RECLAMATION

Managing Water in the West

Conveyance of Refuge Water Supply
South San Joaquin Valley Study Area
Mendota Wildlife Area

Final
Environmental Assessment – Initial Study

U.S. Department of the Interior
Bureau of Reclamation
Mid-Pacific Region
Sacramento, California

Central California Irrigation District
Los Banos, California

Final – May 2008

Contents

Page

Acronyms and Abbreviations xvii

I Introduction and Statement of Purpose and Need I-1
Introduction I-1
Purpose and Need I-1
Associated Local Needs and Objectives under CEQA I-3
Project Scoping I-4
Public Review I-5
Relationship of this EA/IS to the CVPIA I-6
Required Permits and Approvals I-6
Organization I-7

II Background II-1
CVPIA Water Allocation for Mendota Wildlife Area II-1
Mendota Wildlife Area II-2
Relationship of Mendota Pool (and Dam), Reclamation and CCID II-5

III Description of Alternatives III-1
Alternative Development and Screening Criteria III-1
Project Alternatives III-3
No Action and No Project Alternative III-3
Alternative MEN-5 – Replace Dam III-4
Alternative MEN-7 – Rehabilitate Existing Dam III-7
Alternative MEN-9B – Convey Full Level 4 Water using Westlands Water District Facilities III-9
Alternative MEN-12 – Convey Level 4 Water Supplies using Westlands Water District Facilities When Mendota Dam is Dewatered III-12
Alternatives Considered but Eliminated from Detailed Study III-13
Alternative MEN-1 – Deliver Water from California Aqueduct through Westlands Water District Laterals 6 and 7 to Mendota Wildlife Area III-13
Alternative MEN-2 – Modify Operation of Mendota Dam and Pool to Provide Water Supply for Mendota Wildlife Area from September through December III-14
Alternative MEN-3 – Combine Alternatives MEN-1 and MEN-2 to Provide Year-Round Water Supply to Mendota Wildlife Area III-14
Alternative MEN-4 – Store Water in the Pine Flat Reservoir, Pump via Fresno Irrigation District Facilities, New Facilities, and the James Bypass to Mendota Wildlife Area III-14
Alternative MEN-6 – Combine Alternatives MEN-1 and MEN-4 ..... III-15
Alternative MEN-8 – Install Groundwater Wells at Mendota Wildlife Area to Provide Full Level 4 Water Supply III-15
Alternative MEN-9 – Use Westlands Water District Facilities to Convey Water Year-round III-16
Alternative MEN-10 – Deliver Water through New Pipeline from the Delta-Mendota Canal III-17

Alternative MEN-11 – Deliver Water through New Pipeline from the San Joaquin River III-17
Alternative MEN-13 – Install Groundwater Wells at Mendota Wildlife Area to Provide Water when Mendota Pool is Dewatered III-17

IV Affected Environment and Environmental Consequences IV-1
Water Resources IV-1
Affected Environment IV-1
Environmental Consequences IV-12
Land Use IV-23
Affected Environment IV-23
Environmental Consequences IV-24
Biological Resources IV-27
Affected Environment IV-27
Environmental Consequences IV-42
Cultural Resources IV-56
Affected Environment IV-56
Environmental Consequences IV-59
Air Quality IV-63
Affected Environment IV-63
Environmental Consequences IV-67
Geology IV-72
Affected Environment IV-72
Environmental Consequences IV-74
Recreational Resources IV-76
Affected Environment IV-76
Environmental Consequences IV-78
Noise IV-80
Affected Environment IV-80
Environmental Consequences IV-82
Socioeconomics IV-84
Affected Environment IV-84
Environmental Consequences IV-85
Visual Resources IV-87
Affected Environment IV-87
Environmental Consequences IV-88
Environmental Justice IV-90
Affected Environment IV-90
Environmental Consequences IV-91

V Cumulative and Growth-inducing Impacts V-1
Cumulative Impacts V-1
Related and Reasonably Foreseeable Projects and Actions V-1
Resource-specific Cumulative Impacts V-2
Growth-inducing Impacts V-3

VI Consultation and Coordination VI-1
Public Involvement VI-1
Applicable Regulatory Requirements and Coordination VI-1
Clean Air Act VI-1
Fish and Wildlife Coordination Act VI-1
Endangered Species Act VI-2

National Historic Preservation Act VI-3
Indian Trust Assets VI-3
Farmlands Policy VI-3
Executive Order 11988, Floodplain Management VI-4
Executive Order 11990, Protection of Wetlands VI-4
Clean Water Act VI-4
Magnuson-Stevens Fishery Conservation and Management Act VI-5

VII Persons and Agencies Consulted VII-1

VIII References VIII-1

Appendices

A California Environmental Quality Act Checklist

B Addendum to 1995 Decision Document – Mendota Wildlife Area Conveyance Alternatives

C Biological Resources

D Water Quality and Temperature Data

E Cultural Resources

F Article 11

G Mitigation Included in the Alternatives

H Comment Letters and Responses to Comments

Tables

II-1 Monthly Water Needs for Mendota Wildlife Area II-4

III-1 Summary of Alternative Screening Results, Mendota Wildlife Area III-2

III-2 Proposed Facilities for Alternative MEN-9B III-11

III-3 Proposed Facilities for Alternative MEN-12 ..... III-13

IV-1 Streamflows Downstream from Mendota Dam IV-3

IV-2 Surface Water Quality Data, Mendota Wildlife Area IV-8

IV-3 Surface Water Quality Data, Delta-Mendota Canal at Mendota Pool IV-10

IV-4 Surface Water Quality Data, California Aqueduct at O'Neill Intake IV-10

IV-5 Groundwater Quality Data, Mendota Wildlife Area IV-11

IV-6 Some Commonly Found Wildlife Resources at Mendota Wildlife Area IV-34

IV-7 Selected Special-status Plants in the Project Area IV-38

IV-8 Selected Special-status Wildlife and Fish in the Project Area IV-40

IV-9 Known Prehistoric Resources in the Project Area IV-58

IV-10 Attainment Status for San Joaquin Valley Air Basin....IV-65

IV-11 Summary of Maximum Monitored Ambient Air Quality Data in the Project Area....IV-65

IV-12 Ambient Air Quality Standards....IV-66

IV-13 CEQA Significance Criteria, SJVAPCD....IV-68

IV-14 Project Alternative Construction Emission Sources, Potential Pollutants, and Emission Factor Sources....IV-68

IV-15 General Conformity de Minimis Thresholds....IV-69

IV-16 Projected 2005 Regional Emissions Inventory....IV-69

IV-17 Estimated Annual Construction Emissions by Alternative (Without Mitigation)....IV-70

IV-18 Noise Levels of Heavy Construction Equipment....IV-81

IV-19 Fresno County Noise Level Standards....IV-82

IV-20 Central Valley Demographics, 2004....IV-85

IV-21 Percent of Labor by Industry Sector....IV-85

IV-22 Population Percentages for Fresno County, Madera County, and California, 2000....IV-90

IV-23 Individuals Below Poverty Level for Fresno County, Madera County, and California, 1999....IV-91

VI-1 Review, Permits, and Licenses Required for the Conveyance of Refuge Water Supply....VI-2

VI-2 Comparison of Impacts on Aquatic Ecosystems....VI-5

Figures

I-1 Wildlife Refuge Areas Identified in CVPIA....I-2

II-1 Mendota Wildlife Area and Dam Location Map....II-3

III-1 Alternative MEN-5 Dam Location....III-6

III-2 Conveyance Alternatives....III-10

IV-1 Alternative MEN-5 Habitat Impacts....IV-46

CONVEYANCE OF REFUGE WATER SUPPLY ENVIRONMENTAL ASSESSMENT AND INITIAL STUDY

SOUTH SAN JOAQUIN VALLEY STUDY AREA

Mendota Wildlife Area

Lead Agencies:
U.S. Department of Interior – Bureau of Reclamation
Central California Irrigation District

FINAL

May 2008

Acronyms and Abbreviations

°C	degrees Celsius
°F	degrees Fahrenheit
µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter
µmhos/cm	micromhos per centimeter
µS/cm	microSiemens per centimeter
ac-ft	acre-feet
bgs	below ground surface
BO	Biological Opinion
B.P.	before present
CAA	Clean Air Act of 1970
CARB	California Air Resources Board
CCID	Central California Irrigation District
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
cfs	cubic feet per second
CNDDB	California Natural Diversity Database
CO	carbon monoxide
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CV Water Board	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
dBA	A-weighted decibel
Decision Document	Decision Document: Report of Recommended Alternatives, Refuge Water Supply and San Joaquin Basin Action Plan Lands
Delta	Sacramento-San Joaquin Delta
DWR	California Department of Water Resources
DOSD	State of California Division of Safety of Dams
EA/IS	Environmental Assessment/Initial Study
EC	electrical conductivity
E-clay	Corcoran Clay
ECP	erosion control plan
EPA	U.S. Environmental Protection Agency
ESA	Federal Endangered Species Act

gpm	gallons per minute
HEP	Habitat Evaluation Procedures
lf	linear foot
mg/L	milligrams per liter
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_x	oxides of nitrogen
NO_2	nitrogen dioxide
NTU	Nephelometric turbidity units
PEIS	Programmatic Environmental Impact Statement
PM_{10}	particulate matter with an aerodynamic diameter less than 10 microns
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than 2.5 microns
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
Reclamation	U.S. Bureau of Reclamation
ROG	reactive organic gas
SHPO	State Historic Preservation Officer
SJRRMC	San Joaquin River Resource Management Coalition
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SLDMCA	San Luis Delta Mendota Canal Authority
SO_2	sulfur dioxide
SU	Siemens unit
SWPPP	stormwater pollution prevention plan
TDS	total dissolved solids
ton/day	tons per day
ton/yr	tons per year
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service
WWD	Westlands Water District

Chapter I
Introduction

and

Statement of Purpose and Need

Introduction

This Environmental Assessment/Initial Study (EA/IS) evaluates the potential effects of the alternatives to provide reliable year-round water deliveries to Mendota Wildlife Area (Mendota WA). Section 3406(d) of the Central Valley Project Improvement Act (CVPIA) requires the Secretary of Interior to provide reliable year-round water supplies of suitable quality, meeting peak seasonal needs, to maintain and improve wetland habitat areas on certain refuges in the Central Valley of California in the National Wildlife Refuge System, State wildlife management areas, and Grassland Resource Conservation District (see Figure I-1).

These refuges include Mendota WA which is located in the San Joaquin Valley, 30 miles west of Fresno, California. Under normal operating conditions, water is delivered to Mendota WA via gravity flow and pumping from Mendota Pool at Fresno Slough. In addition to Mendota WA, several Central Valley Project (CVP) Settlement Contractors and San Joaquin River Exchange Contractors[1] (Exchange Contractors) rely on Mendota Pool for water deliveries and include: Fresno Slough Water District; James Irrigation District; Tranquility Irrigation District; Reclamation District No. 1606; Coelho Family Trust; Westlands Water District; Laguna Water District; Central California Irrigation District, Columbia Canal Company, Henry Miller Reclamation District (aka San Luis Canal Company), Dudley Indart Contract, Tranquility Public Utility District (formerly Melvin Hughes Contract), Marvin and Patricia Meyers Contract, and Firebaugh Canal Water District.

The EA/IS identifies and evaluates the potential affected environment and environmental consequences (both beneficial and adverse) of implementing the proposed alternatives. The EA/IS was developed to meet the requirements of the National Environmental Policy Act of 1969 (NEPA) and California Environmental Quality Act (CEQA). The Mid-Pacific Region of Reclamation is the Federal Lead Agency for NEPA compliance, on behalf of the U.S. Department of the Interior. Central California Irrigation District (CCID) is the CEQA Lead Agency[2].

Purpose and Need

The primary purpose for this proposed action is to provide reliable year-round water deliveries to Mendota WA.

The need for this proposed action is to facilitate optimal management of Mendota WA and to address the associated operation, maintenance, and infrastructure conditions that preclude and/or restrict reliable year-

[1]The San Joaquin River Exchange Contractors claimed water rights in the San Joaquin River and agreed to forgo these rights in exchange for Central Valley Project water diverted from the Sacramento-San Joaquin River Delta and San Francisco Bay system and delivered to the Mendota Pool. Contract provisions allow for reductions of as much as 25 percent of contracted amounts under dry conditions (as determined by the Shasta Inflow Index).

[2]Although the Mendota WA is owned and managed by the California Department of Fish and Game (CDFG), CCID is the CEQA lead agency. This is because current limitations on refuge water supply deliveries are a result of CCID facility (Mendota Dam) operations and many of the alternatives considered involve reconstruction, reoperation, or retrofit of Mendota Dam.

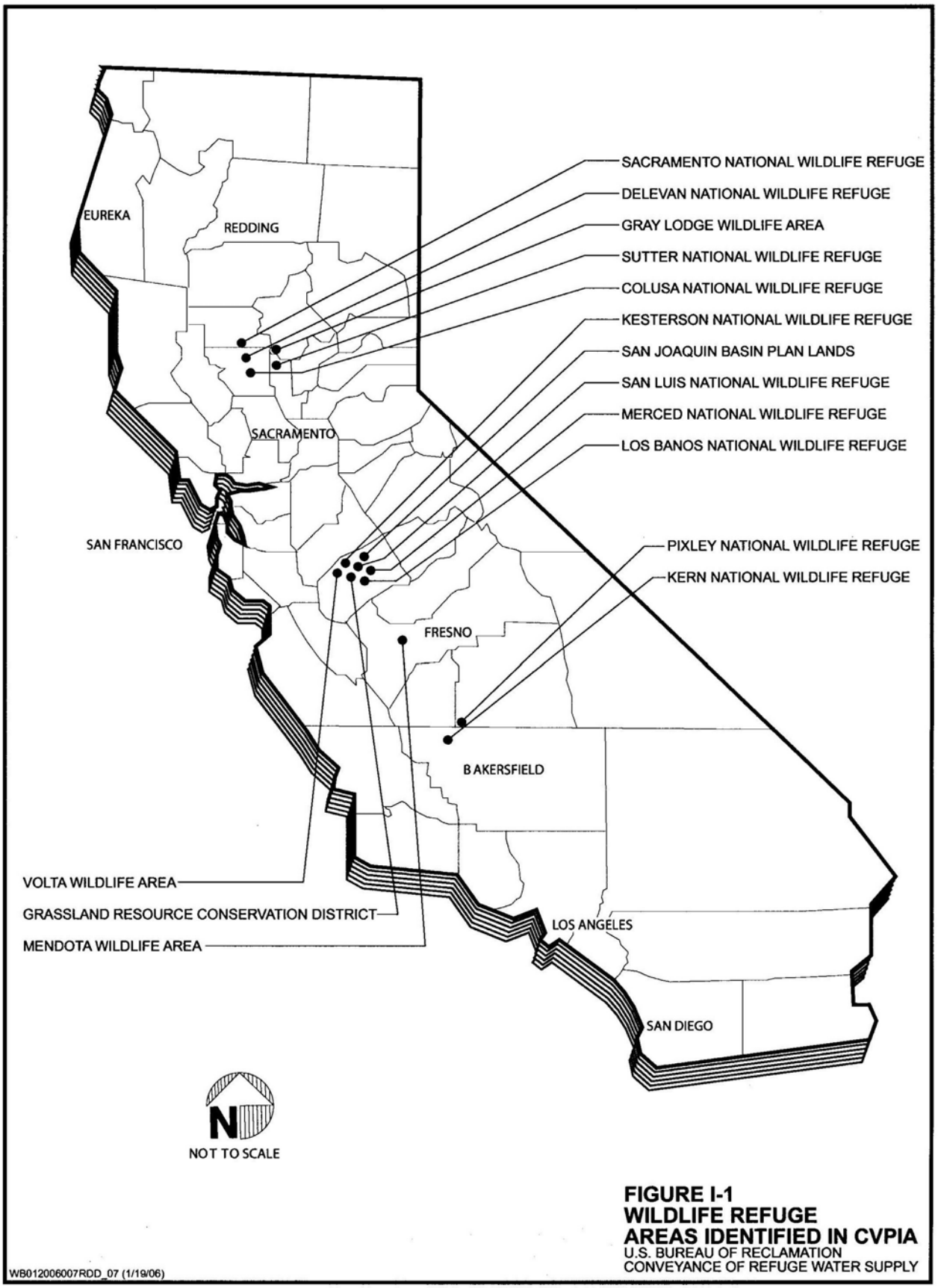

FIGURE I-1
WILDLIFE REFUGE AREAS IDENTIFIED IN CVPIA
U.S. BUREAU OF RECLAMATION
CONVEYANCE OF REFUGE WATER SUPPLY

round water deliveries, and to minimize the frequency and duration of periods when sufficient water supplies are not available to Mendota WA. Under normal operations, Mendota Dam impounds water and creates Mendota Pool and fills Fresno Slough providing water supplies to Mendota WA and the CVP Settlement and Exchange Contractors noted above and others. CCID drains (dewaters) Mendota Pool at least once every two years to facilitate their inspection, maintenance and any necessary repairs on Mendota Dam (CCID March 17, 2004). Dewatering of Mendota Pool typically starts in late November and Mendota Pool may remain empty through January 15 when Mendota Pool is allowed to refill. Outside of dewatering of Mendota Pool for maintenance activities, there are periods during the year when Mendota Pool level drops below the water surface staff gauge reading of 14.0, affecting the water level of Fresno Slough and restricting Mendota WA pumps from extracting water from Fresno Slough.

Wetlands within Mendota WA are completely dependent on water deliveries by gravity flow via specific conveyance structures and ditches, and/or sufficient water levels to facilitate infiltration and pumping/ extraction of water in fully serving Mendota WA. Therefore, sufficient water levels are critical and disruption of year-round water supply deliveries limits effective management of Mendota WA. The dewatering of Mendota Pool occurs during the period when Mendota WA traditionally floods-up to maximize habitat values of managed wetlands on the refuge. Therefore, the dewatering significantly diminishes the habitat benefits (from over flooding or not flooding areas) on Mendota WA by preventing water deliveries during a critical period of need.

Associated Local Needs and Objectives under CEQA

CCID as the CEQA Lead Agency has additional needs and objectives for the proposed action. To meet the water deliveries of the Mendota WA, CCID responsibilities lie in the operations of Mendota Dam. Mendota Dam has operational as well as short and long-term maintenance issues that can be solved by rehabilitating or replacing Mendota Dam that would improve the reliability of available water supplies and maintain water levels at historical levels necessary for gravity irrigation to Mendota WA. The following issues address specific local problems and needs. The resultant objectives would address and resolve them.

Operational Issues:

1. It is difficult to minimize leaks with the existing system of wooden flashboards.
2. Removal of flashboards is time consuming and labor intensive; and during high flows is particularly difficult and arduous.
3. CCID is responsible for the water supply to refill Mendota Pool after the Pool is dewatered.
4. Maintaining lower water levels in Mendota Pool reduces to risk of piping failure and makes it more difficult to make deliveries to upstream water users.
5. Mendota Pool water users can not make water deliveries when Mendota Pool is dewatered.

Short-Term Maintenance Issues:

1. Two automated and four manual slide gates require scheduled maintenance annually/biannually with the Mendota Pool dewatered.
2. Replacing damaged or severely leaking flashboards require Mendota Pool to be dewatered to minimize the water flow over the flashboards to be removed.

Long-Term Maintenance Issues:

1. Mendota Dam foundation must be inspected for voids to prevent piping failure.
2. Filling voids is performed with Mendota Dam dewatered.
3. Flash boards need to be replaced on regular schedule. Structurally sound wood timbers are difficult and expensive to procure.

CEQA Objectives:

- Redesign or replace Mendota Dam to:
  - eliminate dependency on flashboards for controlling flows from Mendota Pool
  - improve efficiency and effectiveness of dam maintenance and operations
  - eliminate frequent dewatering for maintenance/repairs and related adverse effects to Mendota WA and Contract Water Users
- Improve and provide reliable year-round deliveries and conveyance of water to and from Mendota Pool and beneficiaries (e.g., Mendota WA, Contract Water Users).
- Mitigate for potential short-term and long-term adverse effects to environmental resources (e.g., habitat of species of concern; open water, riparian, and wetland habitat, Mendota WA)
- Protect local environmental resources (natural and developed resources, ecosystems, cultural, recreation)

All alternatives analyzed would provide reliable year-round water deliveries to Mendota WA. Some alternatives analyzed in this EA/IS are designed to improve the reliability of year-round water supplies from Mendota Pool, which in turn would provide a benefit to all Mendota Pool users, including CVP Settlement Contractors, Exchange Contractors, and Mendota WA.

Project Scoping

Reclamation held the initial series of public meetings and workshops for the Mendota WA from fall 1993 through spring 1994, to solicit public comments on the potential conveyance and system alternatives. The meetings included a discussion of the general purpose and scope of the project, the planning processes that governed the project, the alternatives identified for evaluation, and the evaluation criteria to be used to compare alternatives.

The primary public issues expressed at the meetings included the following:

- Limited water resources in the study area
- Federal Endangered Species Act (ESA) restrictions
- Water-use efficiency of the alternatives
- Cost effectiveness of the alternatives
- Multiple water uses

Agency workshops, discussions with water purveyors, and additional public scoping meetings were held in early June 1995, to identify and confirm alternatives that were considered feasible and capable of accomplishing the purpose and need of the proposed action.

Public issues expressed at these meetings included the following:

- Water quantities, source, use, and quality
- Impacts to groundwater in the San Joaquin Valley
- Impacts to environmental and social issues both at and outside of Mendota WA
- Endangered species concerns
- Use of State facilities to supplement the CVP

In October 1997, Reclamation held an additional public meeting in Los Banos, California, to provide information on the overall conveyance of a refuge water supply program. Although numerous potential alternatives were subsequently identified, funding restrictions limited implementation of an improved conveyance solution.

A subsequent meeting was held March 22, 2005, among Reclamation, CCID, California Department of Fish and Game (CDFG), and U.S. Fish and Wildlife Service (USFWS) to ensure that the alternatives previously identified with public input were still consistent with current operations at Mendota Dam and Mendota WA, and to identify potential new alternatives for consideration. The alternatives that were developed previously with public involvement and the additional alternatives that were developed to broaden the range of potential alternatives were evaluated as part of the 18 alternatives and subalternatives identified in this environmental document.

Additional comments beyond the scope of this environmental document included questions about project funding and agreements and terms with water districts. Although these issues are not analyzed in this document, they are key issues in determining the recommended alternative and were used in the selection process.

Public Review

The initial Draft Conveyance of Refuge Water Supply South San Joaquin Valley Study Area Mendota Wildlife Area Environmental Assessment/Initial Study (EA/IS) was released on April 30, 1997, for a 45-day public comment and review period. Reclamation and CDFG held a public meeting on June 25, 1997 in Sacramento, California. Reclamation withdrew the document from consideration because of changes in priorities of the use of restoration funds, but continued to evaluate the project during the intervening years.

Given funding constraints, a number of additional alternatives to provide reliable water supplies to the Mendota WA were evaluated. Given these evaluations and need to disclose the investigation and potential impacts associated with the implementation of alternatives that were not included in the initial public Draft EA/IS, the decision was made to re-release the document. Accordingly, a second Draft EA/IS was released for public review. A press release was made May 18, 2007, announcing the availability of the document for public review and comment, which was sent by Reclamation via mail and email to approximately 300 interested individuals, organizations, and news entities. A copy of the draft document was posted online at http://www.usbr.gov/mp/nepa/nepa_projdetails.cfm?Project_ID=104. To obtain all input, the comment period was extended three times by press release sent on June 29, 2007; July 5, 2007; and July 17, 2007 to accommodate requests for additional review time.

Written comments were received from the following agencies and entities:

- National Resources Defense Council – July 2, 2007
- The Bay Institute – July 30, 2007
- California Water Impact Network – July 31, 2007
- Revive the San Joaquin – July 30, 2007
- Westlands Water District – August 1, 2007
- San Luis & Delta-Mendota Water Authority – August 1, 2007
- U.S. Fish and Wildlife Service – July 17, 2007

- U.S. Environmental Protection Agency – July 13, 2007
- California Department of Fish and Game – July 31, 2007

Comment letters and response are included in Appendix H.

Relationship of this EA/IS to the CVPIA

Reclamation completed a Programmatic Environmental Impact Statement (PEIS) in 2000 to identify the impacts of implementing the CVPIA. Among the provisions evaluated in the PEIS was the anticipated systemwide and local impacts of long-term delivery of CVP water supplies to the 14 federal, state, and private wetland habitat areas identified in the CVPIA. In addition, the PEIS evaluated the impacts of implementing other provisions of the CVPIA, including the renewal of CVP contracts; the dedication of project yield for fish, wildlife, and habitat restoration; and the acquisition of Level 4 supplies in terms of systemwide effects. The cumulative impact contribution of the proposed action is addressed in Chapter V, Cumulative and Growth-inducing Impacts, of this EA/IS.

Required Permits and Approvals

The following permits/authorizations are anticipated to be potentially required to allow for the conveyance of refuge water supply improvements to the Mendota WA:

- U.S. Army Corps of Engineers
    - Section 404 Individual or Nationwide Permit (wetlands)
- State Water Resources Control Board
    - National Pollutant Discharge Elimination System General Construction Activity Storm Water Permit
- Regional Water Quality Control Board
    - Section 401 Water Quality Certification
- U.S. Fish and Wildlife Service
    - Endangered Species Act
- National Oceanic and Atmospheric Administration - Fisheries
    - Endangered Species Act
    - Magnuson-Stevens Fishery Conservation and Management Act
- California Department of Fish and Game
    - Section 1601 Streambed Alteration Agreement
    - California Endangered Species Act
- Advisory Council of Historic Preservation
    - Section 106

Organization

The remainder of this EA/IS is organized as follows:

- Chapter II provides background information on CVPIA and related requirements/needs of Mendota WA; describes Mendota WA and discusses current operational and infrastructure conditions/limitations and scoping efforts.
- Chapter III discusses the No Action and No Project Alternatives, describes alternatives under consideration and alternatives considered but eliminated from detailed study.
- Chapter IV provides regional and site-specific information related to water resources, land use, biological resources, cultural resources, air quality, geology and soils, recreational resources, noise, socioeconomics, visual resources, and environmental justice. This chapter also discusses possible impacts of the project alternatives, determines the significance of each impact, and provides preliminary mitigation measures designed to ensure that the impacts do not significantly affect the environment.
- Chapter V provides a summary of cumulative and growth-inducing impacts.
- Chapter VI presents a history of public involvement and a list of applicable regulations requiring compliance before a project alternative is implemented.
- Chapter VII identifies persons and agencies contacted during preparation of this EA/IS.
- Chapter VIII lists references used to prepare this report.
- Appendix A is the CEQA Checklist.
- Appendix B is the Addendum to the 1995 Decision Document to determine feasible alternatives.
- Appendix C contains site photographs and supporting documents for biological resources.
- Appendix D presents water quality and temperature data for the project area.
- Appendix E contains supporting documents for cultural resources.
- Appendix F contains Article 11 of the "Second Amendment Contract for Exchange of Waters" (Exchange Contract) between Reclamation and CCID. September 15, 1967; Revised December 6, 1967.
- Appendix G summarizes the anticipated impacts and recommended mitigation for construction of the alternatives.
- Appendix H contains comment letters and responses to comments.

Chapter II
Background

CVPIA Water Allocation for Mendota Wildlife Area

Section 3406(d) of the CVPIA requires the Secretary of Interior to provide reliable year-round water supplies of suitable quality, meeting peak seasonal needs, to maintain and improve wetland habitat areas on certain refuges in the Central Valley of California in the National Wildlife Refuge System, State wildlife management areas, and Grassland Resource Conservation District (see Figure I-1). These refuges include Mendota WA which is located in the San Joaquin Valley, 30 miles west of Fresno, California.

In January 2001, Reclamation completed a Programmatic Environmental Impact Statement (PEIS) evaluating the impact of CVPIA implementation. The PEIS provided NEPA compliance for Level 2 water supplies and also addressed effects of the use of refuge and return flows associated with full Level 4 supply. In addition, the PEIS evaluated the impacts of implementing other provisions of CVPIA, including renewing water supply contracts and dedicating project yield for fish, wildlife, and habitat restoration. Specific conveyance improvements required to deliver Level 2 and incremental Level 4 water supplies to the refuges were not evaluated in the PEIS; therefore, project-specific environmental review is required when such improvements are proposed. In addition to this EA/IS, acquisition of incremental Level 4 water supply will be further analyzed in subsequent site-specific documents.

The quantity, quality, and timing of water deliveries to refuges identified in CVPIA (shown on Figure I-1) are in accordance with parameters specified in Reclamation's *Report on Refuge Water Supply Investigations, Central Valley Hydrologic Basin, California* (Reclamation, 1989a) and the *San Joaquin Basin Action Plan/Kesterson Mitigation Action Plan Report* (Reclamation, 1989b), which were incorporated by reference into CVPIA. The reports specified the following two primary levels of water supplies:

- Level 2
- Level 4

Level 2 water supply is identified as a firm, average historical annual water supply required to manage for minimal wetlands maintenance and wildlife habitat development. Level 2 water generally comes from CVP yield. Level 4 water supply is identified as the amount of water required to manage for optimal wetlands and wildlife habitat development.

The difference between Level 2 and Level 4 water supply amounts is referred to as "incremental Level 4", that increment of water which is required in addition to Level 2 supplies to achieve optimum wildlife habitat development. Incremental Level 4 water supplies are to be acquired through voluntary measures, which include water acquisition from willing sellers, water conservation, conjunctive use, lease, donations, or similar activities, or a combination of such activities which do not require involuntary reallocations of project yield.

Full Level 4 supply is defined as the combination of Level 2 and incremental Level 4 supplies.

To implement the refuge water supply provisions of CVPIA, Reclamation entered into a contract, titled "*Contract Between the United States and State of California for Water Supply to Los Banos, Volta, North Grasslands and Mendota Wildlife Areas, January 19, 2001"* otherwise referred to as "Water Supply Contract", with CDFG providing for firm CVP Project Water deliveries to the wildlife areas owned/managed by CDFG within the San Joaquin Basin. Consistent with the Water Supply Contract, the

following is the breakout for Level 2 and Incremental level allocations from the total Full Level 4 water allocation of 29,650 ac-ft for Mendota WA:

- Level 2 = 27,594 ac-ft per year (includes 9,094 ac-ft per year of Replacement Water[1])
- Incremental Level 4 = 2,056 ac-ft per year

Mendota Wildlife Area

Mendota WA is located in the San Joaquin Valley of California, approximately 30 miles west of Fresno, California (see Figure II-1). At 12,425 acres, Mendota WA is the largest publicly owned and managed wetland in the San Joaquin Valley. Established between 1954 and 1966, the wildlife area is adjacent to Fresno Slough and the 900-acre Alkali Sink Ecological Reserve. Approximately 8,300 acres of wetlands are maintained at Mendota WA, including almost 6,800 acres of seasonal wetlands. Mendota WA is owned and managed by CDFG.

CVP water is typically conveyed to Mendota WA using the Delta-Mendota Canal (which terminates at Mendota Pool), and Mendota Pool which is created by Mendota Dam. Mendota Pool floods a portion of San Joaquin River and Fresno Slough. Water is subsequently pumped from Fresno Slough to Mendota WA and also conveyed from Fresno Slough to Mendota WA by gravity flows. Mendota WA is dependent on gravity flows from Fresno Slough to provide water deliveries to approximately 3,000 acres of wetlands adjacent to both west and east sides of the slough. Fresno Slough is allowed to backflow (gravity flow) through certain water control structures onto Mendota WA. Currently, there are no other existing means to facilitate water delivery to those specific 3,000 wetland acres. Mendota WA is also dependent on adequate water level at Fresno Slough to facilitate pumping that serves many areas of Mendota WA as well.

This disruption of year-round water supply deliveries due to dewatering and lowered Mendota Pool water level limits effective management of Mendota WA. If prior notification of dewatering of Mendota Pool occurs, the WA takes on additional water deliveries in advance of the scheduled dewatering period. This additional water is then held onsite for an extended period of time, which results in poor water quality (elevated TDS, increased risk of avian botulism, etc.) and overall habitat degradation. Seepage of water from flooded cells in Mendota WA increases when Mendota Pool is drained making it more difficult to maintain water in these ponds.

During the period when Mendota Pool is dewatered, water recedes on Mendota WA lands because of the lack of new water supplies, allowing desirable plant species to germinate at the wrong time of the year, only to die out when water is reintroduced. Also, undesirable plant species may germinate and become established that are expensive to eradicate and often overtake desirable plants. Extended periods or unplanned dewatering of Mendota Pool prevents optimum management of the habitat because Mendota WA personnel are unable to flood fields for migrating waterbirds; furthermore, what is already flooded is not capable of remaining at appropriate water levels creating a possibility for botulism outbreak as well as quality habitat loss in the future.

Other currently existing conveyance means are not adequate to help sustain Mendota WA during dewatering periods. CDFG has entered into a contractual agreement with Westlands Water District (WWD) to convey a small portion of Level 2 water supplies to Mendota WA during the dewatering period, mainly during December and January. Total amount of Level 2 water conveyed by WWD to Mendota WA is approximately 100-200 ac-ft during this period, and serves the purpose of providing minimal maintenance flows to avoid 1,000 acres of wetlands.

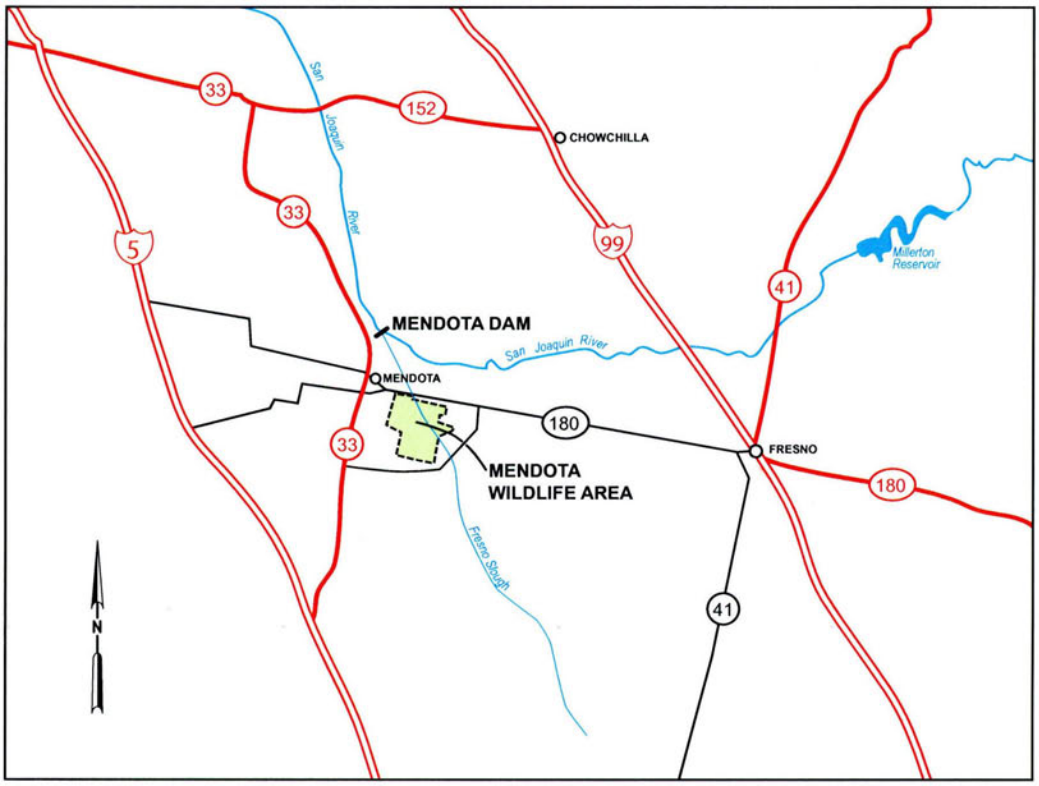

FIGURE II-1
MENDOTA WILDLIFE AREA AND DAM LOCATION MAP
U.S. BUREAU OF RECLAMATION
CONVEYANCE OF REFUGE WATER SUPPLY

WB012006007RDD_03 (1/19/06)

from completely drying out in the southwest corner of the WA during the dewatered periods. In past years, with no maintenance flows in December and January during a dewatered period, the WA has experienced a loss of up to 2,500 acres of wetlands. Actual peak flow needs, and even reasonable maintenance flow needs, during this period exceed the available capacity in WWD facilities that reach Mendota WA. Therefore, Mendota WA is not able to receive a reliable year-round water supply. Water supply requirements for Mendota WA are shown in Table II-1. Presently, Reclamation does not have an existing agreement with any water delivery entity for delivery of water to Mendota WA. Reclamation currently negotiates an annual agreement with CDFG to reimbursement those conveyance costs paid by CDFG during periods Mendota Pool is dewatered.

Table II-1
Monthly Water Needs for Mendota Wildlife Area

Month	Full Level 4 Needs[a] (ac-ft)	Peak Flow for Optimal Management[b] (cfs)
January	1,250	50
February	1,250	30
March	1,150	10
April	1,150	15
May	2,800	35
June	2,150	40
July	2,150	45
August	2,500	40
September	5,150	150
October	5,000	250 to 150[c]
November	3,600	150 to 80[d]
December	1,500	35
Total	**29,650**	

[a]Source: Reclamation, 1989a.
[b]Source: Brueggemann, 2005.
[c]Flow of 250 cfs is sustained for approximately 2 weeks and decreases to 150 cfs by the last week of October.
[d]After November 25, flow requirements reduce to 80 cfs.

Note: cfs = Cubic feet per second.

Subsidence is a problem affecting Mendota WA, Mendota Dam, and Mendota Pool. The entire Mendota area has experienced significant subsidence that has changed the slope of the land. Subsidence in the area at Mendota Dam has been greater than the subsidence at Mendota WA. Personnel from Mendota WA have water control structures off of Fresno Slough that have been in place over 30 years, and those water levels are currently approximately 0.5 feet lower with the water surface elevation at Mendota Pool. This lower water level at Fresno Slough has also affected both pumping and gravity flows to Mendota WA. Slight reductions in water-surface elevation substantially affect the amount of area maintained by the delivery of water to those 3,000 wetland acres dependent on gravity flows on Mendota WA. The level of Mendota Pool drops too low at differing times throughout the year exclusive of a dewatering episode, with the resulting effect being that Mendota WA pumps on the inlet channels from Fresno Slough may

not be able to pick up water and gravity flows to Mendota WA are interrupted. Sedimentation and aquatic weed growth have also contributed to this problem in the inlet channels, but water levels in the pool is the major factor in this problem. According to the DOSD files, DOSD requires that CCID maintain Mendota Pool level at a maximum reading of 13.9 on the water surface staff gauge on Mendota Dam.

Mendota WA incorporates Mendota Pool into its habitat management. Fresno Slough provides approximately 900 acres of open, deep water habitat extending through the WA and beyond. This provides a unique, natural, and complimentary habitat other refuges and wildlife areas mimic through man made irrigation and drainage ditches, at expense to their operational budgets, with much lower environmental benefits.

Relationship of Mendota Pool (and Dam), Reclamation and CCID

Reclamation entered into a contractual arrangement with CCID titled "Second Amended Contract for Exchange of Waters, December 6, 1967" (Exchange Contract). Article 11 of the Exchange Contract (see Appendix F) describes the responsibilities for operation and maintenance of Mendota Pool and associated Mendota Dam. CCID privately owns Mendota Dam, and is responsible for the operation and maintenance of Mendota Dam at its own expense.

The article describes the elevation range of 160.0 to 161.5 feet (US Geological Survey Datum) that Mendota Pool should be maintained by CCID during normal operations. An equivalent reading on the water surface staff gauge at Mendota Pool would be 13.0 to 14.5 feet. Due to subsidence in the Mendota area, the water surface staff gauge (located on the east side of the upstream dam structure) at Mendota Pool is now the only current reference point for water surface elevation of Mendota Pool.

The water level in Mendota Pool is primarily maintained by wooden flash boards on Mendota Dam, which cannot be safely removed or installed during flood conditions. The flash boards must be removed before winter storm flows reach the dam. This process lowers the water level in Mendota Pool, which in turn, impedes delivery and distribution of water to Mendota WA and other Mendota Pool users when storm flows are expected to pass. CCID completely drains (dewaters) Mendota Pool at least once every two years to allow CCID personnel to perform standard inspections and any necessary repairs, due to the age and condition of the Mendota Dam structure.

Dewatering of Mendota Pool typically starts in late November and Mendota Pool may remain empty through January 15 when Mendota Pool is allowed to refill. CCID has dewatered Mendota Pool seven times in the last nine years (Paul Forsberg, January 2006). When dewatering is necessary, water cannot be delivered to Mendota WA through the Fresno Slough because Mendota Pool water surface elevation is not adequate. CCID may implement a schedule to dewater Mendota Dam and perform standard inspections annually if a proposed rehabilitation plan is not developed and implemented (White, 2005).

The State of California Division of Safety of Dams (DOSD) is required to perform annual inspections of all non-Federal jurisdictional dams. Mendota Dam falls within the DOSD's jurisdiction. DOSD's mission states, "The California Water Code entrusts the regulatory Dam Safety Program to the California Department of Water Resources (DWR). The principal goal of this program is to avoid dam failure and thus prevent loss of life and destruction of property. Dams under State jurisdiction are an essential element of the California infrastructure that provides constant water supply integrity." DOSD routinely inspects Mendota Dam to assure it is adequately maintained and to direct CCID (owner) to correct any deficiencies found. It is the intent of DOSD to have dam owners safely operate and maintain their dams such that the dams continue to stay in service without failure into the foreseeable future. Dam maintenance, as directed by DOSD, may include replacement of key facilities if needed to prevent the failure of the dam.

Review of DOSD file records (1930-present) indicate that inspections have been accomplished for Mendota Dam on an approximate annual basis and that inspections were performed in varying months over the years. Inspections by DOSD were often performed when the dam was fully operational and the water surface level in Mendota Pool was within the normal elevation range.

The Exchange Contract, Article 8, lists the monthly maximum delivery quantities and flows which Reclamation has committed to CCID in all years, with the exception of critically dry years when the quantities are reduced. CCID furnishes estimates of their aggregate monthly delivery requirements and a weekly summary including daily delivery schedules to Reclamation. Changes to the daily delivery schedule may be made with 48 hours notice to Reclamation by CCID. Reclamation, at its sole option, reserved the right to suspend deliveries to CCID for the period December 15 through January 15, or by mutual agreement, for a longer or different period sometime between November 1 and February 15.

Chapter III
Description of Alternatives

Alternative Development and Screening Criteria

The initial development of alternatives was based, in part, on previous studies completed by Reclamation regarding refuge water supply. The following primary investigative reports were considered in the initial development of the alternatives:

- *Report on Refuge Water Supply Investigations, Central Valley Hydrologic Basin, California* (Reclamation, 1989a)
- *San Joaquin Basin Action Plan/Kesterson Mitigation Action Plan Report* (Reclamation, 1989b)
- *Refuge Water Supply Study, Plan Coordination Team Interim Report* (Reclamation, 1992)
- *Refuge Water Supply, Proposed Plan of Study* (Reclamation, 1993)

Reclamation held a series of public meetings and workshops from fall 1993 through spring 1994 to solicit public comments on the potential alternatives and identify additional alternatives for consideration. Seven alternatives were developed to provide for year-round water deliveries to Mendota WA: MEN-1, MEN-2 (Facilities Re-operation Alternative), MEN-3, MEN-4A, MEN-4B, MEN-4C, and MEN-5 (Dam Replacement Alternative).

A workshop was held on June 17, 1994, to screen the seven alternatives. Workshop attendees included staff from Reclamation, USFWS, CDFG, and CH2M HILL. Alternative MEN-6 – a combination of Alternatives MEN-1 and MEN-4 – was added during the workshop. The cost; reliability of water supply; and environmental, social, and institutional constraints for each of the alternatives were preliminarily evaluated.

Reclamation held public workshops, discussions with water purveyors, and screening meetings in early June 1995. During these workshops and meetings, the participants preliminarily determined that the alternatives were feasible with respect to accomplishing the purpose of and satisfying the need for the project alternatives. Reclamation and USFWS further refined the alternatives and presented their findings in the Decision Document (Reclamation, 1995). The following preliminary screening criteria were established and used to determine alternative feasibility:

- Cost
- Reliability of water supply
- Environmental constraints
- Social and institutional constraints

Because the time between the initial alternative development effort and the preparation of this document was more than 10 years, it was determined that an additional effort to develop alternatives was warranted. Further alternative development efforts include the March 22, 2005, meeting between Reclamation, CCID, CDFG, and USFWS. This effort was undertaken to ensure that the alternatives previously identified were consistent with current operations at Mendota Dam and Mendota WA, and to identify potential new alternatives that should be considered.

During this meeting, it was suggested that without substantial modifications to Mendota Dam or construction of a new dam, the existing facility could not be relied on to provide a consistent supply of water to Mendota WA. These discussions identified the need to also consider and evaluate additional

alternatives that could use similar facilities such as an independent dam, while relying on Mendota Dam to convey supplies during the same period of the year that it currently conveys them. Nine additional alternatives were developed to deliver year-round water supplies to Mendota WA: MEN-7, MEN-8, MEN-9A, MEN-9B, MEN-9C, MEN-10, MEN-11, MEN-12, and MEN-13.

The nine additional alternatives were screened using the same criteria as those used for the initial alternatives and an addendum to the Decision Document (see Appendix B) was prepared and finalized on January 13, 2006. Consideration of additional alternatives was predicated on ensuring a broad, reasonable range of alternatives to carry through the NEPA/CEQA process.

Table III-1 summarizes the alternatives screening results.

Table III-1
Summary of Alternative Screening Results, Mendota Wildlife Area

Alternative Name	Selected for Analysis	Reason(s) for Selection or Dismissal
No Action and No Project	Yes	Required by NEPA and CEQA.
MEN-1	No	Level 2 and Level 4 water supplies would not be provided to the east side of Mendota WA. Dewatering associated with required maintenance would remain a problem.
MEN-2	No	Level 2 and Level 4 water supplies would not be provided to Mendota WA during annual CCID inspection[a]. Allows only a short duration for repairs prior to the start of the irrigation season.
MEN-3	No	Level 2 and Level 4 water supplies would not be provided to Mendota WA during annual CCID inspection[a]. Dewatering associated with required maintenance would remain a problem.
MEN-4A	No	Dewatering associated with required maintenance would remain a problem; Full level 4 water supply would only be provided to the east side of Mendota WA. Place of use does not extend to Mendota Pool. The Kings River water right does not include benefits to fish and wildlife and would have to be amended.
MEN-4B	No	Same as Alternative MEN-4A.
MEN-4C	No	Same as Alternative MEN-4A.
MEN-5	Yes	Level 2 and Level 4 water supplies could be provided to Mendota WA except when the new Mendota Dam is dewatered. This is the Locally Preferred Alternative and is a major project identified in the USFWS Programmatic Biological Opinion of June 28, 1999.
MEN-6	No	Dewatering associated with required maintenance would remain a problem; Place of use does not extend to Mendota Pool; The Kings River water right does not include benefits to fish and wildlife and would have to be amended.
MEN-7	Yes	Level 2 and Level 4 water supplies could be provided to Mendota WA except when the rehabilitated Mendota Dam is dewatered.
MEN-8	No	Infeasible because of water quality concerns, potential overdraft conditions, and excessive costs associated with installing as many as 120 wells.
MEN-9A	No	Infeasible because of capacity constraints of WWD facilities.
MEN-9B	Yes	Level 2 and Level 4 water supplies could be provided to Mendota WA when Mendota Dam is dewatered.

Table III-1
Summary of Alternative Screening Results, Mendota Wildlife Area

Alternative Name	Selected for Analysis	Reason(s) for Selection or Dismissal
MEN-9C	No	Infeasible because of excessive costs associated with upgrades to WWD facilities.
MEN-10	No	Infeasible because of excessive costs associated with new pipeline installation.
MEN-11	No	Infeasible because of the requirement to reoperate Millerton Reservoir.
MEN-12	Yes	Level 2 and Level 4 water supplies could be provided to Mendota WA when Mendota Dam is dewatered.
MEN-13	No	Infeasible because of water quality concerns, potential overdraft conditions, and excessive costs associated with installing as many as 40 wells.

[a]An agreement between CDFG and WWD provides for conveyance of a small portion of scheduled Level 2 water during the dewatering period, serving the purpose of providing minimal maintenance flows on the west side of Mendota WA only. Capacity limitations of WWD facilities during this period restrict Mendota WA from receiving total desired maintenance flows, with peak flow needs for this period far exceeding available capacity in WWD facilities.

Project Alternatives

No Action and No Project Alternative

The No Action Alternative is required under NEPA to define existing and future conditions without a Federal action. The No Project Alternative is required under CEQA to define existing conditions without the project. Both the No Action and No Project Alternatives provide baseline information to which the Action Alternatives are compared to determine their effects. In this EA/IS, the No Action and No Project Alternatives were determined to be equivalent because the operation of Mendota Dam and Pool in relationship to Mendota WA will remain approximately the same for the foreseeable future and no growth or other changes are anticipated in the project area. Therefore, the No Project and the No Action Alternatives will be treated the same throughout this document.

Under the No Action and No Project Alternative, Mendota WA would continue to receive water from Mendota Pool through the existing delivery systems. The timing of these supplies would not be reliable to achieve optimal habitat management and generally would not exceed historical annual average water deliveries to Mendota WA. Level 2 (27,594 ac-ft) water supplies would continue to be supplied to Mendota WA during years that Mendota Pool is operational and does not require dewatering and/or extensive maintenance. Full Level 4 supply (29,650 ac-ft) could be supplied during years that Incremental Level 4 water supplies of 2,056 ac-ft can be obtained by Reclamation for Mendota WA and that Mendota Pool is operational and does not require dewatering and/or extensive maintenance.

The existing water management for Mendota WA would continue into the future during the time periods Mendota Pool is filled. Gravity water deliveries to Mendota WA would continue to be subject to fluctuations in the water surface elevation of Mendota Pool and the pumps would continue to operate with the same operations and maintenance schedules currently in place. In the month prior to dewatering, Mendota WA would perform any necessary maintenance to limit water losses (leaks, spills and seepage) from its water control structures, conveyance system, and wetlands (any flooded areas). Mendota WA would then divert enough additional water in anticipation of unavailable supplies from Mendota Pool

from a minimum of 4 weeks up to two and half months. When Mendota Pool is dewatered for long periods (greater than 4 weeks biannually), water recedes in the flooded fields within Mendota WA because of the lack of new water supplies and this change in water regime can allow desirable plant species to germinate at the wrong time of the year only to die out when water is reintroduced. Also, undesirable plant species may germinate and become established that are expensive to eradicate and often overtake desirable plants.

CDFG has entered into a contractual agreement with Westlands Water District (WWD) to convey a small portion of Level 2 water supplies to Mendota WA during the dewatering period, mainly during December and January, with CDFG carrying the burden of the conveyance cost. Total amount of Level 2 water conveyed by WWD to Mendota WA is between 100-200 ac-ft during this period, and serves the purpose of providing minimal maintenance flows to avoid 1,000 acres of wetlands from completely drying out in the southwest corner of the WA during the dewatered periods. Actual peak flow needs during this period exceed the available capacity in the WWD facilities that reach Mendota WA. Therefore, Mendota WA is not able to receive a reliable year-round water supply. Water supply requirements for Mendota WA are shown in Table II-1. Presently, Reclamation does not have an existing agreement with any water delivery entity for delivery of water to Mendota WA. Reclamation is currently negotiating an agreement with CDFG for reimbursement of those conveyance costs paid by CDFG.

Operation and Maintenance

Under the No Action and No Project Alternative, CCID anticipates that annual inspections of Mendota Dam and bi-annual Mendota Pool dewatering would be required and may be increased to an annual schedule. Dewatering would continue to be performed between late November and January 15 and Mendota Pool would be allowed to refill after the inspections were complete. CCID will continue inspecting Mendota Dam foundation, and locate and monitor voids for changes within the foundation. If minor dam repairs are required, Mendota Pool would remain dewatered until the repairs were made. If the required repairs were extensive, CCID would require additional dewatering time, and make less water available for Mendota WA.

Flashboards will continue to be utilized to set the water level target range and the existing slide gates will be utilized to maintain constant water levels in Mendota Pool during normal operations. Placement of the flashboards involves manually lowering a long structural timber into a slot in Mendota dam and firmly seating the flashboard on top of the previous flashboard. It is difficult to minimize leaks with the existing system of wooden flashboards because the mating surfaces are prone to imperfections, twists, and warps. The wood flashboards will swell over time and debris in the water will help reduce leaks to a manageable level but large leaks require additional intervention by CCID.

Removal of flashboards is time consuming and labor intensive because the flashboards are long and are handle manually one at a time. Typically the removal is done without water flowing over the flashboards; however, if the flashboards need to be removed during high flows, it is particularly difficult and arduous.

Alternative MEN-5 – Replace Dam

Under Alternative MEN-5, the Locally Preferred Alternative, a new dam would be constructed north of existing Mendota Dam (see Figure III-1). The new dam would be approximately 400 feet downstream from the existing dam and would consist of a 180-foot-long, 10-bay, gated concrete structure near the center of the San Joaquin River channel. The new dam would increase the capacity of Mendota Pool (currently 3,000 ac-ft) by approximately 13 ac-ft. Mendota Pool at the face of the new dam would be approximately 18 feet deep. With gates down, there would be a maximum water-surface elevation of 14.7 feet at Mendota Dam. This alternative solves operational, maintenance and infrastructure issues with existing Mendota Dam, but could also meet the water supply needs of Mendota WA. This alternative would require agreements between Reclamation and CCID for the cost share allocation of the new dam, maintenance of Mendota Pool levels, frequency and duration of dewatering, etc.

Mendota Pool would continue to be dewatered during flushing and maintenance operations. These periods of dewatering are expected to be shorter in duration than recent years. However, the frequency and duration of dewatering periods if a new dam were built are currently unknown. The open, deep water habitat Mendota Pool provides to Mendota WA would not be available during dewatering but water regimes within Mendota WA are anticipated to be held near levels required for optimal habitat management if the dewatered periods are of short duration. If the dewatered periods were typically short and infrequent, dewatering of the pool would not negatively affect the desirable plant communities in Mendota WA.

The preliminary design flood event for the radial control gates (eight 15- by 18-foot radial control gates) is 8,000 cfs. The final design would consider all relevant data, including flood flows. Normal flows of 200 to 600 cfs would be passed by two sluice-gates.

Although the passage of anadromous fish either upstream or downstream of the existing dam is a topic of continuing study in the San Joaquin River Restoration Program, the proposed new dam would be designed so that it could be retrofitted with a fish passageway in the future, as determined necessary. Proposed fish passage facilities would be designed and constructed to meet National Marine Fisheries Service (NMFS) and CDFG fish passage facility criteria. Construction of such a facility would require additional environmental review including impact assessment and mitigation development as determined necessary under NEPA and CEQA. The design and associated cost of the facility will be determined after the need for fish passage is decided.

The existing dam at Mendota Pool would not be demolished; however, Mendota Dam's existing wooden flashboards would be removed to allow water to flow freely and surround the old dam location. The existing Mendota Dam is eligible for the National Register of Historic Places.

Operation and Maintenance

The new dam would be visually inspected each year by DOSD, but Mendota Pool would not be dewatered for this purpose. The pool would continue to be dewatered during flushing and maintenance operations; however, dewatering for inspections, maintenance, and repairs of Mendota Dam would occur every 4 to 8 years for the first 30 years and gradually increase over the useful life of the new dam (50+ years). A formal agreement would need to be negotiated to ensure that dewatering is minimized to the extent possible and that dewatering is scheduled in coordination with Mendota WA. This will ensure that impacts to wildlife and plant life, as well as area operations, are minimized. The agreement could include measures to help maintain the Mendota Pool water surface elevation at or above a gauge reading of 14.0 feet at Mendota Dam. CCID would continue to operate and maintain the new dam and extend their private ownership to the new Mendota Dam. Regular operations and maintenance would continue to include operation of the dam, setting reservoir levels, releasing water for irrigation, and performing general dam inspections and routine maintenance activities.

Typical radial control gate bay design include method to install a temporary stop log dam upstream of a radial control gate to allow the radial control gate to be taken out of service without dewatering the reservoir upstream. The temporary stop log dam permits the operator to perform many routine maintenance items of the radial control gates while the dam remains in operation.

The radial control gates allow the operator to adjust the gate height in close coordination with changes in river flows due to storm events or flood control releases. A single operator can

FIGURE III-1
ALTERNATIVE MEN-5 DAM LOCATION
U.S. BUREAU OF RECLAMATION
CONVEYANCE OF REFUGE WATER SUPPLY

RDD \\LOKI\PROJECTS\RDDGIS\MENDOTA\MXDS\FIGIII-1_MEN5_NEWDAM.MXD FIGIII-1_MEN5_NEWDAM.PDF 1/18/2006 19:07:10

reposition all of the radial control gates in anticipation of a storm event with less than an hour's notice. Also the operator will be able to lower the radial control gates river flow recede and safely capture enough flow to refill Mendota Pool.

Required Agency Standards and Endangered Species Act Compliance

The following proposed actions and/or agency regulatory requirements and standards subject to agreement between Reclamation and CCID are applicable to Alternative MEN-5:

- Reclamation consulted with NOAA Fisheries under the Magnuson-Stevens Fisheries Conservation and Management Act in 2001. NOAA Fisheries recommended that Essential Fish Habitat (EFH) conservation measures be included in Alternative MEN-5. The 2001 NOAA Fisheries letter and recommendations can be found in Appendix C. Reclamation will be submitting a detailed response to NOAA Fisheries letter that will describe measures to avoid, minimize, mitigate or offset the adverse impact of the proposed action on EFH.
- Reclamation consulted with the USFWS and NOAA Fisheries under Section 7 of the ESA. The USFWS issued a Programmatic Biological Opinion (PBO) dated June 28, 1999, that identified MEN-5 and terms and conditions if satisfied, would allow MEN-5 to be appended to the PBO. The PBO is provided in Appendix C and documentation is being developed to ensure the terms and conditions of the PBO are met and any new information since 2001 has been considered. NOAA Fisheries concurred in their May 23, 2001, letter that MEN-5 is not likely to adversely affect listed species under their purview. Reclamation will coordinate with NOAA Fisheries via informal consultation to ensure any new information since 2001 has been considered.

Alternative MEN-7 – Rehabilitate Existing Dam

Under Alternative MEN-7, necessary repairs would be made to the existing Mendota Dam to bring it up to an acceptable 50-year service life condition. The size of the rehabilitated dam would accommodate a maximum capacity of 8,000 cfs when the gates on Mendota Dam are raised to prevent Mendota Dam from restricting storm flows in the San Joaquin River and Fresno Slough systems. The final design would consider all relevant data, including flood flows. Nine of the 18 existing bays would be required to pass 8,000 cfs. Seven of the radial gates would be used to pass 8,000-cfs flow and two gates would be used to regulate normal river flows. The gate bays would have concrete and a reinforced concrete extension added to the perimeter of the existing piers to provide for the radial gate pins. Sockets would be provided in the floor slab and pier walls for steel flashboards, to be used if maintenance of the gates is required when Mendota Pool is full. Reclamation would consider pursuing MEN-7, contingent upon mutually acceptable agreements with CCID for the cost share allocation of the rehabilitated dam, maintenance of Mendota Pool water levels, frequency and duration of dewatering, etc.

Mendota Pool would continue to be dewatered during flushing and maintenance operations; however, dewatering for inspections, maintenance, and repairs of Mendota Dam would occur every 4 to 8 years for the first 30 years, then gradually increase over the useful life of the rehabilitated dam (50+Years). These periods of dewatering would be short duration of approximately 2 weeks before Mendota Pool could be refilled and normal diversions to the Mendota WA would resume. The open, deep water habitat Mendota Pool provides to the Mendota WA would not be available during dewatering but water regimes within the Mendota WA could be held near levels required for optimal habitat management.

The existing deck structure above the piers would be removed and replaced with a new deck. The new deck would be equipped with electric operators for the seven radial gates, and would be placed at a slightly higher elevation for safety during flood flows. The weir boards on the nine remaining, unused bays would be removed and permanently closed with a concrete wall or steel-plate structure.

A new, reinforced concrete floor slab would be placed over the existing slab to provide an erosion-resistant surface for the underflow of the new gates and to provide stability for the entire dam. This slab would cover all existing floor slab areas.

New cutoff sheet piles would be driven near the edge of the existing foundation slab and around the ends of Mendota Dam to completely enclose the structure. New abutments would also be constructed. The existing steel rotation bridge would be removed and backfilled with a reinforced concrete wall. The new bridge deck would also extend over this area to allow for access from the west abutment. The dam would be designed to accommodate the potential future installation of fish passage facilities.

Although the passage of anadromous fish either upstream or downstream of the existing dam is a topic of continuing study, the proposed rehabilitated dam would be designed so that it could be retrofitted with a fish passageway in the future, as determined necessary. The determinations of whether such a facility is ultimately required and what features such a facility should have would be made by CCID in coordination with the appropriate Federal and State resource agencies, including CDFG, pursuant to the relevant Fish and Game Code sections, and applicable Federal Regulations.

Operation and Maintenance

The rehabilitated dam would be visually inspected each year by DOSD, but Mendota Pool would not be dewatered for this purpose. Mendota pool would continue to be dewatered during flushing and maintenance operations; however, dewatering for inspections, maintenance, and repairs of Mendota Dam would occur every four to eight years for the first 30 years, then gradually increase over the useful life of the new dam (50+Years). A formal agreement would be needed to insure dewatering is scheduled in coordination with Mendota WA to minimize impacts to wildlife area operations, and could include measures to help maintain Mendota Pool water surface at or above a gauge reading of 14.0 feet at Mendota Dam. CCID would continue to operate, maintain, and own the rehabilitated dam. Regular operations and maintenance would continue to include operation of Mendota Dam, setting reservoir levels, releasing water for irrigation, and performing general dam inspections and routine maintenance activities.

Typical radial control gate bay design include method to install a temporary stop log dam upstream of a radial control gate to allow the radial control gate to be taken out of service without dewatering the reservoir upstream. The temporary stop log dam permits the operator to perform many routine maintenance items of the radial control gates while the dam remains in operation.

The radial control gates allow the operator to adjust the gate height in close coordination with changes in river flows due to storm events or flood control releases. A single operator can reposition all of the radial control gates in anticipation of a storm event with less than an hour's notice. Also the operator will be able to lower the radial control gates river flow recede and safely capture enough flow to refill Mendota Pool.

Required Agency Standards and Endangered Species Act Compliance

The following proposed actions and/or agency regulatory requirements and standards are applicable to Alternative MEN-7:

- The existing Mendota Dam is eligible for listing on the National Register of Historic Places or California Register of Historical Resources. Consultation with the State Historic Preservation Officer (SHPO) would be necessary before extensive modification to Mendota Dam occurred.
- Reclamation consulted with NOAA Fisheries under the Magnuson-Stevens Fisheries Conservation and Management Act in 2001. NOAA Fisheries recommended that Essential Fish Habitat (EFH) conservation measures be included in Alternative MEN-5. Alternative MEN-7 could have similar

EFH requirements as MEN-5. The 2001 NOAA Fisheries letter and recommendations can be found in Appendix C.

- Reclamation consulted with the USFWS and NOAA Fisheries under Section 7 of the Federal Endangered Species Act (ESA). The USFWS issued a Programmatic Biological Opinion (PBO), dated June 28, 1999, that indicated MEN-5 could be appended to the PBO provided the terms and conditions outlined in the PBO are satisfied. The PBO does not specifically indicate the rehabilitation of existing Mendota Dam as a major project that could be appended to the PBO. However, it may be possible to amend the PBO to include MEN-7 since the impacts and resulting terms and conditions outlined in the PBO would be similar. The findings by NOAA Fisheries may also be similar subject to informal consultation and any new information that has not been considered since NOAA Fisheries generated their letter of May 23, 2001.

Alternative MEN-9B – Convey Full Level 4 Water using Westlands Water District Facilities

This alternative would provide full, reliable, year-round Level 4 water deliveries to Mendota WA pursuant to CVPIA. Under Alternative MEN-9B, portions of existing WWD Laterals 5, 6, and 7 would be modified to accommodate the extra flow required for Level 4 water supply. A new, 42-inch-diameter pipe would connect to Lateral 5 at the existing terminus and convey water to Mendota WA Pump 7. A 300-linear foot (lf), 48-inch-diameter bypass would be installed around Pumping Plant 6-2 on Lateral 6 that would increase the capacity of Lateral 6 by 74 cfs, from 30 to 104 cfs. A new, 54-inch-diameter pipe would connect to Lateral 7 and convey water to Mendota WA Pump 7.

Figure III-2 shows the facilities proposed for the alternatives that would use WWD facilities.

The facilities outside of Mendota WA would require the purchase of rights-of-way for both permanent and construction easements. Assuming a permanent easement width of 40 feet, a construction easement width of 80 feet along the pipelines, and two acres at the discharge point near Pumping Plant 6-1, this would require 110 acres of permanent and temporary right-of-way. Additionally, Alternative MEN-9B would require the construction of a rubber dam across Fresno Slough to provide sufficient water-surface elevation.

Table III-2 lists the facilities required for Alternative MEN-9-B.

Water delivery is directly delivered to the west side of Mendota WA regardless of the operations of Mendota Dam. Water would also be delivered to Fresno Slough by passing water into the inlet canals on the west side of Mendota WA and creating a reverse flow back to the Fresno Slough. The inlet canals are level canals with Fresno Slough would not require any modifications to allow flows in this manner.

Rubber dam would be deflated during normal Mendota Dam operations.

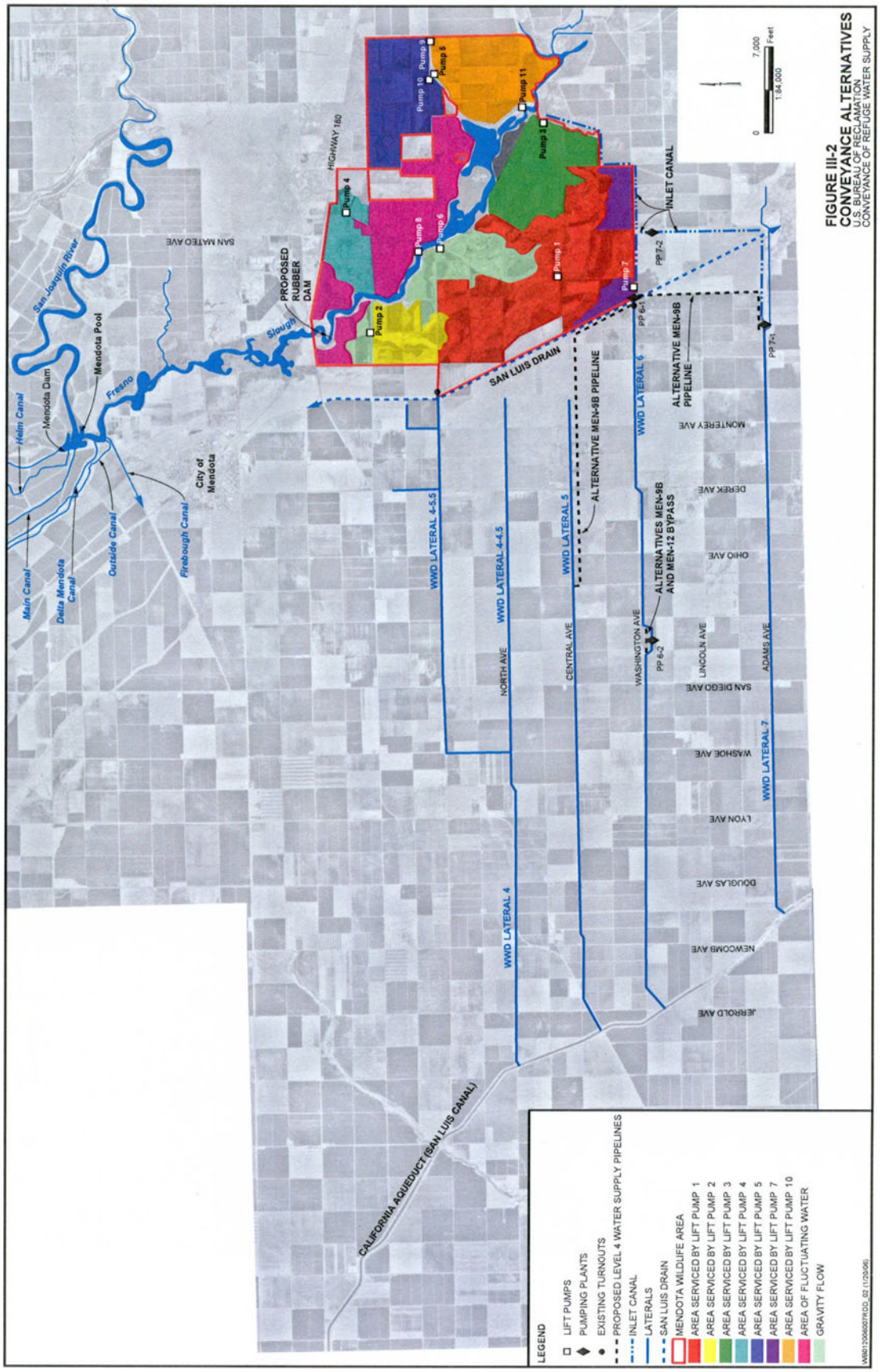
FIGURE III-2
CONVEYANCE ALTERNATIVES
U.S. BUREAU OF RECLAMATION
CONVEYANCE OF REFUGE WATER SUPPLY
0
7,000
Feet
1:84,000
LEGEND
LIFT PUMPS
PUMPING PLANTS
EXISTING TURNOUTS
PROPOSED LEVEL 4 WATER SUPPLY PIPELINES
INLET CANAL
LATERALS
SAN LUIS DRAIN
MENDOTA WILDLIFE AREA
AREA SERVICED BY LIFT PUMP 1
AREA SERVICED BY LIFT PUMP 2
AREA SERVICED BY LIFT PUMP 3
AREA SERVICED BY LIFT PUMP 4
AREA SERVICED BY LIFT PUMP 5
AREA SERVICED BY LIFT PUMP 7
AREA SERVICED BY LIFT PUMP 10
AREA OF FLUCTUATING WATER
GRAVITY FLOW
CALIFORNIA AQUEDUCT (SAN LUIS CANAL)
SAN LUIS DRAIN
WWD LATERAL 4
WWD LATERAL 4-4.5
WWD LATERAL 4-5.5
WWD LATERAL 5
WWD LATERAL 6
WWD LATERAL 7
ALTERNATIVE MEN-9B PIPELINE
ALTERNATIVES MEN-9B AND MEN-12 BYPASS
ALTERNATIVE MEN-9B PIPELINE
INLET CANAL
PROPOSED RUBBER DAM
Slough
Mendota Pool
Mendota Dam
City of Mendota
Fresno
San Joaquin River
Main Canal
Delta Mendota Canal
Outside Canal
Firebough Canal
Helm Canal
HIGHWAY 180
SAN MATEO AVE
MONTEREY AVE
DERBY AVE
OHIO AVE
SAN DIEGO AVE
WASHOE AVE
LYON AVE
DOUGLAS AVE
NEWCOMB AVE
JERROLD AVE
NORTH AVE
CENTRAL AVE
WASHINGTON AVE
LINCOLN AVE
ADAMS AVE
Pump 1
Pump 2
Pump 3
Pump 4
Pump 5
Pump 6
Pump 7
Pump 8
Pump 9
Pump 10
Pump 11
PP 6-1
PP 6-2
PP 7-1
PP 7-2

The rubber dam would be inflated prior to dewatering Mendota Pool at Mendota Dam. Water to the East side would be delivered by gravity flow from Fresno Slough and the pumping stations located on the east side of Mendota WA.

This alternative could convey Full Level 4 water supplies to Mendota WA if Mendota Dam was dewatered for long periods any time of the year.

Operation and Maintenance

The existing dam would be visually inspected each year by DOSD and Mendota Pool would be dewatered as outlined in the No Action and No Project Alternative. Mendota Pool would continue to be dewatered as needed for any reason. A formal agreement would be needed to insure dewatering is scheduled in coordination with Mendota WA to minimize impacts to wildlife area operations, to allow the rubber dam to be inflated and maintain the water surface elevation in Fresno Slough upstream of the rubber dam and could include measures to help maintain Mendota Pool water surface at or above a gauge reading of 14.0 feet at Mendota Dam. CCID would continue to operate and maintain the existing dam in accordance with the Exchange Contract. Regular operations and maintenance would continue to include operation of the existing dam, setting reservoir levels, releasing water for irrigation, and performing general dam inspections and routine maintenance.

Required Agency Standards and Endangered Species Act Compliance

The following proposed actions and/or agency regulatory requirements and standards are applicable to Alternative MEN-9B:

- Informal consultation potentially leading to formal consultation on listed species including EFH.
- No ESA consultation actions with the USFWS or NOAA Fisheries specific to this alternative have been completed to date.

Table III-2
Proposed Facilities for Alternative MEN-9B

Item	Description
1	Pipeline from Lateral 5 • Length: 26,200 lf • Diameter: 42 inches • Capacity: 50 cfs
2	Discharge structure • Capacity: 50 cfs
3	Lateral 6 bypass around Pumping Plant 6-2 • Length: 300 lf • Diameter: 48 inches • Capacity: 104 cfs
4	Pipeline from Lateral 7 • Length: 12,900 lf • Diameter: 54 inches • Capacity: 104 cfs
5	Discharge structure • Capacity: 208 cfs
6	Power to accommodate air compressor for rubber dam
7	Rubber dam across Fresno Slough

Alternative MEN-12 – Convey Level 4 Water Supplies using Westlands Water District Facilities When Mendota Dam is Dewatered

This alternative would provide Full Level 4 water deliveries to Mendota WA during the period when Mendota Dam is dewatered. Alternative MEN 12 is considered a hybrid of Alternative MEN-9B and the No Action and No Project Alternative because it would use two different mechanisms to provide Full Level 4 water to Mendota WA. Because Mendota Pool is never dewatered during the period of peak demand (250 cfs in early October), the facilities required under Alternative MEN-12 would be smaller than under Alternative MEN-9B. Under Alternative MEN-12, Mendota WA would rely on the existing Mendota Dam for the majority of the year, except during the period when Mendota Dam is dewatered for CCID inspections, maintenance, and repairs.

Under Alternative MEN-12, a portion of existing WWD Lateral 6 would be modified to accommodate the extra flow required for Full Level 4 water supply while Mendota Dam is dewatered (see Figure III-2). At Pumping Plant 6-2 on Lateral 6, a 300-lf, 48-inch-diameter bypass would be installed to increase the capacity of Lateral 6 by 74 cfs, from 30 to 104 cfs, and allow Mendota WA to obtain its water through Lateral 6 when Mendota Dam is dewatered. Additionally, Alternative MEN-12 would require the construction of a rubber dam across Fresno Slough to provide sufficient water-surface elevation.

Table III-3 lists the facilities required for Alternative MEN-12.

This alternative would deliver less than the required 150 cfs for November 1st to the 24th, however Mendota Pool is not often dewatered before November 25th. The capacity of 104 cfs would be sufficient to maintain the water level in Mendota Pool behind the rubber dam and deliver Full Level 4 supply to the Mendota WA.

Water delivery is directly delivered to the west side of the Mendota WA.

Rubber dam would be deflated during normal Mendota Dam operations.

The rubber dam would be inflated prior to dewatering Mendota Pool at Mendota Dam. Water to the East side would be delivered by gravity flow from Mendota Pool upstream of the rubber dam and the pumping stations located on the east side of Mendota WA.

Operation and Maintenance

The existing dam would be visually inspected each year by DOSD and Mendota Pool would be dewatered on the same schedule as the No Action and No Project Alternative. Mendota Pool would continue to be dewatered as needed from late November until mid February. A formal agreement would be needed to insure dewatering is scheduled in coordination with Mendota WA to minimize impacts to wildlife area operations, to allow the rubber dam to be inflated and maintain the water surface elevation in Fresno Slough upstream of the rubber dam and could include measures to help maintain Mendota Pool water surface at or above a gauge reading of 14.0 feet at Mendota Dam. This would be scheduled in coordination with Mendota WA. CCID would continue to operate and maintain the existing dam in accordance with the San Joaquin River Restoration Settlement Contract. Regular operations and maintenance would continue to include operation of the existing dam, setting reservoir levels, releasing water for irrigation, and performing general dam inspections and routine maintenance work.

Required Agency Standards and Endangered Species Act Compliance

The following proposed actions and/or agency regulatory requirements and standards are applicable to Alternative MEN-12:

- Informal consultation potentially leading to formal consultation on listed species including EFH.
- No ESA consultation actions with the USFWS or NOAA Fisheries specific to this alternative have been completed to date.

Table III-3
Proposed Facilities for Alternative MEN-12

Item	Description
1	Lateral 6 bypass around Pumping Plant 6-2 • Length: 300 lf • Diameter: 48 inches • Capacity: 74 cfs
2	Discharge structure • Capacity: 104 cfs
3	Power to accommodate air compressor for rubber dam
4	Rubber dam across Fresno Slough

Alternatives Considered but Eliminated from Detailed Study

The Decision Document (Reclamation, 1995) described the alternatives identified during technical investigations and public involvement meetings in 1994 for the conveyance of water supplies to Mendota WA. The Decision Document also discussed the initial screening of the alternatives based on environmental, technical, and economic feasibility, in addition to scoping and screening project efforts. The potential feasibility of alternatives identified in the Decision Document was further considered in the June, 1995, public involvement workshops, stakeholder meetings, and field investigations. Additional alternatives were identified in the revised addendum to the Decision Document, dated January 13, 2006.

The alternatives described in the following sections have been considered but eliminated because of excessive costs; water supply reliability; and/or environmental, social, and institutional constraints.

Alternative MEN-1 – Deliver Water from California Aqueduct through Westlands Water District Laterals 6 and 7 to Mendota Wildlife Area

Under Alternative MEN-1, water would be diverted from California Aqueduct (San Luis Canal) through existing WWD Laterals 6 and 7 to the west boundary of Mendota WA. This alternative would require construction of bypasses around three existing pumping plants, one on Lateral 6 and two on Lateral 7. A 130-cfs pumping plant would be constructed at the end of Lateral 6 to deliver water to the southwest corner of Mendota WA.

This alternative was eliminated from consideration because dewatering associated with required maintenance would remain problematic, water would only be provided to the west side of Mendota WA, and the economic costs would outweigh the benefits (Reclamation, 1994). Alternatives MEN-9A, MEN-9B, and MEN-9C are newer versions of this alternative. Alternative MEN-9B is being carried forward for detailed consideration.

Alternative MEN-2 – Modify Operation of Mendota Dam and Pool to Provide Water Supply for Mendota Wildlife Area from September through December

Under Alternative MEN-2, Mendota Dam and Mendota Pool would be modified during dewatering operations to provide a firm water supply for Mendota WA during the critical period of September through December. Maintenance to Mendota Dam that was historically performed during the winter months would be performed during a different time of the year to eliminate dewatering of Mendota Pool during the critical period. Existing irrigation facilities and diversions from Fresno Slough would require no modifications or new facilities. This alternative was considered an interim solution, and was initially selected for further consideration in the Decision Document.

Alternative MEN-2 was subsequently eliminated from further consideration because the short duration allowed for repairs prior to the start of the irrigation season (January 1st through February 15th). This alternative would not provide a permanent remedy to allow dewatering of Mendota Pool by CCID for inspections and/or maintenance during a different time.

Alternative MEN-3 – Combine Alternatives MEN-1 and MEN-2 to Provide Year-Round Water Supply to Mendota Wildlife Area

Under Alternative MEN-3, elements of Alternatives MEN-1 and MEN-2 would be combined to provide a year-round water supply to Mendota WA. This alternative would require construction of a bypass around the pumping plant on Lateral 6 and a pumping plant at the end of the Lateral 6 canal. This alternative was eliminated from consideration because dewatering associated with CCID maintenance and/or inspections would remain problematic. In addition, similar to Alternative MEN-1, this alternative would only supply water to the west side of Mendota WA.

Alternative MEN-4 – Store Water in the Pine Flat Reservoir, Pump via Fresno Irrigation District Facilities, New Facilities, and the James Bypass to Mendota Wildlife Area

The Alternative MEN-4 series of alternatives was originally proposed by the water users on the eastern side of the San Joaquin Valley (the Fresno Irrigation District, Kings River Conservation District, Pixley Irrigation District, and Tulare Lake Basin Water Storage District).

This series of alternatives would take water supplies scheduled for delivery in the fall and winter months to Mendota WA and deliver them for irrigation uses in Tulare Lake Basin in the summer. The water normally used for irrigation in Tulare Lake would be retained in storage in Pine Flat Reservoir, located on Kings River. In the fall, Mendota WA water stored in Pine Flat Reservoir would be delivered to Mendota WA as scheduled, using Kings River, conveyance facilities operated by Fresno Irrigation District, new conveyance facilities, and a canal owned by Mid-Valley Water District. The water would be delivered to the upslope lands on the eastern side of Mendota WA for subsequent distribution and use, or directly to Mendota Pool (also see the discussion for Alternative MEN-6).

The variations of Alternative MEN-4, Alternatives MEN-4A, 4B, and 4C, were eliminated from consideration for the following reasons:

- The permitted place of use for water appropriated from Kings River extends to Mendota Pool. However, for Kings River water to be used outside of any district in Kings River Water Association, the place-of-use boundary would have to be amended by the State Water Board.

- Kings River water right does not include benefits to fish and wildlife as a permitted use under the Kings River Water Association's water rights license/permit. To use Kings River Water, the purpose of use would have to be amended.
- Dewatering associated with required maintenance would remain problematic.
- Water supplies would only be provided to the east side of Mendota WA.

Alternative MEN-4A

Under Alternative MEN-4A, water would be conveyed from Pine Flat Reservoir via Kings River. This alternative would require construction of a turnout structure at the end of Fresno Irrigation District to the new 8-mile, cast-in-place, gravity-fed conveyance pipeline that connects to the canal via an 84-inch-diameter pipeline owned by Mid-Valley Water District.

Alternative MEN-4B

Under Alternative MEN-4B, water would be conveyed from Pine Flat Reservoir via Kings River. This alternative would include construction of a turnout structure at the end of Fresno Irrigation District facilities to a new 82,400-lf concrete-lined canal. This alternative would require the construction of 20 siphon road crossings and 15 check structures.

Alternative MEN-4C

Under Alternative MEN-4C, water would be conveyed from Pine Flat Reservoir via Kings River. This alternative would include construction of a turnout structure at the end of Fresno Irrigation District facilities to a new 70,300-lf concrete-lined canal to convey water to James Bypass. This alternative would require the construction of 15 siphon road crossings and 12 check structures.

Alternative MEN-6 – Combine Alternatives MEN-1 and MEN-4

Alternative MEN-6 is a combination of Alternatives MEN-1 and MEN-4. Components of Alternative MEN-1 would be used to deliver water to the west side of Mendota WA. Components of Alternative MEN-4 would be used to deliver water to the east side of Mendota WA.

Alternative MEN-6 was eliminated from consideration for the following reasons:

- The permitted place of use for water appropriated from Kings River does not extend to Mendota Pool. For Kings River water to be used outside of any district in Kings River Water Association, the place-of-use boundary would have to be amended by the State Water Board.
- Kings River water right does not include benefits to fish and wildlife as a permitted use under the Kings River Water Association's water rights license/permit. To use Kings River Water, the purpose of use would have to be amended.
- Dewatering associated with required maintenance would remain problematic.

Alternative MEN-8 – Install Groundwater Wells at Mendota Wildlife Area to Provide Full Level 4 Water Supply

Alternative MEN-8 would produce Full Level 4 water supply using only groundwater obtained onsite. This alternative was designed around the peak flow of 250 cfs required for October water deliveries to

Mendota WA. The facilities required for this alternative would include 100 to 120 wells, approximately 300 feet deep.

New wells installed at Mendota WA would need to be constructed of corrosion-resistant material to reduce the potential for well collapse resulting from adverse water quality conditions.

Alternative MEN-8 was eliminated from consideration because of the following concerns:

- The ability of the local aquifer to produce the water
- Impacts to potential overdraft conditions
- Impacts to existing local groundwater users
- Groundwater quality and compatibility with the support of wildlife
- The potential to induce additional subsidence
- The high capital costs of well installation, and required infrastructure resulting from the number of wells required, conveyance infrastructure, underground power infrastructure, and the specialized well casing needed to resist corrosion

Alternative MEN-9 – Use Westlands Water District Facilities to Convey Water Year-round

The Alternative MEN-9 series of alternatives provides conveyance water to Fresno Slough to meet year-round Full Level 4 water supply requirements via existing WWD facilities or land. All three variations of Alternative MEN-9 require construction of a rubber dam across Fresno Slough.

Alternative MEN-9A

Under Alternative MEN-9A, the existing WWD facilities (without modifications) would be used to convey water from California Aqueduct (San Luis Canal) to Mendota WA. The facilities used to evaluate this alternative were WWD Laterals 5, 6, and 7, because of their proximity to the existing Mendota WA internal water delivery system.

Alternative MEN-9A was eliminated from consideration because of capacity constraints within WWD facilities. The existing WWD system could not meet the demands of Mendota WA from May through August and from September through November.

Alternative MEN-9C

Under Alternative MEN-9C, water would be conveyed from San Luis Canal to Mendota WA through a newly installed pipeline. The new 58,400-lf, 72-inch-diameter, gravity-fed pipeline would be installed parallel to Lateral 6. This would be an improvement over Alternative MEN-1 because it would deliver water directly to Fresno Slough, to be impounded behind the rubber dam.

This alternative was eliminated from further consideration because of excessive costs relative to Alternative MEN-9B, which is being carried forward for detailed consideration.

Alternative MEN-10 – Deliver Water through New Pipeline from the Delta-Mendota Canal

Under Alternative MEN-10, a new 27,200-lf, 72-inch-diameter, pressurized pipeline would be constructed from Delta-Mendota Canal to Mendota WA. The pipeline would discharge into Fresno Slough behind a new rubber dam. Mendota WA would be able to continue using its existing water conveyance infrastructure.

Additional facilities required under Alternative MEN-10 would include a pumping plant, surge tanks, power for the pumping plant, and a discharge structure to transition the flow from the pipeline to Fresno Slough.

This alternative was eliminated from further consideration because of excessive costs.

Alternative MEN-11 – Deliver Water through New Pipeline from the San Joaquin River

Under Alternative MEN-11, water would be conveyed from San Joaquin River through a screened pumping plant and a new 21,000-foot, 72-inch-diameter, pressurized pipeline along San Mateo Avenue to Lift Pump 4, along the northern border of Mendota WA. The pipeline would discharge into the H Canal, which is tributary to Fresno Slough. The sizes of three culvert crossings of the H Canal along a Mendota WA maintenance road would need to be increased.

This alternative was eliminated from further consideration because it would require the re-operation of Millerton Reservoir to accommodate new summer and late fall flows in San Joaquin River to meet Mendota WA demands, which was not considered feasible at the time of the Decision Document. Among other things, the San Joaquin River Restoration Program currently underway will analyze re-operation of Friant Dam to meet the requirements of the Stipulation of Settlement for NRDC v. Rodgers, *CIV S-88-1658 LKK/GGH*. It will not address re-operation to meet refuge water supply requirements. As such, a diversion from San Joaquin River for this purpose would likely receive opposition if the water supply for fish restoration would be affected.

Alternative MEN-13 – Install Groundwater Wells at Mendota Wildlife Area to Provide Water when Mendota Pool is Dewatered

Alternative MEN-13 is a hybrid version of Alternative MEN-8 and the No Action and No Project Alternative in that it includes construction of groundwater wells to assist in delivering a portion of Level 4 water supplies to Mendota WA only when Mendota Pool is dewatered for CCID inspections/maintenance. This alternative would include construction of as many as 40 wells, approximately 300 feet-deep.

This alternative was eliminated from further consideration because of the same set of concerns associated with Alternative MEN-8.

Other Alternatives Considered, but Eliminated From Detailed Study

<u>Reset Pump Bowls:</u> The channels leading from Fresno Slough to the Mendota WA have lost capacity due to the lower water levels of the slough and sedimentation in Mendota Pool. Resetting the bowls of the pumps, located at the head of the channels on Fresno Slough boundaries, would require initial dredging of the channels to lower the channel elevations, followed with annual dredging needed as maintenance.

There is a lack of suitable dredge disposal area on the WA. This alternative was not compatible with Mendota WA habitat management plan and was removed from consideration.

Move Pumps to a different location: Moving the pumps to different locations on Fresno Slough boundaries would require reconstruction and/or new construction of conveyance structures (ditches, pipes, canals, etc.) from these new pump locations to various end delivery points on Mendota WA, or modifications would be required to redirect water from new pump locations into existing conveyance structures. There are limitations as to the number of locations on Fresno Slough boundaries that would accommodate water conveyance structures, and the water levels are basically the same in most areas of the slough. Due to additional impacts on the wetlands and associated costs, this alternative is not compatible with Mendota WA habitat management plan.

Chapter IV
Affected Environment and Environmental Consequences

This chapter describes the existing conditions in the project area and the potential environmental effects associated with the alternatives. Each alternative was evaluated relative to the existing environmental conditions and against thresholds of significance described for each resource area. Mitigation measures are recommended to reduce potential impacts to a less than significant level.

In accordance with CEQA regulations, potential environmental impacts are discussed in this chapter in proportion to their significance. The level of analysis for each type of impact was determined by the amount of information that would be required for decision makers to make an informed choice. Consequently, different levels of detail are presented for the resource areas discussed in this chapter.

The significance of an impact with respect to CEQA is based on the thresholds for determining significance of impacts in the environmental checklist in Appendix A of the State CEQA Guidelines. NEPA has no specific significance criteria other than Section 1508.27 of the NEPA Regulations (40 CFR 1508.27) which states that "significance" requires considerations of both context and intensity of the impact. The environmental assessment/finding of no significant impact provides evidence, analysis and reasons for the determination of the significance of impacts under NEPA. Therefore, the significance criteria from Appendix A of the CEQA guidelines described for each resource in this chapter apply only to CEQA.

Water Resources

Affected Environment

Surface Water

Regional Setting. The San Joaquin River Basin extends from the Delta in the north to the north fork of the Kings River in the south, encompassing about 32,000 square miles in the northern part of the San Joaquin Valley, roughly from Fresno to Stockton. The climate of the San Joaquin Valley is semiarid, characterized by hot, dry summers and mild winters, except at the highest altitudes, where distinct wet and dry seasons prevail. Annual temperatures range from 20 to 100 degrees Fahrenheit (°F). Most precipitation falls from November to April, with rain at the lower elevations and snow in the higher regions. On the valley floor, precipitation decreases from north to south, ranging from 14 inches in Stockton to 8 inches at Mendota (Reclamation, 1997).

The primary sources of surface water to the San Joaquin Valley are rivers that drain the western slope of the Sierra Nevada Range, the Delta-Mendota Canal, and the California Aqueduct. The San Joaquin, Merced, Tuolumne, Stanislaus, Calaveras, Mokelumne, and Cosumnes Rivers drain large areas of high-elevation watershed that supply snowmelt runoff during the late spring and early summer months. Peak flows occur in May and June in most years along all of the major rivers. Extensive water supply, hydroelectric, and flood control efforts during the past century have resulted in the construction of dams and reservoirs that now control the flow on nearly all major rivers in the San Joaquin Valley (Reclamation, 1997).

Central Valley agriculture receives irrigation water from the CVP, the State Water Project, local water districts, individual water right holders, and groundwater. Most of this water is delivered to farmers

through irrigation districts and other water agencies. Deliveries average about 22.5 million ac-ft per year, with the State Water Project providing about 10 percent, local surface water rights about 30 percent, and groundwater about 35 percent. The CVP normally supplies about 25 percent of Central Valley water to approximately 200 water districts, individuals, and companies through water service contracts, water rights, and exchange contracts.

Site Setting. The Mendota Pool is located at the confluence of the San Joaquin River and Fresno Slough. The Mendota Pool receives water from the San Joaquin River, the Delta via the Delta-Mendota Canal, groundwater pumping from the Mendota Pool Pumpers, and intermittently from the Kings River drainage in the south via the James Bypass into Fresno Slough. Water from the Mendota Pool is diverted for a variety of agricultural, municipal, and habitat management uses. Mendota WA receives water from the Mendota Pool via Fresno Slough, which is managed by CCID as a water conveyance facility. Gates and pumps divert water from Fresno Slough to Mendota WA.

San Joaquin River. The San Joaquin River from Gravelly Ford to the Mendota Pool (about 24 miles) is frequently dry except during flood control releases, because water from Friant Dam (Millerton Lake) is released to satisfy downstream water right agreements and the majority is diverted into the Madera and Friant-Kern Canals to meet contractual water supply obligations in accordance with the Reclamation Reform Act of 1982. Any flows passing Gravelly Ford percolate to groundwater and/or, during flood control releases, flows into Mendota Pool.

Delta-Mendota Canal. The Delta-Mendota Canal, completed in 1951, carries water southeast from the Tracy Pumping Plant along the west side of the San Joaquin Valley for agricultural irrigation and municipal and industrial purposes, and wetland irrigation at the San Luis National Wildlife Refuge complex. This water is conveyed to replace San Joaquin River water that is impounded at Friant Dam. The canal is about 117 miles long and terminates at Mendota Pool. The initial diversion capacity is 4,600 cfs, which is gradually decreased to 3,211 cfs at the Mendota Pool.

James Bypass and North Fork Kings River. Water in the James Bypass predominantly comes from the Delta-Mendota Canal via the Mendota Pool. However, flood flows from the Kings River can reverse flow toward Mendota Pool.

Mendota Pool and Dam. Mendota Pool is a re-regulating reservoir for more than 1 million ac-ft of CVP water pumped from the Delta and delivered by the Delta-Mendota Canal. The Mendota Pool is impounded by Mendota Dam, which is owned and operated by CCID. Currently, Mendota Pool is sustained by the inflow from the Delta-Mendota Canal, which typically conveys 2,500 to 3,000 cfs to the Mendota Pool during the irrigation season. San Joaquin River water is only conveyed to the Mendota Pool during periods of flood flow. Mendota Pool extends over 5 miles up the San Joaquin River Channel and over 10 miles into Fresno Slough and varies from less than 100 to several hundred feet wide. Water depth varies but averages about 4 feet (San Joaquin River Resource Management Coalition [SJRRMC], 2003). Mendota Pool contains approximately 8,000 ac-ft of water and has a surface area of approximately 2,000 acres when full. It is the largest body of ponded water in the San Joaquin Valley basin floor.

The primary function of Mendota Dam is to distribute water from the Delta-Mendota Canal and the San Joaquin River and pumped groundwater to a number of irrigation districts collectively known as Exchange Contractors. Other districts, such as WWD, James Irrigation District, and Tranquility Irrigation District, national wildlife refuges, and wildlife areas also rely on Mendota Pool for diversions. Water deliveries leave Mendota Pool in nearly every direction, including downstream into the San Joaquin River. Between 200 and 600 cfs of Delta-Mendota Canal water is released into the San Joaquin River downstream of Mendota Pool for diversion at Sack Dam (SJRRMC, 2003).

Built in 1917, the existing dam is a 386-foot concrete slab. Reinforced concrete piers spaced at approximately 20-foot centers rise from the slab and provide a structure on which weir boards are fixed to

retain a water depth of approximately 18 feet. A concrete bridge deck extends the length of Mendota Dam to allow manual placement and removal of the weir boards. Two steel sluice gates with electric operators are used to provide downstream releases of approximately 200 to 600 cfs. The dam has a leakage rate through the flashboards of between 15 and 80 cfs. During the irrigation season, this water is included in the deliveries made to downstream contractors. During the nonirrigation season (from about November to February), CCID seals the leaks as much as possible to avoid water loss. The water that continues to leak through Mendota Dam is ultimately delivered to downstream customers including the San Luis Canal Company, Los Banos Wildlife Area, and the San Luis National Wildlife Refuge. This leakage is accounted for as part of operations and total deliveries through measurement downstream at the Arroyo Canal or at the delivery point to each refuge area. Mendota Pool also releases water into the western Grasslands area via Outside, Main, and Helm Canals. Water is provided to Mendota WA via Fresno Slough.

CCID lowers Mendota Pool water elevation every one to three years between late November and mid-January to perform inspections at Mendota Dam. The dam requires intensive inspection and resulting repair to continue operation. The frequency of required remedial repairs, such as identifying and filling voids under the structure, is increasing. As a result, dewatering is expected to be required annually in the future. In addition, it is questionable whether the facility will be able to keep Mendota Pool water-surface elevations high enough to provide diversions to upstream (Fresno Slough) diverters. When Mendota Pool is drained, water cannot be delivered from Mendota Pool to Mendota WA. As a result, seasonal habitat is unavailable and Mendota WA is managed at a suboptimal level (SJRRMC, 2003).

Streamflows Downstream from Mendota Dam. Streamflow data were collected from an existing gauge site three miles downstream from Mendota Dam on the San Joaquin River. The period of record was January 1985 to June 1986 and January 1987 to October 1996. Table IV-1 represents average daily flows (by month) at three levels: minimum flow, 90 percent exceedance flow (i.e., the streamflows downstream from Mendota Dam exceed the listed value 90 percent of the time), and 50 percent exceedance flow (median flow).

Table IV-1
Streamflows Downstream from Mendota Dam

Month	Minimum Flows	90 Percent Exceedance Flows	50 Percent Exceedance Flows
October	100	151	206
November	25	73	117
December	15	21	63
January	12	14	40
February	20	30	141
March	30	90	260
April	40	107	255
May	90	135	295
June	150	275	497
July	350	410	544
August	210	278	478
September	120	192	283

Note: Streamflows listed in cfs.

Source: Reclamation, 1997.

Mendota Wildlife Area Surface Water Supply. Mendota WA has contracts for 27,593 ac-ft of water per year (Contract Level 2 supply). However, full Level 4 water supply, needed for optimal management of the wildlife area, requires 29,650 ac-ft per year. Limitations on meeting Contract Level 2 and full Level 4 water supplies are discussed in Section II.

Differences in the amount of water currently contracted for and the amount actually delivered are caused by the following:

- Dewatering of Mendota Pool for inspections and dam maintenance every 1 to 3 years between late November and at least January 15 (dewatering Mendota Pool effectively terminates water deliveries to Mendota WA)
- Periodic dewatering of Mendota WA canals and ponds to control cattails and aquatic weeds
- Maintenance and construction of ditches and levees at Mendota WA, which require periodic dewatering of canals
- Occurrence of drought when most water supplies are curtailed

In recent years, when the Mendota Pool has been dewatered, Mendota WA has accepted full Contract Level 2 water supply by overflooding wetland areas before late November and taking delivery of water during other months, resulting in suboptimal refuge management.

Mendota Wildlife Area Surface Water Delivery and Internal Distribution System. Because Mendota WA is intensively and artificially maintained with surface irrigation water, a water conveyance infrastructure is in place to service the 272 field cells. A field cell is the individual unit of water management at Mendota WA. Several ditch pumps help convey water to the higher elevations of Mendota WA to irrigate feeding or nesting areas for wildlife or cover plants. Approximately 2,410 acres east of Fresno Slough (east side) are irrigated and flooded through gravity flow when the Mendota Pool is at normal elevation (gauge reading between 14.0 feet and 14.5 feet at the Mendota Dam).

By contract, water use on the east side between October 1 and February 28 of each year is not charged against Mendota WA's annual water supply. By definition, the east side becomes part of the Fresno Slough during this time period. Water use between March and September on the east side is charged against the Mendota WA water contract. Water to irrigate the rest of the east side and all acreage west of Fresno Slough must be lifted by pumps into the delivery system.

A series of nine Mendota WA lift pumps convey water from Fresno Slough or its tributaries into canals, where the water is distributed throughout the wildlife area. In addition, three return-flow pumps recirculate water in the wildlife area. The lift pumps range in size from 15 to 100 horsepower and have capacities from 9 to 93 cfs. The return-flow pumps range in size from 20 to 30 horsepower and have capacities from 11 to 13 cfs. The lift pumps and the return-flow pumps lift water into various canals that distribute the water to different fields for flooding.

As discussed previously, Mendota Pool is usually dewatered every one to two years from Thanksgiving to at least January 15 for maintenance or inspections. The Mendota Pool can be ready to receive water in four weeks when maintenance is not required after structural inspections. Even though Mendota Pool can be available, it takes approximately 8,000 ac-ft of water to refill; therefore, the operators wait until multiple demands for water delivery are present before refilling. When Mendota Pool is dewatered, the Fresno Slough water level drops and the lift pumps are not able to provide water into Mendota WA's internal water distribution system. To compensate for this lack of water, the wildlife area floods fields before Mendota Dam is dewatered and then depends on rainfall and some water from WWD until Mendota Dam is operational.

Groundwater

Regional Setting. Mendota WA is located along the southern border of the San Joaquin River Hydrologic Region and northern border of the Tulare Lake Hydrologic Region, according to the California Department of Water Resources' (DWR) Bulletin 118 (2003). Surface water hydrology in the vicinity of Mendota WA is aligned more with the San Joaquin River Hydrologic Region to the north; however, groundwater in this area is hydrologically and geographically a part of the Kings Subbasin in the Tulare Lake Region, according to DWR. The Kings Subbasin is bounded by the San Joaquin River to the north, Sierra foothills to the east, the southern fork of the Kings River to the south, and WWD on the west. Groundwater in both regions has been heavily developed by pumping, largely for crop irrigation. Pumping has caused substantial subsidence in the area and has altered regional groundwater flow patterns. Annual groundwater pumping exceeds recent estimates of perennial yield by approximately 200,000 ac-ft in the San Joaquin River Hydrologic Region and 800,000 ac-ft in the Tulare Lake Hydrologic Region (Reclamation, 1997).

Site Setting. The vicinity of Mendota WA is underlain by an upper alluvium to a depth of 450 feet below ground surface (bgs). The alluvium is made up of four clay layers that consist of basin, floodplain, lacustrine, and marsh deposits. Few wells derive water from basin deposits, which are exposed along Fresno Slough (DWR, 2003). The lacustrine and marsh deposits in the subsurface are mostly impermeable, and in some cases restrict the vertical movement of water. The Corcoran Clay (E-clay) underlies the western third of the subbasin. The top of the E-clay is at about 450 feet bgs at Mendota WA and approximately 55 feet thick (Page, 1986). Above the E-clay, the A-clay is less widespread than the E-clay, but averages 80 feet deep, acting as a local confining bed in parts of the Mendota Pool area. The C-clay also lies above the E-clay, but is less extensive than the A-clay or the E-clay. The construction of many large-diameter wells with screens above and below the E-clay has rendered it locally ineffective as a confining unit (Woodward-Clyde Consultants, Inc., 1994).

Subsidence of 29 feet has been measured in the City of Mendota, indicating significant inelastic aquifer compaction (Natural Resources Conservation Service, 2005). More severe subsidence has occurred in areas southwest of Mendota. The Exchange Contractors are continuously monitoring subsidence, water levels, and compaction at two extensometers located near the Mendota Pool at the intersection of Russell Avenue and the Delta-Mendota Canal. Since 1957, about 5 feet of land subsidence has been measured (Reclamation, 2004). Future subsidence is possible in the upper and lower aquifers, where confined conditions are present (CCID, 1997).

Groundwater levels vary widely in wells surrounding Mendota WA, according to DWR monitoring well data (DWR, 2003). Monitoring data show seasonal variations between 20 and 100 feet bgs at some locations. The average of this variation is between 20 and 40 feet bgs. Except during drought periods, the water levels in deep wells (below the E-clay) have generally been rising since the late 1960s; however, in the immediate vicinity of Mendota WA, groundwater levels are still significantly below historical levels, according to DWR's water data library (http://wdl.water.ca.gov/).

Because Mendota WA is near the City of Mendota and adjacent to wells operated by the Mendota Pool Pumpers, drawdown and seasonal fluctuation in water levels at the wildlife area are common, particularly in the shallow aquifer between the A-clay and E-clay, where the majority of local pumping occurs. According to water levels measured in the fall of 1993 after seasonal pumping by the Mendota Pool Pumpers and others in the area, a cone of depression of approximately 40 feet was present around the northeast of the Mendota Pool Pumpers' wells along Fresno Slough. Monitoring wells located just east of the Mendota Pool Pumpers' wells show significant seasonal variation in depth to groundwater. Approximately 1 mile east of several Mendota Pool Pumper wells along Fresno Slough, depth to water ranged from 15 to 30 feet during a time of minimal pumping, and 75 to 95 feet during groundwater pumping episodes (CCID and City of Mendota, 1999) in the vicinity of Mendota Pool. Seasonal decreases

in groundwater levels during periods of heavy pumping have also affected the pumping rates attainable from some wells in the project area (CCID and City of Mendota, 1999). Groundwater levels are not monitored at Mendota WA to determine the impacts of the local pumping.

The depths of typical municipal and irrigation wells range from 100 to 500 feet bgs, and average approximately 210 feet bgs (DWR, 2003). The yields from irrigation wells in the area range up to 3,000 gallons per minute (gpm), but average between 500 and 1,500 gpm. The lowest pumping rates are observed immediately east of the City of Mendota, and higher rates are observed several miles north of the city.

The transmissivity of the aquifer shows significant lateral and vertical variability, with specific capacities ranging from 23 to 59 gpm per foot of drawdown. These values suggest a range of aquifer transmissivity between 46,000 and 108,000 gallons per day, per foot (CCID and City of Mendota, 1999). The specific yield of the aquifer in the Kings Subbasin has been estimated as 11.3 percent (DWR, 2003).

The estimated safe groundwater yield from the upper aquifer for Mendota WA is about 5,500 ac-ft per year (Reclamation, 1994). Three wells at Mendota WA were abandoned in the 1950s because of high boron concentrations, and no groundwater wells are currently in use at the wildlife area (Reclamation, 1994).

Surface Water Quality

Regional Setting. Surface water quality in the San Joaquin Valley is affected by several factors, including natural runoff, agricultural return flows, biostimulation, construction, logging, grazing, operations of flow-regulating facilities, groundwater pumping, urbanization, and recreation. In addition, irrigating crops in the western portion of the San Joaquin Valley has accelerated the leaching of minerals from the soils, altering water quality conditions in the San Joaquin River system. Salinity, boron, selenium, and an array of pesticides (including diazinon and chlorpyrifos), parameters of concern to wildlife, may be found in regional surface water supplies.

Water quality conditions in the Mendota Pool depend on inflows from the Delta-Mendota Canal, banked CVP water and groundwater pumped into Mendota Pool by Marvin Meyers and the Mendota Pool Pumpers, respectively, and, to a limited extent, San Joaquin River inflows. Water quality in the San Joaquin River varies considerably along the river's length. Above Millerton Lake and downstream towards Mendota Pool, flows are infrequent, but the quality of water released from Friant Dam is generally excellent. The reach from Gravelly Ford to Mendota Pool (about 17 miles) is perennially dry except during flood control releases from Friant Dam. During the irrigation season, most of the water released from the Mendota Pool to the San Joaquin River and to irrigators is imported from the Delta via the Delta-Mendota Canal. This water has higher concentrations of total dissolved solids (TDS) than water in the upper reaches of the San Joaquin River, and might be affected by runoff and seepage into the canal (SJRRMC, 2003).

Additionally, flood waters from the Kings River can flow into Mendota Pool. This water is generally of very high quality. Locally, agricultural subsurface drainage and surface return flows of varying quality also contribute to the water quality in the Mendota Pool.

Site Setting. Water quality data in the vicinity of Mendota WA are available for various locations and periods from Reclamation's Central Valley Operations office, USGS, and CDFG (on file at Mendota WA). The most common parameters tested are salinity (specific conductance); TDS; and constituents of concern to wildlife, such as selenium, boron, arsenic, and molybdenum.

USGS monitored general water quality in the San Joaquin River near Mendota from 1951 to 1984 (SJRRMC, 2003). According to these data, the Mendota Pool has a mean EC of 324 microSiemens per

centimeter (µS/cm) in winter and 401 µS/cm in summer. Because Delta water is conveyed to the Mendota Pool by the Delta-Mendota Canal, significant diurnal variation in the salinity of Mendota Pool results. Diurnal variation in salinity measured at Check Structure 21 during winter and spring ranges from 250 to 1,000 µS/cm (Reclamation, 2005). Mendota Pool Pumper wells that pump lesser-quality, shallow groundwater are not allowed to pump when Fresno Slough flows toward Mendota Pool (SJRRMC, 2003).

A major water quality concern in the project area is selenium. Selenium in the San Joaquin River downstream of Mendota Dam has exceeded the freshwater aquatic life criteria of 5 micrograms per liter (µg/L) on two occasions, according to data collected by the San Joaquin River Exchange Contractors (San Joaquin River Exchange Contractors Water Authority, 1999). In both cases, the concentrations were 10 µg/L. Additionally, selenium in the Delta-Mendota Canal at Washoe Avenue exceeded 5 µg/L in 21 of the 118 samples taken between January 1990 and December 1999.

Water quality standards for salts and boron have also been exceeded in the San Joaquin River downstream of Mendota Dam to Sack Dam. This reach is also impaired for pesticides (SJRRMC, 2003).

Surface water quality data are available for the following water resources in the project area:

- Mendota WA (see Table IV-2)
- Mendota Pool
- San Joaquin River below Mendota Dam
- Delta-Mendota Canal at Mendota Pool (see Table IV-3)
- California Aqueduct at O'Neill Intake (see Table IV-4)

Mendota Pool. USGS monitored general water quality in the San Joaquin River near the Mendota Pool from 1951 to 1984 (SJRRMC, 2003). Based on these data, the Mendota Pool has a mean specific conductance of 324 µS/cm in winter and 401 µS/cm in summer. Mendota Pool Pumpers wells that pump lesser-quality shallow groundwater are not allowed to pump when Fresno Slough flows toward Mendota Pool (SJRRMC, 2003).

San Joaquin River below Mendota Dam. The primary area of concern for water quality downstream from Mendota Dam begins in the reach downstream from Sack Dam, where almost all of the flow consists of agricultural drainage (CV Water Board, 1988). Constituents of primary concern include TDS, salinity, and boron.

Modifications to the river for flood control have reduced the natural river flows between Mendota Dam and Sack Dam. Flows in this reach are maintained by discharges from the Mendota Pool. Water quality in this reach is therefore similar to that of the Mendota Pool. Water quality standards have been exceeded for salinity and boron, and impairments also exist for pesticides (CV Water Board, 2002a and 2002b)

Delta-Mendota Canal. Because Delta water is conveyed to the Mendota Pool by the Delta-Mendota Canal, significant diurnal variation in the salinity of Mendota Pool results. Diurnal variation in salinity measured at Check Structure 21 during winter and spring ranges from 250 to1,000 µS/cm (Reclamation, 2005). The CDFG and Mendota WA test pH, temperature, TDS, and salinity on an ongoing basis (approximately monthly). Other parameters have been tested by Mendota WA when additional funding was available. Table IV-3 summarizes available water quality data for the Delta-Mendota Canal just upstream of Mendota Pool.

Table IV-2
Surface Water Quality Data, Mendota Wildlife Area

Total Dissolved Solids					
Location/Description	**Sample Period**	**Median (mg/L)**	**Minimum (mg/L)**	**Maximum (mg/L)**	**Number of Samples**
Highway 180 at Bridge	1/02-7/05	312	28	574	70
Mendota WA Bridge	1/02-7/05	311	25	538	70
Pump 3	1/02-7/05	303	25	590	63
Pump 5	3/02-7/05	326	65	774	66
Pump 6 (return)	3/02-3/05	404	179	865	49
Pump 8 (return)	4/02; 4/04; 3/05	536	287	842	5
Pump 11	3/03-6/03; 4/04; 7/04; 3/05	535	313	883	10
Specific Conductance					
Location/Description	**Sample Period**	**Median (µS/cm)**	**Minimum (µS/cm)**	**Maximum (µS/cm)**	**Number of Samples**
Highway 180 at Bridge	1/02-7/05	548	53	1,003	70
Mendota WA Bridge	1/02-7/05	551	48	975	70
Pump 3	1/02-7/05	569	49	981	63
Pump 5	3/02-7/05	567	130	1,107	66
Pump 6 (return)	3/02-3/05	707	389	1,443	49
Pump 8 (return)	4/02; 4/04; 3/05	926	501	1,168	5
Pump 11	3/03-6/03; 4/04; 7/04; 3/05	966	517	1,445	10
Boron					
Location/Description	**Sample Period**	**Median (mg/L)**	**Minimum (mg/L)**	**Maximum (mg/L)**	**Number of Samples**
Highway 180 at Bridge	3/02-3/03	0.3	0.2	0.4	12
Mendota WA Bridge	3/02-3/03	0.25	0.2	0.4	12
Pump 3	3/02-9/02	0.25	0.2	0.4	6
Pump 5	6/02-3/03	0.2	0.2	0.3	9
Pump 6	3/02-5/02; 10/02-3/03	0.325	ND	0.5	8
Pump 8	3/02-5/02	0.4	0.3	0.5	3
Pump 11	-	-	-	-	0
Selenium					
Location/Description	**Sample Period**	**Median (µg/L)**	**Minimum (µg/L)**	**Maximum (µg/L)**	**Number of Samples**
Highway 180 at Bridge	3/02-3/03	ND	ND	ND	12
Mendota WA Bridge	3/02-3/03	ND	ND	ND	12
Pump 3	3/02-9/02	2	ND	2	6
Pump 5	6/02-3/03	2	ND	2	9
Pump 6	3/02-5/02; 10/02-3/03	ND	ND	ND	8
Pump 8	3/02-5/02	2	ND	2	3
Pump 11	-	-	-	-	0

Table IV-2
Surface Water Quality Data, Mendota Wildlife Area

Molybdenum					
Location/Description	**Sample Period**	**Median (µg/L)**	**Minimum (µg/L)**	**Maximum (µg/L)**	**Number of Samples**
Highway 180 at Bridge	3/02-3/03	ND	ND	ND	12
Mendota WA Bridge	3/02-3/03	ND	ND	ND	12
Pump 3	3/02-9/02	ND	ND	ND	6
Pump 5	6/02-3/03	ND	ND	ND	9
Pump 6	3/02-5/02; 10/02-3/03	ND	ND	ND	8
Pump 8	3/02-5/02	ND	ND	ND	3
Pump 11	-	-	-	-	0
Arsenic					
Location/Description	**Sample Period**	**Median (µg/L)**	**Minimum (µg/L)**	**Maximum (µg/L)**	**Number of Samples**
Highway 180 at Bridge	3/02-3/03	2	ND	3	9
Mendota WA Bridge	3/02-3/03	2	ND	3	10
Pump 3	3/02-9/02	3	2	4	6
Pump 5	6/02-3/03	2.5	ND	4	9
Pump 6	3/02-5/02; 10/02-3/03	5	ND	10	8
Pump 8	3/02-5/02	5	2	7	3
Pump 11	-	-	-	-	0

Notes:

mg/L = Milligrams per liter.

Minimum Detection Limits:

Arsenic = Method - EPA 200.8, DLR- 2 µg/L.

Boron = Method - EPA 200.7, DLR 0.1 mg/L.

Molybdenum = Method EPA 200.8, DLR 10 µg/L.

Selenium = Method SM 3114-B, DLR 2 µg/L.

Source: CDFG, 2005.

California Aqueduct. The California Aqueduct, via WWD laterals, is a potential conveyance facility of acquired Level 4 water supplies for Mendota WA. Table IV-4 presents California Aqueduct water quality data collected daily from January 2000 through July 2005 at the O'Neill Intake, upstream of WWD. Water quality in the WWD laterals is similar to the source waters (California Aqueduct), but growers can pump groundwater into the WWD pipelines if the blended supply meets applicable water quality standards (Bettner, 2006). Additionally, WWD laterals could receive irrigation drainage. Because of possible mixing of groundwater and irrigation drainage with California Aqueduct water, water quality in the WWD laterals might vary from the data in Table IV-4.

Table IV-3
Surface Water Quality Data, Delta-Mendota Canal at Mendota Pool

Constituent	Units	Median	Minimum	Maximum	Number of Samples
pH	SU	7.7	7.0	9.3	36
Temperature	°C	19	8.8	28.7	70
TDS	mg/L	258	105	598	70
Specific Conductance	µS/cm	449	227	935	70
Boron	mg/L	0.2	0.1	0.6	12
Selenium	µg/L	3	ND	4	12
Molybdenum	µg/L	ND	ND	ND	12
Arsenic	µg/L	2	ND	3	12

Notes:

Period of record for pH, temperature, TDS, and specific conductance is January 2002 through July 2005. Period of record for boron, selenium, molybdenum, and arsenic is March 2002 through March 2003.

°C = Degrees Celsius.
ND = Not detected.
SU = Siemens unit.

Source: Mendota WA, 2005.

Table IV-4
Surface Water Quality Data, California Aqueduct at O'Neill Intake

Constituent	Units	Average	Minimum	Maximum	Number of Samples
pH	pH	7.8	5.8[a]	9.0	1,879
Specific Conductance	µS/cm	458	218	714	2,004
Turbidity	NTU	7.0	0.87	38.55	1,995

[a]Isolated occurrence reported from June 13 through July 5, 2001. Typically, pH ranges from 6.7 to 8.8.

Notes:

Period of record is January 2000 through July 2005.

NTU = Nephelometric turbidity units.

Source: DWR, 2005.

Groundwater Quality

Regional Setting. Inadequate drainage and accumulating salts have been persistent problems along the west side and in parts of the east side of the San Joaquin River Hydrologic Region for more than a century. In some portions of the San Joaquin River Hydrologic Region, natural drainage conditions are inadequate to percolate surface water to deep groundwater. This occurs because vertical conductivity is low and, therefore, limits downward drainage of infiltrated water (Reclamation, 1997).

Groundwater zones commonly used along portions of the western margin of the San Joaquin Valley have high TDS concentrations, ranging from 500 mg/L to more than 2,000 mg/L (Bertoldi et al., 1991). Levels of TDS in the Kings Subbasin are typically between 40 and 570 mg/L, averaging 240 mg/L in 414 samples from water supply wells. Nitrates and 1,2-dibromo-3-chloropropane have been found in groundwater along the eastern side of the subbasin. High fluoride, boron, and sodium levels have also been found in localized areas (DWR, 2003).

Several CCID wells in the study area show progressive degradation in water quality. Water in a CCID well approximately 2 miles north of the City of Mendota had an specific conductance of approximately 420 micromhos per centimeter (µmhos/cm) in the early 1960s, 1,050 µmhos/cm by 1975,

1,550 µmhos/cm by 1988, and 2,090 µmhos/cm in 1996. This pattern has been verified by other wells in the area along the Delta-Mendota Canal, upslope of the San Joaquin River (CCID and City of Mendota, 1999).

West of the San Joaquin River and Fresno Slough, the quality of the groundwater between the A-clay and E-clay also has degraded in recent decades. This is a result of northeasterly migration of poor-quality groundwater, overpumping, use of Delta-Mendota Canal water for irrigation, and concentration of salts in water beneath irrigated lands (Reclamation, 2004).

The following sections provide known, detailed information on selenium, manganese, TDS, and salinity.

Selenium. Selenium is found naturally in soils and groundwater on the west side of the region, where concentrations in shallow groundwater have been highest south of Los Banos and Mendota (median concentrations of 10,000 to 11,000 µg/L) (Bertoldi et al., 1991). Use of groundwater to support aquatic species might be impaired because of elevated concentrations of selenium (chronically above the U.S. Environmental Protection Agency's [EPA] Freshwater Aquatic Life Criterion of 5 µg/L) (Reclamation, 2004).

Table IV-5
Groundwater Quality Data, Mendota Wildlife Area

Well Name/Location	Date	Sampled Interval (feet bgs)	Specific Conductance (µS/cm)	Boron (µg/L)	Selenium (µg/L)	Molybdenum (µg/L)
Fresno Slough 1[a]	06/13/1991	350-500	6,960	3,000	NR	NR
Tranquility 16 (Southern Border)[b]	06/18/1991	-	1,930	1,800	ND (<2)	NR
Traction Ranch (Southeast Corner)[c]	03/31/1992	-	7,800	2,000	ND (<2)	NR
MN-TW-01[d]	04/13/1992	120-135 300-340 460-485	9,640 7,760 2,340	5,000 2,100 1,400	ND (<6) 7 ND (<6)	ND (<200) ND (<200) ND (<200)
MN-TW-02[d]	04/13/1992	340-360 530-550	5,601 2,640	2,200 1,300	ND (<4) ND (<4)	ND (<200) ND (<200)
Summary Statistics	**Median**		**5,584**	**2,350**	**<4**	**<200**
	Minimum		**1,930**	**1,300**	**<2**	**<200**
	Maximum		**9,640**	**5,000**	**7**	**<200**
	Number of Observations		**8**	**8**	**7**	**5**

[a]Fresno Slough 1 results reported by Fruit Growers Laboratory, Inc., 1991.

[b]Tranquility No. 16 test results reported by BC Laboratories, Inc., 1991.

[c]Traction Ranch well test results reported by BSK Analytical Laboratories, Inc., 1992.

[d]Test results for MN-TW-01 and MN-TW-02 reported by Twining Laboratories, Inc., 1992.

Note:

NR = Not reported.

Manganese. Groundwater pumped from wells in the City of Firebaugh has historically contained high levels of manganese. High manganese concentrations and hydrogen sulfide odors have also been a problem in groundwater produced from the City of Mendota's municipal wells (CCID, 1997).

Total Dissolved Solids and Salinity. Electrical conductivities (EC) greater than 1,800 µmhos/cm are found in an area south of the City of Mendota, corresponding to the Mendota Pool area. Higher-salinity groundwater (up to 3,000 µmhos/cm) might be locally present below the E-clay in the Firebaugh and Mendota areas (CCID and City of Mendota, 1999); however, these concentrations will be limited in areal extent. Shallow groundwater in this area also contains boron concentrations greater than 2.5 mg/L (CCID, 1997).

Between the A-clay and E-clay, the lowest TDS concentrations, less than 400 mg/L, are located near and northeast of the San Joaquin River; the highest TDS concentrations, up to 830 mg/L, are west and northwest of the City of Mendota. East of the Fresno Slough, the lowest TDS concentrations are within approximately one mile of the San Joaquin River. Generally, near the City of Mendota, TDS concentrations increase from northeast to southwest.

Groundwater monitoring wells drilled for a groundwater investigation for the City of Mendota ranged from 430 to 520 feet bgs and extended to near the base of or just below the E-clay. These wells, within two miles of the City of Mendota, reported TDS concentrations between 1,300 and 1,700 mg/L and EC between 2,000 and 2,700 µmhos/cm between 1992 and 1996. Constituents in CCID wells averaged slightly lower. Wells tested in 1997 at Locke Ranch, north of Mendota Dam, showed TDS concentrations between 375 and 830 mg/L and EC ranging from 650 to 1,400 µmhos/cm (CCID and City of Mendota, 1999).

Less information is available for groundwater beneath the E-clay. Deep wells in the area include five test wells and one deep cluster monitoring well at the Mendota Airport, with screened intervals between 425 and 520 feet bgs. TDS concentrations range from 600 to 1,660 mg/L and average above 1,000 mg/L. EC ranges from 925 to 2,400 µmhos/cm, averaging approximately 1,400 µmhos/cm. Drilling below 800 feet would be needed to evaluate the quality of the groundwater at a greater depth beneath the E-clay (CCID and City of Mendota, 1999).

Site Setting. Groundwater samples were collected from discrete intervals at the test wells drilled at or adjacent to Mendota WA in 1991 and 1992. Data from these wells are shown in Table IV-5. EC values as high as 9,600 µmhos/cm were reported at depths ranging from 120 to 130 feet bgs. Boron and selenium were also detected at these depths, with boron ranging from 2.1 to 5.0 mg/L, and selenium at 7 µg/L. Selenium was not detected below 460 feet bgs; however, EC measurements remained greater than 2,000 µmhos/cm (Twining Laboratories, Inc., 1992). In contrast, delivered surface water consistently contains less than 1,000 µmhos/cm (Reclamation, 2004).

Environmental Consequences

Criteria for Determining Significance

A project would cause a significant impact to water resources if it resulted in any one of the following:

- Substantial flooding or erosion
- Adverse effects in a significant body of water, such as a stream, lake, or bay
- Human exposure to reasonably foreseeable hydrologic hazards, such as flooding or tsunamis
- Water supply shortages
- Adverse effects to surface water or groundwater quality or quantity

Effects to groundwater quality should also be evaluated with respect to impacts from hazardous wastes and materials. Hazardous materials and wastes are substances defined as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S. Code [USC] 9601 through 9675); the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA) (42 USC 6901 through 6992); and Title 22 of California Code of Regulations (CCR). In general, this includes substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, would present substantial danger to public health and welfare or to the environment if released.

No Action and No Project Alternative Impacts

Surface Water Supply and Use. Under the No Action and No Project Alternative, Mendota WA would continue to have a firm water supply of at least 27,594 ac-ft per year (Contract Level 2). For the purposes of this analysis, it has been assumed that contracted supplies of 27,594 ac-ft per year would continue to be delivered, as has been the case since 1996. In years when Mendota Pool is dewatered for CCID inspections and maintenance, Mendota WA would continue to take delivery of the full contracted supply by over flooding field cells during months when water is available, resulting in continued suboptimal wildlife area management. However, CCID expects to annually dewater Mendota Pool if the existing dam remains in place.

Surface Water Storage and Delivery. Under the No Action and No Project Alternative, the gates would be open progressively longer (i.e., when Mendota Pool is dewatered) as CCID reduced the losses from leaks, deep percolation, and surface evaporation. Water-surface elevations would continue to fluctuate during storm events because of manual gate operations. The annual dam maintenance requirements should not increase significantly in the future if adequate preventive maintenance were to continue. Mendota WA would continue to receive delivery from the Mendota Pool through existing delivery systems according to existing agreements.

Streamflows Downstream from Mendota Dam. Under the No Action and No Project Alternative, streamflows downstream from Mendota Dam would be the same as under current conditions. Mendota Dam would continue to leak water through the flashboards at about 80 cfs prior to sealing operations, and CCID would continue to seal the leaks to the maximum extent possible during the critical period of November through March, when demand downstream is much lower than 80 cfs. Removal of flash boards during high flows would continue to be a safety risk.

Groundwater. Under the No Action and No Project Alternative, groundwater pumping at Mendota WA would not be resumed. Depth to groundwater, direction of groundwater flow, and groundwater recharge (5,500 ac-ft per year) would be the same as under current conditions.

Surface Water Quality. Total consumptive use would be expected to slightly increase in the future because the managers at the Mendota WA will be better able to adapt the habitat management during annual dewatered conditions. The recent trend has been to provide Mendota WA with contracted supplies of 27,594 ac-ft per year; therefore, this supply was assumed for the No Action and No Project Alternative. Potential increased consumptive use under the No Action and No Project Alternative due to improved habitat management at Mendota WA would result in a small increase in TDS and boron concentrations in return flows from Mendota WA compared to current conditions. Changes in selenium would be within rounding error margins and not measurable.

Groundwater Quality. Potential changes in groundwater quantity have not been calculated because the total volume of the groundwater reservoir beneath Mendota WA (with which the recharge would mix) is not known. In general, no discernable effects to groundwater quality would be expected if no action were

taken to provide full Level 4 water supply to Mendota WA, which would not occur under the No Action and No Project Alternative.

No Action and No Project Alternative Mitigation

No mitigation would be required under the No Action and No Project Alternative.

Alternative MEN-5 Impacts

Surface Water Supply and Use. Water delivery to Mendota WA under Alternative MEN-5 would equal full Level 4 water supply, as required by the CVPIA, more often than under the No Action and No Project Alternative. The requirement to dewater Mendota Pool for a short time period approximately every 4 years for inspections and maintenance would continue. The Mendota WA would be able to maintain optimal habitat management during these short dewatering periods.

Because the existing dam would be left in place, no interruption of water supplies would be expected. The water supply to Mendota WA lands would not be interrupted during construction. Additionally, replacing Mendota Dam with a modern, automated structure would benefit recipients of water from Mendota Pool by allowing a much faster response to changes in flows and irrigation water demands. The automated gates would make it much safer for personnel to raise them prior to and during high flows past Mendota Dam.

Monthly water supply and runoff for Mendota WA would be similar from year to year, reducing annual variation due to the dewatering of Mendota Pool. Dewatering would continue to be required for inspections and maintenance. Dewatering would be scheduled to meet the needs of recipients of water from Mendota Pool and, therefore, minimize potential impacts caused by water supply interruption. Dewatering Mendota pool during high flows would be much shorter duration and Mendota Pool would return to normal operation shortly after high flows were past. **Therefore, implementing Alternative MEN-5 would not result in significant impacts to water supply and use.**

Surface Water Storage and Delivery. Approximately 13 ac-ft more water would be stored in the Mendota Pool under Alternative MEN-5 than under existing conditions. Sedimentation in Mendota Pool would increase until a new equilibrium was reached and most of the increase of capacity would be lost. Maximum water-surface elevations in Mendota Pool would not exceed their historical maximum levels. Average water-surface elevations would remain approximately six to twelve inches higher throughout the year and would fluctuate less during the winter because of automated gates. It is anticipated that a faster response time would enable CCID to maintain a more consistent water-surface elevation, providing improved operations to surface water diversions from Mendota Pool. Water pumped from Mendota Pool to Mendota WA might not increase with the delivery of full Level 4 water supply, and the hours of pumping might even slightly decrease because of lower dynamic head requirements.

The Mendota Pool might be dewatered if visual inspection suggests problems with Mendota Dam. CCID would continue to dewater Mendota Pool as needed for foundation inspections, gate maintenance, and other required repairs.

Infrequent dewatering of the Mendota Pool for short durations would improve deliveries to Mendota Pool users, allow delivery of full Level 4 water supply to Mendota WA, and allow for optimal management at Mendota WA. CCID would use flows from the San Joaquin River and Fresno Slough to refill Mendota between high flow events and this would slightly reduce deliveries from the DMC. Dewatering periods during a high flow event would reduced by approximately three or more days and Mendota Pool would not need to remain dewatered between high flow events due to the ease of operating radial control gates over the existing system of flashboards.

Mendota WA would continue to respond to dewatering of Mendota Pool when required for inspections and maintenance by over flooding wetland areas before dewatering and taking delivery of water during alternative months, resulting in suboptimal wildlife area management during if the periods of dewatering were much greater than a two-week span. **Implementing Alternative MEN-5 would not, however, result in a significant impact to surface water storage and delivery**.

Streamflows Downstream from Mendota Dam. Under Alternative MEN-5, streamflows downstream from Mendota Dam would be the same as under the No Action and No Project Alternative from March through November downstream flow demands. A new dam would effectively eliminate the current water leakage through Mendota Dam flashboards from December through February. During drought conditions, water would be released at levels similar to existing minimum flows. During nondrought conditions, water would be released at 90 percent exceedance flow levels. These releases would maintain water supply to downstream resources and would approximate the amount of water that currently leaks through the existing dam. **Therefore, implementing Alternative MEN-5 would not result in a significant impact to stream flows downstream from Mendota Dam.**

Groundwater. Under Alternative MEN-5, depth to groundwater and direction of groundwater flow would not differ significantly from the No Action and No Project Alternative. Groundwater recharge in the project area might increase slightly as a result of increased ponding in the Mendota Pool and the Mendota WA, but this would depend on wildlife area management. **This slight increase in groundwater recharge would not result in a significant impact to groundwater resources.**

Water Quality.

Construction. Construction in and around water could cause a variety of water quality impacts. Impacts resulting from the installation of the dam would include disturbance to the streambed, resulting in increases in turbidity and the generation of sediment in the San Joaquin River. **These impacts would be considered minor and would not result in a significant impact to water quality by following normal construction related prevention and mitigation BMPs.**

Hazardous wastes potentially generated at the dam construction site would include motor oil, ethylene glycol, gasoline, diesel fuel, hydraulic fluids, lubricants, and degreasers from the maintenance and repair of construction vehicles. During construction, there is potential for hazardous materials to be accidentally released and cause subsequent impacts to surface water and groundwater resources. **The spill of hazardous materials and subsequent impacts to water resources would not result in a significant impact quality by following normal construction related prevention and mitigation BMPs.**

Operations. Water provided to Mendota WA from the Mendota Pool is subject to consumptive use (evapotranspiration) while ponded at Mendota WA. Evapotranspiration causes water quality constituents to become concentrated in the remaining, unconsumed water (drainage). Therefore, when drainwater from Mendota WA is returned to Fresno Slough and the Mendota Pool, it is of slightly lower quality than water returned to the Mendota Pool under the No Action and No Project Alternative. Under Alternative MEN-5, a slightly higher volume of drainwater would mix with the Mendota Pool and Fresno Slough, resulting in localized water quality declines. **However, because a much larger volume of water would be stored in and delivered from the Mendota Pool and Fresno Slough (more than 950,000 ac-ft in 1999) than the amount of the increase in drainage, water quality declines would not be significant. Additionally, this insignificant water quality decline in the Mendota Pool would cause no significant impact to recipients of water from the Mendota Pool or downstream users on the San Joaquin River.**

Also, under Alternative MEN-5, drainwater quality might slightly improve from that of existing drainwater. With full Level 4 water supply and a stable Mendota Pool elevation, water at Mendota WA could be recirculated regularly, lessening constituent concentration resulting from a long residence time. However, because of the larger volume of water in the Mendota Pool and Fresno Slough, quality

improvements would be expected to be less than significant. **Therefore, the resulting impact to drainwater quality from Alternative MEN-5 would not be significant**.

Groundwater Quality. The quality of water available for groundwater recharge might improve slightly because the quality of delivered water might improve. However, this improvement would be variable and insignificant. **Implementing Alternative MEN-5 would not result in a significant impact to groundwater quality or drainage.**

Alternative MEN-5 Mitigation

To avoid or minimize water quality impacts related to increased erosion and sedimentation as a result of construction activities, the contractor would be required to develop a SWPPP and ECP in coordination with the CV Water Board through the Section 401 permitting process to obtain stormwater management approval for the project. At a minimum, the plans would contain the following Best Management Practices:

- Complete revegetation and stabilization of disturbed soils. Reseeding and mulching work would be completed by October 1 of the year following completion of the project. If erosion control practices are not installed by October 1 of the year following completion, exposed soils could require additional treatment following seasonal rains and subsequent erosion. The seed material would include native plant species and be approved by a revegetation specialist or erosion control specialist. Special emphasis would be given to native plant assemblages that were characteristic to the site prior to construction.
- Construction of interception ditches to direct water away from the tops of cut-and-fill slopes.
- Construction of small sediment catch basins or traps to prevent sediment from being transported away from development sites. The location and size of these basins would be designed to minimize impacts to riparian and wetland areas. Types of sediment traps to be considered include filter berms, straw-bale barriers, filter inlets, vegetative filter strips, and culvert risers.

Implementation of the measures outlined in the contractor's SWPPP and ECP would have no significant impact on water resources.

Alternative MEN-7 Impacts

Surface Water Supply and Use. Water supply to Mendota WA under Alternative MEN-7 would equal full Level 4 water supply as required by the CVPIA.

Construction activities associated with dam rehabilitation would be performed such that there would be no interruption of water supplies, including to Mendota WA. Additionally, upgrading Mendota Dam to an automated structure would benefit recipients of water from the Mendota Pool by allowing a much faster response to changes in flows and irrigation water demands.

Monthly water supply and runoff for Mendota WA would be similar from year to year, reducing annual variation due to the dewatering of the Mendota Pool. Dewatering of Mendota Pool would continue to be required for inspections and maintenance. Dewatering would be scheduled to meet the needs of recipients of water from Mendota Pool and, therefore, minimize potential impacts caused by water supply interruption. Dewatering Mendota pool during high flows would be much shorter duration and Mendota Pool would return to normal operation shortly after high flows were past. **Therefore, implementing Alternative MEN-7 would not result in a significant impact to water supply and use.**

Surface Water Storage and Delivery. The elevation of Mendota Pool would be raised approximately 6 to 12 inches under Alternative MEN-7. Average water-surface elevations would remain higher throughout the year and would fluctuate less during the winter because of automated gates. It is anticipated that a faster response time would enable CCID to maintain a more consistent water-surface elevation, providing improved operations to surface water diversions from Mendota Pool. Water pumped from Mendota Pool to Mendota WA might not increase with the delivery of full Level 4 water supply, and the hours of pumping might even slightly decrease because of lower dynamic head requirements.

Mendota Pool might be dewatered if the visual inspection suggests problems with the dam. CCID would continue to dewater Mendota Pool as needed for inspections and maintenance. This maintenance, however, would be coordinated with Mendota WA and scheduled to minimize impacts to wildlife area operations.

Less frequent and shorter durations of dewatering would improve deliveries to Mendota Pool users, allow delivery of full Level 4 water supply to Mendota WA, and allow for optimal management at Mendota WA. CCID would use flows from the San Joaquin River and Fresno Slough to refill Mendota between high flow events and this would slightly reduce deliveries from the DMC. Dewatering periods during a high flow event would reduced by approximately three or more days and Mendota Pool would not need to remain dewatered between high flow events due to the ease of operating radial control gates over the existing system of flashboards.

Mendota WA would continue to respond to dewatering of Mendota Pool when required for inspections and maintenance by over flooding wetland areas before dewatering and taking delivery of water during alternative months, resulting in suboptimal wildlife area management during if the periods of dewatering were much greater than a 2 week span. **Implementing Alternative MEN-7 would not, however, result in a significant impact to surface water storage and delivery**.

Streamflows Downstream from Mendota Dam. Under Alternative MEN-7, streamflows downstream from Mendota Dam would be the same as under the No Action and No Project Alternative from November through March. A retrofitted dam would effectively eliminate the current existing water leakage through Mendota Dam flashboards. During drought conditions, water would be released at levels similar to existing minimum flows. During nondrought conditions, water would be released at 90 percent exceedance flow levels. These releases would maintain water supply to downstream resources and would approximate the amount of water that currently leaks through the existing dam. **Therefore, implementing Alternative MEN-7 would not result in a significant impact to streamflows downstream from Mendota Dam.**

Groundwater. Under Alternative MEN-7, depth to groundwater and direction of groundwater flow would not differ significantly from the No Action and No Project Alternative. Groundwater recharge in the project area might increase slightly as a result of increased ponding at Mendota WA, but this would depend on wildlife area management. **This slight increase in groundwater recharge would not result in a significant impact to groundwater resources.**

Surface Water Quality.

Construction. Construction in and around water could cause a variety of water quality impacts. Impacts resulting from construction activities related to retrofitting Mendota Dam under Alternative MEN-7 would include disturbance to the streambed, resulting in increases in turbidity and the generation of sediment in the San Joaquin River. **These impacts would be considered minor and would not result in a significant impact to water quality by following normal construction related prevention and mitigation BMPs.**

Hazardous wastes potentially generated at Mendota Dam construction site would include motor oil, ethylene glycol, gasoline, diesel fuel, hydraulic fluids, lubricants, and degreasers from the maintenance and repair of construction vehicles. During construction, there is potential for hazardous materials to be accidentally released and cause subsequent impacts to surface and ground water resources. **The spill of hazardous materials and subsequent impacts to water resources would not result in a significant impact quality by following normal construction related prevention and mitigation BMPs.**

Operations. Water provided to Mendota WA from the Mendota Pool is subject to consumptive use (evapotranspiration) while ponded at Mendota WA. Evapotranspiration causes water quality constituents to become concentrated in the remaining, unconsumed water (drainage). Therefore, when drainwater from Mendota WA is returned to Fresno Slough and the Mendota Pool, it is of significantly lower quality than water provided to Mendota WA from the Mendota Pool. Under Alternative MEN-7, a slightly higher volume of drainwater would mix with the Mendota Pool and Fresno Slough, resulting in localized water quality declines. **However, because a due to the much larger volume of water would be stored and delivered from the Mendota Pool and Fresno Slough (more than 950,000 ac-ft in 1999) than the amount of the increase in drainage, water quality declines would be expected to be less than significant. Additionally, this insignificant water quality decline in the Mendota Pool would cause no significant impact to recipients of water from the Mendota Pool or downstream users on the San Joaquin River.**

Also, under Alternative MEN-7, drainwater quality might slightly improve from that of existing drainwater. With full Level 4 water supply and a stable Mendota Pool elevation, water at Mendota WA could be recirculated regularly, lessening constituent concentration resulting from a long residence time. However, because of the much larger volume of water in the Mendota Pool and Fresno Slough, quality improvements would be expected to be less than significant. **Therefore, the resulting impact to drainwater quality from implementing Alternative MEN-7 would be less than significant**.

Groundwater Quality. The quality of water available for groundwater recharge may improve slightly since quality of delivered water may improve. However, this improvement would be variable and insignificant. **Implementing Alternative MEN-7 would cause no significant impact to groundwater quality or drainage.**

Alternative MEN-7 Mitigation

Mitigation for Alternative MEN-7 would be similar to that described for Alternative MEN-5.

Alternative MEN-9B Impacts

Surface Water Supply and Use. Water delivery to Mendota WA under Alternative MEN-9B would provide full Level 4 water supply as required by CVPIA, without relying on the Mendota Dam. Water provided to Mendota WA under Alternative MEN-9B would be delivered from the California Aqueduct and transported by a series of pipelines and modified existing facilities through WWD. Monthly water supply to and drainage from Mendota WA would be similar every year, eliminating annual variation due to dewatering of the Mendota Pool. **Implementing Alternative MEN-9B would not result in significant impacts to surface water supply and use.**

Surface Water Storage and Delivery. Under Alternative MEN-9B, Level 4 water supply would be acquired from the California Aqueduct and transported to Mendota WA through a wheeling agreement with WWD.

When Mendota Dam is operational, Mendota Dam and Pool would receive some additional drainage from Mendota WA with full Level 4 delivery. However, because of the much larger volume of water stored

and delivered from the Mendota Pool and Fresno Slough (more than 950,000 ac-ft in 1999), this additional water would not result in significant changes in existing operations.

This alternative would require the construction of a rubber dam across Fresno Slough to provide a sufficient water-surface elevation for water deliveries upstream when the Mendota Dam is down for inspections or maintenance. In addition to Mendota WA, WWD, Fresno Slough Water District, Coelho Family Trust, Tranquility Irrigation District, and James Irrigation District would potentially draw water from Mendota Pool if sufficient capacity in the WWD delivery is available after meeting the needs of the Mendota WA. **Because the rubber dam would replace the ability of Mendota Dam to provide a sufficient water-surface elevation for water deliveries, this alternative would not result in significant changes to existing operations.**

Streamflows Downstream from Mendota Dam. Additional drainage from Mendota WA would represent less than a 0.2 percent change by volume of water stored and delivered from the Mendota Pool and Fresno Slough (more than 950,000 ac-ft in 1999).

Under this alternative, a rubber dam would be constructed and inflated across Fresno Slough. The rubber dam would replace the ability of Mendota Dam to provide a sufficient elevation in Fresno Slough. The rubber dam would have the ability to deflate and lie flat during spring flood flows. This is comparable to the existing Mendota Dam, which has flashboards that may be removed during high flows on the San Joaquin River or Fresno Slough. **Therefore, under Alternative MEN-9B, there would be no significant change in streamflows downstream from the existing Mendota Pool.**

Groundwater. Under Alternative MEN-9B, depth to groundwater and direction of groundwater flow would not differ significantly from the No Action and No Project Alternative. Groundwater recharge in the project area might increase slightly as a result of increased ponding at Mendota WA, but this would depend on wildlife area management. **This slight increase in groundwater recharge would not result in a significant impact to groundwater resources.**

Surface Water Quality.

Construction. Construction impacts for pipe trenching could occur over a 150-foot width along the alignment of the two pipelines off Lateral 5 and Lateral 7. Impacts could include soil disturbance, construction traffic, and noise. Installation of the bypass structure around Pumping Plant 6-2 on Lateral 6 would also require mobilization and soil disturbance. Disturbance would also occur in a two-acre area surrounding WWD Pumping Plant 6-1 at the terminus of both pipelines.

Depending on localized shallow groundwater, it might be necessary to dewater trenched areas during construction, particularly if it is necessary to jack under roads or drains. Permits would be required to dispose of the groundwater either to a drain or to adjacent fields for percolation.

Construction of the rubber dam on Fresno Slough would require disturbance of a small (one- to two-acre) area on either bank of the slough. A segment of Fresno Slough would be dewatered during construction, which would affect water supply availability from the slough. Additionally, a small road would be cleared for construction traffic to access both banks of the rubber dam site. To supply underground electrical power to the rubber dam site, a 50-foot-wide area would be cleared and trenched along an existing road to the site.

The primary effects to water quality resulting from construction would be related to sedimentation or spills while work is under way in and adjacent to Mendota WA. When large amounts of potential pollutants, such as fuels, antifreeze, and lubricants required to maintain the equipment, are stored near a river, spills can occur**. These impacts would be considered minor and would not result in a significant impact to water quality by following normal construction related prevention and mitigation BMPs.**

Under Alternative MEN-9B, potential impacts to hazardous materials or hazardous waste management would be the same as those discussed under Alternative MEN-5. **The spill of hazardous materials and subsequent impacts to water resources would not result in a significant impact quality by following normal construction related prevention and mitigation BMPs.**

Operations. Under Alternative MEN-9B, surface water quality would be roughly similar to the source waters (California Aqueduct), but this water is subject to mixing with groundwater and irrigation drainage. WWD laterals may receive irrigation drainage, and growers may pump groundwater into the WWD pipelines if the blended supply meets applicable water quality standards (Bettner, 2006). Surface water quality would also be influenced by ponded water at Mendota WA that is present prior to mixing with piped water, as well as by irrigation drainage present in Fresno Slough from neighboring irrigation districts. Because of possible mixing of irrigation drainage with California Aqueduct water, the quality of water delivered to Mendota WA would be unknown and likely to vary significantly.

Under the assumption that the quality of water delivered to Mendota WA by this alternative would be similar to the source waters (California Aqueduct), the quality of drainage water from Mendota WA would generally improve because of the high quality of California Aqueduct water, as indicated in Table IV-4.

Improvements in Mendota WA drainage water quality would also improve water quality in both the Fresno Slough and in the Mendota Pool when Mendota Dam is operational. Drainwater quality might also slightly improve with full Level 4 water supply and a stable Mendota Pool elevation, because water on the refuge could be recirculated regularly, lessening constituent concentration resulting from a long residence time. However, because of the much larger volume of water in the Mendota Pool and Fresno Slough, quality improvements would be expected to be less than significant. **Therefore, no significant impact to recipients of water from the Mendota Pool or downstream users on the San Joaquin River would occur, regardless of whether Mendota Dam is operational.**

Groundwater Quality. The quality of water available for groundwater recharge would improve slightly. However, this improvement would be insignificant. **The construction associated with Alternative MEN-9B would have little or no effect on groundwater quality or drainage and, therefore, no significant impact would occur.**

Alternative MEN-9B Mitigation

Mitigation for Alternative MEN-9B would be similar to mitigation described for Alternative MEN-5.

Alternative MEN-12 Impacts

Surface Water Supply and Use. Water supply to Mendota WA under Alternative MEN-12 would provide Level 4 water supply as required by CVPIA except from September through later November. Supplemental water provided to Mendota WA under Alternative MEN-12 would be delivered from the California Aqueduct and transported to the wildlife area through modified WWD facilities when the Mendota Pool is dewatered. **Implementing Alternative MEN-12 would not significantly affect either water supply or use in WWD.**

Additionally, monthly water supply to and drainage from Mendota WA would be more consistent, eliminating annual variation due to the seasonal dewatering of the Mendota Pool. **Implementing Alternative MEN-12 would not result in a significant impact to surface water supply and use.**

Surface Water Storage and Delivery. Under Alternative MEN-12, Level 4 water supply would be acquired from the California Aqueduct and transported to Mendota WA through a wheeling agreement with WWD.

With full Level 4 deliveries, Mendota Dam and Pool would receive an additional 210 ac-ft of runoff from Mendota WA. However, because of the much larger volume of water stored and delivered from the Mendota Pool and Fresno Slough (more than 950,000 ac-ft in 1999), this additional water would not result in significant changes in existing operations.

This alternative would require the construction of a rubber dam across Fresno Slough to provide a sufficient water-surface elevation for water deliveries upstream when the Mendota Dam is down seasonally for inspections. In addition to Mendota WA, WWD, Fresno Slough Water District, Coelho Family Trust, Tranquility Irrigation District, and James Irrigation District would potentially draw water from Mendota Pool if sufficient capacity in the WWD delivery is available after meeting the needs of the Mendota WA. Generally, upstream water users do not take water during the time of year that Mendota Dam is dewatered. **Also, because the rubber dam would enhance the ability of Mendota Dam to provide a sufficient water-surface elevation for water deliveries, this alternative would not result in significant changes to existing operations.**

Streamflows Downstream from Mendota Dam. Additional runoff from Mendota WA would represent less than a 0.2 percent change by volume of water stored and delivered from the Mendota Pool and Fresno Slough (more than 950,000 ac-ft in 1999).

Under this alternative, a rubber dam would be constructed and inflated across Fresno Slough to provide sufficient water-surface elevation for water deliveries upstream when Mendota Dam is not operational. The rubber dam would replace the ability of the Mendota Dam to provide a sufficient Mendota Pool water surface elevation in Fresno Slough. The rubber dam would have the ability to deflate and lie flat during spring flood flows. This is comparable to the existing Mendota Dam, which has flashboards that may be removed during high flows on the San Joaquin River or Fresno Slough. **Therefore, under Alternative MEN-12, there would be no significant change in streamflows downstream from the existing Mendota Pool.**

Groundwater. Under Alternative MEN-12, depth to groundwater and direction of groundwater flow would not differ significantly from the No Action and No Project Alternative. Groundwater recharge in the project area might increase slightly as a result of increased ponding at Mendota WA, but this would depend on wildlife area management. **This slight increase in groundwater recharge would not result in a significant impact to groundwater resources.**

Surface Water Quality.

Construction. Construction impacts, including soil disturbance, construction traffic, and noise, might occur during construction of the Lateral 6 bypass around Pumping Plant 6-2 and at the modified discharge structure at the terminus of Lateral 6.

Construction of the rubber dam on Fresno Slough would require disturbance of a small (one- to two-acre) area on either bank of the slough. A segment of Fresno Slough would be dewatered during construction, which would affect water supply availability from the slough. Additionally, a small road would be cleared for construction traffic to access both banks of the rubber dam site. To supply underground electrical power to the rubber dam site, a 50-foot-wide area would be cleared and trenched along an existing road to the site.

The primary effects to water quality resulting from construction would be related to sedimentation or spills while work is under way in and adjacent to Mendota WA. When large amounts of potential pollutants, such as fuels, antifreeze, and lubricants required to maintain the equipment, are stored near a

river, spills can occur**. These impacts would be considered minor and would not result in a significant impact to water quality by following normal construction related prevention and mitigation BMPs.**

Under Alternative MEN-12, potential impacts to hazardous materials or hazardous waste management would be the same as those discussed under Alternative MEN-5. **The spill of hazardous materials and subsequent impacts to water resources would not result in a significant impact quality by following normal construction related prevention and mitigation BMPs.**

Operations. Under Alternative MEN-12, surface water quality would be roughly similar to the source waters (California Aqueduct, but this water is subject to mixing with groundwater and irrigation drainage. WWD laterals may receive irrigation drainage, and growers may pump groundwater into the WWD pipelines if the blended supply meets applicable water quality standards (Bettner, 2006). Surface water quality would also be influenced by ponded water at Mendota WA that is present prior to mixing with piped water, as well as by irrigation drainage present in Fresno Slough from neighboring irrigation districts.

Because of possible mixing of groundwater and irrigation drainage with California Aqueduct water, the quality of water delivered to Mendota WA would be unknown and likely to vary significantly. However, during the time of year when Mendota WA would be taking water through WWD under Alternative MEN-12 (late November through January, when Mendota Dam is dewatered), minimal irrigation would be occurring in WWD. The variability of quality in water delivered to Mendota WA through WWD during this period, therefore, would likely be small.

Under the assumption that the quality of water delivered to Mendota WA by modified WWD facilities would be identical to the source waters (California Aqueduct), the quality of drainage water would improve because of the higher quality of California Aqueduct water.

Improvements in Mendota WA drainage water quality would improve water quality in Fresno Slough. Drainwater quality might also slightly improve with full Level 4 water supply and a stable Mendota Poolwater surface elevation, because water at Mendota WA could be recirculated regularly, lessening constituent concentration resulting from a long residence time. However, because of the much larger volume of water in the Mendota Pool and Fresno Slough, quality improvements would be expected to be less than significant. **Therefore, no significant impact to recipients of water from the Mendota Pool or downstream users on the San Joaquin River would occur.**

Additional impacts to water quality could occur under Alternative MEN-12. The primary effects would be related to sedimentation while construction work is under way in the refuge and spills. Any time large amounts of potential pollutants, such as fuels, antifreeze, and lubricants required to maintain the equipment, are stored near a river, spills can occur**. Impacts to water quality would be considered significant under Alternative MEN-12.**

Groundwater Quality. The quality of water available for groundwater recharge would improve slightly between late November and January, when the Mendota Pool is dewatered. However, this improvement would be insignificant. **The construction associated with Alternative MEN-12 would have little or no effect on groundwater quality or drainage and, therefore, no significant impact would occur.**

Alternative MEN-12 Mitigation

Mitigation for Alternative MEN-12 would be similar to mitigation described for Alternative MEN-5.

Land Use

Affected Environment

Regional Setting

The San Joaquin River Region is an important agricultural region for both California and the United States. Major municipal and industrial centers include the Cities of Fresno, Stockton, Tracy, Modesto, and Merced, which are industrial hubs for food and grain processing. Agriculture in the region is an important employer and affects the regional economy through farm expenditures as well as production of many crops that require processing or transportation after harvest.

This region depends heavily on water supply diverted from the Mendota Pool. The Mendota Pool provides water supplies that affect at least 200,000 acres of land, mostly in Fresno and Merced Counties. Recent cropping pattern analyses indicate a trend toward decreasing alfalfa/field crops and increasing vegetable production in Central California. Many of these vegetables are grown in winter.

Site Setting

Mendota WA is located in western Fresno County, about 30 miles west of Fresno and 4 miles southeast of the City of Mendota. The wildlife area is on the south side of State Highway 180 (Whitesbridge Road), immediately south of the CDFG Alkali Sink Ecological Reserve (a 932-acre tract of land managed for its threatened and endangered species and habitat values), and along both sides of Fresno Slough. Santa Fe Grade Road forms a portion of Mendota WA's western boundary.

Mendota WA is operated by CDFG and was purchased by the California State Wildlife Conservation Board between 1954 and 1966. The wildlife area was established to provide waterfowl habitat, to reduce crop depredation on adjacent lands caused by waterfowl, and to provide for public waterfowl hunting. Water is used to irrigate natural food crops, such as swamp timothy, alkali bulrush, smartweed, and millet, and to flood seasonal, permanent, and semipermanent wetlands. Small grains, corn, and dense nesting cover for wildlife are also irrigated in the uplands. Mendota WA comprises 12,425 acres. Approximately 3,105 acres are on the east side of Fresno Slough, and approximately 8,470 acres are on the west side. An additional 850 acres consist of roads, levees, and developed lands. About 6,819 acres of Mendota WA lands are managed as seasonally flooded wetlands, 457 acres as semipermanent wetlands, and 1,194 acres as permanent wetlands.

At Mendota WA, the 1,373 acres of Traction Ranch lands, acquired in 1986, were farmed under terms of a sales agreement until 1989 and are currently leveled. Ultimately, these lands are anticipated to be converted to wetlands. In addition to farmland, riparian corridor, and wetland acreage, several hundred acres of upland and alkali sink habitat are maintained at Mendota WA for upland species and special-status plant and wildlife species. Because the natural water regime has been changed by human activities, Mendota WA must be artificially maintained with surface irrigation water.

Lands surrounding Mendota WA are managed almost exclusively for agriculture. Most of these lands are irrigated for the production of field crops, including cotton, alfalfa, seeds, small grains, and sugar beets. Horses and sheep graze on some adjacent fields. Little surrounding land remains in natural condition, with the exception of the Alkali Sink Ecological Reserve. Some lands to the north, east, and south of Mendota WA, as well as some onsite, are used for private gun clubs and cropland.

San Joaquin Valley and River Corridor Ongoing and Interrelated Habitat Improvement Projects/ Plans/Programs.

San Joaquin River Restoration Program The NRDC v. Rodgers *CIV S-88-1658- LKK/GGH* Settlement states that the Secretary of the Interior will implement the terms and conditions of the Settlement. Additionally, the Settling Parties agreed that implementation of the Settlement will also require participation of the State of California. Therefore, concurrent with the execution of the Settlement, the Settling Parties entered into a Memorandum of Understanding (MOU) with the State of California (by and through the California Resources Secretary, the Department of Water Resources (DWR), the Department of Fish and Game (DFG), and the California Environmental Protection Agency) regarding the State's role in the implementation of the Settlement. The program established to implement the Settlement is the San Joaquin River Restoration Program, and the "implementing agencies" responsible for the management of the Program include Reclamation, United States Fish and Wildlife Service, NMFS, DWR, and DFG.

Central Valley Project Improvement Act.

San Joaquin Valley Comprehensive Plan (Section 3406(c)(1) of the CVPIA). The San Joaquin River Comprehensive Plan, scheduled for completion by September 30, 1996, was designed to address fish, wildlife, and habitat concerns on the San Joaquin River. If Federal authorization is provided to fully implement the San Joaquin River Restoration Program, requirements for Section 3406(c)(1) will be met under that new legislation.

Anadromous Fish Restoration Program (Section 3406(b)(1) of the CVPIA). The Anadromous Fish Restoration Program is addressing the restoration of anadromous fish in Central Valley rivers and streams. The mainstem San Joaquin River is one of these rivers. The program is limited to addressing the mainstem San Joaquin River from the mouth of the Merced to the Delta. The objective of the program is to develop and implement reasonable efforts to ensure that natural production of anadromous fish in Central Valley rivers and streams will be sustainable in the long-term, at levels not less than twice the average levels attained from 1967 through 1991.

Environmental Consequences

Criteria for Determining Significance

Impacts to land use would be considered significant if they resulted in the following:

- Physical division of an established community
- Conflict with an applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect
- Conflict with an applicable habitat conservation plan or natural community conservation plan
- Conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use

- Conflict with existing zoning for agricultural use or a Williamson Act contract
- Other changes in the existing environment which, because of their location or nature, could result in conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use

No Action and No Project Alternative Impacts

Under the No Action and No Project Alternative, Mendota WA would continue to have a firm water supply of at least 27,594 ac-ft per year (Contract Level 2). However, for the purposes of this analysis, it is assumed that CCID inspections would likely occur annually, and that when Mendota Pool is dewatered for CCID inspections, Mendota WA would continue to take delivery of the full contracted supply by over-flooding field cells during months when water is available, resulting in continued suboptimal wildlife area management. Under the No Action and No Project Alternative, crop predation on neighboring agricultural lands would remain unchanged.

No Action and No Project Alternative Mitigation

No mitigation would be required under the No Action and No Project Alternative.

Alternative MEN-5 Impacts

Construction. Construction activities associated with Alternative MEN-5 would include excavating, compacting, and backfilling, and concrete and asphalt paving related to dam construction. Several types of heavy equipment would be used throughout the construction phase of the project. Potential impacts to neighboring agricultural fields could occur during the construction phase, due to the locations of contractor staging areas and the borrow pit.

Construction activities could cause the temporary loss of production to neighboring agricultural operations and inconvenience to farming operations. Production would be expected to fully recover within 1 to 3 years and the amount of farmland impacted is relatively small, therefore this would not be a significant impact.

Operations. Under Alternative MEN-5, several types of land use would receive benefits. Water supplies to Mendota WA would increase to full Level 4 and allow optimal wildlife area management. The proposed new dam at Mendota Pool would eliminate the existing dam's uncontrolled leaking and allow optimal management of the Mendota Pool as a multi-use, reregulating reservoir.

Implementing Alternative MEN-5 would provide beneficial impacts to nearby agricultural lands by allowing increased wildlife food crop planting at Mendota WA, which would result in the reduction of crop predation on neighboring agricultural lands. Additionally, replacing Mendota Dam with a modern automated structure would benefit agricultural resources by permitting a much faster response to changes in flows and irrigation water demands.

The faster response would facilitate increased system and on-farm efficiencies. Implementing Alternative MEN-5 would also maximize beneficial use of existing agricultural resources by providing a year-round water supply to neighboring agricultural lands. The reliability of this supply would encourage increased winter vegetable production in response to increased market demands. Cropping analysis indicates that vegetable production is expected to increase in the area during the next 30 years.

Alternative MEN-5 Mitigation

The following mitigation measures would reduce impacts to land use resulting from construction activities:

- Schedule construction to minimize impacts to crop production and operations.
- Minimize workspace to lessen impacts to available croplands and decrease potential for the spread of noxious weed.
- Compensate landowners for loss of crop production or impacts to agricultural operations.
- Compensate landowners for loss of property.

Alternative MEN-7 Impacts

Construction. Construction activities associated with Alternative MEN-7 would include excavating, compacting, and backfilling, and concrete and asphalt paving related to dam construction. Several types of heavy equipment would be used throughout the construction phase of the project. Potential impacts to neighboring agricultural fields could occur during the construction phase, due to the locations of contractor staging areas and the borrow pit.

Construction activities could cause the temporary loss of production to neighboring agricultural operations and inconvenience to farming operations. Production would be expected to fully recover within 1 to 3 years and the amount of farmland impacted is relatively small therefore this would not be a significant impact.

Operations. Operational impacts under Alternative MEN-7 would be the same as those listed under Alternative MEN-5.

Alternative MEN-7 Mitigation

Mitigation measures for Alternative MEN-7 would be the same as those listed under Alternative MEN-5.

Alternative MEN-9B Impacts

Construction. The majority of construction activities associated with Alternative MEN-9B would include temporary disturbance to agricultural lands related to the installing underground pipeline and a rubber dam across Fresno Slough. The anticipated width of impact for pipeline installation would be approximately 80 feet along the pipeline route, and two acres at the discharge point near Pumping Plant 6-1. In total, this alternative could cause temporary disturbance to approximately 110 acres of agricultural land.

Construction activities could cause the temporary loss of production to agricultural operations and inconvenience to farming operations. Production would be expected to fully recover within 1 to 3 years and the amount of farmland impacted is relatively small, therefore this would not be a significant impact.

Operations. Operational impacts under Alternative MEN-9B would be the same as those listed under Alternative MEN-5. Impacts would be limited to the need to repair the pipeline, discharge structure, and rubber dam.

Alternative MEN-9B Mitigation

Mitigation measures for Alternative MEN-9B would be the same as those listed under Alternative MEN-5.

Alternative MEN-12 Impacts

Construction. The majority of construction activities associated with Alternative MEN-12 would include temporary disturbance to agricultural lands related to installing underground pipeline, and construction activities related to the installation of a rubber dam across Fresno Slough. The anticipated width of impact for pipeline installation would be approximately 80 feet along the pipeline route, and 2 acres at the discharge point near Pumping Plant 6-1. In total, this alternative could cause temporary disturbance to approximately 3 acres of agricultural land.

Construction activities could cause the temporary loss of production to agricultural operations and inconvenience to farming operations. Production would be expected to fully recover within one to three years and the amount of farmland impacted is relatively small, therefore this would not be a significant impact.

Operations. Under Alternative MEN-12, for the majority of the year, Mendota WA would continue to rely on the existing water delivery system from Mendota Dam to deliver full Level 4 water supply. Mendota WA management would be similar to current conditions except when Mendota Dam is dewatered for CCID inspections. Full Level 4 water supply would be reliably provided during that time to allow for optimal management of Mendota WA. In this way, Alternative MEN-12 would benefit nearby agricultural lands by allowing increased wildlife food crop planting at Mendota WA, which would reduce crop predation on neighboring agricultural lands.

Adverse operational and maintenance impacts would be limited to the need to repair the pipeline, discharge structure, and rubber dam.

Alternative MEN-12 Mitigation

Mitigation measures for Alternative MEN-12 would be the same as those listed under Alternative MEN-5.

Biological Resources

Affected Environment

Regional Setting

Upland and Wetland Habitats. Historically, the San Joaquin Valley floor contained a diverse and productive patchwork of aquatic, wetland, riparian forest, and surrounding terrestrial habitats that supported abundant populations of resident and migratory species of wildlife. Pronghorn, Tule elk, and mule deer grazed the prairies, and large flocks of waterfowl occurred in the extensive wetlands. Such rich

biological diversity and productivity supported the most concentrated nonagricultural population of Native Americans in North America (Cook, 1955; Kroeber, 1961; Latta, 1949).

Historically, the dominant plant communities in the San Joaquin Valley included grasslands, vernal pools, marshes, shrublands, oak woodlands, and riparian forests. Grasslands included several community types, such as non-native grass, pine bluegrass, relictual interior dune, valley needlegrass, and valley sacaton (USFWS, 1998). Valley salt scrub, dominated by Valley saltbush (*Atriplex polycarpa*), occupied the valley floor in sandy, nonalkaline soils.

Upland habitats in San Joaquin Valley shrublands were dominated by shrubs less than six feet tall. Grasses, and herbaceous annuals and perennials typical of grassland communities, covered the ground between and under shrubs. Shrubs occurred in alkali sinks and playas, on alluvial fans, on dune remnants, in riparian areas, and in arid uplands. Uplands provided foraging habitat for migratory waterfowl and shorebirds during wet months. In summer months, ephemeral pools that had not dried provided foraging and nesting habitat for shorebirds, such as the black-necked stilt and American avocet. Other species of birds using this habitat were raven, western meadowlark, horned lark, American pipits, lesser nighthawk, and sage sparrow. Mammals in the valley sink scrub included blacktailed hare, Tipton kangaroo rat, and San Joaquin kit fox. Reptilian species included blunt-nosed lizard, side-blotched lizard, western whiptail, king snake, and western rattlesnake.

Much of the land in the San Joaquin Valley has been converted to agricultural, residential, and municipal and industrial uses. Although natural areas remain, they are significantly smaller in size. For example, less than 10 percent of California's presettlement riparian habitat remains (Faber, 2003). Consequently, remnants of other habitats, including vernal pool, marsh, riparian forest, valley oak savannah, and San Joaquin saltbush, are increasingly valuable.

Open-water Aquatic Habitats. The San Joaquin Valley historically contained a complex network of sloughs, creeks, rivers, lakes, and ponds that supported a variety of resident and anadromous fish. Before settlement, the upper San Joaquin River supported a distinctive native fish fauna that evolved in relative isolation over a period of several million years (Moyle, 1976 and 2002). The life history strategies of native fish species reflect an evolutionary history of adaptation to a region where extended droughts and massive floods are common (Moyle, 2002). Historically, the upper San Joaquin River has supported the following five native fish assemblages:

- **Rainbow Trout.** This assemblage was, and currently is, found in clear streams at high elevations, where stream gradients are high and water is cold and perennial. Species found here included rainbow trout (*Oncorhynchus mykiss*), sculpin (*Cottus* spp.) and Sacramento sucker (*Catostomus occidentalis*). The historical distribution of this assemblage consisted of the mainstem and perennial tributaries of the upper San Joaquin watershed upstream of Gravelly Ford, including the headwater areas of the San Joaquin River.

- **California Roach.** Streams containing this assemblage were generally small and warm, and fed into larger streams flowing through open woodlands. These occurred in a narrow elevational band in the valley foothills. The primary year-round native resident species was the California roach (*Lavinia symmetricus*). This assemblage is present in creeks now flowing into Millerton Lake, the Chowchilla River system, and many of the minor tributaries to the San Joaquin River (Brown, 2003).

- **Pikeminnow-Hardhead-Sucker.** Streams supporting this assemblage generally have summer flows averaging less than 10 cfs. These habitats can be very diverse, but are characterized by deep, rocky pools and wide, shallow riffles (Moyle, 2002). Summer water temperatures are high (66.2 to 71.6°F). Sacramento pikeminnow and Sacramento sucker are the most abundant fish of this assemblage. Their historical distribution included the mainstem San Joaquin River flowing through the foothills.

- **Deep-bodied Fish.** This assemblage occupied the warm waterways of the valley floor, including sluggish river channels, oxbows, floodplain lakes, swamps, and sloughs of the San Joaquin River. Deep-bodied fish included Sacramento perch (*Archoplites interruptus*), thicktail chub (*Gila crassicauda*) and tule perch (*Hysterocarpus traski*), and predominated in weedy backwaters. Adult hitch (*Lavinia exilicauda*), Sacramento blackfish (*Orthodon microlepidotus*), and Sacramento splittail (*Pogonichthys macrolepidotus*) inhabited large stretches of open water.
- **Anadromous Salmonids.** Historically, anadromous salmonids, including fall and spring-run Chinook salmon (*Oncorhychus tshawytscha*) and steelhead (*O. mykiss*), were found in a range overlapping several of the other fish assemblages. Spring-run Chinook salmon and steelhead migrated to the upper accessible reaches of the watershed (upstream of what is now Friant Dam) and coexisted with resident rainbow trout. Chinook salmon and steelhead spawned at high elevations and, occasionally, in the lower reaches of some intermittent streams in the upper watershed (Moyle, 2002). Historically, adult salmon and steelhead migrated upstream through the entire accessible San Joaquin River watershed. Juvenile smolts migrated downstream through the entire San Joaquin River and the Delta toward the ocean.

Today, the fish fauna of the San Joaquin watershed is dominated by more than 30 introduced fish. Many of these have proliferated in habitats disturbed by water depletion and flow alteration.

Less than 60 percent of historical low-elevation stream habitat is now available to anadromous fish and no mid-elevation habitat remains accessible (Moore et al., 1990). Anadromous fish, including fall-run Chinook salmon, migrated through Sack Dam and Mendota Dam successfully until about 1950, when the flows below Friant Dam were significantly reduced because of the completion of the Friant-Kern Canal. The Mendota Dam fish ladder has not operated since that time. The fish barrier placed on the San Joaquin River above the confluence with the Merced River currently acts as a migration barrier to anadromous fish, including fall-run Chinook salmon.

Although the reach of the San Joaquin River immediately downstream of Friant Dam has been altered significantly, potential spawning habitat for salmonids and other fish that spawn over gravel is present at several locations. This reach provides the only potential spawning habitat for anadromous salmonids in the San Joaquin River. Most of the area with gravel substrates suitable for spawning is located between Friant Dam and Lanes Bridge (approximately 12 miles downstream). Flow releases from Friant Dam provide suitable water temperatures for rainbow trout immediately downstream of Mendota Dam; the San Joaquin River Hatchery near Friant Dam raises rainbow trout to support a sport fishery.

Water temperatures in the upper portion of this reach are relatively low because of hypolimnial releases (releases of cold water from the bottom of the reservoir) from Millerton Lake. Farther downstream and ending at Gravelly Ford, the San Joaquin River becomes shallow, warm, and slow-moving. Many warmwater fish species flourish in the lower reaches of the San Joaquin River. Native species currently found in the mainstem San Joaquin River from Friant Dam to Gravelly Ford include Sacramento sucker, rainbow trout, prickly sculpin, and three-spined stickleback. Non-native species include brown trout, common carp, bluegill, smallmouth bass, brown bullhead, mosquitofish, green sunfish, and largemouth bass.

Except in wet years and during very large flow releases from Friant Dam, the San Joaquin River is typically dry from the Gravelly Ford gaging station to the upper reaches of Mendota Pool, a distance of approximately 17 miles. Historical streamflows and conditions in this river reach likely were adequate to support species of the pikeminnow-hardhead-sucker assemblage, deep-bodied fish assemblage, and migrating anadromous species. The dry segment of this reach is currently a migration barrier to anadromous salmonids and migratory species in the pikeminnow-hardhead-sucker assemblage.

In the San Joaquin River system, habitat for the pikeminnow-hardhead-sucker assemblage has been reduced to the mainstem San Joaquin River upstream of Gravelly Ford. Non-native fish species largely have replaced the native species of this assemblage (as well as the deep-bodied fish assemblage). Summer water temperatures in the Mendota Pool are generally suitable for members of the pikeminnow-hardhead-sucker, California roach, and deep-bodied fish assemblages, but are warmer than those preferred by anadromous salmonids and rainbow trout.

From Mendota Pool to Sack Dam, the San Joaquin River is perennial. Flow releases from Mendota Dam provide flows down the San Joaquin River to the Sack Dam, where the streamflows are diverted into the Arroyo Canal. Historically, the San Joaquin River in this reach supported the deep-bodied fish assemblage and served as a seasonal migration corridor for Chinook salmon and steelhead to and from upstream spawning and rearing areas. Presently, native species have been displaced or reduced to a minor portion of the fauna, mostly living in the least-disturbed sloughs in this reach. The dominant fish now inhabiting the segment of the San Joaquin River from Mendota Dam to Sack Dam include largemouth bass, bluegill, bullhead, and other non-native warmwater fish.

Under current conditions, a small amount of water seeps into the San Joaquin River through Sack Dam, but streamflows are not conveyed into and throughout the reach. This leaves the river mostly dry below Sack Dam. However, during some high-flood flow events, water spills over Sack Dam and downstream into the Sand Slough Control Structure. These flood flows are then conveyed into the Eastside Bypass, leaving the San Joaquin River downstream of the Sand Slough Control Structure dry except for impounded pools of agricultural drainwater. Historically, this reach supported the deep-bodied fish assemblage and seasonally migrating anadromous species. Currently, native fish, including anadromous species, have been extirpated or reduced to a minor component of the fish fauna, and generally only non-native fish are found in the impounded pools in this reach.

The reach of the San Joaquin River from the Sand Slough Control Structure downstream to the Merced River confluence currently conveys little to no flow as a result of flow regulation upstream. The slow-moving or standing water in the reach is derived from agricultural return flows, refuge return flows, or the delivery of flood flows from the Eastside Bypass (via Mariposa Slough and Bear Creek) during winter months. Historically, this reach supported the deep-bodied fish assemblage and served as a seasonal corridor for Chinook salmon and steelhead on their upstream or downstream migrations.

Under current conditions, native fish have been extirpated or reduced to a minor part of the fish fauna, primarily existing in the least-disturbed sloughs in this reach. Today, the dominant fish in this reach include largemouth bass, bluegill, bullhead, and other non-native species in the backwater areas inundated by agricultural return flows. At the San Joaquin River's confluence with the Merced River at Hill's Ferry, a fish exclusion barrier is seasonally erected across the San Joaquin River by CDFG. The slotted, metal barrier is placed yearly from mid-September through mid-December, during the peak immigration period, to prevent adult salmonids from accessing the unsuitable habitat of the upper San Joaquin River (JSA, 2001).

This barrier has proven effective except during some flood flow events, when Chinook salmon have been known to successfully pass upstream into the San Joaquin River watershed. During those flood events, it has been documented that a few adult fall-run Chinook salmon have migrated past the Merced River fish barrier, entered Bear Creek, then moved upstream through the Eastside Bypass and re-entered the San Joaquin River at Sand Slough Control Structure. From there, these few stray Chinook salmon might move upstream as far as the Mendota Dam.

The San Joaquin River downstream of the Merced River confluence to the Delta provides suitable passage for Chinook salmon adults and smolts and supports other anadromous and resident anadromous fish.

Site Setting

Mendota Dam is located at the confluence of the San Joaquin River and Fresno Slough. Mendota Dam backs water up from the Mendota Pool into Fresno Slough so water can be used by Mendota WA and other irrigation districts. Fresno Slough extends approximately 5 miles from Mendota Dam to Mendota WA and is the primary source of water for Mendota WA. Fresno Slough also receives intermittent drainage from the Kings River via the James Bypass. The reach of the San Joaquin River immediately upstream of Mendota Dam remains dry year-round and does not support open-water aquatic habitats and fish communities.

There is no designated critical habitat within the action area. Vegetation along Fresno Slough includes species associated with seasonal wetlands, semipermanent wetlands, and upland habitats. Aquatic and terrestrial habitats along Fresno Slough provide breeding and foraging habitat for ground-nesting birds, such as pheasants, ducks, and shorebirds. Mendota WA is one of only a few managed wetland habitat areas of substantial size in the south-central San Joaquin Valley, and it constitutes a habitat oasis in the midst of intensive agricultural land uses. Mendota WA is on the Pacific Flyway, and provides valuable overwintering habitat for migratory waterfowl and shorebirds and year-round habitat for resident bird species.

Mendota Dam and Pool. Mendota Pool is approximately one mile long and varies from less than 100 feet to several hundred feet wide. Water depth varies, but is generally less than 15 feet. When full, Mendota Pool contains approximately 3,000 ac-ft of water and has a surface area of approximately 500 acres. Mendota Pool provides perennially inundated open-water aquatic habitat. Mendota Pool consists of shallow backwater areas upstream of Mendota Dam, which provide habitat to support a sport fishery for non-native species such as bass, bluegill, and bullhead.

On September 16, 2005, a CH2M HILL biologist performed a reconnaissance-level biological evaluation of the Mendota Dam project area to document wildlife and characterize habitats in the project footprint and adjacent lands. Riparian habitat in the vicinity of Mendota Dam is composed of mature, widely spaced cottonwood and willow trees and decaying snags. Other trees and the majority of herbaceous groundcover are non-native species that have likely become established through downstream dispersal of agricultural plants and seeds.

Other species observed included burreed, cattail, hardstem bulrush, rabbitsfoot grass, and creeping wildrye. A ten-acre, mature cottonwood/willow forest occurs 200 feet east of the San Joaquin River; many trees in this forest have a diameter at breast height of more than 12 inches, and some more than 24 inches. Mendota Dam and its vicinity are subject to frequent human disturbance, and much of the riparian zone has been cleared of vegetation. Photographic documentation of the project area is provided in Appendix C.

Westlands Water District. WWD is located in Fresno and Kings Counties. WWD encompasses more than 600,000 acres of farmland, and delivers approximately 1.15 million ac-ft of CVP water annually. A portion of WWD is adjacent to the western boundary of Mendota WA. Habitats adjacent to Mendota WA consist entirely of agricultural uses, including alfalfa, winter wheat, and cotton.

On October 19, 2005, a CH2M HILL biologist performed a reconnaissance-level evaluation of habitats along the proposed alignment to document wildlife and characterize habitats. Nearly all the habitat along these canals is disturbed upland habitat, although some natural grass uplands occur along short segments of the canals. Photographic documentation of the project area is provided in Appendix C.

San Joaquin River Adjacent to and Downstream of Mendota Dam. Riparian vegetation along the reach downstream of Mendota Dam consists of willow and cottonwood. This vegetation provides stream shading, bank stability, and food sources for fish. In this reach of the river, native fish species have been extirpated or reduced to a minor portion of the fauna. The dominant fish in the San Joaquin River

immediately downstream of Mendota Dam include largemouth bass, bluegill, bullhead, and other non-native warmwater fish. During or following large flood events, adult Chinook salmon occasionally have been known to migrate upstream as far as Mendota Dam.

Mendota Wildlife Area. Mendota WA is a 12,425-acre area that is managed primarily as a seasonally flooded wetland for overwintering waterfowl and shorebirds, and habitat at Mendota WA reflects that management focus. Table IV-6 lists the wildlife species typically occurring at Mendota WA.

Mendota WA's Habitat Management Plan is designed to be flexible in response to water availability and climate conditions. Wildlife population dynamics also influence habitat and water management programs.

The following six major habitat types are managed at Mendota WA:

- Seasonal wetlands
- Semipermanent wetlands
- Permanent wetlands
- Cropland
- Natural grass upland
- Riparian

The wetland habitats provide loafing, foraging, and nesting opportunities for waterfowl, wading birds and shorebirds, and the upland areas support foraging habitat for large concentrations of geese, and foraging and nesting habitat for upland birds and other wildlife species. Following is a brief description of each habitat type and applicable subtype, including desirable vegetation, species benefiting from that vegetation, and the amount of water required by month. Acreages of each habitat type are based on the *Mendota Wildlife Area Habitat Management Work Plan Summary for 1996* (Brueggemann, 1996).

Seasonal Wetlands. Seasonal wetlands are inundated fields or ponds managed primarily to grow seeds and produce invertebrates for migratory waterfowl, shorebirds, and other wetland-dependent wildlife. This is the dominant habitat type at Mendota WA, consisting of approximately 6,819 acres. These wetlands are shallow and typically flooded from October through March and then dry for the rest of the year, except for summer irrigation. Seasonal wetlands consist of leveled and unleveled subtypes.

Leveled seasonal wetlands are usually created by reclaiming wetlands from previously developed cropland. This habitat subtype is managed to produce large quantities of waterfowl and shorebird forage, such as watergrass (or wild millet), smartweed, swamp timothy, and alkali bulrush. Additional plant species include cattails, hardstem bulrush, Baltic rush, cocklebur, jointgrass, and spike rush. These species provide many of the habitat requirements for shorebirds, and are used by herons, egrets, white-faced ibis, and California gulls for foraging, and sandhill crane for loafing and roosting. During the summer, diurnal raptors, such as northern harriers and Swainson's hawks, and mammalian predators forage for small mammals and birds in this habitat.

Unleveled seasonal wetlands (natural basins and seasonally flooded channels) have greater variation in water depth and often are deeper than leveled wetlands. The irregular topography and shorelines often combine to form a mosaic of open water, islands, stands of cattail and bulrush, shoreline points, and shallow, flooded flats. Because of the varied water depth and reduced number of manageable acres in this subtype, seed production from moist-soil food plants is greatly reduced.

However, this same variation provides a greater diversity of aquatic plant species and different foraging substrates for a large array of waterfowl and shorebird species. Wetland plants in unleveled seasonal wetlands are similar to those found in leveled habitat. The adjacent upland portions are dominated by introduced annual and native perennial grasses (e.g., soft chess, creeping wildrye, saltgrass, and alkali sacaton), interspersed with native and introduced forbs. Natural basins produce dense populations of invertebrates that are consumed by waterfowl and shorebirds during the premigration and nesting periods.

Semipermanent Wetlands. The dominant plant species in semipermanent wetlands are cattails and hardstem bulrush, with submerged vegetation, including sago pondweed and horned pondweed, in the open-water area. Duckweed grows on the surface of these wetlands. Scattered black willows may be established on the perimeter of these ponds. Most of the plant organisms found in seasonal wetlands are also found in small quantities on the shallow edges of semipermanent wetlands.

Semipermanent wetlands provide nesting, foraging, and roosting habitat for black-crowned night herons and marsh wrens; foraging and roosting habitat for egrets; nesting and roosting habitat for tricolored blackbirds and white-faced ibis; brooding habitat for ducks; foraging habitat for raccoons and giant garter snakes; and summer marsh habitat for many other wetland-dependent wildlife.

Permanent Wetlands. Permanent wetland habitat (approximately 1,194 acres) includes two subtypes: freshwater marshes and freshwater lakes. Water depths in permanent wetlands are deeper than in seasonal wetlands, but are still relatively shallow. Even in freshwater lakes, water rarely exceeds eight feet in depth. Permanent wetlands can act as reservoirs to supply other habitats and can also be maintained through runoff from other habitats. When permanent wetlands are full, their water requirements are similar to those of semipermanent wetlands. A typical permanent wetland in a normal water year will require approximately 0.25 ac-ft of water per acre in January and February; 0.50 ac-ft in March through June; 1.0 ac-ft in July through September; and a total of 1.5 ac-ft from October through December, for an annual total of 7 ac-ft of water per acre.

Vegetation in permanent wetlands is dominated by cattails and hardstem bulrush. Black willows grow in scattered groups on the edges of freshwater lakes. The margins of permanent wetlands support plants typical of seasonal wetlands. Submerged vegetation in the permanent wetlands is common and includes sago pondweed, widgeon grass, water milfoil, and horned pondweed.

Permanent wetlands provide habitat for numerous fish species, such as striped bass, sunfish, catfish, and largemouth bass. Bullfrogs, western pond turtles, and giant garter snakes inhabit the edges of this habitat. White pelicans, double-crested cormorants, California gulls, and several species of diving ducks use these areas as resting and feeding places. Other benefits of permanent wetlands are similar to those of semipermanent wetlands.

Cropland. Croplands (approximately 530 acres) are fields that are managed to produce food and cover crops that do not occur naturally. Croplands require more intensive farming to maintain than food and cover produced in the wetland habitats. Croplands, as managed at Mendota WA, normally have three distinct subtypes: irrigated pasture, corn production, and small-grain production.

Irrigated Pasture. Typical-year water requirements for irrigated pasture are 0.5 ac-ft per acre in February and March and in each month from June through August. The average annual water requirement is 2.5 ac-ft per acre. Vegetation in the irrigated pasture may consist of Dallas grass, perennial fescues, ryegrass, clovers, vetch, and trefoil. Irrigated pasture may be managed to create tall (two- to three-foot) dense (managed) nesting habitat during the spring months for ducks, pheasants, northern harriers, short-eared owls, other ground nesting birds, and mammals. The same pastures may be managed to produce short, green grazing and loafing habitat for sandhill cranes and geese in the winter. The dual use is accomplished through a closely controlled haying program after each nesting season.

Corn Production. Typical-year water requirements for corn are 1.5 ac-ft per acre in May (before irrigation and planting) and 1.0 ac-ft per acre each month from June through August. The average annual water requirement for corn is 4.5 ac-ft per acre. Corn production yields large quantities of high-energy food (carbohydrates) used by all seed-eating wildlife; however, it is grown primarily to feed sandhill cranes and geese during the winter. Additionally, blackbirds, mourning doves, pheasants, finches, ducks, meadow mice, deer mice, cottontails, ground squirrels, and many other species use the corn grain throughout the year.

Table IV-6
Some Commonly Found Wildlife Resources at Mendota Wildlife Area

Ducks		
canvasback	cinnamon teal[a]	gadwall[a]
green-winged teal	mallard duck[a]	northern pintail[a]
Ring-necked duck	ruddy duck[a]	northern shoveler[a]
American widgeon		
Geese and Swans		
Canada goose	ross goose	snow goose
white-fronted goose	tundra swan	
Coots		
American coot		
Wading Birds and Shorebirds		
American avocet[a]	american bittern[a]	white-faced ibis
black-crowned night heron[a]	black-necked stilt[a]	common egret
common snipe	dowitchers	great blue heron
greater yellowlegs	killdeer	lesser sandhill crane
long-billed curlew	pied-billed grebe[a]	Sandpiper
snowy egret	western grebe[a]	
	clark's grebe[a]	
Raptorial Birds		
American kestrel[a]	barn owl[a]	white-tailed kite
burrowing owl[a]	cooper's hawk	great horned owl[a]
northern harrier[a]	red-tailed hawk	turkey vulture
Upland Game		
black-tailed jackrabbit	cottontail rabbit	mourning dove
ring-necked pheasant		
Fish		
brown bullhead	carp	channel catfish
largemouth bass	striped bass	threadfin shad
Mammals		
Badger	beaver	Coyote
Mink	muskrat	Opossum
Raccoon	spotted skunk	striped skunk

[a]Birds nesting at Mendota WA (CDFG, 1976).

Sources: Reclamation, 1989a; CDFG, 1976.

Small-grain Production. Water required for small-grain production is 0.50 ac-ft per acre in late October or early November to germinate the seed and start growth. The average annual water requirement for small-grain production is 0.50 ac-ft per acre. Small-grain production croplands are used to produce food

and cover. The primary crops grown are barley, wheat, safflower, and vetch. These crops are planted in the fall or winter and produce good crops of high-energy food using little water. The advantage of the small grains is that they provide green fall feed and diversity and can be produced with minimum water during a typical mild winter. These crops are rotated in the fields so the soils are not depleted of nutrients by producing the same plants year after year. These crops also provide nesting and escape cover in the spring and summer. The same species that use the corn crop use these crops and obtain the same benefits, but sandhill cranes prefer mowed corn. Also, vetch and safflower are not heavily used by waterfowl as a source of food unless flooded.

Natural Grass Uplands. Natural grass uplands (approximately 3,105 acres) exist in the portions of Mendota WA that have mostly natural topography and support self-sustaining vegetation. They are managed to maintain the native vegetation and wildlife species they support. Common plant species are softchess, filaree, tarweed, creeping wildrye, alkali sacaton, saltgrass, red brome, fescue, and meadow barley. This habitat supports deer mice, meadow mice, kangaroo rats, ground squirrels, long-tailed weasels, cottontail rabbits, coyotes, San Joaquin kit fox, horned larks, meadowlarks, and many other species. No imported water is used in the natural grass upland except for that applied to the seasonal wetlands that meander through them. This habitat is managed by controlled burns.

Riparian Habitat. Riparian habitat (approximately 107,405 lf, totaling 82 acres) consists of permanent and semipermanent wetland habitat along either natural or manmade water channels and their backwaters. Riparian habitat at Mendota WA is found in association with the San Joaquin River, Mendota Pool, Fresno Slough, and managed field cell margins. Riparian habitat is managed to enhance the dense mixture of naturally occurring trees, shrubs, and streamside vegetation. Dominant plant species in riparian corridors are black and sandbar willow, cottonwood, valley oak, button brush, species of *Atriplex*, and wildrose. Subdominant riparian corridor vegetation includes burreed, cattail, hardstem bulrush, rabbitsfoot grass, creeping wildrye, and many other species.

Riparian corridors provide suitable habitat for a variety of resident and migratory passerine birds as well as various hawks, owls, egrets, and herons. Riparian habitat also supports raccoons, beavers, minks, muskrats, northwestern pond turtles, and giant garter snakes.

Water is critical to maintaining riparian habitat, but is not managed. The habitat is dependent on the flows in the waterways that support it, and no water is directly allocated or provided to the habitat except that which first passes through or is used in one of the other managed habitat types.

Special-status Plants. Special-status plants are vascular plants with the following characteristics:

- Designated as rare, threatened, or endangered by the State or Federal government (i.e., listed species)
- Proposed for rare, threatened, or endangered status
- Designated as State candidates or Federal species of concern

Special-status plants that potentially occur in the anticipated impact areas were determined by the following means:

- Conducting literature reviews and searches of CIF's California Natural Diversity Database (CNDDB) (search performed January 2008)
- Reviewing species listings available at CIF's Web site, http://www.dfg.ca.gov/hcpb/species/t_e_spp/tespp.shtml
- Reviewing species lists provided by USFWS at http://sacramento.fws.gov/es/spp_list.htm (obtained December 2005; see Appendix C)

Table IV-7 displays the listed plant species that could occur in the four 7.5-minute USGS topographic quadrangles associated with the project alternatives (Mendota Dam, Firebaugh, Tranquility, and Coit Ranch). Also included are Federal species of concern that have been observed and recorded in the CNDDB within 7 miles of features of the project alternatives. These plant species occur in the following seven habitat types, defined by the California Native Plant Society:

- Valley and foothill grassland
- Chenopod scrub
- Vernal pool
- Meadow
- Playa
- Pinion and juniper woodland
- Cismontane woodland

Of these seven habitat types, all but pinion and juniper woodland and cismontane woodland potentially occur in the impact areas and alternative corridors.

Special-status Wildlife and Fish. For the purposes of this evaluation, special-status wildlife and fish species include taxi with the following characteristics:

- Designated as threatened or endangered by the State or Federal government (i.e., listed species)
- Proposed or petitioned for Federal or State threatened or endangered status
- Designated as State or Federal candidate species
- Identified by USFWS or NOAA Fisheries as a species of concern or by CDFG as a species of special concern

Potential presence of special-status wildlife and fish species in the study area was determined by the following means:

- Conducting literature reviews and CNDDB record searches (search performed January 2008)
- Reviewing species listings available at CDFG's Web site, http://www.dfg.ca.gov/hcpb/species/t_e_spp/tespp.shtml
- Reviewing species lists provided by USFWS at http://sacramento.fws.gov/es/spp_list.htm (obtained December 2005; see Appendix C)
- Reviewing species listings available at NOAA Fisheries' Web site, http://www.nmfs.noaa.gov/pr/species/esa_species.htm

Table IV-8 displays the listed wildlife and fish species that could occur in the four 7.5-minute USGS topographic quadrangles associated with the project alternatives (Mendota Dam, Firebaugh, Tranquility, and Coit Ranch). Also included are Federal species of concern and State species of special concern that have been observed and recorded in the CNDDB within 7 miles of features of the project alternatives. Of the species listed in Table IV-8, the following four species were determined to be of particular concern based on listing status (i.e., Federally and/or State-listed as threatened or endangered) and their reported occurrences in the project corridors and sites:

- Fresno kangaroo rat
- San Joaquin kit fox
- Blunt-nosed leopard lizard
- Giant garter snake (CDFG, 2001)

The Central Valley fall- and late-fall-run Chinook salmon *(Oncorhynchus tshawytscha)* are listed as Federal species of concern. Commercially important Chinook salmon is also a Federally-managed species under the 1996 Magnuson-Stevens Fishery Conservation and Management Act. Federal agencies must consult with NOAA Fisheries on activities that may adversely affect essential fish habitat for this commercially important species. NOAA Fisheries has designated all the currently viable water and most of the habitat historically accessible to Chinook salmon in the following hydrologic units' essential fish habitat: 18040001 (Middle San Joaquin-Lower Chowchilla), 180400002 (Middle San Joaquin-Lower Merced-Lower Stanislaus), and 18400003 (San Joaquin Delta) (PFMC, 1999). Congress defined essential fish habitat as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (50 CFR 600.10).

Regulatory Framework

Several Federal, State, regional and local entities and programs are engaged in planning, land use, and management activities that have the potential to influence fish and wildlife species and their habitats in the project area. The activities resulting from these planning efforts help form the environmental context in which the project alternatives would be implemented, and are important in evaluating project impacts, including cumulative impacts.

Federal Regulations, Standards, and Previous Consultations. The project alternatives and the No Action and No Project Alternative would be subject to the following Federal regulations:

- NEPA, as amended (42 USC Sections 4321 et seq.). The purposes of this act are to declare a national policy to promote efforts that prevent damage to the environment and benefit human health and welfare, increase understanding of natural resources, and establish a National Council on Environmental Quality.

  ESA, including coordination requirements of Sections 7 and 10 and habitat conservation plan requirements of Section 9 (16 USC Sections 1531 et seq.; 50 CFR Part 402). Section 9 of ESA prohibits the "take" of species Federally-listed as threatened or endangered. Take includes any harm or harassment, including significant habitat modification or degradation that could kill or injure wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Take incidental to otherwise lawful activities can be authorized under Section 7 of ESA, where a Federal nexus or agency is involved. Section 10 of ESA provides for project proponents of nonFederal activities to apply for an Incidental Take Permit. This permit includes a habitat conservation plan that specifies impacts to Federally-listed species and measures taken to monitor, minimize, and mitigate such impacts. If approved by USFWS, an Incidental Take Permit for the action will be issued.

- Migratory Bird Treaty Act (16 USC 703 through 712; 50 CFR 10). This act prohibits the take of migratory birds, unless permitted. This regulation can constrain construction activities that have the potential to affect nesting birds, either through vegetation removal and land clearing or through other construction- or operation-related disturbance.

- Fish and Wildlife Coordination Act of 1958 (16 USC 661-667(e)). This act authorizes the Secretaries of Agriculture and Commerce to cooperate with Federal and State agencies to protect and increase the supply of game and mammals. Under an amendment to the act, consultation with USFWS and State fish and wildlife agencies is required when the "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted…or otherwise controlled or modified" by any agency under a Federal permit or license. The purpose of the consultation is to prevent the loss of, or damage to, wildlife resources.

Table IV-7
Selected Special-status Plants in the Project Area

Species Common Scientific Name	Federal Status	State Status
palmate-braced bird's beak, *Cordylanthus palmatus*	Endangered	Endangered
San Joaquin woollythreads, *Monolopia congdonii*	Endangered	None
heartscale, *Atriplex cordulata*	Species of concern	None
brittlescale, *Atriplex depressa*	Species of concern	None
subtle orache, *Atriplex subtilis*	Species of concern	None
Lost Hills crownscale, *Atriplex vallicola*	Species of concern	None
Munz's tidy-tips, *Layia munzii*	Species of concern	None
Sanford's arrowhead, *Sagittaria sanfordii*	Species of concern	None

Notes:

FEDERAL STATUS DEFINITIONS:

Endangered: Species that is in danger of extinction throughout all or a significant portion of its range.

Threatened: Species that is likely to become endangered in the foreseeable future.

Proposed: Species that has been proposed in the Federal Register to be listed as endangered or threatened.

Candidate: Species for which USFWS has sufficient biological information to support a proposal to list as endangered or threatened.

Species of concern: Species for which existing information indicated may warrant listing, but for which substantial biological information to support a proposed rule is lacking.

None: Not listed by the Federal government.

STATE STATUS DEFINITIONS:

Fully Protected: Fully Protected species may not be taken or possessed at any time and no licenses or permits may be issued for their take except for collecting these species for necessary scientific research and relocation of the bird species for the protection of livestock.

Endangered: A native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease.

Threatened: A native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by Chapter 1.5 of the California Fish and Game Code.

Rare: A species, subspecies, or variety is rare when, although not presently threatened with extinction, it is in such small numbers throughout its range that it may become endangered if its present environment worsens.

Candidate: A native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that the commission has formally noticed as being under review by DWR for addition to either the list of endangered species or the list of threatened species, or a species for which the commission has published a notice of proposed regulation to add the species to either list.

Species of special concern: Native species or subspecies that have become vulnerable to extinction because of declining population levels, limited ranges, or rarity. The goal is to prevent these animals from becoming endangered by addressing the issues of concern early enough to secure long-term viability for these species.

None: Not listed by the State government.

Sources: CNDDB search January 2008; information available at http://www.dfg.ca.gov/hcpb/species/t_e_spp/tespp.shtml; and USFWS official species lists from http://sacramento.fws.gov/es/spp_list.htm (obtained December 2005; see Appendix C).

- Executive Orders 11990, Protection of Wetlands, and 11988, Floodplain Management (40 CFR 6.302(a)). The object of the Executive Order 11990 is to minimize the destruction or degradation of wetlands and avoid new construction in wetlands wherever a reasonable alternative exists. The purpose of the Executive Order 11988 is to prevent Federal agencies from contributing to the "adverse impacts associated with the occupancy and modification of floodplains" and the "direct or indirect support of floodplain development." To this purpose, agencies will avoid siting development in floodplains.
- Sections 404 and 401 of the Clean Water Act (CWA) (33 USC 1344). Activities that have the potential to discharge fill materials into Waters of the United States, including wetlands, are regulated under Section 404 of the CWA, as administered by the USACE. Fill activities may be permitted by a nationwide or individual permit. The Nationwide Permit Program involves certain activities that have been preauthorized by USACE. Individual permit applications are submitted to USACE and generally take up to 6 months for issuance. Section 404 (1)(b) guidelines require USACE to rule in favor of the least environmentally damaging practicable alternative when multiple alternatives are available for a project. Typically, USACE requires mitigation in the form of restoring areas of temporary impacts, and restoring and enhancing additional wetland areas at a specified ratio. Alternatively, in-lieu fees can be paid into a mitigation banking fund. Projects requiring a Section 404 permit also require a CWA Section 401 Water Quality Certification or waiver, issued by the appropriate Water Board.

Previous consultations relative to Federal regulations have focused on the *Programmatic Biological Opinion on National Wildlife Refuge and Wildlife Area Water Conveyance Projects, Within Tulare, Kern, Fresno, Madera, and Merced Counties, California* (USFWS, 1999a). Reclamation initiated formal consultation with USFWS pursuant to Section 7 of the ESA on several refuge water supply conveyance projects in the San Joaquin Valley in January 1999, including the conveyance of refuge water supply for Mendota WA. USFWS subsequently issued a BO on these conveyance projects (dated June 28, 1999). The BO is contained in Appendix C of this EA/IS.

The BO addresses the effects of improvements to water conveyance facilities outside refuges that are necessary to deliver Level 4 water to the refuge boundaries. The following categories of projects are authorized under the BO for this purpose: water control structures; weirs; drains; turnouts; siphons; pumps; canal construction, improvement, and revegetation for erosion control; pipeline installation and hydrological testing; wells; dam construction; earthfill embankments and small earth dams; electrical distribution lines; removal of obsolete water conveyance structures; riprap around water management structures; temporary equipment storage and parking areas; and operation and maintenance of structures (USFWS, 1999a).

The BO authorizes take of the following listed species if the terms and conditions of the BO are met: San Joaquin kit fox, Tipton kangaroo rat, blunt-nosed leopard lizard, and giant garter snake. USFWS concluded in the BO that no suitable habitat exists for the valley elderberry longhorn beetle, vernal pool fairy shrimp, vernal pool tadpole shrimp, California red-legged frog, Aleutian Canada goose, riparian brush rabbit, riparian woodrat, San Joaquin woolly-thread, Hoover's wooly-star, California jewelflower, or Kern mallow. Therefore, these special-status plant and wildlife species are not covered under the BO.

Table IV-8
Selected Special-status Wildlife and Fish in the Project Area

Species Common and Scientific Name	Federal Status	State Status
Mammals		
giant kangaroo rat, *Dipodomys ingens*	Endangered	Endangered
Fresno kangaroo rat, *Dipodomys nitratoides exilis*	Endangered	Endangered
San Joaquin kit fox, *Vulpes macrotis mutica*	Endangered	Threatened
Nelson's antelope squirrel, *Ammospermophilus nelsoni*		Threatened
San Joaquin pocket mouse, *Perognathus inornatus inornatus*	Species of concern	None
American badger, *Taxidea taxus*	None	Species of special concern
Birds		
American peregrine falcon, *Falco peregrinus anatum*	Delisted	Endangered/fully protected
bald eagle, *Haliaeetus leucocephalus*	Threatened	Endangered
mountain plover, *Charadrius montanus*	Species of concern	Species of special concern
Swainson's hawk, *Buteo swainsoni*		Threatened
western yellow-billed cuckoo, *Coccyzus americanus occidentalis*	Candidate	Endangered
willow flycatcher, *Empidonax traillii*	None	Endangered
bank swallow, *Riparia riparia*		Threatened
burrowing owl, *Athene cunicularia*	None	Species of special concern
short-eared owl, *Asio flammeus*	None	Species of special concern
white-faced ibis, *Plegadis chihi*	None	Species of special concern
Reptiles		
blunt-nosed leopard lizard, *Gambelia sila*	Endangered	Endangered/fully protected
giant garter snake, *Thamnophis gigas*	Threatened	Threatened
western pond turtle, *Clemmys marmorata*	None	Species of special concern
Silvery legless lizard, *Anniella pulchra pulchra*	None	Species of special concern
Coastal (California) horned lizard, *Phrynosoma coronatum (frontale)*	None	Species of special concern
Amphibians		
California red-legged frog, *Rana aurora draytoni*	Threatened	Species of special concern
California tiger salamander, *Ambystoma californiense*	Threatened	Species of special concern
western spadefoot toad, *Scaphiopus hammondii*	None	Species of special concern
Fish		
Central Valley fall- and late-fall-run Chinook salmon, *Oncorhynchustshawytscha*	Species of concern	Species of special concern
Central Valley steelhead, *Oncorhynchus mykiss*	Threatened	Species of special concern
Delta smelt, *Hypomesus transpacificus*	Threatened	Threatened
Invertebrates		
vernal pool fairy shrimp, *Branchinecta lynchi*	Threatened	None
valley elderberry longhorn beetle, *Desmocerus californicus dimorphus*	Threatened	None

Sources:

CNDDB search January 2008; information available at http://www.dfg.ca.gov/hcpb/species/t_e_spp/tespp.shtml; USFWS official species lists from http://sacramento.fws.gov/es/spp_list.htm (obtained December 2005; see Appendix C); NOAA Fisheries lists from http://www.nmfs.noaa.gov/pr/species/

The BO authorizes temporary impacts of not more than 94.20 acres of aquatic/riparian habitat and 45 acres of upland habitat for all conveyance projects (temporary is defined as less than 6 months for aquatic/riparian habitat and less than 2 years for upland habitat). Permanent impacts of not more than 17.75 acres of aquatic/riparian habitat and 15.20 acres of upland habitat are also authorized under the BO.

Because the BO was prepared based on the results of a previous EA conducted for the conveyance of refuge water supplies to Mendota WA, the Proposed Action presented in this EA/IS will be covered under the BO. The BO also includes undesigned refuge water conveyance projects under the following conditions:

1. The BO develops gross impact estimates to generate "sideboards" for the maximum amount of habitat to be disturbed for structures (see Appendix C for more details).
2. Impact quantification must be provided as designs are completed for each structure, and compared to the sideboard estimates to determine compliance with the BO.
3. Take is authorized for construction in the form of a letter appended to the BO, after it has been determined that construction would be consistent with the BO.

A letter appended to the BO, therefore, would be necessary prior to implementation of the alternatives presented in this EA/IS.

State Regulations, Standards, and Previous Consultations. The project alternatives and No Action and No Project Alternative would be subject to the following State regulations:

- CEQA, as amended (Public Resources Code Sections 21000 et seq.). The CEQA goals are intended to assist California public agencies in identifying potential significant environmental effects of their actions and either avoiding or mitigating those effects, when feasible.
- California Endangered Species Act (CESA) (California Fish and Game Code 2050 et seq.). Section 2050 of the California Fish and Game Code prohibits any activities that would jeopardize or take a species listed as threatened or endangered in the State. Projects that have the potential to affect species listed as threatened or endangered by the State might require an Incidental Take Permit from CDFG under Section 2081 of the Fish and Game Code. The application for this permit requires a project description, an analysis of impacts to the species, and an analysis of the probability of the species' long-term survival as related to impacts.
- California Fully Protected Wildlife Species Provisions (California Fish and Game Code Sections 3511, 4700, 5050, and 5515). These provisions prohibit the take of fully protected birds, mammals, amphibians, and fish. CDFG might authorize the project, with conditions, after reviewing the project impacts.
- Fish and Wildlife Protection and Conservation: Streambed Alteration Agreements (California Fish and Game Code Section 1600). Section 1600 of the Fish and Game Code regulates the alteration of the bed, bank, or channel of a stream, river, or lake, including dry washes. Generally, CDFG asserts jurisdiction up to the top of significant bank cuts, or to the outside of any riparian vegetation associated with a watercourse. Activities that have the potential to affect jurisdictional areas can be authorized through issuance of a streambed alteration agreement, which specifies conditions and mitigation measures that will minimize impacts to riparian resources from proposed actions. Issuance of a streambed alteration agreement takes from 1 to 3 months.

Previous consultations relative to State regulations have focused on CDFG's Mendota WA Comprehensive Management Plan. CDFG conducted an internal consultation to determine whether its January 1994 draft management plan for Mendota WA would jeopardize the continued existence of

threatened or endangered species known to occur at or near Mendota WA pursuant to Section 2090 of the CESA. The BO for this internal consultation (CDFG, 1996) is contained in Appendix C of this document.

Local Regulations and Standards. In addition to the measures required under ESA and CESA to protect listed and proposed species, Fresno and Madera Counties have developed and implemented measures to mitigate or offset impacts to sensitive and special-status species as part of their general plans.

As part of updating or revising the general plans, planning agencies must also comply with the requirements of CEQA and evaluate the environmental impacts associated with the proposed goals and policies. An environmental impact report is often prepared to comply with CEQA.

The most current measures that are designed to conserve natural resources in Fresno and Madera Counties and presented in their general planning and CEQA documents are described in the following discussions.

Fresno County General Plan. The Open Space and Conservation Element of the Fresno County General Plan (http://www.co.fresno.ca.us/4510/4360/General_Plan/GP_Final_policy_doc/Open_Space_Element_rj.pdf) contains policies to protect wetland and riparian areas, fish and wildlife habitat, and vegetation. Wetland and riparian policies seek to protect these habitats while allowing compatible uses where appropriate. Fish and wildlife habitat policies seek to protect natural areas and preserve the diversity of habitat in the county, and policies related to vegetation seek to protect native vegetation resources on private land in the county.

Madera County General Plan. The Agricultural and Natural Resources section of the Madera County General Plan Policy Document (http://www.madera-county.com/rma/archives/uploads/1128960251_Document_gppolicy.pdf) contains policies protective of agriculture, wetland and riparian areas, fish and wildlife habitat, and vegetation. The goal for wetland communities and related riparian areas is to protect these areas throughout Madera County as valuable resources. The goal for fish and wildlife habitat is to protect, restore, and enhance habitats that support fish and wildlife species so as to maintain populations at viable levels; the goal for vegetation is to preserve and protect the valuable vegetation resources of Madera County.

Environmental Consequences

This section discusses effects (both impacts and benefits) that are anticipated with regard to fishery, wildlife, and vegetation resources in the proposed project area and vicinity, and presents project mitigation measures designed to avoid, minimize, and mitigate, where necessary, any adverse effects of the project.

Criteria for Determining Significance

Implementation of project alternatives would cause a significant impact to biological resources if it has the potential to:

- substantially reduce the habitat of a fish or wildlife species
- substantially degrade the quality of the environment
- cause a fish or wildlife population to drop below self-sustaining levels
- threaten to eliminate a plant or animal community
- substantially reduce the number or restrict the range of an endangered, rare, or threatened species
- Hinder implementation of the adopted Open Space and Conservation Element of the Fresno County General Plan, the Agricultural and Natural Resources section of the Madera County General Plan

Policy Document, or other approved local, regional, or State policies or ordinances protecting biological resources, including the ability to establish identified habitat preserves

Assessment Methods

This section describes the effects, including adverse impacts and benefits, of the project alternatives and presents project mitigation measures that would be incorporated to avoid, minimize, or mitigate adverse impacts to vegetation and fish and wildlife resources to a less than significant level. Impact acreage calculations for project alternatives were derived by delineating habitat types on 1998 aerial photography using ArcGIS software. Habitat types included riverine, lacustrine, riparian, and upland. For purposes of this impact analysis, riparian habitat was defined as such only if it clearly supported woody riparian vegetation, and land immediately adjacent to the river was defined as upland habitat if it was devoid of vegetation. Habitat types were ground-truthed during reconnaissance surveys performed in September and October 2005.

No Action and No Project Alternative Impacts

Under the No Action and No Project Alternative, new water supply infrastructure would not be built for Mendota WA. Because no construction would occur, the amount of wildlife and fish habitat and associated resources would not change.

Vegetation. Botanical resources would continue to be managed under existing conditions. The San Joaquin River Basin and River Corridor Ongoing and Interrelated Habitat Improvement Projects, Plans, and Programs have the ability to eliminate some, but not all, impacts if specific project, plan, or program features are implemented. Habitats at Mendota WA would be managed and would support existing plant species.

Wildlife and Fish. Under the No Action and No Project Alternative, impacts to waterfowl would continue to occur as a result of maintenance to Mendota Dam that is required during alternate years. During years when Mendota Pool is not lowered for dam maintenance, fields would be flooded gradually in the fall to optimize waterfowl use, and depth would be maintained at approximately six to eight inches. Fields would remain flooded until spring, at which time they would be drained to allow germination of desirable waterfowl food plants. During years when Mendota Pool is lowered for dam maintenance, many fields at the wildlife area would be flooded deeper than optimal levels for waterfowl foraging. Overfilling the fields initially increased Mendota WA's ability to maintain high numbers of waterfowl, but this management operation adversely affected their ability to feed in these areas.

Although negative biological resource impacts are anticipated to continue into the foreseeable future, the San Joaquin River Basin and River Corridor Ongoing and Interrelated Habitat Improvement Projects, Plans, and Programs, previously discussed, could eliminate many of these impacts if specific project, plan, or program features were implemented. The fisheries downstream from Friant Dam to Mendota Pool (i.e., the managed trout fishery and resident centrarchid [sunfish, bass] species) are not expected to change under the No Action and No Project Alternative. The river reach between Gravelly Ford and Mendota Pool, about 12 to 16 miles long, which is dry except in wet years, is also not expected to change under the No Action and No Project Alternative.

Mendota Pool would continue to intermittently sustain warmwater fish under the No Action and No Project Alternative; however, species composition and age class structure may change somewhat over time. The dewatering of the Mendota Pool every other year for CCID inspections and or maintenance would continue to adversely affect the sport fishery in Mendota Pool because of stranding and increased losses to avian and mammalian predators during dewatering.

Impacts to fisheries downstream of the Mendota Dam would likely remain unchanged under the No Action and No Project Alternative.

Typically, no Friant Division water reaches the lower San Joaquin River except in wet years, and this condition is not expected to change under the No Action and No Project Alternative.

Special-status Species. Under the No Action and No Project Alternative, Mendota Pool would continue to be dewatered every other year for CCID inspections, resulting in the overfilling of fields at Mendota WA. This overfilling would affect foraging habitat not only for waterfowl, but also wading birds, such as white-faced ibis, a California species of special concern.

Wetlands and Waters. Under the No Action and No Project Alternative, no significant impacts to jurisdictional Waters of the United States or wetlands would occur. However, long-term disturbance would continue with periodic dewatering of the Mendota Dam and resultant disruption of water supply to Mendota WA.

No Action and No Project Alternative Mitigation

No mitigation would be required under the No Action and No Project Alternative.

Alternative MEN-5 Impacts

Construction.

Vegetation. Construction of a dam would entail both permanent (the footprint of the constructed feature) and temporary (e.g., equipment staging sites) impact areas. A total of 2.2 acres of existing riparian habitat would be affected during the construction period only (see Figures IV-1A and IV-1B). Although most riparian areas would be revegetated, the riparian impacts would be considered permanent because the construction period would last longer than 6 months (USFWS, 1999a). **Impacts to 2.2 acres of riparian vegetation during the construction period would be considered less than significant with mitigation.**

A total of 0.1 acre of existing upland habitat would be affected in the immediate vicinity of the new dam during construction (see Figure IV-1A). An additional five acres of ruderal or agricultural land would serve as the borrow source for the earthen levee extension. **Because upland habitat is common throughout the region, and the upland habitat that would be affected is already disturbed, impacts to upland habitat would be considered less than significant, and no mitigation is proposed.**

The amounts of riparian and upland habitats that would be affected were similar to those calculated through the HEP analysis (USFWS, 1993).

Wildlife and Fish. Temporary loss of riparian habitat could affect wildlife through loss of food, cover, or shelter. Bird species potentially affected include red-tailed hawk, great horned owl, egret, and heron. Mammals include raccoon, beaver, mink, and muskrat. Direct mortality may occur during clearing and grading if less-mobile species (e.g., reptiles) are encountered in any construction right-of-way. During construction, larger and more-mobile species would normally be displaced temporarily from the right-of-way and active construction areas into nearby habitat. Displaced wildlife may return to adjacent habitats after construction is completed or during periods when construction is not active. **Impacts to wildlife species as a result of construction activities would be less than significant with mitigation.**

Direct losses of fish residing in areas of the Mendota Pool may occur during construction-related activities, including dewatering, levee modifications, and sheet pile installation. Adverse changes in and short-term losses to aquatic habitats, and short-term degradation of water quality in Mendota Pool during construction of a new dam, may also adversely affect resident fish habitats and populations. Resident fish

species potentially affected include Sacramento blackfish, Sacramento splittail, Sacramento pikeminnow, Sacramento sucker, and hitch. **Direct losses, losses in and changes to aquatic habitat, and degradation of water quality in Mendota Pool as a result of construction would be less than significant with mitigation.**

Special-status Species. Construction of Alternative MEN-5 could affect special-status species through the temporary loss of habitat and disturbance from construction activities. Giant garter snake, San Joaquin kit fox, Fresno kangaroo rat, blunt-nosed leopard lizard, and diurnal raptors (e.g., Swainson's hawk) could be affected in this manner, and this would be considered significant without mitigation. The presence of other special-status species in the project area is considered low because of poor habitat quality and the absence of recorded observations in the project area. Although no burrowing owls were observed in the immediate vicinity, and the nearest recorded observation was five miles from the area, upland habitats in the area appear suitable for burrowing owl nesting.

If undiscovered nests were found or new nests were established in the area, construction of Alternative MEN-5 could affect this species through the temporary loss of habitat and disturbance from construction activities, which would be a considered significant without mitigation. Because of their immigration timing (October through December), their exclusion at the Merced Weir except during some flooding events (in which Mendota project construction activities would cease), direct losses of fall-/late fall-run Chinook salmon near the Mendota Pool would not occur during construction.

In addition, any temporary loss of transportation corridor habitat for these species would be less than significant (a loss of approximately .0.25 mile out of approximately 125 miles of river corridor, approximately 0.4 percent). **Consequently, construction impacts to special-status species other than those listed under Alternative MEN-5 would be similar to those under the No Action and No Project Alternative.**

Wetlands and Waters. Construction of Alternative MEN-5 would result in the temporary displacement of 0.1 acre of riverine habitat where the cofferdam is erected downstream of the new dam. This amount of affected riverine habitat is similar to that calculated through the HEP analysis (USFWS, 1993). **Although this habitat would be displaced longer than 6 months and would be considered a permanent impact (USFWS, 1999a), the quality of this riverine habitat is such that this would not be considered a significant impact.** Construction of Alternative MEN-5 may result in the discharge or fill into jurisdictional waters, especially as a result of vegetation clearing and temporary spillway operation on the east bank of the San Joaquin River (see Figure IV-B). **Consequently, impact from construction activities in and around riverine habitat would be considered less than significant with mitigation.**

Operations.

Vegetation. Approximately 1.9 acres of riparian habitat in the project footprint would be permanently affected (see Figures IV-1A and IV-1C). Permanent impacts would be associated with a permanent right-of-way and facility maintenance. As described under Affected Environment, riparian habitats provide multiple biological functions and have been sharply reduced from their historic extent. **Consequently, the permanent loss of 1.9 acres of riparian habitat would be considered less than significant with mitigation.**

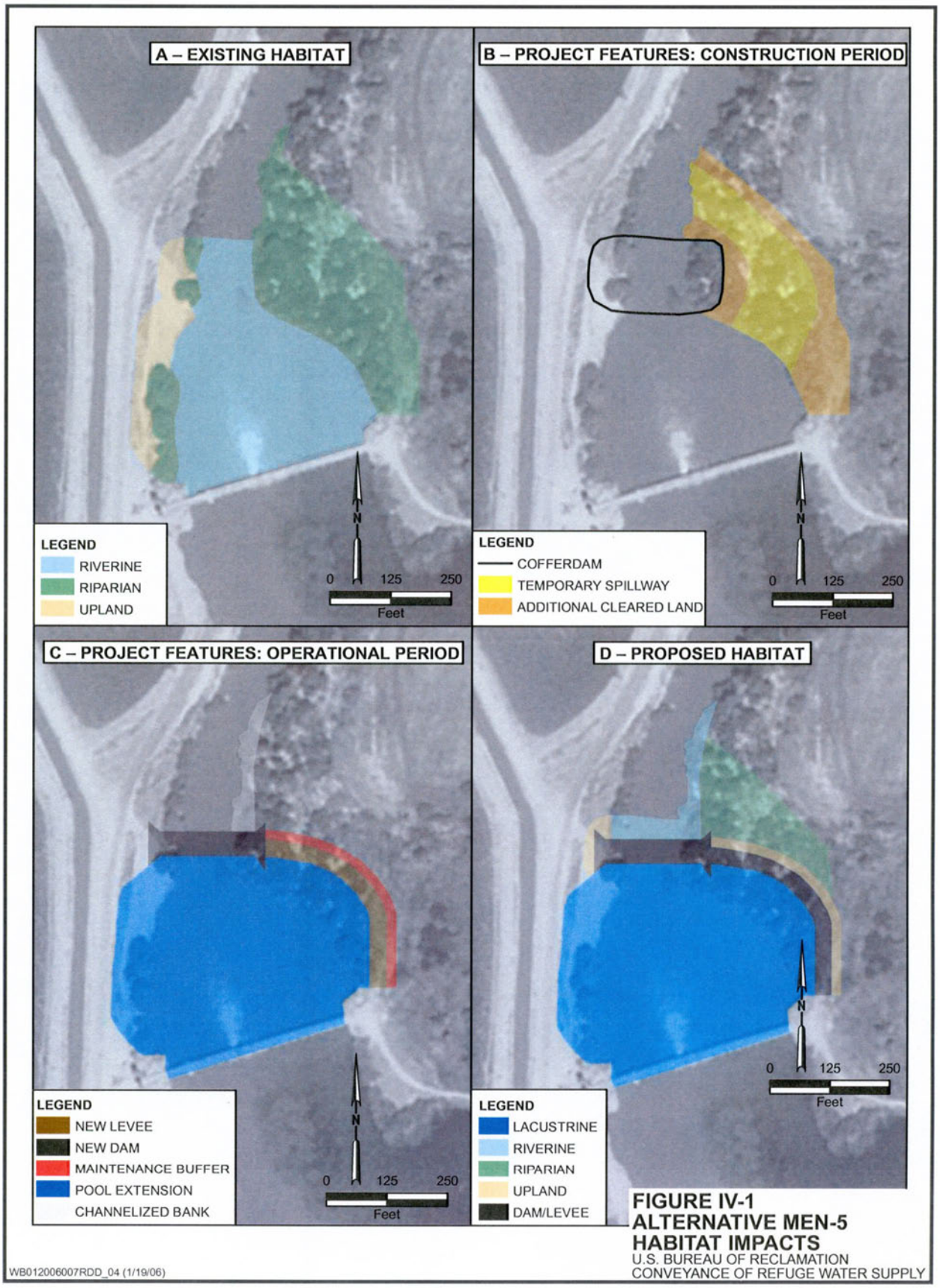

FIGURE IV-1
ALTERNATIVE MEN-5
HABITAT IMPACTS
U.S. BUREAU OF RECLAMATION
CONVEYANCE OF REFUGE WATER SUPPLY

A total of 0.5 acre of existing upland habitat would be eliminated in the footprints of constructed features of the Mendota Pool extension downstream. **Because upland habitat is common throughout the region, and the upland habitat that would be affected is already disturbed, impacts to upland habitat would be considered less than significant, and no mitigation is proposed.**

Mendota Pool water-surface elevation at full capacity may increase from 0.0 to 0.6 feet above its existing level. **This small increase in surface elevation would result in an insignificant reduction of riparian and upland vegetation because Mendota Pool is contained by steep-sided levees.**

Wildlife and Fish. **Modifying operation of Mendota Dam to maintain water in Mendota Pool during the winter months would be expected to result in beneficial impact to overwintering waterfowl that use Mendota Pool and Mendota WA.**

Under Alternative MEN-5, a more consistent water level would be expected in Mendota Pool throughout the year. This, in combination with the less frequent dewatering of Mendota Pool (approximately once every four years for inspections and maintenance), could result in an improvement in the local fishery. CDFG would consider active management of the fishery in Mendota Pool (Stanley, 1999). CDFG would seek to improve the sportfishing opportunities at Mendota Pool and Fresno Slough for public use and would implement fishery habitat enhancement projects when possible. The project design would expand the Mendota Pool downstream of the existing dam, creating an additional 4.5 acres of lacustrine habitat (see Figure IV-1D) that would provide additional benefits to the existing Mendota Pool fishery. This amount of increased lacustrine habitat is very similar to that calculated through the HEP analysis (USFWS, 1993).

Special-status Species. Mendota Pool water-surface elevation at full capacity may increase from 0.5 to 1 foot above its existing level to allow as many as 300 acres of Mendota WA to be rewatered (Brueggemann, 2006). This rewatered area would increase available giant garter snake habitat and provide a benefit to this species during their active season from May until October. The benefits of modifying operations of Mendota Dam to prevent overfilling of fields at Mendota WA would extend to wading birds, including white-faced ibis, a California species of special concern. In addition, any permanent loss of transportation corridor habitat for anadromous salmonid species would be less than significant (a loss of approximately 0.25 mile out of approximately 125 miles, approximately 0.4 percent).

Wetlands and Waters. HEP analysis estimated an overall benefit to seasonal wetlands of Mendota WA that could amount to 2,310 acres (USFWS, 1993), resulting from reductions in the frequency and duration of lowering Mendota Pool water levels during winter months for maintenance. Maintenance of the new dam and other facilities is not anticipated to affect Waters of the United States or wetlands. Operation of the facilities is not expected to affect wetlands or upland areas. When repairs are required in or adjacent to wetland communities, appropriate protective procedures would be followed to minimize effects to wetlands.

Alternative MEN-5 Mitigation

Vegetation. The following mitigation measures would ensure that impacts to vegetation would be reduced to less than significant levels:

- Conduct preconstruction surveys prior to final design to identify locations of special-status plants, following the procedures outlined in *Guidelines for Assessing the Effects of Proposed Developments on Rare and Endangered Plants and Plant Communities* (CDFG, 2000). Surveys must be timed to coincide with the flowering seasons of the targeted species. After preconstruction surveys, develop measures to avoid impacts to special-status plants.
- Where avoidance of special-status plants is not practicable, develop and implement measures for mitigating impacts, including relocation or re-establishment of special-status plant populations.

Mitigation would involve creating suitable habitat in unsuitable habitat by providing soil, water, and vegetation to replicate conditions needed to establish special-status species populations.

- Prior to construction, visit construction areas to verify and refine the acreage of habitats to be affected and characterize the composition and quality of the affected habitat. Mitigate the loss of riparian and wetland habitat by enhancing, restoring, or creating riparian and wetland habitat at a 3:1 ratio for every acre of habitat permanently affected. Mitigation may be accomplished through the following means:
  - Restoration, enhancement, or creation of habitat onsite
  - Restoration, enhancement, or creation of habitat at an offsite location
  - Purchase of mitigation credits in an approved mitigation bank

  Mitigation lands would be protected in perpetuity through conservation easements, fee-title acquisition, or other appropriate mechanisms. Although a candidate riparian mitigation site was proposed as part of a HEP analysis (USFWS, 1993), the project description has changed since this analysis was completed, so the specific mitigation approach for this alternative would be developed during project-level review and implementation.
- Develop and implement a revegetation plan for construction areas. The revegetation plan should incorporate seeding and planting of native species that will resist invasion by noxious weeds.
- Develop and implement a monitoring plan to assess the success of mitigation measures for impacts to vegetation and special-status species (Reclamation and CDFG, 2003). Plantings on the revegetation and compensation sites should be monitored during the growing season (March through September) to determine growth rates for three years from the date of transplant or planting. A yearly report should be submitted to USFWS, including dates of watering, growth rates, cover rates, and mortality figures. Monitoring could be curtailed after three years if success is demonstrated (plant cover of the mitigation site will be at least 80 percent of the cover at the impact site prior to project disturbance and vegetative composition of the dominant [more than 20 percent of the cover] and characteristic species [typical, regularly occurring in the habitat, but not dominant] exceed 80 percent of that which was present at the impact site.) Monitoring of special-status plant mitigation sites could be curtailed after three years if overall survival rates of seeded, planted, or transplanted plants exceed 80 percent of projected survival rates.

Wildlife and Fish. Impacts to wildlife would be reduced to less than significant levels through mitigation measures designed for special-status species (see Special-status Species for details). Impacts to fish would be reduced to less than significant levels by implementing the following mitigation measures:

- Prior to dewatering of construction areas, cofferdams or sheet piling will be placed to isolate work areas and reduce direct impacts to fish in the Mendota Pool.
- Prior to final dewatering of these coffered areas, any fish present will be collected and transported, under the supervision of a USFWS/CDFG-approved fishery biologist, to parts of the Mendota Pool that will be outside of the construction impact area.
- During dewatering of areas of the Mendota Pool for construction, visual surveys will be conducted to identify areas where fish may become stranded. Fish observed from these areas will be collected and relocated (under the supervision of a USFWS/CDFG-approved fishery biologist) to areas in Mendota Pool that remain inundated.

Special-status Species. The following mitigation measures would ensure that impacts to wildlife and fish species would be reduced to less than significant levels:

- Construction personnel shall participate in a USFWS/CDFG-approved worker environmental awareness program covering the potential presence of Federally-listed species, their habitats, and the protections afforded them under the ESA. If any evidence of activity is found suggesting the presence of listed species, the USFWS' Sacramento Office will be contacted to initiate an interagency ESA consultation.
- For construction activities in or adjacent to potential habitat for giant garter snake, the following measures will be implemented (USFWS, 1997):
  - Habitat disturbance will be confined to the minimal area necessary. Areas of snake habitat that are to be avoided during construction will be clearly flagged and designated as avoidance areas.
  - Construction activities in snake habitat will be conducted between May 1 and October 1 to the extent possible. Where construction must occur outside of this period, the following measures will be implemented on upland areas that are potential hibernation habitat for giant garter snakes:
    - Clear, grub and grade all areas no later than October 1 to fill in rodent burrows and cracks.
    - Have a USFWS/CDFG-approved biologist present during all excavations and ground disturbance.
    - Potential facility location sites will be reviewed prior to design to determine whether potential habitat for listed species, including giant garter snakes, is supported in or adjacent to the proposed construction area. Project facilities and areas required to support construction activities (e.g., staging areas) will be sited to avoid areas of potential habitat where possible. If avoidance is infeasible, the acreage of upland and aquatic habitat that will be temporarily and permanently affected will be determined through a preconstruction survey. At appropriate times during or immediately following completion of construction activities, a USFWS/CDFG-approved biologist will verify the acreage of aquatic and upland habitat affected by construction for purposes of determining mitigation requirements and report these amounts to USFWS. Temporarily disturbed areas will be restored to preproject conditions following completion of construction activities.
  - Permanently affected areas will be mitigated by creating or acquiring replacement habitat at a 3:1 ratio for each acre affected. Protection and management of mitigation lands will be provided in perpetuity. Restored areas are to be monitored for one year following completion of restoration activities. Created habitat is to be monitored for five years following completion of habitat creation. Periodic monitoring reports are to be submitted to the USFWS.
- Preconstruction surveys should be conducted for diurnal raptors prior to the peak March-through-August nesting period. Construction during the critical nesting period (March through August) will be avoided, or, if nesting pairs and fledglings are identified within 0.25 mile of construction, a monitoring program will be initiated in consultation with CDFG. If Swainson's hawks are present, site surveys will be conducted to identify nesting activity. If nests are located within 0.5 mile of the project site with a direct line of sight to the activity, CDFG monitoring protocol (CDFG, 1994) will be implemented and the agency will be consulted to establish appropriate mitigation. For other diurnal raptors, seasonal restrictions (March through August) on project activities might be appropriate.
- Preconstruction surveys should be conducted for burrowing owls. Within 24 hours before construction begins, the site shall be inspected for active burrowing owl nests by a qualified, CDFG-

approved biologist. If active nests are found, the following mitigation measures described by CDFG (1994) would be implemented:

- Occupied burrows will not be disturbed during the nesting season (February 1 through August 31) unless the qualified biologist verifies through noninvasive methods that either (1) the birds have not begun egg-laying and incubation, or (2) that juveniles from the occupied burrows are foraging independently and are capable of independent survival.
- To offset the loss of foraging and burrow habitat on the project site, a minimum of 6.5 acres of foraging habitat per pair or unpaired resident bird will be acquired and permanently protected. The protected lands will be adjacent to occupied burrowing owl habitat and at a location acceptable to CDFG.
- When destruction of occupied burrows is unavoidable, existing unsuitable burrows will be enhanced (enlarged or cleared of debris) or new burrows created (by installing artificial burrows) at a ratio of 2:1 on the protected lands site.
- If owls must be moved away from the disturbance area, passive relocation techniques will be used rather than trapping. One or more weeks will be necessary to accomplish this and allow the owls to acclimate to alternative burrows.

- Preconstruction surveys should be conducted for San Joaquin kit fox. Before staging and construction, a USFWS/CDFG-approved biologist should survey for dens and other kit fox sign, such as scat, prey remains, and tracks. The biologist shall follow the *Standard Recommendations for Avoidance of the San Joaquin Kit Fox Prior to or During Ground Disturbance* (USFWS, 1999b), as follows:
  - If dens or other signs are found, confine surface disturbance to areas that do not exhibit the habitat types and sign with an adequate buffer (not less than 200 feet). The biologist must stake and flag to exclude construction activities within 200 feet of potential habitat.
  - To avoid inadvertent entrapment of animals in holes during construction, excavated, steep-walled holes or trenches more than two feet deep should be covered at the close of each working day by plywood or similar materials or provided with one or more escape ramps constructed of earth fill or wooden planks.
  - Construction pipes, culverts, or similar structures with a diameter of four inches or greater that are stored at a construction site for one or more overnight periods should be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved.
  - No work shall be conducted between sunset and sunrise within 0.5 mile of potential habitat.
  - No domestic animals (pets) shall be allowed on the project site.
  - On unposted roads, vehicle speeds shall not exceed 20 miles per hour.
  - Trash shall be disposed of in covered containers and removed daily.
  - Restrict the use of rodenticides and herbicides to prevent secondary poisoning.
  - In the event that take cannot be avoided, contact the USFWS for information before starting the action.
- Before any ground-disturbing activities, have a USFWS/CDFG-approved biologist survey for the presence of the plant associations considered habitat for the Fresno kangaroo rat. The USFWS/CDFG-approved biologist must survey for the presence of Fresno kangaroo rat sign, such as burrow systems and areas of clipped vegetation. As for San Joaquin kit fox mitigation, confine surface disturbance to areas that do not exhibit the habitat types and sign of the Fresno kangaroo rat

with an adequate buffer (not less than 200 feet). Similar measures shall also be taken regarding daily work windows, domestic animals, vehicle speeds, and trash disposal.

- Before staging and construction, have a USFWS/CDFG-approved biologist survey for the presence of the habitat types used by and signs of blunt-nosed leopard lizards. If habitat or sign is observed, protocol surveys must be performed (CDFG, 2004). During the blunt-nosed leopard lizard's hibernation time, surveys are unreliable and cannot be used to determine absence of this species. Notice will be given to CDFG and USFWS 30 days before beginning construction to determine whether capture is desired. For projects from five to ten acres in size (or five to ten linear miles), in suitable habitat, should schedule surface disturbance activities during the active season (approximately April 15 to October 15). A USFWS/CDFG-approved biologist will survey any trenches in the morning and late afternoon to remove lizards that fall into the trench. As for San Joaquin kit fox and Fresno kangaroo rat mitigation, confine surface disturbance to areas that do not exhibit the habitat types and sign of the blunt-nosed lizard with an adequate buffer (not less than 200 feet). Similar measures shall also be taken regarding daily work windows, domestic animals, vehicle speeds, and trash disposal.

Wetlands and Waters. The following mitigation measures would ensure that impacts to wetlands would be reduced to less than significant levels:

- Conduct preconstruction delineations of wetlands and other Waters of the United States. Request a verification of the delineated boundaries from the USACE. Following verification of the delineation boundaries, develop measures to avoid impacts to jurisdictional wetlands.
- After final design, impacts to wetlands and other waters should be quantified. Submit to the USACE a permit application for discharge of fill material into Waters of the United States, following Section 404 of CWA.
- Install and maintain appropriate erosion and sedimentation controls during and following construction as specified in the required SWPPP and ECP (see Water Resources).
- A streambed alteration agreement with CDFG should be obtained, following Section 1601 of the Fish and Game Code, before initiating construction in the 100-year floodplain of any stream crossing.
- Develop and implement mitigation plans for impacts to wetlands. Permanently affected wetlands (disturbed longer than 6 months) should be replaced at a 3:1 ratio. Temporarily affected wetlands should be restored onsite. Stockpile topsoil removed from wetlands and store in upland landscape positions. Following construction disturbance, restore the land surface contours and backfill the top 6 to 12 inches with stockpiled topsoil.
- Following project completion, monitor the site to assess mitigation success. Success criteria should be clearly defined for measures implemented to mitigate for project impacts to wetlands. Yearly reports should be submitted to USFWS and USACE. If success criteria are being met after three years of monitoring, no additional monitoring would be necessary.

Alternative MEN-7 Impacts

Construction.

Vegetation. For this alternative, botanical resources associated with the Mendota Pool would be affected primarily as a result of vegetation clearing and ground disturbance for construction activities. Rehabilitation of the existing dam would entail both permanent (the footprint of the constructed feature) and temporary (e.g., equipment staging sites) impact areas. Construction impacts for Alternative MEN-7 would be the same as those described for Alternative MEN-5. **Impacts to 2.2 acres of riparian**

vegetation during the construction period would not be significant with mitigation. No significant impacts to upland habitat would occur during the construction period of Alternative MEN-7.

Wildlife and Fish. Construction activities in nonagricultural areas (e.g., riparian habitat) could directly affect wildlife, including loss of individuals, temporary displacement of animals, and increased stress to animals during important periods of their life cycles. Construction impacts of Alternative MEN-7 would be the same as those described for Alternative MEN-5. **Impacts to wildlife species as a result of construction activities would be less than significant with mitigation.**

Changes in habitat and short-term degradation of water quality in Mendota Pool during dam rehabilitation may affect resident fish habitat and populations (see Alternative MEN-5). **Changes in aquatic habitat and degradation of water quality in Mendota Pool as a result of construction would be less than significant with mitigation.**

Special-status Species. With the exception of fall-/late fall-run Chinook salmon, no special-status species have been identified at the existing dam site or on adjacent lands that might be used during construction of Alternative MEN-7. As under Alternative MEN-5, direct losses of fall-/late fall-run Chinook salmon near the Mendota Pool would not occur during construction. In addition, any temporary loss of transportation corridor habitat for these species would be less than significant (a loss of 0.25 mile out of approximately 125 miles of downstream river corridor).

Wetlands and Waters. Construction of Alternative MEN-7 would result in the temporary displacement of 0.1 acre of riverine habitat where the cofferdam is erected downstream of the existing dam. **Although this habitat would be displaced longer than 6 months and would be considered a permanent impact (USFWS, 1999a), the quality of this riverine habitat is such that this would not be considered a significant impact.** Construction of Alternative MEN-7 may result in the discharge of fill into jurisdictional waters, especially as a result of vegetation clearing and temporary spillway operation on the east bank of the San Joaquin River. **Consequently, impacts from construction activities in and around riverine habitat could cause less than significant with mitigation to these resources.**

Operations.

Vegetation. The operational effects to vegetation from Alternative MEN-7 would be similar to those for Alternative MEN-5.

Wildlife and Fish. The operational effects to wildlife and fish from Alternative MEN-7 would be similar to those for Alternative MEN-5.

Special-status Species. The operational effects to special-status species from Alternative MEN-7 would be similar to those for Alternative MEN-5.

Wetlands and Waters. The operational effects of Alternative MEN-7 on wetlands and waters would be similar to those for Alternative MEN-5.

Alternative MEN-7 Mitigation

Mitigation measures for Alternative MEN-7 would be the same as those listed for Alternative MEN-5.

Alternative MEN-9B Impacts

Construction.

Vegetation. Wetland vegetation would be disturbed under Alternative MEN-9B, including rabbitfoot grass (*Polypogon monspeliensis*), loosestrife (*Lythrum hyssopifolia*), gumplant (*Grindelia* sp.), cocklebur (*Xanthium strumarium*), and hairgrass (*Deschampsia* sp.). These species occur primarily on 15 acres of seasonal wetland at Mendota WA southwest of Fresno Slough, where staging activities for the rubber dam would occur. **Impacts to wetland vegetation during the construction period would be less than significant with mitigation.**

Disturbed upland habitat represents the vast majority of area that would be affected under Alternative MEN-9B. Staging activities for the rubber dam would also occur on 12 acres northeast of Fresno Slough, which would impact disturbed upland habitat, and potentially affect some seasonal pothole wetlands, in this area. Natural grass uplands (valley sink scrub species) would also be affected as a result of construction activities, including a 0.3-mile segment of the pipeline alignment near the jack and bore west of the San Luis Drain and Pump Station 7. The remaining seven miles of pipeline alignment would traverse disturbed upland habitat bordering agricultural fields. Approximately 74 acres of upland habitat would be temporarily disturbed along the pipeline corridor. **Because upland habitat is common throughout the region, and most of upland habitat that would be affected is already disturbed, no significant impacts to upland habitat would occur during the construction period.**

Wildlife and Fish. Construction activities associated with Alternative MEN-9B could directly affect wildlife through increased stress to animals during important periods of their life cycles, temporary displacement, and direct mortality. Direct mortality may occur during clearing and grading if less-mobile species are encountered in any construction right-of-way. During construction, larger and more-mobile species would normally be displaced temporarily from the right-of-way and active construction areas into nearby habitat. Displaced wildlife may return to adjacent habitats after construction is completed or during periods when construction is not active. **Impacts to wildlife species as a result of construction activities would be less than significant with mitigation.**

A variety of wildlife species were observed during reconnaissance surveys. Wildlife observed at the rubber dam site consisted of common, wetland-associated species, such as blue heron (*Andrea herodias*), marsh wren (*Cistothorus palusris*), greater yellowlegs (*Tringa melanoluca*), northern harrier (*Circus cyaneus*), coyote (*Canis latrans*), and raccoon (*Procyon lotor*). Other species observed along the alignment included California ground squirrel (*Otospermophilus beecheyi*), mourning dove *(Zenaida nacroura*), western meadowlark (*Sternella neglecta*), red-tailed hawk *(Buteo jamaicensis*), American kestrel *(Falco sparverius)*, common raven (*Corvus corax*), white-crowned sparrow (*Zonotrichia leucophrys*), belted kingfisher (*Ceryle alcyon*), desert cottontail (*Sylviagus audubonii*), and bullfrog (*Rana catesbeiana*).

Direct losses of fish residing in areas of the Mendota Pool may occur during construction of the rubber dam and related activities, including dewatering, any necessary levee modifications, and sheet pile installation. Adverse changes in and short-term losses to aquatic habitats, and short-term degradation of water quality in Mendota Pool during construction of the rubber dam, may also adversely affect resident fish habitats and populations. Resident fish species affected may include Sacramento blackfish, Sacramento splittail, Sacramento pikeminnow, Sacramento sucker, and hitch. **Direct losses, losses in and changes to aquatic habitat, and degradation of water quality in Mendota Pool as a result of construction would be less than significant with mitigation.**

Special-status Species. Construction activities could impact special-status species, and impacts could include increased stress to animals during important periods of their life cycles, temporary displacement, and direct mortality. During reconnaissance surveys, several special-status species and their habitats were

observed. Along the San Luis Drain, two individual burrowing owls (*Athene cunicularia*), a Federal and California species of concern, were observed using ground squirrel burrows. At the rubber dam site, a white-faced ibis (*Plegadis chihi*), a California species of special concern, was observed. This area is also potential habitat for giant garter snake (*Thamnophis gigas*), a Federal and California threatened species, and western pond turtle (*Clemmys marmorata*), a California species of concern. Also observed along the alignment between Adams Avenue and Pump 7 was a loggerhead shrike (*Lanius ludovicianus*), a Federal and California species of concern.

Although implementation of Alternative MEN-9B would provide full Level 4 water supply, allowing optimal wildlife management at Mendota WA and benefiting special-status species by providing improved habitat conditions, potential impacts to special-status species as a result of construction activities would be less than significant with mitigation.

Wetlands and Waters. As described previously, construction of Alternative MEN-9B could result in the discharge of fill into jurisdictional waters or wetlands, including Fresno Slough. **Thus, construction activities in and around wetland areas would have less than significant impacts to these resources with mitigation.**

Operations.

Vegetation. Along the pipeline alignment, permanent rights-of-way would be maintained during facility operations and would total 36 acres of upland habitat. Because upland habitat is common throughout the region, and the vast majority of upland habitat that would be affected is already disturbed, no significant impacts to upland habitat would occur during the operational period.

Up to one acre of seasonal wetland vegetation would be eliminated under the footprint of the rubber dam and its maintenance right-of-way. **Impacts to wetland vegetation during the operational period would be less than significant with mitigation.**

Wildlife and Fish. Maintenance activities could result in the disturbance or displacement of wildlife using the rights-of-way and adjacent areas. Wildlife resources that could be disturbed during operation and maintenance activities under Alternative MEN-9B include wildlife species associated with seasonal and permanent wetlands, upland habitats, natural grass uplands, and agricultural habitats. **Impacts to wildlife species as a result of operational impacts would be less than significant with mitigation.**

Maintaining optimal water levels during the winter months in fields at Mendota WA would be expected to result in beneficial impact to overwintering waterfowl that use Mendota WA.

Special-status Species. Maintenance activities could result in the disturbance or displacement of special-status species using the rights-of-way and adjacent areas. Wildlife resources that could be disturbed during operation and maintenance activities under Alternative MEN-9B include special-status species associated with seasonal and permanent wetlands, upland habitats, natural grass uplands, and agricultural habitats. **Impacts to special-status species as a result of operational impacts would be less than significant with mitigation.**

The benefits of maintaining optimal water levels in fields at Mendota WA would extend to wading birds, including white-faced ibis, a California species of special concern.

Wetlands and Waters. As described previously, maintenance of the rubber dam on Fresno Slough would result in the permanent conversion of up to one acre of wetland habitat on Mendota WA for maintenance rights-of-way and utility easements. In addition, a small amount of wetland habitat in Fresno Slough would be displaced by the rubber dam. **Although operation of Alternative MEN-9B would benefit wetlands by providing full Level 4 water supplies to Mendota WA and allowing for optimal wildlife**

management, impacts to wetland areas as a result of the operation of Alternative MEN-9B would be less than significant with mitigation.

Alternative MEN-9B Mitigation

Mitigation for Alternative MEN-9B would be similar to that for Alternative MEN-5. Additionally, it is recommended that consultations be held with appropriate agencies to determine whether small mammal trapping is required to assess the presence of other listed species.

Alternative MEN-12 Impacts

Construction.

Vegetation. Wetland vegetation that would potentially be disturbed by Alternative MEN-12 and potential impacts are similar to those discussed for Alternative MEN-9B. Impacts to upland vegetation would be limited to staging activities for construction of the rubber dam on 12 acres northeast of Fresno Slough. **Impacts to upland vegetation in the right-of-way of Pumping Plant 6-2 would amount to less than 0.1 acre and would not be significant.**

Wildlife and Fish. Wildlife and fishery resources potentially disturbed by Alternative MEN-12 and potential impacts are similar to those discussed under Alternative MEN-9B.

Special-status Species. Construction activities could impact special-status species, and impacts could include increased stress to animals during important periods of their life cycles, temporary displacement, and direct mortality. At the rubber dam site, a white-faced ibis (*Plegadis chihi*), a California species of special concern, was observed. This area is also potential habitat for giant garter snake (*Thamnophis gigas*), a Federal and California threatened species, and western pond turtle (*Clemmys marmorata*), a California species of concern.

Although implementation of Alternative MEN-12 would provide full Level 4 water supply, allowing optimal wildlife management at Mendota WA and benefiting special-status species by providing improved habitat conditions, potential impacts to special-status species as a result of construction activities would be less than significant with mitigation.

Wetlands and Waters. Wetlands potentially disturbed by Alternative MEN-12 and potential impacts would be similar to those discussed under Alternative MEN-9B.

Operations.

Vegetation. **Because upland habitat is common throughout the region, and the upland habitat that would be affected by Alternative MEN-12 is already disturbed, no significant impacts to upland habitat would occur during the operational period.**

Wildlife and Fish. Wildlife and fishery resources potentially disturbed by Alternative MEN-12 and potential operational impacts are similar to those discussed under Alternative MEN-9B.

Special-status Species. Special-status species potentially disturbed by Alternative MEN-12 and potential operational impacts are similar to those discussed under Alternative MEN-9B.

Wetlands and Waters. Impacts to wetlands under Alternative MEN-12 would be similar to the impacts discussed under Alternative MEN-9B.

Alternative MEN-12 Mitigation

Mitigation for Alternative MEN-12 would be similar to that discussed for Alternative MEN-9B.

Cultural Resources

Cultural resources are prehistoric and historic sites, structures, districts, artifacts; or other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. The following are three main categories of cultural resources:

- **Prehistoric resources** are physical properties resulting from human activities that predate written records and are generally identified as isolated artifacts, sites, or deposits of artifacts and other materials, but can also include structural remains.
- **Historic resources** include physical properties and buildings, structures, or objects originating since the introduction of written records. These resources might have important research potential because of their association with historical people or events, or might represent an important example of a type or a style, or preserve the work, of a master artist or architect.
- **Traditional cultural resources** are historic, prehistoric, or contemporary sites that are important because of their association with a particular culture or subculture, its religion, or traditional way of life.

Affected Environment

Regional Setting

Prehistoric Resources. The San Joaquin Valley has a long and complex cultural history with distinct regional patterns that extend back in time for more than 11,000 years before present (B.P.). The first evidence for the presence of prehistoric peoples in the study area that is generally agreed on is represented by distinctive, fluted spear points called Clovis points, found on the margins of extinct lakes in the valley. The ancient hunters who used these spear points existed only between 11,200 and 10,900 B.P. This span of time is often called the Paleoindian Period, and the complex of artifacts characteristic of this period is often called the Clovis complex.

Most researchers believe that the Clovis Complex was followed by another widespread cultural complex, often termed Early Archaic. The indicative artifacts of this period, which has also been called by its geological name, the Early Holocene period, consist of stemmed spear points rather than the fluted points that typify the Clovis Complex. This poorly defined early cultural tradition is best known from a small number of sites in the San Joaquin Valley and the Sierra Nevada foothills and is thought to date from 8,000 to 10,000 B.P.

The increase in food-grinding implements found in archaeological sites indicates that approximately 8,000 years ago, many California cultures shifted the focus of their subsistence strategies from hunting to seed gathering. Recent studies suggest that this cultural pattern is more widespread than originally assumed and is found throughout the study area. Radiocarbon dates associated with this period vary between 8,000 and 2,000 B.P., and cluster in the 6,000 to 4,000 B.P. range (Basgall and True, 1985).

Cultural patterns as reflected in the archaeological record have become better defined for archaeological cultures dating to the last 3,000 years. The archaeological record indicates increasing complexity as specialized adaptations to locally available resources develop and populations expand. Many sites dated to this period contain mortars and pestles or are associated with bedrock mortars, suggesting that the occupants used acorns intensively.

The range of resources used for subsistence increased, and exchange systems expanded significantly, from the previous period. Along the coast and in the Central Valley, archaeological evidence of social stratification and craft specialization is indicated by well-made artifacts, such as charmstones and beads, which were often found with burials (Reclamation, 2000). Portions of the project area that are near the San Joaquin River and Fresno Slough have a high probability of containing buried sites because of the attractiveness of these environments for prehistoric settlement.

Historic Resources. The San Joaquin Valley area was sparsely populated by Euro-Americans during the Mexican Period, but large herds of semiwild horses and cattle were common. Mexican expeditions were mostly military, sent to control the Yokuts people and avenge their raids on the Mexican coastal settlements. The Mexican government granted two large ranchos in the area: one between the Kings River and Cross Creek, the other on the north bank of the Kings River. Only the latter, Manuel Castro's Rancho Laguna de Tache, was occupied.

The California Gold Rush of 1849 changed the region markedly. The demand for meat led to the establishment of cattle ranches and market hunting of tule elk and waterfowl. The Tulare Lake basin became a major stock-raising area serving the mining towns of the Sierra Nevadas and the Cities of Stockton, Sacramento, and San Francisco. Hogs were taken to the tulares to root in the summer and driven into the foothills in the fall to fatten up on oak acorns. As the Gold Rush faded, the miners shifted to new pursuits and agriculture expanded.

The San Joaquin and Kings River Canal Company was organized in 1871 to divert water from the San Joaquin River in a northwesterly direction to and across the Miller and Lux lands. By 1873 the company had constructed 40 miles of canals from Mendota (Harding, 1960). This canal was 54 feet wide at its water surface. Sixty-seven miles of canals and ditches were constructed. This early, large irrigation system was essentially a land-development project in which construction of the irrigation canals was the means used to permit cultivation of lands in large ownership blocks or for colonization and sale to settlers.

Native American Resources. Historically, the San Joaquin Valley contained a diverse and productive patchwork of aquatic, wetland, riparian forest, and surrounding terrestrial habitats that supported abundant populations of resident and migratory species of wildlife. Large herds of pronghorn, tule elk, and mule deer grazed the prairies, and large flocks of wildfowl occurred in the extensive wetlands. Such rich biological diversity and productivity supported one of the densest nonagricultural populations of Native Americans in North America (Cook, 1955; Kroeber, 1961; Latta, 1949).

All of the San Joaquin Valley south of the Delta was occupied by Yokuts. "Yokuts" is a term applied to a large and diverse number of people sharing related languages. They include the Northern Valley, the Southern Valley, and the Foothill groups. Yokuts were seminomadic but maintained regular seasonal sites. However, as trade networks were developed, they also might have had contact with or used resources from other areas.

Items traded to and used by the Yokuts included baskets, weapons, shells, wood, and lithic source material (concentrations of stone waste flakes or tools). The Yokut technology is known primarily from the southern Central Valley; no surviving ethnographic examples from the Northern Valley Yokut Tribes are preserved in known collections.

Site Setting

Known Prehistoric Sites in the Project Area. Generally speaking, the San Joaquin Valley supported relatively high prehistoric population densities in certain kinds of locations favorable for hunting and gathering, such as major streams and sloughs, and the margins of Tulare Lake. The density of prehistoric sites away from water was much lower, but such areas might include specialized food extraction sites of

interest to scientists. Although agricultural activities such as land leveling and plowing have damaged or destroyed many sites, intact deposits remain in many locations. Because of the region's high sedimentation rates, undisturbed archaeological sites might exist even in leveled areas, but remain deeply buried by sediments (Reclamation, 2000).

Table IV-9 summarizes the known prehistoric resources in the project area, recorded during field surveys for various projects in the vicinity. Other surveys have been performed in the general area, but have not found evidence of prehistoric resources.

Known Historic Sites in the Project Area. In 1871, the first permanent diversion facility at Mendota Pool was constructed along with canals to irrigate 5,000 acres (Harding, 1960). The current Mendota Dam was built in 1917. The dam originally contained an active fish ladder and a swing bridge for navigation purposes. These features remain, but are no longer functional. The dam was determined to meet eligibility criteria for the National Register of Historic Places (West and Welch, 1998) because of its association with Henry Miller of the Miller and Lux Ranch.

Table IV-9
Known Prehistoric Resources in the Project Area

Site Number	General Location and Description[a]	Survey Information (Date)	Review Status
FRE-106	Midden located east of Mendota Pool	Initially recorded in 1952.	Destroyed by pipeline ditching. Not considered significant.
FRE-228	Various locations east and south of Mendota WA.	Unknown.	Unknown.
FRE-497	Isolated finds Mendota WA.	Recorded by C. Ritchie (1971).	Evaluated and found not eligible for listing on the National Register of Historic Places or California Register of Historical Resources.
FRE-536	Surface scatter of cultural materials found at Mendota WA.	Recorded by A. Peak (1975).	Evaluated and found not eligible for listing on the National Register of Historic Places or California Register of Historical Resources.
FRE-537	Surface scatter of cultural materials found at Mendota WA.	Recorded by A. Peak and R. Gerry (1975).	Evaluated and found not eligible for listing on the National Register of Historic Places or California Register of Historical Resources.
FRE-538	North of Mendota WA	Unknown.	Not evaluated to determine its significance.
FRE-539	South of Mendota Pool.	Unknown.	Not evaluated to determine its significance.
FRE-540	South of Mendota Pool.	Unknown.	Not evaluated to determine its significance.
FRE-564	Isolates located in Mendota WA.	Recorded by A. Peak and R. Gerry (1975).	Evaluated and found not eligible for listing on the National Register of Historic Places or California Register of Historical Resources.
FRE-730	South of Mendota WA.	Unknown.	Unknown.
FRE-784	North of the Mendota WA.	Unknown.	Not evaluated to determine its significance.

[a]Because of confidentiality regarding prehistoric sites, specific location information cannot be provided.

Miller was one of the most prominent individuals in the history of the San Joaquin Valley. As a major cattleman and developer, he headed one of the largest land holding/agricultural companies in the nation, and helped shape California's water laws. In addition, the Mendota Dam and Pool have played a critical role in the development of irrigated agriculture in the San Joaquin Valley, and is closely associated with the Delta-Mendota Canal and CVP. The dam, therefore, is significant under National Register of Historic Places criteria (a), association with broad patterns in history, and (b), association with persons important in history. It does not have architectural or engineering significance criteria (c) and (d). Reclamation made this determination during a previous submittal and the State Historic Preservation Officer (SHPO) concurred. Mendota Dam is eligible for listing in the National Register of Historic Places (West and Welch, 1998).

Known Native American Sites in the Project Area. No specific villages have been identified in the immediate area of Mendota WA. However, Yokut groups in the vicinity included the Tachi, north and west of Tulare Lake; the Apyachi and Wechihit, north and east of Tulare Lake; the Nopchinchi, along the San Joaquin River; and the Hoyima and Pitkachi, east of Mendota.

Environmental Consequences

Criteria for Determining Significance

Section 106 of the National Historic Preservation Act (NHPA) requires Federal agencies to consider the effects of their undertakings on properties that are eligible for listing or listed in the National Register of Historic Places. The regulations in 36 CFR Part 60.4 describe the criteria to evaluate cultural resources for inclusion in the National Register of Historic Places. Cultural resources can be significant on the national, State, or local level and such resources are required to retain integrity and must (1) exhibit an association with broad patterns of our history, (2) be associated with an important person, (3) embody a distinctive characteristic, or (4) yield information important to prehistory or history.

The regulations in 36 CFR Part 800 (implementing Section 106), call for considerable consultation with the SHPO, Indian tribes, and interested members of the public throughout the process.

Following are the four principal steps:

1. Initiate the Section 106 process (36 CFR Part 800.3).
2. Identify historic properties or resources, eligible for inclusion in the National Register of Historic Places (36 CFR Part 800.4).
3. Assess the effects of the undertaking on historic properties in the area of potential effect (36 CFR Part 800.5).
4. Resolve adverse effects (36 CFR Part 800.6).

Adverse effects to historic properties are often resolved through development and preparation of a Memorandum of Agreement in consultation with Reclamation, SHPO, Indian tribes, and interested members of the public. The Memorandum of Agreement describes stipulations that mitigate adverse effects to the historic property.

Under CEQA, a substantial adverse change in the significance of a historical resource means physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the resource would be materially impaired. The significance of a historical resource is materially impaired when a project demolishes or materially alters in an adverse manner those physical characteristics of the resource that convey its historical significance and that justify its inclusion in or eligibility for inclusion in the California Register of Historical Resources.

Assessment Methods

Literature and Field Surveys. West and Welch (1998) conducted archival research, including Reclamation records and original dam construction drawings obtained from CCID. In addition, they examined the new Mendota Dam project area on foot. Because a borrow site for the new dam was not known at the time of West and Welch's 1998 survey, additional archival and field surveys were conducted by CH2M HILL in 2005. The results of both surveys are incorporated in the Affected Environment section and additional information is provided in Appendix E.

In addition, CH2M HILL conducted a cultural resources archives and records search for known resources in the vicinity of the proposed rubber dam and the affected WWD facilities in 2005. The results are incorporated in the Affected Environment section and in Appendix E.

Native American Heritage Commission. CH2M HILL contacted the Native American Heritage Commission to request a search of the Sacred Lands file and obtain a list of Native Americans who might have information about sensitive cultural resources in the project area, as required under CEQA. The Native American Heritage Commission responded on May 4, 2004, that a search of the sacred lands file did not indicate the presence of Native American cultural resources in the project area. The Native American Heritage Commission also provided a list of Native Americans available for consultation regarding cultural resources matters in the project area. CH2M HILL sent a letter to each name on the Native American Heritage Commission list, requesting information about Native American cultural resources in the project area, on May 17, 2004. To date, there have been no responses.

No Action and No Project Alternative Impacts

The No Action and No Project Alternative do not include new facilities or construction. Under the No Action and No Project Alternative, the previously recorded sites, if still present, would continue to be subject to ongoing natural and management impacts. Mendota WA would continue to pump and exchange water in the developed field cells to maintain habitat and manage species, and would continue to provide hunting and unstructured recreation opportunities. The existing Mendota Dam would continue to be used and maintained by CCID.

No Action and No Project Alternative Mitigation

No mitigation would be required under the No Action and No Project Alternative.

Alternative MEN-5 Impacts

Construction. The proposed site of the relocated Mendota Dam was surveyed by West and Welch (1998) and by CH2M HILL (Appendix E). In addition, CH2M HILL surveyed five potential borrow pit areas that would be associated with dam construction. No evidence of archaeological materials or deposits was observed during either survey. However, archaeological and historic sites are known to exist in the area. Although the area surrounding the new dam has been altered by human activities and natural contours have been changed, it is possible that buried archaeological resources (currently unknown) could be affected during construction. Under CEQA, impacts to newly discovered cultural resources caused by construction activities would be considered significant. Under NHPA, any newly discovered cultural resources would be evaluated for inclusion in the National Register of Historic Places and, if eligible, impacts could be adverse.

Mendota Dam is a recorded historic property (West and Welch, 1998). It has been determined eligible for listing in the National Register of Historic Places (West and Welch, 1998). Mendota Dam would be

inundated by the reservoir created by the new dam. Reclamation consulted with the SHPO on Mendota Dam. The SHPO and Reclamation have determined that inundation would constitute a less than adverse effect with mitigation.

Construction of a new dam 400 feet downstream from Mendota Dam would create a new reservoir area that would inundate the face of the existing Mendota Dam, although the superstructure would remain. Inundation would permanently impair Mendota Dam's integrity of feeling and association in a way that would make it no longer eligible for listing in the National Register of Historic Places. Under CEQA, **the inundation of Mendota Dam would be less than a significant impact to a historic property with mitigation.** Under NHPA, a Memorandum of Agreement would be developed to resolve the adverse effects through mitigation that typical includes complete photo documentation of the facility.

Operations. No impacts to cultural resources would result from the operation of Alternative MEN-5.

Alternative MEN-5 Mitigation

Implementing the following mitigation measures would reduce construction impacts to a level of less than significant:

- Under CEQA, a historic context statement for the property will be completed, and an interpretive program consisting of a plaque or sign that describes Mendota Dam and its historical importance will be developed. The context statement will include photographs and available drawings, and a discussion of the property's associations with Henry Miller's ranching operations, agricultural development in the San Joaquin Valley, and the CVP. Under NHPA, a Memorandum of Agreement would be developed to resolve adverse impacts. The stipulations could include the information described above.
- If excavations that reach relatively deep levels are planned for the borrow areas near the San Joaquin River, a backhoe would be used to excavate trenches before the borrow excavations take place. This test trenching would be monitored by a qualified archaeologist to determine whether buried archaeological deposits are present or not.
- If artifacts or unusual amounts of stone, bone, or shell were uncovered during the test trenching or other construction activities, excavation would be halted in the area of the find and a qualified archeologist would be brought onsite to evaluate the find. If bone were uncovered on non-Federal lands that could be human, the County Coroner would be contacted as required by State law. If the coroner determines that the bone is likely Native American in origin, activities would comply with State law and regulation. On Federal lands, the Native American Graves Protection and Repatriation Act and its regulations would be followed.

Alternative MEN-7 Impacts

Construction. The existing Mendota Dam area was surveyed by West and Welch (1998) and no evidence of prehistoric artifacts or cultural deposits was found. According to West and Welch, the area was completely altered from its natural state and no original contours remained. However, archaeological and historic sites are known to exist in the area, and it is possible that buried archaeological resources (currently unknown) could be affected during construction. **Under CEQA, impacts to newly discovered cultural resources caused by construction activities would not be significant with mitigation. Under NHPA, any newly discovered cultural resources would be evaluated for inclusion in the National Register of Historic Places and, if eligible, impacts could be adverse.**

Mendota Dam is a recorded historic property (West and Welch, 1998). It has been determined eligible for listing in the National Register of Historic Places (West and Welch, 1998). Extensive reconstruction of

Mendota Dam under this alternative would permanently impair Mendota Dam's integrity of feeling and association, materials, and workmanship in a way that would make it no longer eligible for listing in the National Register of Historic Places. **Under CEQA, the rehabilitation of Mendota Dam would be a less than significant impact to a historic property with mitigation. Under NHPA, adverse effects to Mendota Dam would be resolved through preparation and implementation of a Memorandum of Agreement.**

Operations. No impacts to cultural resources would result from the operation of Alternative MEN-7.

Alternative MEN-7 Mitigation

Mitigation measures for Alternative MEN-7 would be the same as those listed for Alternative MEN-5.

Alternative MEN-9B Impacts

Construction. The proposed sites of the rubber dam and the WWD facilities were surveyed by CH2M HILL (2005). No evidence of archaeological materials or deposits was observed during these surveys. Two known historic resources (White's Bridge and Wilson's Ferry) are located within 1 mile of the rubber dam site, but project construction would not affect them. Archaeological and historic properties are known to exist in the area, however. In addition, two recorded prehistoric sites (FRE-536 and FRE-538) are within one mile of the rubber dam site, further indicating the potential presence of unknown archaeological resources. **Under CEQA, impacts to cultural resources caused by construction activities would be less than significant with mitigation. Under NHPA, any newly discovered cultural resources would be evaluated for inclusion in the National Register of Historic Places. If eligible, impacts could be adverse but less than significant with mitigation.**

Operations. No impacts to cultural resources would result from the operation of Alternative MEN-9B.

Alternative MEN-9B Mitigation

If artifacts or unusual amounts of stone, bone, or shell were uncovered during construction activities, excavation would be halted in the area of the find and a qualified archeologist would be brought onsite to evaluate the find. If bone were uncovered on non-Federal lands that could be human, the County Coroner would be contacted as required by State law. If the coroner determines that the bone is likely Native American in origin, activities would comply with State laws and regulations. On Federal lands, the Native American Graves Protection and Repatriation Act and its regulations would be followed.

Alternative MEN-12 Impacts

Construction. Construction impacts under Alternative MEN-12 would be similar to those listed under Alternative MEN-9B.

Operations. No impacts to cultural resources would result from the operation of Alternative MEN-12.

Alternative MEN-12 Mitigation

Mitigation measures for Alternative MEN-12 would be the same as those listed for Alternative MEN-9B.

Air Quality

Affected Environment

Regional Setting

Topography. Mendota WA, in Fresno County, lies in the San Joaquin Valley Air Basin (SJVAB), which includes San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, and Tulare Counties, and the western portion of Kern County. The SJVAB is defined by the Sierra Nevada Range in the east (8,000 to 14,000 feet in elevation), the Coast Ranges in the west (averaging 3,000 feet in elevation), and the Tehachapi Mountains in the south (6,000 to 8,000 feet in elevation). The valley opens to the sea at the Carquinez Straits, where the Delta empties into San Francisco Bay (SJVAPCD, 2002). These topographic features result in weak airflow, which becomes blocked vertically by high barometric pressure over the SJVAB (SJVAPCD, 2002). As a result, the SJVAB is highly susceptible to pollutant accumulation over time (SJVAPCD, 2002).

Climate. The combination of emission sources and atmospheric conditions make the SJVAB susceptible to poor air quality. The main determinants of transport and dispersion are wind speed and direction, atmospheric stability or turbulence, topography, and the existence of inversion layers. Depending on the time of year, these variables – wind speed, temperature, and inversion layers – might result in increased pollutant concentrations in the SJVAB.

During the summer, wind speed and direction data indicate that wind usually originates at the north end of the SJVAB and flows in a south-southeasterly direction through the SJVAB, through Tehachapi Pass, into the Southeast Desert Air Basin (SJVAPCD, 2002). Summer temperatures in the northern valley average in the low 90s (°F) and the upper 90s in the southern part of the SJVAB (SJVAPCD, 2002). Under the meteorological and topographic conditions present in the SJVAB during the summer, certain photo-chemically active pollutants, such as oxides of nitrogen (NO_x) and reactive organic gases (ROG), can react in the presence of sunlight and form secondary pollutants, such as ozone or smog.

During the winter, wind speed and direction data indicate that wind occasionally originates from the south end of the SJVAB and flows in a north-northwesterly direction (SJVAPCD, 2002). Low wind speeds, combined with low inversion layers in the winter, create a climate conducive to high carbon monoxide (CO) and particulate matter with an aerodynamic diameter less than ten microns (PM_{10}) concentrations (SJVAPCD, 2002).

Temperatures in the winter are mild, with the average temperatures in the 50s (°F).

The vertical dispersion of air pollutants in the SJVAB is also limited by the presence of persistent temperature inversions (SJVAPCD, 2002). Inversion layers are significant in determining ozone formation and CO and PM_{10} concentrations (SJVAPCD, 2002). Ozone and its precursors mix and react to produce higher concentrations under an inversion, which traps and holds directly emitted pollutants, like CO (SJVAPCD, 2002). PM_{10} is both directly emitted and created in the atmosphere as a chemical reaction (SJVAPCD, 2002). Concentration levels are directly related to inversion layers because of the limitation of mixing space (SJVAPCD, 2002).

San Joaquin Valley Air Basin Attainment Status. SJVAPCD, formed in 1991, is the local agency with jurisdiction over regional air quality issues in the SJVAB (SJVAPCD, 2002). SJVAPCD has adopted several attainment plans to achieve Federal and California ambient air quality standards (see Regulatory Setting for ambient air quality standards). To meet requirements of the Clean Air Act of 1970 (CAA), SJVAPCD has adopted a one-hour extreme Ozone Attainment Demonstration Plan in 2004 and currently has a Draft PM_{10} Plan available for review and comment by the public (a final draft is due to EPA by

March 2006). SJVAB, which includes Fresno County, is designated non-attainment for the Federal and State air quality standards for ozone, PM_{10}, and particulate matter with an aerodynamic diameter less than 2.5 microns ($PM_{2.5}$). Table IV-10 provides information on current designations for SJVAB.

Site Setting

The air quality monitoring data for the station closest to the project area represents the existing ambient air quality (see Regulatory Setting for Ambient Air quality standards). Data from the two monitoring stations closest to the project area, the Fresno-Sierra Skypark No. 2 and the Fresno-1st Street monitors are summarized in Table IV-11. These values are the maximum measured ambient concentrations for the past three years. During the past three years, both the Federal eight-hour and the California one-hour ozone standards have been exceeded. The California standards for PM_{10} and $PM_{2.5}$ have also been exceeded during the past three years.

Regulatory Setting

Federal. National air quality policies are regulated through the CAA. Pursuant to this act, the EPA established national ambient (meaning a concentration at which a pollutant is known to cause adverse health effects to sensitive population groups) air quality standards for the following air pollutants (termed "criteria" pollutants): CO, ozone, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), PM_{10}, $PM_{2.5}$, and lead. The CAA was amended in 1977 to require each state to maintain a State Implementation Plan for achieving compliance with the national ambient air quality standards. In 1990, the CAA was amended again to strengthen regulation of both stationary and motor vehicle emission sources.

General Conformity. General conformity requirements were adopted by the U.S. Congress as part of the CAA Amendments in 1990, and were implemented by EPA regulations in 1993. General conformity applies in both Federal non-attainment and Federal air quality maintenance areas. Under the conformity provisions of the CAA, a Federal agency cannot approve a project unless the project has been demonstrated to conform to the applicable air quality management plan or State Implementation Plan. These conformity provisions were put in place to ensure that Federal agencies would not interfere with plans for attaining the national ambient air quality standards.

EPA has issued two types of conformity guidelines: transportation conformity rules that apply to transportation plans and projects, and general conformity rules that apply to all other Federal actions. A conformity determination[6] is only required for the alternative that is ultimately selected and approved. The general conformity determination is submitted in the form of a written finding, issued after a minimum 30-day public comment period on the draft determination. A project that produces emissions that exceed conformity thresholds is required to demonstrate conformity with the State Implementation Plan through mitigation or other accepted practices.

State. The California Air Resources Board (CARB) oversees California air quality policies and is responsible for preparing and submitting the State Implementation Plan to EPA. California established State ambient air quality standards in 1969. These standards are generally more stringent and include more pollutants than the national standards. The California CAA was approved in 1988 and requires each local air district in the State to prepare an air quality plan to achieve compliance with California ambient air quality standards. SJVAPCD is the local air district for Fresno County. Table IV-12 lists the Federal and California ambient air quality standards.

[6]A conformity determination is a process that demonstrates how an action would conform to the applicable implementation plan. If emissions cannot be reduced sufficiently, and if air dispersion modeling cannot demonstrate conformity, then a plan for mitigating or offsetting the emissions would need to be developed.

Table IV-10
Attainment Status for San Joaquin Valley Air Basin

Pollutant	Federal Standard	State Standard
Ozone (1-hour)	N/A	Nonattainment/Severe
Ozone (8-hour)	Nonattainment/Serious	N/A
PM_{10}	Nonattainment/Serious	Nonattainment
$PM_{2.5}$	Nonattainment	N/A

Source: SJVAPCD Web site, http://www.valleyair.org/aqinfo/attainment.htm.

Table IV-11
Summary of Maximum Monitored Ambient Air Quality Data in the Project Area

Pollutant	Year	Maximum Concentration (ppm)		Number of Days Standard Exceeded	
		1-hour	8-hour	State 1-hour/8-hour	Federal 1-hour/8-hour
CO	2003	2.70	1.68	0/0	0/0
	2004	3.20	2.19	0/0	0/0
	2005	1.80	1.15	0/0	0/0
Ozone	2003	0.130	0.112	35/NA	1/32
	2004	0.111	0.095	16/NA	0/12
	2005	0.129	0.103	21/NA	2/12
Pollutant	**Year**	**Maximum Concentration (ppm)**		**Number of Days Standard Exceeded**	
		1-hour	**Annual Arithmetic Mean**	**State 1-hour**	
NO_2	2003	0.065	0.014	0	
	2004	0.058	0.011	0	
	2005	0.050	*	0	
Pollutant	**Year**	**Maximum Concentration ($\mu g/m^3$)**		**Number of Days Standard Exceeded**	
		24-hour[a]	**Annual Arithmetic Mean**	**State 24-hour**	**Federal 24-hour**
PM_{10}	2003	74.0	35.0	13	0
	2004	58.0	31.3	5	0
	2005	60.0	*	1	0
$PM_{2.5}$	2003	State: 70.3 Federal: 63.0	17.7	2	0
	2004	State: 77.0 Federal: 71.0	16.8	2	2
	2005	State: 64.6 Federal: 53.0	*	0	0

[a]Two values are reported for the 24-hour $PM_{2.5}$ because the State and national statistics may differ because State statistics are based on California-approved samplers, and national statistics are based on samplers using Federal reference or equivalent methods.

Notes:

The CO, ozone, and NO_2 reported values are from the Fresno-Sierra Skypark No. 2 monitor. The PM_{10} and $PM_{2.5}$ reported values are from the Fresno-1st Street monitor because these pollutants are not monitored at the Fresno-Sierra Skypark No. 2 station.

$\mu g/m^3$ = Micrograms per cubic meter.

NA = At this time, the number of exceedances of the California standard is not reported by CARB. The California 8-hour ozone standard was approved by CARB on April 28, 2005, and is expected to go into effect in early 2006.

ppm = Parts per million.

* = Insufficient (or no) data were available to determine the value.

Source: CARB Web site, http://www.arb.ca.gov/adam/cgi-bin/db2www/adamtop4b.d2w/start.

A region that is meeting the air quality standard for a given pollutant is in attainment for that pollutant. If the region is not meeting the air quality standard, then it is designated as nonattainment for that pollutant. Areas that were previously designated as non-attainment areas but have recently met the standard are designated as maintenance areas. CARB designates nonattainment areas as those with at least one violation of a State standard for a specific pollutant. Attainment areas have no violations of the State standard for a specific pollutant at any monitoring site during a three-year period. The regional and local air quality agencies are primarily responsible for regulating stationary and indirect source emissions and for monitoring ambient pollutant concentrations.

Table IV-12
Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Standard	California Standard
Ozone	1 hour	--	0.09 ppm
	8 hours	0.08 ppm	0.07 ppm
PM_{10}	Annual Arithmetic Mean	--	20 $\mu g/m^3$
	24 hour	150 $\mu g/m^3$	50 $\mu g/m^3$
$PM_{2.5}$	Annual Arithmetic Mean	15 $\mu g/m^3$	12 $\mu g/m^3$
	24 hours	35 $\mu g/m^3$	--
CO	1 hour	35 ppm	20 ppm
	8 hours	9.0 ppm	9.0 ppm
NO_2	Annual Arithmetic Mean	0.053 ppm	0.030 ppm[a]
	1 hour	--	0.18 ppm[a]
Sulfate	24 hours	--	25 $\mu g/m^3$
SO_2	24 hours	0.14 ppm	0.04 ppm
	Annual Arithmetic Mean	0.03 ppm	--
	1 hour	--	0.25 ppm

[a]The NO_2 standards were amended on February 22, 2007 and become effective upon approval by the Office of Administrative Law, expected late 2007.

Source: CARB Web site, http://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm.

Toxic Air Contaminants. In addition to the criteria pollutants, concern about toxic air contaminants has increased in recent years. Toxic air contaminants include airborne inorganic and organic compounds that can cause both short-term (acute) and long-term (carcinogenic, chronic, and mutagenic) impacts to human health.

EPA and California agencies have written regulations to evaluate and, if necessary, mitigate toxic air contaminant emissions sources. Prior to the 1990 CAA Amendments, EPA conducted a program to establish national emission standards for hazardous air pollutants. National emission standards were established for benzene, vinyl chloride, radionuclides, mercury, asbestos, beryllium, inorganic arsenic, radon 222, and coke oven emissions. The CAA Amendments require EPA to set standards for categories and subcategories of sources that emit hazardous air pollutants, rather than for the pollutants themselves. EPA began issuing the new standards in November 1994. However, national emission standards set before 1991 remain applicable.

In California, Assembly Bill 1807 (the Tanner Bill, passed in 1983) established the State Air Toxics Program to identify and develop emissions-control and reduction methods for toxic air contaminants. The bill formally designated 18 substances as toxic air contaminants. In 1993, the 189 hazardous air pollutants identified by EPA were incorporated into California law as toxic air contaminants. Other pollutants have

been added more recently, such as particulate emissions from diesel-fueled engines, designated by California as carcinogenic.

The California Air Toxics Hot Spots Information and Assessment Act of 1987 (Assembly Bill 2588) regulates more than 700 air toxins, including designated toxic air contaminants. Under Assembly Bill 2588, industrial and municipal facilities emitting more than ten tons per year (ton/yr) of a criteria air pollutant must estimate and report their toxic air contaminant emissions to local air districts. The local air districts then prioritize and categorize facilities according to high, intermediate, or low priority for health risk assessments. High-priority facilities are required to submit human health risk assessments to the local air district. If the predicted health risks are great enough, the facilities must communicate the results to the public and implement a risk reduction program.

Environmental Consequences

Criteria for Determining Significance

Impacts to air quality would be considered significant if they resulted in the following:

- Conflict with or obstruction of implementation of the applicable air quality plan
- Violation of any ambient air quality standard or substantial contribution to an existing or projected air quality violation
- A cumulatively considerable net increase of any criteria pollutant for which a region is nonattainment
- Exposure of sensitive receptors to substantial pollutant concentrations
- Creation of objectionable odors affecting a substantial number of people

CEQA significance criteria, adopted by SJVAPCD, are presented in Table IV-13. The significance of project construction and operation emissions was determined by comparison to these thresholds.

Assessment Methods

Construction emissions for the project alternatives were calculated by multiplying the activity (e.g., hours per day) by the appropriate emission factors (e.g., pounds per hour) to estimate daily emissions (e.g., pounds per day). The construction emission sources, pollutants, and the emission factors used for the calculations are listed in Table IV-14. $PM_{2.5}$ emissions from construction activities were not calculated because $PM_{2.5}$ de minimis thresholds have not been established.

According to SJVAPCD's *Guide for Assessing and Mitigating Air Quality Impacts* (2002), the following situations should be considered when evaluating potential impacts related to hazardous air pollutants:

1. Whether a new or modified source of hazardous air pollutants is proposed for a location near an existing residential area or other sensitive receptor
2. Whether a residential development or other sensitive receptor is proposed for a site near an existing source of hazardous air pollutants

Hazardous air pollutant emissions from construction (or operation) were not evaluated because the project alternatives would not involve either of these situations.

General Conformity

A project is exempt from further study under the conformity rule (assumed to conform) if the total net project-related emissions (construction and operation) meet the following requirements:

1. They are less than the applicable de minimis thresholds established by the conformity rule.
2. They are not regionally significant (emissions are regionally significant if they exceed 10 percent of the total regional emissions inventory).

Table IV-13
CEQA Significance Criteria, SJVAPCD

	NO_x (ton/yr)	ROG (ton/yr)	PM_{10} (ton/yr)
Construction Activity	10[a]	10	15[b]
Project Operation	10	10	N/A

[a]Large construction projects lasting many months might exceed the SJVAPCD's annual threshold for ozone precursors (NO_x and ROGs). Therefore, SJVAPCD recommends comparing the construction emissions of ozone precursors to established project operation thresholds.

[b]The construction threshold for PM_{10} has not been established. Therefore, SJVAPCD recommends using the New Source Review threshold as the guideline for measuring impacts related to construction activity (Meier, 2006).

Source: SJVAPCD, 2002.

Table IV-14
Project Alternative Construction Emission Sources, Potential Pollutants, and Emission Factor Sources

Emission Source	Potential Pollutants	Emission Factor Source
Construction Equipment Exhaust	NO_x, PM_{10}, CO, ROGs, and $PM_{2.5}$	URBEMIS2002 (Version 8.7)
Vehicle Exhaust	NO_x, SO_x, PM_{10}, CO, ROGs, and $PM_{2.5}$	EMFAC2002 (Version 2.2)
Fugitive Dust	PM_{10} and $PM_{2.5}$	AP-42, URBEMIS2002 (Version 8.7)

$PM_{2.5}$ emissions were estimated by multiplying the $PM_{2.5}$ fraction by the PM_{10} emissions.

Table IV-15 presents the CAA general conformity de minimis thresholds applicable to the project alternatives.

The projected 2005 regional emissions inventory, for the SJVAB was obtained by querying CARB's emissions inventory database. The emissions inventory values for stationary, area-wide, and mobile sources were summed by pollutant to obtain the total for the SJVAB. The 2005 estimated annual average emissions are presented in Table IV-16 for the nonattainment pollutants with established de minimis thresholds.

Table IV-15
General Conformity de Minimis Thresholds

NO_x (ton/yr)	ROG (ton/yr)	PM_{10} (ton/yr)	$PM_{2.5}$[a] (ton/yr)
50	50	70	100

[a]EPA has not issued attainment status for the new 35-µg/m^3 $PM_{2.5}$ standard (revised December 2006). EPA designations for the 2006 standards will be finalized December 2009. Therefore, the July 2006 general conformity standard will be used for this analysis.

Source: 40 CFR, 1994.

Table IV-16
Projected 2005 Regional Emissions Inventory

NO_x (ton/day)	ROGs (ton/day)	PM_{10} (ton/day)	$PM_{2.5}$ (ton/day)
615.7	381.3	296.6	105.8

Note:
ton/day = Tons per day.

Source: CARB, 2006.

No Action and No Project Alternative Impacts

The No Action and No Project Alternative do not include new facilities or construction. Under the No Action and No Project Alternative, the previously recorded sites at Mendota WA, if still present, would continue to be subject to ongoing natural and management impacts. These include flooding, wave action, levee and road maintenance, unstructured recreation, and public hunting opportunities. Mendota WA would continue to pump and exchange water within the developed field cells to maintain habitat and manage species. The existing Mendota Dam would continue to be used and maintained. Degradation from natural processes and use would continue.

No Action and No Project Alternative Mitigation

No mitigation would be required under the No Action and No Project Alternative.

Alternative MEN-5 Impacts

Construction.

Construction Emissions. SJVAPCD emphasizes implementation of effective and comprehensive control measures rather than detailed quantification of construction emissions (SJVAPCD, 2002). However, because the project alternatives are subject to general conformity, construction emissions were quantified and compared to the general conformity thresholds discussed above. The estimated

construction emissions for Alternatives MEN-5, MEN-7, MEN-9B and MEN-12 are summarized in Table IV-17.

Table IV-17
Estimated Annual Construction Emissions by Alternative (Without Mitigation)

Alternative	Emissions (ton/yr)			
	NO_x	ROG	PM_{10}	$PM_{2.5}$
MEN-5	7	1	1	0.3
MEN-7	7	1	1	0.3
MEN-9B	33	5	4	2
MEN-12	16	2	2	1

Construction activities associated with Alternative MEN-5 would include grading, pipeline and bypass channel trenching, and dam construction. Heavy-duty construction equipment, such as excavators, graders, and bulldozers, would be used during these activities. Fugitive dust emissions would be generated through grading and entrained road dust from vehicle and truck travel on paved and unpaved roads. Construction emissions from Alternative MEN-5 were estimated to be less than the SJVAPCD construction thresholds. **Therefore, construction impacts from Alternative MEN-5 would be less than significant.**

General Conformity. As shown in Table IV-17, the construction emissions for Alternative MEN-5 would be below the de minimis thresholds and less than 10 percent of the regional emissions inventory. Therefore, Alternative MEN-5 is exempt from further study under the general conformity rule, and may be assumed to conform.

Operations. The impacts associated with operation emissions under Alternative MEN-5 would be similar to the emissions associated with the existing dam. **Therefore, no impact to air quality emissions would result from the operation of Alternative MEN-5.**

Alternative MEN-5 Mitigation

No mitigation would be required for Alternative MEN-5.

Alternative MEN-7 Impacts

Construction.

Construction Emissions. The estimated construction emissions for Alternative MEN-7 are similar to those mentioned under Alternative MEN-5, **and would be considered less than significant**.

General Conformity. As shown in Table IV-17, the construction emissions for Alternative MEN-7 would be below the de minimis thresholds and less than ten percent of the regional emission inventory. Therefore, Alternative MEN-7 is exempt from further study under the general conformity rule, and may be assumed to conform.

Operations. The impacts associated with operation emissions under Alternative MEN-7 would be similar to the emissions associated with the existing dam. **Therefore, no impact to air quality emissions would result from the operation of Alternative MEN-7.**

Alternative MEN-7 Mitigation

No mitigation would be required for Alternative MEN-7.

Alternative MEN-9B Impacts

Construction.

Construction Emissions. As shown in Table IV-17, the short-term NO_x emissions from construction for Alternative MEN-9B would exceed the SJVAPCD significance thresholds. **Therefore, construction impacts from NO_x emissions for Alternative MEN-9B would be less than significant with mitigation.**

General Conformity. As shown in Table IV-17, the construction emissions for Alternative MEN-9B would be below the de minimis thresholds and less than ten percent of the regional emission inventory. Therefore, Alternative MEN-9B is exempt from further study under the general conformity rule, and may be assumed to conform.

Operations. Operational impacts associated with Alternative MEN-9B would be limited to maintenance of the pipeline, discharge structure and rubber dam. Associated emissions resulting from operations of Alternative MEN-9B would be minimal. **Therefore, there would be no impact to air quality emissions resulting from the operation of Alternative MEN-9B.**

Alternative MEN-9B Mitigation

The following mitigation measures would reduce construction impacts to a level of less than significant:

- The site would be presoaked sufficiently to limit visible dust emissions to 20 percent opacity.
- Disturbed areas, including storage piles that are not being actively used for construction purposes, would be stabilized to reduce dust emissions using water, chemical stabilizer/suppressant, or covered with a tarp or other suitable cover or vegetative ground cover.
- Onsite and offsite unpaved roads would be stabilized to reduce dust emissions using water or chemical stabilizer/suppressant.
- Land clearing, grubbing, scraping, excavation, land leveling, grading, cutting and filling, and demolition activities would be controlled to reduce fugitive dust emissions by applying water or presoaking.
- When materials are transported offsite, material would be covered or wetted to limit visible dust emissions, and at least six inches of freeboard space from the top of the container would be maintained.
- Operations would limit or expeditiously remove accumulated mud or dirt from adjacent public streets at the end of each workday.
- Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, those piles would be effectively stabilized to reduce fugitive dust emissions using water or chemical stabilizer/suppressant.
- Traffic speeds on unpaved roads and at construction sites would be limited to 15 miles per hour.
- Sandbags or other erosion control measures would be installed to prevent silt runoff to public roadways from sites with slopes greater than one percent.
- Contractor would use alternatively fueled or catalyst-equipped construction equipment when possible.
- Vehicle and equipment idling time would be minimized to the extent practicable (e.g., ten-minute maximum).

- The hours of operation of heavy duty equipment and the amount of equipment in use would be limited to the extent possible.
- Equivalent electrically powered equipment would replace fossil-fueled equipment (provided they are not powered by a portable generator).
- Construction would be curtailed during periods of high ambient pollutant concentrations (this might include halting construction activity during peak-hour vehicular traffic on adjacent roadways).
- Activities would be scheduled to reduce short-term impacts.

Alternative MEN-12 Impacts

Construction.

Construction Emissions. As shown in Table IV-17, the short-term NO_x emissions from construction for Alternative MEN-12 would exceed the SJVAPCD significance thresholds. **Therefore, construction impacts from NO_x emissions for these alternatives would be less than significant with mitigation.**

General Conformity. As shown in Table IV-17, the construction emissions for Alternative MEN-12 would be below the de minimis thresholds and less than ten percent of the regional emission inventory. Therefore, Alternative MEN-12 is exempt from further study under the general conformity rule, and may be assumed to conform.

Operations. Operational impacts associated with Alternative MEN-12 would be limited to maintenance of the pipeline, discharge structure, and rubber dam. Associated emissions resulting from operations of Alternative MEN-12 would be minimal. **Therefore, no impact to air quality emissions would result from the operation of Alternative MEN-12.**

Alternative MEN-12 Mitigation

Mitigation Measures for Alternative MEN-12 would be the same as those listed for Alternative MEN-9B.

Geology

Affected Environment

Regional Setting

Geology. The San Joaquin Valley is a major geological feature of California, and is part of a large, northwest-to-southeast-trending structural trough of the Central Valley that has been filled with as much 32,000 feet of marine and continental deposits ranging in age from Jurassic to Holocene. It lies between the Coast Ranges on the west and the Sierra Nevada Range on the east, and extends northwest from the Tehachapi Mountains to the Delta near Stockton. The San Joaquin Valley is 250 miles long and 50 to 60 miles wide, and is an almost featureless alluvial valley floor interrupted occasionally by low hills.

The Mendota Pool is located where the alluvial fan of Silver and Panoche Creeks merge from the west into the San Joaquin River Basin. To the north of Mendota Dam, the San Joaquin River lies along the boundary between the Sierran and Coast Range fans; the Mendota Pool and Fresno Slough lie along the boundary between the fans to the south of Mendota Dam. In the Mendota Pool area, deposition occurs in two types of environments: alluvial fans and rivers. To the east and west of the San Joaquin River,

alluvial deposition predominates and river deposition occurs along the course of the San Joaquin River (Woodward-Clyde Consultants, Inc., 1994).

Soils. Basin soils formed from granite are typically found east of Fresno Slough. The Merced and Rossi soils, which have formed in granitic valley basin deposits, are examples of San Joaquin Valley basin soils. The Merced soil (the predominant soil) is typically fine-textured and dark with a high shrink-swell potential. This soil is sometimes underlain by coarser strata below about six feet. These soils have a low seepage potential from ponded areas.

Basin soils formed from mixed alluvium are found on a large portion of Mendota WA west of Fresno Slough. These soils are very fine-textured, with clay content of 75 percent, and form wide cracks when dry. These soils are well suited for ponds and wetlands, and are best represented by the Tachi soil. A perched water table is present in some areas. This soil generally has excellent characteristics for ponding water; however, Mendota WA managers report that one pond underlain by this soil exhibits moderate seepage.

Basin rim soils (Coast Range alluvium) are found near the western boundary of Mendota WA and are well suited for wetlands and ponds. These soils tend to be fine-textured and saline-sodic, and are typically underlain by fine-textured materials to a depth of 15 feet or more. A perched water table is present in some areas, and the Lethent soil best represents these lands.

Site Setting

Subsidence. As a result of long-term groundwater overdraft, subsidence (the sinking of a large area of land surface) might occur over a broad area. Subsidence is more closely related to past changes in water levels than to current changes because of the slow drainage of fine-grained deposits. Between 1920 and 1970, subsidence at Mendota WA ranged from four to eight feet (Bull, 1972; Poland et al., 1975). Maximum subsidence of 29 feet occurred approximately 18 miles from Mendota WA between 1925 and 1977 (Ireland et al., 1984). According to the California Water Commission (1996), six to seven feet of subsidence occurred in the Mendota Pool area between 1917 and 1970; three feet of subsidence occurred between 1960 and 1970. Subsidence stabilized between 1970 and 1984; however, between 1989 and 1994, another foot of subsidence was observed (California Water Commission, 1996).

The hydrograph from the City of Mendota's well shows that the water level began to recover in about 1968, when pumping was reduced as imported CVP water became available. Little subsidence has occurred since the imported CVP water became available, except for a slight resumption during the drought of 1977 through 1978 (USGS, 1985). In general, greater demand is placed on groundwater supplies in dry or critically dry years, when subsidence might increase.

Geologic Hazards. No faults exist near Mendota WA, and no major structures are present at Mendota WA, so little potential danger of seismic ground failure exists. Active and potentially active faults occur in the Coast Range and the Sierra Nevada. The San Joaquin Valley has low seismicity compared to the highly seismic Coast Range and the low-to-moderately seismic Sierra Nevada.

Potential structural damage, landslides, surface fault ruptures, and liquefaction are related to regional earthquake activity. Surface fault rupture occurs along faults during earthquakes that are typically magnitude 5.5 and larger. The potential for surface fault rupture at Mendota WA is considered low because earthquakes in the area are usually less than magnitude 5 on the Richter Scale.

Environmental Consequences

Criteria for Determining Significance

Impacts to geological resources would be considered significant if they resulted in the following:

- Exposure of people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving the following:
  - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault
  - Strong seismic ground shaking
  - Landslides
- The loss of the use of soil for agriculture or habitat, loss of aesthetic value from a unique landform, loss of mineral resources, or severe erosion or sedimentation
- Location on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse
- Location on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks of life or property

No Action and No Project Alternative Impacts

Existing trends would continue on the MWA and adjacent agricultural lands under the No Action and No Project Alternative.

No Action and No Project Alternative Mitigation

No mitigation would be required under the No Action and No Project Alternative.

Alternative MEN-5

Construction. Construction in and around water could cause a variety of geologic impacts. Both wind and water erosion would increase in the construction and staging areas during implementation of Alternative MEN-5. Increased erosion from a bypass channel would result in increased sediment in the river during construction; however, the loss would not be considered substantial. **Therefore, this impact would be less than significant.**

The construction phase of this alternative would have little or no effect on subsidence. In the long term, increased groundwater recharge would benefit Mendota WA and adjacent lands by slightly decreasing the potential for land subsidence.

Soil salinity would decrease on most lands. Salinity in some areas on westside basin rim deposits could increase if the substrata materials did not permit enough deep percolation to compensate for increased water and salt applications. **However, this potential impact would be less than significant.**

Operations. Surface soils in the Mendota Dam area are nonexpansive. The thin, silty soils are susceptible to being blown, especially during construction. The Madera County Soil Survey classifies these soils as the Columbia Series. Riverbed materials are classified as Riverwash.

An exploratory drilling program would need to be conducted to better define substrata characteristics below the surface soils. Recent alluvial deposits often contain gravel, sand, and clay, which should be considered during design and construction.

No known faults exist near Mendota WA; therefore, there is little potential for substantial adverse effects resulting from strong seismic ground shaking. Operation of Alternative MEN-5 would not result in an offsite landslide caused by an unstable a geologic unit. Additionally, Alternative MEN-5 would not be located on expansive soil; therefore, it would not create a substantial risk to life or property.

Alternative MEN-5 Mitigation

Mitigation for impacts related to increased sediment in the river would be similar to that listed under Water Resources. **Implementation of the measures listed in the contractor's SWPPP and ECP would reduce the impacts to a level of less than significant.**

Alternative MEN-7 Impacts

Potential impacts to geology and soils under Alternative MEN-7 would be similar to those discussed under Alternative MEN-5.

Alternative MEN-7 Mitigation

Mitigation for Alternative MEN-7 would be similar to mitigation described for Alternative MEN-5.

Alternative MEN-9B Impacts

Potential impacts to geology and soils under Alternative MEN-9B would be similar to those discussed under Alternative MEN-5.

Alternative MEN-9B Mitigation

Mitigation for Alternative MEN-9B would be similar to mitigation described for Alternative MEN-5.

Alternative MEN-12 Impacts

Potential impacts to geology and soils under Alternative MEN-12 would be similar to those discussed under Alternative MEN-5.

Alternative MEN-12 Mitigation

Mitigation for Alternative MEN-12 would be similar to mitigation described for Alternative MEN-5.

Recreational Resources

Affected Environment

Regional Setting

Federal and State wildlife and areas located in the San Joaquin River and Tulare Lake regions provide both consumptive and nonconsumptive recreation opportunities. These opportunities are typically associated with the presence of waterfowl and include hunting and observing wildlife. Other activities are fishing and picnicking. Most visitations at the wildlife refuges and areas coincide with the presence of waterfowl.

Site Setting

Through the years, providing opportunities for wildlife-oriented recreation has become an increasingly important objective for Mendota WA. Many recreationists use Mendota WA for nonconsumptive activities, such as nature study. Portions of Mendota WA are also designated for waterfowl hunting (a consumptive activity) and are managed accordingly.

Mendota WA is open to the public 24 hours a day, seven days a week, from the middle of January (the first day after the close of waterfowl hunting season) through September 15. Waterfowl may be hunted on Saturdays, Sundays, and Wednesdays from mid-October through mid-January.

Recreation data for Mendota WA were gathered from three sources: (1) annual summaries of recreation visitation to Mendota WA tallied from completed visitor registration cards for the years 1980-1995, (2) an interview with the Mendota WA manager, and (3) a site visit. While these three sources were adequate for a general assessment of the recreational use history, the absence of a more systematic and thorough onsite procedure for collecting recreational use data over the years makes a more specific assessment problematic. For example, in the 1979-1980 annual summary of recreation visitation to Mendota WA, it was stated that a spot field check revealed that only 20 percent of the visitors to the area obtained visitor use permits. Thus, any data collected from the visitor registration cards likely reflect only a fraction of the actual use. Recreation visitation reported should be viewed as a conservative estimate of actual history of recreational use.

There were 13 principal recreational uses at Mendota WA from 1980-1995. Because there is no record of the average duration of these uses, they are reported as “recreation visits.” The Heritage Conservation and Recreation Service define a recreation visit as “the entry of any person into a site or area of land or water for recreation purposes.” Overall, there were an estimated 500,838 recreation visits from 1980-1995 (33,389 visits per year). Of this, 263,505 (52 percent) were for fishing; 162,131 (32 percent) were for waterfowl hunting; 23,158 (5 percent) were for camping; 16,398 (3 percent) were for dog training/field trials; 4,825 (less than 1 percent) were for nature study; 4,361 (less than 1 percent) were for rabbit hunting; 2,694 (less than 1 percent) were for birding; 1,747 (less than 1 percent) were for raccoon hunting; 1,332 (less than 1 percent) were for picnicking; and 1,214 (less than 1 percent) were for frogging. These recreational uses are described briefly below.

Fishing. As stated previously, CDFG does not actively manage the fishery in Mendota Pool (Stanley, 1999). Warmwater game and nongame fish populations support heavy fishing pressure in Mendota Pool. Due to the hydraulic link with the Delta, many fish species uncommon to the San Joaquin River have been recorded or caught by anglers (e.g., yellowfin goby, striped bass, logperch). Winter dewatering, high water exchange rates, turbidity, poor recruitment, and a lack of microhabitats (e.g., escape cover for juvenile fish) appear to be among the factors constraining the recreational fisheries. Flood flows from the

Kings River drainage are conveyed through Mendota Pool to the lower San Joaquin River to avoid or reduce flooding in the Tulare Basin.

Fishing is the most popular recreational pastime at Mendota WA, accounting for 52 percent of the overall use. An average of 17,534 anglers visit Mendota WA annually to fish for a variety of species, including black bass, crappie, catfish, bluegill, and striped bass. While fishing occurs throughout the year, much less occurs from mid-October to mid-January when most of Mendota WA is closed three days a week (Wednesday, Saturday, and Sunday) to all uses except waterfowl hunting. Additionally, when Mendota Pool is dewatered every other year, the number of anglers dwindles for one to two months until Mendota Pool water surface level and fish recover. Angling diminished significantly from 1989-1992 during a prolonged drought in California.

Waterfowl Hunting. Waterfowl hunting is the second most popular recreational pastime, accounting for 32 percent of the overall use, with an average of 10,809 hunters annually. The waterfowl hunting statistics are believed to be accurate because a fee is charged onsite for hunting, and numbers of hunters are recorded.

Among the waterfowl hunted are ducks, geese, coots, moorhens, and snipe. The waterfowl hunting season is typically mid-October through mid-January.

Waterfowl hunting is a top priority for Mendota WA staff; in part because the revenue it generates is returned to the Mendota WA operating budget. Yearly changes in the quality of waterfowl hunting and the number of hunters are influenced by conditions external to the Pacific Flyway (e.g., in Alaska and Canada where migratory birds begin their journey) as well as by internal factors related to any changes in the condition of nesting habitat.

Typically, waterfowl hunters line up at the check station (near the entrance) the night before their hunt and either pitch a tent or sleep in their vehicles. Waterfowl hunting has been consistently popular over the years, with the exception of the drought period of the late 1980s and early 1990s.

Other Activities. Camping accounts for five percent of the overall recreational use and averages 1,544 campers annually. Camping conditions are primitive, and use is scattered throughout the year. The heaviest use occurs in the summer months. Minimal use occurs in the winter months, when Mendota WA is largely restricted to waterfowl hunting. Campers spread out along the waterway rather than congregate in a campground. Campers are essentially self-regulating. No fees are collected for camping and Mendota WA staff makes only intermittent spot checks to monitor camper behavior. When necessary, the staff relies on game wardens or local law enforcement officials to deal with unruly or criminal conduct.

Sightseeing accounts for approximately three percent of the recreational use. An average of 1,093 sightseers visits Mendota WA annually. With the exception of waterfowl hunting season, sightseeing takes place throughout the year. Most sightseeing occurs in the spring and early summer months (nesting season). Because this category of use is poorly defined, it seems likely that it might be confused with nature study and birding. Sightseeing also may be a likely adjunct to hunting and fishing outings in the area.

Pheasant hunting represents about one percent of the overall use. An average opening weekend will have approximately 700 hunters. Pheasant hunting is limited to November and December and occurs on a much smaller scale than waterfowl hunting. Pheasants are resident to the area and have recently been the focus of habitat manipulations designed to improve brood survival. The primary purpose for improving brood survival is to enhance public hunting opportunity.

Dove season runs the first 15 days of September, and concurrently with pheasant season. No records of dove hunters are kept during the second half of the season when waterfowl hunting is permitted.

However, the number of dove hunters has increased dramatically in recent years as hunting opportunities at Mendota WA have become more abundant.

Dog training and field trials account for approximately one percent of the overall recreational use of Mendota WA, and average 362 participants annually. Much of this use is in organized groups and typically precedes and follows the waterfowl hunting season.

The remainder of the activities described each account for less than one percent of total recreation usage at Mendota WA. Nature study accounts for 322 visits annually. Participants range from organized groups of local elementary school students to college students. The bulk of the visitation occurs in the spring during nesting season. Rabbit hunting accounts for 291 visits annually. Rabbit hunting occurs all year except during waterfowl hunting season.

Birding averages 180 visits annually. The somewhat sketchy record of birding suggests that it takes place throughout the year, with most use occurring in the spring months (nesting season) and minimal use in the winter months. Birding at Mendota WA is likely also limited by the fact that the same type of viewing is offered at Los Banos Wildlife Area to the north. Los Banos Wildlife Area is 1.5 hours closer to the San Francisco Bay Area, where most of the birders are thought to reside.

Raccoon hunting averages 116 visits annually. The hunting season extends from late winter into the fall. Picnicking averages 89 visits annually. Picnicking occurs throughout the year, except during waterfowl hunting season. Frogging averages 81 visits annually. The season extends from spring to fall.

Recreational Visitor Characteristics. The characteristics of visitors to Mendota WA are based on interviews with the Mendota WA manager, onsite observations, review of visitor registration cards, and brief discussions with visitors.

Most recreational use appears to be locally based. Anglers, campers, and sightseers frequently come from towns within a 50-mile radius of Mendota WA. Visitor registration cards indicate that many people drive from Fresno, Madera, Kerman, Mendota, Coalinga, and other surrounding communities. According to staff, many “recreational” pastimes border on subsistence pursuits (e.g., fishing for food as much as for sport and bathing rather than swimming in Fresno Slough). Moreover, some “visitors” are likely living at Mendota WA (i.e., “camping”) while working in the vicinity as migrant laborers. Additionally, approximately 75 to 80 percent of the visitors are habitual or repeat visitors.

The group users and uses are generally limited to local school and college groups, Boy Scout groups who visit Mendota WA for nature studies and dog trainers who occasionally come in groups for field trials. Group users and uses represent only a small fraction of the total recreational use of the area.

Environmental Consequences

Criteria for Determining Significance

Impacts to recreational resources would be considered significant if they resulted in the following:

- A decline in the quality or quantity of existing recreational facilities or services, or exceeded adopted State or local recreation planning standards
- Conflicts with established recreational uses

No Action and No Project Alternative Impacts

Under the No Action and No Project Alternative, there would be no construction and there would be no additional water supply to Mendota WA. Therefore, there would be no enhancement or interruption of recreation and no impact to recreational use.

No Action and No Project Alternative Mitigation

No mitigation would be required under the No Action and No Project Alternative.

Alternative MEN-5 Impacts

Construction. **Construction activities resulting from Alternative MEN-5 would have no impact to recreational resources at the Mendota Pool, or Mendota WA.** The Mendota Pool would be maintained during construction, and construction activities would be confined to the area surrounding Mendota Dam.

Operations. A reliable supply of Level 4 water would improve habitat for waterfowl, fish, and other forms of wildlife, and could result in greater public awareness of water's significance to the health and well-being of San Joaquin Valley. In this regard, an educational opportunity exists with Mendota WA to elevate the public's understanding of the complex and dynamic nature of contemporary ecosystems management. The CDFG still would not actively manage the fishery in Mendota Pool but would continue to provide sportfishing opportunities at Mendota Pool and Fresno Slough. Hunting opportunities would also improve with the increase in available habitat as a result of the Level 4 water supplies. **Therefore, impacts resulting from Alternative MEN-5 would be beneficial to recreational resources.**

Alternative MEN-5 Mitigation

Under Alternative MEN-5, no adverse impacts to recreational resources would occur; therefore, mitigation measures would not be required.

Alternative MEN-7 Impacts

Construction. Construction activities associated with Alternative MEN-7 would be similar to those listed under Alternative MEN-5.

Operations. Operational impacts resulting from Alternative MEN-7 would be similar to the impacts described under Alternative MEN-5.

Alternative MEN-7 Mitigation

Under Alternative MEN-7, no adverse impacts to recreational resources would occur; therefore, mitigation measures would not be required.

Alternative MEN-9B Impacts

Construction. **Construction activities resulting from Alternative MEN-9B would have no impact to recreational resources at the Mendota Pool, or Mendota WA.** Current operations at the Mendota Pool would be maintained during construction, and construction activities would be confined to pipeline installation in surrounding agricultural fields, and construction of the rubber dam on Fresno Slough.

Operations. Operational impacts resulting from Alternative MEN-9B would be similar to the impacts described under Alternative MEN-5.

Alternative MEN-9B Mitigation

Under Alternative MEN-9B, no impacts to recreational resources would occur; therefore, mitigation measures would not be required.

Alternative MEN-12 Impacts

Construction. Construction activities resulting from Alternative MEN-12 would be similar to those described under Alternative MEN-9B.

Operations. Operational impacts resulting from Alternative MEN-12 would be similar to the impacts described under Alternative MEN-5.

Alternative MEN-12 Mitigation

Under Alternative MEN-12, no adverse impacts to recreational resources would occur; therefore, mitigation measures would not be required.

Noise

Affected Environment

Noise is often defined as "unwanted sound." Depending on its intensity, it has the potential to disrupt sleep, interfere with speech communication, or even damage hearing. Noise is generated by a variety of interior and exterior sources. Exterior noise sources can be mobile or stationary, such as motor vehicles, aircraft, construction work, industrial processes, various human activities, and miscellaneous operations such as emergency vehicles and air conditioning units.

Sound waves, traveling outward from a source, exert a sound pressure, which is commonly assigned a "sound pressure level," measured in decibels (decibels, or dB - a logarithmic measure of the ratio between sound pressure and the approximate threshold of human hearing). Environmental noise is usually measured in A-weighted decibels (dBA); the A-weighting describes a correction for variations in the typical human ear's frequency response at commonly encountered noise levels. In general, a fluctuation in sound of 1 dBA is noticeable only under laboratory conditions. A change of 3 dBA is just noticeable in field conditions, a 5 dBA change is clearly noticeable and a 10-dBA change is perceptually twice (or half) as loud. For example, a noise level of 70 dBA sounds approximately twice as loud as 60 dBA and four times as loud as 50 dBA. Table IV-18 presents the maximum noise levels for equipment that would be typically be used for a construction project.

Table IV-18
Noise Levels of Heavy Construction Equipment

Equipment Item	Maximum Noise Level (dBA) at 50 feet (15 meters)
Saws	72-82
Dump truck	84-7
Front end loader (1.5 cubic yards)	77-82
Backhoe	84-93
Crane	90-96
Water truck (3,000 gallons)	81-84

Note:

dBA = A-weighted decibels.

Source: EPA, 1971.

Federal, State, and local agencies have developed guidelines for evaluating the compatibility of different land uses and various noise levels. In general, noise is not considered a nuisance unless humans are exposed to excessive levels. Generally, counties have established noise standards for the following three land use categories:

1. Insensitive Land Uses, for which noise levels do not affect successful operation of activities. Included in this category are transportation and agriculture.
2. Moderately Sensitive Land Uses, for which some degree of noise control must be exercised if activities are to be successfully carried out. General business and recreation are included in this category.
3. Sensitive Land Uses, for which lack of noise control results in annoyance impacts. This category primarily includes residential uses.

Regional Setting

Existing noise levels at Mendota WA and the Mendota Pool are generally at or below a day-night average sound level of 65 dBA, which is the generally accepted limit for outdoor noise levels in residential areas (Departments of the Air Force, Army, and Navy, 1978; U.S. Department of Housing and Urban Development, 1978). Generally, modern residential building shells will generally yield interior noise levels that are approximately 20 dBA lower than exterior levels (windows and doors closed). Typical sources of noise include automobiles and trucks, with the higher noise levels occurring near transportation routes. Aircraft and helicopter flights are less-frequent sources of noise.

Site Setting

Mendota WA is located in a rural area. Noise levels in the project area are relatively low and intermittent. Noise generators in the project area are Highway 180, Highway 33, agricultural operations, and aircraft flyovers.

Fresno County Health and Safety Code, Noise Control. The Fresno County Board of Supervisors has adopted the Noise Control element of the Health and Safety Code to protect persons from excessive levels

of noise within or near a residence, school, church, hospital, or public library, and to warn persons of the hazards of excessive noise in places of public entertainment.

Table IV-19 presents exterior noise level standards for noises measured at any affected single- or multiple-family residence, school, hospital, church, or public library.

Table IV-19
Fresno County Noise Level Standards

Category	Cumulative Number of Minutes in any 1-hour Period	Noise Level Standards, dBA Daytime 7 a.m. to 10 p.m.	Noise Level Standards, dBA Nighttime 10 p.m. to 7 a.m.
1	30	50	45
2	15	55	50
3	5	60	55
4	1	65	60
5	0	70	65

Source: Fresno County, 2005.

Environmental Consequences

Criteria for Determining Significance

A noise impact would be considered significant if it resulted in any of the following:

- Generation of, or exposure to, noise levels in excess of standards established in the local general plan or noise ordinances, or applicable standards of other agencies
- Generation of, or exposure to, excessive groundborne vibration or groundborne noise levels
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project

No Action and No Project Alternative Impacts

Under the No Action and No Project Alternative, no construction would occur; therefore, there would be no noise impacts.

Alternative MEN-5 Impacts

Construction. Construction of the Dam Replacement Alternative would temporarily raise the ambient noise levels in the project area. Typical noise levels generated by equipment would likely range between 75 dBA and 100 dBA at 50 feet from the source (EPA, 1971). Therefore, assuming that average project noise is 95 dBA at 50 feet from the source, noise levels exceeding 65 dBA could affect sensitive recaptors within 1,600 feet, and in clear view of the source. However, there are no sensitive human noise receptors within 1,600 feet of the project area.

In addition, construction activities would take place during the daytime, no earlier than 7:00 a.m. and no later than 7:00 p.m. Otherwise, the nighttime decibel penalties would be incurred when calculating day-night average sound level/community noise equivalent level values.

Noise-sensitive wildlife species would be expected to avoid both the project area and neighboring areas during the construction period, but would be expected to return when noise-generating operations are discontinued. **Potential noise impacts to human and wildlife receptors, therefore, would be less than significant.**

Operations. There would be no impacts resulting from the operation of Alternative MEN-5.

Alternative MEN-5 Mitigation

Because Alternative MEN-5 would not result in a significant noise impact, no mitigation measures would be required.

Alternative MEN-7 Impacts

Construction. Construction activities related to Alternative MEN-7 would be the same as those listed under Alternative MEN-5.

Operations. There would be no impacts resulting from the operation of Alternative MEN-7.

Alternative MEN-7 Mitigation

Because Alternative MEN-7 would not result in a significant noise impact, no mitigation measures would be required.

Alternative MEN-9B Impacts

Construction. Potential construction-related noise impacts under Alternative MEN-9B would be similar to those described under Alternative MEN-5. However, construction activities associated with the installation of the new conveyance facility from Lateral 7 would occur within 1,600 feet of sensitive human noise receptors. **Potential noise impacts to wildlife receptors would be less than significant; however, potential noise impacts to human receptors would be less than significant with mitigation.**

Operations. There would be no impacts resulting from the operation of Alternative MEN-9B.

Alternative MEN-9B Mitigation

Implementation of the following mitigation measures would reduce impacts resulting from increased noise levels due to construction to a level of less than significant:

- Construction activities would be limited to the hours of 7:00 a.m. to 7:00 p.m.
- No construction would be performed within 1,000 feet of an occupied dwelling unit on Sundays or legal holidays.
- All equipment would have sound-control devices no less effective than those provided on the original equipment. Equipment exhaust would be muffled.

Alternative MEN-12 Impacts

Construction. Potential construction-related noise impacts under Alternative MEN-12 would be similar to those described under Alternative MEN-5. **Potential noise impacts to human and wildlife receptors would be less than significant.**

Operations. There would be no impacts resulting from the operation of Alternative MEN-12.

Socioeconomics

Affected Environment

Regional Setting

The northern segment of the San Joaquin Valley, constituted by Merced, Stanislaus, Kern, San Joaquin, Kings, Madera, Tulare, and Fresno counties, is home to over three million residents, or approximately ten percent of the total population of California. The labor force for this region totals over 1.6 million workers. Unemployment rates, which are residency-based labor market statistics, are consistently higher in the region than in the adjacent regions due to the significant seasonal nature of the region's employment. The average rate in the region in 2003 was 10.8 percent, down from 13.1 percent in 1998. Because the region offers a ready supply of homes at relatively low prices, many workers who commute to the San Francisco Bay Area region live in San Joaquin Valley communities. Table IV-20 details population, labor force, and unemployment rate statistics for each county within this region, and the State of California.

Agriculture is the predominant form of employment and comprises approximately 18 percent of aggregate employment. In total, approximately 222,000 persons in this region are employed in some capacity in the agricultural sector. Following agriculture, in order by the number of jobs provided, are service, government, retail trade, and manufacturing. Table IV-21 lists county-specific industry sector breakdowns of employment distributions as compared to California.

The leading manufacturing industry in the region is that of food and related products. The largest portions contributing to this total come from Stanislaus and San Joaquin Counties. Following this industry in terms of gross yearly revenue in the region are industry sectors such as paper, chemicals, and allied products; stone, clay, glass, and concrete products; and printing and publishing.

Site Setting

The City of Mendota is 1.5 miles east of Fresno Slough, approximately two miles northeast of the easternmost boundary of Mendota WA and one mile south of the Mendota Dam site. It is the only significant community in the study area. Because of its proximity to the overall study area and immediate proximity to the potential dam replacement site, the City of Mendota is the community most likely to be affected by any action taken.

Table IV-20
Central Valley Demographics, 2004

	Estimated Population	Total Labor Force	Unemployment Rate (percent)
Merced County	234,169	98,900	10.8
Stanislaus County	494,822	226,100	9.1
Kern County	732,401	318,600	9.8
San Joaquin County	636,466	285,200	8.5
Kings County	141,510	54,400	10.8
Fresno County	866,523	409,500	10.4
Madera County	136,923	63,200	8.8
Tulare County	400,123	182,900	11.5
California	36,271,091	17,552,300	6.2

Source: Employment Development Department, 2004.

The current population estimate in Mendota is 8,858 (U.S. Census, 2004). Like many communities in the northern San Joaquin Valley, Mendota's economy is agriculturally based and labor intensive. Most family incomes depend, in whole or in part, on farm labor or farm produce preparation. Farm labor and produce preparation jobs are low paying and seasonal. Most permanent residents in the workforce are tenant laborers working for, but not owning, the farms or businesses where they work. Major employers in the City of Mendota include a sugar beet processing plant, two produce packing companies, and a melon packing and shipping company. Virtually all other enterprises could be described as small goods and services businesses. Major services are available in Fresno, located approximately 40 miles to the east.

Table IV-21
Percent of Labor by Industry Sector

	Total Farm	Manufacturing	Retail Trade	Government
Merced	10	11	8	18
Stanislaus	6	10	9	11
Kern	12	4	8	17
San Joaquin	6	7	9	14
Kings	13	7	7	25
Fresno	11	7	8	16
Madera	16	5	5	16
Tulare	16	6	7	16
California	2	9	9	14

Source: http://www.labormarketinfo.edd.ca.gov/cgi/dataanalysis/cesReport.asp?menuchoice=ces, Employment Development Department, 2004.

Environmental Consequences

Criteria for Determining Significance

Impacts to socioeconomics would be considered significant if they resulted in the following:

- Substantial growth or concentration of population

- Substantial impacts to local housing supplies
- Substantial impacts to local health and safety by exceeding or degrading local public service capabilities
- Substantial impacts to the regional agricultural economy in the short or long-term

No Action and No Project Alternative Impacts

Under the No Action and No Project Alternative, Mendota Dam would not be replaced and existing dam operations would continue. No significant effects to any community or population center in the study area would occur under the No Action and No Project Alternative.

No Action and No Project Alternative Mitigation

No mitigation would be required under the No Action and No Project Alternative.

Alternative MEN-5 Impacts

Construction. As discussed under Land Use, temporary impacts to neighboring agricultural operations may result due to construction of Alternative MEN-5. **Production would be expected to fully recover within one to three years and the amount of farmland impacted is relatively small, therefore this would not be a significant impact.**

Construction of Alternative MEN-5 would require a local or regional contractor to install the necessary facilities. The construction effort would likely result in local expenditures in terms of lodging, food, and construction-related materials and equipment purchases. **Therefore, construction of Alternative MEN-5 would result in temporary and minor beneficial impacts to the local economy.**

The limited size of construction activities would not induce population growth to the local area or displace existing housing. A small increase in the number of vehicles near the construction site and the City of Mendota would occur from construction personnel and deliveries, but would be temporary and, would not be significant. The project would not create safety hazards to the general public. Mendota's public services and utilities and service systems would not be adversely affected by the project.

Operations. The capacity of Mendota Pool would be similar to the No Action and No Project Alternative and dam operations would be essentially the same. **Thus, irrigators would not be affected.**

If reliable Level 4 water deliveries result in increased use of Mendota WA by waterfowl, implementation of Alternative MEN-5 would result in a long-term beneficial socioeconomic impact. Increased numbers of waterfowl would translate to increased opportunities for wildlife viewing and hunting, with resultant increases in expenditures on recreation, and food within the local economy. **Therefore, Alternative MEN-5 would result in beneficial socioeconomic impacts to the local community.**

Alternative MEN-5 Mitigation

The following mitigation measures would reduce impacts to socioeconomics resulting from construction activities to a less than significant level:

- Construction activities would be scheduled to minimize impacts to crop production and operations.
- Landowners would be compensated for any loss of property, loss of crop production, or impacts to agricultural operations.

Alternative MEN-7 Impacts

Construction. Construction impacts for Alternative MEN-7 would be similar to those listed under Alternative MEN-5.

Operations. Operational impacts for Alternative MEN-7 would be similar to those listed under Alternative MEN-5.

Alternative MEN-7 Mitigation

Mitigation measures for Alternative MEN-7 would be the same as those listed under Alternative MEN-5.

Alternative MEN-9B Impacts

Construction. Construction impacts for Alternative MEN-9B would be similar to those listed under Alternative MEN-5.

Operations. Operational impacts for Alternative MEN-9B would be similar to those listed under Alternative MEN-5.

Alternative MEN-9B Mitigation

Mitigation measures for Alternative MEN-9B would be the same as those listed under Alternative MEN-5.

Alternative MEN-12 Impacts

Construction. Construction impacts for Alternative MEN-12 would be similar to those listed under Alternative MEN-5.

Operations. Operational impacts for Alternative MEN-12 would be similar to those listed under Alternative MEN-5.

Alternative MEN-12 Mitigation

Mitigation measures for Alternative MEN-12 would be the same as those listed under Alternative MEN-5.

Visual Resources

Affected Environment

Visual resources are areas that are considered valuable because of their aesthetic attributes and the desirability of maintaining those attributes. The interpretation and evaluation of scenic and aesthetic qualities involves an intuitive reaction on the part of the observer, which is influenced by the viewpoint, the surrounding viewshed, and the particular viewer's sensitivity to the surroundings and existing resources.

Regional Setting

The visual landscape of the San Joaquin River regions has changed considerably since the 1940s, when the valley was largely open grasslands with scattered expanses of oak woodland. Wetlands, vernal pools, and riparian corridors added visual variety to the landscape. Settlement was sparse, with small communities, located primarily along the rivers, and scattered rural ranches. A significantly smaller area of the landscape was irrigated and few of the rivers were regulated. Much of the view opportunity was limited to the road and railroad corridors.

After the population influx following World War II, rapid agricultural development and the growth of communities changed the visual landscape substantially and relatively quickly. Much of the grassland was replaced by irrigated cropland, rice fields, and orchards. Most of the wetlands, vernal pools, and riparian corridors were eliminated.

Construction of dams and reservoirs substantially altered the visual character of valleys in which reservoirs were constructed. The reservoirs added visual variety, because large water bodies are widely perceived as features of high visual interest. However, these reservoirs changed the visual character provided by free-flowing streams. CVP canals also added visual variety to the landscape by their form and water feature qualities.

The Delta landscape once consisted of a vast system of wetlands and river channels. The construction of levees, beginning in the 1850s, dramatically changed the look of this area. The establishment of settlements in the Delta began in the mid-1800s. Continued urban growth has substantially altered the visual aspect of the Delta margins.

Site Setting

Mendota WA is located in a rural area. The visual atmosphere is characterized primarily by wetland and other aquatic environments, and is heavily populated by bird and other wildlife species. In combination, the natural setting of Mendota WA and its associated wildlife, create a host of aesthetically pleasing resources throughout the Mendota WA's expanse. Mendota WA is surrounded by relatively flat terrain dominated by agricultural croplands.

Environmental Consequences

Criteria for Determining Significance

Impacts to visual resources would be significant if they resulted in the following:

- A substantial adverse effect to a scenic vista
- Substantial degradation of the existing visual character or quality of the site and its surroundings
- Creation of a new source of substantial light or glare, which would adversely affect daytime or nighttime views in the area

No Action and No Project Alternative Impacts

Under the No Action and No Project Alternative, no construction would occur; therefore, there would be no impacts to visual resources.

No Action and No Project Alternative Mitigation

No mitigation would be required under the No Action and No Project Alternative.

Alternative MEN-5 Impacts

Construction. During the construction phase of Alternative MEN-5, the existing visual setting would be altered with construction equipment staging areas, grading, and dewatering. Visual impacts from construction would be temporary. In addition, the construction area would be closed to public access; hence, there would be substantially fewer people viewing the area. **Therefore, visual impacts during the construction phase would be less than significant.**

Construction of the proposed project will result in the removal of vegetation from the project area. This would include removal of riparian vegetation adjacent to the east side of the Mendota Pool for water diversion for the proposed dam construction. **Upon completion of the construction period, the lack of vegetation in the project area would be less than significant visual impact with mitigation.**

Operations. There would be no impacts to visual resources resulting from the operation of Alternative MEN-5.

Alternative MEN-5 Mitigation

As described under Biological Resources, the removal of native vegetation would be minimized to the extent possible. Additionally, revegetation measures would be developed and implemented to restore disturbed areas. Implementation of these measures would reduce the impact to a level of less than significant.

Alternative MEN-7 Impacts

Construction. Construction impacts for Alternative MEN-7 would be similar to those listed under Alternative MEN-5.

Operations. Operational impacts for Alternative MEN-7 would be similar to those listed under Alternative MEN-5.

Alternative MEN-7 Mitigation

Mitigation measures for Alternative MEN-7 would be the same as those listed under Alternative MEN-5.

Alternative MEN-9B Impacts

Construction. Potential impacts to visual resources would primarily occur along or adjacent to existing WWD conveyance facilities. These existing laterals are located in irrigated field crops that do not have a significant scenic value. Therefore, visual impacts would be less than significant.

Operations. There would be no impacts to visual resources resulting from the operation of Alternative MEN-9B.

Alternative MEN-12 Impacts

Construction. Potential impacts to visual resources would be similar to those discussed under the Alternative MEN-9B.

Operations. There would be no impacts to visual resources resulting from the operation of Alternative MEN-12.

Environmental Justice

Affected Environment

The concept of environmental justice embraces two principles: (1) fair treatment of all people regardless of race, color, nation of origin, or income, and (2) meaningful involvement of people in communities potentially affected by the project.

Executive Order 12898, Section 2-2, signed by President Clinton in 1994, requires all Federal agencies to conduct "programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons the benefits of, or subjecting persons to discrimination because of their race, color or national origin."

Section 1-101 requires Federal agencies to identify and address, as appropriate, "disproportionately high and adverse human health or environmental effects" of programs on minority and low-income populations (Executive Order 12898, 1994). California Government Code, Section 65040.12 (c), defines environmental justice as "the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation and enforcement of environmental laws and policies."

The 2000 U.S. Census reports numbers of both minority and property residents. Minority populations included in the census are identified as Black or African American; American Indian and Alaskan Native, Asian; Native Hawaiian or Other Pacific Islander, Hispanic; or Other. Table IV-22 presents population percentages for Fresno and Madera Counties and the State.

Poverty status is reported as the number of families with income below poverty level ($17,029 for a family of four in 1999, as reported in the 2000 Census of Population and Housing). Table IV-23 details county-specific and State poverty statistics.

Table IV-22
Population Percentages for Fresno County, Madera County, and California, 2000

	White	Black or African American	American Indian and Alaskan Native	Asian	Native Hawaiian or Other Pacific Islander	Hispanic	Persons Reporting Some Other Race	Persons Reporting Two or More Races
Fresno County	54.3	5.3	1.6	8.1	0.1	44.0	25.9	4.7
Madera County	62.2	4.1	2.6	1.3	0.2	44.3	24.4	5.2
California	59.5	6.7	1.0	10.9	0.3	46.7	16.8	4.7

Source: U.S. Census Bureau, 2005.

Environmental Consequences

Criteria for Determining Significance

Environmental justice is defined by EPA as "The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." Executive Order 12898, "General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires all Federal agencies to adopt strategies to address environmental justice concerns within the context of agency operations.

Impacts to environmental justice would be significant if they resulted in any of the following:

- Negative changes for the natural or physical environment or to health of a minority or low-income population or children
- Changes that affect negatively minority or low-income populations or children appreciably more than the general population or other comparison group
- Risk or rate of environmental hazard exposure by a minority or low-income population that exceeds those of the general population or other comparison group
- A health or environmental effect to minority or low-income population by cumulatively or multiply exposing them to environmental hazards

Table IV-23
Individuals Below Poverty Level for Fresno County, Madera County, and California, 1999

	Number of Individuals	Percent
Fresno County	179,085	22.9
Madera County	24,514	21.4
California	4,706,130	14.2

Source: U.S. Census Bureau, 2005.

No Action and No Project Alternative Impacts

No environmental justice impacts would occur under the No Action and No Project Alternative because no construction would occur.

No Action and No Project Alternative Mitigation

No mitigation would be required under the No Action and No Project Alternative.

Alternative MEN-5 Impacts

Construction. No minority or low-income populations would be adversely affected, directly or indirectly, by the proposed dam replacement. Construction impacts identified in the Socioeconomics section related to local expenditures, as well as potential work for local construction workers, are generally anticipated to be beneficial, in addition to being shared across income levels, including minorities and low-income groups. **Thus, construction of the proposed dam would potentially be a beneficial impact.**

Operation. There would be no impacts resulting from the operation of Alternative MEN-5.

Alternative MEN-5 Mitigation

Because Alternative MEN-5 would not result in significant environmental justice impacts, no mitigation would be required.

Alternative MEN-7 Impacts

Construction. Potential construction-related impacts under Alternative MEN-7 would be similar to those described under Alternative MEN-5.

Operations. There would be no impacts resulting from the operation of Alternative MEN-7.

Alternative MEN-7 Mitigation

Because Alternative MEN-7 would not result in significant environmental justice impacts, no mitigation would be required.

Alternative MEN-9B Impacts

Construction. Potential construction-related impacts under Alternative MEN-9B would be similar to those described under Alternative MEN-5.

Operation. There would be no impacts resulting from the operation of Alternative MEN-9B.

Alternative MEN-9B Mitigation

Because Alternative MEN-9B would not result in significant environmental justice impacts, no mitigation would be required.

Alternative MEN-12 Impacts

Construction. Potential construction-related impacts under Alternative MEN-12 would be similar to those described under Alternative MEN-5.

Operations. There would be no impacts resulting from the operation of Alternative MEN-12.

Alternative MEN-12 Mitigation

Because Alternative MEN-12 would not result in significant environmental justice impacts, no mitigation would be required.

Chapter V
Cumulative and Growth-inducing Impacts

Cumulative Impacts

Both CEQA and NEPA require that the cumulative impacts of a proposed project be addressed in an environmental document when cumulative impacts are expected to be significant and, under CEQA, when the project's incremental effect is cumulatively considerable (Guidelines 15130[a], 40 CFR 1508.25[a][2]). Included in this chapter is a discussion of reasonably foreseeable projects and actions that might occur near the project area, and the type of cumulative impacts that could result from these projects in conjunction with the project alternatives.

Cumulative impacts are effects that may be individually minor at a project level, but collectively result in greater effects when considered in relation to other past, present, and foreseeable future projects.

Cumulative impacts may arise in the following three ways:

- Disturbances that recur through time
- The same type of disturbance that occurs over a limited area
- Different disturbances that affect the same or similar environmental resources

To identify related projects, the CEQA Guidelines (15130[b]) recommend either the list or projection approach. This analysis uses the list approach, which entails listing past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of CCID or Reclamation. In addition, a discussion regarding identified resource-specific significant impacts have been analyzed for cumulative effects.

Related and Reasonably Foreseeable Projects and Actions

San Joaquin River Restoration Program

The San Joaquin River Restoration Settlement of September 2006, pending final approval, concluded an 18-year legal dispute and established a 20-year plan to restore flows and fish to the main stem of the San Joaquin River between the confluence of the Merced River and Friant Dam. The Settlement also provided strategies to minimize the impact of water loss to the Bureau of Reclamation's agricultural and urban water contractors. A five-agency, Federal and State Program Management Team has been convened to begin identifying information needs, planning implementation strategies, and developing a Program organization structure. The five agencies include: Bureau of Reclamation (Reclamation), U.S. Fish and Wildlife Service (FWS), NMFS, California Department of Water Resources (DWR) and California Department of Fish and Game (DFG). The San Joaquin River Restoration Program (SJRRP) will work towards the two main goals of the settlement: restoring water flows and salmon to the San Joaquin River below Friant Dam, and providing water supply certainty for the farmers and cities in the Friant service area who rely on water from the river.

San Joaquin Basin Action Plan

The San Joaquin Basin Action Plan is a cooperative project among CDFG, USFWS, and Reclamation designed to meet the long-term mitigation requirements for Kesterson Reservoir and to contribute

significantly to the North American Waterfowl Management Plan. Under the San Joaquin Basin Action Plan, approximately 4,500 acres of new wetlands have been created or are in the process of being created, and an additional 6,239 acres of existing wetlands have been protected. Together, these actions mitigate for losses associated with closure of Kesterson Reservoir while satisfying 12 percent of the Central Valley Habitat Joint Venture's San Joaquin Basin objective for wetland preservation (53,000 acres) and 22 percent of the objective for wetland creation (20,000 acres). The Reclamation will also execute long-term agreements to supply 52,000 ac-ft of CVP water annually to sustain these wetlands.

Upper San Joaquin River Basin Storage Investigation

The Upper San Joaquin River Basin Storage Investigation is considering a range of approaches to increase water supplies through the enlargement of Millerton Lake at Friant Dam. Reclamation and DWR are conducting the Upper San Joaquin River Basin Storage Investigation to consider a 700,000-ac-ft Millerton Lake expansion and other alternatives to providing surface storage in the upper San Joaquin River Basin. As stated in the CALFED Record of Decision, the goal of the project is to "contribute to restoration of and improve water quality for the San Joaquin River and facilitate conjunctive water management and water exchanges that improve the quality of water deliveries to urban communities." The investigations are ongoing.

At this time, no alternatives have been evaluated in a project-level environmental document, and the feasibility of such a project has yet to be determined. This project has the potential to improve fish conditions in the San Joaquin River and could increase flows into the Delta, depending on operation of Friant Dam and Mendota Pool. Because this project is not yet defined in detail, it is considered in the qualitative analysis of cumulative effects.

Resource-specific Cumulative Impacts

The cumulative effects analysis focuses on impacts associated with the development of facilities necessary to deliver reliable Level 4 water supplies to Mendota WA. The project area is dominated by agricultural uses and is anticipated to remain in agricultural use in the long-term. The implementation of any of the action alternatives would result in both beneficial and adverse impacts. Adverse impacts were identified primarily in relation to project construction activities for the following resource categories:

- **Water Resources:** Adverse contributions to regional water pollution would be insignificant because of the generally short-term nature of the construction period and the small potential contribution to turbidity and overall quality. Mitigation, including the development of a SWPPP, ECP, and a restoration plan, will ensure that there would be essentially no adverse impacts to water quality as a cumulative effect.

- **Biological Resources:** Implementation of any of the action alternatives would result in short-term impacts to habitats used by a number of species, including species that are listed as threatened or endangered by USFWS and CDFG. Generally, limited long-term impacts could also occur where facilities resulted in a permanent encumbrance such as a pipeline or pumping station. As described in the Biological Resources section, Reclamation would design facilities to avoid or minimize impacts to sensitive habitats and would mitigate impacts where avoidance is not possible. Mitigation measures would include revegetation and monitoring at replacement ratios determined reasonable for each type of habitat. In addition to adverse effects, the overall action would result in a number of wildlife and vegetation benefits in the project area. Increased water supplies would allow for the development of additional habitat, which would ensure the maintenance of habitats that could not be maintained during dry periods. Accordingly, potential cumulative negative effects to biological resources would be minor and the cumulative effects in general would be beneficial.

The San Joaquin River Restoration Program and the Upper San Joaquin River Basin Storage Investigation, described previously, have the ability to mitigate many of the adverse effects associated with past actions by restoring San Joaquin River flows and associated habitats. Specific benefits, however, are speculative because of uncertainty as to how these programs would be implemented.

- **Land Use:** Implementation of any of the alternatives could temporarily disrupt agricultural activities during construction. Impacts to land use are primarily limited to short-term disturbances of agricultural areas. Alternatives, which include permanent facilities such as canals and pipelines, would result in permanent impacts. Routing conveyance facilities to avoid agricultural impacts to the extent possible would lessen overall impacts to agricultural productivity. These short-term impacts would not result in any noticeable cumulative effects.
- **Air Quality:** Temporary construction impacts, such as increased dust during construction, could adversely affect air quality. Implementation of the mitigation measures prescribed in the Air Quality section, including dust control measures, would result in no significant cumulative impact on air quality.
- **Hazardous Materials/Waste Management**: Project activities could increase the potential for exposure to hazardous materials/waste or increased the likelihood of a hazardous material release to the environment. Impacts associated with hazardous materials/hazardous waste management would be significant if they resulted in noncompliance with applicable regulatory guidelines or increased the amounts generated beyond available waste management capacities. Mitigation for impacts related to hazardous materials in the river would be similar to those discussed for water resources. Implementation of the measures listed in the contractor's SWPPP and ECP would reduce cumulative impacts to a level of less than significant.
- **Visual Resources**: Temporary construction activities or long-term operations would not cause significant adverse cumulative effects to visual resources.

Growth-inducing Impacts

Growth-inducing impacts are defined in Section 15125(g) of the CEQA Guidelines as "the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment." The proposed alternatives would result in some economic activity during construction in terms of a temporary demand for labor, building materials, and a limited degree of lodging. These short-term economic benefits would not result in significant growth-inducing economic or population growth, or the need to provide additional new housing.

Chapter VI
Consultation and Coordination

This chapter provides a history of public involvement and a description of the Federal and State regulations that apply to the project.

Public Involvement

A series of public meetings and workshops were held from fall 1993 through spring 1994 to solicit public comments on the potential alternatives and to identify additional alternatives for consideration. The meetings included a discussion of the general purpose and scope of the project, the planning processes that govern the project, the alternatives identified for evaluation, and the evaluation criteria to be used to compare alternatives. Both verbal and written comments were received. The primary public issues expressed at the meetings included the limited water resources in the study area, ESA restrictions, the water-use efficiency of the alternatives, the cost effectiveness of the alternatives, and multiple water uses.

Agency workshops, discussions with water purveyors, and public scoping meetings were held in early June 1995 to determine the feasibility of the selected alternatives. Public comments received during the scoping meetings held in early June 1995 focused primarily on water quantities, source, use, and quality. Concerns over potential impacts to groundwater were strongest in the San Joaquin Valley because of the area's historical groundwater concerns and increased use. In general, the public requested a thorough and objective review of potential impacts to water uses both at and outside of Mendota WA, in terms of environmental and social issues. Comments ranged from a desire that impacts to all endangered species in the project vicinity be disclosed to concerns over water quality impacts in the Delta. It was also requested that State facilities be used wherever possible to supplement the CVP.

In October 1997, Reclamation held an additional public meeting in Los Banos, California, to provide information on the overall Conveyance of Refuge Water Supply Project.

Applicable Regulatory Requirements and Coordination

This EA/IS has been prepared to comply with the environmental review and consultation requirements of NEPA and CEQA. Compliance with specific environmental review and consultation requirements to implement the project alternatives are identified in Table VI-1.

Clean Air Act

The CAA, as amended, requires that any Federal entity engaged in an activity that might result in the discharge of air pollutants must comply with all applicable air pollution control laws and regulations (Federal, State, or local). Air quality mitigation measures will be incorporated into contractor specifications to ensure that compliance with Federal, State, or local laws and regulations is achieved.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (16 USC 661 through 666c) and other acts express the will of the U.S. Congress to protect the quality of the aquatic environment as it affects the conservation, improvement, and enjoyment of fish and wildlife resources. Under the Fish and Wildlife Coordination Act, any Federal agency that proposes to control or modify any body of water must first consult with USFWS or NOAA Fisheries, as appropriate, and with the head of the appropriate State agency exercising

administration over the wildlife resources of the affected state. USFWS completed a draft Coordination Act Report in December 2002 and is in the process of updating the report with current project information. Completion of Coordination Act requirements is expected in 2006.

Table VI-1
Review, Permits, and Licenses Required for the Conveyance of Refuge Water Supply

Agency	Act or Regulation	Requirement	Compliance Procedure	Status
USACE	Section 404 Wetlands Permit under the CWA Executive Order 11990, Protection of Wetlands	Possible dredge and fill permits for pipeline crossings; notice coordination	Obtain permitting approval; agencies review NEPA/CEQA document as part of process	Permits or Waivers will be obtained prior to construction
USACE/Water Board	Section 402 National Pollutant Discharge Elimination System/General Construction Activity Stormwater Permit	Project requires disturbance greater than one acre	Obtain permitting approval; agencies review NEPA/CEQA document as part of process	Permits or Waivers will be obtained prior to construction
USACE/Water Board	Section 401 Water Quality Certification	Work accomplished requires discharge to surface waters	Obtain permitting approval; agencies review NEPA/CEQA document as part of process	Permits or Waivers will be obtained prior to construction
FEMA	National Flood Insurance Program	Letter of map revision	Obtain approval based on hydraulic study	Complete prior to construction
USFWS	ESA	Compliance with provisions of ESA.	ESA Section 7 consultation; agency reviews draft and final EA/IS	Complete prior to construction
NOAA Fisheries	ESA	Compliance with provisions of ESA	Complete	Complete
NOAA Fisheries	Magnuson-Stevens Fishery Conservation and Management Act	Consultation on essential fish habitat	Complete	Complete
CDFG	Streambed Alteration Agreement under Section 1601 of the Fish and Game Code	Alteration to a stream channel	Obtain agreement approval; agency reviews NEPA/CEQA document as part of process	Complete prior to construction
CDFG	CESA	Compliance with provisions of CESA	Agency reviews proponent's submittals; prepares BO	Complete prior to construction
Advisory Council on Historic Preservation	NHPA, Section 106; Executive Order 11593, Section 2 (b) (36 CFR 800)	Compliance with provisions of the NHPA	SHPO review of environmental document and coordination	Sign MOA prior to construction

Endangered Species Act

ESA, as amended, includes provisions for the protection of threatened, endangered, proposed listed, candidate, or rare species, or species of concern. Pursuant to the procedural requirements of Section 7 of the ESA, Reclamation initiated formal consultation with USFWS on several refuge water supply conveyance projects in the San Joaquin Valley (dated January 5, 1999). USFWS subsequently issued a Programmatic BO on these conveyance projects (dated June 28, 1999). The BO is in Appendix C of this

EA/IS. Reclamation is currently working with USFWS to update the BO with current project information. Completion of consultation actions is expected in 2006.

National Historic Preservation Act

The NHPA, as amended, requires the lead Federal agency to identify historic properties within the area of potential effects. If there are adverse effects to such properties, then a Memorandum of Agreement is developed with the SHPO and other consulting parties to resolve the adverse effects. The Advisory Council on Historic Preservation is invited to participate in the Memorandum of Agreement.

The area of potential effect, including Mendota Dam, has been surveyed. Because Mendota Dam has been determined eligible for listing on the National Register of Historic Places, Reclamation is consulting with the SHPO and the Advisory Council on Historic Preservation as described in 36 CFR 800. Consultation activities are expected to be completed in 2006.

Indian Trust Assets

Indian trust assets are legal interests in assets that are held in trust by the U.S. Government for Federally recognized Indian tribes or individuals. The trust relationship usually stems from a treaty, executive order, or act of Congress. The Secretary of the Interior is the trustee for the United States on behalf of Federally-recognized Indian tribes. Assets are anything owned that holds monetary value. Legal interests means that there is a property interest for which there is a legal remedy, such a compensation or injunction, if improper interference occurs.

Assets can be real property, physical assets, or intangible property rights, such as a lease or right to use something. Indian trust assets can not be sold, leased or otherwise alienated without the United States' approval. Trust assets may include lands, minerals, and natural resources, as well as hunting, fishing, and water rights. Indian reservations, rancherias, and public domain allotments are examples of lands that are often considered trust assets. In some cases, Indian trust assets may be located off trust land.

Reclamation shares the Indian trust responsibility with all other agencies of the Executive Branch to protect and maintain Indian trust assets reserved by Indian tribes or Indian individuals, by treaty, statute, or executive order. The Department of Interior's policy is to carry out its activities in a manner that protects Indian trust assets and avoids adverse impacts whenever possible (Reclamation Indian Trust Asset Policy, July 2, 1993).

Reclamation has reviewed the Indian trust asset status in the vicinity of the Mendota Dam, Mendota WA, and alternative conveyance facilities. Neither Alternative MEN-5, nor the other alternatives discussed in this EA/IS would potentially affect Indian trust assets. The nearest Indian trust assets to this action are at the Table Mountain Rancheria, near Millerton Lake, approximately 40 air miles east; and at the Santa Rosa Rancheria, near Lemoore, California, approximately 45 air miles southeast. Accordingly, the project alternatives would have no potential effect on Indian trust assets; no impacts would occur and no formal consultation regarding this action with Federally-recognized tribes is planned.

Farmlands Policy

Council on Environmental Quality memoranda to heads of agencies, dated August 30, 1976 and August 11, 1980, and the Farmlands Protection Policy Act of 1981 require agencies for this environmental document to include farmland assessments designed to minimize adverse impacts to prime and unique farmlands. As described in the Land Use section of Chapter IV, the proposed project would cause no adverse impacts to farmlands. Reclamation will work directly with affected landowners to compensate them for short- or long-term impacts.

Executive Order 11988, Floodplain Management

Executive Order 11988 requires Federal agencies to prepare floodplain assessments for proposals in or affecting floodplains. If any agency proposes to conduct an action in a floodplain, it must consider alternatives to avoid adverse effects and incompatible development. If the only practicable alternative involves siting in a floodplain, the agency must minimize potential harm to or in the floodplain and explain why the action is proposed in the floodplain. No impacts to floodplain areas are anticipated.

Executive Order 11990, Protection of Wetlands

Executive Order 11990 requires Federal agencies to prepare wetlands assessments for proposals in or affecting wetland. Agencies must avoid undertaking new construction in wetlands unless no practicable alternative is available and the proposed action includes practicable measures to minimize harm to wetlands. Impacts to wetland areas are anticipated to be relatively minor and temporary. Impacts will be mitigated as identified in Chapter IV under Biological Resources.

Clean Water Act

Any person or public agency proposing to locate a structure, excavate, or discharge dredged or fill materials into waters of the United States must obtain a Section 404 Permit from USACE. Under Section 404 of the CWA, USACE's jurisdiction over navigable waters has been expanded to include rivers, coastal waters, adjacent wetlands, lakes, intermittent streams, and low-lying areas behind dikes along the coast. Improvements requiring work in streams or wetlands regulated by USACE require a Section 404 Permit.

> 40 CFR Part 230.10(a) states that except as provided under section 404(b)(2), no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences.
>
> 1. For the purpose of this requirement, practicable alternatives include, but are not limited to:
>
> i. Activities which do not involve a discharge of dredged or fill material into the waters of the United States or ocean waters;
>
> ii. Discharges of dredged or fill material at other locations in waters of the United States or ocean waters;
>
> 2. An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered.
>
> 3. Where the activity associated with a discharge which is proposed for a special aquatic site (as defined in Subpart E) does not require access or proximity to or siting within the special aquatic site in question to fulfill its basic purpose (i.e., is not ``water dependent''), practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise. In addition, where a discharge is proposed for a special aquatic site, all practicable alternatives to the proposed discharge

which do not involve a discharge into a special aquatic site are presumed to have less adverse impact on the aquatic ecosystem, unless clearly demostrated otherwise.

4. For actions subject to NEPA, where the Corps of Engineers is the permitting agency, the analysis of alternatives required for NEPA environmental documents, including supplemental Corps NEPA documents, will in most cases provide the information for the evaluation of alternatives under these Guidelines. On occasion, these NEPA documents may address a broader range of alternatives than required to be considered under this paragraph or may not have considered the alternatives in sufficient detail to respond to the requirements of these Guidelines. In the latter case, it may be necessary to supplement these NEPA documents with this additional information.

5. To the extent that practicable alternatives have been identified and evaluated under a Coastal Zone Management program (a section 208 program) or other planning process, such evaluation shall be considered by the permitting authority as part of the consideration of alternatives under the Guidelines. Where such evaluation is less complete than that contemplated under this subsection, it must be supplemented accordingly.

To comply with the CWA, the impacts on aquatic ecosystems of four action alternatives were compared in Table V1-2.

Table VI-2
Comparison of Impacts on Aquatic Ecosystems

Alternative	Temporary Cofferdam	Temporary Dewatering	Temporary Construction	Permanent Impacts
MEN-5	0.1 acres	2.2 acres	None	1.9 acres
MEN-7	0.1 acres	2.2 acres	None	None
MEN-9B	1 to 2 acres	None	27 acres	1 acre
MEN-12	1 to 2 acres	None	27 acres	1 acre

Based on the analysis contained in this document, summarized in Table VI-2, alternative MEN-12 is the least environmentally damaging practicable alternative (LEDPA). MEN-12 provides long tem protection for Mendota Wildlife area and the upstream portion of Fresno Slough from temporary dewatering of Mendota Pool for maintenance and inspections of Mendota Dam. MEN-12 will provide an uninterruptible water supply to meet optimal habitat management for Mendota Wildlife Area.

Magnuson-Stevens Fishery Conservation and Management Act

Federal agencies are required by the Magnuson-Stevens Fishery Conservation and Management Act to consult with NOAA Fisheries on all actions that may affect essential fish habitat as defined in Amendment 14 of the Pacific Salmon Fishery Management Plan pursuant to the Magnuson-Stevens Fishery Conservation and Management Act. NOAA Fisheries is required to provide essential fish habitat conservations recommendations. Consultation by Reclamation with the NOAA Fisheries was concluded with letter dated August 16, 2001.

Chapter VII
Persons and Agencies Consulted

The following individuals were consulted during preparation of this EA/IS:

- Beam, John/CDFG
- Bettner, Thad/WWD
- Brooks, John/USFWS
- Brueggermann, Steve/CDFG
- Burns, Bob/WWD
- Forsberg, Paul/CDFG
- Garrison, Dale/USFWS
- Gruenhagen, Ned/Reclamation
- Harris, Seth/San Luis and Delta-Mendota Water Authority
- Huddelston, Robert/CDFG
- Jachens, Chuck/Reclamation
- Jefferies-Soniea, Mona/Reclamation
- Kleinsmith, Doug/Reclamation
- Meier, Dan/Reclamation
- McHale, Sharon/Reclamation
- Nechanicky, Sonya/Reclamation
- Nepstad, Mike/Reclamation
- Welch, Patrick/Reclamation
- White, Chris/CCID
- Young, David/Reclamation
- Zewe, Brian/Reclamation

Chapter VIII
References

Basgall, M.E., and D.L. True. 1985. *Archaeological Iinvestigation in Crowder Canyon, 1973-1984: Excavations at Site SBR-421B, SBR-421C, SBR-421D and SBR-713, San Bernardino County, California*. Report on file at the San Bernardino Archaeological Information Center, San Bernardino County Museum.

Belitz, K.R., and F.J. Heimes. 1990. "Ground-Water System of the Central Part of the Western Valley," In *Preliminary Assessment of Sources, Distribution, and Mobility of Selenium in the San Joaquin Valley, California*. U.S. Geological Survey Water-Resources Investigations 88-4186.

Bertoldi, G.L., R.H. Johnson, and K.D. Evenson. 1991. Ground Water in the Central Valley, California – A Summary Report, U.S. Geological Survey Professional Paper 1401-A: Washington, DC.

Bettner, Thad/Westlands Water District (WWD). 2006. Personal communication with Heather Waldrop/CH2M HILL. January 23.

Blum, D. 1984. "San Joaquin Salmon. One Victim of Dams, Diversions," In *The Fresno Bee*. February 1.

Bondello, M.C. 1976. The Effects of High Intensity Motorcycle Sounds on the Acoustical Sensitivity of the desert Iguana, *Dipsosaurus dorsalis*. Master of Science thesis, California State University, Fullerton.

Bowles, A.E. 1994. Responses of Wildlife to Noise. Chapter 8 In *Wildlife and Recreationists, Coexistence through Management and Research.* Edited by R.L. Knight and K.L. Gutzwiller. Island Press, Washington D.C.

Brown, L./U.S. Geological Survey (USGS), Fishery Biologist. 2003. Letter to C. White/Central California Irrigation District (CCID), General Manager. May 2.

Brown, L., and P.B. Moyle. In Press. "Native Fishes of the Sacramento-San Joaquin Drainage, California: A History of Decline." In: *Historical Changes in Fish Assemblages of Large North American Rivers*. American Fisheries Society, Bethesda, Maryland.

Brown, L.R., and P.B. Moyle. 1992. "Native Fishes of the San Joaquin Drainage: Status of a Remnant Fauna," In *Proceedings of Endangered and Sensitive Species of the San Joaquin Valley, California: a Conference on Their Biology, Management, and Conservation.* California State College, December 10-11, 1987. Bakersfield, California.

Brown, R.L. 1991. *Bioengineering Problems in River Systems of the Central Valley, California*. American Fisheries Society Symposium, vol. 10, pp. 19–31.

Brueggemann, S./California Department of Fish and Game (CDFG), Mendota WA Manager. 2005. Email to Mona Jeffries-Soniea/U.S. Bureau of Reclamation (Reclamation), Project Manager. December 2.

Brueggeman, S. 1996. *Wildlife Area Habitat Management Work Plan Summary for 1996.* California Department of Fish and Game (CDFG), State of California, The Resources Agency.

Bull, W.B. 1972. *Prehistoric Near-Surface Subsidence Cracks in Western Fresno County, California*. U.S. Geological Survey Professional Paper 437-C.

California Air Resources Board (CARB). 2006a. California Ambient Air Quality Standards. http://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm. Accessed January 2006.

California Air Resources Board (CARB). 2006b. Air Quality Monitoring Data. http://www.arb.ca.gov/adam/cgi-bin/db2www/adamtop4b.d2w/start. Accessed January 2006.

California Air Resources Board (CARB). 2005. Emissions Inventory – Almanac Emission Projection Data. http://www.arb.ca.gov/app/emsinv/fcemssumcat_query.php. Accessed January 2006.

California Department of Fish and Game (CDFG). 2005. Mendota Wildlife Area water quality data on file at wildlife area office. Provided to CH2M HILL by Steve Brueggemann via email on July 22.

California Department of Fish and Game (CDFG). 2004. *Approved Survey Methodology for the Blunt-nosed Leopard Lizard*. May.

California Department of Fish and Game (CDFG). 2001. *San Joaquin Valley Giant Garter Snake Project 2001*. Region 4 Resources Assessment Program, Contribution No. 20.

California Department of Fish and Game (CDFG). 2000. *Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities*. The Resources Agency. http://www.dfg.ca.gov/whdab/pdfs/guideplt.pdf. May.

California Department of Fish and Game (CDFG). 1994. Staff report regarding mitigation for impacts to Swainson's hawks in the Central Valley of California. Sacramento. June.

California Department of Fish and Game (CDFG). 1976. *Check List of the Birds of the Mendota Wildlife Area*. Region 4. Project W-50-D. July.

California Department of Transportation. 1999. Caltrans Water Quality Practice Management Guidelines. December.

California Department of Transportation. 1992. California State and County Scenic Highways.

California Department of Water Resources (DWR). 2005. Daily water quality data for Check 13, O'Neill Intake, Station ID C13. Available online from California Data Exchange Center (CDEC), http://cdec.water.ca.gov/cgi-progs/staMeta?station_id=C13.

California Department of Water Resources (DWR). 2003. California's Groundwater - Bulletin 118, Update 2003.

California Department of Water Resources (DWR). 1993. Water Transfers in California: Translating Concepts into Reality. 1994, California Water Plan Update, Volume 1, Bulletin 160-93.

California Water Commission (CWC). 1996. Minutes from meeting held on February 2, 1996, in Modesto, California.

Central California Irrigation District (CCID). 1997. "Groundwater Conditions in and near the Central California Irrigation District." Prepared by Kenneth D. Schmidt and Associates. May.

Central California Irrigation District (CCID). 1992. Annual Report. Los Banos, California.

Central California Irrigation District (CCID) and City of Mendota. 1999. "Groundwater Conditions in the Vicinity of the City of Mendota." Prepared by Kenneth D. Schmidt and Associates. February.

Central Valley Regional Water Quality Control Board (CV Water Board). 2002a. *Total Maximum Daily Load for Salinity and Boron in the Lower San Joaquin River*.

Central Valley Regional Water Quality Control Board (CV Water Board). 2002b. *Draft Implementation Framework for the Control of Diazinon and Chlorpyrifos in the San Joaquin River Basin*.

Central Valley Regional Water Quality Control Board (CV Water Board). 1988. *Modifications to Beneficial Uses and Water Quality Objectives Necessary for the Regulation of Agricultural Subsurface Discharges in the San Joaquin Basin*, a staff report. Central Valley Region. Sacramento, California.

Cook, A.J. 1955. *The Aboriginal Population of the San Joaquin Valley, California*. University of California Anthropology Record, vol. 16, pp. 31–80.

Corwin, J.T., and D.A. Cotanche. 1988. Regeneration of Sensory Hair Cells After Acoustic Trauma. *Science*, Vol. 240.

Croft, M.G. 1972. *Subsurface Geology of the Late Tertiary and Quaternary Water-Bearing Deposits of the San Joaquin Valley, California*. U.S. Geological Survey Water Supply Paper 1999-H.

Davis, G.H., and J.F. Poland. 1957. Ground-Water Conditions in the Mendota-Huron Area, Fresno and Kings Counties, California, U.S. Geological Survey Water-Supply Paper 1360-G: U.S. Geological Survey, Denver, CO, pp. 409-588.

Departments of the Air Force, Army, and Navy. 1978. *Environmental Protection Planning in the Noise Environment*.

Dimmitt, M.A., and R. Ruibal. 1980. Environmental Correlates of Emergence in Spadefoot Toads (*Scaphiopus*). *Journal of Herpetology*, Vol. 14.

Dooling, R.J. 1980. Auditory Perception in Birds. In *Acoustic Communication in Birds*. Edited by D.E. Kroodsma and E.H. Miler. Academic Press, New York.

Faber, P.M. 2003. *California Riparian Systems: Processes and Floodplain Management, Ecology, and Restoration*. 2001 Riparian Habitat and Floodplains Conference Proceedings, Riparian Habitat Joint Venture, Sacramento, California.

Fletcher, J.L. 1980. Effects of Noise on Wildlife: A Review of relevant Literature 1971 – 1978. In *Proceedings of the Third International Congress on Congress on Noise as a Public Health Problem*. Edited by J.V. Tobias, G. Jansen, and W.D. Ward. American Speech-Language-Hearing Association, Rockville, Maryland.

Fresno County. 2005. Fresno County Ordinance Code. July 12, 2005.

Fujii, R., and W.C. Swain. 1995. Areal distribution of selected trace elements, salinity, and major ions in shallow ground water, Tulare Basin, southern San Joaquin Valley, California. U.S. Geological Survey Water Resource Investigation Report 9504048. Sacramento, California.

Gladwin, D.N., D.A. Ashern, and K.M. Manci. 1987. Effects of Aircraft Noise and Sonic Booms on Fish and Wildlife: Results of a Survey of the U.S. Fish and Wildlife Service Endangered Species and Ecological Services Field Offices, Refuges, Hatcheries, and Research Centers. NERC 88/30, USFWS, National Ecology Research Center, Fort Collins, Colorado.

Harding, S.T. 1960. *Water in California*. N-P Publications, Palo Alto, California.

Hastings, M.C., A.N. Popper, J.J. Finneran, and P.J. Lanford. 1996. Effects of Low frequency Underwater Sounds on the Hair Cells of the Inner Ear and Lateral Line of the Teleost Fish *Astronotus Ocellatus*. *Journal of the Acoustical Society of America*, Vol. 99, No. 3.

Ireland, R.L., J.F. Poland, and F.S. Riley. 1984. *Land Subsidence in the San Joaquin Valley, California, as of 1980*. U.S. Geological Survey Professional Paper 437-I.

JSA. 2001. *Technical Memorandum on the Potential Barriers to Migrating Steelhead and Chinook Salmon on the San Joaquin River.* Prepared for Friant Water Users Authority and the Natural Resources Defense Council. December.

Kroeber, A.L. 1961. "The Nature of Landholding Groups in Aboriginal California," In *Aboriginal California: Three Studies in Culture History*. University of California Archaeology Residency Facility. Berkeley, California, 58 pp.

Latta, F.F. 1949. *Handbook of Yokuts Indians*. Bear State Books. Oildale, California, 287 pp. and map.

Lewis, E.R., and P.M. Narins. 1985. "Do Frogs Communicate with Seismic Signals?" *Science*, Vol. 267, No. 4683.

Manci, K.M., D.N. Gladwin, R. Villella, and M.G. Cavendish. 1988. *Effects of Aircraft Noise and Sonic Booms on Domestic Animals and Wildlife: A Literature Synthesis.* U.S. Fish and Wildlife Service. National Ecology Research center, Fort Collins, Colorado. NERC-88/29.

Mayer, K.E., and W.M. Laudenslayer (editors). 1988. *A Guide to Wildlife Habitats of California*. California Department of Forestry and Fire Protection. Sacramento, California.

Meier, Chrystal/San Joaquin Valley Air Pollution Control District (SJVAPCD). 2006. Personal communication with Heather Waldrop/CH2M HILL. January 10.

Moore, S.B., J. Winckel, S.J. Detwiler, S.A. Klasing, P.A. Gaul, N.R. Kanim, B. Kesser, A.B. DeBevec, K. Beardsley, and L.K. Puckett. 1990. *Fish and Wildlife Resources and Agricultural Drainage in the San Joaquin Valley, California*, Volumes I and II. Prepared by the San Joaquin Valley Drainage Program. Sacramento, California. October.

Moyle, P.B. 2002. *Inland Fishes of California*. Revised and expanded. University of California Press, Berkeley, California.

Moyle, P.B. 1976. *Inland Fishes of California*. University of California Press, Berkeley, California.

National Park Service. 1994. Report on the Effects of Aircraft Overflights on the National Park System. Report to Congress.

Natural Resources Conservation Service. 2005. *Long Range Planning for Drought Management: The Groundwater Component.* http://wmc.ar.nrcs.usda.gov/technical/GW/Drought.html. Accessed June.

Pacific Fishery Management Council (PFMC). 1999. Amendment 14 to the Pacific Coast Salmon Plan. Appendix A: Identification and Description of Essential Fish Habitat, Adverse Impacts, and Recommended Conservation Measures for Salmon. PFMC, Portland, Oregon. August.

Page, R.W. 1986. *Geology of the Fresh Ground-Water Basin of the Central Valley, California, with Texture Maps and Sections*. U.S. Geological Survey Professional Paper 1401-c.

Poland, J.F., B.F. Lofgren, R.L. Ireland, and R.G. Pugh. 1975. *Land Subsidence in the San Joaquin Valley, California, as of 1972*. U.S. Geological Survey Professional Paper 437-H.

Raines, R., and C. Karp. 1992. *Affected Environment and Environmental Consequences for the Friant Division Contract Renewals, Team Draft, Environmental Impact Statement*. Bureau of Reclamation, Denver Technical Service Center. Denver, Colorado.

Reynolds, F.L., R.L. Reavis, and J. Schuler. 1990. *Central Valley Salmon and Steelhead Restoration and Enhancement Plan*. State of California, The Resources Agency, California Department of Fish and Game. Sacramento, California, 115 pp.

Ryals, B.M., and E.W. Rubel. 1988. Hair Cell regeneration After Acoustic Trauma in Adult *Coturnix* Quail. *Science*, Vol. 240, No. 4860.

San Joaquin River Exchange Contractors Water Authority. 1999. Unpublished water quality data.

San Joaquin River Resource Management Coalition (SJRRMC). 2003. *Upper San Joaquin River Conceptual Restoration Plan, Phase I*. August.

San Joaquin Valley Air Pollution Control District (SJVAPCD). 2002. *Guide for Assessing and Mitigating Air Quality Impacts* (Revised). Includes Technical Document: Information for Preparing Air Quality Sections in EIRs. January.

Stanley, J./California Department of Fish and Game (CDFG), Region 4, Regional Fisheries Biologist. 1999. Personal communication. January 20.

Summers Engineering. 1988. *Reconnaissance Report Mendota Dam Relocation.* Hanford, California

Twining Laboratories, Inc. 1992. Test results produced for Calwater Drilling, April 13 and April 17. On file in the Mendota WA office.

U.S. Bureau of Reclamation (Reclamation). 2005. *Water Quality Reports: Delta-Mendota Canal at Check 21. EC and TDS*. http://www.usbr.gov/mp/cvo/wqrpt.html.

U.S. Bureau of Reclamation (Reclamation). 2004. *Water Transfer Program for the San Joaquin River Exchange Contractors Water Authority 2005-2014*. Draft EIS/EIR. June 7.

U.S. Bureau of Reclamation (Reclamation). 1997. *Central Valley Improvement Act Draft Programmatic Environmental Impact Statement*.

U.S. Bureau of Reclamation (Reclamation). 1995. *Decision Document: Report of Recommended Alternatives, Refuge Water Supply and San Joaquin Basin Action Plan Lands*. April.

U.S. Bureau of Reclamation (Reclamation). 1994. *Final Environmental Assessment and Finding of No Significant Impact, Interim Refuge Water Supply*. Mid-Pacific Region. Sacramento, California.

U.S. Bureau of Reclamation (Reclamation). 1989a. *Report on Refuge Water Supply Investigations, Central Valley Hydrologic Basin, California*. March.

U.S. Bureau of Reclamation (Reclamation). 1989b. *San Joaquin Basin Action Plan/Kesterson Mitigation Action Plan Report.*

U.S. Bureau of Reclamation (Reclamation). 1986. *Central Valley Fish and Wildlife Management Study, Refuge Water Supply, Central Valley Hydrologic Basin, California*, draft. Mid-Pacific Region. Sacramento, California.

U.S. Bureau of Reclamation (Reclamation) and California Department of Fish and Game (CDFG). 2003. *Conveyance of Refuge Water Supply Environmental Assessment and Initial Study – South San Joaquin Valley Study Area: Kern and Pixley National Wildlife Refuges*. Public Draft.

U.S. Bureau of Reclamation (Reclamation), U.S. Fish and Wildlife Service, California Department of Fish and Game, and Grassland Resource Conservation District. 2004. Evaluation of Groundwater Potential for Incremental Level 4 Refuge Water Supply. July.

U.S. Bureau of Reclamation (Reclamation), U.S. Fish and Wildlife Service, and California Department of Fish and Game. 1996. *The Central Valley Project Improvement Act Administrative Draft Programmatic Environmental Impact Statement*, plus technical appendices.

U.S. Census Bureau. 2005. State and County QuickFacts. Data derived from Population Estimates, 2000 Census of Population and Housing, 1990 Census of Population and Housing, Small Area Income and Poverty Estimates, County Business Patterns, 1997 Economic Census, Minority- and Women-Owned Business, Building Permits, Consolidated Federal Funds Report, 1997 Census of Governments. Accessed August.

U.S. Census Bureau. 2004. Population Estimates, Online information: http://factfinder.census.gov/. Accessed November, 2005.

U.S. Department of Agriculture. 1970. Irrigation Water Requirements, Technical Release 21. Reference: www.nas.usda.gov/ca/

U.S. Department of Housing and Urban Development. 1978. Environmental Criteria and Standards, Section 51.101.9.

U.S. Environmental Protection Agency (EPA). 1971. *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances*. Arlington, Virginia, Prepared by Bolt, Beranek and Newman, Boston, MA., U.S. Government Printing Office, Washington, D.C.

U.S. Fish and Wildlife Service (USFWS). 2005. *Santa Rosa Plain Conservation Strategy*. Final. http://www.fws.gov/sacramento/es/santa_rosa_conservation.html. December.

U.S. Fish and Wildlife Service (USFWS). 1999a. *Programmatic Biological Opinion on National Wildlife Refuge and Wildlife Area Conveyance Projects Within Tulare, Kern, Fresno, Madera, and Merced Counties, California*. June.

U.S. Fish and Wildlife Service (USFWS). 1999b. *Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance*. June. Sacramento Office.

U.S. Fish and Wildlife Service (USFWS). 1998. *Final Endangered Species Act Section 7 Consultation Handbook*. March 1998.

U.S. Fish and Wildlife Service (USFWS). 1997. *Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake in Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter and Yolo Counties, California*. Sacramento Fish and Wildlife Office. 1-1-F-97-149. November.

U.S. Fish and Wildlife Service (USFWS). 1995. *Draft Anadromous Fish Restoration Plan: A Plan to Increase Natural Production of Anadromous Fish in the Central Valley of California*. December.

U.S. Fish and Wildlife Service (USFWS). 1993. *USBR-San Joaquin River Basin Resource Initiative: Proposed Replacement of Mendota Pool Dam Planning Aid Report Memorandum*. March.

U.S. Geological Survey (USGS). 1985. *National Water Summary 1984*. U.S. Geological Survey Water-Supply Paper 2275. U.S. Government Printing Office. Washington, DC.

West, G.J., and P. Welch. 1998. *Class III Archeological Survey for the Mendota Dam and Downstream Areas, Fresno and Madera Counties, California*. U.S. Bureau of Reclamation, Sacramento, California. March.

Wever, E.G., M. Hepp-Raymond, and J.A. Vernon. 1966. Vocalization and Hearing in the Leopard Lizard. In *Proceedings of the National Academy of Sciences*, Vol. 55.

Wever, E.G., and J.A. Vernon. 1960. The Problem of Hearing in Snakes. *Journal of Auditory research Supplement 5*, Vol. 1.

White, Christopher/Central California Irrigation District. 2005. Conversation with Heather Waldrop/ CH2M HILL. March 22.

White, Christopher/Central California Irrigation District. 1998. Personal communication.

Woodward-Clyde Consultants, Inc. 1994. *Groundwater Study of Mendota Pool and Vicinity.* Oakland, California.