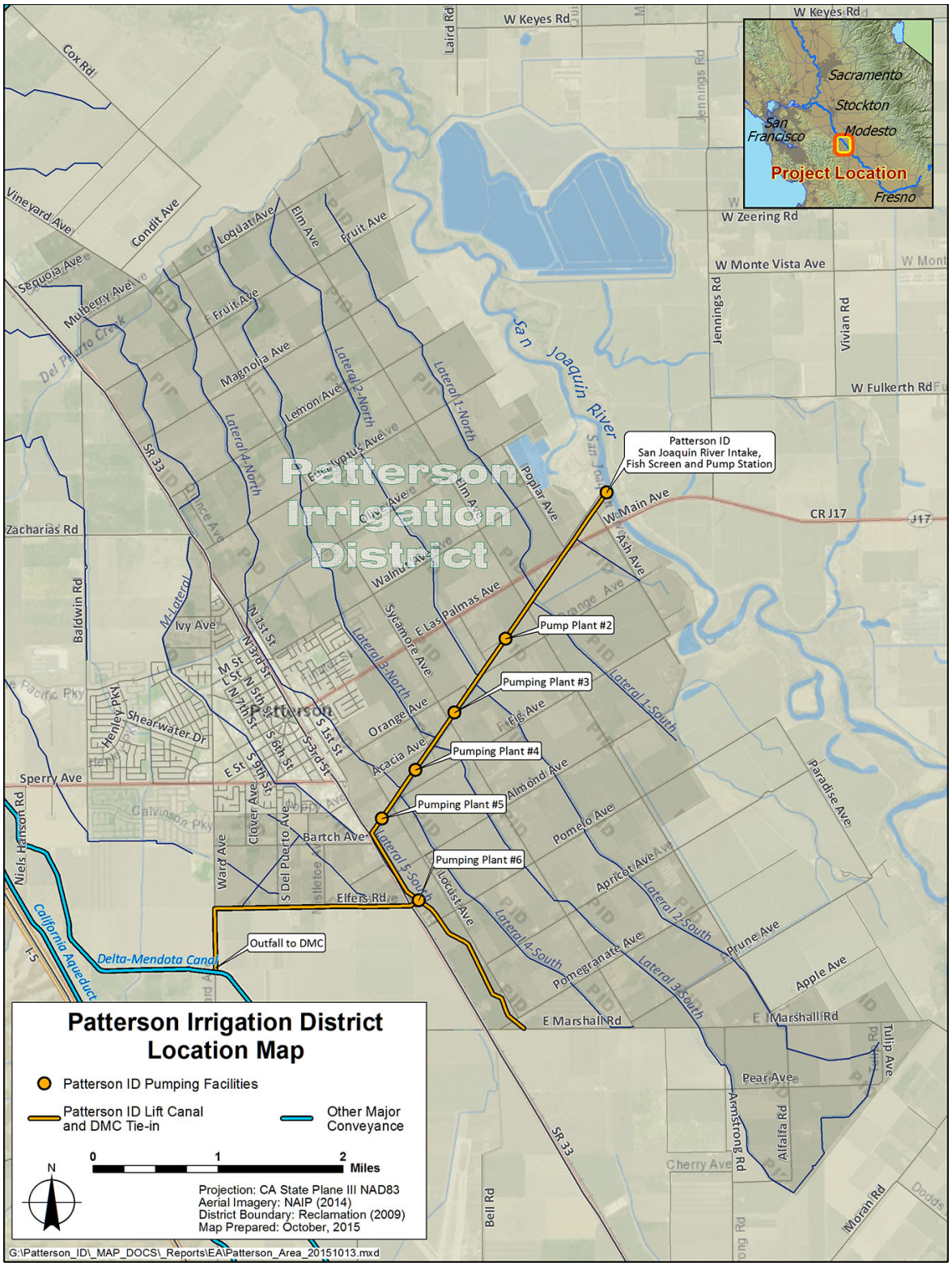

Figure 3-1.
Patterson Irrigation District

Banta-Carbona Irrigation District BCID is located near the City of Tracy in San Joaquin County, California and is downstream from the San Joaquin River and Stanislaus River confluence (Figures 1-1). The primary water supply for Alternative B is the San Joaquin River, for which the district holds three rights to divert water at River Mile 63.5 (See Figure 3-2). BCID's pre-1914 water rights on the San Joaquin River have served as the district's primary source of water for over 100 years. Diversion from BCID's canal will typically begin in March and end in November with average monthly diversion rates ranging from 150 to 215 cfs from May through August. The district also has a CVP contract of 20,000 AF annually and takes delivery of this water when available from the DMC. The distribution system in BCID consists of 2.5 miles of unlined canal, 33.2 miles of concrete lined canal, and 46 miles of underground pipeline. CVP water from the DMC is gravity-fed through two turnouts and a pipeline connected to the BCID Main Lift Canal. A fish screen facility is located at BCID's diversion on the San Joaquin River to prevent entrainment of fish species into the diversion works. The target species used for the establishment of the design criteria of the screen facility are the Chinook salmon (up to 400 cfs) and the Delta smelt (up to 250 cfs). The fish screen facility consists of a vee-shaped screen located within the leveed canal close to the river and 18 panel screens installed vertically in a vee configuration with 9 panels to a side. Each panel is 6'-1" tall and 11'-6" wide. Fish pass the screens and are pumped through a Hidrostal fish pump to the fish return pipeline on the north levee. This pipeline returns fish back to the river downstream from the diversion point. The positive barrier fish screen is fully consistent with the fish screen criteria of the regulatory agencies including NMFS, California Department of Fish and Wildlife, and the USFWS. CVP water from the DMC is gravity-fed through two turnouts and a pipeline connected to the BCID Main Lift Canal. BCID's distribution system includes a 65 cfs connection into the DMC.

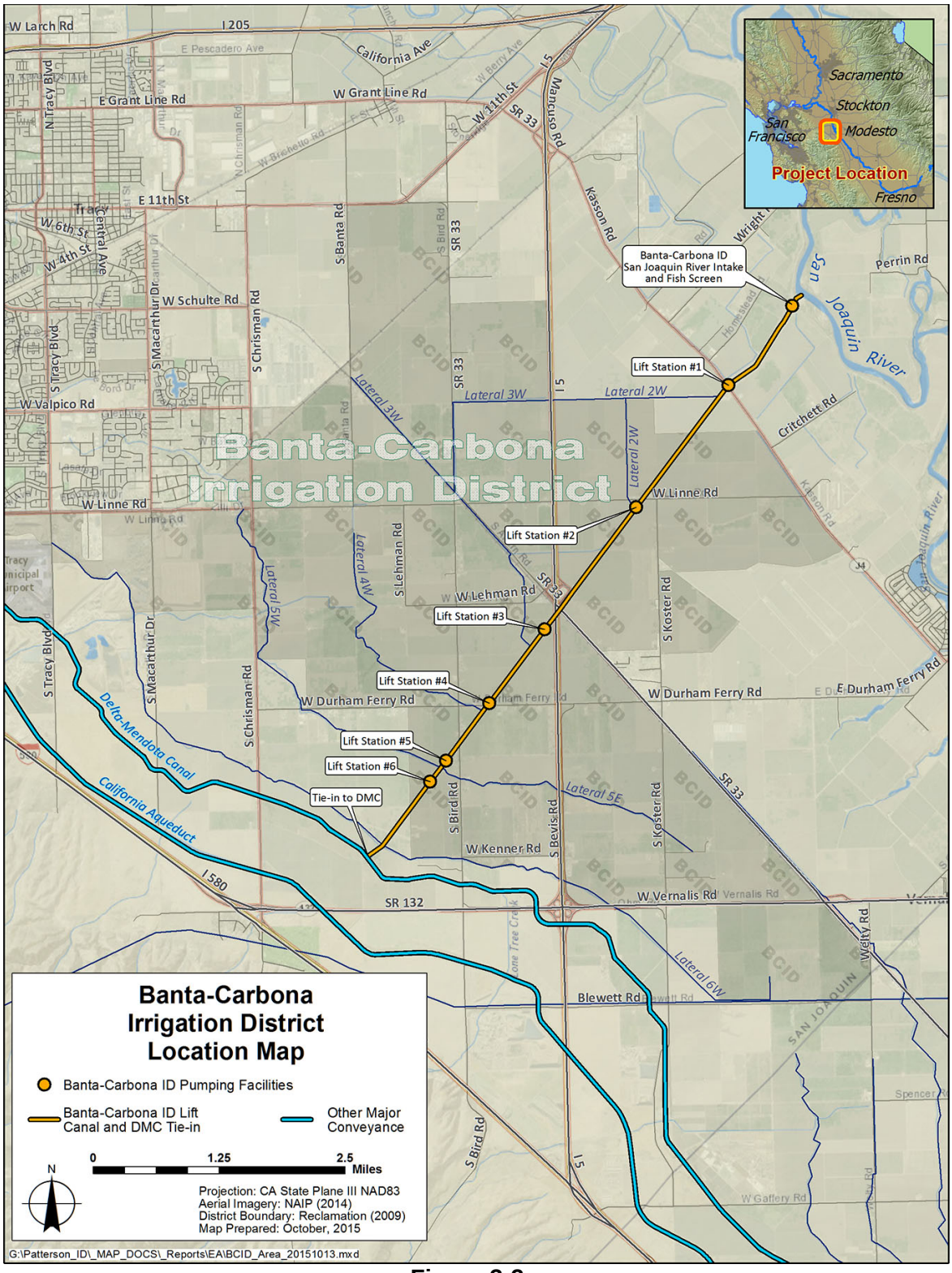

Figure 3-2.
Banta-Carbona Irrigation District

Friant Division The Friant Division was authorized by Congress under the concept of conjunctive use, where CVP water was meant to be a supplemental supply to alleviate groundwater overdraft in the area. Based on the conjunctive use concept within the Friant Division, contractors are expected to continue mixed use of CVP and other surface water supplies and groundwater, with greater emphasis on groundwater use during dry periods when surface water is limited or expensive and percolate excess surface water in wet years. The Friant Division is an integral part of the CVP, and is integrated into the CVP to the extent that San Joaquin River water is used to fulfill the CVP's obligations at the Mendota Pool and in the San Joaquin River. Major facilities of the Friant Division include Friant Dam and Millerton Lake, the Friant-Kern Canal and the Madera Canal.

Sacramento-San Joaquin Delta The hydraulics of the Delta are complicated by tidal influences, a multitude of agricultural and municipal and industrial (M&I) diversions for use within the Delta itself, and by CVP and SWP operations and exports. Principal factors affecting Delta hydrodynamics are (1) river inflow and outflow from the Sacramento River and San Joaquin River systems, (2) daily tidal inflow and outflow through San Francisco Bay, and (3) export pumping from the south Delta, primarily through the Banks and Jones pumping plants. Inflow to the Delta comes from the Sacramento, San Joaquin, Mokelumne, Calaveras, and Cosumnes rivers, and many smaller eastside tributaries.

In the south Delta, decreases in water levels due to CVP and SWP export pumping are a concern for local agricultural diverters because during periods of low-water levels, sufficient pump draft cannot be maintained, and irrigation can be interrupted.

Agreements exist between Reclamation and DWR regarding how the CVP and SWP will jointly operate to meet the goals and needs of the projects, and to meet shared responsibilities for in-basin requirements and water quality requirements in the Delta. Both projects export water from the Delta for use in areas to the south. For example, the Coordinated Operation Agreement, signed in November 1986, contains joint operations rules that the CVP and SWP have agreed to follow to allow operations while meeting in-basin flow and/or water quality standards in Delta (Reclamation and DWR 1986).

CVP and SWP operations are also constrained by a number of flow and quality regulations throughout the Delta watershed. These regulations include restrictions to exports from the Delta and can be impacted by changes in Delta inflow.

Central Valley Project Long-Term Water Service Contracts In accordance with Central Valley Project Improvement Act (CVPIA) Section 3404c, Reclamation is renegotiating long-term water service contracts. As many as 113 CVP water service contracts within the Central Valley of California may be renewed during this process. The action alternatives would be consistent with CVP long-term water service contracts.

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Release Schedule for Restoration Flows The volume and pattern of Restoration Flows to be released is determined according to procedures outlined in the Restoration Flows Guidelines and consistent with the Settlement, the Settlement Act, and conditions of the

Permits 11885, 11886, and 11887 and License 1986. As described in Section 2.4.1, "Project-Level Actions" of the SJRRP PEIS/R, operations at Friant Dam release Restoration Flows to the San Joaquin River, according to the six flow schedules specified in Exhibit B of the Settlement. These flow schedules are specified to six year types: Critical-Low, Critical-High, Dry, Normal-Dry, Normal-Wet, and Wet. The total annual unimpaired runoff at Friant Dam for a water year is the index by which the water year type is determined (based on water years 1922 through 2004). As part of the Restoration Flow allocation process, Reclamation considers existing channel capacities, in-channel construction activities, and any deliveries from the San Joaquin River under the terms and conditions of the Second Amended Contract for Exchange of Waters (Contract Ilr-1144) (Exchange Contract), dated February 14, 1968.

The Settlement includes an annual allocation of Restoration flow using either the Restoration Flow schedules included in Exhibit B of the Settlement, or a more continuous hydrograph in consideration of recommendations to be made by the Restoration Administrator.

Restoration Flows Table 3-1 presents the estimated portion of Restoration Flows that would reach the lower San Joaquin River and that would be available for recapture under the action alternatives from March 23, 2016 through March 22, 2017, as defined in the 2016 Water Rights Order. These flows account for holding contract diversions and channel losses between Friant Dam and Mendota Pool. In addition, these flows exclude periods of flood when Restoration Flows are not available for recapture. As a result, although Wet years have more flows, Wet years tend to align with floods and, therefore, there are less Restoration Flows available for recapture in Wet years than drier year types. Additionally, there is a Restoration Flow capacity restriction in Reach 4 (Sack Dam to Eastside Bypass Confluence) of 300 cfs.

Pursuant to Condition 1 of the 2013 Water Rights Order, Reclamation can only recapture Restoration Flows that originate from Friant Dam. Any inflows downstream from Friant Dam, such as Cottonwood Creek or Salt Slough, may contribute to the flow targets described in Exhibit B of the Settlement, but may not be diverted by Reclamation under the 2013 Water Rights Order. Thus, total flows reaching the Merced River confluence will exceed the amount of Restoration Flows available for recapture.

CalSim II Modeling The flows presented in the analysis in this EA are based on 2012 CalSim II water operations simulations, using Reclamation's 2012 CalSim II model. CalSim II is the best available tool for evaluating system-wide water operations throughout the Central Valley and is the standard operations model used for CVP/SWP systems analysis. CalSim II typically simulates system operations for an 82-year period using a monthly time step. The model assumes that facilities, land-use, water supply contracts, and regulatory requirements are constant over this period, representing a fixed level of development. The historical flow record of October 1921 to September 2003, adjusted for the influence of land-use change and upstream flow regulation, is used to represent the possible range of hydrologic conditions. Results from a single simulation may not necessarily correspond to actual system operations for a specific month or year, but are representative of general water supply conditions. The purpose of using simulated

data is to understand the conditions that might exist under current operations for a broader number of water year types with a more representative sample of each year type, including normal-dry, dry, and critical high year types. Therefore, this CalSim II output is appropriate to represent the general water supply conditions for the analysis of this EA.

Table 3-1.
Average Monthly Restoration Flows Available for Recapture Below the Merced River Confluence Under the Action Alternatives, by SJRRP Year Type

SJRRP Year Type	March (cfs)	April (cfs)	May (cfs)	June (cfs)	July (cfs)	August (cfs)	September (cfs)	October (cfs)	November (cfs)	December (cfs)	January (cfs)	February (cfs)
Wet	19	94	56	75	21	43	62	102	218	129	104	94
Normal-Wet	228	276	131	112	43	43	62	109	249	130	113	67
Normal-Dry	288	300	81	81	43	43	62	109	249	135	152	125
Dry	300	228	70	70	37	37	62	109	223	147	125	111
Critical High	240	0	0	0	0	0	0	0	16	0	0	0

Notes:

Values in the table do not include Restoration Flows that may coincide with flood releases or tributary inflows downstream from Friant Dam because they cannot be recaptured per the Settlement or Reclamation's water license and permits.

Losses and flow restriction were calculated as follows:

1 Losses in Reach 1 and Reach 2 are calculated as defined in the Settlement

2 5% operational loss at Mendota Pool

3 Flow restricted to 300 cfs in Reach 4

4 No losses assumed in Reach 4 or the Eastside Bypass, consistent with assumptions in Exhibit B of the Settlement.

Key:

cfs = cubic feet per second

SJRRP = San Joaquin River Restoration Program

3.1.2 Environmental Consequences

This section discusses the environmental consequences of the alternatives for water resources. Overall water supply changes for the Friant Division long-term contractors as a result of the implementation of Restoration Flow actions, and including recapture of Interim and Restoration Flows, is discussed in the SJRRP PEIS/R. For additional information on the potential water resources impacts of recirculating recaptured Restoration Flows, see the Recirculation EA.

No Action Alternative

As mentioned above in the No Action Alternative description, the SJRRP Selected Alternative (Alterative C1) includes recapture of up to 1,000 cfs at existing facilities along the river below the Merced River confluence. Table 3-2 presents the estimated portion of Restoration Flows that would reach the San Joaquin River below the Merced River and that would be available for recapture under the No Action Alternative. These flows account for diversions and losses between Friant Dam and Mendota Pool. In addition, these flows exclude periods of flood when Restoration Flows are not available for recapture. As a result, although Wet years have more flows, Wet years tend to align with floods and, therefore, there are less Restoration Flows available for recapture in Wet years than drier year types. Additionally, the No Action Alternative (future no action condition) includes a design channel capacity of 4,500 cfs.

The potential upper bound of recapture below the Merced River confluence under the No Action Alternative (SJRRP Preferred Alternative [Alternative C1]) is reported in Table 3-3 as a percent of the total San Joaquin River flow at Vernalis. Availability of Restoration Flows for the No Action Alterative was estimated using standard methodologies that are consistent with the current regulatory framework, using CalSim II, which is the best available tool for evaluating system-wide water operations throughout the Central Valley. CalSim II is described above in Section 3.1.1, in the section titled “Hydrology – Surface Water Supplies and Facilitates Operations” subsection “Operational Modeling.”

Pursuant to Condition 1 of the 2013 Water Rights Order, Reclamation can only recapture Restoration Flows that originate from Friant Dam. Any inflows downstream from Friant Dam, such as Cottonwood Creek or Salt Slough, may contribute to the flow targets described in Exhibit B of the Settlement, but may not be diverted by Reclamation under the 2013 Water Rights Order. Thus, total flows reaching the lower San Joaquin River (below the Merced River confluence) will exceed the amount of Restoration Flows available for recapture.

The analysis in the SJRRP PEIS/R Chapter 14, “Hydrology – Surface Water Quality,” found that the No Action Alternative (SJRRP Preferred Alternative [Alterative C1]) would not result in any violations of existing water quality standards or substantial water quality changes that would adversely affect beneficial uses, or have substantive impacts on public health. As stated in the SJRRP PEIS/R in Impact SWQ-5 on page 14-35, “[p]otential surface water quality effects within the San Joaquin River from the Merced River to the Delta would not result in any additional violations of existing water quality standards or substantial water quality changes that would adversely affect beneficial uses, or have substantive impacts on public health. Surface water quality impacts in the San

Joaquin River from the Merced River to the Delta under [the SJRRP Selected Alternative] Alternative C1 would be less than significant." Additionally, it was stated that "[o]n a historical monthly average basis, EC at San Joaquin River sites below the Merced River and below the Tuolumne River would be less than under the [SJRRP PEIS/R] No Action Alternative, particularly during March and April."

As discussed in SJRRP PEIS/R Chapter 12, "Hydrology – Groundwater," generally, both groundwater levels and groundwater quality impacts are anticipated to be potentially significant and unavoidable in association with the reduction of water supply to the Friant Division long-term contractors for the SJRRP Selected Alternative (Alternative C1).

Table 3-2.
Average Monthly Restoration Flows Available for Recapture Below the Merced River Confluence Under the No Action Alternative (SJRRP Selected Alternative [Alternative C1]), by SJRRP Year Type

SJRRP Year Type	March (cfs)	April (cfs)	May (cfs)	June (cfs)	July (cfs)	August (cfs)	September (cfs)	October (cfs)	November (cfs)	December (cfs)	January (cfs)	February (cfs)
Wet	46	866	294	392	21	43	62	102	218	129	104	94
Normal-Wet	556	2320	148	121	43	43	62	109	249	130	113	67
Normal-Dry	701	1092	81	81	43	43	62	109	249	135	152	125
Dry	732	282	70	70	37	37	62	109	223	147	125	111
Critical High	585	0	0	0	0	0	0	0	16	0	0	0

Notes:

Values in the table do not include Restoration Flows that may coincide with flood releases or tributary inflows downstream from Friant Dam because they cannot be recaptured per the Settlement or Reclamation's water license and permits.

Losses and flow restriction were calculated as follows:

1 Losses in Reach 1 and Reach 2 are calculated as defined in the Settlement

2 5% operational loss at Mendota Pool

3 Design channel capacity of 4,500 cfs

4 No losses assumed in Reach 4 or the Eastside Bypass, consistent with assumptions in Exhibit B of the Settlement.

Key:

cfs = cubic feet per second

SJRRP = San Joaquin River Restoration Program

Table 3-3.
Average Monthly Restoration Flow Able to be Recaptured in the San Joaquin River from the Merced River to the Delta (No Action Alternative) as a Percentage of Average Monthly San Joaquin River Flow at Vernalis, by SJRRP Year Type

SJRRP Year Type	March (cfs)	April (cfs)	May (cfs)	June (cfs)	July (cfs)	August (cfs)	September (cfs)	October (cfs)	November (cfs)	December (cfs)	January (cfs)	February (cfs)
Wet	0.3%	2.0%	1.3%	1.8%	0.2%	1.1%	1.6%	2.8%	5.3%	2.6%	1.6%	1.1%
Normal-Wet	7.4%	10.9%	2.5%	2.9%	1.8%	1.9%	2.5%	3.6%	9.5%	3.5%	1.8%	0.9%
Normal-Dry	20.8%	19.0%	2.3%	4.5%	3.2%	3.1%	3.4%	4.6%	11.7%	5.0%	4.7%	2.8%
Dry	30.0%	10.2%	3.0%	6.0%	3.8%	3.4%	4.0%	5.5%	11.8%	8.0%	3.5%	2.4%
Critical High	30.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	0.0%	0.0%

Note:

Amount of Restoration Flows able to be recaptured at below the Merced River based on the availability of Restoration Flows under the SJRRP Preferred Alternative (Alternative C1).

Key:

cfs = cubic feet per second

Alternative A – Recapture at Patterson Irrigation District

Under Alternative A, recapture of a portion of Restoration Flows would occur at PID using existing facilities. This action alternative is a subset of the No Action Alternative (SJRRP Selected Alternative [Alterative C1]) being implemented in phases as constraints in the system (e.g., existing channel capacity restrictions) are removed. The portion of Restoration Flows available for recapture at PID will be limited by the availability of Restoration Flows, as shown in Table 3-1, and the 40 cfs of pumping capacity at PID.

The potential upper bound of recapture at PID facilities is reported in Table 3-4 as a percent of the total San Joaquin River flow at Vernalis. Availability of Restoration Flows for each action alternative were estimated using standard methodologies that are consistent with the current regulatory framework, using CalSim II, which is the best available tool for evaluating system-wide water operations throughout the Central Valley. CalSim II is described above in Section 3.1.1, in the section titled "Hydrology – Surface Water Supplies and Facilitates Operations" subsection "Operational Modeling." The San Joaquin River at Vernalis was used for two main reasons, 1) it is the San Joaquin River compliance location for flow and water quality under the SWRCB D-1641, so it is representative of potential downstream impacts, and 2) when the same comparison point is used, the No Action Alternative and the action alternatives can be compared to each other. The purpose of using simulated data is to understand the conditions that might exist under current operations for a broader number of water year types with a more representative sample of each year type, including normal-dry, dry, and critical high year types.

As shown, the portion of flows that could be recaptured at PID is minimal in comparison to the flows in the San Joaquin River. Table 3-4 and Table 3-3 (Alternative A and the No-Action Alternative, respectively), show that Alternative A recaptures an equal or smaller percentage of the total San Joaquin River flow at Vernalis as compared to the No Action Alternative (SJRRP Selected Alterative [Alternative C1]).

As described above, the analysis in the SJRRP PEIS/R Chapter 14, "Hydrology – Surface Water Quality," found potential surface water quality effects would not result in any additional violations of existing water quality standards or substantial water quality changes that would adversely affect beneficial uses, or have substantive impacts on public health within the San Joaquin River from the Merced River to the Delta (SWQ-5) and would be less than significant and beneficial on salinity in the San Joaquin River at Vernalis (SWQ-7).

Reclamation intends to operate to the current (2016, 2017) water quality standards, as required by the SWRCB. Therefore, Alternative A would not result in any violations of existing water quality standards or substantial water quality changes that would adversely affect beneficial uses, or have substantive impacts on public health. This is reiterated in the 2016 Water Rights Order, stating that once Restoration Flows pass the Merced River confluence and mix with water in the lower San Joaquin River, recapture at any location cannot physically change the concentration of any constituents in the San Joaquin River water column and, therefore, will have no effect on water quality.

Alternative A could cause a very small decrease in water quality in the DMC. Pumping at Jones Pumping Plant ranged from about 3,100 to 4,800 acre-feet per day in February 2016. 3,600 acre-feet per day equals approximately 1,800 cfs of flow. During this same time, water quality at DMC headworks was approximately 600 microsiemens per centimeter (μS/cm) (ranged between about 450 and 850 μS/cm). At most, under Alternative A, 40 cfs of recaptured Restoration Flows would be introduced into the DMC. Although not the case currently, the water quality on the San Joaquin River near Patterson (SJP gage) generally worse than at Vernalis near Banta-Carbona. Using the February 2015 SJP water quality of 2,200 μS/cm, and assuming the SJP water quality for the maximum recaptured Restoration Flows, the electrical conductivity in the DMC would only increase from 600 to 635 μS/cm. Given the wide fluctuation in the DMC at this time, a 35 μS/cm change would be less than significant (DWR 2016).

The 2016 Water Rights Order also addressed water quality in the DMC. The order found that there would be a less than significant change in EC due to recapture at PID (and BCID) compared to recapture at the Delta.

As stated above, both groundwater levels and groundwater quality impacts are anticipated to be potentially significant and unavoidable in association with the reduction of water supply to the Friant Division long-term contractors for the No Action Alternative. Alternative A, as compared to the No Action Alternative (PEIS/R Preferred Alternative [Alternative C1]), is a temporary one year action that may contribute to abating additional groundwater pumping within the Friant Division as Alternative A is not reducing water supply to the Friant Division long-term contractors but providing Restoration Flows available for recapture. Therefore, this impact would be less than significant.

Table 3-4.
Average Monthly Restoration Flow Able to be Recaptured at PID as a Percentage of Average Monthly San Joaquin River Flow at Vernalis, by SJRRP Year Type

SJRRP Year Type	March (cfs)	April (cfs)	May (cfs)	June (cfs)	July (cfs)	August (cfs)	September (cfs)	October (cfs)	November (cfs)	December (cfs)	January (cfs)	February (cfs)
Wet	0.0%	0.1%	0.1%	0.1%	0.2%	1.0%	1.0%	1.0%	0.8%	0.7%	0.4%	0.3%
Normal-Wet	0.4%	0.4%	0.6%	0.8%	1.6%	1.8%	1.6%	1.3%	1.5%	1.0%	0.4%	0.2%
Normal-Dry	1.1%	0.8%	1.1%	2.2%	3.0%	2.9%	2.2%	1.7%	1.9%	1.4%	1.1%	0.7%
Dry	1.6%	1.5%	1.6%	3.1%	3.6%	3.2%	2.6%	2.0%	2.1%	2.2%	0.9%	0.6%
Critical High	1.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	0.0%	0.0%

Note:

Amount of Restoration Flows able to be recaptured at PID is based on the availability of Restoration Flows at PID's diversion facility and PID's proposed 40 cubic feet per second instantaneous pumping capacity limitation. The values in this table do not consider available DMC capacity nor any downtime/maintenance or PID capacity constraints.

Key:

cfs = cubic feet per second

PID = Patterson Irrigation District

SJRRP = San Joaquin River Restoration Program

Alternative B – Recapture at Banta-Carbona Irrigation District

Under Alternative B, recapture of a portion of Restoration Flows would occur at BCID using existing facilities. This action alternative is a subset of the No Action Alternative (SJRRP Selected Alternative [Alterative C1]) being implemented in phases as constraints in the system (e.g., existing channel capacity restrictions) are removed. The portion of Restoration Flows available for recapture at BCID will be limited by the availability of Restoration Flows, as shown in Table 3-1, and the 65 cfs of pumping capacity at BCID.

The potential upper bound of recapture at BCID facilities is reported in Table 3-5 as a percent of the total San Joaquin River flow at Vernalis. Availability of Restoration Flows for each action alternative were estimated using standard methodologies that are consistent with the current regulatory framework, using CalSim II, which is the best available tool for evaluating system-wide water operations throughout the Central Valley. CalSim II is described above in Section 3.1.1, in the section titled "Hydrology – Surface Water Supplies and Facilitates Operations" subsection "Operational Modeling."

As shown, the portion of flows that could be recaptured at BCID is minimal in comparison to the flows in the San Joaquin River. Table 3-5 and Table 3-3 (Alternative B and the No-Action Alternative, respectively), show that Alternative B recaptures a smaller percentage of the total San Joaquin River flow at Vernalis as compared to the No Action Alternative (SJRRP Selected Alterative [Alternative C1]).

As described above, the analysis in the SJRRP PEIS/R Chapter 14, "Hydrology – Surface Water Quality," found potential surface water quality effects would not result in any additional violations of existing water quality standards or substantial water quality changes that would adversely affect beneficial uses, or have substantive impacts on public health within the San Joaquin River from the Merced River to the Delta (SWQ-5); and would be less than significant and beneficial on salinity in the San Joaquin River at Vernalis (SWQ-7).

Reclamation intends to operate to the current water quality standards in 2016, as required by the SWRCB. Additionally, the recapture at BCID would be added to the Delta Exports calculation, so would have no impact on the Net Delta Outflow Index as defined by D-1641. Therefore, Alternative B would not result in any violations of existing water quality standards or substantial water quality changes that would adversely affect beneficial uses, or have substantive impacts on public health. This is reiterated in the 2016 Water Rights Order, stating once Restoration Flows pass the Merced River confluence and mix with water in the lower San Joaquin River, recapture at any location cannot physically change the concentration of any constituents in the San Joaquin River water column and, therefore, will have no effect on water quality.

Alternative B could cause a very small decrease in water quality in the DMC. Pumping at Jones Pumping Plant ranged from about 3,100 to 4,800 acre-feet per day in February 2016. 3,600 acre-feet per day equals approximately 1,800 cfs of flow. During this same time, water quality at the DMC headworks was approximately 600 μS/cm (ranged between about 450 and 850 μS/cm). At most, under Alternative B, 65 cfs of recaptured Restoration Flows will be introduced into the DMC. Although not the case currently, the

water quality on the San Joaquin River near Patterson (SJP gage) is generally worse than at Vernalis near Banta-Carbona. Using the February 2015 SJP water quality of 2,200 μS/cm, and assuming the SJP water quality for the maximum recaptured Restoration Flows under Alternative B, the electrical conductivity in the DMC would only increase from 600 to 656 μS/cm. Given the wide fluctuation in the DMC at this time, a 56 μS/cm change would be less than significant (DWR 2016).

The 2016 Water Rights Order also addressed water quality in the DMC. The order found that there would be a less than significant change in EC due to recapture at BCID (and PID) compared to recapture at the Delta.

As stated above, both groundwater levels and groundwater quality impacts are anticipated to be potentially significant and unavoidable in association with the reduction of water supply to the Friant Division long-term contractors for the No Action Alternative. Alternative B, as compared to the No Action Alternative (PEIS/R Preferred Alternative [Alternative C1]), would be a temporary one year action that may contribute to abating additional groundwater pumping within the Friant Division, as Alternative B would not reduce water supply to the Friant Division long-term contractors but would provide recaptured Restoration Flows available for recirculation.

Table 3-5.
Average Monthly Restoration Flow Able to be Recaptured at BCID as a Percentage of Average Monthly San Joaquin River Flow at Vernalis, by SJRRP Year Type

SJRRP Year Type	March (cfs)	April (cfs)	May (cfs)	June (cfs)	July (cfs)	August (cfs)	September (cfs)	October (cfs)	November (cfs)	December (cfs)	January (cfs)	February (cfs)
Wet	0.0%	0.1%	0.1%	0.1%	0.2%	1.1%	1.6%	1.6%	1.4%	1.1%	0.6%	0.4%
Normal-Wet	0.7%	0.7%	1.0%	1.3%	1.8%	1.9%	2.5%	2.1%	2.5%	1.6%	0.7%	0.4%
Normal-Dry	1.8%	1.3%	1.8%	3.6%	3.2%	3.1%	3.4%	2.7%	3.0%	2.2%	1.8%	1.1%
Dry	2.7%	2.4%	2.5%	5.0%	3.8%	3.4%	4.0%	3.3%	3.4%	3.5%	1.4%	0.9%
Critical High	2.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	0.0%	0.0%

Note:

Amount of Restoration Flows able to be recaptured at BCID is based on the availability of Restoration Flows at BCID's diversion facility and BCID's proposed 65 cubic feet per second instantaneous pumping capacity limitation. The values in this table do not consider available DMC capacity nor any downtime/maintenance or BCID capacity constraints.

Key:

BCID = Banta-Carbona Irrigation District
cfs = cubic feet per second
SJRRP = San Joaquin River Restoration Program

Alternative C – Recapture at Patterson Irrigation District and Banta-Carbona Irrigation District

Alternative C would be the aggregate of Alternatives A and B with recapture of Restoration Flows at PID and BCID using existing facilities. Alternative C is for a temporary total combined 105 cfs diversion at PID and BCID, 40 cfs and 65 cfs respectively. Like Alternatives A and B, this action alternative is a subset of the No Action Alternative (SJRRP Preferred Alternative [Alterative C1]) being implemented in phases as constraints in the system (e.g., existing channel capacity restrictions) are removed. The portion of Restoration Flows available for recapture at PID and BCID would be limited by the availability of Restoration Flows, as shown in Table 3-1, and the 105 cfs combined pumping facilities at PID (40 cfs) and BCID (65 cfs).

The potential upper bound of recapture at PID and BCID facilities is reported in Table 3-6 as a percent of the total San Joaquin River flow at Vernalis. Availability of Restoration Flows for each action alternative were estimated using standard methodologies that are consistent with the current regulatory framework, using CalSim II, which is the best available tool for evaluating system-wide water operations throughout the Central Valley. CalSim II is described above in Section 3.1.1, in the section titled "Hydrology – Surface Water Supplies and Facilitates Operations" subsection "Operational Modeling."

As shown, the portion of flows that could be recaptured at PID and BCID would be minimal in comparison to the flows in the San Joaquin River. Table 3-6 and Table 3-3 (Alternative C and the No-Action Alternative, respectively), show that Alternative C recaptures a smaller percentage of the total San Joaquin River flow at Vernalis as compared to the No Action Alternative (SJRRP Selected Alterative [Alternative C1]).

As described above, the analysis in the SJRRP PEIS/R Chapter 14, "Hydrology – Surface Water Quality," found potential surface water quality effects would not result in any additional violations of existing water quality standards or substantial water quality changes that would adversely affect beneficial uses, or have substantive impacts on public health within the San Joaquin River from the Merced River to the Delta (SWQ-5); and would be less than significant and beneficial on salinity in the San Joaquin River at Vernalis (SWQ-7).

Reclamation intends to operate to the current water quality standards in 2016, as required by the SWRCB. Additionally, the recapture at BCID would be added to the Delta Exports calculation, so would have no impact on the Net Delta Outflow Index as defined by D-1641. Therefore, Alternative C would not result in any violations of existing water quality standards or substantial water quality changes that would adversely affect beneficial uses, or have substantive impacts on public health. This is reiterated in the 2016 Water Rights Order, stating once Restoration Flows pass the Merced River confluence and mix with water in the lower San Joaquin River, recapture at any location cannot physically change the concentration of any constituents in the San Joaquin River water column and, therefore, would have no effect on water quality.

Alternative C could cause a very small decrease in water quality in the DMC. Pumping at Jones Pumping Plant ranged from about 3,100 to 4,800 acre-feet per day in February

2016. 3,600 acre-feet per day equals approximately 1,800 cfs of flow. During this same time, water quality at DMC headworks was approximately 600 μS/cm (ranged between about 450 and 850 μS/cm). At most, 105 cfs of recaptured Restoration Flows would be introduced into the DMC. Although not the case currently, the water quality on the San Joaquin River near Patterson (SJP gage) is generally worse than at Vernalis near Banta-Carbona. Using the February 2015 SJP water quality of 2,200 μS/cm, and assuming the SJP water quality for the maximum recaptured Restoration Flows, the electrical conductivity in the DMC would only increase from 600 to 688 μS/cm. Given the wide fluctuation in the DMC at this time, an 88 μS/cm change would be less than significant (DWR 2016).

The 2016 Water Rights Order also addressed water quality in the DMC. The order found that there would be a less than significant change in EC due to recapture at PID and BCID compared to recapture at the Delta.

As stated above, both groundwater levels and groundwater quality impacts are anticipated to be potentially significant and unavoidable in association with the reduction of water supply to the Friant Division long-term contractors for the No Action Alternative. Alternative C, as compared to the No Action Alternative (PEIS/R Selected Alternative [Alternative C1]), would be a temporary one year action that may contribute to abating additional groundwater pumping within the Friant Division as Alternative C would not reduce water supply to the Friant Division long-term contractors, but would provide recaptured Restoration Flows available for recirculation.

Table 3-6.
Average Monthly Restoration Flow Able to be Recaptured at PID and BCID as a Percentage of Average Monthly San Joaquin River Flow at Vernalis, by SJRRP Year Type

SJRRP Year Type	March (cfs)	April (cfs)	May (cfs)	June (cfs)	July (cfs)	August (cfs)	September (cfs)	October (cfs)	November (cfs)	December (cfs)	January (cfs)	February (cfs)
Wet	0.0%	0.2%	0.1%	0.2%	0.2%	1.1%	1.6%	2.6%	2.2%	1.8%	1.0%	0.7%
Normal-Wet	1.1%	1.1%	1.4%	1.8%	1.8%	1.9%	2.5%	3.4%	4.0%	2.5%	1.1%	0.6%
Normal-Dry	3.0%	2.2%	2.3%	4.5%	3.2%	3.1%	3.4%	4.4%	4.9%	3.6%	3.0%	1.7%
Dry	4.3%	3.8%	3.0%	6.0%	3.8%	3.4%	4.0%	5.3%	5.5%	5.7%	2.2%	1.5%
Critical High	4.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	0.0%	0.0%

Note:

Amount of Restoration Flows able to be recaptured at PID and BCID is based on the availability of Restoration Flows at PID and BCID's diversion facility and PID and BCID's proposed combined 105 cubic feet per second instantaneous pumping capacity limitation. The values in this table do not consider available DMC capacity nor any downtime/maintenance or PID and BCID capacity constraints.

Key:

BCID = Banta-Carbona Irrigation District
cfs = cubic feet per second
PID = Patterson Irrigation District
SJRRP = San Joaquin River Restoration Program

3.2 Cumulative Impacts

Temporary recaptured Restoration Flows from PID and/or BCID recirculated to the CVP would not have any controversial or highly uncertain effects, or involve unique or unknown environmental risks. The action alternatives would not trigger other water service actions and would not contribute to cumulative effects to physical resources when added to other past, present or reasonably foreseeable actions. The canals, rivers, creeks, and conveyance and distribution facilities associated with the action alternatives are managed primarily for agricultural supplies. The action alternatives would not interfere with the deliveries, operations, or cause substantial adverse changes to the conveyance facilities.

The remainder of the SJRRP actions, including the continued release of future Restoration Flows from Friant Dam, the recapture of flows at specific San Joaquin River and Delta diversion and/or pumping facilities are all reasonably foreseeable and required under the Settlement and the Act. Future program actions related to the SJRRP have been addressed in the SJRRP PEIS/R (Reclamation 2012a), as discussed earlier in this EA. Areas of potential concern, such as water supply impacts, recapture mechanisms, and cumulative impacts have been discussed within the SJRRP PEIS/R.

Currently, Reclamation is preparing the Long-term Recapture and Recirculation of Restoration Flows EIS for the SJRRP. In July 2015 Reclamation published a Notice of Intent to prepare an EIS to identify a set of alternatives for the recapture and recirculation of Restoration Flows to long-term contractors of the Friant Division of the CVP.

The proposed recapture, when added to other actions, would not contribute to significant increases or decreases in environmental conditions. The action alternatives would occur only for one year and recapture a maximum of up to: 28,979 AF of Restoration Flows in Alternative A; 47,090 AF of Restoration Flows in Alternative B; or 76,069 AF of recaptured Restoration Flows in Alternative C. The action alternatives would not be precedent-setting. The action alternatives would not contribute to cumulative impacts on water resources, land use, biological resources, cultural resources, ITAs, air quality, or climate change and GHG emissions.

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4.0 Consultation and Coordination

4.1 National Environmental Policy Act

This EA has been prepared pursuant to NEPA, which was signed into law in 1969 (42 U.S. Code [USC] Section 4321 et seq.). In addition, it was prepared in accordance with Council on Environmental Quality (CEQ) regulations for implementing NEPA, 40 CFR Parts 1500- 1508. This EA assesses if the action alternatives would cause any significant environmental effects. The Draft EA was circulated for 30 days for public review and comment and considers and responds to comments received.

4.2 Fish and Wildlife Coordination Act of 1934 (16 USC § 661 et seq.)

The Fish and Wildlife Coordination Act (FWCA) requires that Reclamation consult with fish and wildlife agencies (Federal and state) on all water development projects that could affect biological resources. The action alternatives do not involve Federal water development projects; therefore, the FWCA does not apply.

4.3 Endangered Species Act of 1973 (16 USC § 1531 et seq.)

Section 7 of the Endangered Species Act (ESA) requires Federal agencies, in consultation with the Secretary of the Interior, to ensure that their actions do not jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of these species.

The action alternatives would not have any effect on listed species beyond those analyzed in the previously described applicable ESA analyses. The action alternatives would not change the land use patterns of the cultivated or fallowed fields that have some value to listed species. In addition, the short duration of the water availability, the requirement that no native lands be converted without consultation with the USFWS, and the stringent requirements for transfers under applicable laws would prevent any effect to any federally listed species or any critical habitat.

4.4 National Historic Preservation Act (16 USC § 470 et seq.)

The NHPA of 1966, as amended (16 USC 470 et seq.), requires that Federal agencies give the Advisory Council on Historic Preservation an opportunity to comment on the effects of an undertaking on historic properties, properties that are eligible for inclusion in the NRHP. The 36 CFR Part 800 regulations implement Section 106 of the NHPA.

Section 106 of the NHPA requires federal agencies to consider the effects of federal undertakings on historic properties, properties determined eligible for inclusion in the NRHP. Compliance with Section 106 follows a series of steps that are designed to identify interested parties, determine the area of potential effect, conduct cultural resource inventories, determine if historic properties are present within the area of potential effect, and assess effects on any identified historic properties. The activities associated with the action alternatives would include no new ground disturbance, no change in land use, and the use of existing conveyance features to move and store water. Reclamation has determined that there would be no potential to affect historic properties by the action alternatives pursuant to 36 CFR 800.3(a)(1).

4.5 Migratory Bird Treaty Act of 1918 (16 USC § 703 et seq.)

The MBTA implements various treaties and conventions between the U.S. and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Unless permitted by regulations, the MBTA provides that it is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. Subject to limitations in the MBTA, the Secretary of the Interior may adopt regulations determining the extent to which, if at all, hunting, taking, capturing, killing, possessing, selling, purchasing, shipping, transporting or exporting of any migratory bird, part, nest or egg will be allowed, having regard for temperature zones, distribution, abundance, economic value, breeding habits and migratory flight patterns.

The action alternatives would not change the land use patterns of the cultivated or fallowed fields that have value to birds protected by the MBTA; therefore, the action alternatives would have no effect on birds protected by the MBTA.

4.6 Executive Order 113007 and American Indian Religious Freedom Act of 1978 – Indian Trust Assets and Sacred Sites on Federal Lands

Executive Order 113007 and the American Indian Religious Freedom Act of 1978 are designed to protect ITAs, accommodate access and ceremonial use of Native American sacred sites by Native American religious practitioners, avoid adversely affecting the physical integrity of such sacred sites, and protect and preserve the observance of traditional Native American religions. The action alternatives would not violate these protections.

4.7 Executive Order 12898 – Environmental Justice in Minority and Low-Income Populations

Executive Order 12898 requires Federal agencies to identify and address disproportionately high and adverse human health and environmental effects of Federal programs, policies, and activities on minority and low-income populations. The action alternatives have been assessed for potential environmental, social, and economic impacts on minority and low-income populations. Minority and low-income populations would not be disproportionately exposed to adverse effects relative to the benefits of the action.

4.8 Central Valley Project Improvement Act

Reclamation's evolving mission was written into law on October 30, 1992, in the form of Public Law 102-575, the Reclamation Projects Authorization and Adjustment Act of 1992. Included in the law was Title 34, the CVPIA. The CVPIA amended previous authorizations of the CVP to include fish and wildlife protection, restoration, and mitigation as project purposes having equal priority with irrigation and domestic water supply uses, and fish and wildlife enhancement as having equal priority with power generation. The action alternatives would be consistent with CVPIA.

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5.0 Public Comments

On December 21, 2015, Reclamation released the Draft EA for public review and comment. The comment period on the Draft EA began on December 21, 2015, and closed on January 20, 2016. Table 5-1 provides a list of the agencies that provided comments on the Draft EA.

Table 5.1.
Comment Letters Received on the Draft EA

Agency	Affiliation
The Bay Institute and Natural Resources Defense Council	Organization
San Joaquin River Exchange Contractors Water Authority	Local Agency
San Luis & Delta-Mendota Water Authority	Local Agency
Stockton East Water District	Local Agency
West Stanislaus Irrigation District	Local Agency

Key:
EA = Environmental Assessment

The public comments have been reviewed and, in accordance with NEPA CEQ Regulations, responses have been developed for all substantive comments (Attachment C).

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6.0 List of Preparers and Reviewers

6.1 U.S. Department of the Interior, Bureau of Reclamation

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Traci Michel, Deputy Program Manager, San Joaquin River Restoration Program

6.2 MWH

Meredith Parkin, J.D., Principal Environmental Scientist

William Smith, P.E., Principal Engineer

John Roldan, P.E., Principal Water Resources Planner

Jeffrey Payne, P.E., Principal Water Resources Planner

Barbara McDonnell, Principal Environmental Scientist

Cynthia Jones, Senior Biologist

Rina Binder-Macleod, Water Resources Planner

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