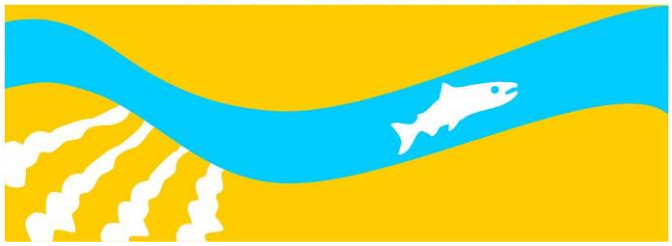
Mendota Pool Bypass and Reach 2B Improvements Project

Technical Memorandum on Environmental Field Survey Results
(Subject to Revision)

SAN JOAQUIN RIVER
RESTORATION PROGRAM



November 2011

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List of Abbreviations and Acronyms

Act	San Joaquin River Restoration Settlement Act
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act of 1970
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
cm	centimeter
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CSU	California State University
Delta	Sacramento–San Joaquin Delta
DWR	California Department of Water Resources
EIS/R	Environmental Impact Statement/Report
ESA	Endangered Species Act
ESU	Evolutionarily Significant Units
ºF	degrees Fahrenheit
FACW	facultative wetland plants
FR	Federal Register
GIS	Geographic Information System
GPS	Global Positioning System
LIDAR	Light Detection and Ranging
NEPA	National Environmental Policy Act of 1969
NMFS	National Marine Fisheries Service
NRCS	Natural Resource Conservation Service
NRDC	Natural Resources Defense Council
OBL	obligate plants
OHWM	ordinary high water mark
PG&E	Pacific Gas and Electric Company
Project	Mendota Pool Bypass and Reach 2B Improvements Project
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
Settlement	Stipulation of Settlement

SJRRP	San Joaquin River Restoration Program
SR	State Route
State	State of California
TL	total length
TM	technical memorandum
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WBWG	Western Bat Working Group
WHR	Wildlife-Habitat Relationships System
WUS	waters of the United States

This Draft Technical Memorandum (TM) was prepared by the San Joaquin River Restoration Program (SJRRP) Team as a draft document in support of preparing an Environmental Impact Statement/Environmental Impact Report (EIS/R) for the Mendota Pool Bypass and Reach 2B Improvements Project (Project). The purpose for circulating this document at this time is to facilitate early coordination regarding initial approaches currently under consideration by the SJRRP Team with the Settling Parties, Third Parties, other stakeholders, and interested members of the public. Therefore, the content of this document may not necessarily be included in the Project EIS/R. While the SJRRP Team is not requesting formal comments on this document, all comments received will be considered in refining the concepts and approaches described herein to the extent possible.

1.0 Summary

1.1 Purpose

The purpose of this technical memorandum (TM) is to provide biological background information and survey results needed to support the resource area sections in the Mendota Pool Bypass and Reach 2B Improvements Project (Project) Environmental Impact Statement/Report (EIS/R) and to support the permit applications necessary to implement the Project, including the Biological Assessment. The Project includes the construction, operation, and maintenance of the Mendota Pool Bypass and improvements in the San Joaquin River channel in Reach 2B to convey at least 4,500 cubic feet per second (cfs). This TM is also intended to facilitate the alternatives analysis for the Project, which will be developed in a separate memorandum.

1.2 Background Information

The San Joaquin River is California's second longest river and it historically supported a rich and diverse ecosystem guided by seasonal runoff patterns. Operation of Friant Dam, beginning in 1945, ceased flow in some portions of the river, which ultimately led to the extirpation of salmon runs in the San Joaquin River upstream from its confluence with the Merced River. In 1988, a coalition of environmental groups filed a lawsuit challenging the manner in which the dam and its water diversions were operated. On September 13, 2006, this lawsuit, known as *Natural Resources Defense Council (NRDC), et al., v. Kirk Rodgers, et al.*, was settled (Settlement). The Settlement establishes a Restoration Goal and a Water Management Goal for the San Joaquin River, as well as a framework for accomplishing the goals that will require National Environmental Policy Act and California Environmental Quality Act review and environmental compliance. The Settlement includes a detailed timeline for developing and implementing San Joaquin River Restoration Program (SJRRP) actions, which will be implemented by a group of State of California (State) and Federal agencies. These agencies include the U.S. Department of the Interior, Bureau of Reclamation (Reclamation), as the Federal lead agency under the National Environmental Policy Act of 1969, and the California Department of Water Resources (DWR), as the State lead agency under the California Environmental Quality Act, as well as the U.S. Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), and California Department of Fish and Game (CDFG).

1.3 Methods

The methods used to prepare this TM included reviewing existing data sources, including databases, literature, and unpublished reports, and conducting reconnaissance-level and

focused field surveys. Surveys were conducted as described in the Mendota Pool Bypass and Reach 2B Improvements Project Draft Technical Memorandum on Existing Environmental Conditions: Data Needs and Survey Approach (SJRRP 2010a), except where lack of permission to enter private property precluded surveys at the time or location (see Section 3.2).

Permission to access private property was not granted until August 2010. Field surveys were initiated in August 2010, at which time biologists conducted wildlife habitat assessment and special-status vegetation alliance surveys. Access to private property in the study area was not granted in time to initiate some of the field surveys identified in the Data Needs and Survey Approach TM (SJRRP 2010a) (i.e., the March 2010 reconnaissance survey, the 2010 rare plant surveys, or the 2010 wetland delineation). Wetland delineation and rare plant surveys are now scheduled to be conducted in 2011.

1.4 Results and Discussion

The potential for special-status wildlife species identified during the background review to occur in the study area was evaluated during the wildlife habitat assessment survey conducted August 23 through August 27, 2010. During the habitat assessment survey, wildlife habitat types throughout the study area were mapped. For most species, the background information combined with the habitat assessment survey provides sufficient information to determine the potential for individual special-status wildlife species to occur in the study area, and to support Project environmental documents and permitting. During the summer of 2011, focused surveys were conducted in accessible portions of the study area for valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) and Fresno kangaroo rat (*Dipodomys nitratoides exilis*) . Fresno kangaroo rat was not detected during the surveys. Elderberry shrubs (*Sambucus* spp.) with exit holes potentially created by valley elderberry longhorn beetle were detected during the surveys. Additional surveys are needed for valley elderberry longhorn beetle, Fresno kangaroo rat, and blunt-nosed leopard lizard (*Gambelia sila*) in portions of the study area where permission to access private property has not been granted. Although the potential for occurrence of vernal pool branchiopods is considered low, one portion of the study area where access was not available during the habitat assessment survey warrants further evaluation of habitat suitability for longhorn fairy shrimp (*Branchinecta longiantenna*) and vernal pool fairy shrimp (*Brachinecta lynchi*).

Surveys for special-status vegetation alliances were also conducted August 23 through August 27, 2010. Special-status vegetation alliances were mapped where they were found in the study area, primarily along the San Joaquin River corridor. A total of 18 unique vegetation alliances were mapped, most with multiple occurrences. Although the surveyors did not have access to the entire study area at the time of the survey, it is estimated that approximately 70 percent of the special-status vegetation alliances present in the study area were mapped during this effort. Access to additional private property would be needed to complete the mapping.

2.0 Introduction

This Technical Memorandum (TM) on Environmental Field Survey Results provides biological background information and survey results for the Mendota Pool Bypass and Reach 2B Improvements Project (Project). The San Joaquin River Restoration Program (SJRRP) was established in late 2006 to implement the Stipulation of Settlement (Settlement) in *NRDC, et al., v. Kirk Rodgers, et al.*

Reclamation, as the Federal lead agency under the National Environmental Policy Act of 1969 (NEPA), and the DWR, as the State lead agency under the California Environmental Quality Act (CEQA), prepared this TM as an initial step in the preparation of an Environmental Impact Statement/Report (EIS/R) for the Project. Federal authorization for implementing the Settlement is provided in the San Joaquin River Restoration Settlement Act (Act) (Public Law 111-11).

2.1 Purpose of this Technical Memorandum

The purpose of this TM is to provide biological data and survey results needed to support the biology sections in the Project EIS/R, permitting documents, and consultations necessary to implement the Project.

Using the information from the Existing Environmental Conditions Data Needs and Survey Approach TM (SJRRP 2010a), and other relevant data sources, this TM provides background information and the results of field surveys conducted to collect baseline and existing conditions information.

2.2 Overview of Mendota Pool Bypass and Reach 2B Improvements Project

The Project includes the construction, operation, and maintenance of the Mendota Pool Bypass and improvements in the San Joaquin River channel in Reach 2B to convey at least 4,500 cfs. The Project area (Figure 2-1) extends from the Chowchilla Bypass Bifurcation Structure to approximately 1 mile below the Mendota Dam. The extent of Project area boundaries will depend on the final alternatives considered. The Project area is in Fresno and Madera counties, near the town of Mendota.

Paragraph 11(a)(1) of the Settlement stipulates the creation of a bypass channel around the Pool to ensure conveyance of at least 4,500 cfs from Reach 2B downstream to Reach 3. Paragraph 11(a)(2) of the Settlement stipulates modifications in channel capacity, incorporating new floodplain habitat and related riparian habitat, to ensure conveyance of at least 4,500 cfs between the Chowchilla Bypass Bifurcation Structure and the new Mendota Pool Bypass. Because the functions of these channels may be inter-related, the design, environmental compliance, and construction of the two are being

addressed as one project. The Project shall be implemented consistent with the Settlement and the San Joaquin River Restoration Settlement Act (Public Law 111-11).

The Mendota Pool Bypass would include conveying at least 4,500 cfs around the Pool from Reach 2B to Reach 3 and a fish barrier to direct upmigrating adult salmon into the bypass channel. This action would include the ability to divert 2,500 cfs to the Pool and may consist of a bifurcation structure in Reach 2B. The bifurcation structure would include a fish passage facility to enable up-migrating salmon to pass the structure and a fish screen to direct out-migrating fish into the bypass channel and minimize or avoid fish entrainment to the Pool.

Improvements to Reach 2B would include modifications to the San Joaquin River channel from the Chowchilla Bypass Bifurcation Structure to the new Mendota Pool Bypass to provide a capacity of at least 4,500 cfs with integrated floodplain habitat. The options under consideration include potential levee set backs along Reach 2B to increase the channel and floodplain capacity and provide for floodplain habitat. Floodplain habitat is included along the Reach 2B portion of the Project as required by the Settlement; floodplain habitat is being considered along the Mendota Pool Bypass channel because Central Valley floodplains have been shown to be of value to rearing juvenile salmon as they migrate downstream (Sommer 2001, Sommer 2004, Grosholz 2006, and Jeffres 2008).

2.3 Organization of this Technical Memorandum

The content and format of this TM are intended to dovetail with the future Project EIS/R, which will meet the requirements of NEPA, as set forth by the Council on Environmental Quality (CEQ) and Reclamation's NEPA policy and guidance, including the U.S. Department of the Interior Implementation of NEPA and Final Rule, and CEQA and the State of California's CEQA Guidelines. The TM is organized as shown below.

Section 1.0 Summary – summarizes the information in this TM

Section 2.0 Introduction – introduces the TM, presenting background project information, and describing its purpose and organization

Section 3.0 Methods – presents the methods used to prepare this TM

Section 4.0 Results and Discussion – presents the review of existing biological data, field survey results, and an evaluation of the potential for specific resources to be present in the study area

Section 5.0 Acknowledgements – provides a list of those who contributed to the document

Section 6.0 References – lists all references cited in this TM

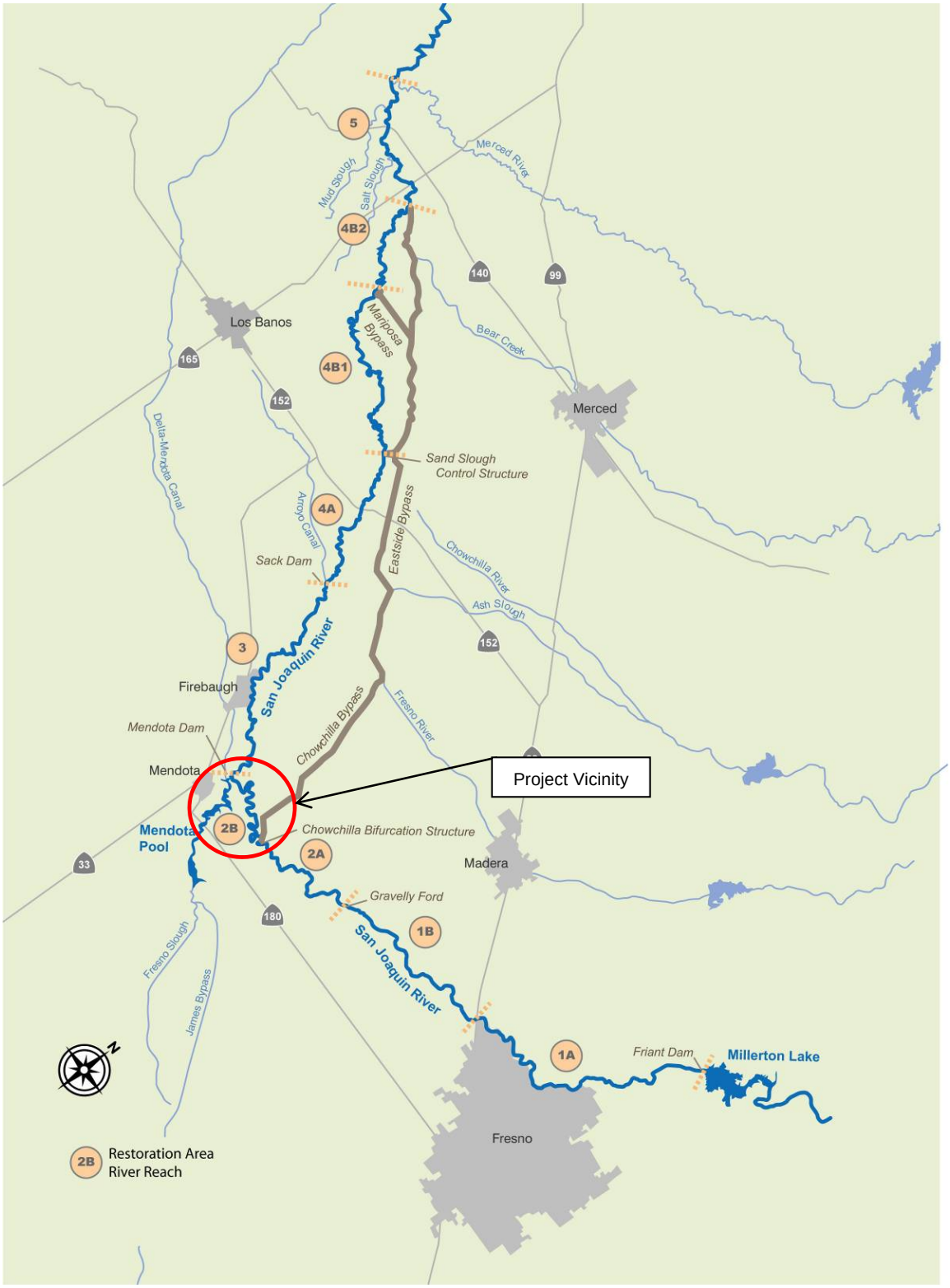

Figure 2-1.
Overview of SJRRP Restoration Area and Project Vicinity

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3.0 Methods

This section presents the methods used to identify biological resources in the study area (see Figure 3-1). This section discusses the background information and literature that was reviewed and details the methods used during field surveys and post-field data processing. It also summarizes the study limitations and how they may influence the results presented in this TM.

The methods used to identify and evaluate biological resources that may be present in the study area are organized by resource area:

- Fish and aquatic resources (Section 3.3)
- Special-status wildlife species (Section 3.4)
- Wetlands and other waters (Section 3.5)
- Special-status plant species (Section 3.6)
- Special-status vegetation alliances (Section 3.7)

3.1 Study Limitations

Temporary Entry Permits used to obtain legal access to private property in the study area (Section 3.2) contain language limiting how data collected on private property can be used and distributed. Biological resources field survey data (e.g., Geographic Information System [GIS] files) documented in this report will be kept on file with Reclamation and the California DWR. These data will also be provided to USFWS, NMFS, CDFG, and other regulatory agencies with jurisdiction or regulatory authority over biological resources. Any information related to private property provided to the public and/or reported in subsequent environmental documents as part of the Project will be general in nature and will not identify assessor's parcel numbers, addresses, owner names, or specific locations of biological resources, unless otherwise required by law.

To facilitate discussion of existing resources in the Project vicinity, database searches were conducted for the area extending up to 10 miles from a line drawn between the endpoints of Reach 2B along the centerline of the San Joaquin River channel, from the Chowchilla Bifurcation Structure to Mendota Dam (Figure 3-1). The line was used because at the time of the database searches the Project area had not been defined. A 10-mile buffer from that line was used because species that occur within this 10-mile range are expected to be more likely to occur within the study area. Throughout this TM, when distances are reported as “from the Project area,” they are typically measured from this line.

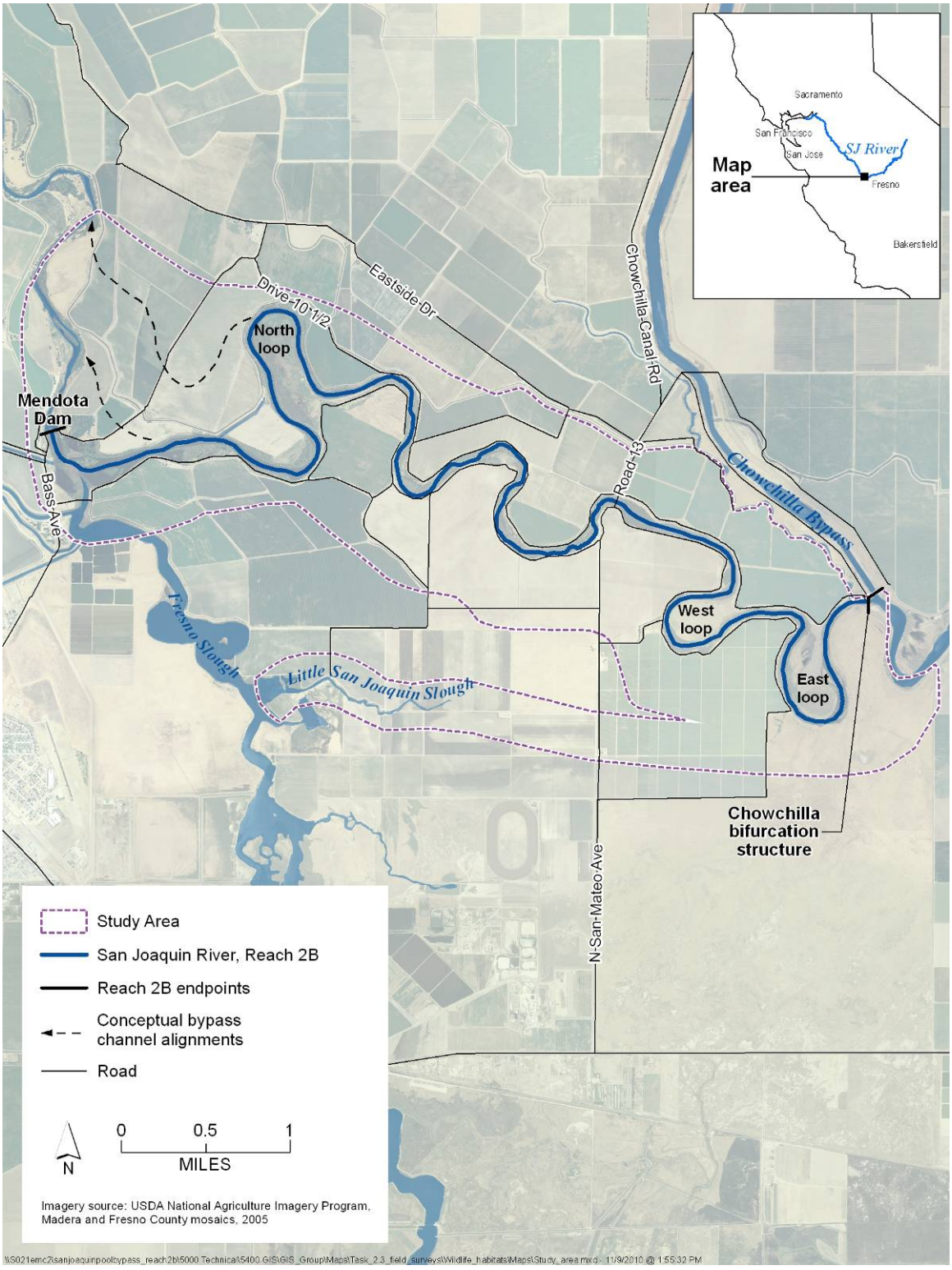

Figure 3-1.
Study Area

3.2 Study Area and Field Access

This TM addresses only the Project as described in Section 2.2. The maximum extent of the Project is expected to lie entirely within the Mendota Dam U.S. Geological Survey (USGS) 7.5-minute quadrangle. This TM was prepared concurrently with the Project Description TM, which will identify the preferred Project alternative. The extent of the Project area boundaries will depend on the final alternative selected, and this extent will continue to be developed as the environmental documentation (or Project EIS/R) process progresses. Therefore, a broad study area was delineated that was anticipated to include the entire geographic footprint of the final Project alternative selected. That 5,360-acre study area and the general extent and vicinity of options currently under investigation are shown on Figure 3-1. This study area should not be confused with the use of "Project area" in this TM, as defined above (Section 3.1) and used primarily in relation to database searches.

During August 2010, when the wildlife habitat mapping (Section 3.4.3), wildlife habitat assessment surveys (Section 3.4.4), and special-status vegetation alliances surveys and mapping were conducted (Section 3.7.3), access to privately owned property had been granted to only a portion of the study area. Access had been granted primarily to parcels located south of the San Joaquin River, and access was primarily not available north of the river. During the March 2011 valley elderberry longhorn beetle surveys (Section 3.4.5) and special-status plant surveys (Section 3.6.3), access was granted to a few additional parcels. Figure 3-2 shows the portions of the study area that were accessible to the field teams, as well as public roads outside those parcels that were used to gain visual access to some areas where permission to enter had not been granted.

3.3 Fish and Other Aquatic Resources

This section describes the methods used to identify and evaluate fish and aquatic resources that may be present in the study area. No field surveys for fish specific to the Project were conducted as part of this study.

3.3.1 Special-Status Species Identification

Fish species with any of the following special-status designations that may be found in the study area are addressed in this TM:

- Federally listed as endangered, threatened, or proposed for Federal listing under the Endangered Species Act (ESA) (50 CFR 17.12 [listed plants]); 50 CFR 17.11 (listed animals); and various notices in the *Federal Register* (proposed species)
- Federal candidates for possible future listing as threatened or endangered under the ESA (73 FR 75176, December 10, 2008)

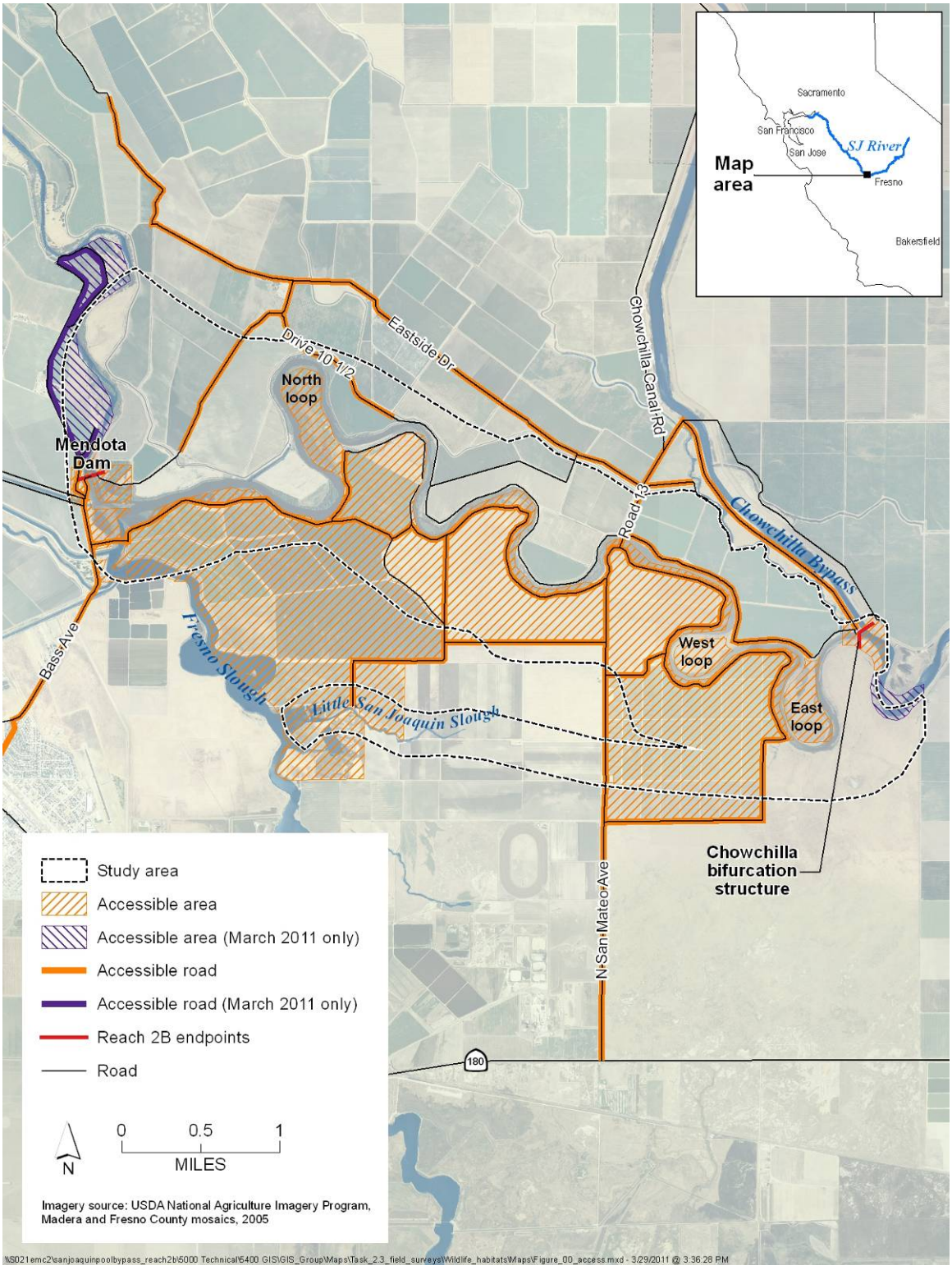

Figure 3-2.
Access in the Study Area During Field Surveys

- State listed as endangered or threatened, proposed for State listing, or State candidate for listing (14 CCR 670.5)
- State fully protected (California Fish and Game Code Sections 3511 [birds], 4700 [mammals], 5050 [amphibians and reptiles], and 5515 [fish])
- CDFG Species of Special Concern and Watch List species (CDFG 2011)

3.3.2 Review of Existing Data

Database searches and a literature review were conducted to identify special-status fish and aquatic resources that could potentially occur in the study area. Two primary databases were reviewed:

- California Natural Diversity Database (CNDDB) (CDFG 2009a): All records from the Mendota Dam USGS 7.5-minute quadrangle in this database, maintained by CDFG, as well as all records from the upstream and downstream (Gravelly Ford and Firebaugh) quadrangles were reviewed. All species with records from these quadrangles and meeting the above status criteria for inclusion are addressed in this TM
- USFWS Sacramento Field Office Species List (USFWS 2009a): All species on this list generated at the Sacramento USFWS website for the Mendota Dam quadrangle are addressed in this TM

Information regarding aquatic resources and potential habitat conditions found in Reach 2B is contained in the sources identified below. The extent of information in the San Joaquin Valley for aquatic resources includes surveys done over a wide area along the San Joaquin River and its tributaries. Most of the sampling conducted did not include any of Reach 2 with the exception of the Mendota Pool. Sources of existing data which were reviewed and referenced during the preparation of this TM included the following:

- Brown 1993. Distribution, Ecology, and Status of the Fishes of the San Joaquin River Drainage, California. California Fish and Game 79: 96-114
- CDFG 2007. San Joaquin River fishery and aquatic resources inventory. Final report, September 2003–September 2005
- CH2MHILL 2003, Upper San Joaquin River Conceptual Restoration Phase 1 Planning Document. Prepared for the San Joaquin River Resource Management Coalition August 2003
- CH2MHILL 2005, Upper San Joaquin River Conceptual Restoration Phase 2 Planning Document. Prepared for the San Joaquin River Resource Management Coalition December 2005
- Jones and Stokes 1986. White Bass Sampling Program Final Report. Prepared by Jones and Stokes, Sacramento, CA for the CDFG, Rancho Cordova, CA
- McBain and Trush 2002, San Joaquin River Restoration Study Background Report, prepared for Friant Water Users Authority, Lindsay, Calif., and Natural Resources Defense Council, San Francisco, Calif., Chapter 7: Fish Resources

- Moyle 2002. Inland Fishes of California, University of California Press
- Saiki 1984. Environmental conditions and fish faunas in low elevation rivers on the irrigated San Joaquin Valley floor, California. California Fish and Game 70: 145-157

3.3.3 Field Surveys

No field surveys for fish specific to the Project were conducted as part of this study.

3.4 Special-Status Wildlife Species

This section describes the methods used to identify special-status wildlife species potentially occurring in the study area and describes how the likelihood of occurrence was evaluated. The evaluations were based on database searches and literature review, as well as habitat mapping and habitat assessment surveys.

3.4.1 Special-Status Species Identification

Wildlife species of the following special-status designations are addressed in this TM:

- Federally listed as endangered threatened, or proposed for Federal listing under the ESA (50 CFR 17.12 [listed plants]); 50 CFR 17.11 (listed animals); and various notices in the Federal Register (proposed species)
- Federal candidates for possible future listing as threatened or endangered under the ESA (73 FR 75176, December 10, 2008)
- State listed as endangered or threatened, proposed for State listing, or State candidate for listing (14 CCR 670.5)
- State fully protected (California Fish and Game Code Sections 3511 [birds], 4,700 [mammals], 5050 [amphibians and reptiles], and 5515 [fish])
- USFWS Bird of Conservation Concern species (USFWS 2008a)
- CDFG Species of Special Concern and Watch List species (CDFG 2011)

3.4.2 Review of Existing Data

Database searches were conducted to identify the special-status wildlife species that potentially occur in the study area. Three primary databases were reviewed to obtain special-status wildlife species occurrence data from within 10 miles of the Project area:

- CNDDB (CDFG 2009a): All records from the Mendota Dam USGS 7.5-minute quadrangle in this database, maintained by CDFG, and all records from the surrounding eight quadrangles (Jamesan, Tranquillity, Coit Ranch, Firebaugh, Poso Farm, Firebaugh NE, Bonita Ranch, and Gravelly Ford) were reviewed. Additionally, all records from within 10 miles of the Project area, as identified using GIS software, were reviewed. All species with records from these quadrangles or this geographic area and meeting the status criteria for inclusion (Section 3.4.1) are addressed in this TM

- USFWS Sacramento Field Office Species List (USFWS 2009a): All species on this list generated at the Sacramento USFWS website for the Mendota Dam quadrangle are addressed in this TM
- Audubon Society Important Bird Area species list for the Mendota Wildlife Area (Audubon Society 2009): All species reportedly observed at the Mendota Wildlife Area and meeting status criteria for inclusion (Section 3.4.1) are addressed in this TM

The following reports or data sources were identified as particularly relevant to this TM, and were reviewed before and referenced during its preparation:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002)
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)
- Endangered Species Recovery Program species profiles (ESRP 2006)

For the majority of species, specific literature was reviewed in addition to the sources listed above. References not listed above but cited in this TM are provided in Section 6.

3.4.3 Wildlife Habitat Mapping

Habitat types in the study area were classified and mapped based on cover type and with consideration of the habitat requirements of special-status wildlife species potentially occurring in the study area. The cover type was determined based on a combination of structure and plant species composition—for example, shrub-dominated communities were classified as scrub due to structure, and then further categorized as willow or riparian scrub depending on the dominant species present. Many of the habitat types were defined following the California Wildlife-Habitat Relationships System (WHR) (WHR 2010). The WHR defined habitat types specifically with wildlife use in mind, and in many cases these habitat types fit well with the landscape observed in the study area. In some cases, such as where a habitat in the study area did not quite fit the WHR categories, habitats were defined following Holland's types (1986). In several instances, categories were created to capture habitats important in the study area but not adequately represented by the WHR or Holland types, or to capture in one broad category several WHR/Holland habitat types that could be grouped together in the study area, based on anticipated or observed wildlife use. In some cases these categories followed Moise (2002).

Wildlife habitats in the study area were mapped using a combination of existing data, aerial photo interpretation, and field surveys. Prior to conducting field surveys, GIS vegetation data generated by Moise (2002) were overlain on color aerial photography from May 5, 2009. Then, based on preliminary observations recorded during initial site visits and aerial photo interpretation, the existing polygons were revised, collapsed, and expanded, and unmapped habitats in the study area were delineated. These draft wildlife habitat type maps were taken into the field during the habitat assessment surveys (Section

3.4.4), at which point they were ground-truthed and revised based on field observation made from accessible areas (Section 3.2). After returning from the field, the surveyors used notes and edits recorded on the paper maps to manually revise the GIS wildlife habitat types map.

3.4.4 Initial Site Visits and Habitat Assessment Surveys

Prior to the habitat assessment surveys, site visits were conducted on December 15, 2009 and May 19, 2010 by Project team biologists Jonathan Stead and Jessie Golding, along with other Project team staff and agency personnel. Although a biological reconnaissance survey was planned for March 2010 and the habitat assessment survey for May 2010 (SJRRP 2010a), permission to enter property in the study area was not obtained until August 2010, shortly after which the habitat assessment surveys were initiated.

Wildlife habitat assessment surveys were conducted in the study area from August 23 through 27, 2010. Surveys were conducted by a field team composed of three and four biologists, including Andrea Coleman, Matthew Bettelheim, Ode Bernstein, and Foung Vang. The field team was familiar with the list of special-status wildlife species potentially occurring in the study area, as identified during the background review, and reviewed habitat requirements for those species shortly before conducting the surveys.

Surveys were conducted in a similar manner throughout the portions of the study area where access to private or publicly owned property had been granted (Section 3.2). Excluding agricultural areas, surveys were conducted on foot where habitat features allowed (where dense cover did not preclude access). While on foot the field team walked meandering transects and did the following to aid in direct and indirect wildlife observations:

- Used binoculars and a spotting scope to scan habitats, identify birds, and search trees for signs of use, including nests and cavities
- Overturned logs and debris to detect evidence of reptilian activity
- Examined burrows, tracks, and scat to determine the type of species and to look for signs of recent presence or occupancy

Where foot surveys were not possible because access was not granted (Figure 3-2), surveys were done largely by car. In areas of dense riparian vegetation, the crew stopped and surveyed briefly on foot to gain access to the river whenever a break in the vegetation allowed, where access to private or publicly owned property had been granted. In areas where permission to enter private or publicly owned property was not granted, public roads (as shown on Figure 3-2) were used to gain visual access wherever possible. For these “windshield surveys,” the field team used binoculars and a spotting scope to observe habitat features and wildlife from the public road.

For all surveys, data were recorded in the same manner. At the beginning and end of each survey period (differentiated by day and by land owner) the time and temperature were recorded on a data sheet. Also recorded on this sheet were general habitat characteristics, such as dominant habitat types, common plant species, and level of disturbance. Direct

and indirect wildlife observations were recorded on a species list, with a Global Positioning System (GPS) unit, or onto a map. Habitat types were recorded and mapped on large field maps (1 inch = 200 feet). Any additional observations were recorded on the field maps or in field notebooks.

3.4.5 Focused Surveys

Bird Surveys

In addition to the general habitat surveys conducted throughout accessible portions of the study area described above, a focused, post-breeding season bird survey was conducted on August 26, 2010, from 6:00 a.m. to 8:30 a.m., and a second, early breeding season bird survey was conducted on March 3, 2011, from 7:45 a.m. to 9:30 a.m. in a patch of riparian vegetation on the south bank of the San Joaquin River, to provide supplementary information. The bird survey location was selected for the relatively complex vegetative structure present, including annual grassland, scattered elderberry shrubs, willow thickets, and discrete patches of mature Fremont's cottonwood. Although technically not within the scope of the habitat assessment survey described in this section, the focused bird survey was conducted at one favorable location to facilitate identification of as many birds as possible that were present at the time of the habitat assessment survey. This is not considered to be a comprehensive survey of bird species in the study area. Surveyors began the survey in open grassland, and then moved on foot to open areas along the river bank that afforded an unobstructed view of the surrounding vegetation on the near and far banks. Surveyors remained stationary at various locations during the survey period for a minimum of 10 minutes to allow bird activity to resume after the initial disturbance associated with their movements between vantage points. All birds detected were identified to genus or species, based on call, song, plumage characteristics, behavior, or a combination of these. Target species for this survey included the western yellow-billed cuckoo and southwest willow flycatcher. The survey concluded after bird activity markedly declined in response to increasing ambient temperature.

Valley Elderberry Longhorn Beetle Protocol Surveys

Valley elderberry longhorn beetle protocol surveys were conducted in the study area on March 1 through March 4, 2011, and March 8 through March 9, 2011. Surveys were conducted by teams of two biologists as part of a six- or eight-person crew. Surveyors included Andrea Coleman, Ode Bernstein, Matthew Bettelheim, Mark Wilson, Ivan Parr, Nour Mardini, Erin Maroni, Derek Jansen, Emily Magnaghi, and David Pecora. The surveys were conducted according to the protocol established by USFWS in *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (USFWS 1999a).

Accessible portions of the study area were surveyed for the presence of valley elderberry beetle or its host plant, the elderberry shrub (*Sambucus* spp.). The biologists conducted surveys on foot within all areas of suitable habitat. Data were collected for all living shrubs encountered that featured one or more stems measuring 1.0 inch or greater in diameter at ground level. Each shrub was photographed, and its location was recorded with a GPS unit. All stems greater than 1.0 inch in diameter were counted and recorded in one of three size categories: 1 to 3 inches in diameter, 3 to 5 inches in diameter, or greater than 5 inches in diameter. The type of habitat (riparian or nonriparian) was recorded for

each shrub. Additionally, biologists inspected each shrub for the presence of exit holes by walking the perimeter of the shrub and inspecting the interior stems, except where precluded by dense vegetation or other hazards. The biologist recorded any potential exit hole, which included round to ovular holes ranging from 0.1 to 0.8 inch in diameter with clean to rough edges, new or old. Results of these surveys are presented in Section 4.2.2.

Fresno Kangaroo Rat Surveys

Fresno kangaroo rat surveys were conducted in the study area on July 17 through 22, 2011. Surveys were led by Foung Vang, with assistance from a field team of two or three additional biologists, including Jessie Golding, Laura Castro, Christa Verdegaal, and James Kitch. The surveys were conducted according to the live-trapping protocol outlined in the survey memorandum prepared by Reclamation in May 2011 (Banonis 2011). This protocol was established based on survey guidelines in DWR's Federal permit TE063429-1 for the Fresno kangaroo rat, under which the trapping was authorized, and in coordination with URS, DWR, Reclamation, CDFG, and USFWS.

The trap locations were selected based initially on habitat assessment surveys, followed by more focused reconnaissance. A 410-acre area of grassland and elderberry savannah habitat was initially identified as potentially suitable Fresno kangaroo rat habitat, using a broad-scale approach based on habitat assessment surveys and habitat mapping conducted in August 2010. Of these 410 acres of potentially suitable habitat, permission to enter was granted for only approximately 97 acres. These 97 acres were visually surveyed by Foung Vang on July 15 to establish the best Fresno kangaroo rat trapping locations. The best trapping locations were ones that contained signs of recent kangaroo rat activity, including burrows, tracks, and droppings, as well as representative habitat, including sandy soils and arid, open habitat. During the July 15 assessment, the majority of the 97 acres of potentially suitable habitat to which access had been granted was determined to be largely unsuitable for Fresno kangaroo rat for one or more reasons: vegetation was too dense (e.g., annual grassland); areas did not contain sandy soil; and/or areas did not contain sign of recent kangaroo rat activity. Three discrete trapping locations were identified, one within the East Loop, one within the West Loop, and a third area near the Chowchilla Bifurcation structure. These three locations provided the best potential Fresno kangaroo rat habitat available in the study area where permission to enter was granted at the time of the surveys.

Survey methods followed the live-trapping protocol outlined in the memorandum prepared by Reclamation in May 2011 (Banonis 2011). A total of 150 traps were set, 50 at each of the three trapping locations. Traps were baited using bird seed, and included an unbleached paper towel as insulating material. Traps were set at dusk, checked every 3 hours (two checks per night), and were checked no later than 1 hour before sunrise. Trapping was conducted for 5 consecutive nights and resulted in a total of 750 trap nights. All animals captured were identified to species, sexed, weighed, marked, and released. Animals were marked by clipping hairs at or near the proximal end of their tails. To identify kangaroo rats to species, the hind feet of all kangaroo rats (*Dipodyms* spp.) captured were inspected to determine the number of toes. Hind feet of kangaroo rats were not measured if the individual had five toes. Results of these surveys are presented in Section 4.2.2.

3.5 Wetlands and Other Waters

This section describes the methods used to identify and evaluate wetlands and other waters that may be present in the study area.

3.5.1 Wetlands and Other Waters Identification

For the purposes of this document, wetlands and other aquatic resources (e.g., rivers, streams and natural basins) are a subset of waters of the United States (WUS) and are protected under Section 404 of the Clean Water Act. The U.S. Army Corps of Engineers (USACE) has the primary Federal responsibility for administering regulations that concern waters and wetlands. In this regard, USACE acts under two statutory authorities: the Rivers and Harbors Act (Sections 9 and 10), which governs all work within specified activities in "navigable waters," and the Clean Water Act (Section 404), which requires prior authorization to the placement of fill into WUS, including wetlands.

3.5.2 Review of Existing Data

To evaluate where wetlands and other WUS could potentially occur in the study area, all records from the Mendota Dam USGS 7.5-minute quadrangle (DWR quadrangle 381D) in the National Wetlands Inventory database, maintained by USFWS (USFWS 2009b), and all records from the surrounding eight quadrangles (i.e., Jamesan, Tranquillity, Coit Ranch, Firebaugh, Poso Farm, Firebaugh NE, Bonita Ranch, and Gravelly Ford) were reviewed. Similarly, the Natural Resource Conservation Service (NRCS) soil maps (UCDSRL 2008) were reviewed for hydric and partially hydric soils. Biologists also reviewed aerial photographs of the study area, and the San Joaquin River Restoration Study Background Report (McBain and Trush 2002).

3.5.3 Focused Surveys

Although a wetland delineation had been planned for 2010 (SJRRP 2010a), access to private property was not obtained in time to capture the spring wet season and conduct the delineation in 2010. The wetland delineation in the study area was performed from March through July 2011.

Base Maps

A grid pattern was overlaid over the study area and a tile system was developed, with each tile corresponding to a particular location in the study area. To assist with the field efforts, maps with aerial photos were printed for each tile at a scale of 1 inch = 100 feet (1:1200). To further assist with field efforts, other relevant information was overlaid on the aerial base survey maps, such as contours, names of streams and nearby roads, soil types, and location of National Wetland Institute wetlands recorded, based on previous reconnaissance efforts. Wetland boundaries were drawn directly on maps in the field and electronic data of the boundary data were later digitized using GIS.

1987 USACE Manual and Regional Supplement

Potential jurisdictional wetlands were delineated in accordance with the routine onsite methodology described in the USACE Wetlands Delineation Manual (Environmental Laboratory 1987) and the Regional Supplement to the USACE Wetland Delineation manual: Arid West.

Three parameters are considered to determine if an area is a jurisdictional wetland: soil, vegetation, and hydrology. Under normal circumstances (undisturbed conditions), a jurisdictional wetland must have positive wetland indicators of all three parameters. The following sections describe each of the three wetland parameters, and methods used for their evaluation. Soil characteristics, hydrologic patterns, and vegetation present were recorded for each test pit location.

Vegetation

Hydrophytic vegetation is "the sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present," as defined by the USACE (Environmental Laboratory 1987). In accordance with the Regional Supplement, the following indicators were evaluated to determine whether hydrophytic vegetation is present:

- Dominance Test
- Prevalence Index
- Other indicators

Soils

For an area to be considered a jurisdictional wetland, the soil must be classified as hydric by the NRCS, or it must possess field indicators that are associated with reducing soil conditions. Consistent with the Draft Regional Supplement, the presence of hydric soil indicators was evaluated after digging a soil pit to a depth of at least 20 inches (50 centimeters [cm]) and describing the soil profile. Occasionally, on each parcel, pits were dug greater than 20 inches to determine if there were layers present that might restrict or promote drainage. Prior to conducting field delineations, the Local Hydric Soils List was obtained to determine where hydric soils would likely be found in the study area; the presence of a particular soil on the Local Hydric Soils List, however, was not considered to be a hydric soil indicator in and of itself (in contrast to the 1987 Manual).

Hydrology

A jurisdictional wetland must be permanently inundated or irregularly saturated to the surface long enough to develop hydric soils and to support vegetation adapted for periodically anaerobic conditions. According to the 1987 Manual, an area has wetland hydrology if it is inundated or saturated to the surface continuously for at least 5 percent of the growing season in most years. The Regional Supplement, however, allows alternative approaches to determine the start of the growing season at the discretion of the applicable USACE District; these include:

When two or more different nonevergreen, vascular plant species growing in the wetland or surrounding areas exhibit one or more of the following:

- Emergence of herbaceous plants from the ground;
- Appearance of new growth from vegetative crowns;

- Coleoptile/cotyledon emergence from seed;
- Bud burst on woody plants;
- Emergence or elongation of leaves of woody plants; and/or
- Emergence or opening of flowers; and
- When temperature measured at 12 inches (30 cm) depth is 41ºF or higher.

At the time field delineations were performed in March and later, a number of annual wetland species were observed to have emerged in the study area; therefore, the growing season was assumed to have begun for purposes of evaluating wetland hydrology.

The Regional Supplement separates wetland hydrology indicators into four groups: Group A indicators are based on direct observations; Group B consists of evidence that suggest the area is subject to ponding or flooding; Group C consists of indirect evidence that the soil was recently saturated; and Group D consists of soil and vegetation features that suggest recent wet conditions. In each group, primary and secondary indicators have been identified. Wetland hydrology was concluded if one primary indicator was present from any group, or, in the absence of a primary indicator, wetland hydrology was assumed if two or more secondary indicators from any group were present.

Routine Determination Method

Field characterization followed the routine determination method outlined in the 1987 Manual for areas greater than 5 acres. A baseline was set that was parallel to primary stream(s) on each parcel or perpendicular to the hydrologic gradient. The number of required transects was determined based on the baseline length. The baseline length was divided by the number of required transects. Lines showing the baseline and transects were overlain on the field base maps. Each wetland parameter was evaluated at observation points along each transect, and a data form was filled out for each observation point. Observation points were established at points along each transect for each plant community present. When one observation point was determined to be a wetland and the next observation point was determined to be a nonwetland, additional observation points were established to determine the wetland-nonwetland boundary. These observation points were established where subtle changes in vegetation, disappearance of wetland hydrology indicators, or changes in topography were noted.

This method was repeated for each transect. Data forms and base maps were evaluated, and additional points taken as needed, to document wetland boundaries. In areas with complex upland-wetland mosaic patterns, multiple observation points were often necessary to determine wetland boundaries. All observation points were accurately recorded in the large-scale maps.

In the office, data were mapped using GIS and overlain on aerial maps. Draft maps were checked to ensure wetland boundaries were mapped accurately. Finally, each wetland type (i.e., wet meadow, marsh, riparian wetland) was quantified using GIS techniques.

Regional Supplement

The regional supplement was used to address wetland indicators, delineation guidance, and other information that is specific to the Arid West Region. Regional differences in climate, geology, soils, wetland hydrology, plant and animal communities, and other factors are important to the identification and functioning of wetlands, and cannot be considered adequately in a single national manual. The Regional Supplement is designed for use with the current version of the USACE Manual and all subsequent versions. Where differences in the two documents occur, the Regional Supplement takes precedence over the USACE Manual.

Wetland Delineation

Field surveys were conducted by George Strnad and Chris Hargreaves on March 17 through 19, April 7 through 9, and May 27 through 30, 2011. Existing landforms, vegetation, hydrology, and soil conditions were evaluated to identify potential wetlands and other WUS in the study area. The entire study area (where access was permitted by landowners as per Figure 3-2) was walked to provide a detailed analysis of the potential wetlands and other WUS. Sites that would likely pond, flood, or saturate based on their topographic position were examined by means of a soil test pit. In addition, test pits were evaluated in adjacent upland areas to determine wetland boundaries. Soils at each test pit location were examined to a maximum depth of 20 inches, as recommended in the Regional Supplement (USACE 2008). In areas where the boundary was poorly defined, such as the dry meadow/wet meadow interface, at least two and sometimes three to four data points were taken. Soil characteristics, hydrologic patterns, and vegetation present were recorded for each test pit location. Wetlands in areas north of the river where access was not granted were given a thorough visual examination from the south bank of the river. Aerial photography and topography of these areas were used to determine wetland boundaries based on similarities with wetland areas that were closely examined by the routine determination method in areas south of the river.

Test pit locations were carefully recorded on a large-scale field map and marked with wooden stakes labeled with the point designation. All areas found to match the criteria for wetlands or other waters set forth by USACE were hand-recorded onto tile maps. The information gathered was then digitized and overlain onto electronic aerial photographs of the study area, resulting in a wetland delineation map set for the study area.

3.6 Special-Status Plant Species

This section describes the methods used to identify special-status plant species that occur in the surveyed accessible portion of the study area and that may potentially occur in areas where access was not granted. The pre-survey evaluations of potential occurrence of listed plants were based on database searches and literature review. Although botanical surveys in accordance with CDFG's *Protocols for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Natural Communities* (CDFG 2009c, revised November 24) were planned for 2010 (SJRRP 2010a), access to private property was not obtained in time to conduct the early and mid-season surveys in 2010. As required by the CDFG protocol, botanical surveys must be conducted during the

flowering period of the plant species. Accordingly, special-status plant surveys in the study area, where access had been granted, took place from August 2010 through July 2011. A large portion of the study area north of the river (Figure 3-2) was not surveyed because permits to access these properties were not granted by their landowners.

3.6.1 Special-Status Species Identification

For the purpose of this document special-status plant species are defined as species that are legally protected under the Federal ESA, the California Endangered Species Act (CESA), or other regulations, and species that are considered sufficiently rare or endangered by the scientific community to qualify for such listing. Special-status plants are species in the following categories:

- Listed or proposed for listing as threatened or endangered under the Federal ESA or candidates for possible future listing as threatened or endangered under the Federal ESA (50 CFR §17.12)
- Listed or candidates for listing by the State of California as threatened or endangered under CESA (Fish and Game Code §2050 et seq.)[1]
- Listed as rare under the California Native Plant Protection Act (Fish and Game Code §1900 et seq.)[2]
- Meet the definition of rare or endangered under CEQA §15380(b) and (d). Species that may meet the definition of rare or endangered include the following:
  - Species considered by the California Native Plant Society (CNPS) to be "rare, threatened or endangered in California" (Lists 1A, 1B and 2)
  - Species that may warrant consideration on the basis of local significance or recent biological information
  - Some species included on the CNDDB Special Plants, Bryophytes, and Lichens List (CDFG 2008)

3.6.2 Review of Existing Data

To evaluate which special-status plants could potentially occur in the study area, database searches and a literature review were conducted. Three primary databases were reviewed to obtain special-status plant occurrence data from within 10 miles of the Project area:

- CNDDB (CDFG 2009a): All records from the Mendota Dam USGS 7.5-minute quadrangle (DWR quadrangle 381D) in this database, maintained by CDFG, and all records from the surrounding eight quadrangles (Jamesan, Tranquillity, Coit

[1] A species, subspecies, or variety of plant is endangered when the prospects of its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, disease, or other factors (Fish and Game Code §2062). A plant is threatened when it is likely to become endangered in the foreseeable future in the absence of special protection and management measures (Fish and Game Code §2067).

[2] A plant is rare when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens (Fish and Game Code §1901).

Ranch, Firebaugh, Poso Farm, Firebaugh NE, Bonita Ranch, and Gravelly Ford) were reviewed. Additionally, all records from within 10 miles of the Project area, as identified using GIS software, were reviewed. All species with records from these quadrangles or from within this geographic area and meeting the above status criteria for inclusion (Section 3.6.1) are addressed in this TM

- USFWS Sacramento Field Office Species List (USFWS 2009a): All species on this list generated at the Sacramento USFWS website for the Mendota Dam quadrangle are addressed in this TM
- CNPS species list for Mendota Dam USGS 7.5-minute quadrangle (DWR quadrangle 381D): All plants in this database, maintained by CNPS, and all records from the surrounding eight quadrangles (Jamesan, Tranquillity, Coit Ranch, Firebaugh, Poso Farm, Firebaugh NE, Bonita Ranch, and Gravelly Ford) were reviewed. All CNPS species with records from these quadrangles and meeting the above status criteria for inclusion are addressed in this TM

The following reports or data sources were identified as particularly relevant to this TM, and were reviewed before and referenced during its preparation:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002)
- Jepson Online (The Jepson Online Interchange, California Floristics), University of California, Berkeley. Most recent additions: September 2, 2009
- The Jepson Manual (Hickman 1993)
- Endangered Species Recovery Program species profiles (ESRP 2006)

For the majority of plant species, specific literature was reviewed in addition to the sources listed above. References not listed above but cited in this TM are provided in Section 6.

3.6.3 Focused Surveys

Botanical surveys were conducted in accordance with CDFG's *Protocols for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Natural Communities* (CDFG 2009c), in a manner sufficient to locate any listed species that may have been present. Specifically, the following requirements of the CDFG protocol were followed:

- The surveys were conducted in the field at the proper time of year when listed species were both evident and identifiable during their flowering period.
- The surveys were floristic in nature. A floristic survey requires that every plant observed be identified to the extent necessary to determine its rarity and listing status. In addition, sufficient visits spaced throughout the growing season are necessary to accurately determine what plants exist on the site. To properly characterize the site and document the completeness of the survey, a complete list of plants observed on the site is included in this botanical survey report.

- The surveys were conducted in a manner that is consistent with conservation ethics.
- Photography was used to document plant identification and habitat whenever possible.
- The surveys were conducted using systematic field techniques in all habitats of the site to ensure a thorough coverage of potential impact areas.
- The surveys were well-documented.
- Before field surveys were conducted, relevant botanical information in the general study area was compiled to provide a regional context for the investigators. Literature and database searches were conducted as described above in Section 3.6.2.

Generally, vegetation and habitat types potentially occurring in the study area were identified based on biological and physical properties of the site and surrounding ecoregion, unless a larger assessment area was appropriate. A list of special-status plants, and vegetation alliances with the potential to occur in the study area or its vicinity was assembled. Field surveys and subsequent reporting is comprehensive and floristic in nature and not restricted to or focused only on this list.

Field Survey Method

All habitat types known to support special-status plants within the accessible portion of the study area were surveyed during their bloom periods by the botanists using side-by-side survey transect methods. Less survey effort was focused on agricultural or heavily disturbed areas and areas dominated by dense infestations of invasive, nonnative species.

The level of effort required per given area and habitat was dependent upon the vegetation and its overall diversity and structural complexity, which determined the distance at which plants could be identified. Surveys were conducted by walking over the entire site to ensure thorough coverage, noting all plant taxa. The level of effort was sufficient to provide comprehensive reporting.

Timing and Number of Visits

Access to private property was not obtained in time to conduct early and mid-season special-status plant surveys in 2010. Only late season surveys were conducted in 2010 (August) and early and mid-season surveys were conducted in 2011 (March to July). Surveys were conducted in the field at the time of year when special-status species were both evident and identifiable, during flowering or fruiting. Visits were spaced throughout the growing season to accurately determine what plants exist on site. This involved multiple visits to the same site (e.g., in early, mid, and late-season for flowering plants) to capture the floristic diversity at a level necessary to determine if special-status plants were present.

Qualifications

Botanists George Strnad and Chris Hargreaves conducted botanical surveys throughout accessible potions of the study area and possess the following qualifications:

- Knowledge of plant taxonomy and vegetation alliance ecology;
- Familiarity with the plants of the area, including special-status species;
- Familiarity with vegetation alliances of the area, including special-status vegetation alliances;
- Experience conducting floristic field surveys or experience with floristic surveys conducted under the direction of an experienced surveyor;
- Familiarity with the appropriate State and Federal statutes related to plants and plant collecting; and
- Experience analyzing the impacts of development on native plant species and vegetation alliances.

Survey Scheduling

The plant surveys were performed in four phases at four different times of the year. Protocol surveys for the California jewel-flower (*Caulanthus californicus*), recurved larkspur (*Delphinium recurvatum*), Munz's tidy tips (*Layia munzii*), caper-fruited tropidocarpum (*Tropidocarpum capparideum*), California satintail (*Imperata brevifolia*), and San Joaquin woollythreads (*Monolopia congdonii*) were performed in the first phase, on March 4, 11, 17, 18, and 19, 2011. Heartscale (*Atriplex cordulata*), brittlescale (*Atriplex depressa*), Lost Hills crownscale (*Atriplex vallicola*), succulent owl's-clover (*Castilleja campestris* ssp. *succulenta*), and San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*) surveys were performed in the second phase, on April 7, 2011. Surveys for the late flowering species lesser saltscale (*Atriplex miniscula*), vernal pool smallscale (*Atriplex persistens*), subtle orache (*Atriplex subtilis*), palmate-bracted bird's-beak (*Cordylanthus palmatus*), hairy Orcutt's grass (*Orcuttia pilosa*), and Sanford's arrowhead (*Sagittaria sanfordii*) were performed in the third phase, on May 28, June 24, and June 25, 2011, and in the fourth phase, which was conducted in the previous year on August 23 through 27, 2010.

3.7 Special-Status Vegetation Alliances

This section describes the methods used to identify special-status vegetation alliances potentially occurring in the study area and describes how the likelihood of occurrence was evaluated.

3.7.1 Special-Status Vegetation Alliance Identification

For the purposes of this document, special-status vegetation alliances are defined as natural communities that are of limited distribution statewide or within a county or region and are often vulnerable to environmental impacts of projects. These natural communities may or may not contain special-status species or their habitat. The current version of the List of California Vegetation Alliances (CDFG 2009b) indicates vegetation alliances of high inventory priority as globally or State ranked 1-3 (critically imperiled, imperiled and vulnerable) for conservation status. Most types of wetlands and riparian communities are considered special-status vegetation alliances due to their limited distribution in

California. These high-priority vegetation alliances often contain special-status plants (defined under "Special-Status Plant Species" [see Section 3.6]).

CDFG and its collaborators use a suite of factors to assess the conservation ranking of vegetation alliances. These assessments lead to the designation of a conservation status rank. All California vegetation alliances are described, ranked, and assembled into a list. CDFG then issues the ranked list of California vegetation alliances for the public's use, for CNDDB mapping efforts, and for project impact assessment. Until fall 2009 the basis for determination of a plant community's rank was CDFG's List of California Terrestrial Natural Communities (CDFG 2003a). In December 2009, a new, substantially revised List of California Vegetation Alliances (CDFG 2009b) was introduced. It is based on the extensive work of several authors – John Sawyer, Todd Keeler-Wolf and Julie Evens. Their vegetation classification and mapping effort throughout California culminated in the publication of *A Manual of California Vegetation – 2nd Edition* in 2009 (Sawyer 2009). Based on this publication, the term "natural community" closely translates to "vegetation alliance" under the new National Vegetation Classification (FGDC 2008).

CDFG currently requires that the vegetation alliance nomenclature be based on both the old (CDFG 2003a) and the current (CDFG 2009b) systems when evaluating project impacts, however, only the most recent ranking list should be used to determine conservation status (Hickson, pers. comm., 2009). Conservation ranks in this list provide an estimate of the risk of elimination for vegetation alliances. They are based on a one (1) to five (5) scale rank (NatureServe Explorer 2009), ranging from critically imperiled (1) to demonstrably secure (5). Status is assessed and documented at three distinct geographic scales of the assessment (G = Global, N = National, and S = Subnational or State). The numbers have the following meaning:

1 = critically imperiled
2 = imperiled
3 = vulnerable
4 = apparently secure
5 = secure

For example, G1 would indicate that vegetation alliance is critically imperiled across its entire range (i.e., globally). In this sense the natural community/vegetation alliance as a whole is regarded as being at very high risk of extirpation. A rank of S3 would indicate the natural community/vegetation alliance is vulnerable and at moderate risk within a particular state or province, even though it may be more secure elsewhere.

3.7.2 Review of Existing Data

Database searches and a literature review were conducted to evaluate which special-status vegetation alliances could potentially occur in the study area. The following sources of information were reviewed to obtain special-status vegetation alliance occurrence data from the Project area and its 10-mile vicinity:

- CNDDB (CDFG 2009a): All records from the Mendota Dam USGS 7.5-minute quadrangle (DWR quadrangle 381D) in this database, maintained by CDFG, and all records from the surrounding eight quadrangles (Jamesan, Tranquillity, Coit Ranch, Firebaugh, Poso Farm, Firebaugh NE, Bonita Ranch, and Gravelly Ford)

were reviewed. Additionally, all records from within 10 miles of the Project area, as identified using GIS software, were reviewed. All high-priority inventory vegetation alliances (CDFG 2009b) (terrestrial plant communities [CDFG 2003a]) with records from these quadrangles or from within this geographic area and meeting the above rank criteria for inclusion (Section 3.7.1) are addressed in this TM

The following reports or data sources were identified as particularly relevant to this TM, and were reviewed before and referenced during its preparation:

- A Manual of California Vegetation (Sawyer 2009): All high priority vegetation alliances with a potential to occur in the Project area and its 10-mile vicinity are addressed in this TM
- The most recent version (December 7, 2009) of the List of California Vegetation Alliances (CDFG 2009b)
- Terrestrial Vegetation of California (Barbour 2007)
- San Joaquin River Restoration Study Background Report (McBain and Trush 2002)
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)
- Endangered Species Recovery Program species profiles (ESRP 2006)

For the majority of special-status vegetation alliances, specific literature was reviewed in addition to the sources listed above. References not listed above but cited in this TM are provided in Section 6.

3.7.3 Focused Surveys

Prior to the start of the detailed vegetation alliance surveys, reconnaissance site visits were conducted by project team biologists Jonathan Stead and Jessie Golding on December 15, 2009, and vegetation ecologist George Strnad along with other Project team staff and agency personnel, on May 19, 2010. Although a biological reconnaissance survey was planned for March 2010 and the vegetation alliance survey for May 2010 (SJRRP 2010a), permission to enter property in the study area was not obtained until August 2010, shortly after which the vegetation alliance surveys were initiated.

Focused surveys in the study area where property access had been granted (Section 3.2) were conducted from August 23-27, 2010 by George Strnad, who worked in coordination with a group of three to four wildlife biologists performing habitat surveys (Section 3.4.4). Initially, cultivated areas with farm crops were observed to be separated from natural vegetation areas during a brief reconnaissance review of each portion of the study area. The type of crop was noted for each farmed area; however, farm fields were not walked. Natural vegetation within the study area was closely surveyed by walking adjacent roads or the banks along the shallow San Joaquin River bed, and wherever dense cover did not preclude access. Dominant species within each distinctive segment of the

vegetated areas were identified. Dominance was determined based on aerial cover of the plant species in each area. The overstory, understory, and herbaceous layer dominance was determined based on the 50/20 cover dominance rule. All plants were considered dominant in a given stratum in order of their percent cover from largest to lowest until their combined cover reached 50 percent. After this, only plants with cover of 20 percent or greater were considered dominant. The type and aerial extent of the observed vegetation alliances were noted on large-scale aerial photographs (1”=200’) directly in the field. The marked-up field maps were later scanned and used as a background to create digitized GIS maps of the vegetation alliances within the study area. Where possible, areas where no access was permitted were surveyed visually from a distance across the river (primarily from the left bank). Inaccessible areas where visibility was limited or vegetation was not discernable were not surveyed.

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4.0 Results and Discussion

This section presents the results of the background review and field surveys conducted, as well as a discussion of the biological resources expected to be present in the study area and additional surveys that may be needed. Results are organized by resource area: fish and other aquatic resources (Section 4.1); special-status wildlife species (Section 4.2); wetlands and other waters (Section 4.3); special-status plant species (Section 4.4); and special-status vegetation alliances (Section 4.5).

4.1 Fish and Other Aquatic Resources

This section identifies existing data sources for aquatic resources and special-status fish species and presents a brief evaluation of the data. Focused fish or aquatic field surveys for the Project were not conducted as part of this study. As described below, the suite of species occupying the study area and adjacent waters includes a substantial number of introduced fishes along with a few native species. Surveys of these resources are not necessary because the fish population within Mendota Pool is similar to what is in the salvage at the State and Federal fish salvage facilities, and additional special-status fish surveys are not needed in the study area for environmental documents or permits. Because warm-water fish populations in the Delta-Mendota Canal could act as predator source populations to the study area, an assessment of the predation risk from this source could be considered for post-construction, long-term monitoring associated with the restoration program. Fish and aquatic resources are discussed in general in Section 4.1.1, and information related to special-status fish species is presented in Section 4.1.2.

4.1.1 Aquatic Resources

Fish communities in the upper San Joaquin River basin have changed markedly in the last 112 years as a result of water resources development, habitat alteration, and the introduction of exotic fishes (Table 4-1Table 4-1). Of the four San Joaquin River drainage native fish assemblages described by Moyle (2002), three of the fish assemblages occur in the San Joaquin River system upstream of Millerton Lake. The fourth, the deep-bodied fish assemblage, occurs in Millerton Lake and in the San Joaquin River, downstream of Friant Dam to the Delta. The fish assemblages were described in the Fisheries Management Plan (SJRRP 2010b; pp. 2-7 through 2-9).

The rainbow trout assemblage, which includes native and hatchery rainbow trout, sculpin, Sacramento sucker, Kern brook lamprey, and threespine stickleback, historically occurred upstream of Millerton Lake. Under present conditions, because of the dam and modifications to the temperature regime downstream of the dam, this assemblage occurs primarily in the upper half of Reach 1. Historically, the California roach fish assemblage likely occurred in Reach 1 and extended upstream of Millerton Lake. Under present conditions, the California roach assemblage is limited to areas upstream of Millerton Lake, and roach are no longer found downstream of Friant Dam (Table 4-1). The historic

pikeminnow-hardhead-sucker assemblage in the San Joaquin River was probably located within the upper part of Reach 1 and extended upstream of the present location of Friant Dam. Today, this assemblage is primarily located within the lower part of Reach 1A and extends downstream into Reach 1B. Habitat for this fish assemblage has been modified by extensive gravel mining along the San Joaquin River throughout Reach 1. The deep-bodied fish assemblage historically occurred from upstream of Millerton Lake and extended to the Delta. Under current conditions, the deep-bodied fishes assemblage occurs in the lower half of Reach 1A and extends downstream into Reach 1B. Reach 2B historically was within the deep-bodied fish assemblage and remains within that assemblage under existing conditions, although this fish assemblage has been greatly modified by numerous introduced fishes and the loss of several native species, including the tule perch and hitch (Table 4-1). Today, the deep-bodied fish assemblage also covers the remainder of the San Joaquin River from Reaches 2 through 5 (SJRRP 2010b). Habitat conditions associated with the deep-bodied fish assemblage also support predacious exotic fishes such as largemouth bass, black crappie, and green sunfish.

Reach 2B and the remaining project Reaches 3 through 5 (which are within the deep-bodied fishes assemblage) are potentially unique in that these reaches could be seasonally inhabited by fall- and spring-run Chinook salmon and steelhead adults and juveniles after successful restoration of the river and reintroduction of these anadromous fish.

Changes in historical habitat conditions, combined with the introduction of nonnative fish species, are thought to have resulted in a general decline in both the abundance and distribution of native fishes (Moyle 1976, 2002), with several species extirpated from the system or exhibiting a marked restriction in distribution in the San Joaquin River. The Delta-Mendota Canal provides a source of exotic species; they are pumped up along with water from the Delta that is then released into the San Joaquin River at the Mendota Pool. Specific information on the current abundance and distribution of native fishes in Mendota Pool within Reach 2B is lacking, and prior to Interim Flows, the seasonal nature of flows upstream of the Mendota Pool limited the establishment of a year-round fishery. Surveys have been conducted upstream and downstream of Reach 2B that document the range of fish species that would possibly occupy this reach. Recent historical changes in the fish fauna below Friant Dam (Reach 1) are shown in Table 4-1, (CDFG 2007, CH2MHILL 2003, Moyle 2002). Reach 1 extends approximately 40 river miles from Friant Dam to Gravelly Ford. Gravelly Ford is located 13 river miles upstream of Reach 2B. Prior to Interim Flows, the river was seasonally dry in most years between Gravelly Ford and the San Mateo Avenue crossing within Reach 2B. While a few of the fish species listed in Table 4-1 may not use Reach 2B (e.g., Kern Brook lamprey, prickly sculpin), this data represents the best historical tracking of fish fauna in the San Joaquin River over time.

Table 4-1.
Changes in the Fish Fauna Present in the San Joaquin River Below Friant Dam (Reach 1)*

Species	1898	1934	1941	1971	1985	2005
Native Species						
Sacramento splittail	X	–	–	–	–	–
Hitch	X	X	X	–	–	–
California roach	X	X	X	–	–	–
Hardhead	X	X	X	–	–	–
Sacramento pikeminnow	X	X	X	-–	–	X
Sacramento blackfish	X	X	X	–	–	–
Chinook salmon	X	X	X	–	–	–
Tule perch	X	X	X	–	–	–
Sacramento sucker	X	X	X	X	X	X
Rainbow trout	X	X	X	X	X	X
Prickly sculpin	X	X	X	X	X	X
Threespine stickleback	X	X	X	X	X	X
Kern brook lamprey	N	N	N	X	X	X
Pacific lamprey	N	N	N	–	–	–
Introduced Species						
Brown trout	–	X	X	X	X	–
Common carp	–	X	X	X	X	X
Goldfish	–	–	–	–	–	X
Golden shiner	–	–	–	–	–	X
Bluegill	–	X	X	X	X	X
Green sunfish	–	–	–	X	X	X
Redear sunfish	–	–	–	–	–	X
Black crappie	–	–	–	–	–	X
Smallmouth bass	–	X	X	N	X	–
Spotted bass	–	–	–	–	–	X
Largemouth bass	–	–	–	X	X	X
Channel catfish	–	–	–	–	–	X
Brown bullhead	–	–	–	X	X	X
Mosquitofish	–	–	–	X	X	X
Total Number of Species	**14**	**17**	**17**	**13**	**13**	**18**
Percent Native Species	**100**	**77**	**77**	**38**	**38**	**33**

Modified and updated from CH2MHILL 2003 (Table 5.2.1-1), Moyle 2002 (Table 9), CDFG 2007.

*Reach 1 is located 13 river miles upstream of Reach 2B. It extends approximately 40 river miles from Friant Dam to Gravelly Ford.

N = not recorded, but probably present; X = present; — = not present

Anadromous fish have complex lifecycles, using freshwater rivers and tributaries for adult spawning, egg incubation, and early juvenile rearing, followed by an extended rearing and maturation period in estuaries and the ocean. Anadromous salmonids, including Chinook salmon (*Oncorhynchus tshawytscha*) and likely steelhead (*O. mykiss*) historically migrated through the San Joaquin River to spawning areas in the tributaries and the main stem within or upstream of where Millerton Lake is located today. Hence

these species, at least seasonally, occupied or passed through habitat containing a full suite of native species as well as through Reach 2B (Moyle 1976, 2002). Fall-run Chinook salmon likely also used the San Joaquin River system when flows were sufficient for upstream passage during the fall.

Under existing conditions, fall-run Chinook salmon have occasionally been observed moving into the San Joaquin River upstream of the Merced River and past the Hills Ferry Barrier. The barrier is seasonally installed to prevent movement of adult salmonids into areas that currently do not provide any spawning habitat. Between 1992 and 2010, observations of adult fall-run Chinook salmon were frequent in the San Joaquin River, Reach 5, and associated water bodies (Gates, pers. comm., 2011). These fish were found in locations ranging from just upstream of the Hills Ferry Barrier to the Boundary Drain east of the town of Los Banos (Figure 4-1). Steelhead were not observed in the San Joaquin River upstream of the Hills Ferry Barrier between 1992 and 2010.

Prior to the initiation of Interim Flows, the section of Reach 2B between the Chowchilla Bifurcation Structure and San Mateo Avenue was mostly dry. Downstream of San Mateo Avenue, Reach 2B is backwatered by the Mendota Pool. Aquatic habitat in Reach 2B is either limited by a dry channel or affected by an impounded water body. Surface flows throughout Reach 2B have only occurred during very wet periods. Water delivered to the Mendota Pool from the Delta-Mendota Canal is withdrawn at seven canal or pump locations in the pool and an additional amount is released downstream into Reach 3 to other contractors. Downstream of the last diversion point at Sack Dam, the river has typically been dry for several miles.

A few surveys focused on fish were conducted in the San Joaquin River or in the major tributaries on the floor of the San Joaquin Valley (Jones and Stokes 1986, Brown 1993, Ford 2001, and CDFG 2007). The most relevant surveys for Reach 2B are the Jones and Stokes and CDFG surveys because of the location of sampling and recent data collection, respectively. Brown (1993) surveyed the San Joaquin River system in 1985–1986, focusing on the tributaries (including the Fresno River and Berenda Slough) and Reach 1 of the San Joaquin River. Ford (2001) summarized fishes collected from the Tuolumne River, an eastside tributary to the San Joaquin River along with the Merced and Stanislaus Rivers. Results of these studies are discussed below.

Jones and Stokes (1986) conducted a fish survey in the San Joaquin River in 1986 in search of white bass. During the survey, sampling was conducted in three reaches of the river: between Friant Dam and Mendota Pool, within Mendota Pool, and from Mendota Dam downstream to Mossdale. The survey used several collecting techniques, including

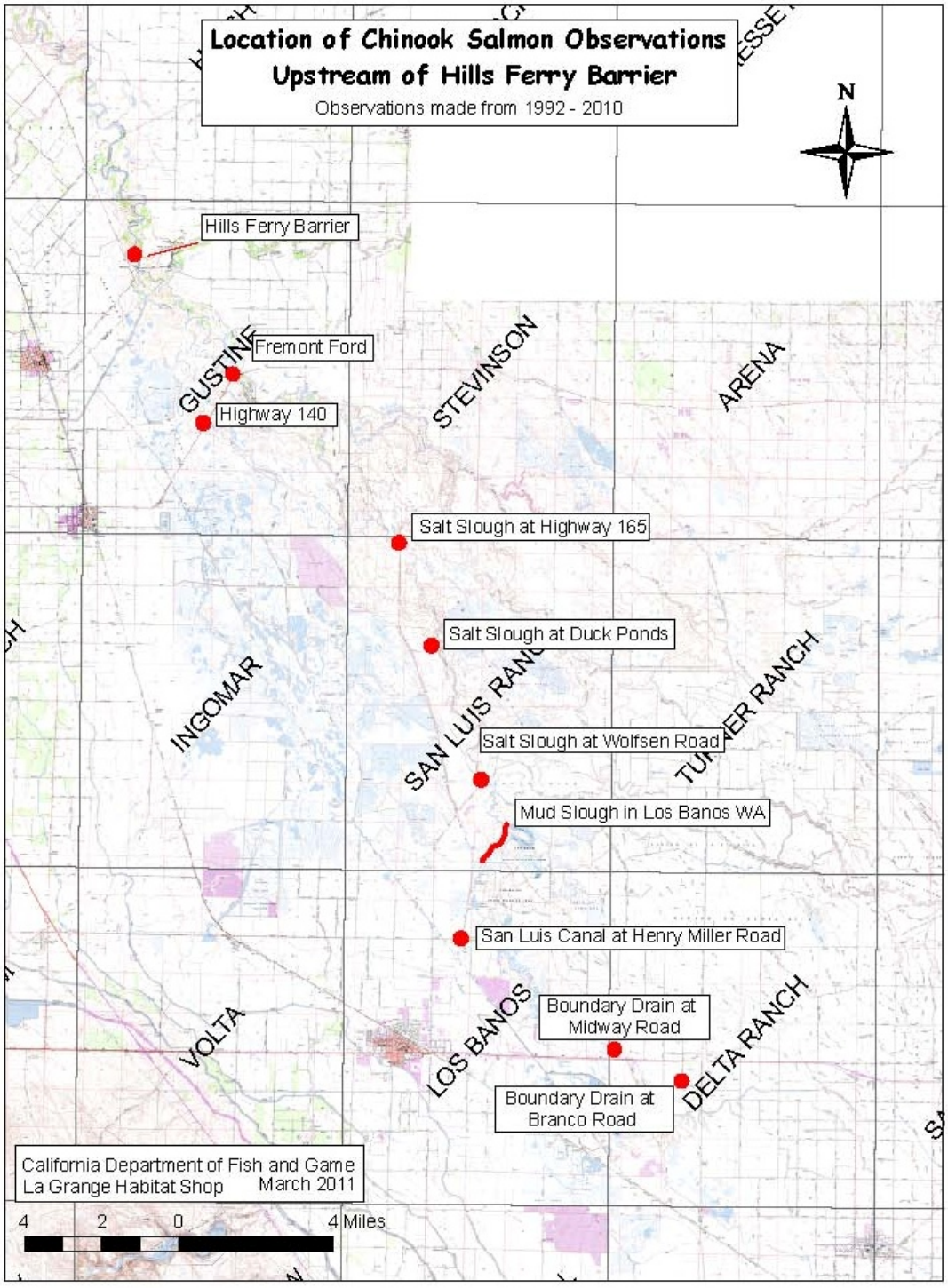

Figure 4-1.
Locations of Chinook Salmon Observations Upstream of Hills Ferry Barrier

gillnets, seines, fyke traps, boat electrofishing, and underwater observation. Not all methods were employed at all locations. The study collected two native species (hitch [*Lavinia exilicauda*] and Sacramento sucker [*Catostomus occidentalis*]), and twenty introduced species from the Mendota Pool in Reach 2B. The following introduced species were also collected from Mendota Pool and are presented in order of abundance (from most abundant to least abundant). Scientific and common names have been updated from Jones and Stokes (1986) to be consistent with current nomenclature (Nelson 2004).

- Threadfin shad (Dorosoma petenense)
- Black crappie (Pomoxis nigromaculatus)
- Inland silverside (Menidia beryllina)
- Striped bass (Morone saxatilis)
- Channel catfish (Ictalurus punctatus)
- Bluegill (Lepomis macrochirus)
- White crappie (Pomoxis annularis)
- Goldfish (Carassius auratus)
- Common carp (Cyprinus carpio)
- Green sunfish (Lepomis cyanellus)
- Black bullhead (Ameiurus melas)
- Largemouth bass (Micropterus salmoides)
- White catfish (Ameiurus catus)
- Pumpkinseed (Lepomis gibbosus)
- American shad (Alosa sapidissima)
- Warmouth (Lepomis gulosus)
- Golden shiner (Notemigonus crysoleucas)
- Brown bullhead (Ameiurus nebulosus)
- Western mosquitofish (Gambusia affinis)
- Bigscale logperch (Percina macrolepida)

In addition to hitch and suckers, three other native species were found in the San Joaquin River between Mendota Pool and Mossdale:

- Sacramento blackfish (*Orthodon microlepidotus*)
- Sacramento pikeminnow (*Ptychocheilus grandis*)
- California roach (Hesperoleucus symmetricus)

Two introduced species not found in Mendota Pool were also collected in the river between Mendota Pool and Mossdale:

- Smallmouth bass (Micropterus dolomieu)
- Spotted bass (Micropterus punctulatus)

Several introduced species were observed during a site visit conducted on December 15, 2009 in Reach 2B of the San Joaquin River immediately downstream of the Chowchilla Bifurcation structure, at two locations containing dead fish. These two sites were low points in the channel where water pooled after Interim Flows ceased and fish in these pools subsequently were stranded, then died as the water seeped into the ground. Fish were identified visually and were not keyed out. Their relative abundance was also noted. The following species occurred in these dried pools in declining order of abundance: threadfin shad, bluegill, green sunfish, black crappie, largemouth bass, and golden shiner.

Over the last 24 years, additional introduced aquatic species have appeared in the Delta and the suite of species found in Mendota Pool likely has shifted as well. CDFG (2007) documents several new species during surveys of Reaches 1, 3 and 5 during 2004 and 2005. In the CDFG study, five native fish species and four introduced fish species were collected from Reach 1 (native fish collected were rainbow trout, Sacramento sucker, threespine stickleback, sculpin spp., and lamprey spp.). Four native species and twelve introduced species were collected from Reach 1 downstream of State Route (SR) 41. Rainbow trout and stickleback were absent from this reach, but native Sacramento pikeminnow were collected from this section of the river along with suckers, sculpin, and lamprey. Only one native fish and eight introduced species were collected from Reach 1B downstream of SR 99. The only native species present in this reach was Sacramento sucker.

No sampling was done between Gravelly Ford and Mendota Dam because the channel was dry, and no sampling was conducted in Mendota Pool. Sampling occurred in Reaches 3 and 5, but not in Reach 4. One native species (Sacramento sucker) and nine introduced species were found in Reach 3. A total of six native species (Sacramento blackfish, Sacramento splittail, tule perch, Sacramento sucker, Sacramento pikeminnow, and prickly sculpin) and 18 introduced species were collected from Reach 5. The suite of species collected in Reach 5 by CDFG (2007) was similar to the suite of species collected from the Mendota Pool by Jones and Stokes (1986).

In general, the number of species detected during the CDFG survey increased with distance downstream from Friant Dam (with the exception that total species declined in Reach 1B) and the composition of fish assemblages shifted from dominance by native species to dominance by nonnative species. Except for suckers, native species were absent between SR 41 and Reach 4. Sacramento suckers were present in all reaches sampled (CDFG 2007). Introduced fishes in Reach 1 were mostly sunfishes (largemouth bass, redear, and green sunfish), and western mosquitofish. Reach 1B also supported spotted bass, bluegill, black crappie, channel catfish, brown bullhead, and three species of introduced minnows: carp, goldfish, and golden shiners.

Reach 3 was similar in species composition to Reach 1 with the addition of threadfin shad and red shiner. Many more species typically found in the Delta were collected in Reach 5, the likely consequence of fish moving upstream through the perennially flowing sections of the San Joaquin River. Introduced species found in this reach include threadfin shad, inland silverside, striped bass, white crappie, white and channel catfish, brown bullhead, red shiner, golden shiner, fathead minnow, and big-scale logperch, in addition to species found in Reach 3.

Reaches 1 and 3 and the Mendota Pool would likely be sources of fishes that will initially colonize Reach 2B once flows are restored to the San Joaquin River. Under existing conditions, the Mendota Pool is drained about every 2 years to repair boils that occur along the base of Mendota Dam. Draining the reservoir essentially cuts off all downstream flow into Reach 3; it temporarily reduces the amount of permanent aquatic habitat in the pool upstream of the dam. However, some locations in the pool retain standing water during the drawdown. Future plans call for construction of a Mendota

Pool Bypass channel or relocating Mendota Pool into Fresno Slough and restoring the historic river channel in that location. Either or both options will change how the river will be managed in the future. Reach 3 will also provide an initial source population of fish for Reach 2B once the river reaches are hydraulically reconnected.

The San Joaquin Hatchery, located in Reach 1 near Friant Dam and operated by CDFG, is a production hatchery that began operation in 1956. The hatchery spawns and raises rainbow trout for planting in the San Joaquin River below Friant Dam and other waters in Fresno and Madera counties. The hatchery has a production capacity of approximately 380,000 pounds annually and releases approximately 20,000 pounds of "catchable" rainbow trout (about 10 to 12 inches long) into the San Joaquin River below Friant Dam each year (Lindsay 2003, as cited in CH2MHill 2003). Stocking of catchable rainbow trout from the hatchery maintains a rainbow trout fishery in Reach 1 (CH2MHill 2003). The hatchery operations and facilities will likely be altered to assist in re-establishing runs of Chinook salmon in the San Joaquin River.

4.1.2 Special-Status Fishes

Seven special-status fish species were identified by the database search as having potential to occur in the study area, and are evaluated further in this section.

Delta smelt

Status: Federally listed as threatened, State listed as endangered

Species Description

Delta smelt (*Hypomesus transpacificus*) are slender-bodied fish about 2 to 3 inches long, in the Osmeridae family (smelts). The species is endemic to the Sacramento-San Joaquin Delta. Delta smelt are euryhaline fish that typically rear in open waters of the estuary (Moyle 2002). They are mostly found within a salinity range of 2 to 7 parts per thousand and have been collected from the estuarine waters up to 14 parts per thousand. This is mostly an annual species with adults that move into the interior Delta before spawning, beginning in December. Spawning occurs from February through May with larval and juvenile fish developing during spring and summer and moving westward into Suisun Bay. USFWS has defined four primary constituent elements of delta smelt habitat: (1) shallow freshwater to slightly brackish sites for spawning; (2) protected channels and rivers to provide transport of larvae to downstream rearing sites; (3) estuary rearing habitat that provides a shallow, protective, food-rich environment; and (4) unrestricted access to spawning sites between December and July (59 FR 65260).

Known Occurrences

CNDDB describes no known occurrences within 10 miles of the Project area (CDFG 2009a). Delta smelt have been found in the San Joaquin River as far upstream as Mossdale and above, but still within the legal boundaries of the Delta. Delta smelt potentially could occur in Mendota Pool, because water from the Delta is pumped into the Delta-Mendota Canal, but the likelihood of delta smelt surviving the trip in the canal system is extremely low. Delta smelt reaching the Mendota Pool would be unlikely to survive since this is unlike the tidally dominated habitat they use in the Delta.

Conclusion
Based on the available data and existing habitat conditions, the potential for delta smelt to occur within the study area is extremely low. The study area is more than 100 river miles from the nearest occupied delta smelt habitat. Potential Project-related flow volume, timing or water quality changes from the San Joaquin River into the Delta may affect delta smelt. Changes in the timing or magnitude of the diversion of water into the Delta-Mendota Canal may also occur as a result of the Project and may affect delta smelt.

Central Valley Spring-Run Chinook Salmon
Status: Federally listed as threatened.

Species Description
Central Valley spring-run Chinook salmon Evolutionarily Significant Units (ESU) consist primarily of three populations in three tributary systems (Mill, Deer, and Butte creeks) and also the Feather River and Clear Creek, all within the Sacramento River Basin. Recent reintroductions have also established a run in Battle Creek. The population uses rearing and migration habitats in the Sacramento River Basin and Delta, San Francisco Bay, and offshore ocean waters (Entrix 2009).

Historically, spring-run salmon on the San Joaquin River migrated upstream between April and early July, with most adults migrating upstream in May and June. Currently, there is no population of spring-run salmon in the San Joaquin River basin. However, spring-run populations in the Sacramento River basin typically migrate upstream between February and June (Stillwater Sciences 2003).

Spring-run Chinook salmon tend to enter freshwater as immature fish, migrate far upriver, and delay spawning for weeks or months (stream-type life history) (WCCSBRT 1997, Groot 1991). Spawning occurs in Sacramento River tributaries from late September through mid-November. Fry emerge from the gravel from November to March and spend about 3 to 15 months in freshwater habitats prior to emigrating to the ocean (Kjelson 1982). Spring-run Chinook salmon generally mature between 2 and 4 years of age.

In addition to rearing in natal streams, spring-run Chinook salmon juveniles rear in the lower part of nonnatal tributaries and intermittent streams during the winter months (Maslin 1997, Snider 2001). Emigration can be highly variable (CDFG 1998). Some juveniles may begin outmigrating soon after emergence, whereas others over-summer and emigrate as yearlings with the onset of intense fall storms (CDFG 1998). The emigration period for spring-run Chinook salmon extends from November to early May (CDFG 1998). Emigration appears to coincide with high precipitation and high Sacramento River flows.

NMFS designated as critical habitat for Central Valley spring-run Chinook salmon the Sacramento River and specific tributaries occupied by spawning and rearing spring-run Chinook, as well as the Sacramento Delta Hydrologic Unit within the Sacramento-San Joaquin Delta (Entrix 2009).

Known Occurrences

Spring-run Chinook salmon do not now occur within the study area. Historically, spring-run Chinook salmon spawned in the river from about the present day location of Friant Dam to as far upstream as Mammoth Pool (River Mile 322) (McBain and Trush 2002). During the late 1930s and early 1940s, as the Friant Dam was being constructed, large runs continued to return to the river. After the dam was completed and the reservoir was filling, runs of 30,000 to 50,000 fish continued to return and spawn in the river downstream of the Friant Dam. These runs were completely gone by 1950, as diversions from Friant Dam resulted in the river being dry at Gravelly Ford (McBain 2002).

About 30 years after the loss of this run, Moyle (1970) describes two observations that reflect on the ability of individual salmon to reoccupy and use habitat when conditions are favorable for migration and reproduction. An 30-inch adult male Chinook salmon was caught by an angler in the San Joaquin River below Friant Dam on July 1, 1969. The following spring, on April 3, 1970, three juvenile salmon (10.5 to 11 cm total length [TL]) were collected from Mill Creek, a tributary to the Kings River below Pine Flat Dam. Access to the San Joaquin and Kings rivers was facilitated by an exceptionally wet spring in 1969. Flows in the San Joaquin River (below the Friant Dam) in the fall of 1968 were limited for fall-run Chinook (100 to 200 cfs until mid-January 1969), then increased and remained between 8,000 and 10,000 cfs through mid-June. The 1969-70 flows were similar in the fall and much drier in the winter, but reflected a similar pattern, with flows peaking quickly to the 1,000-cfs range in mid-January and then quickly receding to much lower levels throughout the spring of 1970. It is unlikely that the juvenile Chinook found in the Kings River in the spring of 1970 were the progeny of 1969 fall-run adults, because flows were too low to support passage into the Kings River until January, which is well past the normal migration period for fall-run Chinook. The juvenile salmon were larger than fry, which implies that these fish were spawned by spring-run Chinook salmon that entered the Kings River via Fresno Slough during the spring of 1969, then held over and successfully spawned in the fall that year. The adult male Chinook salmon that was taken from the San Joaquin River in July of 1969 is further indication of a life history strategy aligned with spring-run Chinook salmon.

Reports of Chinook salmon with spring-run-like life histories have occurred in tributaries of the San Joaquin River and Delta, specifically in the Stanislaus and Mokelumne rivers. Snorkel surveys in the Stanislaus River in the mid-2000s and netting surveys in the early 2000s resulted in the observation or capture of adult Chinook salmon from the Stanislaus River in mid-summer (Wikert, pers. comm., 2011). There are reports that adult Chinook salmon exhibiting traits similar to spring-run Chinook have been counted in the Woodbridge Dam fish ladder by the East Bay Municipal Utility District (Wikert, pers. comm., 2011).

Spring-run Chinook salmon would stay in the San Joaquin River over summer to take advantage of deep, cold pools in upper Reach 1, but anticipated habitat conditions in Reach 2B (temperature and flows) would not support year-round rearing (Stillwater Sciences 2003). It is anticipated that implementation of the Project will aid in the reintroduction of spring-run Chinook salmon to the lower San Joaquin River. Furthermore, the San Joaquin hatchery operations and facilities will be modified to

support a conservation hatchery and assist in re-establishing spring-run Chinook salmon in the San Joaquin River.

Conclusion
Based on the occurrence data and available information, spring-run Chinook salmon are not present within the study area. When migration flows are restored to the San Joaquin River and fish passage is provided, adult spring-run Chinook salmon from other rivers in the Central Valley may stray into the San Joaquin River during winter or spring. If successful migration, holding, and spawning occurs, juvenile fish could be found using Reach 2B for migrant rearing from November through May.

Central Valley Fall-Run Chinook Salmon
Status: Federal Listing Not Warranted, Species of Special Concern.

Species Description
Central Valley fall-run Chinook salmon occur in the Sacramento River and its tributaries; the Delta and Suisun Marsh; the San Joaquin River and five of its east-side tributaries, including the Merced, Tuolumne, Stanislaus, Mokelumne, and Cosumnes rivers (Moyle 2002). The Central Valley ESU is considered the southernmost native spawning population of Chinook salmon (Entrix 2009).

Fall-run Chinook are currently the most numerous of the Central Valley runs (WCCSBRT 1997) and the only race that regularly spawns in the San Joaquin Basin (NMFS 2008).

Fall-run are ocean-type Chinook that tend to enter freshwater as fully mature fish, migrate to lowland reaches of large rivers and tributaries, and spawn within a few days or weeks of arriving on the spawning grounds (Healey 1991, Moyle 2002). Currently, adult fall-run salmon in the San Joaquin River basin typically migrate upstream between October and early December (Stillwater Sciences 2003). Fall-run Chinook spawn between late October and early December in tributaries of the Sacramento Basin and San Joaquin Basin (Moyle 2002).

Fall-run Chinook salmon typically rear in freshwater for 1 to 3 months before outmigrating to the ocean, but some may disperse downstream as fry soon after emerging from the streambed. These young-of-the-year fish will occur in Reach 2B as transient juveniles as they migrate downstream toward the ocean (Stillwater Sciences 2003).

Known Occurrences
Historically, fall-run Chinook salmon likely used the San Joaquin River system when flows were sufficient for upstream passage during the fall. Runs now occur in the Stanislaus, Tuolumne, and Merced Rivers.

The Grasslands Bypass Annual Report series has reported on species collected for tissue sampling from the San Joaquin River, in the vicinity of Mud Slough and the confluence of the Merced River. These reports include the capture of adult fall-run Chinook salmon between 2001 and 2009, and are summarized as follows:

In the period between 2001 and 2009, two adult salmon were collected from the San Joaquin River in the vicinity of the Merced River. One adult Chinook salmon was collected from the San Joaquin River at Fremont Ford (Site G) on December 3, 2003, and one adult Chinook salmon collected at the San Joaquin River at Hills Ferry, below Mud Slough (Site H) on December 5, 2007. No Chinook salmon were collected at the sampling location near Mud Slough and Highway 140 (Site E) during this time (SFEI 2002).

An older report covering the period from 1993 to 2002 is referenced in the 2001-2002 report; it notes that 26 Chinook salmon were collected under this program, but the data to support these claims were not verifiable (Eacock, pers. comm., 2011). As mentioned earlier in this section, between 1992 and 2010, observations of adult fall-run adult Chinook salmon were a regular occurrence common in the San Joaquin River and associated waterways in Reaches 5 and 4 and associated water bodies (Gates, pers. comm., 2010).

During the fall of 2010, after large, early storms damaged the Hills Ferry Barrier and allowed salmon to move above the barrier for several days, multiple adult Chinook salmon were observed by Fish and Game biologists below Sack Dam between November 16 and 18, and below Mendota Dam between November 22 and December 8 (Guzman, pers. comm., 2011).

Conclusion

Based on the occurrence data and available information, fall-run Chinook salmon are not present within the study area. It is likely that when flows are restored to the San Joaquin River and fish passage is provided, adult fall-run Chinook salmon could migrate upstream through Reach 2B. Adult fall-run Chinook salmon would migrate upstream through Reach 2B from October through December, and juvenile fish would use Reach 2B for migrant rearing from February through May.

Central Valley Steelhead

Status: Federally listed as threatened.

Species Description

Central Valley steelhead (*Oncorhynchus mykiss*) Distinct Population Segment consists of naturally spawned anadromous populations of *O. mykiss* downstream of natural and man-made impassable barriers in the Sacramento and San Joaquin rivers and their tributaries. Steelhead can be divided into two life history types, winter (ocean-maturing) and summer (river-maturing), based on their sexual maturity at river entry and duration of their spawning migration. Only winter-run types are currently found within the Central Valley. Two artificial propagation programs, both steelhead hatcheries, are considered part of the Distinct Population Segment; the Coleman National Fish Hatchery and the Feather River Fish Hatchery. The San Joaquin Hatchery, downstream of Friant Dam, rears rainbow trout for planting into Reach 1 and other locations above Millerton Lake in Fresno and Madera counties. The hatchery operations and facilities would be modified for a conservation hatchery to support restoring spring-run Chinook salmon to the San Joaquin

River There is currently no plan for the hatchery to support restoring steelhead runs to the San Joaquin River.

Central Valley steelhead generally leave the ocean from August through April and move upstream into Central Valley rivers. Spawning takes place from December through April with a peak between January and March. Steelhead are iteroparous, capable of spawning more than once over several years — so post-spawn adults (called kelts during this life stage) can return to the ocean where they will mature and possibly migrate inland to spawn again. Juvenile steelhead rear in cold-water streams in riffles, runs, and pools. Most steelhead will rear for at least a full year before they begin migrating downstream to the ocean. Outmigration occurs when fish reach 6 to 8 inches in size and begin to transform from a resident juvenile form to a smolt. Outmigration can occur from fall through spring with a peak from February through April.

NMFS has defined six primary constituent elements of Central Valley steelhead habitat: (1) freshwater spawning sites; (2) freshwater rearing sites with sufficient shade, foraging areas, and space for growth and movement; (3) freshwater migration corridors with sufficient areas of cover; (4) estuarine areas that provide areas for foraging and cover; (5) near shore marine areas that allow for juvenile transition from natal streams to offshore environments; and (6) off-shore marine areas with sufficient forage (70 FR 52521, September 2, 2005).

Known Occurrences
Steelhead and resident rainbow trout have been captured in the three main tributaries of the San Joaquin River — the Stanislaus, Tuolumne, and Merced rivers. They are not present in the dry sections of Reach 2B. Between the Merced River and Reach 2B, there are several passage obstructions (e.g., Hills Ferry Barrier, Sack Dam, Mendota Dam) that prevent steelhead from migrating into Reach 2B. It is possible, but highly unlikely, that juvenile steelhead could be present in the Mendota Pool because water from the Delta is delivered to the pool via the Delta-Mendota Canal. Aquatic habitat in Mendota Pool is unsuitable for steelhead during the warm summer months. It is likely that when flows are restored to the San Joaquin River and passage is provided, steelhead may move upstream and occupy Reach 2B seasonally when water temperatures and habitat are suitable. They could reside year round in Reach 1. If steelhead do become established in the San Joaquin River, they would use Reach 2B as a migration corridor and seasonal habitat for juvenile rearing. We have been unable to verify any sightings of steelhead in the proximity of the Project area.

Conclusion
Based on the occurrence data and available information, there is extremely low potential for Central Valley steelhead to be present within the study area.

Southern Distinct Population Segment of North American Green Sturgeon
Status: Federally listed as threatened.

Species Description

The southern Distinct Population Segment of North American green sturgeon (*Acipenser medirostris*) (green sturgeon) are among the largest of the bony fish (Moyle 2002). Green sturgeon are an anadromous, slow-growing, late-maturing and long-lived species (Nakamoto 1995). The maximum age of this species is likely 60 to 70 years or more (Moyle 2002). There is limited information available about the life history details of green sturgeon because of their low abundance, and most of what is known has been developed only recently (NMFS 2009).

Green sturgeon are principally marine dwelling fish, but spawning, larval, juvenile, and some subadult rearing occurs in freshwater (NMFS 2009). Adults and subadults enter the San Francisco Bay estuary during the spring and remain until autumn (Kelley 2007). Green sturgeon are currently known to spawn upstream in the Sacramento River from larvae that are captured below the Red Bluff Diversion Dam and at the Glenn-Colusa Irrigation District pumping plant (Adams 2002). Rotary Screw Trap catch data have shown declining catches since 1994. Spawning is known to occur in the upper river, particularly around the Red Bluff Diversion Dam (Brown 2007). Spawning in the San Joaquin River system has not been recorded, but it is likely that sturgeon historically used this basin. Spawning occurs in deep pools in large, turbulent river mainstreams from March to July, with a peak in mid-April to mid-June (Moyle 1992).

Green sturgeon larvae disperse downstream from Sacramento River spawning areas soon after hatching, and rear as juveniles and subadults for several years throughout the Sacramento-San Joaquin Delta before migrating into the ocean (Beamesderfer 2004 2007). Little is known about larval rearing habitat requirements. In the Klamath River, juvenile green sturgeon are reported to grow rapidly to 300 millimeters in 1 year and to more than 600 millimeters within 2 to 3 years (Nakamoto 1995). Green sturgeon feed on benthic invertebrates, including shrimp, mollusks, amphipods, and occasionally small fish (Moyle 1992). Juveniles rear in fresh and estuarine waters for about 1 to 4 years (Nakamoto 1995, NMFS 2009). Juveniles seem to outmigrate in the summer and fall before the end of their second year (Moyle 2002). They disperse widely in the ocean after their outmigration from freshwater and before their return spawning migration (Moyle 1992). Green sturgeon spend the majority of the adult life in the oceans, where they migrate considerable distances northward along the Pacific Coast and into other estuaries, particularly the Columbia (Adams 2002). Adults reach sexual maturity only after many years of growth: 9 to 13 years for males and 13 to 27 years for females (Nakamoto 1995, Van Eenennaam 2006).

Known Occurrences

Green sturgeon are the most widely distributed and most marine-oriented of the sturgeon family (Moyle 2002). They range offshore along the Pacific Coast from Ensenada Mexico to the Bering Sea and in rivers from British Columbia to the Sacramento River (Moyle 2002). In North America, spawning populations are currently found in only three river systems: the Sacramento and Klamath Rivers in California and the Rogue River in southern Oregon. The southern Distinct Population Segment includes all green sturgeon populations south of the Eel River, with the only known spawning population being in the Sacramento River.

When not in the ocean, green sturgeon occupy freshwater and estuarine habitat in the Sacramento River (upstream to Keswick Dam), lower Feather River, lower Yuba River, the Sacramento-San Joaquin Delta, and Suisun, San Pablo, and San Francisco bays. Recent information gleaned from CDFG fisherman report cards imply that green sturgeon may occur in the San Joaquin River within Reach 5 (Jackson 2011).

Conclusion
Based on the occurrence data and available information, there is some possibility that green sturgeon could potentially occur in the San Joaquin River but are precluded from moving upstream into the Project reach by dry Sack Dam and Mendota Dam when the river is connected by high flows.

Hardhead
Status: CDFG Species of Special Concern.

Species Description
Hardhead (*Mylopharodon conocephalus*) are endemic to the Sacramento–San Joaquin Province and occur in sections of the larger low- and mid-elevation streams of the Sacramento-San Joaquin watershed (Moyle 2002). They can reach 12 inches standard length in 4 to 6 years in the larger rivers but rarely exceed 11 inches standard length in the smaller streams. The maximum size for hardhead is believed to be around 39 inches TL and they may live longer than 10 years. Adult hardhead are bottom-feeding omnivores in deep pools. Juveniles may take insects from the surface. Prey items may include insect larvae, snails, algae and aquatic plants, crayfish, and other large invertebrates. Hardhead prefer water temperatures above 68 degrees Fahrenheit [ºF]) with optimal temperatures around 75 to 82ºF. In the colder Pit River system, they prefer the warmest available water where temperatures that peak at 63 to 70ºF. Their distribution is limited to well-oxygenated streams and the surface water of impoundments. They are often found in clear deep pools (greater than 2.6 feet) and runs with slower water velocities of 8 to 16 inches per second. Hardhead distribution in streams appears to be limited by their poor swimming ability in colder waters. Larvae and post-larvae may occupy river edges or flooded habitat before seeking deeper low-velocity habitat once they have grown larger. Hardhead are ecologically associated with the Pikeminnow-Hardhead-Sucker native fish assemblage, which historically occurred along main stem portions of the San Joaquin River flowing through the lower foothills (corresponding to areas upstream of Reach 1) (Moyle 2002).

Known Occurrences
CNDDB (CDFG 2009a) described no known occurrence of the species within 10 miles of the Project area. Occurrences of hardhead were noted in the San Joaquin River between Mendota Pool and Mossdale, and also in Reach 1 (Jones and Stokes 1986). EA Engineering (1990, as cited in Brown 1993) noted small numbers of hardhead in the Tuolumne River. Ford (2001) also documented hardhead in the Tuolumne River. Saiki (1984) found hardhead in the San Joaquin River in reaches upstream of Mendota Pool, although the fish were rare, and in the Merced River, where hardhead were abundant.

Conclusion
Based on the occurrence data and available information, there is low potential for hardhead to occur within the study area. It is likely that when flows are restored to the San Joaquin River, hardhead may utilize Reach 2B when suitable habitat exists. If hardhead occupy Reach 2B after restoration, it may be as a movement corridor between the San Joaquin River and other Central Valley tributaries.

Sacramento Splittail
Status: CDFG Species of Special Concern.

Species Description
Sacramento splittail (*Pogonichthys macrolepidotus*) are endemic to the Sacramento and San Joaquin river systems of California, including the Delta and the upper parts of the San Francisco Bay (Moyle 2002; McBain and Trush 2002). Adults move upstream beginning in late November to late January, foraging in flooded areas along the main rivers, bypasses, and tidal freshwater marsh areas before spawning. Spawning typically takes place on inundated floodplains from February through June, with peak spawning in March and April. Available information indicates that splittail spawn in open areas with moving, turbid water less than 5 feet deep, among dense annual vegetation and where water temperatures are less than about 59ºF.

After emergence, most larval splittail remain in flooded riparian areas for 10 to 14 days, most likely feeding among submerged vegetation before moving off floodplains into deeper water as they become stronger swimmers (Moyle 2002). Although juvenile splittail are known to rear in upstream areas for a year or more, most move to tidal waters after only a few weeks, often in response to flow pulses. The majority of juveniles apparently move downstream into shallow, productive estuarine waters from April to August. Because splittail have a high tolerance for variable environmental conditions, and are generally opportunistic feeders (prey includes mysid shrimp, clams, copepods, amphipods, and some terrestrial invertebrates), reduced prey abundance will not likely have major population-level impacts. Year class success appears dependent on high outflow, and wet years along with access and availability of floodplain spawning and rearing habitats.

Splittail are ecologically associated with the deep-Bodied native fish assemblage, which historically occurred along low-gradient, valley-bottom portions with slower water and warmer temperatures than upstream reaches (Moyle 2002). These conditions historically existed along much of the main stem San Joaquin River and correspond to Reaches 3 to 5.

Known Occurrences
CNDDB (CDFG 2009a) found no known occurrence of the species within 10 miles of the Project area. Saiki (1984) observed Sacramento splittail along the San Joaquin River downstream of the Merced River confluence, although occurrence was rare, and CDFG (2007) notes a recent occurrence within Reach 5. During wet years, they have also been observed in the Tuolumne River (Ford 2001).

Recommendation
Based on the occurrence data and available information, there is low potential for splittail to currently occur within the study area. It is likely that when flows are restored to the San Joaquin River, splittail could occupy Reach 2B when suitable habitat exists.

4.2 Special-Status Wildlife Species

This section presents the results of the background data review and field surveys, including the wildlife habitat mapping, and conclusions for each special-status wildlife species regarding potential to occur in the study area. A list of all wildlife species observed in the study area during the 2010 habitat assessment survey is provided in Table 4-2. Wildlife mapping is discussed in Section 4.2.1. State and Federally listed or CDFG fully protected species are addressed in Section 4.2.2; other special-status wildlife species identified during the CNDDB search (CDFG 2009a) are addressed in Section 4.2.3. Similar information for special-status bird species reportedly observed at Mendota Wildlife Area but not included in the results of the USFWS species list search and lacking CNDDB documented occurrences from within 10 miles of the Project is presented in Section 4.2.4. Although not specifically addressed in the following sections, common bird species protected under the Migratory Bird Treaty Act occur in the study area.

4.2.1 Wildlife Habitat Mapping

A total of 19 wildlife habitat types were mapped in the study area. The three most abundant habitat types in the study area were all agricultural (i.e., deciduous orchard, cropland, and vineyard). Although an effort was made to map the entire study area, including areas where access had not been granted, accessible vantage points and aerial imagery were not sufficient for wildlife habitat mapping in approximately 512 acres of the 5,360-acre study area. While those areas were mapped as accurately as possible, the associated uncertainty was documented by indicating that these areas were "not ground-truthed." Acreages for each wildlife habitat type mapped in the study area are provided in Table 4-3. The first number in each row indicates the total acreage mapped, including the portion not ground-truthed due to lack of access, and the second number indicates the portion that was mapped but not ground-truthed. Wildlife habitat types mapped in the study area are described below.

Tree-Dominated Habitats

Valley Foothill Riparian
As described by WHR (2010), valley foothill riparian habitat is characterized by mature riparian forest of winter deciduous trees that is generally associated with areas of floodplains and low-velocity flows with gravely or rocky soils. The typical dominant canopy species in this habitat within the study area is Fremont cottonwood (*Populus fremontii*). Typical dominant subcanopy tree species include Goodding's black willow (*Salix gooddingii*), Oregon ash (*Fraxinus latifolia*), and blue elderberry (*Sambucus mexicana*). Typical understory shrub species include wild rose (*Rosa californica*), buttonbrush (*Cephalanthus occidentalis*), sandbar willow (*Salix exigua*), and, in some areas, California blackberry (*Rubus ursinus*). In the study area this habitat type primarily

occurs in narrow bands between the river margins and croplands, and therefore may be more similar to valley foothill riparian edge habitat (that is, habitat on the edge of a valley foothill riparian forest, as opposed to the interior). Accordingly, cover may be less dense than would be expected in the interior of a stand of valley foothill riparian forest, and the "forest" may appear less mature. This habitat type includes some areas mapped by Moise (2002) as cottonwood riparian, willow riparian, and mixed riparian.

Table 4-2.
Animal Species Observed in the Study Area

Common Name	Scientific Name
Mammals	
domestic dog	*Canis domesticus*
coyote	*Canis latrans*
American beaver	*Castor canadensis*
kangaroo rat	Dipodomys sp.
domestic cat	*Felis domesticus*
black-tailed jackrabbit	*Lepus californicus*
bobcat	*Lynx rufus*
long-tailed weasel	*Mustela frenata*
raccoon	*Procyon lotor*
fox squirrel	*Sciurus niger*
California ground squirrel	*Spermophilus beecheyi*
desert cottontail	*Sylvilagus audubonii*
Reptiles and Amphibians	
western pond turtle	*Actinemys marmorata*
western whiptail	*Aspidoscelis tigris munda*
western toad	*Bufo boreas*
rattlesnake	Crotalus sp.
gopher snake	*Pituophis catenifer*
Gilbert's skink	*Plestiodon gilberti*
chorus frog	Pseudacris sp.
American bullfrog	*Rana catesbeiana*
northern leopard frog	*Rana pipiens*
desert spiny lizard	*Sceloporus magister*
western fence lizard	*Sceloporus occidentalis*
red-eared slider	*Trachemys scripta elegans*
side-blotched lizard	*Uta stansburiana*
Fish	
shad	Dorosoma sp.
sunfish	Lepomis sp.
striped bass	*Morone saxitalis*
Invertebrates	
crayfish	*Astacidae*
European mantis	*Mantis religiosa*
Birds	
Cooper's hawk	*Accipiter cooperii*
Clark's grebe	*Aechmophorus clarkii*
western grebe	*Aechmophorus occidentalis*

Table 4-2.
Animal Species Observed in the Study Area

Common Name	Scientific Name
red-winged blackbird	*Agelaius phoeniceus*
northern pintail	*Anas acuta*
cinnamon teal	*Anas cyanoptera*
blue-winged teal	*Anas discors*
mallard	*Anas platyrhynchos*
gadwall	*Anas strepera*
American pipit	*Anthus rubescens*
scrub jay	*Aphelocoma californica*
great egret	*Ardea alba*
great blue heron	*Ardea herodias*
short-eared owl	*Asio flammeus*
burrowing owl	*Athene cunicularia*
oak titmouse	*Baeolophus inornatus*
Canada goose	*Branta canadensis*
American bittern	*Botaurus lentiginosus*
great-horned owl	*Bubo virginianus*
cattle egret	*Bubulcus ibis*
red-tailed hawk	*Buteo jamaicensis*
red-shouldered hawk	*Buteo lineatus*
Swainson's hawk	*Buteo swainsoni*
green heron	*Butorides virescens*
dunlin	*Calidris alpina*
California quail	*Callipepla californica*
Anna's hummingbird	*Calypte anna*
house finch	*Carpodacus mexicanus*
purple finch	*Carpodacus purpureus*
turkey vulture	*Cathartes aura*
hermit thrush	*Catharus guttatus*
belted kingfisher	*Ceryle alcyon*
wrentit	*Chamaea fasciata*
killdeer	*Charadrius vociferus*
common nighthawk	*Chordeiles minor*
northern harrier	*Circus cyaneus*
marsh wren	*Cistothorus palustris*
northern flicker	*Colaptes auratus*
olive-sided flycatcher	*Contopus cooperi*
American crow	*Corvus brachyrhynchos*
common raven	*Corvus corax*
yellow-rumped warbler	*Dendroica coronata*
snowy egret	*Egretta thula*
white-tailed kite	*Elanus leucurus*
horned lark	*Eremophila alpestris*
Brewer’s blackbird	*Euphagus cyanocephalus*
merlin	*Falco columbarius*
American kestrel	*Falco sparverius*
American coot	*Fulica americana*

Table 4-2.
Animal Species Observed in the Study Area

Common Name	Scientific Name
common moorhen	*Gallinula chloropus*
common yellowthroat	*Geothlypis trichas*
sandhill crane	*Grus canadensis*
black-necked stilt	*Himantopus mexicanus*
barn swallow	*Hirundo rustica*
Bullock's oriole	*Icterus bullockii*
loggerhead shrike	*Lanius ludovicianus*
California gull	*Larus californianus*
song sparrow	*Melospiza melodia*
common merganser	*Mergus merganser*
northern mockingbird	*Mimus polyglottos*
brown-headed cowbird	*Molothrus ater*
long-billed curlew	*Numenius americanus*
black-crowned night heron	*Nycticorax nycticorax*
orange-crowned warbler	*Oreothlypis celata*
house sparrow	*Passer domesticus*
savannah sparrow	*Passerculus sandwichensis*
fox sparrow	*Passerella iliaca*
American white pelican	*Pelecanus erythrorhynchos*
double-crested cormorant	*Phalacrocorax auritus*
phainopepla	*Phainopepla nitens*
Nuttal's woodpecker	*Picoides nuttallii*
downy woodpecker	*Picoides pubescens*
hairy woodpecker	*Picoides villosus*
California towhee	*Pipilo crissalis*
spotted towhee	*Pipilo maculatus*
white-faced ibis	*Plegadis chihi*
pied-billed grebe	*Podilymbus podiceps*
bushtit	*Psaltriparus minimus*
great-tailed grackle	*Quiscalus mexicanus*
ruby-crowned kinglet	*Regulus calendula*
golden-crowned kinglet	*Regulus satrapa*
black phoebe	*Sayornis nigricans*
Say’s phoebe	*Sayornis saya*
western bluebird	*Sialia mexicana*
American goldfinch	*Spinus tristis*
western meadowlark	*Sturnella neglecta*
European starling	*Sturnus vulgaris*
tree swallow	*Tachycineta bicolor*
Bewick's wren	*Thryomanes bewickii*
California thrasher	*Toxostoma redivivum*
American robin	*Turdus migratorius*
house wren	*Troglodytes aedon*
western kingbird	*Tyrannus verticalis*
barn owl	*Tyto alba*
yellow-headed blackbird	*Xanthocephalus xanthocephalus*

Table 4-2.
Animal Species Observed in the Study Area

Common Name	Scientific Name
mourning dove	*Zenaida macroura*
golden-crowned sparrow	*Zonotrichia atricapilla*
white-crowned sparrow	*Zonotrichia leucophrys*

Note: The species presented in this table were observed within the study area; however, they are not necessarily residents, and some may only occur infrequently.

Table 4-3.
Wildlife Habitat Types Mapped in the Study Area

Habitat Type	Total Area (Acres)	Area not Ground-Truthed (Acres)
Tree Dominated		
valley foothill riparian	150.91	21.64
Shrub Dominated		
elderberry savannah	62.45	-
riparian scrub	104.18	0.58
willow scrub	123.33	16.61
Herbaceous Dominated		
annual grassland	426.54	-
fresh emergent wetland	68.45	5.17
pasture	15.41	-
river wash	9.99	1.07
wet herbaceous	80.57	3.24
Aquatic		
lacustrine	243.11	0.00
potential seasonal wetland	9.42	9.42
riverine	98.73	-
Developed		
cropland	1,086.72	303.43
irrigated hayfield	243.45	-
irrigated row and field crop	79.15	-
deciduous orchard	1,643.86	-
evergreen orchard	9.70	-
vineyard	473.28	-
Nonvegetated		
barren	24.88	-
disturbed	408.87	32.31
Total	**5,363.00**	**393.48**

Shrub-Dominated Habitats

Elderberry Savannah

As described by Holland (1986), elderberry savannah habitat is characterized by a winter-deciduous shrub savannah dominated by blue elderberry (*Sambucus mexicana*) and an

understory of nonnative grasses. The habitat is generally associated with alluvial soil and areas of floodplains and in natural stands this habitat typically succeeds into riparian vegetation. Typical understory species present in the study area include tarweed (*Hemizonia spp.*), mustard (*Brassica spp.*), California wild rose (*Rosa californica*), and annual grasses.

Riparian Scrub

As described in Moise (2002), riparian scrub habitat is characterized by a mix of semishrubby perennials and woody vines. In the study area, some areas also included a layer of shrub-like trees, including tobacco tree (*Nicotiana glauca*), blue elderberry (*Sambucus mexicana*), buttonbrush (*Cephalanthus occidentalis*), sandbar willow (*Salix exigua*), and Goodding's black willow (*Salix gooddingii*). Common understory species include California wild rose (*Rosa californica*), mugwort (*Artemisia douglasiana*), jimpson weed (*Datura spp.*), cocklebur (*Xanthium strumarium*), nettle (*Urtica dioica*), sunflower (*Helianthus annuus*), tarweed (*Hemizonia spp.*), mustard (*Brassica spp.*) and lupin (*Lupinus spp.*).

Riparian scrub is distinguished from willow scrub habitat, described below, by the fact that this is a habitat dominated by multiple species (i.e., willow and nonwillow riparian species), whereas willow scrub habitat is dominated by stands of willow species. In the study area much of the riparian scrub occurs along highly channelized portions of the river or areas that are subject to frequent disturbance.

Willow Scrub

As described by Moise (2002), willow scrub habitat is characterized by winter deciduous, shrubby, streamside willow thickets that are generally associated with areas subject to flooding or disturbance. Typical dominant species present in the study area include Goodding's black willow (*Salix gooddingii*) and sandbar willow (*Salix exigua*). Typical understory species include wild rose (*Rosa californica*). This habitat type is similar to Holland's (1986) Great Valley Willow Scrub. In the study area, much of the willow scrub occurs along sand and gravel bars and in small patches along the banks of the San Joaquin River. This habitat type includes some areas mapped by Moise (2002) as willow scrub and low-density willow scrub.

Herbaceous-Dominated Habitats

Annual Grassland

As described by WHR (2010), annual grassland habitat is characterized by open grassland dominated by annual, nonnative grass species that are generally found on flat plains or rolling hills. Typical dominant grass species include wild oats (*Avena fatua*), soft chess (*Bromus hordeaceus*), ripgut brome (*Bromus diandrus*), red brome (*Bromus madritensis*), wild barley (*Hordeum marinum*), and foxtail fescue (*Vulpia myuros*). Common forbs typically associated with this habitat include broadleaf filaree (*Erodium botrys*), redstem filaree (*Erodium cicutarium*), turkey mullein (*Eremocarpus setigerus*), true clovers (*Trifolium* spp.), bur clover (*Medicago minima*), and popcorn flower (*Cryptantha muricata*).

Grasses and forbs in the study area were dead or dormant at the time of the wildlife habitat assessment survey (August 2010), and were therefore difficult to identify. Tarweed (*Hemizonia sp.*) was common in some areas and was mapped as annual grassland. In the study area annual grassland habitat occurs in several places, including on a less disturbed piece of land in the eastern portion of the study area, south of the San Joaquin River and adjacent to elderberry savannah and riparian scrub habitat. Originally this area was mapped by Moise (2002) as herbaceous vegetation but it was re-categorized to reflect potential habitat value for upland species and to distinguish it from the other areas categorized as wet herbaceous. Other areas mapped as annual grassland typically had a strong ruderal vegetation component.

Fresh Emergent Wetland

As described by WHR (2010), fresh emergent wetland habitat is characterized by erect, rooted, herbaceous, water-intense plants most commonly found on level to gently rolling topography, in depressions or at the edge of rivers or lakes in areas that are flooded frequently. Common species on the upper margins of this habitat in the study area include yerba mansa (Anemopsis californica) and on more alkali sites, saltgrass. Common species on more saturated sites include common cattail (Typha latifolia) and tule bulrush (Scirpus acutus var. occidentalis). This habitat type is similar to Moise's (2002) wetland/ marsh habitat, and may blend into the wet herbaceous habitat type described below. Fresh emergent wetland habitat in the study area primarily occurs along the margins of and sometimes as small "islands" within lacustrine habitats, including portions of the San Joaquin River, Fresno Slough, and Little San Joaquin Slough.

Pasture

As described by WHR (2010), pasture habitat is characterized by irrigated and grazed habitat that consists of a mix of perennial grasses and legumes that provide 100 percent canopy closure planted on flat and gently rolling terrain. Species occurring in this habitat type include Bermuda grass (*Cynodon dactylon*), white melilot (*Melilotus albus*), and ryegrasses (*Lolium spp.*). Annual grasses were present; however, they were dead at the time of the wildlife habitat assessment survey, and were therefore difficult to identify. This habitat type was mapped south of Little San Joaquin Slough along the finger of the study area that follows the proposed bypass channel alignment.

Riverwash

As described by Moise (2002), riverwash habitat is characterized by scoured banks and bars within or adjacent to the active river channel, without significant vegetative cover. In the study area, this habitat type was mapped at a few locations along the San Joaquin River.

Wet Herbaceous

Wet herbaceous habitat is characterized by annual and perennial herbaceous vegetation growing in areas with a high water table or subject to frequent flooding. These areas are typically wetter than annual grassland but not wet enough to be classified as fresh emergent wetland. Vegetation is lower-growing than in riparian scrub or valley foothill riparian habitats. Common species occurring in this habitat type include white melilot (*Melilotus albus*), Indian dogbane (*Apocynum cannabinum*), Bermuda grass (*Cynodon*

dactylon), ryegrasses (*Lolium spp.*), tarweed (*Hemizonia spp.*), and cocklebur (*Xanthium strumarium*). This habitat type includes a portion of what Moise (2002) define as Herbaceous, in which they combine herbaceous riparian vegetation with drier grassland. Due to wildlife species preferences and the different value of wet and dry herbaceous habitats for individual wildlife species, the category here is split into wet herbaceous and annual grassland. Wet herbaceous habitat in the study area may blend into other riparian and wetland habitats.

Aquatic Habitats

Lacustrine

As described by WHR (2010), lacustrine habitat is characterized by inland depressions or dammed riverine channels containing standing water. Due to the presence of the Mendota Dam, large portions of aquatic habitat in the study area hold water throughout the summer.

Potential Seasonal Wetland

In one portion of the study area where access had not been granted, two features were identified from aerial photographs as potential seasonal wetlands. The features appear to be artificially inundated and may be more appropriately described as agricultural wetlands, but since access was not available the exact character of these features remains unknown. Additional description of the two features is provided in Section 4.2.2 under the heading "Longhorn Fairy Shrimp."

Riverine

As described by WHR (2010), riverine habitat is characterized by intermittent or continually running water of rivers or streams. There are three zones (not mapped) in this habitat type: the open water zone, submerged zone and the shore zone. Riverine habitat was mapped upstream of the San Mateo Avenue crossing, where water was visibly flowing during the habitat assessment survey. This habitat type includes Moise's (2002) open water habitat. Fresh emergent wetland habitat is mapped separately from riverine habitat, although it may be within the shore or submerged zone as defined by WHR.

Developed Habitats

Developed habitats in the study area consist of agricultural lands, which dominate the study area, and occur in most portions of the study area outside of the lands immediately adjacent to the San Joaquin River.

Cropland

As described by WHR (2010), cropland habitat is generally characterized by a variety of annual crops, typically grown as a monoculture that is planted in spring and harvested in summer or fall. In the study area, an effort was made to define cropland more specifically based on the type of crop, as described below. The more general cropland habitat type was used when a more specific habitat type could not be assigned, such as where agricultural fields had recently been tilled at the time of the habitat assessment survey.

Irrigated Hayfield
As described by WHR (2010), irrigated hayfield habitat is characterized by alfalfa fields and grass hayfields where ploughing may occur annually but often is less frequent. Alfalfa is typically planted as a monoculture and usually exists unplowed for approximately 3 years or more. Grass hayfields are characterized by irrigated, intensively mowed and managed grass crops with nearly 100 percent cover. In addition, occasionally "native" hay fields are irrigated to enhance their productivity. Native hay fields may include introduced grasses and forbs, but they are managed less intensively and contain a variety of naturally occurring species as well.

Irrigated Row and Field Crops
As described by WHR (2010), irrigated row and field crop habitat is characterized by annual or perennial green vegetable crops such as asparagus, broccoli, lettuce, cucumbers, fruits from strawberries to melons, and root vegetables such as carrots, potatoes, and beets. Cotton is also grown as an irrigated row crop. Most of these crops are grown in rows and canopy cover varies from 100 percent to crops with significant bare areas. These crops are also managed in a crop rotation system.

Deciduous Orchard
As described by WHR (2010), deciduous orchard habitat is characterized by deciduous trees that produce almonds, apples, apricots, cherries, figs, nectarines, peaches, pears, pecans, pistachios, plums, pomegranates, prunes, and walnuts. Deciduous orchards typically consist of a single species of deciduous trees planted in linear, uniformly spaced rows where the crowns typically touch. Orchards in the study area were clearly managed to reduce understory growth at the time of the habitat assessment and therefore the typical understory of low-growing grasses, legumes, and other herbaceous plants was sparse or absent from this habitat type.

Evergreen Orchard
As described by WHR (2010), evergreen orchard habitat is characterized by evergreen trees that produce avocados, dates, olives, and citrus fruits. Evergreen orchard habitat typically consists of evergreen trees planted in linear, uniformly spaced rows where crowns typically do not touch. Orchards in the study area were managed to reduce understory growth at the time of the habitat assessment survey and therefore the typical understory composed of low-growing grasses, legumes, and other herbaceous plants was sparse or absent from this habitat type.

Vineyard
As described by WHR (2010), vineyard habitat is characterized by a single species of vines, usually supported on wood and wire trellises of boysenberries, olallieberries, raspberries, or grapes planted in rows. Typically the ground under the vines is sprayed with herbicides to prevent growth of herbaceous plants, and the ground between the rows of vines is often kept open and grasses or other herbaceous plants may be planted or allowed to grow to control erosion.

Nonvegetated Habitats

Barren

As described by WHR (2010), barren habitat is characterized by less than 2 percent total vegetation cover by herbaceous, desert, or nonwildland species and less than 10 percent cover by tree or shrub species. This habitat is limited to nonvegetated areas that have not been significantly disturbed but instead are naturally sparsely vegetated due to hydrology or other factors. This habitat does not include areas within an active river channel (Riverwash).

Disturbed

As described by Moise (2002), disturbed habitat is characterized by areas where it is unlikely or impossible to find significant native vegetation, which includes permanent roads or roads at least two lanes in width, canals, levees, structures and associated landscaping, parks, golf courses, active gravel mines or other areas maintained free of vegetation by regular disturbance. As used here this habitat type also includes areas defined as urban by both WHR (2010) and Moise (2002). This habitat is present throughout the study area in the form of roads and structures associated with agricultural activities.

4.2.2 Listed and Fully Protected Wildlife

Federally and State listed, proposed, candidate and fully protected wildlife species addressed in this TM are presented in Table 4-4. Existing data, relevant field observations, and an evaluation for Federally and State listed and fully protected species regarding potential to occur are presented in this section in the same taxonomic order as presented in Table 4-4. Each species is designated as having a high, moderate, or low potential to occur within the study area. These determinations are based on the methods described in Section 3.4, and are further explained for each species in the subsections that follow.

Longhorn Fairy Shrimp

Status: Federally listed as endangered.

Species Description

Longhorn fairy shrimp (*Branchinecta longiantenna*) is found in vernal pool and swale habitats from Alameda and Contra Costa counties south to San Luis Obispo County. USFWS has defined four primary constituent elements of longhorn fairy shrimp critical habitat: (1) complexes of mounds, swales, and upland with continuous or intermittent water flow to allow for dispersal; (2) depressional features that become inundated during winter rains to form pools that hold water for a minimum of 23 days; (3) food sources, such as detritus; and, (4) organic/inorganic structures within pools that provide shelter (71 FR 7136). Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of longhorn fairy shrimp can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, “Special-Status Plants and Wildlife,” Section 9.5.3.2

Table 4-4.
Federally and State-Listed or Fully Protected Wildlife Species

Scientific Name **Common Name**	**Federal/ State Status**	**Preferred Habitat**	**Potential to Occur in the Study Area**
Invertebrates			
Branchinecta longiantenna longhorn fairy shrimp	FE/--	Found in vernal pools, particularly clear to turbid grass-bottomed pools and clear-water pools in sandstone depressions.	Low: No suitable habitat observed during habitat assessment surveys. Suitable habitat absent from study area, with possible exception of unsurveyed land in southeast of the study area. Re-evaluate following permission to enter.
Branchinecta lynchi vernal pool fairy shrimp	FT/--	Found in vernal pools, particularly small, clear-water sandstone depression pools and grassy swale, earth slump, or basalt-flow depression pools.	Low: No suitable habitat observed during habitat assessment surveys. Suitable habitat absent from study area, with possible exception of unsurveyed land in southeast of the study area. Re-evaluate following permission to enter.
Desmocerus californicus dimorphus valley elderberry longhorn beetle	FT/--	Elderberry shrubs with stem diameters of 2 to 8 inches. Species always found close to host plant. Larvae may remain in stems for up to 2 years.	High: Elderberry shrubs abundant in study area. Old exit holes observed during protocol surveys.
Amphibians			
Ambystoma californiense California tiger salamander	FT/ST	Grasslands and understory of valley-foothill hardwood habitats. Require vernal pools or other seasonal water sources for breeding and mammal burrows or other underground refuges.	Low: Study area outside known current and historic range. No suitable habitat observed during habitat assessment surveys. Suitable habitat absent from study area, with possible exception of unsurveyed land in southeast of the study area.
Rana draytonii California red-legged frog	FT/SSC	Pools with emergent vegetation, typically without predatory fish, and upland hibernacula, such as small mammal burrows or moist leaf litter.	Low: Assumed absent from the study area and vicinity, based on current known distribution, presence of two invasive ranid frog species, and presence of invasive, predatory fish species.
Reptiles			
Gambelia sila blunt-nosed leopard lizard	FE/SE and FP	Sparsely vegetated alkali and desert scrub habitats, in areas of low topographic relief. Seek cover in mammal burrows, under shrubs or structures such as fence posts.	Moderate: No suitable habitat observed during habitat assessment surveys. Suitable habitat absent from study area, with possible exception of unsurveyed land in southeast of the study area. Re-evaluate following permission to enter.

Table 4-4.
Federally and State-Listed or Fully Protected Wildlife Species

Scientific Name **Common Name**	**Federal/ State Status**	**Preferred Habitat**	**Potential to Occur in the Study Area**
Thamnophis gigas giant garter snake	FT/ST	Marshes, low-gradient streams, canals, and irrigation ditches with dense emergent vegetation, water persisting throughout the active period, open areas along water margins, and access to upland habitat for hibernation and escape from flooding.	High: Previously detected in study area (CDFG 2009a). Suitable habitat observed in portions of the San Joaquin River affected by Mendota Dam, and in Fresno Slough.
Birds			
Aquila chrysaetos golden eagle	MBTA, GBEPA/FP	Found in rolling hills, mountain areas, sage-juniper flats, or deserts. Forages in open areas with low vegetation. Nests on cliff faces or in large trees.	Low: No eagles or suitable eagle nesting habitat observed during habitat assessment survey. May occur during foraging or wintering but nesting not expected.
Buteo swainsoni Swainson's hawk	MBTA/ST	Nests in riparian areas, oak woodlands, and isolated and roadside trees close to grassland or agricultural foraging habitat.	High: Swainson's hawk nests previously documented in study area (CDFG 2009a). Two pairs present in study area during habitat assessment survey.
Coccyzus americanus occidentalis western yellow-billed cuckoo	FC, BCC, MBTA/SE	Large blocks of riparian habitats (particularly woodlands with willow and cottonwood) along floodplains of larger river systems. Dense understory foliage important.	Low: Study area located outside of current known range. Suitable habitat limited and not observed during habitat assessment survey. Not likely to occur due to extended absence from the region.
Elanus leucurus white-tailed kite	MBTA/FP	Prefers grasslands, oak woodlands, riparian scrub, and savannas. Forages in wetland and grassland areas.	High: Species observed in the study area during valley elderberry longhorn beetle surveys.
Grus canadensis tabida greater sandhill crane	MBTA/FP	Nests in wet meadows and emergent marshes. Forages in wet meadows, marshes, freshwater margins, and less frequently grasslands and croplands.	High: Sandhill cranes observed flying nearby during valley elderberry longhorn beetle protocol survey –may be different subspecies. Likely an uncommon visitor during nonnesting season.
Riparia riparia bank swallow	MBTA/ST	Colonial nester primarily in riparian and other lowland habitats west of the desert. Requires vertical banks/cliffs with fine-textured/sandy soils near water to dig nest cavity.	Low: No suitable nesting habitat observed during habitat assessment survey. Suitable nesting habitat no longer present at historic Mendota Pool occurrence location.

Table 4-4.
Federally and State-Listed or Fully Protected Wildlife Species

Scientific Name **Common Name**	**Federal/ State Status**	**Preferred Habitat**	**Potential to Occur in the Study Area**
Mammals			
Ammospermophilus nelsoni Nelson's antelope squirrel	--/ST	Merced County south to Kings, Tulare and Kern counties, at elevations ranging from 200 to 1,200 feet. Dry, sparsely vegetated loam soils with widely scattered shrubs, forbs, and grasses in broken terrain with gullies and washes.	Low: Species not observed during habitat assessment survey, although California ground squirrels were observed. Study area is north of current range of this species.
Dipodomys nitratoides exilis Fresno kangaroo rat	FE/SE	Restricted to native grasslands in Fresno County within the San Joaquin Valley; nearly level, light, friable soils in chenopod scrub and grassland communities.	Moderate: Despite efforts to trap this species, it has not been detected at nearby sites where it was present in 1992. Kangaroo rat sign (e.g., tail drags, potential burrows) was observed in the study area (primarily east and west loops), although 2011 trapping efforts within the study area captured only Heermann's kangaroo rat.
Vulpes macrotis mutica San Joaquin kit fox	FE/ST	Grassland or grassy open stages with scattered shrubby vegetation; requires loose-textured sandy soils for burrowing; requires suitable prey base of small rodents.	Low: Although habitat potentially offering denning and foraging opportunities was observed during the habitat assessment survey, prior surveys in portions of the study area have failed to confirm the presence of this species, and it is presumed extirpated in the area by USFWS (USFWS 2010).

Key:
U.S. Fish and Wildlife Service and Federal Listing Categories:
BCC = Bird of Conservation Concern
FC = Candidate for Federal Listing
FD = Federally Delisted
FE = Federally Listed as Endangered
FT = Federally Listed as Threatened
GBEPA = Protected under the Golden and Bald Eagle Protection Act
MBTA = Protected under the Migratory Bird Treaty Act
California Department of Fish and Game State Listing Categories:
FP = Fully Protected
SC = Candidate for State Listing
SE = State Listed as Endangered
SSC = Species of Special Concern
ST = State Listed as Threatened

- Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (USFWS 2005a), Chapter II, "Biology of Covered Species," Section C, "Federally Listed Animal Species," No. 3, "Longhorn Fairy Shrimp (Branchinecta *longiantenna*)," pp. 186-190

Known Occurrences

No recorded occurrences of longhorn fairy shrimp are reported in the CNDDB from within 10 miles of the Project (CDFG 2009a). The species was recently observed within 2 miles of the Project, however, in vernal pool and seasonal wetland habitat at the proposed Alkali Sink Conservation Bank, just south of the study area (Davis, pers. comm., 2010a). Although critical habitat for longhorn fairy shrimp is not included in the study area (71 FR 7135–7141), the study area does lie within the San Joaquin Valley Recovery Unit for this species (USFWS 2005a). Krista Tomlinson, CDFG Ecological Reserve Biologist, is currently sampling the Alkali Sink Ecological Reserve for vernal pool–associated species and this information could be potentially available and useful to the SJRRP (Battistoni, pers. comm., 2010). This work may provide additional information on occurrences of longhorn fairy shrimp in the vicinity of the study area.

Potential to Occur

Vernal pool complexes have been mapped just south of the Project area, as near as approximately 0.2 mile at the closest point, based on aerial photo-interpretation by Holland (2009), and longhorn fairy shrimp have been documented south of the study area (Davis, pers. comm., 2010a). However, no vernal pool habitat was identified within the study area during the habitat assessment survey. Generally, soils in the study area are sandy and well drained, are not expected to hold rainwater on the surface for extended periods, and appear to lack areas with microtopography and soils typically associated with fairy shrimp.

A possible exception is on the south side of the San Joaquin River, at the eastern end of the study area, in an area that could not be surveyed on foot because access was not granted. This area was surveyed with binoculars and a spotting scope. Although notable swales were observed, no vernal pool vegetation was seen during the habitat assessment survey and the soils appeared sandy, suggesting that vernal pools are not present. However, habitat assessment surveys were conducted in summer, a time of year when wetland areas can be difficult to identify, and based on review of aerial photography there may be two seasonal wetland features with low potential to provide habitat for vernal pool–associated species. These features appear wet even in aerial photography captured in the fall, suggesting that they are being artificially inundated, perhaps to provide water for cattle that are grazed on the property. This type of unnatural hydrology is not particularly compatible with fairy shrimp biology. The larger of the two features appears white in some images, suggesting very high alkalinity.

Close proximity of these two features to the channel of the San Joaquin River and an analysis of the local topography (based on aerial photographs, topographic maps, and recent LIDAR [Light Detection and Ranging] data) suggest that they may be periodically inundated by river floodwaters. This periodic inundation could carry predatory fishes to these pools which could persist as long as the features pond water, rendering them

unsuitable for fairy shrimp. The frequency of such events is currently unknown. Despite the qualifiers, these features should be considered potential habitat for longhorn fairy shrimp until they can be inspected more closely or additional information regarding their origin and use can be gathered.

Based on the conditions observed during the habitat assessment survey, the potential for occurrence of longhorn fairy shrimp in the study area was assessed as low.

Recommendation
Once access is granted, the two features described above and adjacent habitat, should be carefully surveyed and evaluated for the presence of habitat with potential to support longhorn fairy shrimp and other vernal pool associated species. If suitable habitat is not present, longhorn fairy shrimp will be assumed absent from the study area. If suitable habitat is found, avoidance of that habitat would be the primary strategy. Otherwise, the Project team would evaluate the costs and benefits of assuming presence in suitable habitat versus conducting protocol surveys. Currently, no protocol-level surveys are recommended for this species.

Protocol Surveys
USFWS has developed a survey protocol for vernal pool branchiopods, including the longhorn fairy shrimp (USFWS 1996). The survey requirements and timing outlined by USFWS are summarized below:

- Surveys must be conducted by a biologist who has a USFWS Section 10(a)(1)(A) Recovery Permit
- A complete survey consists of either:
  - Two full wet season surveys done within a 5-year period
  - Two consecutive seasons of one full wet season survey and one dry season survey (or one dry season survey and one full wet season survey)

For wet season surveys, surveyors should visit sites after initial storm events to determine when pools/swales have been inundated, holding greater than 1.2 inches of standing water for 24 hours after a rain event

During wet season surveys, sites should be sampled according to USFWS procedures once every 2 weeks, beginning no later than 2 weeks after their initial inundation and continuing until they are no longer inundated or until they have experienced 120 days of continuous inundation

Permission to survey within the dry season requires the completion of both the full wet season survey and the dry season survey, including the complete analysis of all dry soil samples

Vernal Pool Fairy Shrimp

Status: Federally listed as threatened.

Vernal pool fairy shrimp, Dwight Harvey/USFWS

Species Description

The vernal pool fairy shrimp (*Branchinecta lynchi*) is a vernal pool branchiopod distributed through the grasslands of California, from Shasta County south to Riverside County. USFWS has defined four primary constituent elements of vernal pool fairy shrimp critical habitat: (1) complexes of mounds, swales, and upland with continuous or intermittent water flow to allow for dispersal; (2) depressional features that become inundated during winter rains to form pools that hold water for a minimum of 18 days; (3) food sources, such as detritus; and (4) organic/inorganic structures within pools that provide shelter (71 FR 7142). Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.3.3
- Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (USFWS 2005a), Chapter II, "Biology of Covered Species," Section C, "Federally Listed Animal Species," No. 4, "Vernal Pool Fairy Shrimp (*Branchinecta lynchi*)," pp. 191-203

Known Occurrences

A review of those documents containing species accounts for the vernal pool fairy shrimp listed above, as well as the CNDDB (CDFG 2009a), revealed no reported occurrences of the species from within 10 miles of the Project area. Those sources document occurrences near Reach 1, approximately 37 miles northeast of Reach 2B, and near reaches 4B, 5, and the Eastside Bypass, approximately 12 miles northwest of the Project area (McBain and Trush 2002). The species was recently observed within 2 miles of the Project area; however, this sighting was in vernal pool habitat at the proposed Alkali Sink Conservation Bank, just south of the study area (Davis, pers. comm., 2010a). Although critical habitat for vernal pool fairy shrimp is not included in the study area (50 FR 7118–7167), the study area does lie within the San Joaquin Valley Recovery Unit for this species (USFWS 2005a). Krista Tomlinson, CDFG Ecological Reserve Biologist, is currently sampling the Alkali Sink Ecological Reserve for vernal pool–associated species and this information could be potentially available and useful to the SJRRP (Battistoni, pers. comm., 2010). This work may provide additional information on occurrences of vernal pool fairy shrimp in the vicinity of the study area.

Potential to Occur

Considerations relevant to the evaluation of the potential for vernal pool fairy shrimp to occur in the study area are essentially the same as for longhorn fairy shrimp, described above. Just south of the Project area, as near as approximately 0.2 mile at the closest

point, Holland (2009) mapped an existing vernal pool complex based on aerial photo-interpretation, and vernal pool fairy shrimp have been documented from this vicinity (Davis, pers. comm., 2010a). However, no vernal pool habitat was identified within the study area during the habitat assessment survey. While the potential for occurrence of vernal pool fairy shrimp was generally assessed as low, as described above for longhorn fairy shrimp, some uncertainty remains regarding habitat suitability at the eastern end of the study area, south of the San Joaquin River.

Recommendation
Once access is granted, habitat suitability at the eastern end of the study area, south of the San Joaquin River, should be carefully evaluated. If suitable habitat is not present, vernal pool fairy shrimp will be assumed absent from the study area. If suitable habitat is found, avoidance of that habitat would be the primary strategy. Otherwise, the Project team would evaluate the costs and benefits of assuming presence in suitable habitat versus conducting protocol surveys. Currently, no protocol-level surveys are recommended for this species.

Protocol Surveys
USFWS has developed a survey protocol for vernal pool branchiopods, including the vernal pool fairy shrimp (USFWS 1996). The survey requirements and timing outlined by USFWS are summarized immediately before this discussion of vernal pool fairy shrimp, under the heading "Longhorn Fairy Shrimp."

Valley Elderberry Longhorn Beetle
Status: Federally listed as threatened.

Species Description
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) is endemic to the Central Valley and ranges from southern Shasta County south to Fresno County. It is dependent on elderberry shrubs (*Sambucus* spp.) in which it lays its eggs. Elderberry shrubs are typically found within riparian habitats. Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of the valley elderberry longhorn beetle can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.3.5
- Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*), 5-Year Review: Summary and Evaluation (USFWS 2006)

Elderberry shrub with evidence of valley elderberry longhorn beetle presence, Jonathan Stead/URS

Known Occurrences
The following sources describe occurrences of the valley elderberry longhorn beetle within the vicinity of the Project area:

- CNDDB (CDFG 2009a) reports no occurrences within 10 miles of the Project area
- The San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.3.5 states that a population of valley elderberry longhorn beetle is known from near Reach 1A of the San Joaquin River, and that elderberry host plants east of Mendota and near the Chowchilla Canal showed evidence of potential beetle presence
- Much of the San Joaquin River Restoration Area, including portions of Reach 2B, was surveyed for valley elderberry longhorn beetle in 2004 and 2005. These surveys are described in the report titled "Valley Elderberry Longhorn Beetle Surveys, San Joaquin River, 2004–2005" (Kucera 2006)

Survey Results
Valley elderberry longhorn beetle protocol surveys were conducted in the study area on March 1 through 4 and March 8 through 9, 2011. Altogether, 560 shrubs were observed; the data collected are presented in Table 4-5. The shrubs were easily identified at the time of the surveys because, unlike most other woody shrubs within the study area, the elderberries had begun to leaf out, making them easy to spot and readily distinguishable. The shrubs observed varied widely in size and age, ranging from 4-foot-tall shrubs with five to ten stems, to shrubs greater than 15 feet tall with hundreds of stems.

Table 4-5.
Valley Elderberry Longhorn Beetle Protocol Survey Results

Habitat Type	Exit Holes	Stem Size Class	Stem Count
Riparian	Yes	1 to 3 inches	2,716
		3 to 5 inches	1,105
		> 5 inches	718
	No	1 to 3 inches	1,206
		3 to 5 inches	347
		> 5 inches	157
Nonriparian	Yes	1 to 3 inches	3,173
		3 to 5 inches	1,072
		> 5 inches	886
	No	1 to 3 inches	862
		3 to 5 inches	214
		> 5 inches	115
		Total Stems	**12,571**

Exit holes were noted in a majority of the shrubs surveyed; however, not all exit holes could be conclusively identified as having been created by the valley elderberry longhorn

beetle. The exit holes noted in the field were generally round to ovular, and ranged from 0.1 to 0.8 inch in diameter. As stated in the 1991 USFWS status review for the species, valley elderberry longhorn beetles create exit holes that are round to ovular, clean-edged, and range from 0.3 to 0.4 inch in diameter. Some of the holes observed fit this description and were likely created by the species; however, many of the holes observed were outside the size range expected for holes created by valley elderberry longhorn beetle, or did not have clean edges. Evaluation of photographs collected during the survey revealed that some of the exit holes noted during the field survey were not created by valley elderberry longhorn beetle (Figure 4-1). Some of the larger holes may be old valley elderberry longhorn beetle holes that were subject to secondary damage by birds or other insects. Some of the smaller holes were likely created by another species of insect, such as ants or termites, which are known to burrow in old wood.

Potential to Occur

The valley elderberry longhorn beetle has high potential to occur within the study area. As described above, protocol surveys established the presence of hundreds of elderberry shrubs within the study area. Some of these contained exit holes, likely indicating past or current presence of the beetle.

Recommendation

Surveys completed in the study area will be sufficient to initiate formal consultation with USFWS for potential project impacts to valley elderberry longhorn beetle (Rickabaugh, pers. comm., 2011). For purposes of formal consultation, the survey data are only good for 2 years; however, additional surveys will be needed within 2 years of Project construction to finalize mitigation requirements. Surveys will also be needed in the area where access has not been provided and surveys specifically for the Project have not been conducted. These surveys will provide an opportunity to revisit shrubs in the footprint of the selected alternative, and potential valley elderberry beetle exit holes should be re-evaluated at that time.

Examples of “exit holes” noted, but not likely created by valley elderberry longhorn beetles.

Example of an exit hole noted in the field, potentially created by valley elderberry longhorn beetle.

Figure 4-2.
Examples of Elderberry Exit Holes

California Tiger Salamander

Status: Federally and State listed as threatened.

California tiger salamander, Matthew Bettleheim/URS

Species Description

The California tiger salamander (*Ambystoma californiense*) inhabits grasslands and open oak woodlands in central and northern California. The primary constituent elements of California tiger salamander critical habitat are: (1) freshwater ponds, vernal pools, and other ephemeral or permanent water bodies that ponds water at least until May; (2) adjacent uplands with small mammal burrows that are used for shelter during most of the animal's life; and (3) upland movement corridors (70 FR 49390). The range of the California tiger salamander is currently restricted to the Central Valley and the South Coast Ranges of California from Butte County south to Santa Barbara County. More detailed life history and species descriptions can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.1
- "Life history and demographic variation in the California tiger salamander (*Ambystoma californiense*)" (Trenham 2000)
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)

Known Occurrences

A review of the documents listed above containing species accounts for the California tiger salamander, as well as the CNDDB (CDFG 2009a), revealed no reported occurrences of the species from within 15 miles of the Project area. The nearest six previously documented occurrences lie between 17 and 25 miles northeast of the Project area. Of those six occurrences, two are listed as extirpated (including the closest documented occurrence, 17 miles from the Project area), one is listed as possibly extirpated, and the other three are listed as extant or presumed extant. The nearest presumed extant population is located 22 miles northeast of the Project area. The study area appears to lie outside the historic and current range of this species (USGS 2010; McCamman 2010). There is no designated or proposed critical habitat for California tiger salamander within 10 miles of the Project area (70 FR 49379-49458).

H.T. Harvey and Associates observed egg masses suggestive of California tiger salamander on February 26, 2009, at the proposed Alkali Sink Conservation Bank less than 2 miles south of the Project area (Davis, pers. comm., 2010a). Site monitoring revealed the presence of western spadefoot tadpoles in some pools where the California tiger salamander egg masses were observed; however, the presence of California tiger salamander was not confirmed. Because of the lack of prior California tiger salamander records from the Central Valley floor in this area and a lack of conclusive evidence,

potential for occurrence of California tiger salamander at the proposed Alkali Sink Conservation Bank is considered "possible," as opposed to "likely" or "present" (Davis, pers. comm., 2010a). Alternatively, the egg masses could be attributed to western spadefoot (Davis, pers. comm., 2010b).

Potential to Occur

Although there are grasslands within the study area, the majority of aquatic habitats in the study area are not suitable for California tiger salamander breeding. The primary aquatic habitats in the study area are the San Joaquin River, Mendota Pool, Fresno Slough, and Little San Joaquin Slough. These water bodies contain nonnative, predatory fish species (see Section 4.1), a condition that is not compatible with California tiger salamander breeding (Shaffer 1993).

As described under the heading "Longhorn Fairy Shrimp," habitat on the south side of the San Joaquin River, at the eastern end of the study area, could not be surveyed on foot because access was not granted. Based on review of aerial photography, there may be two seasonal wetland features at this location with low potential to provide habitat for vernal pool–associated species. The larger of the two features appears white in some images, suggestive of very high alkalinity. These features appear wet even in aerial photography captured in the fall, suggesting that they are being artificially inundated, perhaps to provide water for cattle that are grazed on the property.

The close proximity of these features to the channel of the San Joaquin River and an analysis of the local topography (based on aerial photographs, topographic maps, and recent LIDAR [Light Detection and Ranging] data) suggest that they may be periodically inundated by river floodwaters. This periodic inundation could carry predatory fishes to these pools which could persist as long as the features pond water, rendering them unsuitable for California tiger salamander. The frequency of such events is currently unknown. Given the presence of bullfrogs (*Rana catesbeiana*) at permanent and semipermanent waters in the study area, as observed during August 2010 surveys, bullfrogs would be expected to occupy these potential seasonal wetlands as well. At another location, these features would warrant further investigation as potential breeding habitat for California tiger salamander; as it is, the study area appears to lie outside the historic and current range of this species and the potential for California tiger salamander to occur in the study area has been assessed as low.

No populations of California tiger salamander have been confirmed within 17 miles of the Project area, an area which includes protected lands with potentially suitable habitat. The three closest known extant populations (two described as extant and one as presumed extant) are between 22 and 25 miles northeast of the Project area, and the CNDDB data (see "Known Occurrences" above) suggest that the species' range is contracting away from the study area.

California tiger salamander was not detected in a 2004 herpetological inventory of the nearby Alkali Sink Ecological Reserve (Sousa, pers. comm., 2010), although western spadefoot toad was detected (CDFG. 2009a; Sousa, pers. comm., 2010). Survey methods included using dip nets, visual encounters, cover boards, and nighttime area searches to

sample vernal pools and nearby habitat (Sousa, pers. comm., 2010). Similarly, California tiger salamander was not detected at the nearby Mendota Wildlife Area during searches, though the searches did confirm the presence of western spadefoot (Dickert, pers. comm., 2010). These were not protocol surveys, however, and the lack of California tiger salamander detections does not conclusively demonstrate that they are absent.

Western spadefoot breeds in vernal pool habitats similar to those required by California tiger salamander. Therefore, surveys that resulted in western spadefoot detections at these nearby wildlife reserves presented opportunities for detecting the much larger California tiger salamander larvae, if present. In several instances, the surveyors noted that the breeding habitat where western spadefoot were detected did not remain inundated for long enough to allow for California tiger salamander metamorphosis during the year when the surveys were conducted (Davis, pers. comm., 2010a; Dickert, pers. comm., 2010; Sousa, pers. comm., 2010). Western spadefoot has a markedly shorter larval (aquatic) life-cycle phase than California tiger salamander and can breed in pools that are much shorter-lived than those needed for California tiger salamander to grow through metamorphosis. Duration of ponding (which is controlled by factors such as rainfall, soil permeability, and ambient temperature) may explain why western spadefoot has been detected in the Project vicinity but the presence of California tiger salamander has not been confirmed.

Krista Tomlinson, CDFG Ecological Reserve Biologist, has noted that sandy soils at Alkali Sink Ecological Reserve may lead to higher percolation rates than in other nearby areas with vernal pools (Battistoni, pers. comm., 2010). Ms. Tomlinson sampled the Alkali Sink Ecological Reserve for vernal pool–associated species during the 2009–2010 wet season, but California tiger salamander was not detected (Battistoni, pers. comm., 2010). She also sampled CDFG-owned lands along the ephemeral Tin Can Slough, which runs through portions of the Mendota Wildlife Area, Alkali Sink Ecological Reserve, and the proposed Alkali Sink Conservation Bank for California tiger salamander, all of which are south of the study area. Although Tin Can Slough may hold water longer than other potential California tiger salamander breeding habitat in the vicinity of the study area, California tiger salamander was not detected during the surveys. Ms. Tomlinson believes that the presence of nonnative, predatory fish in the slough renders this habitat unsuitable for California tiger salamander.

It may be that the presence of California tiger salamander has not been confirmed within 17 miles of the Project area because the study area lies outside the species' historic and current range. According to all sources, the study area is near or beyond the western extent of the range of the species within the San Joaquin Valley portions of Fresno and Madera counties. Historically populations in Fresno and Madera counties were present in low densities and were primarily in the eastern regions of the San Joaquin Valley. Today most of these populations are considered no longer extant (Fisher 1996). Of three reliable sources describing the range of the species, only one source (CDFG's California Wildlife Habitat Relationship System [Bolster 2005]) includes the valley floor portion of the western edge of Madera County in that range. More recent sources show the study area as outside of the range of the species, including the Patuxent Natural Resource Center –

National Amphibian Atlas (USGS 2010) and the most recent 2010 CDFG California tiger salamander status report (McCamman 2010).

The 2010 CDFG status report shows that the Project area is approximately 20 miles southwest of the currently recognized range of the species, and approximately 10 miles southwest of the more broadly defined range of the genetically distinct southern San Joaquin Valley population (based on Figure 10 in McCamman 2010). This report is based on extensive range-wide survey information from 1993 (Shaffer 1993, as cited in McCamman 2010) and genetic population information published in 2004 that mapped five genetically and geographically distinct populations of the species (Shaffer 2004). Historically, extensive flooding of the San Joaquin River at some locations, combined with extreme alkalinity in isolated wetlands at others, and the predominance of sandy, well-drained soils such as those found in the study area may have prevented the range of California tiger salamander from extending into the portion of the valley floor where the study area lies.

Recommendation
California tiger salamander should currently be assumed absent from the study area because the study area lies outside the species' known range. The potential for this species to be present in the study area could be re-evaluated following access in the southeasternmost extent of the study area, where aerial photo interpretation suggests marginally suitable breeding habitat may be present.

Protocol Surveys
Although focused surveys are not proposed, CDFG has developed a protocol for California tiger salamander surveys (CDFG 2003b). The survey requirements, timing and procedures outlined by CDFG are summarized below:

- A site assessment of the recorded occurrences within a 3.1-mile radius and the habitat characteristics should be recorded within a 1.24-mile radius of the Project boundary before field surveys
- Field surveys, which consists of aquatic larval and upland habitat surveys, should be conducted by a biologist who has an active CDFG Scientific Collecting Permit and a USFWS Section 10(a)(1)(A) Recovery Permit
- Aquatic larval surveys should be performed at all potential breeding sites for two calendar years before a negative finding can be supported and should be conducted between March, April and May, with at least 10 days between surveys
- Upland habitat surveys using drift nets should be conducted during fall and winter
- Once a California tiger salamander has been observed, surveys may cease

California Red-Legged Frog

Status: Federally listed as threatened and CDFG Species of Special Concern.

California red-legged frog, Matthew Bettleheim/URS

Species Description

The California red-legged frog (*Rana draytonii*) is typically found near aquatic features with emergent vegetation, such as pools in marshes, streams, and ponds. USFWS has defined four primary constituent elements of California red-legged frog critical habitat: (1) aquatic breeding habitat characterized by standing bodies of fresh water that hold water for at least 20 weeks per year; (2) nonbreeding aquatic habitat including fresh water environments that provide for foraging, shelter, predator avoidance, and aquatic dispersal; (3) upland habitat that provides for foraging, shelter and predator avoidance and is within 200 feet of a riparian area; and (4) riparian or upland habitat with no barriers, such as large areas of dense development or large bodies of water, that allows for dispersal between other suitable habitat types (71 FR 19261–19263). California red-legged frog is believed to have historically occurred from the California coast near Marin County, inland towards Shasta County, California, and southward to northwestern Baja California, Mexico (USFWS 2002). The frog has been extirpated over much of its historic range, including the floor of California's Central Valley, and is believed to be extirpated from 24 of the 46 California Counties in which it was originally present. More detailed species descriptions can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.3.6
- Recovery Plan for the California Red-Legged Frog (*Rana aurora draytonii*) (USFWS 2002)

Known Occurrences

The following sources describe occurrences of California red-legged frog from the vicinity of the Project area:

- CNDDB (CDFG 2009a): There are no recorded occurrences within 10 miles of the Project area
- Critical Habitat (61 FR 25813; USFWS 2008b): There is no designated or proposed critical habitat within 10 miles of the Project area
- Recovery Area (USFWS 2002): The Project area is within Recovery Area 1: Sierra Nevada Foothills and Central Valley. Recovery Area 1 is considered to have a low recovery area status because it has few existing populations, high threat levels and, in general, moderate habitat suitability

Potential to Occur

Anurans observed in the study area during the wildlife habitat assessment survey included native western toads (*Bufo boreas*), and nonnative American bullfrogs and northern leopard frogs (*R. pipiens*). While habitat in the study area might otherwise be suitable for California red-legged frog, an abundance of introduced predators severely limits the current suitability of that habitat. Introduced bullfrogs and predatory fish have been a significant factor in the decline of California red-legged frog (USFWS 2002). During the habitat assessment survey, numerous bullfrogs were observed throughout aquatic habitat in the study area, especially in habitat potentially suitable for California red-legged frog. Predatory fish were observed during a December 2009 site visit, as well as during the habitat assessment and are expected to be abundant in the study area (see Section 4.1). The habitat value of Mendota Pool, which otherwise would probably satisfy California red-legged frog primary constituent element number 1 (above), is severely compromised by the presence of nonnative predatory species. Due to the abundance of nonnative, predatory species present in aquatic habitat in the study area, the lack of known occurrences within 10 miles of the Project area (CDFG 2009a), and the fact that California red-legged frog is thought to have been extirpated from the floor of the Central Valley before 1960 (USFWS 2002), this species is not expected to occur in the study area.

Recommendation

The California red-legged frog is assumed to be absent from the study area and vicinity, based on the absence of habitats that are likely to support breeding. No additional data collection or focused surveys are recommended for this species.

Blunt-Nosed Leopard Lizard

Status: Federally and State listed as endangered, and CDFG Fully Protected.

Blunt-nosed leopard lizard, Jessie Golding/URS

Species Description

The blunt-nosed leopard lizard (*Gambelia sila*) inhabits alkali and desert scrub communities within the San Joaquin Valley of California and adjacent foothills. It is found at elevations ranging from 100 to 2,400 feet. More detailed life history and species descriptions can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.3.7
- Recovery Plan for the Upland Species of the San Joaquin Valley (USFWS 1998), Section L, "Blunt-nosed leopard lizard (*Gambelia sila*)," pp. 113–122
- Endangered Species Recovery Program Species Profile for the blunt-nosed leopard lizard (ESRP 2006)
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)

Known Occurrences

In addition to general information on range and occurrences provided in the species descriptions referenced above, the following sources describe occurrences of blunt-nosed leopard lizard in the Project vicinity:

- The CNDDB (CDFG 2009a) describes five occurrences of blunt-nosed leopard lizard within 5 miles of Reach 2B:
  - Occurrence No. 4: 1979: Museum of Vertebrate Zoology specimen collected, approximately 2.5 miles southwest of the Project area
  - Occurrence No. 208: 2004: species observed during CDFG survey of ecological reserve in annual grassland/iodine bush series, approximately 2 miles south of the Project area
  - Occurrence No. 110: 1988: four individuals observed by D. Williams of USFWS in alkali grassland with scattered clumps of alkali sacaton and woody shrubs, approximately 4 miles north of the Project area
  - Occurrence No. 207: 1976: essential habitat for the species was observed; subsequent surveys in 1998, 1999 and 2003 failed to detect the species, approximately 5 miles southeast of the Project area
  - Occurrence No. 392: 1988: one adult observed by N. Nicolai in open, sparse alkali grassland, approximately 4.8 miles north of the Project area

- The CNDDB (CDFG 2009a) also describes an additional 19 occurrences within 5 to 10 miles of the Project area

Potential to Occur
Based on the habitat assessment survey, suitable blunt-nosed leopard lizard habitat is largely lacking from the study area. Although some habitats contained sandy or alkali soils, including riparian scrub and annual grassland, blunt-nosed leopard lizard is not expected to occur in these areas because of regular inundation during seasonal flood flow or the presence of dense vegetation, two habitat characteristics that are not suitable for the species (USFWS 1998). During the habitat assessment survey, alkali scrub habitat was observed immediately south of the study area, at its eastern end, from Whitesbridge Avenue and San Mateo Road. This area falls outside of the study area, and habitat to the north, closer to the San Joaquin River that falls within the study area appeared to contain dense annual grassland. However, this area was not surveyed on foot because access was not granted, and although not obvious from the fence line surveys conducted, suitable habitat may be present. Based on the proximity of known occurrences and the potential for suitable habitat area to occur, there is a moderate potential for blunt-nosed leopard lizard to occur at the eastern end of the study area, south of the San Joaquin River, in areas not accessible during the habitat assessment survey.

Recommendation
Protocol surveys are not recommended at this time. Currently accessible portions of the study area do not provide suitable habitat for the species. Protocol surveys may be warranted at the southeastern extent of the study area, pending access and further evaluation of habitat suitability at that location. Habitat suitability should be further assessed once access has been obtained, in areas not subject to periodic inundation and lacking regular disturbance such as crop rotation, disking, and tilling. Habitat suitability would be determined based on the following: lack of dense vegetation; abundance of small mammal burrows (primarily ground squirrel burrows and kangaroo rat tunnels) for refuge; and abundance of prey species such as grasshoppers and other lizard species. If suitable habitat is identified and complete avoidance of those potentially occupied habitats is not possible, protocol surveys would be required.

Protocol Surveys
Protocol level surveys for blunt-nosed leopard lizard in accordance with the revised 2004 CDFG guidelines (CDFG 2004) require 12 surveys between April 15 and July 15, and 5 surveys between August 1 and September 15. The USFWS previously provided the SJRRP with protocol survey guidelines for blunt-nosed leopard lizard specific to water year 2010 Interim and Restoration flow projects (USFWS 2009c). The primary difference between the USFWS and CDFG guidelines is that the USFWS guidelines require protocol level surveys in adjacent areas that are actual or potential blunt-nosed leopard lizard habitat, up to 330 feet from the Project footprint boundary. The USFWS guidelines are summarized below; however, if protocol surveys are deemed necessary for this Project, Reclamation will seek USFWS and CDFG input on the specific survey protocol used prior to implementation:

- Surveys should be conducted in separate seasons for adults and hatchlings/sub-adults. The periods are defined as follows:
  - I. April 15–July 15: Conduct 12 adult surveys with no more than 4 consecutive survey days and no more than 8 survey days within a 30-day period
  - II. August 1–September 15: Conduct 5 additional hatchling/sub-adult surveys
- Surveys should be conducted by two or more Level I or Level II blunt-nosed leopard lizard researchers, with no more than three Level I researchers for every Level II researcher
- Surveys should be conducted when air temperature is between 77ºF and 95ºF between sunrise and 2:00 p.m.
- Surveys should not be conducted on overcast days, or when sustained wind velocity exceeds 10 miles per hour
- Surveys must be conducted on foot. Researchers should walk parallel, 40- to 100-foot transects (depending on vegetation density) across the entire area to be surveyed
- In addition to recording the location of blunt-nosed leopard lizards observed, the presence of habitat features, the time of day, air temperature, and soil temperature should also be recorded during surveys
- Once a blunt-nosed leopard lizard has been observed, the USFWS and CDFG should be notified immediately. Surveys should continue until completed
- Survey results are valid for up to 1 year

Giant Garter Snake

Status: Federally and State listed as threatened.

Species Description

Giant garter snake (*Thamnophis gigas*) is found within the Central Valley, from Butte Creek south to the Mendota Wildlife Area, 10 miles west of Fresno (Fisher 1994), although its previous range extended much farther south (Hansen 1980). The species occurs in tributaries, freshwater marshes and floodplains, and other freshwater wetland habitats within the Central Valley of California. Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of giant garter snake can be found in the following documents:

Giant garter snake, Kelly Hornaday/USFWS

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, “Special-Status Plants and Wildlife,” Section 9.5.3.8

- Endangered Species Recovery Program Species Profile for the giant garter snake (ESRP 2006)
- Draft Recovery Plan for the giant garter snake (USFWS 1999b)

Known Occurrences
In addition to general information on range and occurrences provided in the species descriptions referenced above, the following sources describe occurrences of giant garter snake in the Project vicinity:

- The CNDDB (CDFG 2009a) describes one occurrence within the Project area:
  - Occurrence No. 3: 1976: A specimen was collected from a slough near the San Joaquin River in the Mendota Pool area and deposited into the Museum of Vertebrate Zoology
- The CNDDB (CDFG 2009a) describes five additional occurrences within 5 miles of the Project area:
  - Occurrence No. 1: 1976, observed at Fresno Slough, approximately 3 miles south of the Project area
  - Occurrence No. 2: 1974, specimens were collected by the Museum of Vertebrate Zoology and CDFG at Mendota Wildlife Area, approximately 2.5 miles south of the Project area
  - Occurrence No. 5: 1974, a specimen was collected southeast of Mendota and north of railroad tracks, approximately 3.5 miles south of the Project area
  - Occurrence No. 16: 1972, two specimens were collected by the Fischer Museum, Los Angeles Zoo in an area west of Fresno Slough, north of railroad tracks between Mendota and Whites bridge, approximately 2.6 miles south of the Project area
  - Occurrence No. 159: 2001, observed within a sensitive, suppressed location along a wide, slow-moving slough within 1 to 9.5 miles south of the Project area. The habitat is reportedly threatened by drainage of Mendota Pool for dam construction
- The CNDDB (CDFG 2009a) describes one additional occurrence between 5 and 10 miles from the Project area:
  - Occurrence No. 7: 1976, observed along Highway 33, at Douglas Ave., approximately, 9.6 miles northeast of the Project area

Potential to Occur
The distribution of giant garter snake is currently limited to 13 populations (USFWS 1999b). The primary habitat of one of the remnant populations is Mendota Wildlife Area, roughly 3 miles south of the Project area and hydrologically connected to Mendota Pool via Fresno Slough. During the habitat assessment, highly suitable habitat for giant garter snake was observed in areas of fresh emergent wetland vegetation in lacustrine habitat from the Mendota Pool to the eastern side of the North Loop. A large area of highly suitable habitat was also observed at the west end of Little San Joaquin Slough, where it

meets Fresno Slough. Marginal habitat was present in vegetated irrigation canals at the west end of the study area, between the San Joaquin River, Mendota Pool, and Fresno Slough. Given the continuous nature of suitable habitat between known occurrences of giant garter snake and Mendota Pool, as well as the historic occurrence from the pool itself, this species has high potential to occur in these areas identified as suitable habitat.

At other locations in the study area smaller agricultural irrigation ditches may provide marginal habitat for giant garter snake. Because they are typically highly managed, somewhat temporary (they may not be located in the same places year after year), and surrounded by intensively managed agricultural uplands, these ditches are unlikely to provide habitat for giant garter snake on their own. Due to their proximity to more extensive, more suitable habitat, however, and the presence of prey species such as bullfrogs, giant garter snakes may occasionally be present in some of these ditches.

Recommendation
There is no formal protocol survey for this species, and focused surveys have a low probability of detecting the snake when present unless trapping is conducted. Presence of giant garter snake should be assumed in habitats identified as potentially suitable for this species. Potentially suitable aquatic habitat is defined here as lacustrine habitat in the San Joaquin River downstream of San Mateo Road, and lacustrine habitat in Mendota Pool, Fresno Slough, and Little San Joaquin Slough.

Golden Eagle

Status: Protected under the Golden and Bald Eagle Protection Act, CDFG Fully Protected, protected under the Migratory Bird Treaty Act, and CDFG Watch List.


Golden eagle, George Gentry/USFWS

Species Description
The golden eagle (*Aquila chrysaetos*) occurs throughout California as a resident, migrant or wintering species. It does not breed on the floor of the Central Valley, but it does occur there as a wintering or migratory species. It is typically found in rolling foothills, mountainous areas, sage-juniper flats, or deserts. It prefers open areas with low vegetation for foraging and nests on cliff faces or within large trees. Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of the golden eagle can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, “Special-Status Plants and Wildlife,” Section 9.5.4.17
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)

Known Occurrences
The following sources describe occurrences of the golden eagle within the vicinity of the Project area:

- Mendota Wildlife Area recorded sighting (eBird 2009)
- CNDDB (CDFG 2009a) does not describe any occurrences from within 10 miles of the Project area

Potential to Occur
Suitable golden eagle nesting habitat is not found in the low elevation portions of the San Joaquin Valley. Although there are no recorded occurrences in the CNDDB from within 10 miles of the Project area, detection at the Mendota Wildlife Area suggests that this species is at least sometimes present in the Project vicinity during the winter and seasonal migration events. The study area contains some suitable open foraging habitat that supports populations of common prey items for this species such as California ground squirrel (*Spermophilus beecheyi*). The potential for foraging golden eagles to be present in the study area has been assessed as low, and is more likely during the winter and migratory periods.

Recommendation
Occasional or rare presence of foraging golden eagles in the study area should be considered possible.

Swainson's Hawk
Status: Protected under the Migratory Bird Treaty Act and State listed as threatened.

Swainson's hawk,
John and Karen Hollingsworth/USFWS

Species Description
Swainson's hawk (*Buteo swainsoni*) is found within California almost exclusively during the breeding season, although a small population overwinters in the San Francisco Bay Delta region. Its breeding range includes the lower Sacramento and San Joaquin valleys, Klamath Basin, and Butte Valley. It nests in single trees or riparian areas near open foraging habitats such as grasslands and agricultural areas. Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of Swainson's hawk can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.3.11
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)

Known Occurrences
The following sources describe occurrences of Swainson's hawk within the vicinity of the Project area:

- CNDDB (CDFG 2009a) describes the following six occurrences from within or immediately adjacent to the Project area:
  - Occurrence No. 780: 1999, one adult was observed in a nest in a cottonwood tree surrounded by agricultural fields by Nikolle Brown, within 1 mile of the Project area, south of the San Joaquin River
  - Occurrence Nos. 781–783: 1999, a total of four adults were observed nesting and one adult was observed soaring in riparian habitat along Reach 2B of the San Joaquin River by Nikolle Brown
  - Occurrence No. 784: 1979, 1999, one adult and one fledgling were observed in 1979 by D. Gaines and one adult was observed nesting in a willow in 1999 by Nikolle Brown near the Mendota Pool
  - Occurrence No. 830: 1999, 2000, four nests were observed in 1999 and one adult was seen nesting in 2000 along Reach 2B of the San Joaquin River by Nikolle Brown
- CNDDB (CDFG 2009a) also describes the following seven occurrences from between 4 and 10 miles of the Project area:
  - Occurrence No. 37: 1979, 1981, Adult birds but no nest was observed, approximately 8 miles northwest of the Project area
  - Occurrence No. 277: 1979, 2000, two adults and three young were observed nesting in 1979 and two adults were observed in a nest and nearby snag in 2000 in a cottonwood tree by Nikolle Brown, approximately 6 miles northeast of the Project area
  - Occurrence No. 785: 1999, two adults were observed nesting in a cottonwood tree surrounded by agricultural fields by Nikolle Brown, along the San Joaquin River, approximately 8.5 miles northwest of the Project area
  - Occurrence No. 790: 1999, 2000, one adult was observed nesting in 1999 and one adult was observed soaring in a riparian area by Nikolle Brown, along the San Joaquin River, approximately 9 miles northwest of the Project area
  - Occurrence No. 37: 1979, two adults were observed, approximately 4 miles northwest of the Project area
  - Occurrence No. 938: 2001, two adults were observed soaring in a riparian area by Nikolle Brown, along the San Joaquin River, approximately 7 miles east of the Project area
  - Occurrence No. 1103: 2000, two adults were observed roosting in a pine by Geoffrey T. Gray, approximately 7 miles southwest of the Project area
- The San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.3.11 reports records of Swainson's hawk near the Chowchilla Canal and the Mendota Pool

Potential to Occur
Swainson's hawk was observed in the study area during the site visit, the habitat assessment survey, and the valley elderberry longhorn beetle protocol surveys. One Swainson's hawk was observed soaring and perching near the eastern end of the study area, along the San Joaquin River corridor, during the site visit conducted on May 19, 2010. On that same day, a large stick nest occupied by two raptor chicks was observed near the middle of the study area, in a tall tree in the riparian corridor on the right bank of the San Joaquin River. Although positive identification was not obtained due to time constraints, this nest was considered a potential Swainson's hawk nest. During the August 2010 habitat assessment survey, biologists detected a Swainson's hawk pair alternately foraging and roosting just north of the Chowchilla Bifurcation Structure inside the study area. A second pair was similarly observed alternately foraging and roosting north and east of Mendota Pool. Additionally, Swainson's hawk was observed in these areas during the valley elderberry longhorn beetle protocol surveys.

Prior to the 2010 field visits, Swainson's hawk was known to nest within the study area at multiple locations, as recently as 2000. Swainson's hawk is typically monogamous and pairs often reuse nest sites during successive breeding seasons. Of 13 occurrences known from within 10 miles of the Project area, all but one includes sightings within the last 10 years. Additionally, riparian habitats in the study area contain numerous suitable nest trees, and a number of habitat types identified in the study area provide potential foraging habitat for Swainson's hawk, including annual grassland, barren, elderberry savannah, irrigated hayfield, wet herbaceous, and pasture. Swainson's hawk is expected to nest and forage in the study area, and is expected to be present primarily during the nesting season (March–August [CDFG 1994, 2005]).

Recommendation
It should be assumed that Swainson's hawk nests in the study area, and that the presence of suitable uplands provides Swainson's hawk with foraging habitat.

Protocol Surveys
Swainson's hawk nesting survey protocols are described in "Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley" (Swainson's Hawk Technical Advisory Committee 2000). These guidelines should be considered during development of the preconstruction survey plan. To meet the minimum level of protection, the guidelines recommend surveys as summarized below:

- Surveys should be conducted for a half-mile radius around all Project activities
- Surveys should be conducted for at least two survey periods before Project initiation. The periods are defined as follows:
  - I. January–March 20 (recommended optional), one survey
  - II. March 20–April 5, three surveys
  - III. April 5–April 20, three surveys
  - IV. April 21–June 10, monitoring known nest sites only
  - V. June 10–July 30, three surveys

Western Yellow-Billed Cuckoo

Status: Candidate for Federal listing, protected under the Migratory Bird Treaty Act, and State listed as endangered.

Species Description

The western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) breeds in North America and northern Mexico and winters in South America. Within California, its current nesting range includes the Sacramento Valley, the South Fork of the Kern River, the lower Colorado River Valley, and sometimes the Prado Basin in Riverside and San Bernardino counties. It breeds in large patches of densely vegetated riparian habitat. Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of the western yellow-billed cuckoo can be found in the following documents:

Western yellow-billed cuckoo, J.A. Spendelow/USFWS

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.3.14
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)

Known Occurrences

CNDDB (CDFG 2009a) describes one historic occurrence (Occurrence No. 85) from within 10 miles of the Project area. This record reports that the Museum of Vertebrate Zoology collected two specimens from near Mendota Pool in 1918, and three birds were observed again in 1950. Although adjacent to or within the study area, this occurrence is described as "possibly extirpated."

Potential to Occur

Although the western yellow-billed cuckoo did occur in the area historically, it currently has low potential to occur within the study area. The study area is not within its current range (CDFG 2005) and the only known occurrence within the vicinity is 59 years old and listed as possibly extirpated (CDFG 2009a). During the habitat assessment survey, which included a post-breeding focused bird survey on August 26, 2010 (methods described in Section 3.4.3), biologists detected 58 bird species in the study area but did not detect western yellow-billed cuckoo.

Western yellow-billed cuckoos inhabit dense, mature riparian forests composed of cottonwoods and willows, typically more than 300 feet wide and rarely less than 50 acres in area, with optimal stands greater than 200 acres (Laymon 1989). Of the 5,360 acres in the study area, approximately 150 acres were mapped as valley foothill riparian (Table 4-3). As described previously (Section 4.2.1), valley foothill riparian habitat in the study area primarily occurs in narrow bands between the river margins and croplands, and therefore may be more similar to valley foothill riparian edge habitat. Accordingly, cover may be less dense than would be expected in the interior of a stand of valley foothill riparian habitat, and the "forest" may appear less mature. Preferred habitat in the study

area, specifically large, continuous stands of mature valley foothill riparian habitat, is highly limited or lacking. A 2001 habitat assessment of an adjacent 5-mile reach beginning immediately at the upstream end of Reach 2B similarly found that the relatively open, young stands of cottonwoods and willows found there are not suitable for this species (ESRP 2001).

Recommendation
Given the information available at this time, it is reasonable to assume that western yellow-billed cuckoo is not present in the study area. Coincident with protocol valley elderberry longhorn beetle surveys currently anticipated for spring 2011 (western yellow-billed cuckoo activity is most likely to be detected during the spring breeding season), limited additional focused bird surveys in or near remnant patches of relatively mature riparian forest in Reach 2B would provide additional support for this assumption.

Protocol Surveys
Although protocol surveys are not recommended, a draft protocol for western yellow-billed cuckoo surveys can be found in "Yellow-billed Cuckoo (*Coccyzus americanus*): A Technical Conservation Assessment" Appendix B, "Draft Yellow-billed Cuckoo Survey and Monitoring Protocol for California," (Laymon 1998). That protocol is summarized below:

- Surveys should be conducted between June 15 and August 10
- Surveys include two types: presence/absence and nest monitoring
- Presence/absence surveys would require walking, with stops at every 660 feet within suitable habitat at a rate of 2.5 miles per morning. At each stop, calls will be played. If the survey area is wider than 330 feet, then more transects would be necessary. No area within the patch should be greater than 330 feet from any survey point. Timing is also important for the survey. Specifications are as follows:
  - Surveys should be conducted between 6:30 a.m. and 12:00 p.m. The hot part of the day should be avoided. Surveys on days exceeding 100°F in temperature should be avoided
  - At each stop, 10 calls should be played with about 30- to 60-second pauses between each
- Nest location and monitoring surveys require 4 person-days while the parents are feeding the young, to prevent abandonment. Once nests are found, they should only be checked when parents are absent

White-Tailed Kite
Status: Protected under the Migratory Bird Treaty Act and CDFG Fully Protected.

Species Description
White-tailed kite (*Elanus leucurus*) is a year-round resident of the San Joaquin Valley and coastal lowlands of California, ranging from the western Sierra Nevada Mountains to San Diego County. Its preferred nesting habitats include grasslands, oak woodlands,


White-tailed kite, Greg Hoffman

riparian scrub, and savannas. It forages in wetland and grassland areas. Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of white-tailed kite can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.15
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)

Known Occurrences
The following sources describe occurrences of white-tailed kite within the vicinity of the Project area:

- Mendota Wildlife Area recorded sighting (eBird 2009)
- CNDDB (CDFG 2009a) does not report any occurrences within 10 miles of the Project area

Potential to Occur
The white-tailed kite has a high potential to nest and forage within suitable habitat types within the study area. The species was observed in the study area during the valley elderberry longhorn beetle protocol surveys. Multiple individuals were observed kiting, courting, feeding, and roosting within and near the East Loop. Additionally, several observations have been made at the Mendota Wildlife Area. Large trees in the riparian corridor provide potential nest habitat for this species, and various terrestrial habitats provide suitable foraging habitat.

Recommendation
Measures that will be required during Project implementation to protect impacts to other nesting birds and raptors, such as preconstruction surveys and nondisturbance buffers around active nests, will also be sufficient to prevent take of white-tailed kite, should they be present at that time. As white-tailed kite is a CDFG fully protected species, CDFG may require a nondisturbance zone surrounding their active nests at a larger buffer size (e.g., 0.25 mile) than that required for other special-status (but not fully protected) bird species.

Greater Sandhill Crane
Status: Protected under the Migratory Bird Treaty Act, State listed as threatened, and CDFG Fully Protected.

Species Description

Greater sandhill crane (*Grus canadensis tabida*) is found throughout central California. It nests in wet meadows and emergent marshes of northern California and winters in the Central and Imperial valleys. Its preferred foraging habitats are wet meadows, marshes, freshwater margins, and less frequently grasslands and croplands. Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of greater sandhill crane can be found in the following documents:

Sandhill cranes, USFWS

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.3.12
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)

Known Occurrences

The following sources describe occurrences of greater sandhill crane within the vicinity of the Project area:

- Mendota Wildlife Area recorded sighting (eBird 2009)
- The San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.3.12 reports records of greater sandhill crane along the San Joaquin River and specifically near Reach 2
- CNDDB (CDFG 2009a) describes no occurrences within 10 miles of the Project area

Potential to Occur

Greater sandhill crane has a high potential to occur within the study area during the nonbreeding season; although it likely does occur in the study area on occasion, it is unlikely to occur with frequency. The study area contains potentially suitable foraging habitats, including annual grassland, fresh emergent wetland, irrigated hayfield, cropland, irrigated row and field crop, pasture, and wet herbaceaous. Based on recent observations and known occurrences, this species is likely a sporadic visitor to the study area. Flocks of sandhill crane were heard and seen flying over the study area during valley elderberry longhorn beetle protocol surveys. During the habitat assessment survey, a local landowner stated that he has seen sandhill crane roosting and foraging south of the Little San Joaquin Slough during the winter months (Ward, pers. comm., 2010). These observations may have been of greater sandhill crane or the similar subspecies, lesser sandhill crane (*Grus canadensis canadensis*).

Recommendation
It is likely that the greater sandhill crane occurs in the study area and, although it is potentially present infrequently, the species should therefore be assumed to roost and forage within suitable habitat in the study area, as described above.

Bank Swallow
Status: Protected under the Migratory Bird Treaty Act and State listed as threatened.

Species Description
Bank swallow (*Riparia riparia*) breeds throughout the northern United States and Canada and winters in South America. Within California it is found primarily in the Central Valley, especially along the Sacramento River. It requires vertical banks or bluffs composed of soft, sandy soils near still or running water for nesting. Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of the bank swallow can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.3.16
- Recovery Plan: Bank Swallow (*Riparia riparia*) (CDFG 1992)


Bank swallow, unknown

Known Occurrences
The following sources describe occurrences of bank swallow within the vicinity of the Project area:

- CNDDB (CDFG 2009a) describes one occurrence, Occurrence No. 162, within approximately 10 miles of the Project area. In 1980, 30 birds were observed in a nesting colony near Mendota Pool, within the Project area
- The San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.3.16 reports records of bank swallow near Mendota Pool

Potential to Occur
Although the CNDDB occurrence establishes that bank swallows occurred in the area historically, and the single occurrence is presumed extant, the database contains no evidence of any attempts to monitor the occurrence or confirm that it is extant (CDFG 2009a). CDFG had previously provided the coordinates of the historic CNDDB bank swallow occurrence, near Mendota Pool, at the downstream end of the study area, and biologists visited that location during the habitat assessment survey. Suitable nesting habitat at the historic location was not detected during foot surveys. Despite carefully searching stream banks during the habitat assessment survey, no bank swallows or suitable bank swallow habitat were detected in the study area.

The study area is not within the bank swallow's current range (CDFG 2005), and major monitoring efforts for the species have been concentrated on the Sacramento River. One survey was conducted along a 5-mile reach of the San Joaquin River, immediately upstream of Reach 2B, in July and August of 2001, where all river banks potentially providing suitable habitat were surveyed on foot. No evidence of bank swallow presence, such as recently excavated burrows, was observed during those surveys despite the presence of suitable habitat at this location, roughly 5 linear miles from the historical occurrence recorded in the CNDDB, upstream of the study area (ESRP 2001). Because of these data, and based on the results of the habitat assessment survey, the potential for bank swallow occurrence in the study area was assessed as low.

Recommendation
Bank swallow should be assumed absent from the study area.

Nelson's Antelope Squirrel
Status: State listed as threatened.

Species Description
Nelson's antelope squirrel (*Ammospermophilus nelsoni*) is found within the western and southern portions of the Tulare Basin, the San Joaquin Valley, and the contiguous areas to the west in the upper Cuyama Valley and on the Carrizo and Elkhorn plains. It prefers dry, open habitats with scattered shrubs. Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of Nelson's antelope squirrel can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.3.19
- Recovery Plan for the Upland Species of the San Joaquin Valley (USFWS 1998), Species Accounts, "State Listed, Federal Candidates and Other Animals Species of Concern," Section II.M.2

Known Occurrences
In addition to general information on range and occurrences provided in the species descriptions referenced above, the following sources describe occurrences of Nelson's antelope squirrel in the Project vicinity:

- CNDDB (CDFG 2009a) describes two occurrences within 10 miles of the Project area:
  - Occurrence No. 81: 1918, the Museum of Vertebrate Zoology collected one specimen, approximately 2 miles south of the Project area
  - Occurrence No. 296: 1920, the Museum of Vertebrate Zoology collected one specimen, approximately 9 miles west of the Project area
- The Recovery Plan for the Upland Species of the San Joaquin Valley (USFWS 1998) reports that since 1979 Nelson's antelope squirrel has disappeared from

many of the smaller islands of habitat on the valley floor, including Alkali Sink and Kerman ecological reserves in Fresno County

Potential to Occur
Nelson's antelope squirrel has low potential to occur in the study area. There have been no recorded occurrences within the vicinity of the study area within the last 89 years, and the closest known occurrence (CNDDB Occurrence No. 81 [CDFG 2009a]) is from an area where the species is no longer extant (USFWS 1998). Additionally, the study area is at or beyond the eastern edge of the species' documented historic range (USFWS 1998). No individuals of this species were observed during the habitat assessment survey. However, California ground squirrels were active and were observed throughout areas of potential habitat, which suggests that the heat or time of day was not responsible for the absence of Nelson's antelope squirrel.

Recommendation
Nelson's antelope squirrel should be assumed absent from the study area.

Fresno Kangaroo Rat
Status: Federally and State listed as endangered.

Species Description
Fresno kangaroo rat (*Dipodomys nitratoides exilis*) occurred historically in Madera, Merced, and Fresno counties. It has been found in alkali desert scrub habitat between 200 and 300 feet in elevation. Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of the Fresno kangaroo rat can be found in the following documents:


Fresno kangaroo rat, B. Moose Peterson

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.3.20
- Recovery Plan for the Upland Species of the San Joaquin Valley (USFWS 1998) Section I, pp. 96-105

Known Occurrences
The following sources describe documentation and studies of Fresno kangaroo rat within the vicinity of the Project area:

- CNDDB (CDFG 2009a) describes the following occurrences from within 10 miles of the Project area:
  - Occurrence No. 1: 1934, 2001–2003, one male was collected in alkali sink scrub by A.E. Culbertson, approximately 1 mile south of the Project area. No

individuals were found during reconnaissance surveys in 2001–2003. Listed as possibly extirpated

  - Occurrence No. 4: 1974–1975, 1981–1982, 2001, 2003, trappings in 1974–1975 resulted in 17 captures and trapping in 1981–1982, 2001, and 2003 resulted in zero captures within alkali sink habitat, approximately 4 miles southeast of the Project area. Listed as possibly extirpated
  - Occurrence No. 21: 1934, two individuals were collected by A.E. Culbertson, approximately 7 miles southeast of the Project area
  - Occurrence No. 22: 1934, one individual was collected by A.E. Culbertson, approximately 9 miles northeast of the Project area

- Critical habitat for the Fresno kangaroo rat is designated in an area of alkali sink habitat, approximately 2 miles south of the Project area (50 FR 4222–4226)
- The San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.5 reports that the last known detection at the Alkali Sink Ecological Reserve (which is about 2 miles south of the Project area) occurred in 1992 and that extensive trapping since 1993 in Madera and Fresno counties have resulted in no further detections
- The Proponent's Environmental Assessment for the Gill Ranch Gas Storage Project (Entrix 2008), Chapter 4.4, "Biological Resources," Section 4.4.1.3 summarizes Fresno kangaroo rat survey results from Alkali Sink Ecological Reserve from an unpublished CDFG report. According to this source, a lone male Fresno kangaroo rat was trapped on the reserve in 1992 and before that capture it had been 13 years since the species had been trapped at the reserve. Since 1992 CDFG grid surveys and independent research efforts, including reconnaissance trapping of active burrows conducted systematically over large portions of the reserve at some of the locations where Fresno kangaroo rats are most likely to persist, have failed to detect this species

Survey Results

Fresno kangaroo rat live-trapping surveys were conducted in the study area on July 17 through 22, 2011, as described in Section 3.4.5. Altogether, 750 trap nights were conducted; the data collected are presented in Table 4-6. No Fresno kangaroo rats were captured during the trapping. The four species captured, with total numbers of individuals captured, were:

- Heermann's kangaroo rat (*Dipodyms heermanni*) – 154 individuals
- Deer mouse (*Peromyscus maniculatus*) – 54 individuals
- Western harvest mouse (*Reithrodontomys megalotis*) – 2 individuals
- California ground squirrel (*Spermophilus beecheyi*) – 1 individual

The species captured remained consistent, with minor exceptions, throughout the trapping effort, but both capture rates and recapture rates increased throughout the trapping effort.

Capture rates reached a maximum of 47 percent, and recapture rates reached a maximum of approximately 83 percent.

Table 4-6.
Fresno Kangaroo Rat 2011 Live-Trapping Results

Trap Night/Start Date	Species Captured	Total Capture Rate[a]	Total Recapture Rate[b]
Night 1/July 17	• Heermann's kangaroo rat • Deer mouse	15.3%	36.8%
Night 2/July 18	• Heermann's kangaroo rat • Deer mouse • Western harvest mouse	26.3%	40.6%
Night 3/July 19	• Heermann's kangaroo rat • Deer mouse • Western harvest mouse	35.7%	60.7%
Night 4/July 20	• Heermann's kangaroo rat • Deer mouse • California ground squirrel	39%	76.3%
Night 5/July 21	• Heermann's kangaroo rat • Deer mouse	47%	82.7%

[a] Total capture rate = (Total # of captures per night) / (Total # of trap-sets per night [300 traps])
[b] Total recapture rate = (Total # of recaptures per night) / (Total # of new captures per night + Total # of recaptures per night)

Potential to Occur

Fresno kangaroo rat has moderate potential to occur in the study area. The last confirmed sighting or trapping of a four-toed kangaroo rat in the range of the Fresno kangaroo rat was that described above, of a lone male, by Daniel Williams in November 1992, at the Alkali Sink Ecological Reserve (Kelly, pers. comm., 2009). Since then, all trappings at that location have failed to detect the species (Entrix 2008). In 2001, trapping was conducted over a 5-mile stretch of the San Joaquin River corridor, primarily immediately upstream of the study area; the trap lines farthest downstream extended into the Reach 2B study area, near the Chowchilla Bifurcation Structure (ESRP 2001). This effort consisted of 1,200 total trap nights but failed to detect the species, although 121 individual Heermann's kangaroo rats (D. heermanni) were captured. Trapping was also conducted in Reach 2 before the installation of groundwater monitoring equipment in 2001 and 2002, and Heermann's was the only kangaroo rat captured during that effort as well (Wolfe, pers. comm., 2009). Similarly, in the July 2011 750-trap night trapping effort in the Reach 2B study area, Heermann's kangaroo rat was the only kangaroo rat species captured.

Fresno kangaroo rat has not been observed in the Project vicinity since 1992, despite focused survey efforts Even so, the study area is connected to Alkali Sink Ecological Reserve via relatively undisturbed land that may provide suitable habitat, but has not been surveyed on foot due to lack of permission to enter. If there are extant populations of Fresno kangaroo rat, it may be they are most likely to be found between Alkali Sink Ecological Reserve, the land between the study area and the reserve, and in suitable

habitat along the San Joaquin River between Gravelly Ford and Mendota (Kelly, pers. comm., 2009).

During the habitat assessment survey, marginally suitable habitat was observed at several locations in the study area, including within the East and West Loops and immediately southeast of the Chowchilla Bifurcation Structure. During the July 2011 trapping effort, much of the habitat previously identified as potentially suitable did not contain suitable microhabitats for the Fresno kangaroo rat. The areas did not contain the alkali sink habitat most commonly associated with Fresno kangaroo rat, and the areas supported vegetation that was too dense, lacked sandy soil, and did not provide the open environment that Fresno kangaroo rats typically require. Based on these observations and results, the assessment of the areas identified previously as potentially suitable habitat, where permission to enter was granted, has been revised; these areas do not provide suitable habitat for Fresno kangaroo rat, and live-trapping has demonstrated the absence of the species from those areas.

Suitable habitat may also be present at the eastern end of the study area, south of the San Joaquin River, where access has not been provided. Based on the proximity to previously documented occurrences and the presence of potentially suitable habitat, the potential for occurrence of Fresno kangaroo rat in the portion of the study area identified as potentially suitable, where access has not been provided, is assessed as moderate.

Recommendation
When access is available, additional surveys should be conducted in areas that have been identified as potentially suitable but have not been surveyed.

San Joaquin Kit Fox

Status: Federally and State listed as endangered.

Species Description
The San Joaquin kit fox (*Vulpes macrotis mutica*) is a small fox endemic to the arid San Joaquin Valley of California. It prefers grasslands, oak savanna, and woodland habitats. Dens used by the San Joaquin kit fox are typically excavated from California ground squirrel burrows, although some will dig their own dens if loose, friable soils are available (California Department of Pesticide Regulations 2009). Detailed descriptions of the current distribution, habitat requirements, foraging and reproductive behaviors of the San Joaquin kit fox can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.3.22
- Recovery Plan for the Upland Species of the San Joaquin Valley (USFWS 1998), Section L, "San Joaquin Kit Fox (*Vulpes macrotis mutica*), pp. 122–136

- Endangered Species Recovery Program Species Profile for the San Joaquin kit fox (ESRP 2006)

Known Occurrences
In addition to general information on range and occurrences provided in the species descriptions referenced above, the following sources describe occurrences of San Joaquin kit fox in the Project vicinity:

- The CNDDB (CDFG 2009a) describes one occurrence of San Joaquin kit fox within 5 miles of Reach 2B:
  - Occurrence No. 373 describes the collection of one male specimen from the vicinity of Mendota, approximately 2.5 miles south of the Project area, in 1947
- The CNDDB (CDFG 2009a) describes an additional seven occurrences within 10 miles of the Project area:
  - Occurrence No. 1117: 1990, two kit fox sighted by Gail Presley (CDFG) in Firebaugh, approximately 10 miles northwest of the Project area
  - Occurrence No. 14: 1990, two adults sighted on the west side of Road 9 by Gail Presley (CDFG) during a spotlighting survey, approximately 7 miles north of the Project area
  - Occurrence No. 92: 1990, a natal den was observed by Daniel Williams (California State University [CSU], Stanislaus), approximately 7 miles north of the Project area
  - Occurrence No. 188: 1990, tracks and scat were observed by Daniel Williams (CSU Stanislaus) during field surveys, approximately 9 miles north of the Project area
  - Occurrence No. 91: 1990, a natal den was observed by Daniel Williams (CSU Stanislaus), approximately 8 miles northeast of the Project area
  - Occurrence No. 13: 1975, one kit fox was sighted at a den, approximately 8 miles southeast of the Project area
  - Occurrence No. 370: 1920, one male kit fox was collected by Joseph Dixon and A. Oliver, approximately 10 miles northwest of the Project area

Potential to Occur
All of the occurrences of San Joaquin kit fox documented within 10 miles of the Project area are over 15 years old, and the one occurrence from 2.5 miles away from the Project area is over 60 years old, so these occurrences may not represent current populations. While the occurrences do suggest a historic presence in the Project vicinity, and are within dispersal distance of the species to the study area, surveys conducted in 2001, 2003, and 2004 failed to confirm presence of the species in the Project vicinity (ESRP 2001, 2004). The 2001 effort took place in August and September and consisted of four night spotlighting surveys, scat investigation, and the use of five remote camera stations (ESRP 2001). The 2004 effort took place in June, September, October and December of

2003 and March and April of 2004 and consisted of spotlighting, 18 trackplate stations, and six remote camera stations. Both surveys took place along a 5-mile stretch of the San Joaquin River immediately upstream of Reach 2B, extending into the study area at the Chowchilla Bifurcation Structure, and neither resulted in positive detection of kit fox or kit fox sign.

Potentially suitable habitat for San Joaquin kit fox was observed in the study area during the habitat assessment survey. Habitat types in the study area that may provide suitable habitat for denning and foraging include annual grassland, elderberry savannah, barren, and pasture. Based on direct observation or observation of sign, prey species including California ground squirrel and kangaroo rat are present in these habitat types at various locations in the study area. Meandering transects provided opportunities to observe kit fox dens or potential dens, but no canid dens or burrows large enough to shelter a kit fox were detected during the habitat assessment survey. Other habitats, including irrigated hayfield, valley foothill riparian, and the margins of other agricultural areas may provide some foraging and dispersal opportunities for kit fox, but are marginal at best with regards to meeting all of the habitat requirements of kit fox. Habitat and historic distribution suggest that San Joaquin kit fox could be present in the study area. Based on current distributional records and recent surveys, however, this species is presumed to be extirpated in the vicinity of southwestern Madera County (USFWS 2010). Kit fox is not expected to be present in the study area.

Recommendation
San Joaquin kit fox should be assumed absent from the study area, because the study area lies outside the species' current range..

Protocol Surveys
While there is no specific survey protocol for San Joaquin kit fox in the southern portion of its range (the location of the Project), the survey protocol for the San Joaquin kit fox in its northern range recommends that an early evaluation of the Project area be prepared and presented to USFWS to determine the necessary measures for protection of the species (USFWS 1999c). Early evaluation in the northern range requires that the following information be submitted to USFWS:

- Project description and map (with potential kit fox habitat delineated)
- Recorded occurrences within a 10-mile radius
- Description of vegetation communities
- Description of continuity of vegetation communities within the Project area and 10-mile radius
- Habitat suitability based on one set of walking transects
- Analysis of adverse impacts of the Project on kit foxes
- Recommendations for mitigation
- Analysis of cumulative impacts

4.2.3 Other Special-Status Wildlife

Special-status wildlife species identified during the CNDDB database search (CDFG 2009a) that lack Federal or State Endangered Species Act listing status or State fully protected status are addressed in this section. These species are listed in Table 4-Table 4-7. Existing data, relevant field observations, and evaluation for species potential to occur are addressed in this section. USFWS birds of conservation concern and CDFG species of special concern and watch list species are also presented in the table. Similar information for special-status bird species reportedly observed at Mendota Wildlife Area that did not meet the criteria for inclusion in Section 4.2.2 or this section are addressed in Section 4.2.4, and are also listed in Table 4-7Table 4-. Each species is designated as having a high, moderate, or low potential to occur within the study area. These determinations are based on the methods described in Section 3.4 and are further explained for each species in the subsections that follow.

Western Spadefoot

Status: CDFG Species of Special Concern.

Species Description

Western spadefoot (Spea hammondii) is a small anuran that ranges throughout the Central Valley of California and adjacent foothills. It primarily inhabits grassland and valley-foothill hardwood woodlands that contain vernal pools or seasonal wetlands, which are essential for breeding. It is typically found in close association with breeding habitat. More detailed life history and species descriptions for western spadefoot can be found in the following documents:

Western spadefoot, James Bettaso/USFWS

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.2

- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)

Table 4-7.
Other Special-Status Wildlife Species

Scientific Name **Common Name**	**Federal/ State Status**	**Preferred Habitat**	**Potential to Occur in the Study Area**
Amphibians			
Spea hammondii western spadefoot	--/SSC	Grassland and valley-foothill hardwood woodlands, vernal pools or seasonal wetlands are essential for egg laying.	Low: No suitable habitat observed during habitat assessment surveys. Suitable habitat absent from study area, with possible exception of unsurveyed land in southeast of the study area. Re-evaluate following permission to enter.
Reptiles			
Actinemys marmorata western pond turtle	--/SSC	Ponds, marshes, rivers, streams, irrigation ditches, and vernal pools; with basking sites and suitable upland habit for egg laying.	High: Species observed in the study area during habitat assessment survey, including likely nest.
Anniella pulchra pulchra silvery legless lizard	--/SSC	Sand dunes or sandy soil, with litter; also wooded stream edges, and occasionally desert-scrub. Bush lupine often indicates suitable conditions. Found in leaf litter, under rocks, logs, and driftwood.	High: Species known from immediately adjacent to the study area and suitable habitat present at various locations in the study area.
Masticophis flagellum ruddocki San Joaquin whipsnake	--/SSC	Open, dry, treeless areas, including grassland and saltbush scrub. Takes refuge in rodent burrows, under shaded vegetation, and under surface objects.	High: Recent nearby occurrences and suitable habitat present in the study area.
Phrynosoma blainvillii coast horned lizard	--/SSC	Coastal sage, chaparral, and other brushy, shrubby vegetation habitats that provide a low shrub structure; Overwinters in small mammal burrows.	High: Recent nearby occurrences, suitable habitat and some native ant colonies present in the study area.
Birds			
Accipiter cooperii * Cooper's hawk	MBTA/WL	Typically found in patchy woodlands. Nests and forages near open water and wetland vegetation.	High: Observed along San Joaquin River corridor during habitat assessment survey.
Agelaius tricolor tricolored blackbird	BCC, MBTA/SSC	Typically nests next to open water in freshwater marsh with extensive emergent or riparian vegetation. Breeding colonies also reported in grain fields. Forages in grasslands, wetland habitats, and some agricultural areas.	High: Observed along San Joaquin River corridor during a 19 May 2010 site visit.

Table 4-7.
Other Special-Status Wildlife Species

Scientific Name **Common Name**	**Federal/ State Status**	**Preferred Habitat**	**Potential to Occur in the Study Area**
Anser albifrons elgasi * greater white-fronted goose	MBTA/SSC	Prefers moist and wet environments, including freshwater wetlands, croplands, and pastures. Breeds in Alaska.	High: Likely present during winter and migratory periods. August habitat assessment survey did not provide opportunity to observe this species.
Asio flammeus short-eared owl	MBTA/SSC	Open grasslands, prairies, dunes, irrigated fields, and wetlands. Nests on the ground in tall grass stands.	High: Observed along San Joaquin River corridor during habitat assessment survey and during valley elderberry longhorn beetle surveys.
Athene cunicularia burrowing owl	BCC, MBTA/SSC	Open, dry, annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation, with small mammal burrows for nesting and roosting.	Moderate: Observed flying just north of the study area. Suitable habitat is present within the study area, but no sign of this species was observed during wildlife habitat assessment survey.
Aythya americana * redhead	MBTA/SSC	Nests near freshwater emergent wetlands and areas of deep, open water.	Moderate: Although suitable habitat is present in the study area, this species was not observed during the habitat assessment survey.
Charadrius montanus mountain plover	BCC, MBTA/SSC	Roosts and forages in short grasslands, freshly plowed fields, and bare ground with flat topography. Prefers fallow, grazed, or burned areas and alkali flats with burrowing rodents.	Moderate: Potential wintering and foraging habitat is present in the study area.
Circus cyaneus * northern harrier	MBTA/SSC	Nests and forages in open habitats including freshwater marshes and weedy edges of rivers and streams. Also found in agricultural areas such as pastures and some croplands.	High: Observed along San Joaquin River corridor during habitat assessment survey.
Falco columbarius merlin	MBTA/WL	Occurs in coast, grasslands, savannas, woodlands, coniferous forests, wetlands, and occasionally desert habitats. Requires dense tree stands near bodies of water.	High: Observed in study area near Fresno Slough during valley elderberry longhorn beetle protocol surveys.
Grus canadensis canadensis * lesser sandhill crane	MBTA/SSC	Forages in agricultural fields, pastures, and mowed to grazed grasslands. Roosts in shallow water within wetland habitats.	Moderate: Potential wintering and foraging habitat is present in the study area.

Table 4-7.
Other Special-Status Wildlife Species

Scientific Name **Common Name**	**Federal/ State Status**	**Preferred Habitat**	**Potential to Occur in the Study Area**
Lanius ludovicianus * loggerhead shrike	BCC, MBTA/SSC	Breeds in shrubland or open woodlands. Requires tall shrubs/trees for hunting perches and nests. Uses riparian edges in the Central Valley.	High: Observed along San Joaquin River corridor during habitat assessment survey.
Larus californicus * California gull	MBTA/WL	Preferred inland habitat includes riverine, lacustrine, and cropland habitats.	Moderate: Potential wintering and foraging habitat is present in the study area. Observed flying over the study area.
Numenius americanus * long-billed curlew	BCC, MBTA/WL	Winters in upland herbaceous areas and croplands.	High: Observed in the study area during valley elderberry longhorn beetle surveys. Potential wintering and foraging habitat is present in the study area.
Pandion haliaetus * osprey	MBTA/WL	Found near large, open, fish-bearing waters. Nests and roosts on large tree, snags, and cliffs.	Moderate: Potential wintering and foraging habitat is present in the study area.
Pelecanus erythrorhynchos * American white pelican	MBTA/SSC	Forages in shallow inland waters such as marshes, canals and lake or river edges.	High: Observed at Mendota Pool during habitat assessment survey.
Phalacrocorax auritus * double-crested cormorant	MBTA/WL	Found in riverine habitats within the Central Valley.	High: Observed at Mendota Pool during habitat assessment survey.
Plegadis chihi white-faced ibis (rookery site)	MBTA/WL	Forages in emergent freshwater wetlands and flooded croplands/pastures. Roosts in dense wetland vegetation.	Moderate: Observed flying over the study area. Potential rookery and foraging habitat present in the study area.
*Xanthocephalus xanthocephalus** yellow-headed blackbird	MBTA/SSC	Nests in marshes with tall emergent vegetation and areas of relatively deep water.	High: Observed along San Joaquin River corridor and Fresno Slough during valley elderberry longhorn beetle protocol surveys.
Mammals			
Eumops perotis californicus western mastiff bat	--/SSC	Roosts in crevices in cliff faces, high buildings, and tunnels; forages in arid, semi-arid habitat-coniferous and deciduous woodlands, coastal scrub, grasslands, and chaparral.	High: Although evidence of roosting habitat was not observed during the habitat assessment survey, may forage over much of the study area.

Table 4-7.
Other Special-Status Wildlife Species

Scientific Name **Common Name**	**Federal/ State Status**	**Preferred Habitat**	**Potential to Occur in the Study Area**
Lasiurus blossevillii western red bat	--/SSC	Roosts primarily in trees, typically adjacent to open fields or streams, which are protected above and open below for foraging; prefers habitat edges and mosaics with trees.	High: May roost in trees in riparian habitat in the study area, and may forage over much of the study area.
Taxidea taxus American badger	--/SSC	Grasslands, savannas, and mountain meadows; require friable soils, and relatively open, uncultivated ground; requires suitable prey base of burrowing rodents.	Moderate: Although potentially suitable habitat is present in the study area, no sign of this species was observed during the habitat assessment survey.

*Species addressed in Section 4.2.4.
Key:
U.S. Fish and Wildlife Service and Federal Listing Categories:
BCC = Bird of Conservation Concern
FC = Candidate for Federal Listing
FD = Federally Delisted
FE = Federally Listed as Endangered
FT = Federally Listed as Threatened
MBTA = Protected under the Migratory Bird Treaty Act
California Department of Fish and Game State Listing Categories:
FP = Fully Protected
SC = Candidate for State Listing
SE = State Listed as Endangered
SSC = Species of Special Concern
ST = State Listed as Threatened
WL = Watch List

Known Occurrences
In addition to general information on range and occurrences provided in the species descriptions referenced above, the following sources describe occurrences of western spadefoot in the Project vicinity:

- The CNDDB (CDFG 2009a) describes two occurrences of the western spadefoot within 3 miles of Reach 2B:
  - Occurrence No. 238: 2001, many tadpoles were observed in vernal pools within an alkali sink area, approximately 2.3 miles south of the Project area
  - Occurrence No. 300: 2004, 100 tadpoles were observed in vernal pools within an alkali sink area, approximately 2.3 miles south of the Project area
- CNDDB (CDFG 2009a) describes two occurrences of the western spadefoot from within 4 miles of Reach 2B:
  - Occurrence No. 298: 2004, one tadpole was observed in a vernal pool at Kerman Ecological Reserve, approximately 2.6 miles south of the Project area
  - Occurrence No. 299: 2004, 25 tadpoles were observed in a vernal pool at Kerman Ecological Reserve, approximately 3.3 miles south of the Project area

Potential to Occur
Although present in the Project vicinity, western spadefoot has a low potential to occur in the study area. Suitable habitat for this species was not observed during the habitat assessment survey. Generally, soils in the study area are sandy, well drained, and are not expected to hold rainwater on the surface for extended periods to allow for the creation of temporary pools, which are required by this species for breeding. Additionally, predatory bullfrogs (*Rana catesbeiana*) were observed throughout aquatic habitat in the study area, especially in areas of slow-moving water that might otherwise serve as marginal breeding habitat.

Features identified in aerial photography as potential seasonal wetland habitat in the southeasternmost extent of the study area, as described for longhorn fairy shrimp and California tiger salamander (Section 4.2.2) should be considered potential habitat for western spadefoot until they can be inspected more closely or additional information regarding their origin and use can be gathered.

Recommendation
Once access is granted to the southeasternmost extent of the study area it should be evaluated for the presence of habitat with potential to support western spadefoot. If suitable habitat is not present, this species will be assumed absent from the study area. If suitable habitat is found, this species should be assumed present.

Western Pond Turtle
Status: CDFG Species of Special Concern.

Species Description
Western pond turtle (*Actinemys marmorata*) is found within a variety of aquatic environments, including ponds, marshes, rivers, streams, irrigation ditches, and vernal pools, and ranges from Washington to Mexico. It requires basking sites such as partially submerged logs or rocks, and suitable upland habitat (sandy banks or grassy open fields) for egg laying. Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of the western pond turtle can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.3
- Amphibian and Reptile Species of Special Concern in California, (Jennings 1994), pp. 98–103


Western pond turtle, Matthew Bettelheim/URS

Known Occurrences
The following sources describe occurrences of western pond turtle within the vicinity of the Project area:

- CNDDB (CDFG 2009a) describes the following five occurrences from within 5 miles of the Project area:
  - Occurrence No. 22: unknown, one specimen was collected by D.C. Holland, adjacent to the Mendota Pool
  - Occurrence No. 25: 2001, one juvenile was observed at Fresno Slough by Catherine Dickert (CDFG) approximately 4.5 miles south of the Project area
  - Occurrence No. 226: 2001, one adult was observed at Hamburger Slough by Catherine Dickert (CDFG), approximately 3.5 miles south of the Project area
  - Occurrence No. 227: 2001, two juveniles were observed at Tin Can Slough by Catherine Dickert (CDFG), approximately 3 miles south of the Project area
  - Occurrence No. 228: 2001, two juveniles and two adults were observed in a ditch by Catherine Dickert (CDFG), approximately 3.5 miles south of the Project area
- The San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.5 reports records of western pond turtle at Mendota Pool and within the Mendota Wildlife Area

Potential to Occur
During the habitat assessment survey, western pond turtles were observed within the study area and suitable habitat was identified throughout the aquatic habitats present. Three western pond turtles were observed at the Mendota Pool. Additionally, a

depredated nest, thought to belong to a western pond turtle, was observed near the edge of the San Joaquin River, north of a large, centrally located grassland area on the south side of the San Joaquin River. The San Joaquin River, the Fresno and Little San Joaquin sloughs, the Mendota Pool, and the adjacent uplands provide suitable habitat for this species; therefore, it has a high potential to occur in these areas.

Recommendation
Presence of this species should be assumed throughout aquatic habitats in the study area, as well as in nonagricultural uplands adjacent to the aquatic habitats.

Silvery Legless Lizard
Status: CDFG Species of Special Concern.

Species Description
Silvery legless lizard (*Anniella pulchra pulchra*) is found from Contra Costa County south to Mexico within the Sierra Nevada, Transverse, Peninsular and Coastal ranges, and in the San Joaquin Valley. It prefers areas with loose soils and leaf litter within riparian, oak woodland, interior dune and chaparral habitats. Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of the silvery legless lizard can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.5
- Amphibian and Reptile Species of Special Concern in California (Jennings 1994), pp. 108-111

Silvery legless lizard, Matthew Bettleheim/URS

Known Occurrences
The CNDDB (CDFG 2009a) describes only one occurrence of the silvery legless lizard within 10 miles of the Project area, but it is located within the study area. As recorded in Occurrence No. 13, in 2000 one individual was observed in litter east of Willow Slough, north of the San Joaquin River, and west of the Chowchilla bifurcation structure by Julie Vance (DWR), adjacent to Reach 2B.

Potential to Occur
Although silvery legless lizard was not observed during the habitat assessment survey, areas of suitable habitat were identified, including riparian scrub and valley foothill riparian habitats. Primarily in the eastern portion of the study area, multiple areas featured loose or sandy soils and bush lupine (*Lupinus* sp.), a plant that often co-occurs with legless lizards. Based on the presence of suitable habitat and a known occurrence of the species within the last 10 years from the east end of the study area, this species has a high potential to occur.

Recommendation
Presence of this species should be assumed in areas of suitable habitat within the study area. Focused surveys are not recommended for this species.

San Joaquin Whipsnake
Status: CDFG Species of Special Concern.

Species Description
The San Joaquin whipsnake (*Masticophis flagellum ruddocki*) is endemic to the San Joaquin Valley of California, between Arbuckle and Kern County. It prefers dry, open scrub, grassland, chaparral, and desert within the San Joaquin Valley. Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of the San Joaquin whipsnake can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.6
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)

Known Occurrences
The CNDDB identified two occurrences within 10 miles of the Project area:

- Occurrence No. 33: 2004, the shed skin of one adult was found and identified in an area of iodine bush and patches of annual grassland, approximately 2.4 miles south of the Project area
- Occurrence No. 32: 2004, one adult was observed in annual grassland, approximately 5.6 miles southeast of the Project area

Potential to Occur
The San Joaquin whipsnake has a high potential to occur within the study area. The occurrences described above are recent, and Occurrence No. 33 is an area connected to the study area by relatively undisturbed habitat. This species was not observed during the habitat assessment survey; however, suitable habitat was identified, primarily in areas mapped as annual grassland.

Recommendation
San Joaquin whipsnake should be assumed present in habitat identified as suitable.

Coast Horned Lizard
Status: CDFG Species of Special Concern.

Species Description
Coast horned lizard (*Phrynosoma blainvillii*) is endemic to California and ranges from Sonoma County to Los Angeles County with patchy populations throughout the Central Valley and Coast Ranges. It prefers sandy soils but can be found in a variety of habitats including riparian woodland, chaparral, annual grassland, alkali flats, oak savannah, coastal scrub and some agricultural areas. Detailed descriptions of the current

distribution, habitat requirements, and foraging behaviors of coast horned lizard can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.3
- Amphibian and Reptile Species of Special Concern in California (Jennings 1994), pp. 130–133

Coast horned lizard, Jessie Golding/URS

Known Occurrences
The CNDDB (CDFG 2009a) describes two occurrences of coast horned lizard from within 10 miles of the Project area, both from approximately 2 miles south of the Project area:

- Occurrence No. 622: 2002, 2003, 2004, two individuals were observed in 2002 by Adrian Howard, one adult was observed in 2003 by Michelle Selmon and one adult was observed in 2004 by Rick Ortega (CDFG) within alkali sink scrub
- Occurrence No. 655: 2003, one adult was observed in an alkali sink ecological reserve by Shari Heitkotter (CDFG)

Potential to Occur
Coast horned lizard has high potential to occur within the study area. This species was not observed during the habitat assessment survey; however, high temperatures during the surveys may have caused the species to retreat underground making them difficult to observe. Suitable habitat was identified in areas of sandy soil in valley foothill riparian and annual grassland habitat. Additionally, the CNDDB occurrences described above are recent and from an area connected to the study area by relatively undisturbed habitat.

Recommendation
The coast horned lizard should be assumed present in the areas of suitable habitat identified above.

Tri-colored blackbird, Lee Karney/USFWS

Tricolored Blackbird
Status: USFWS Bird of Conservation Concern, protected under the Migratory Bird Treaty Act, CDFG Species of Special Concern.

Species Description
Tricolored blackbird (*Agelaius tricolor)* is a passerine nearly endemic to California. It is found primarily in the Sacramento Valley, the

San Joaquin Valley, along the central and southern California coasts, and the northeast interior of California. It breeds in colonies found near open water, typically in freshwater marsh habitat where there is extensive emergent or riparian vegetation. Its preferred foraging habitats include grasslands and agricultural areas. Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of the tricolored blackbird can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.33
- California Bird Species of Special Concern, Part II: Species Accounts, pp. 437–443 (Shuford 2008)

Known Occurrences
The following sources describe occurrences of tricolored blackbird within the vicinity of the study area:

- CNDDB (CDFG 2009a) does not report any occurrences from within 5 miles of the Project area. The following six occurrences are from places between 5 and 10 miles from the Project area:
  - Occurrence Nos. 222–225: 1992, nesting birds in flocks ranging in size from 200 to 6,000 adults were observed by Steve Brueggeman near duck brood ponds in the Mendota Wildlife Area, These occurrences are between approximately 5 and 6.5 miles south of the Project area
  - Occurrence No. 277: 1975, 5,000 individuals were observed building nests on pools near Cottonwood Creek by E. C. Beedy, et al., approximately 6.5 miles south of the Project area
  - Occurrence No. 374: 1997, 2001, 2,000 individuals were observed in April 1997, 2,500 were observed in May 1997, and 10,000 were observed in 2001, on a substrate of silage by Diana Humple and Roy Churchwell, approximately 6 miles northeast of the Project area

Potential to Occur
Tricolored blackbird has high potential to occur within the study area. Although no individuals were observed during the habitat assessment survey, a flock of hundreds of individuals was observed during a May 19, 2010 site visit near the West Loop. Suitable nesting habitat featuring areas of open water surrounded by emergent and riparian vegetation was observed at the Mendota Pool and throughout the riparian corridor west of the North Loop. The areas of annual grassland and cropland present in the study area are suitable for foraging.

Recommendation
Presence of this species should be assumed in the areas suitable habitat identified above.

Short-eared Owl

Status: Protected under the Migratory Bird Treaty Act and CDFG Species of Special Concern.

Species Description

The short-eared owl (*Asio fl ammeus*) is a widespread winter migrant and infrequent breeder in California west of the Sierra Nevada to the coastline. It prefers open areas with few trees, such as grasslands, prairies, dunes, meadows, irrigated lands, and emergent wetlands. It is a ground-nesting raptor and typically nests in grass stands near marshes, meadows, and agricultural fields. More detailed species descriptions can be found in the following sources:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.29
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)

Short-eared owl, Ronald Laubenstein/USFWS

Known Occurrences

The San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.29, reports that there is a record of short-eared owl near the San Luis National Wildlife Refuge, which located more than 40 miles north of the study area.

Potential to Occur

During the habitat assessment survey and the valley elderberry longhorn beetle protocol surveys, short-eared owl was observed along the San Joaquin River in the study area. In August, two short-eared owls were observed at the river's edge in a stand of mature willows. In March, several individuals were flushed from riparian vegetation at various locations along the river. Short-eared owls have a high potential to occur in suitable habitats throughout the study area, including fresh emergent wetland, annual grassland, irrigated row and field crops, and hayfields.

Recommendation

The presence of this species should be assumed in suitable habitats throughout the study area.

Burrowing Owl

Status: Protected under the Migratory Bird Treaty Act and CDFG Species of Special Concern.

Species Description
The burrowing owl (*Athene cunicularia*) is a year-round resident throughout much of the valley and coastal lowlands of California. It is typically found in open, dry, annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. It is a ground-nesting raptor and often uses the burrows of other species, such as ground squirrels. More detailed species descriptions can be found in the following sources:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.27
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)

Known Occurrences
The following sources describe occurrences of burrowing owl from the vicinity of the study area:

- CNDDB (CDFG 2009a): The following five occurrences of burrowing owl are recorded from within 10 miles of the Project area (CDFG 2009a):
  - Occurrence No. 89: 1989, juveniles, adults and burrows were observed on the east bank of the San Luis Drain by Steven Miyamoto, approximately 4 miles south of the Project area
  - Occurrence No. 538: 1989, two owls and an active burrow were observed on the bank of the San Luis Canal by Steven Miyamoto, approximately 6.5 miles south of the Project area
  - Occurrence No. 539: 1991, two owls and an active burrow were observed on the bank of the San Luis Canal by J.A. Halstead (Kings River Conservation District), approximately 5.5 miles south of the Project area
  - Occurrence No. 589: 1984, 12 pairs of owls were monitored between February 1 and July 31 within heavily grazed grassland by Rachael Conroy and David Chesemore (CSU Fresno), approximately 6 miles southeast of the Project area
  - Occurrence No. 793: 2006, eight adults were observed at the top of a canal bank by Kevin O'Connor (CDFG), approximately 9.3 miles south of the Project area
- The San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.27, reports that there is a record of burrowing owl near the Mendota Pool

Potential to Occur
The burrowing owl has a moderate potential to occur within the study area. Despite 5 occurrences within 10 miles of the Project area and a record of the species near the Mendota Pool, this species was not observed during the habitat assessment. During the valley elderberry longhorn beetle protocol surveys, an individual was observed flying just north of the study area. Several areas of potentially suitable habitat were identified, including agricultural fields and annual grassland. Additionally, the berm surrounding the Little San Joaquin Slough provides potential nesting habitat.

Recommendation
Although this species was not observed during the habitat assessment survey, suitable habitat was identified in the study area and owls could come to occupy the habitat before Project construction. While no focused surveys are recommended to support Project permitting, surveys for burrowing owls are recommended in areas of suitable habitat as part of pre-construction survey activities.

Protocol Surveys
Typical measures to protect burrowing owls before and during construction are described in the "Staff Report on Burrowing Owl Mitigation" (CDFG 1995), and summarized below:

- Surveys should be conducted in winter (December 1 to January 31) and during the breeding season (April 15 to July 15) at dusk or dawn
- Suitable habitat in Project area plus a 500-foot buffer should be surveyed on foot to identify burrows and owls
  - Maximum distance between transects should be less than 100 feet

Mountain Plover
Status: USFWS Bird of Conservation Concern, protected under the Migratory Bird Treaty Act, CDFG Species of Special Concern, proposed for Federal listing as threatened.

Species Description
The mountain plover (*Charadrius montanus*) is a winter resident of California found mostly in the Sacramento, San Joaquin, and Imperial valleys. It prefers to roost and forage in open grasslands, freshly plowed fields, and flat sparsely vegetated areas. Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of the mountain plover can be found in the following documents:


Mountain plover, Brian Small

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and

Wildlife," Section 9.5.4.21

- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)
- California Birds Species of Special Concern, Part II: Species Accounts, pp. 180-186 (Shuford 2008)

Known Occurrences
The following sources describe occurrences of the mountain plover within the vicinity of the study area:

- CNDDB (CDFG 2009a) describes the following two occurrences from within 10 miles of the Project area:
  - Occurrence No. 16: 2002, 40 birds were observed in plowed and fallow fields by Kimberly Kreitinger, approximately 8 miles south of the Project area
  - Occurrence No. 17: 2001, five adults were observed on an area of tilled soil by Kimberly Kreitinger, approximately 8.5 miles south of the Project area

Potential to Occur
This species was not observed during the habitat assessment survey; however, mountain plover winters in the Central Valley and breeds elsewhere (CDFG 2005), so its presence would only be expected September through March. Areas of suitable habitat, including agricultural fields and grassland, are present throughout the study area. There are two documented occurrences that fall within 10 miles of the Project area from within the last 10 years. Considering its life history, the aforementioned occurrences, and presence of suitable habitat, the mountain plover has a moderate potential to occur within the study area.

Recommendation
Presence of this species should be assumed in areas of suitable habitat.

Merlin
Status: Protected under the Migratory Bird Treaty Act and CDFG Watch List.


Merlin, Ronald Laubenstein/USFWS

Species Description
Merlin (*Falco columbarius*) is a small falcon that ranges across much of the northern hemisphere. Within California, merlin occur along the coast, in grasslands, savannas, woodlands, coniferous forests, wetlands, and occasionally desert, from September to May. Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of merlin can be found in the following documents:

- San Joaquin River Restoration Study

Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.18

- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)

Known Occurrences
In addition to general information on range and occurrences provided in the species descriptions referenced above, the following sources describe occurrences of merlin in the Project vicinity:

- The CNDDB (CDFG 2009a) describes one occurrence of Merlin within 10 miles of the Project area:
  - Occurrence No. 11: 2007, one bird was observed in a rural area by Richard Montgomery (USFWS), approximately 2.6 miles from the Project area
- Mendota Wildlife Area recorded sighting (eBird 2009)

Potential to Occur
Merlin is somewhat of a habitat generalist and has a high potential to occur within the study area during the nonbreeding season (September to May). The species was observed within the study area near Fresno Slough during the valley elderberry longhorn beetle protocol surveys. Additionally, there is a recent CNDDB occurrence within a few miles of the Project area. Suitable foraging habitat is present in areas identified as annual grassland, fresh emergent, and elderberry savannah.

Recommendation
Merlin is not expected to nest within the study area. Presence of this species should be assumed in areas of suitable foraging habitat during the nonbreeding season.

White-Faced Ibis
Status: Protected under the Migratory Bird Treaty Act and CDFG Watch List (rookery sites).

Species Description
White-faced ibis (*Plegadis chihi*) rookery sites are reported primarily from Colusa, Yolo, Fresno, Kings, Siskiyou, Plumas, and Modoc counties, with scattered rookeries in Southern California (Small 1994). White-faced ibis nest in shallow marshes of the Central Valley, which also serve as foraging habitat (CDFG 2005). Detailed descriptions of the current distribution and habitat requirements of white-faced ibis rookery sites can be found in the following documents:


White-faced ibis, Dave Menke/USFWS

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.12
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)

Known Occurrences
The following sources describe occurrences of white-faced ibis within the vicinity of the study area:

- CNDDB (CDFG 2009a) describes one occurrence (Occurrence No. 9) within 10 miles of the Project area, from 1983, when 24 pairs were observed nesting in cattail at Fresno Slough at Mendota Wildlife Area, approximately 5 miles south of the Project area
- In the San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.12, Wolfe, pers. obs. (2000 and 2001), reports that white-faced ibis have been observed within San Joaquin River Reach 2
- In "Preliminary Surveys for Endangered and Sensitive Species, 2001 Pilot Project of the San Joaquin River Riparian Habitat Restoration Program," (ESRP 2001), it is noted that one or more white-faced ibis were observed from Reach 2A of the San Joaquin River, immediately upstream of the study area

Potential to Occur
This species was observed flying over the study area during the habitat assessment survey. The large areas of fresh emergent wetland present at the Mendota Pool and eastward along the San Joaquin River until the North Loop provide potential rookery and foraging habitat. Based on the proximity of the previously documented rookery site and the presence of foraging areas within the study area, there is a moderate potential for white-faced ibis rookeries to occur.

Recommendation
Occasional presence of this species should be assumed in all areas of suitable habitat, and nesting may occur in potential rookery habitat during the breeding season.

Western Mastiff Bat
Status: CDFG Species of Special Concern.

Species Description
Western mastiff bat (Eumops perotis californicus) ranges from the San Joaquin Valley and Coast Ranges of central California to the Colorado Desert. It occurs in open, dry areas such as coniferous or deciduous woodland, chaparral, desert habitats, coastal scrub, savanna, rocky canyons, and occasionally urban settings. It roosts primarily on cliff faces, man-made structures, and


Western mastiff bat, Dick Wilkins

rocky outcrops. More detailed life history and species descriptions can be found in the following documents:

- California's Wildlife: "western mastiff bat," CDFG (Ahlborn 1999)
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)
- Mammalian species of special concern in California (CDFG) (Williams 1986)

Known Occurrences
There are two CNDDB (CDFG 2009a) occurrences of western mastiff bat within 10 miles of the Project area:

- Occurrence No. 162: 1911, 1918, specimens collected by Grinnell, approximately 2 miles south of the Project area
- Occurrence No. 235: 1999, detected on Whites Bridge near Fresno Slough, approximately 3.5 miles south of the Project area

Potential to Occur
This species is known from the Project vicinity, and has a high potential to forage in the study area. Potential roost sites in the study area, such as Chowchilla Bifurcation Structure and Mendota Dam, were investigated during the habitat assessment survey and no bat sign was observed. Cliff roosting habitat is not present within the study area or nearby areas, decreasing the likelihood that a maternity roost would be present. This species may forage over much of the study area.

Recommendation
This species should be assumed to forage over the study area.

Protocol Surveys
Although surveys beyond the general habitat assessment are not currently recommended for this species, the Western Bat Working Group (WBWG) recommends the following detection methods for western mastiff bat (WBWG 2007):

- Passive acoustic detection with a low-frequency microphone is recommended for detecting the western mastiff bat
- Western mastiff bat roosts may also be visually surveyed for, by looking for guano at the base of roost sites
- Although mist-netting is possible, it is not a recommended way of surveying for the western mastiff bat

Western Red Bat
Status: CDFG Species of Special Concern.

Species Description
The western red bat (*Lasiurus blossevillii*) is a wide ranging bat that roosts primarily in trees from sea level up through coniferous forests. Its range is west of the Sierra Nevada from Shasta County south to Mexico. Its winter range includes western lowlands and coastal regions south of the San Francisco Bay. Western red bats typically forage over water and near riparian forests or over gravel bars. More detailed life history and species descriptions can be found in the following documents:

- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)
- WBWG, Western Red Bat Species Account (Van der Maarel 2005)


Western red bat, J. Scott Altenbach

Known Occurrences
There are two CNDDB (CDFG 2009a) occurrences of western red bat within 10 miles of the study area:

- Occurrence No. 70: 1999, species observed in cottonwood/riparian forest habitat, approximately 2 miles south of the Project area
- Occurrence No. 71: 1999, detected on Whites Bridge near Fresno Slough, approximately 3.5 miles south of the Project area

Potential to Occur
Western red bat has a high potential to occur in the study area. No individuals or bat sign was observed during the habitat assessment survey; however, suitable riparian forest roosting habitat was observed along the San Joaquin River corridor.

Recommendation
It should be assumed that this species roosts in trees in areas mapped as valley foothill riparian habitat that occur in the study area, and forages over much of the study area.

Protocol Surveys
WBWG recommends the following methods for western red bat detection and surveys:

- Active acoustic detection is the easiest method of identifying the presence of the western red bat
- Surveys should not be visual, as the bat roosts singly, and is difficult to detect in trees
- Surveys should not be dependent on mist-netting, as foraging areas are not suitable for netting

American Badger
Status: CDFG Species of Special Concern.

Species Description
The American badger (*Taxidea taxus*) is found throughout most of California with the exception of the forested northwestern portion of the State. This carnivore is most abundant in drier regions containing scrub, forest, and herbaceous habitats. They are active year round and spend most of their time underground. Badgers prey on rodents, reptiles, birds, eggs, insects, and carrion. More detailed life history and species descriptions can be found in the following document:

- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)

American badger, Gary M. Stolz/USFWS

Known Occurrences
The CNDDB identifies one American badger occurrences (Occurrence No. 82) within 10 miles of the Project area. In 1985 one adult badger was observed standing on a burrow, approximately 3 miles south of the Project area, at Alkali Sink Ecological Reserve.

Potential to Occur
Based on the proximity of the known occurrence to the study area, there is moderate potential for badger to occur. Potential habitat areas, including annual grassland and open habitat such as elderberry savannah habitat, were identified within the study area during the habitat assessment survey. However, no sign of this species was observed. All large burrows identified within the study area narrowed within one foot of the surface, making them unsuitable for badger.

Recommendation
Once access is granted to the southeasternmost extent of the study area, it should be surveyed on foot using meandering transects to detect potential badger dens, identifiable by their characteristic shape, horizontal claw marks, and other features. Even if this species is not detected, occasional presence in the study area should be assumed. Focused surveys are not recommended, and neither USFWS nor CDFG has established survey protocols for this species.

4.2.4 Birds Observed at Mendota Wildlife Area

Bird species addressed in this section were not identified by either the USFWS species list or CNDDB database search[3]. These species, however, have been observed at Mendota Wildlife Area (eBird 2009), located approximately 3.5 miles south of the Project area (Figure 3-1), and are conferred special-status (either as a USFWS bird of

[3] Due to their State fully protected status, golden eagle and greater sandhill crane (both observed at Mendota Wildlife Area but not identified during the other database searches) are addressed in Section 4.2.2, Listed and Fully Protected Wildlife.

conservation concern or a CDFG species of special concern or watch list species). All birds discussed in this section are also protected from unlawful take, killing, or possession under the Migratory Bird Treaty Act (16 U.S.C. § 703–712). All of the species addressed in this section are listed in Table 4-7, and are presented in this section in the same order as listed in the table.

Although habitat suitability and seasonality of use may vary for each species, observations at Mendota Wildlife Area suggest all of these species have some potential for occurrence in the study area. In each species discussion below the type of suitable habitat that is present within the study area is discussed. In many cases these species have been observed during the migratory or wintering period, and nesting in the study area and vicinity is not expected.

Cooper's Hawk

Status: Protected under the Migratory Bird Treaty Act and CDFG Watch List.

Cooper's hawk, James Phelps

Cooper's hawk (*Accipiter cooperii*) is a year-round California resident found in woodlands, including riparian woodlands, and edge habitats. It builds platform nests in trees, often pine trees, in deciduous and coniferous forests (Ehrlich 1998). Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of the Cooper's hawk can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.21
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)

This species was observed during the habitat assessment survey and the valley elderberry longhorn beetle protocol surveys. Potential foraging and nesting habitat was identified in the study area.

Greater white-fronted goose, USFWS

Greater White-Fronted Goose

Status: Protected under the Migratory Bird Treaty Act and CDFG Species of Special Concern.

Greater white-fronted goose (*Anser albifrons elgasi*) breeds in Alaska and winters in northeastern California and the Central Valley. It is common within the Central Valley between October and March but is also

seen in September, April, and early May. It is found in wet habitats including grasslands, pastures, croplands, meadows, freshwater emergent wetlands, and lacustrine habitat (Ehrlich 1988). A detailed description of the current distribution, habitat requirements, and foraging behaviors of greater white-fronted goose can be found in the California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005). Potential migratory, wintering and foraging habitat was observed in the study area and could occur at the nearby Mendota Wildlife Area.

Redhead

Status: Protected under the Migratory Bird Treaty Act and CDFG Species of Special Concern.

Redhead, Kevin Bercaw

Redhead (*Aythya americana*) is a year-round resident of California and is known to breed and winter within the Central Valley. It nests in a floating cup nest attached to emergent vegetation in freshwater emergent wetlands, within dense vegetation, near open water (Ehrlich 1988). In the winter, it forages over large, deep bodies of water. Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of the redhead can be found in the following documents:

- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)
- California Bird Species of Special Concern, Part II: Species Accounts, pp. 85-90 (Shuford 2008)

Potential nesting and foraging habitat was observed in the study area.

Northern Harrier

Status: Protected under the Migratory Bird Treaty Act and CDFG Species of Special Concern.

Northern harrier, Ned Kroeger/USFWS

Northern harrier (*Circus cyaneus*) is a widespread resident raptor in California. It builds platform nests on slightly elevated ground or in thick vegetation in areas of prairie, savannah, sloughs, wet meadows or marshes (Ehrlich 1988). It forages in areas of open grassland and prairie. Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of the northern harrier can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.16
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)
- California Bird Species of Special Concern, Part II: Species Accounts, pp. 149-155 (Shuford 2008)
- In "Preliminary Surveys for Endangered and Sensitive Species, 2001 Pilot Project of the San Joaquin River Riparian Habitat Restoration Program," (ESRP 2001), it is noted that one or more northern harriers were observed from Reach 2A of the San Joaquin River, immediately upstream of the study area

This species was observed during the habitat assessment survey and the valley elderberry longhorn beetle protocol surveys. Potential foraging and nesting habitat was identified in the study area.

Lesser Sandhill Crane

Status: Protected under the Migratory Bird Treaty Act and CDFG Species of Special Concern.

Lesser sandhill crane (*Grus canadensis canadensis*) is a winter resident of marshes and farmland in the Central Valley of California (Sibley 2003). It is an opportunistic forager that eats primarily aquatic insects, as well as grains, shoots, bulbs, and berries (Ehrlich 1988). Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of the lesser sandhill crane can be found in the following documents:

Sandhill crane, USFWS

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.3.12
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)
- California Bird Species of Special Concern, Part II: Species Accounts, pp. 167–172 (Shuford 2008)

Potential wintering or foraging habitat for this species was observed in the study area. Sandhill crane were heard and observed during the valley elderberry longhorn beetle protocol surveys. During the habitat assessment survey a local landowner stated that he has seen sandhill crane roosting and foraging south of the Little San Joaquin Slough during the winter months (Ward, pers. comm., 2010). These observations may have been of lesser sandhill crane or the similar subspecies, greater sandhill crane.

Loggerhead Shrike

Status: USFWS Bird of Conservation Concern, protected under the Migratory Bird Treaty Act, and CDFG Species of Special Concern.

Loggerhead shrike (*Lanius ludovicianus*) is a year-round resident of lowlands and foothills throughout California (Sibley 2003). The shrike prefers open habitats with scattered perches and feeds mostly on large insects, but eats a variety of prey (CDFG 2005). It typically builds a cup nest in shrubs in either fields with scattered shrubs or open woodlands (Ehrlich 1988). Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of the loggerhead shrike can be obtained from the following sources:

Loggerhead shrike, Dave Menke/USFWS

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.31
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)
- California Bird Species of Special Concern, Part II: Species Accounts, pp. 271–277 (Shuford 2008)
- In "Preliminary Surveys for Endangered and Sensitive Species, 2001 Pilot Project of the San Joaquin River Riparian Habitat Restoration Program," (ESRP 2001), it is noted that one or more loggerhead shrikes were observed from Reach 2A of the San Joaquin River, immediately upstream of the study area

This species was observed during the habitat assessment survey. Potential foraging and nesting habitat for this species was identified in the study area.

California Gull

Status: Protected under the Migratory Bird Treaty Act and CDFG Watch List.

California gull, Dave Menke/USFWS

California gull (*Larus californicus*) is a common winter resident of California that breeds in the alkali and freshwater lacustrine habitat east of the Sierra Nevada Mountains and the Cascades (CDFG 2005). A detailed description of the current distribution, habitat requirements, and foraging behaviors of the California gull can be obtained from the following source:

- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)

This species was observed in the study area during valley elderberry longhorn beetle protocol surveys. Potential foraging and nesting habitat for this species was identified in the study area.

Long-Billed Curlew

Status: USFWS Bird of Conservation Concern, protected under the Migratory Bird Treaty Act, and CDFG Watch List.

Long-billed curlew, Lee Karney/USFWS

Long-billed curlew (*Numenius americanus*) is a winter resident of the marshes, fields, lawns and beaches of California (Sibley 2003). It builds a scrape nest usually in prairies or grassy meadows near water. It forages in a variety of habitats, feeding primarily on insects and burrow-dwelling crustaceans (Ehrlich 1988). Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of the long-billed curlew can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.25
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)
- In "Preliminary Surveys for Endangered and Sensitive Species, 2001 Pilot Project of the San Joaquin River Riparian Habitat Restoration Program," (ESRP 2001), it is noted that one or more long-billed curlew were observed from Reach 2A of the San Joaquin River, immediately upstream of the Project area

This species was observed in the study area during valley elderberry longhorn beetle protocol surveys. Potential wintering or foraging habitat for this species was observed in the study area.

Osprey

Status: Protected under the Migratory Bird Treaty Act and CDFG Watch List

Osprey, Steve Hilldebrand/USFWS

Osprey (*Pandion haliaetus*) is a migratory and winter resident throughout California and a breeding resident of northern California. It is a large, solitary raptor that preys primarily on fish and is typically found near bodies of water. It uses rivers,

lakes, bays, estuaries and surf zones to forage. It is a platform nester that builds nests along rivers, lakes and coasts (Ehrlich 1988). Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of the osprey can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.14
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)

Potential wintering or foraging habitat was observed in the study area.

American White Pelican

Status: Protected under the Migratory Bird Treaty Act and CDFG Species of Special Concern.

American white pelican (*Pelecanus erythrorhynchos*) is a common winter resident in the Central Valley of California that breeds primarily in the interior of North America, including areas of northern California. It forages in shallow, inland waters at the edge of marshes, lakes and rivers. During the winter, it roosts on the ground near the water's edge. Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of the American white pelican can be found in the following document:

American white pelican, Dave Menke/USFWS

- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)

This species was observed during the habitat assessment survey near the Mendota Pool. Potential wintering or foraging habitat was observed in the study area.

Double-Crested Cormorant

Status: Protected under the Migratory Bird Treaty Act and CDFG Watch List (rookeries).


Double-crested cormorant, Rodney Krey/USFWS

Double-crested cormorant (*Phalacrocorax auritus*) is a year-round resident of the California coast and a winter resident of the Central Valley and inland areas of Southern California. Within the Central Valley it is found within lacustrine and riverine habitats. It requires rocks, steep cliffs, dead tree branches or similar features for roosting and builds a platform nest either in trees or on the ground (Ehrlich 1988). Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of the double-crested cormorant can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife," Section 9.5.4.8
- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)

This species was observed during the habitat assessment survey and the valley elderberry longhorn beetle protocol surveys near the Mendota Pool and Fresno Slough. Potential wintering or foraging habitat was observed in the study area.

Yellow-headed Blackbird

Status: Protected under the Migratory Bird Treaty Act and CDFG Species of Special Concern.

Yellow-headed blackbird (*Xanthocephalus xanthocephalus*) is a winter resident of California that historically bred throughout the Central Valley, although it is now patchily distributed throughout this breeding range (Shuford 2008). It builds a cup nest and breeds almost exclusively in marshes with emergent vegetation (Ehrlich 1988: Shuford 2008). It forages primarily on grass and forb seeds. Detailed descriptions of the current distribution, habitat requirements, and foraging behaviors of the yellow-headed blackbird can be obtained from the following sources:


Yellow-headed blackbird, Dave Menke/USFWS

- California Interagency Wildlife Task Group, California Wildlife Habitat Relationships species accounts (CDFG 2005)
- California Bird Species of Special Concern, Part II: Species Accounts, pp. 444-450 (Shuford 2008)

This species was observed in the study area during valley elderberry longhorn beetle protocol surveys. Potential wintering or foraging habitat for this species was observed in the study area.

4.3 Wetlands and Other Waters

This section presents the findings of a survey of potential jurisdictional Wetlands and WUS for the San Joaquin River Restoration Program, Mendota Pool Bypass, and Reach 2B Channel Improvements Project. These potentially jurisdictional waters may be subject to regulation by the USACE under Section 404 of the federal Clean Water Act. All conclusions presented in this report are subject to verification by the USACE.

4.3.1 Wetlands and Other Waters Identification

For the purposes of this document, wetlands and other aquatic resources (e.g., rivers, streams, and natural basins) are a subset of WUS and are protected under Section 404 of the Clean Water Act. The USACE has the primary Federal responsibility for administering regulations that concern waters and wetlands. In this regard, USACE acts under two statutory authorities: the Rivers and Harbors Act (Sections 9 and 10), which governs all work within specified activities in "navigable waters"; and the Clean Water Act (Section 404), which requires prior authorization to the placement of fill into WUS, including wetlands.

4.3.2 Categories of Wetlands in the Study Area

Three categories of potential jurisdictional wetlands were identified in the study area, as well as potential other WUS. The three wetland categories were riparian wetland, wet meadow, and marsh. Table 4-8 summarizes the acreage of each category of potential jurisdictional wetland and other WUS in the study area.

Table 4-8.
Study Area Wetlands and Waters of the United States

Wetland and Nonwetland Type	Area (acres)
Riparian wetlands	165.89
Wet meadows	66.97
Marshes	72.18
Wetlands Subtotal	**305.04**
Other waters of the United States	524.61

Riparian Wetland

There are two types of riparian wetlands in the study area: riparian woodland and riparian scrub. These were combined because they are very often mixed together and overlapping each other. Riparian woodland wetlands in the study area include Black Willow Thicket, Fremont Cottonwood Woodland, and Oregon Ash Groves vegetation alliances. They are typically located along the levees of the river and adjacent drainages, as well as in concave depressions throughout the study area. On higher elevation and better drained

soil parcels, Fremont cottonwood dominates and integrades with sandbar willow. Black willow, with the associated Oregon ash, prevails at lower elevations with poorly drained soils and flat topography. Mixed riparian wetland scrub usually develops in artificial or highly disturbed habitats along ditches and levees. Mixed scrub vegetation grows 10 to 30 feet tall, and is dominated by California rose (*Rosa californica*), Himalayan blackberry (*Rubus ursinus*), blue elderberry (*Sambucus mexicana*), coyote brush (*Baccharis pilularis*), or sandbar willow (*Salix exigua*). Mixed marsh and wet meadow species form often the adjacent understory in the vicinity of the riparian wetlands.

Wet Meadow

Meadows are herbaceous communities dominated by mixtures of perennial grasses and forbs with other grass-like species, such as rushes and sedges. Some meadows in the study area include scattered riparian shrubs and trees, but do not contain enough woody vegetation to be included in the riparian scrub or riparian woodland wetland categories. Wet meadows are often located adjacent to dry meadows, and other upland areas that are higher above the water table. They typically have flat or concave surface relief and are located in low-lying troughs and basins with poorly drained soils near the San Joaquin River or its tributaries. These site characteristics help maintain extended periods of soil saturation or flooding during the growing season.

Wet meadows are found throughout the study area and are often used for grazing. Under natural conditions, wet meadows in the study area are found in swales, drainages, and on lower riparian terraces. These wetlands receive water from river floodplain high water table, overbank flooding, and sheet drainage from excessive runoff during winter, spring, and early summer. Tarplant (*Centromadia pungens*), yerba manza (*Anemopsis californica*), alkali heath (*Frankenia grandiflora*), salt grass (*Distichlis spicata*), and creeping wildrye (*Leymus triticoides*) often occur in wet meadows in the study area.

Marsh

The mostly mixed marsh vegetation alliances are dominated by annual and perennial emergent vegetation with varying amounts of herbs and grass-like species. The vegetative cover is often very dense. In contrast to meadow communities, which are seasonally saturated, marsh communities have saturated soil throughout most of the year except, possibly, in some cases during the dry months of late summer. River water retained by the Mendota Dam is the principal source of water for marshes in the study area.

4.3.3 Potential Nonwetland Other Waters of the United States

The river channel between the ordinary high water marks (OHWM), areas of backed up water upstream of Mendota Dam, and other small tributaries in the study area were identified as potential jurisdictional other WUS. These areas lack hydrophytic vegetation typically required to qualify as a wetland. They are delineated based on this lack of vegetation and by the OHWM, which is defined as the boundary of the active river channel. Actively managed agricultural irrigation ditches, stock ponds, and larger agricultural ponds were not included.

4.4 Special-Status Plant Species

Special-status plant species evaluated for potential to occur in the study area are listed in Table 4-9. The potential for each of these species to occur is assessed in this section, based on existing data and the results of field surveys in the portion of the study area where access was permitted by landowners (Figure 3-2). No special-status plant species were observed during field surveys. The native vegetation in the accessible portion of the study area has been heavily impacted by the construction of flow-constricting levees; conversion of riparian areas into agricultural fields; intensive grazing in the small remnant inboard riparian areas; introduction of invasive species through cattle grazing and possibly re-seeding of pastures with nonnative high production annual grass species; large variation in the groundwater table because of extreme variation in the river flows; dewatering of fields; groundwater pumping for irrigation; herbicide application and earthmoving agricultural activities, such as construction of irrigation canals and ditches; grading of fields for drainage; deep riping of soil for aeration/decompaction; and other activities that may be the primary causative factors of the reduced plant species diversity and absence of special-status plant species. A list of all plant species observed during the survey effort is provided as Attachment A. Common names follow scientific names published in the Jepson Manual (Hickman 1993). All species observed were identified to a level sufficient to determine their rarity status.

Table 4-9.
Federal-, State-, or CNPS-Listed Plant Species

Scientific Name **Common Name**	**Family**	**Federal/ State/ CNPS Status**	**Habitat/ Communities**	**Potential to Occur**	**Blooming Period/ Protocol Survey Date**	**Elevation**
Atriplex cordulata heartscale	Chenopodiaceae	--/--/1B.2	Chenopod scrub, meadows and seeps, and sandy/saline or alkaline valley and foothill grassland.	Not observed during surveys in accessible areas. Moderate potential to occur elsewhere, based on negative surveys in accessible areas, little suitable habitat, and disturbance. However, CNDDB observations within 5 miles of the Project area.	Apr-Oct/ late April	3 – 1,230 feet
Atriplex depressa brittlescale	Chenopodiaceae	--/--/1B.2	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland, and alkaline or clay vernal pools.	Not observed during surveys in accessible areas. Moderate potential to occur elsewhere, based on negative surveys in accessible area, little suitable habitat, and disturbance. However, CNDDB observations within 10 miles of the Project area.	Apr-Oct/ late April	3 – 1,050 feet
Atriplex minuscula lesser saltscale	Chenopodiaceae	--/--/1B.1	Chenopod scrub, playas, and alkaline or sandy valley and foothill grassland.	Not observed during surveys in accessible areas. Moderate potential to occur elsewhere, based on negative surveys in accessible area, little suitable habitat, and disturbance. However, CNDDB observations within 10 miles of the Project area.	May-Oct/ mid-June	50 – 660 feet

Table 4-9.
Federal-, State-, or CNPS-Listed Plant Species

Scientific Name **Common Name**	**Family**	**Federal/ State/ CNPS Status**	**Habitat/ Communities**	**Potential to Occur**	**Blooming Period/ Protocol Survey Date**	**Elevation**
Atriplex persistens vernal pool smallscale	Chenopodiaceae	--/--/1B.2	Alkaline vernal pools.	Not observed during surveys in accessible areas. Low potential to occur elsewhere, based on negative surveys in accessible area, no alkaline vernal pools, and disturbance. However, CNDDB observations within 10 miles of the Project area.	Jun-Oct/ mid-June	30 – 380 feet
Atriplex subtilis subtle orache	Chenopodiaceae	--/--/1B.2	Valley and foothill grassland.	Not observed during surveys in accessible areas. Moderate potential to occur elsewhere, based on negative surveys in accessible area, little suitable habitat, and disturbance. However, CNDDB observations within 5 miles of the Project area.	Jun-Aug (Oct*) *uncommon /mid-June	130 – 330 feet
Atriplex vallicola Lost Hills crownscale	Chenopodiaceae	--/--/1B.2	Chenopod scrub, valley and foothill grassland, and alkaline vernal pools.	Not observed during surveys in accessible areas. Moderate potential to occur elsewhere, based on negative surveys in accessible area, little suitable habitat, and disturbance. However, CNDDB observations within 5 miles of the Project area.	Apr-Aug/ late April	165 – 2,080 feet

Table 4-9.
Federal-, State-, or CNPS-Listed Plant Species

Scientific Name **Common Name**	**Family**	**Federal/ State/ CNPS Status**	**Habitat/ Communities**	**Potential to Occur**	**Blooming Period/ Protocol Survey Date**	**Elevation**
Castilleja campestris ssp. *succulenta* succulent owl's-clover	Scrophulariaceae	FT/SE/1B.2	Vernal pools (often acidic).	Not observed during surveys in accessible areas. Very low potential to occur elsewhere, based on negative surveys in accessible area, no suitable habitat, and disturbance. Some potential based on elevation.	Apr-May/ late April	165 – 2,460 feet
Caulanthus californicus California jewel-flower	Brassicaceae	FE/SE/1B.1	Chenopod scrub, pinyon and juniper woodland, and sandy valley and foothill grassland.	Not observed during surveys in accessible areas. Very low potential to occur elsewhere, based on negative surveys in accessible area, little suitable habitat, and disturbance.	Feb-May/ mid-March	200 – 3,280 feet
Cordylanthus palmatus palmate-bracted bird's-beak	Scrophulariaceae	FE/SE/1B.1	Chenopod scrub and alkaline valley and foothill grassland.	Not observed during surveys in accessible areas. Low potential to occur elsewhere, based on negative surveys in accessible area, little suitable habitat, and disturbance. However, CNDDB observations within 5 miles of the Project area.	May-Oct/ mid-June	15 – 510 feet

Table 4-9.
Federal-, State-, or CNPS-Listed Plant Species

Scientific Name **Common Name**	**Family**	**Federal/ State/ CNPS Status**	**Habitat/ Communities**	**Potential to Occur**	**Blooming Period/ Protocol Survey Date**	**Elevation**
Delphinium recurvatum recurved larkspur	Ranunculaceae	--/--/1B.2	Chenopod scrub, cismontane woodland, and alkaline valley and foothill grassland.	Not observed during surveys in accessible areas. Low potential to occur elsewhere, based on negative surveys in accessible area, little suitable habitat, and disturbance. However, CNDDB observations within 10 miles of the Project area.	Mar-Jun/ mid-March	10 – 2,460 feet
Imperata brevifolia California satintail	Poaceae	--/--/2.1	Chaparral, coastal scrub, Mojavean desert scrub, meadows and seeps (often alkali), and mesic riparian scrub.	Not observed during surveys in accessible areas. Low potential to occur elsewhere, based on negative surveys in accessible area, little suitable habitat, and disturbance. Elevation is suitable.	Sep-May/ mid-March	0 – 1,640 feet
Layia munzii Munz's tidy tips	Asteraceae	--/--/1B.2	Chenopod scrub and alkaline clay valley and foothill grassland.	Not observed during surveys in accessible areas. Moderate potential to occur elsewhere, based on negative surveys in accessible area, little suitable habitat, and disturbance. However, CNDDB observations within 5 miles of the Project area.	Mar-Apr/ mid-March	490 – 2,300 feet

Table 4-9.
Federal-, State-, or CNPS-Listed Plant Species

Scientific Name **Common Name**	**Family**	**Federal/ State/ CNPS Status**	**Habitat/ Communities**	**Potential to Occur**	**Blooming Period/ Protocol Survey Date**	**Elevation**
Leptosiphon serrulatus Madera leptosiphon	Polemoniaceae	--/--/1B.2	Cismontane woodland and lower montane coniferous forest.	Not observed during surveys in accessible areas. No potential to occur, based on negative surveys in accessible area, no suitable habitat, lower elevation, and disturbance.	Apr-May/ late April	980 – 4,265 feet
Monolopia congdonii San Joaquin woollythreads	Asteraceae	FE/--/1B.2	Chenopod scrub and sandy valley and foothill grassland.	Not observed during surveys in accessible areas. Moderate potential to occur elsewhere, based on negative surveys in accessible area, little suitable habitat, and disturbance. However, CNDDB observations within 10 miles of the Project.	Feb-May/ mid-March	200 – 2,630 feet
Orcuttia inaequalis San Joaquin Valley Orcutt grass	Poaceae	FT/SE/1B.1	Vernal pools.	Not observed during surveys in accessible areas. Very low potential to occur elsewhere, based on negative surveys in accessible area, no vernal pools, and disturbance.	Apr-Sep/ late April	30 – 2,500 feet
Orcuttia pilosa hairy Orcutt grass	Poaceae	FE/SE/1B.1	Vernal pools.	Not observed during surveys in accessible areas. Very low potential to occur elsewhere, based on negative surveys in accessible area, no vernal pools, and disturbance.	May-Sep/ mid-June	150 – 660 feet

Table 4-9.
Federal-, State-, or CNPS-Listed Plant Species

Scientific Name **Common Name**	**Family**	**Federal/ State/ CNPS Status**	**Habitat/ Communities**	**Potential to Occur**	**Blooming Period/ Protocol Survey Date**	**Elevation**
Sagittaria sanfordii Sanford's arrowhead	Alismataceae	--/--/1B.2	Assorted shallow freshwater marshes and swamps.	Not observed during surveys in accessible areas. Moderate potential to occur elsewhere, based on negative surveys in accessible area, little suitable habitat, and disturbance. However, CNDDB observations within 5 miles of the Project area and suitable habitat.	May-Oct/ mid-June	0 – 2,130 feet
Tropidocarpum capparideum caper-fruited tropidocarpum	Brassicaceae	--/--/1B.1	Alkaline hills valley and foothill grassland.	Not observed during surveys in accessible areas. Low potential to occur elsewhere, based on negative surveys in accessible area, little suitable habitat, and disturbance.	Mar-Apr/ mid-March	1 – 1,500 feet

Key:
U.S. Fish and Wildlife Service Federal Listing Categories:
FE = Federally Listed as Endangered
FT = Federally Listed as Threatened
California Department of Fish and Game State Listing Categories:
SE = State Listed as Endangered
ST = State Listed as Threatened
California Native Plant Society Listing Categories:
List 1A = Plants presumed extinct in California
List 1B.1 = Plants rare, threatened, or endangered in California and elsewhere; seriously threatened in California
List 1B.2 = Plants rare, threatened, or endangered in California and elsewhere, fairly threatened in California
List 1B.3 = Plants rare, threatened, or endangered in California and elsewhere, not very threatened in California
List 2.1 = Plants rare, threatened, or endangered in California, but more common elsewhere; seriously threatened in California

4.4.1 Federally and State-Listed Plants

Succulent Owl's Clover (Castilleja campestris ssp. succulenta)

Status: Federally listed as threatened, State listed as endangered, CNPS List 1B.2. Critical habitat for succulent owl's clover has been designated near Reach 1A of the San Joaquin River. Succulent owl's clover, also known as fleshy owl's-clover, is an annual herb that is native to California and is endemic (limited) to California alone. Like other members of Castilleja and related genera, it is partly parasitic (hemiparasitic) on the roots of other plants. It belongs to the snapdragon family (Scrophulariaceae). Succulent owl's clover occurs on the margins of vernal pools, swales and some seasonal wetlands, often on acidic soils. It is never dominant and it is typically found in only a few of the vernal pools in an area. It is found only in vernal pools along the rolling lower foothills and valleys along the eastern San Joaquin Valley in the Southern Sierra Foothills Vernal Pool Region. Habitat loss and fragmentation are the largest threats to the survival and recovery of this vernal pool species. More detailed species description can be found in the following document:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife"

There are no known occurrences from the Project area and its 10-mile vicinity. Critical habitat for this species has been designated in other areas of the California Central Valley (Federal Register 50 CFR Part 17). No succulent owl's clover plants were observed during botanical surveys conducted in accessible portions of the study area. There is a very low potential for the plant to occur in the nonaccessible portions of the study area, based on negative survey results from accessible areas, no suitable habitat, disturbance, and elevation.

California Jewel-Flower (Caulanthus californicus)

Status: Federally and State listed as endangered, CNPS List 1B.1 species. This CNPS designation indicates that it is a California endemic considered by CNPS to be seriously endangered because greater than 80 percent of occurrences are threatened. Critical habitat has not been designated for California jewel-flower. California jewel-flower (Caulanthus californicus) is an annual herb that is native to California. An annual in the mustard family (Brassicaceae), California jewel-flower grows to about 4 inches in height (Hickman 1993). Its seeds germinate in the fall when the rainy season begins, but additional seedlings may continue to emerge for several months (USFWS 1998). California jewel-flower seedlings develop into rosettes (clusters of leaves at ground level) during the winter months. This species blooms between February and May and seed set continues until the plants die, which may occur as late as May in years of favorable rainfall and temperatures. Both plant size and population size of California jewel-flower vary substantially depending on site and weather conditions (USFWS 1998).

California jewel-flower, USFWS

California jewel-flower grows at elevations of 0 to 3,000 feet in shadscale scrub, valley and foothill grassland, and pinyon-juniper woodland (CNPS 2009). Its geographic range is in the southern San Joaquin Valley, but it was formerly much more widespread. More detailed species description can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife"
- USFWS. 1998. *Recovery plan for upland species of the San Joaquin Valley, California*. Region 1, Portland, OR. 319 pp.

There are no known occurrences of the species from the Project area and its 10-mile vicinity. No California jewel-flower plants were observed during botanical surveys conducted in the accessible portion of the study area. The potential for the species to occur in the nonaccessible portion of the study area is very low, based on negative survey results from accessible areas, little suitable habitat, and disturbance.

Palmate-Bracted Bird's-Beak (Cordylanthus palmatus)

Status: Federally listed as endangered, State listed as endangered, CNPS List 1B.1.
Palmate-bracted bird's-beak is a hemiparasitic annual. Saltgrass is the most likely host plant for palmate-bracted bird's-beak. The combination of hemiparasitism, salt excretion, and a deep root system allows palmate-bracted bird's-beak to grow during the hot, dry months after most other annuals have died (Coats 1993). This species is restricted to seasonally flooded, saline-alkali soils in lowland plains and basins at elevations of less than 500 feet. Within these areas, palmate-bracted bird's-beak grows primarily along the edges of channels and drainages, with a few individuals scattered in seasonally wet depressions, alkali scalds, and grassy areas (USFWS 1998). More detailed species description can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife"
- USFWS. 1998. *Recovery plan for upland species of the San Joaquin Valley, California* . Region 1, Portland, OR. 319 pp.

Palmate-bracted bird's-beak, USFWS

The occurrence of palmate-bracted bird's-beak has been recorded at the Alkali Sink Ecological Reserve and Mendota National Wildlife Refuge. CNPS records indicate occurrences in the Kerman (359A), Tranquillity (360A), Firebaugh NE (381A) and Poso Farm (381B) quadrangles. These are immediately adjacent to the study area quadrangle Mendota Dam (381D). The potential for this plant to occur in the nonaccessible portion of the study area is low, based on negative survey results from accessible areas, little suitable habitat, and disturbance. However, there are several CNDDB observations within

5 miles of the Project area. No palmate-bracted bird's-beak plants were observed during botanical surveys conducted in the accessible portion of the study area.

San Joaquin Woollythreads (Monolopia congdonii)

Status: Federally listed as endangered, CNPS List 1B.2. This CNPS designation indicates that it is a California endemic considered by CNPS to be fairly endangered because 20 to 80 percent of known occurrences are threatened. Critical habitat has not been proposed for San Joaquin woollythreads. An annual in the sunflower family (Asteraceae), San Joaquin woollythreads is 2 to 12 inches tall (Hickman 1993). It grows at elevations of 200–2,650 feet in alkali sinks and valley and foothill grassland with sandy soils (CNPS 2009). *The Jepson Manual* treats this plant as *Lembertia congdonii* (Hickman 1993). The geographic range of San Joaquin woollythreads is in the southwestern San Joaquin Valley (Hickman 1993). Plants bloom between February and May, shed seed immediately upon maturity, and then die and break apart. As part of efforts to conserve San Joaquin woollythreads, extensive surveys of potential habitat for this species have been conducted on public lands, and its ecology has been researched (USFWS 1998). A recovery strategy for the species is provided in Recovery Plan for Upland Species of the San Joaquin Valley, California (USFWS 1998). More detailed species description can be found in the San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife." CNPS has recorded the species in the vicinity of the study area in DWR quadrangle Coit Ranch (360B) approximately 8 miles south of the Project area. Based on negative survey results from accessible areas, disturbed habitat, occurrence in the vicinity, and the elevation range, the potential for the species to occur in the nonaccessible portion of the study area is moderate. No San Joaquin woollythreads plants were observed during botanical surveys conducted in the accessible portion of the study area.

San Joaquin Valley Orcutt Grass (Orcuttia inaequalis)

Status: Federally and State listed as endangered, a CNPS List 1B.1. This CNPS designation indicates that it is a California endemic considered by CNPS to be seriously endangered because more than 20 of 26 occurrences are threatened. Critical habitat for this species is designated immediately adjacent to Reach 1A. San Joaquin Valley Orcutt grass is a small, grayish-green, sticky, aromatic, tufted annual in the grass family (Poaceae) that occurs in vernal pools. The plant has several stems 2–6 inches tall, terminating in a spike-like inflorescence (58 Federal Register [149]:41700–41708, August 5, 1993). The blooming period for this species is from April through September (Skinner 1994). San Joaquin Valley Orcutt grass occurs near Friant, and suitable habitat for this species is present on clay soils on hillsides far above the river. Restoration actions that influence vernal pools could affect this species. The overall trend for this species is one of decline (CDFG 1999). More detailed species description can be found in the San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife." San Joaquin Valley Orcutt grass is not known from the study area or its vicinity. It has been documented in the Fresno North, Friant, and Lanes Bridge quadrangles (CDFG 2009a). Based on the sandy nature of the soils in the vicinity of Reach 2B, negative survey results from accessible areas, the lack of preferred habitat (vernal pools), degree of disturbance, and no known occurrences within the Project vicinity, the potential for the plant to occur in the nonaccessible portion

of the study area is very low. No San Joaquin Valley Orcutt grass plants were observed during botanical surveys conducted in the accessible portion of the study area.

Hairy Orcutt Grass (Orcuttia pilosa)

Status: Federally and State listed as endangered, CNPS List 1B.1. This designation indicates that it is a California endemic considered by CNPS to be seriously endangered because greater than 80 percent of occurrences are threatened. Hairy Orcutt grass (*Orcuttia pilosa*) is an annual species native to California. It is a yellow-green, tufted annual of the grass family. This species is found in vernal pools in undulating topography on remnant alluvial fans and stream terraces. The species grows primarily in large pools that retain water until late spring (Stone 1988). Its elevation range is 150-660 feet. The life history of hairy Orcutt grass is similar to that of other species in its genus (Orcuttia). Inflorescences appear a few days after the water in the pools evaporates, as early as May and sometimes even in mid-April. Most flowers and seed are produced in June and July; however, flowering may continue into September in wet years (Griggs 1980, 1981). More detailed species description can be found in the San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife." Critical habitat for this species is designated in and immediately adjacent to Reach 1A of the San Joaquin River in the Gregg, Herndon, Lanes Bridge, and Madera quadrangles. There are no known occurrences in the study area; the nearest documented CNPS occurrence is located in the Madera quadrangle (380A). Based on the lack of preferred habitat (vernal pools), negative survey results from accessible areas, degree of disturbance, known occurrences near the study area and elevational distribution, the potential for the plant to occur in the nonaccessible portion of the study area is very low. No hairy Orcutt grass plants were observed during botanical surveys conducted in the accessible portion of the study area.

4.4.2 CNPS Rare, Threatened, or Endangered (List 1 and 2 Plants)

Heartscale (Atriplex cordulata)

Status: CNPS List 1B.2. Heartscale is an annual herb of the goosefoot family (Chenopodiaceae) that grows 4–20 inches tall (Hickman 1993). This species lives in moderately alkaline or saline soil in chenopod scrub, desert scrub, or sandy grassland habitats (Skinner 1994). Heartscale blooms from April to October (Skinner 1994). More detailed species description can be found in the San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife." Heartscale has been reported to occur in the study area (Mendota Dam DWR quadrangle 381D). CNPS records identify the species also in the adjacent Jamesan (359B), Tranquillity (360A), Bonita Ranch (380B), Gravelly Ford (380C), Firebaugh NE (381A), and Poso Farm (381B) quadrangles. There is a moderate potential for the plant to occur in the nonaccessible portion of the study area, based on negative survey results from accessible areas, little suitable habitat, and degree of disturbance, soil type, and known occurrences. No heartscale plants were observed during botanical surveys conducted in the accessible portion of the study area.

Brittlescale (Atriplex depressa)

Status: CNPS List 1B.2. Brittlescale is an annual herb from the goosefoot family (Chenopodiaceae). The species is found in chenopod scrub, playas, and valley foothill grassland habitats on clay or alkaline soils (Skinner 1994). More detailed species description can be found in the San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife." CNPS and CNDDB records identify brittlescale in the Jamesan (359B) and Tranquillity (360A) quadrangles adjacent to the study area. There is a moderate potential for the species to occur in the nonaccessible portion of the study area, based on negative survey results from accessible areas, little suitable habitat, degree of disturbance, and nearby occurrences. No brittlescale plants were observed during botanical surveys conducted in the accessible portion of the study area.

Lesser Saltscale (Atriplex minuscula)

Status: CNPS List 1B.1. Lesser saltscale is an annual herb of the goosefoot family (Chenopodiaceae) (Hickman 1993). The species has many upright reddish stems that grow up to 16 inches tall, as well as egg-shaped leaves. Lesser saltscale occurs in alkaline soils of chenopod scrub, playa, and grassland habitats. The flowering period of lesser saltscale is May–October (Skinner 1994). More detailed species description can be found in the San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife." Based on CNPS and CNDDB records, this plant occurs in the study area (Mendota Dam 381D) and the adjacent Jamesan (359B), Bonita Ranch (380B), Gravelly Ford (380C), and Firebaugh NE (381A), Poso Farm (381B). There is a moderate potential for the species to occur in nonaccessible portion of the study area, based on negative survey results from accessible areas, little suitable habitat, degree of disturbance, records of presence in the study area and vicinity, soils, and elevation. No lesser saltscale plants were observed during botanical surveys conducted in the accessible portion of the study area.

Vernal Pool Smallscale (Atriplex persistens)

Status: CNPS List 1B.2. Vernal pool smallscale is an annual herb of the goosefoot family (Chenopodiaceae). This species is found in chenopod scrub and vernal pool communities. The flowering period of vernal pool smallscale is July–September (Skinner 1994). More detailed species description can be found in the San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife." The species has been recorded by CNPS and CNDDB in the Bonita Ranch (380B), and Gravelly Ford (380C) quadrangles, which are adjacent to the study area quadrangle. The potential for the species to occur in the nonaccessible portion of the study area is low, based on negative survey results from accessible areas, absence of alkaline vernal pools, degree of disturbance, presence in the vicinity of the study area, the appropriate habitat and elevation . No vernal pool smallscale plants were observed during botanical surveys conducted in the accessible portion of the study area.

Subtle Orache (Atriplex subtilis)

Status: CNPS List 1B.2. Subtle orache is a short-statured, fine-textured, annual in the goosefoot family occurring in valley and foothill grasslands. Its blooming period is from June to October. More detailed species description can be found in the San Joaquin River

Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife." Based on CNPS and CNDDB records, this plant occurs in the study area (Mendota Dam 381D) and the adjacent Jamesan (359B), Bonita Ranch (380B), Gravelly Ford (380C), and Firebaugh NE (381A) quadrangles. The potential for the species to occur in the nonaccessible portion of the study area is moderate. The plant has been recorded in the study area and its immediate vicinity, but no plants were identified in the accessible portion of the study area, there is very little suitable habitat, and the study area has been quite disturbed. No subtle orache plants were observed during botanical surveys conducted in the accessible portion of the study area.

Lost Hills Crownscale (Atriplex vallicola)

Status: CNPS List 1B.2. Lost Hills crownscale is an annual plant in the goosefoot family. It is a small (< 8 inches in height) one- to few-stemmed, generally erect plant with ascending to erect branches and stiff, gray-scaly, surfaces that become glabrous. The leaves are elliptic to ovate, green to gray-scaly, entire with a tapered to obtuse base. The plant occurs near dried ponds on alkaline soils in vernal pools, and in chenopod scrub and valley and foothill grassland (CNPS 2009). The species intergrades with A. coronata, perhaps best considered a subspecies of it (Hickman 1993). A more detailed species description can be found in the San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife." CNPS and CNDDB records indicate presence in the immediate vicinity of the study area in the Jamesan (359B) and Tranquillity (360A) quadrangles. Based on negative survey results from accessible areas, little suitable habitat, degree of disturbance, and the known occurrences, the potential for the Lost Hills crownscale to occur in the nonaccessible portion of the study area is moderate. No Lost Hills crownscale plants were observed during botanical surveys conducted in the accessible portion of the study area.

Recurved Larkspur (Delphinium recurvatum)

Status: CNPS List 1B.2. Recurved larkspur, a member of the buttercup family (Ranunculaceae), is a perennial herb that grows 7–33 inches tall (Hickman 1993). This species grows in seasonal alkali wetlands of chenopod scrub, grassland, and montane woodland communities, typically in valley bottoms on heavy clay alkali soils (Jones and Stokes 1998). Recurved larkspur blooms from March through May (Skinner 1994). It is widely distributed throughout elevations of 100–1,970 feet in California's Central Valley (Hickman 1993). A more detailed species description can be found in the San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife." The plant is known from the immediate vicinity of the study area. Its presence has been recorded in the CNDDB and CNPS databases from the Jamesan (359B), Bonita Ranch (380B), Firebaugh NE (381A) and Firebaugh (381C) quadrangles. The potential for recurved larkspur to occur in the nonaccessible portion of the study area is low, based on negative survey results from accessible areas, little suitable habitat, degree of disturbance, and its recorded presence in the immediate vicinity. No recurved larkspur plants were observed during botanical surveys conducted in the accessible portion of the study area.

California Satintail (Imperata brevifolia)

Status: CNPS 2.1. California satintail is a perennial in the grass family (Poaceae). It is 4-12 inches tall (Hickman 1993), with plume-like, densely white-silky-hairy, appearing speckled from adherent brown anthers. It blooms from September through May in wet meadows, springs, streambanks, and flood plains below 1,640 feet. The CNDDB has two records of this species from Fresno County. The first is 1.5 miles northeast of Centerville, and the second is in the City of Fresno. This species has low potential to occur in the nonaccessible portion of the study area, based on negative survey results from accessible areas, little suitable habitat, elevation, and degree of disturbance. No California satintail plants were observed during botanical surveys conducted in the accessible portion of the study area.

Munz's Tidy Tips (Layia munzii)

Status: CNPS List 1B.2. Munz's tidy tips is an annual in the sunflower family (Asteraceae). It is 3–20 inches tall (Hickman 1993) and blooms between March and April (CNPS 2009). It grows at elevations of 490-2,300 feet in alkaline clay soils in low-lying areas and on hillsides in chenopod scrub, valley sink scrub and valley and foothill grassland. Populations may be evident only in wet years. Restoration actions that influence grasslands and scrub could affect this species. More detailed species description can be found in the following documents:

- San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife"
- USFWS. 1998. *Recovery Plan for Upland Species of the San Joaquin Valley, California*. Region 1, Portland, OR. 319 pp.

CNDDB and CNPS have records of this species in the Jamesan (359B), Tranquillity (360A), Coit Ranch (360B), Firebaugh (381C) quadrangles, which are adjacent to the study area quad (Mendota Dam 381D). Even though the majority of soils in Reach 2B is sandy while this species appears to predominantly occur on clayey soils, the potential for the plant to occur within the nonaccessible portion of the study area is moderate, based on negative survey results from accessible areas, little suitable habitat, and degree of disturbance. However, there are numerous known occurrences in the immediate vicinity. No Munz's tidy tips plants were observed during botanical surveys conducted in the accessible portion of the study area.

Madera Leptosiphon (Leptosiphon serrulatus)

Status: CNPS 1B.2. Madera leptosiphon is an annual in the phlox family (Polemoniaceae). The plant is 2-7 inches tall and puberulent. Its leaf lobes are 4-10 mm, linear and hairy. The inflorescence is a head (capitulum). The flower color is white below and dark purple at the transition to the throat. The throat is yellow, 0.16–0.24 inches, with white lobes 0.20-0.28 inches. The plant occurs in woodland openings and chaparral at elevations from 980-4,265 feet, in the southern Sierra Nevada foothills. Typically, it blooms from April through May. The CNDDB database contains records of the plant's presence from several areas east of Fresno. There is no potential for the plant to occur in the nonaccessible portion of the study area, based on the distance from previous

occurrence records, negative survey results from accessible areas, no suitable habitat, lower elevation than that reported for other occurrences, and degree of disturbance. No Madera leptosiphon plants were observed during botanical surveys conducted in the accessible portion of the study area.

Sanford's Arrowhead (Sagittaria sanfordii)

Status: CNPS List 1B.2. Sanford's arrowhead is a rhizomatous emergent perennial herb of the water-plantain family (Alismataceae). This species grows in freshwater marshes, ponds, and ditches and various other shallow stagnant or slowly moving freshwater habitats (Hickman 1993) and flowers from May through October (Skinner 1994). More detailed species description can be found in the San Joaquin River Restoration Study Background Report (McBain and Trush 2002), Chapter 9, "Special-Status Plants and Wildlife." The CNPS and CNDDB databases contain records of the plant's presence from the study area quadrangle (Mendota Dam 381D), however, the species has not been observed there since 1948. This site was surveyed in 1980; however, no plants were found. Another adjacent quadrangles where the plant was recorded by CNPS is Jamesan (359B). The potential for the plant to occur in the study area is moderate, based on negative survey results from accessible areas, degree of disturbance in the study area, previous occurrence records, and suitable habitat. No Sanford's arrowhead plants were observed during botanical surveys conducted in the accessible portion of the study area; however, only limited access was available in the majority of emergent wetlands because of deep mud and dense vegetation conditions.

Caper-Fruited Tropidocarpum (Tropidocarpum capparideum)

Status: CNPS List 1B.1. Caper-fruited tropidocarpum is an annual plant in the mustard family (Brassicaceae). The plant can reach 6-28 inches in height. Its flowers are yellow tinged with purple. Caper-fruited tropidocarpum grows on alkaline soils on low alkaline hills and in valley and foothill grassland at elevations from 1 through 1,500 feet. It blooms from March through April. CNDDB lists only one occurrence of this plant near Fresno. The potential for caper-fruited tropidocarpum to occur in the nonaccessible portion of the study area is low, based on negative survey results from accessible areas, little suitable habitat, degree of disturbance and elevation . No caper-fruited tropidocarpum plants were observed during botanical surveys conducted in the accessible portion of the study area.

4.5 Special-Status Vegetation Alliances

This section first lists special-status vegetation alliances known to occur in the study area and its 10-mile vicinity, based on the background review, and then lists vegetation alliances observed in the study area during the August 2010 field survey. Acreages of each special-status vegetation alliance identified within the study area during 2010 field surveys are provided in Table 4-10. In the discussions below, the first vegetation alliance name is the 2003 terrestrial natural community designation (CDFG 2003a), the second and third are the current vegetation alliance common and scientific names (CDFG 2009b). The vegetation alliances' global and state ranks are noted in parentheses. Detailed descriptions of special-status vegetation alliances identified in the study area, or

with potential to occur in unsurveyed portions of the study area are included in Attachment B.

Table 4-10.
Vegetation Alliances Identified in the Study Area

Common Name	Scientific Name	List	Acres
Blue elderberry stands	*Sambucus nigra* shrubland alliance	(G3S3)	122.45
Black willow thickets	*Salix gooddingii* alliance	(G4S3)	101.46
Fremont cottonwood forest	*Populus fremontii* alliance	(G4S3.2)	66.02
Tar plant fields	*Centromadia pungens* or other spp. herbaceous alliance	(G2?S2?)	39.09
California bulrush marsh	*Schoenoplectus californicus* herbaceous alliance	(G5S4)	12.60
California rose briar patches	*Rosa californica* alliance	(G3S3)	12.07
Pale spike rush marshes	*Eleocharis macrostachya* herbaceous alliance	(G4S4)	9.49
Silver bush lupine scrub	*Lupinus albifrons* shrubland alliance	(G4S4)	8.22
Oregon ash groves	*Fraxinus latifolia* forest alliance	(G4S3.2)	7.41
Creeping rye grass turfs	*Leymus triticoides* herbaceous alliance	(G4S3)	6.19
Salt grass flats	*Distichlis spicata* herbaceous alliance	(G5S4)	1.75
Button willow thickets	*Cephalanthus* occidentalis alliance	(G5S2)	1.56
Yerba mansa meadows	*Anemopsis californica* herbaceous alliance	(G3S2)	0.76
Alkali heath marsh	*Frankenia salina* alliance	(G4S3)	0.69
Spinescale scrub	*Atriplex spinifera* alliance	(G3S3)	0.66
Red willow thickets	*Salix laevigata* woodland alliance	(G3S3)	0.62
Arrow weed thickets	*Pluchea sericea* shrubland alliance	(G3S3.3)	0.43
Valley oak woodland	*Quercus lobata* woodland alliance	(G3S3)	0.21

Key:
G = Global, N = National, S = Subnational or State
1 = critically imperiled, 2 = imperiled, 3 = vulnerable, 4 = apparently secure, 5 = secure
? = temporary status where CDFG has not made a final decision about the rank.

4.5.1 Globally or State Ranked Critically Imperiled Vegetation Alliances

No globally or State ranked critically imperiled special-status vegetation alliances are known to occur in the study area or within a 10-mile vicinity of the Project area.

4.5.2 Globally or State Ranked Imperiled Vegetation Alliances

Six globally or State ranked imperiled special-status vegetation alliances are known to occur within a 10-mile vicinity of the Project area:

- Box-Elder Forest, box-elder forest – *Acer negundo* alliance (G5S2)
- Buttonbush Scrub, button willow thickets – *Cephalanthus occidentalis* alliance (G5S2)Tar Plant Fields, tar plant fields – *Centromadia pungens* or other spp. herbaceous alliance (G2?S2?)[4]
- Alkali Sacaton Grassland, alkali sacaton grassland – *Sporobulus airoides* alliance (G4S2)

[4] Question mark denotes temporary status where CDFG has not made a final decision about the rank(s).

- Ditch-Grass Wetland, widgeon-grass mats – *Ruppia* (*cirrhosa, maritima*) aquatic herbaceous alliance (G4?S2)
- Western Sea-Purslane Marsh, Western sea-purslane marsh – *Sesuvium verrucosum* herbaceous alliance (G3S2.2)

The following four globally or State ranked imperiled special-status vegetation alliances were identified in the study area during the August 2010 field surveys:

- Buttonbush Scrub, button willow thickets – *Cephalanthus occidentalis* alliance, (G5S2)
- Tar Plant Fields, tar plant fields – *Centromadia pungens* or other spp. herbaceous alliance (G2?S2?)
- Ditch-Grass Wetland, widgeon-grass mats – *Ruppia* (*cirrhosa, maritima*) aquatic herbaceous alliance (G4?S2) (this alliance could not be verified because of the location in the middle of the river downstream of the Mendota Pool)
- Alkali Meadow, yerba mansa meadows – Anemopsis californica herbaceous alliance (G3S2)

4.5.3 Globally or State-Ranked Vulnerable Vegetation Alliances

There are thirteen globally or State ranked vulnerable special-status vegetation alliances known to occur within a 10-mile vicinity of the Project area.

- Valley Sink Scrub, Iodine bush scrub – *Allenrolfea occidentalis* alliance (G4S3)
- Northern Claypan Vernal Pool, includes the following three alliances: (1) Fremont's goldfields–saltgrass alkaline vernal pools - *Lasthenia fremontii – Distichlis spicata* alliance (G4S3); (2) Fremont's goldfields–Downingia vernal pools – *Lasthenia fremontii – Downingia* (*bicornuta*) alliance (G3S3); and 3) smooth goldfields vernal pool bottoms - *Lasthenia glaberrima* alliance (G3S3)
- Valley Oak Forests and Woodlands, Valley oak woodland – *Quercus lobata* woodland alliance (G3S3)
- Oregon Ash Riparian Forest, Oregon ash groves – *Fraxinus latifolia* forest alliance (G4S3.2)
- California Sycamore Riparian Forest and Woodland, California sycamore woodlands – *Platanus racemosa* alliance (G3S3)
- Fremont Cottonwood Riparian Forests and Woodlands, Fremont cottonwood forest – *Populus fremontii* alliance (G4S3.2)
- Black Willow Riparian Forests and Woodlands, Black willow thickets – *Salix gooddingii* alliance (G4S3)
- Red Willow Riparian Forests, Red willow thickets – *Salix laevigata* woodland alliance (G3S3)
- Spinescale Scrub, Spinescale scrub – *Atriplex spinifera* alliance (G3S3)

- California Rose Riparian Scrub, California rose briar patches – *Rosa californica* alliance (G3S3)
- Bush Seepweed Scrub, Bush seepweed scrub – *Suaeda moquinii* alliance (G5S3.2)
- Elderberry Scrub and Savanna, Blue elderberry stands – *Sambucus nigra* shrubland alliance (G3S3)
- Alkali Heath Dwarf Scrub, Alkali heath marsh – *Frankenia salina* alliance (G4S3)

The following eleven globally or State ranked vulnerable special-status vegetation alliances were identified in the accessible portions of the study area during the August 2010 field surveys:

- Valley Oak Forests and Woodlands, Valley oak woodland – *Quercus lobata* woodland alliance (G3S3)
- Oregon Ash Riparian Forest, Oregon ash groves – *Fraxinus latifolia* forest alliance (G4S3.2)
- Fremont Cottonwood Riparian Forests and Woodlands, Fremont cottonwood forest - *Populus fremontii* alliance (G4S3.2)
- Black Willow Riparian Forests and Woodlands, Black willow thickets – *Salix gooddingii* alliance (G4S3)
- Red Willow Riparian Forests, Red willow thickets – *Salix laevigata* woodland alliance (G3S3)
- Spinescale Scrub, Spinescale scrub – *Atriplex spinifera* alliance (G3S3)
- California Rose Riparian Scrub, California rose briar patches – *Rosa californica* alliance (G3S3)
- Elderberry Scrub and Savanna, Blue elderberry stands – *Sambucus nigra* shrubland alliance (G3S3)
- Alkali Heath Dwarf Scrub, Alkali heath marsh – *Frankenia salina* alliance (G4S3)
- Creeping rye grass turfs – *Leymus triticoides* herbaceous alliance (G4S3)
- Arrow weed thickets – *Pluchea sericea* shrubland alliance (G3S3.3)

4.5.4 Globally or State-Ranked Apparently Safe Vegetation Alliances

In addition to the above imperiled and vulnerable vegetation alliances, several globally and state ranked apparently safe vegetation alliances were observed. They were:

- Salt grass flats – *Distichlis spicata* herbaceous alliance, (G5S4)
- Silver bush lupine scrub – *Lupinus albifrons* shrubland alliance (G4S4)

- Pale spike rush marshes – *Eleocharis macrostachya* herbaceous alliance (G4S4)
- California bulrush marsh – *Schoenoplectus californicus* herbaceous alliance (G5S4)

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Attachment A
Plant Species Observed in the Study Area

Table A-1

Plant Species Observed in the Study Area

Species Name	Common Name	Family	Nativity	Status
Achillea millefolium	Yarrow	Asteraceae	native	NA
Acroptilon repens	Russian knapweed	Asteraceae	nonnative	CDFA List B, Cal-IPC moderate
Aegilops triuncialis	barbed goatgrass	Poaceae	nonnative	CDFA List B, Cal-IPC high
Agoseris heterophylla	annual mountain dandelion	Asteraceae	native	NA
Agropyron cristatum	crested wheatgrass	Poaceae	nonnative	NA
Agrostis avenacea	Pacific bentgrass	Poaceae	nonnative	Cal-IPC limited
Agrostis capillaris	colonial bent grass	Poaceae	nonnative	NA
Agrostis exarata	spike bentgrass	Poaceae	native	NA
Agrostis gigantea	giant bentgrass	Poaceae	nonnative	NA
Ailanthus altissima	tree-of-heaven	Simaroubaceae	nonnative	Cal-IPC moderate
Allium neopolitanum	white garlic	Liliaceae	nonnative	NA
Alnus rhombifolia	white alder	Betulaceae	native	NA
Alyssum alyssoides	small alyssum	Brassicaceae	nonnative	NA
Amaranthus albus	tumbleweed	Amaranthaceae	nonnative	NA
Amaranthus blitoides	pigweed	Amaranthaceae	native	NA
Amaranthus californicus	California pigweed	Amaranthaceae	native	NA
Amaranthus palmeri	carelessweed	Amaranthaceae	native	NA
Ambrosia psilostachya	western ragweed	Asteraceae	native	NA
Ammannia robusta	grand redstem	Lythraceae	native	NA
Amsinckia eastwoodiae	Eastwood's fiddleneck	Boraginaceae	native	NA
Amsinckia menziesii	Menzies' fiddleneck	Boraginaceae	native	NA
Anagallis arvensis	scarlet pimpernel	Primulaceae	nonnative	NA
Anemopsis californica	yerba manza	Saururaceae	native	NA
Anthemis cotula	stinking dog fennel	Asteraceae	nonnative	NA
Anthriscus caucalis	bur chervil	Apiaceae	nonnative	NA
Apocynum cannabinum	dogbane	Apocynaceae	native	NA
Artemisia biennis	biennial sagewort	Asteraceae	nonnative	NA
Artemisia douglasiana	Douglas's mugwort	Asteraceae	native	NA
Artemisia dracunculus	wormwood tarragon	Asteraceae	nonnative	NA
Arundo donax	giant reed	Poaceae	nonnative	Cal-IPC high
Asclepias fascicularis	narrow-leaf milkweed	Asclepiadaceae	native	NA
Asclepias speciosa	showy milkweed	Asclepiadaceae	native	NA
Asparagus officinalis ssp.	asparagus	Liliaceae	nonnative	NA

Table A-1
Plant Species Observed in the Study Area

Species Name	Common Name	Family	Nativity	Status
Aster subulatus var. *ligulatus*	annual wateraster	Asteraceae	native	NA
Astragalus asymmetricus	San Joaquin milkvetch	Fabaceae	native	NA
Astragalus didymocarpus var. *didymocarpus*	two-seeded milkvetch	Fabaceae	native	NA
Astragalus douglasii var. *douglasii*	Jacumba milk vetch	Fabaceae	native	NA
Astragalus gambelianus	Gambel's dwarf milkvetch	Fabaceae	native	NA
Atriplex fruticulosa	ball scale	Chenopodiaceae	native	NA
Atriplex phyllostegia	leafclover saltweed	Chenopodiaceae	native	NA
Atriplex polycarpa	allscale saltbush	Chenopodiaceae	native	NA
Atriplex semibacchata	Australian saltbush	Chenopodiaceae	nonnative	Cal-IPC moderate
Atriplex spinifera	spinescale saltbush	Chenopodiaceae	native	NA
Atriplex triangularis	fat hen	Chenopodiaceae	native	NA
Avena barbata	slender wild oats	Poaceae	nonnative	Cal-IPC moderate
Avena fatua	common wild oats	Poaceae	nonnative	Cal-IPC moderate
Avena sativa	cultivated oats	Poaceae	nonnative	NA
Azolla filiculoides	Pacific mosquito fern	Azollaceae	native	NA
Baccharis douglasii	Douglas baccharis	Asteraceae	native	NA
Baccharis salicifolia	mulefat	Asteraceae	native	NA
Bassia hyssopifolia	fivehook bassia	Chenopodiaceae	nonnative	Cal-IPC limited
Bidens laevis	bur marigold	Asteraceae	native	NA
Brassica nigra	black mustard	Brassicaceae	nonnative	Cal-IPC moderate
Brassica rapa	rape mustard	Brassicaceae	nonnative	Cal-IPC limited
Briza minor	little rattlesnake grass	Poaceae	nonnative	NA
Bromus carinatus	California brome	Poaceae	native	NA
Bromus catharticus	rescuegrass	Poaceae	nonnative	NA
Bromus diandrus	ripgut brome	Poaceae	nonnative	Cal-IPC moderate
Bromus hordeaceous	soft chess	Poaceae	nonnative	Cal-IPC limited
Bromus madritensis ssp. *madritensis*	foxtail chess	Poaceae	nonnative	NA
Bromus madritensis ssp. *rubens*	red brome	Poaceae	nonnative	Cal-IPC high
Bromus secalinus	rye brome	Poaceae	nonnative	NA
Bromus tectorum	cheatgrass	Poaceae	nonnative	Cal-IPC high
Calandrinia ciliata	common red maids	Portulacaceae	native	NA
Camissonia boothii	Booth's suncup	Onagraceae	native	NA
Camissonia campestris	field suncup	Onagraceae	native	NA
Camissonia contorta	plains evening primrose	Onagraceae	native	NA

Table A-1

Plant Species Observed in the Study Area

Species Name	Common Name	Family	Nativity	Status
Capsella bursa-pastoris	shepherd's purse	Brassicaceae	nonnative	NA
Cardamine oligosperma	bittercress	Brassicaceae	native	NA
Carduus pycnocephalus	Italian thistle	Asteraceae	nonnative	CDFA List C, Cal-IPC moderate
Carex barbarae	Santa Barbara sedge	Cyperaceae	native	NA
Catalpa bignonioides	southern catalpa	Bignoniaceae	nonnative	NA
Celtis sp.	hackberry	Ulmaceae	nonnative	NA
Cenchrus echinatus	southern sandbur	Poaceae	nonnative	CDFA List C
Cenchrus longispinus	mat sandbur	Poaceae	nonnative	CDFA List C
Centaurea cyanus	Batchelor buttons	Asteraceae	nonnative	NA
Centaurea maculosa	spotted knapweed	Asteraceae	nonnative	CDFA Lista CA, Cal-IPC high
Centaurea melitensis	Napa star thistle	Asteraceae	nonnative	Cal-IPC moderate
Centaurea solstitialis	yellow-star thistle	Asteraceae	nonnative	CDFA List C, Cal-IPC high
Centaurium venustum	canchalagua	Gentianaceae	native	NA
Cephalanthus occidentalis	California buttonwillow	Rubiaceae	native	NA
Cerastium glomeratum	mouse-ear chickweed	Caryophyllaceae	nonnative	NA
Chamaesyce maculata	spotted spurge	Euphorbiaceae	nonnative	NA
Chamaesyce serpens	common spurge	Euphorbiaceae	nonnative	NA
Chamomilla occidentalis	valley mayweed	Asteraceae	native	NA
Chamomilla suaveolens	pineappleweed	Asteraceae	nonnative	NA
Chenopodium album	white goosefoot	Chenopodiaceae	nonnative	NA
Chenopodium berlandieri	Berlandier's goosefoot	Chenopodiaceae	native	NA
Chenopodium dessicatum	aridland goosefoot	Chenopodiaceae	native	NA
Chenopodium murale	nettleleaf goosefoot	Chenopodiaceae	nonnative	NA
Chenopodium vulvaria	stinking goosefoot	Chenopodiaceae	nonnative	NA
Chrysothamnus nauseosus	rubber rabbitbrush	Asteraceae	native	NA
Cirsium vulgare	bull thistle	Asteraceae	nonnative	Cal-IPC moderate
Claytonia perfoliata	miner's lettuce	Portulacaceae	native	NA
Conium maculatum	poison hemlock	Apiaceae	nonnative	Cal-IPC moderate
Convolvulus arvensis	field bindweed	Convolvulaceae	nonnative	Cal-IPC List C
Conyza bonariensis	asthmaweed	Asteraceae	nonnative	NA
Conyza canadensis	Canada horseweed	Asteraceae	native	NA
Conyza floribunda	many-flowered horseweed	Asteraceae	nonnative	NA
Coronopus didymus	lesser swine wart cress	Brassicaceae	nonnative	NA
Cotula australis	Australian waterbuttons	Asteraceae	nonnative	NA

Table A-1
Plant Species Observed in the Study Area

Species Name	Common Name	Family	Nativity	Status
Crassula aquatica	aquatic pygmy weed	Crassulaceae	native	NA
Crassula connata	sand pygmy weed	Crassulaceae	native	NA
Crassula tillaea	Mediterranean pygmy weed	Crassulaceae	nonnative	NA
Crepis setosa	bristly hawksbeard	Asteraceae	nonnative	NA
Cressa truxillensis	alkali weed	Convolvulaceae	native	NA
Cucurbita foetidissima	calabazilla	Cucurbiataceae	native	NA
Cuscuta salina	saltmarsh dodder	Cuscutaceae	native	NA
Cynara cardunculus	artichoke thistle, cardoon	Asteraceae	nonnative	Cal-IPC moderate
Cynodon dactylon	Bermuda grass	Poaceae	nonnative	Cal-IPC moderate
Cyperus erythrorhizos	red-root flatsedge	Cyperaceae	native	NA
Cyperus sp.	flatsedge	Cyperaceae	?	?
Datura stramonium	jimsonweed	Solanaceae	nonnative	NA
Datura wrightii	western jimsonweed	Solanaceae	native	NA
Daucus carota	wild carrot	Apiaceae	nonnative	NA
Deschampsia danthonioides	annual hairgrass	Poaceae	native	NA
Descurainia incana	soft mountain tansy mustard	Brassicaceae	native	NA
Descurainia sophia	herb sophia	Brassicaceae	nonnative	Cal-IPC limited
Dichelostemma capitata	blue dicks	Liliaceae	native	NA
Digitaria sanguinalis	crabgrass	Poaceae	nonnative	NA
Distichlis spicata	inland saltgrass	Poaceae	native	NA
Downingia cuspidata	toothed downingia	Campanulaceae	native	NA
Dysphania ambrosioides	epazote	Amaranthaceae	nonnative	NA
Echinochloa colona	jungle rice	Poaceae	nonnative	NA
Echinochloa crus-galli	barnyard grass	Poaceae	nonnative	NA
Echinodorus berteroi	upright burhead	Alismataceae	native	NA
Eleocharis acicularis	needle spikerush	Cyperaceae	native	NA
Eleocharis atropurpurea	purple spikerush	Cyperaceae	native	NA
Eleocharis macrostachya	common spikerush	Cyperaceae	native	NA
Elymus glaucus	blue wildrye	Poaceae	native	NA
Epilobium brachycarpum	panicled willowherb	Onagraceae	native	NA
Epilobium ciliatum	fringed willowherb	Onagraceae	native	NA
Equisetum laevigatum	smooth scouring rush	Equisetaceae	native	NA
Eragrostis barrelieri	Mediterranean lovegrass	Poaceae	nonnative	NA
Eragrostis cilianensis	stinkgrass	Poaceae	nonnative	NA
Eragrostis curvula var. *curvula*	weeping lovegrass	Poaceae	nonnative	NA
Eremocarpus setigerus	turkey mullein	Euphorbiaceae	native	NA
Eriogonum gracillimum	rose and white buckwheat	Polygonaceae	native	NA
Erodium botrys	broad-leaf filaree	Geraniaceae	nonnative	NA

Table A-1

Plant Species Observed in the Study Area

Species Name	Common Name	Family	Nativity	Status
Erodium cicutarium	red-stem filaree	Geraniaceae	nonnative	Cal-IPC limited
Erodium moschatum	white-stem filaree	Geraniaceae	nonnative	NA
Euthamia occidentalis	western goldenrod	Asteraceae	native	NA
Ficus carica	edible fig	Moraceae	nonnative	Cal-IPC moderate
Filago californica	California herb impia	Asteraceae	native	NA
Filago gallica	Mediterranean herb impia	Asteraceae	nonnative	NA
Frankenia salina	alkali heath	Frankeniaceae	native	NA
Fraxinus oregana	Oregon ash	Oleaceae	native	NA
Galium aparine	goose grass	Rubiaceae	native	NA
Gastridium ventricosum	nit grass	Poaceae	nonnative	NA
Geranium carolinianum	Carolina geranium	Geraniaceae	native	NA
Geranium columbinum	longstalk cranesbill	Geraniaceae	nonnative	NA
Geranium dissectum	cut-leaf geranium	Geraniaceae	nonnative	NA
Geranium molle	dovefoot geranium	Geraniaceae	nonnative	NA
Geranium pusillum	miniature gernaium	Geraniaceae	nonnative	NA
Gilia leptalea	Bridge's gilia	Polemoniaceae	native	NA
Gilia tricolor	bird's eye gilia	Polemoniaceae	native	NA
Gnaphalium californicum	California cudweed	Asteraceae	native	NA
Gnaphalium canescens	Wright's cudweed	Asteraceae	native	NA
Gnaphalium luteo-album	everlasting cudweed	Asteraceae	nonnative	NA
Gnaphalium palustre	lowland cudweed	Asteraceae	native	NA
Gossypium hirsutum	cotton	Asteraceae	nonnative	NA
Grindelia camporum	Great Valley gumweed	Asteraceae	native	NA
Guillenia lasiophylla	California mustard	Brassicaceae	native	NA
Hedera helix	English ivy	Araliaceae	nonnative	Cal-IPC high
Helianthus annuus	common sunflower	Asteraceae	native	NA
Heliotropium curassavicum	seaside heliotrope	Boraginaceae	native	NA
Hemizonia fitchii	Fitch's tarweed	Asteraceae	native	NA
Hemizonia kelloggii	Kellogg's tarplant	Asteraceae	native	NA
Hemizonia pungens	common tarweed	Asteraceae	native	NA
Herniaria hirsuta	hairy rupturewort	Caryophyllaceae	nonnative	NA
Hesperevax sparsiflora var. *s.*	few-flowered evax	Asteraceae	native	NA
Hesperocnide tenella	western nettle	Urticaceae	native	NA
Heterotheca grandiflora	telegraph weed	Asteraceae	native	NA
Heterotheca subaxillaris	camphorweed	Asteraceae	native	NA
Hirschfeldia incana	Mediterranean hoary mustard	Brassicaceae	nonnative	Cal-IPC moderate
Hordeum brachyantherum ssp. *b.*	meadow barley	Poaceae	native	NA
Hordeum depressum	alkali barley	Poaceae	native	NA

Table A-1
Plant Species Observed in the Study Area

Species Name	Common Name	Family	Nativity	Status
Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	Poaceae	nonnative	NA
Hordeum murinum ssp. *leporinum*	hare barley	Poaceae	nonnative	NA
Hordeum murinum ssp. *murinum*	foxtail barley	Poaceae	nonnative	Cal-IPC moderate
Hordeum vulgare	great barley	Poaceae	nonnative	NA
Hutchinsia procumbens	prostrate hutchinsia	Brassicaceae	native	NA
Hypochaeris glabra	smooth cat's ear	Asteraceae	nonnative	Cal-IPC limited
Juglans californica	California walnut	Juglandaceae	planted	NA
Juglans x regia	English walnut	Juglandaceae	nonnative	NA
Juncus ambiguus	saline toad rush	Juncaceae	native	NA
Juncus balticus	Baltic rush	Juncaceae	native	NA
Juncus bryoides	moss rush	Juncaceae	native	NA
Juncus bufonius	common toad rush	Juncaceae	native	NA
Juncus effusus	common bog rush	Juncaceae	native	NA
Juncus mexicanus	Mexican rush	Juncaceae	native	NA
Juncus phaeocephalus var. *paniculatus*	brown-headed rush	Juncaceae	native	NA
Kochia californica	red molly	Chenopodiaceae	native	NA
Lactuca serriola	prickly lettuce	Asteraceae	nonnative	NA
Lamium amplexicaule	giraffe's head henbit	Lamiaceae	nonnative	NA
Lasthenia californica	California goldflields	Asteraceae	native	NA
Lasthenia chrysantha	alkali sink goldfields	Asteraceae	native	NA
Lasthenia glabrata ssp. *glabrata*	yellow-rayed goldfields	Asteraceae	native	NA
Lasthenia minor	smooth goldfields	Asteraceae	native	NA
Lasthenia platycarpha	alkali goldfields	Asteraceae	native	NA
Lathyrus jepsonii var. *californicus*	Jepson's pea	Fabaceae	native	NA
Layia glandulosa	white layia	Asteraceae	native	NA
Layia platyglossa	common tidy-tips	Asteraceae	native	NA
Lemna minor	common duckweed	Lemnaceae	native	NA
Lepidium campestre	English cow cress	Brassicaceae	nonnative	NA
Lepidium dictyotum var. *dictyotum*	alkali peppergrass	Brassicaceae	native	NA
Lepidium latifolium	broad-leafed pepper	Brassicaceae	nonnative	CDFA List B, Cal-IPC high
Lepidium latipes var. *latipes*	dwarf pepperweed	Brassicaceae	native	NA
Lepidium nitidum ssp. *nitidum*	common shining peppergrass	Brassicaceae	native	NA
Lepidium nitidum ssp. *oreganum*	Oregon shining peppergrass	Brassicaceae	native	NA
Lepidium oxycarpum	forked pepperweed	Brassicaceae	native	NA
Leptochloa uninervia	one-nerved sprangletop	Poaceae	native	NA

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Plant Species Observed in the Study Area

Species Name	Common Name	Family	Nativity	Status
Leymus triticoides	creeping wildrye	Poaceae	native	NA
Linaria canadensis	blue toadflax	Scrophulariaceae	native	NA
Loeflingia squarrosa	spreading pygmyleaf	Caryophyllaceae	native	NA
Lolium multiflorum	Italian rye grass	Poaceae	nonnative	Cal-IPC moderate
Lotus corniculatus	birdsfoot treefoil	Fabaceae	nonnative	Cal-IPC moderate
Lotus purshianus	Spanish lotus	Fabaceae	native	NA
Lotus strigosus	strigose lotus	Fabaceae	native	NA
Ludwigia palustris	marsh seedbox	Onagraceae	native	NA
Ludwigia peploides	floating primrose	Onagraceae	native	NA
Lupinus albifrons	silverbush lupine	Fabaceae	native	NA
Lupinus bicolor	dove lupine	Fabaceae	native	NA
Lupinus concinnus	elegant lupine	Fabaceae	native	NA
Lupinus nanus	sky lupine	Fabaceae	native	NA
Lythrum hyssopifolium	hyssop loosestrife	Lythraceae	nonnative	Cal-IPC moderate
Machaeranthera gracilis	slender goldenweed	Asteraceae	native	NA
Malacothrix coulteri	snake's head	Asteraceae	native	NA
Malva neglecta	dwarf mallow	Malvaceae	nonnative	NA
Malva nicaeensis	bull mallow	Malvaceae	nonnative	NA
Malva parviflora	cheeseweed mallow	Malvaceae	nonnative	NA
Malva sylvestris	hollyhock	Malvaceae	nonnative	NA
Malvella leprosa	alkali mallow	Malvaceae	native	CDFA List C
Marrubium vulgare	horehound	Lamiaceae	nonnative	Cal-IPC limited
Marsilea vestita ssp. *vestita*	hairy waterclover	Marsileaceae	native	NA
Matricaria matricarioides	chamomille	Asteraceae	nonnative	NA
Medicago lupulina	black medic	Fabaceae	nonnative	NA
Medicago polymorpha	bur clover	Fabaceae	nonnative	Cal-IPC limited
Medicago sativa	alfalfa	Fabaceae	nonnative	NA
Melia azedarach	China berry	Meliaceae	nonnative	NA
Melilotus indica	annual sweetclover	Fabaceae	nonnative	NA
Mentha pulegium	pennyroyal	Lamiaceae	nonnative	Cal-IPC moderate
Mentha spicata	spearmint	Lamiaceae	nonnative	NA
Microseris douglasii	Douglas's silverpuffs	Asteraceae	native	NA
Mimulus guttatus	seep monkeyflower	Scrophulariaceae	native	NA
Morus alba	white mulberry	Moraceae	nonnative	NA
Muhlenbergia filiformis	slender muhly	Poaceae	native	NA
Nassella pulchra	purple-needlegrass	Poaceae	native	NA
Nerium oleander	Oleander	Oleaceae	nonnative	NA
Nicotiana attenuata	coyote tobacco	Solanaceae	native	NA
Nicotiana glauca	tree tobacco	Solanaceae	nonnative	Cal-IPC moderate

Table A-1
Plant Species Observed in the Study Area

Species Name	Common Name	Family	Nativity	Status
Oenothera elata ssp. *hookeri*	Hooker's evening primrose	Onagraceae	native	NA
Oenothera laciniata	cutleaf evening primrose	Onagraceae	nonnative	NA
Oxalis corniculatus	creeping wood sorrel	Oxalidaceae	nonnative	NA
Oxalis pes-caprae	Bermuda buttercup	Oxalidaceae	nonnative	Cal-IPC moderate
Phacelia ciliata	Great Valley phacelia	Hydrophyllaceae	native	NA
Phacelia distans	distant phacelia	Hydrophyllaceae	native	NA
Phacelia fremontii	Fremont's phacelia	Hydrophyllaceae	native	NA
Phacelia ramosissima var. *latifolia*	branching phacelia	Hydrophyllaceae	native	NA
Phalaris aquatica	Harding grass	Poaceae	nonnative	Cal-IPC moderate
Phalaris arundinacea	reed canarygrass	Poaceae	native	NA
Phalaris canariensis	canary grass	Poaceae	nonnative	NA
Phalaris paradoxa	paradox canary grass	Poaceae	nonnative	NA
Phleum pratense	cultivated timothy	Poaceae	nonnative	NA
Pholistoma membranaceum	white fiesta flower	Hydrophyllaceae	native	NA
Phoradendron macrophyllum	bigleaf mistletoe	Viscaceae	native	NA
Phyla nodiflora	turkey tanglefruit, lippia	Verbenaceae	native	NA
Physalis philadelphica	tomatillo	Solanaceae	nonnative	NA
Plagiobothrys leptocladus	alkali popcornflower	Boraginaceae	native	NA
Plagiobothrys nothofulvus	rusty popcornflower	Boraginaceae	native	NA
Plantago elongata	prairie plantain	Plantaginaceae	native	NA
Plantago erecta	California plantain	Plantaginaceae	native	NA
Plantago lanceolata	lanceleaf plantain	Plantaginaceae	nonnative	Cal-IPC limited
Plantago major	common plantain	Plantaginaceae	nonnative	NA
Platanus racemosa	western sycamore	Platanaceae	native	NA
Pluchea odorata	marsh fleabane	Asteraceae	native	NA
Poa annua	annual bluegrass	Poaceae	nonnative	NA
Poa pratensis	Kentucky bluegrass	Poaceae	nonnative	Cal-IPC limited
Polygonum aviculare	prostrate knotweed	Polygonaceae	nonnative	NA
Polygonum arenastrum	dooryard knotweed	Polygonaceae	nonnative	NA
Polygonum douglasii ssp. *douglasii*	Douglas's knotweed	Polygonaceae	native	NA
Polygonum lapathifolium	willow smartweed	Polygonaceae	native	NA
Polypogon maritimus	Mediterranean rabbitsfoot	Poaceae	nonnative	NA
Polypogon monspeliensis	rabbitfootgrass	Poaceae	nonnative	Cal-IPC limited
Populus fremontii	Fremont cottonwood	Salicaceae	native	NA
Portulaca oleracea	common purslane	Portulacaceae	nonnative	NA
Potentilla rivalis	brook cinquefoil	Ranunculaceae	native	NA
Prunus dulcis	almond	Rosaceae	nonnative	NA

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Plant Species Observed in the Study Area

Species Name	Common Name	Family	Nativity	Status
Prunus emarginata	bitter-leaf cherry	Rosaceae	nonnative	NA
Puccinellia simplex	California alkali grass	Poaceae	native	NA
Quercus lobata	valley oak	Fagaceae	native	NA
Ranunculus aquatilis	aquatic buttercup	Ranunculaceae	native	NA
Raphanus sativus	wild radish	Brassicaceae	nonnative	Cal-IPC limited
Rorippa curvisiliqua	western yellow cress	Brassicaceae	native	NA
Rorippa nasturtium-aquaticum	watercress	Brassicaceae	native	NA
Rosa californica	California rose	Rosaceae	native	NA
Rubus discolor	Himalayan blackberry	Rosaceae	nonnative	Cal-IPC high
Rubus pensilvanicus	Pennsylvania blackberry	Rosaceae	nonnative	NA
Rubus ursinus	California blackberry	Rosaceae	native	NA
Rumex acetosella	sheep sorrel	Polygonaceae	nonnative	Cal-IPC moderate
Rumex crispus	curly dock	Polygonaceae	nonnative	Cal-IPC limited
Rumex hymenosepalus	wild rhubarb	Polygonaceae	native	NA
Rumex pulcher	fiddle dock	Polygonaceae	nonnative	NA
Sagina apetala	annual pearlwort	Caryophyllaceae	native	NA
Salix exigua	sandbar, narrowleaf willow	Salicaceae	native	NA
Salix exigua x melanopsis	hybrid willow	Salicaceae	native	NA
Salix gooddingii	black willow	Salicaceae	native	NA
Salix laevigata	red willow	Salicaceae	native	NA
Salix lucida ssp. *lasiandra*	shining willow	Salicaceae	native	NA
Salsola kali	Russian thistle	Chenopodiaceae	nonnative	Cal-IPC Limited, USDA List C
Salsola tragus	Russian thistle	Chenopodiaceae	nonnative	Cal-IPC Limited, USDA List C
Salvia columbariae	chia	Lamiaceae	native	NA
Sambucus mexicana	blue elderberry	Caprifoliaceae	native	NA
Saponaria officinalis	bouncing bet	Caryophyllaceae	nonnative	Cal-IPC limited
Schismus barbatus	Mediterranean schismus	Poaceae	nonnative	Cal-IPC limited
Scirpus acutus	California tule	Cyperaceae	native	NA
Scirpus fluviatilis	river bulrush	Cyperaceae	native	NA
Scirpus maritimus	hardstem bulrush	Cyperaceae	native	NA
Senecio jacobaea	tansy ragwort	Asteraceae	nonnative	CDFA List B
Senecio vulgaris	common groundsel	Asteraceae	nonnative	NA
Setaria gracilis	bristly foxtail	Poaceae	native	NA
Silybum marianum	blessed milkthistle	Asteraceae	nonnative	Cal-IPC limited
Sisymbrium irio	London rocket	Brassicaceae	nonnative	Cal-IPC moderate
Sisymbrium officinale	hedge mustard	Brassicaceae	nonnative	NA
Sisymbrium orientale	oriental hedge mustard	Brassicaceae	nonnative	NA

Table A-1
Plant Species Observed in the Study Area

Species Name	Common Name	Family	Nativity	Status
Solanum douglasii	Douglas's nightshade	Solanaceae	native	NA
Solanum elaeagnifolium	silver-leaved horsenettle	Solanaceae	nonnative	USDA List B
Solanum lanceolatum	orangeberry nightshade	Solanaceae	nonnative	CDFA List B
Solidago californica	California goldenrod	Asteraceae	native	NA
Solidago occidentalis	Western goldenrod	Asteraceae	native	NA
Soliva sessilis	field burweed	Asteraceae	nonnative	NA
Sonchus asper	spiny sowthistle	Asteraceae	nonnative	NA
Sonchus oleraceus	common sowthistle	Asteraceae	nonnative	NA
Sorghum bicolor	sorghum	Poaceae	nonnative	NA
Sorghum halapense	Johnson grass	Poaceae	nonnative	Cal-IPC List C
Spergula arvensis ssp. *arvensis*	corn spurry	Caryophyllaceae	nonnative	NA
Spergularia atrosperma	blackseed sandspurry	Caryophyllaceae	native	NA
Spergularia bocconei	Boccone's sand spurry	Caryophyllaceae	nonnative	NA
Spergularia macrotheca var. *leucantha*	large-flowered sand spurry	Caryophyllaceae	native	NA
Sporobolus indicus	smut grass	Poaceae	nonnative	NA
Stachys albens	white hedge-nettle	Lamiaceae	native	NA
Stellaria media	common chickweed	Caryophyllaceae	nonnative	NA
Stellaria nitens	shiny chickweed	Caryophyllaceae	native	NA
Stephanomeria virgata ssp. *virgata*	rod wire lettuce	Asteraceae	native	NA
Suaeda moquinii	bush seepweed	Chenopodiaceae	native	NA
Tamarix parviflora	small-flower tamarisk	Tamaricaceae	nonnative	Cal-IPC high
Tamarix pentandra	saltcedar	Tamaricaceae	nonnative	Cal-IPC high
Taraxacum officinale	common dandelion	Asteraceae	nonnative	NA
Thlaspi arvense	fan pepperweed	Brassicaceae	nonnative	NA
Torilis arvensis	hedge parsley	Apiaceae	nonnative	Cal-IPC moderate
Tribulus terrestris	puncture vine	Zygophyllaceae	nonnative	USDA List C
Trifolium aureum	hop clover	Fabaceae	nonnative	NA
Trifolium depauperatum var. *amplectens*	pale bladder clover	Fabaceae	native	NA
Trifolium depauperatum var. *depauperatum*	cowbag clover	Fabaceae	native	NA
Trifolium depauperatum var. *truncatum*	dwarf sack clover	Fabaceae	native	NA
Trifolium dubium	shamrock clover	Fabaceae	nonnative	NA
Trifolium fucatum	sour clover	Fabaceae	native	NA
Trifolium gracilentum	pinpoint clover	Fabaceae	native	NA
Trifolium variegatum	white-tipped clover	Fabaceae	native	NA
Trifolium willdenovii	tomcat clover	Fabaceae	native	NA
Triphysaria eriantha	butter n' eggs	Scrophulariaceae	native	NA
Triteleia hyacinthina	wild hyacinth	Liliaceae	native	NA

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Plant Species Observed in the Study Area

Species Name	Common Name	Family	Nativity	Status
Triticum aestivum	common wheat	Poaceae	nonnative	NA
Typha angustifolia	narrowleaf cattail	Typhaceae	native	NA
Typha latifolia	broadleaf cattail	Typhaceae	native	NA
Ulmus pumila	Siberian elm	Ulmaceae	nonnative	NA
Urtica dioica ssp. *holosericea*	stinging nettle	Urticaceae	native	NA
Urtica urens	dwarf nettle	Urticaceae	nonnative	NA
Verbascum thapsus	woolly mullein	Scrophulariaceae	nonnative	Cal-IPC limited
Veronica chamaedrys	germander speedwell	Scrophulariaceae	nonnative	NA
Veronica peregrina	wandering neckweed	Scrophulariaceae	native	NA
Veronica persica	bird's eye speedwell	Scrophulariaceae	nonnative	NA
Vicia cracca	bird vetch	Fabaceae	nonnative	NA
Vicia sativa	spring vetch	Fabaceae	nonnative	NA
Vicia villosa	hairy vetch	Fabaceae	nonnative	NA
Vulpia bromoides	six-weeks fescue	Poaceae	nonnative	NA
Vulpia microstachys	small fescue	Poaceae	native	NA
Vulpia myuros	rattail fescue	Poaceae	nonnative	Cal-IPC moderate
Washingtonia robusta	Washington fan palm	Arecaceae	nonnative	Cal-IPC moderate
Wislizenia refracta ssp. *californica*	jackass clover	Capparaceae	native	NA
Xanthium spinosum	spiny cocklebur	Asteraceae	native	NA
Xanthium strumarium	rough cocklebur	Asteraceae	native	NA

Key:
NA = not applicable
Cal-IPC = California Invasive Plant Council
USDA = U.S. Department of Agriculture
CDFA = California Department of Food and Agriculture

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Attachment B
Special-Status Vegetation Alliances with Potential to Occur or Observed in the Study Area

This attachment presents descriptions of special-status vegetation alliances with potential to occur or detected during field surveys in the study area. A primary source of additional information for these alliances is *A Manual of California Vegetation*, Second Edition, by John Sawyer, Todd Keeler-Wolf, and Julie Evens 2009, ISBN 978-0-943460-49-9. Additional sources are listed for some alliances, as appropriate.

Globally or State Ranked Imperiled Vegetation Alliances

Box-Elder Forest (box-elder forest – Acer negundo alliance)

Status: State ranked as imperiled (G5S2) – At high risk of extinction or elimination in the State due to very restricted range, very few populations, steep declines, or other factors.

Box-elder forest is a vegetation alliance where box-elder trees are dominant in the canopy or co-dominant with Oregon ash (*Fraxinus latifolia*), white alder (*Alnus rhombifolia*), Fremont cottonwood (*Populus fremontii*), black willow (*Salix gooddingii*) or valley oak (*Quercus lobata*). Box-elder trees are typically less than 60 feet tall and the alliance provides intermittent or continuous cover that may be two-tiered. The understory shrub layer is open or intermittent, the herbaceous layer is sparse to abundant. In California, the alliance is mainly limited to riparian zones of major streams and rivers that are regularly flooded. Stands of box-elder forest are typically small and rare in the San Joaquin Valley (Sawyer 2009). The Project area and its 10-mile vicinity are within the known distribution area of this alliance; however, no box elder trees were observed during the vegetation alliance surveys. The box-elder forest alliance has some potential to occur in areas of the Project that were not surveyed due to lack of access.

Buttonbush Scrub (button willow thickets – Cephalanthus occidentalis alliance)

Status: State ranked as imperiled (S2) – At high risk of extinction or elimination in the State due to very restricted range, very few populations, steep declines, or other factors.

Button willow thickets is a vegetation alliance where button willow shrubs are dominant in the canopy or co-dominant with red-twig dogwood (*Cornus sericea*), black willow (*Salix gooddingii*), shining willow (*S. lucida* ssp. *lasiandra*), and sandbar willow (*S. exigua*). Button willow shrubs are typically less than 20 feet tall and the alliance provides open, intermittent, or continuous canopy cover. The herbaceous understory layer is sparse or grassy. The alliance occurs in seasonally flooded basins, sloughs, oxbow lakes and floodplains with subsurface water at the end of the growing season. Many small stands occur in riparian settings throughout most of its distribution range in the San Joaquin Valley. Often these stands form narrow strips along levees (Sawyer 2009). The Project

area and its 10-mile vicinity are within the known distribution area of this alliance. Numerous small areas of Buttonbush Scrub were observed during the vegetation alliance surveys.

Tar Plant Fields (tar plant fields – Centromadia pungens or other spp.) herbaceous alliance)

Status: Globally and State tentatively ranked as imperiled (G2?S2?) – At high risk of extinction or elimination due to very restricted range, very few populations, steep declines, or other factors.

Tar plant fields is a vegetation alliance where tar plant of the genus Centromadia is dominant to conspicuous in the herbaceous layer with other herbaceous species (*Atriplex* spp., *Bromus* spp., *Deschampsia danthonioides*, *Downingia bella*, *Erodium cicutarium*, *Hirschfeldia incana*, *Lasthenia fremontii*, *L. californica*, *Trifolium depauperatum*, and *T. variegatum*). Emergent shrubs, such as alkali heath (*Frankenia salina*) and *Suaeda moquinii* may be present at low cover. Herbs are typically lower than 3 feet and their cover is intermittent. The alliance occurs in vernally wet habitats, including edges of alkaline vernal pools, bottoms of shallow pools, and alkaline flats subjected to periodic or intermittent water inundation. Soils are fine-textured alluvium, sometimes underlain by claypan or another impervious layer, poorly drained, and derived from sedimentary or volcanic substrates. Observations from the San Joaquin Valley include reports of summer flowering *C. pungens* covering large parts of the section, typically occurring on alkaline flats (Sawyer 2009). The Project area and its 10-mile vicinity are within the known distribution area of this alliance. Numerous areas of tar plant fields were observed during the vegetation alliance surveys.

Alkali Sacaton Grassland (alkali sacaton grassland – Sporobulus airoides alliance)

Status: State ranked as imperiled (S2) – At high risk of extinction or elimination in the State due to very restricted range, very few populations, steep declines, or other factors.

This alliance is a tussock-forming grassland dominated by alkali sacaton (*Sporobolus airoides*). This grassland alliance occurs on fine-textured, poorly drained, usually alkaline soils. Most sites have seasonally high water tables or are saturated during winter flooding. Intergrades and often co-occurs with the Alkali Meadow and Northern Claypan Vernal Pool vegetation alliances. Alkali sacaton grassland was formerly extensive in the Tulare Lake Basin and along the San Joaquin Valley through north to Stanislaus and Contra Costa counties, now much reduced. Other major native grasses occurring in this alliance are alkali barley, dwarf barley, annual hair grass, saltgrass and creeping wildrye. Characteristic forbs and shrubs include iodine bush, alkali heath, alkali mallow, gumplant, saltbush, and bush seepweed. Nonnative grasses are also prevalent, particularly foxtail barley, Mediterranean barley, red brome, soft chess and foxtail fescue. The showy display of spring wildflowers includes yellow carpet, bluedicks, downingia, goldfields, meadowfoam, miniature lupine, navarretia, popcorn flower, and tidy tips.

According to the CNDDB database large areas of alkali sacaton grassland occur approximately 5 miles north of the Project area. Several areas of sacaton grassland were observed during reconnaissance surveys in the downstream reaches of the river. No

sacaton grass was observed during the vegetation alliance surveys. However, based on the presence of appropriate habitat and nearby occurrences, the alkali sacaton grassland alliance has a high potential to occur in areas of the Project that were not surveyed due to lack of access.

Ditch-grass Wetland (widgeon-grass mats – Ruppia (cirrhosa, maritima) aquatic herbaceous alliance)

Status: State ranked as imperiled (S2) – At high risk of extinction or elimination in the State due to very restricted range, very few populations, steep declines, or other factors.

Widgeon-grass mats is a vegetation alliance where widgeon-grass species are dominant, herb forming submerged beds in water with other aquatic species (*Myriophyllum* spp., *Najas guadalupensis*, *Potamogeton foliosus*, *Utricularia macrorhiza*, and *Zannischellia palustris*). Widgeon-grass mats are typically less than 8 inches tall and the alliance canopy cover is open to continuous. The alliance occurs in seasonally or permanently flooded brackish marshes, channels, ponds, rivers, coastal wetlands; low-lying basins of high evaporation and infrequent inputs of freshwater in alkaline and saline wetlands (Sawyer 2009). The alliance occurs in Los Banos Wildlife Refuge and San Luis Wildlife Refuge, and is dominant in managed marshes around Kesterson Reservoir in the San Joaquin Valley (Schuler 1990). According to the *Manual of California Vegetation* (Sawyer 2009) distribution map for the vegetation alliance, the northern portion of the Project area and its 10-mile vicinity is within the known distribution area of this alliance. During the vegetation alliance surveys, large areas of water plants resembling widgeon-grass were observed in the river downstream of the Mendota Pool, however, their species could not be confirmed because sampling was infeasible due to high currents and adjacent deep water areas. Based on the known distribution range and the presence of appropriate habitat, the ditch-grass wetland alliance has a high potential to occur.

Western Sea-Purslane Marsh (Western sea-purslane marsh – Sesuvium verrucosum herbaceous alliance)

Status: State tentatively ranked as imperiled and threatened (S2.2) – At high risk of extinction or elimination in the State due to very restricted range, very few populations, steep declines, or other factors. Globally tentatively ranked as vulnerable – at moderate risk of extinction or elimination due to a restricted range, relatively few populations, recent and widespread declines, or other factors.

Western sea-purslane marsh is a vegetation alliance where Western sea-purslane is the dominant or co-dominant in the herbaceous layer with other herbaceous species (*Chenopodium chenopodioides, Cotula coronopifolia, Distichlis spicata, Heliotropium curassavicum, Lolium perenne, Rumex crispus, R. pulcher, Salicornia bigelovii, Sarcocornia pacifica,* and *Spergularia marina*). Western sea-purslane marsh is typically less than 3 feet tall and the alliance canopy cover is open to intermittent. The alliance occurs in seasonally dry alkaline flats; margins are usually alkaline or saline habitats, including coastal wetlands, vernal pools, and desert playas. Soils are usually clay. Stands occur in the San Joaquin Valley and the Kern National Wildlife Refuge and other alkaline wetlands (Sawyer 2009). The western portion of the Project area and its 10-mile vicinity is within the known distribution area of this alliance. During the vegetation alliance

surveys, no western sea-purslane was observed. However, the western sea-purslane marsh alliance has some potential to occur in parts of the study area that were not surveyed due to lack of access.

Alkali Meadow (Yerba mansa meadows – Anemopsis californica herbaceous alliance)

Status: State ranked as imperiled (S2), Globally ranked as vulnerable (G3)–At high risk of extinction or elimination in the State due to very restricted range, very few populations, steep declines, or other factors. Globally ranked as vulnerable – at moderate risk of extinction or elimination due to a restricted range, relatively few populations, recent and widespread declines, or other factors.

Yerba mansa meadows is a vegetation alliance where *Anemopsis californica* is dominant or co-dominant with other herbaceous species (*Ambrosia psilostachya, Bromus hordeaceus, Carex praegracilis, Distichlis spicata, Euthamia occidentalis, Lactuca serriola, Leymus triticoides*). Yerba mansa meadows occur on alkaline or saline soils on stream terraces, floodplains, seeps and in marshes. *Anemopsis californica* is an obligate wetland plant, based on the USFWS Wetland Inventory (1996 National List). The alliance was observed in well preserved riparian meadows on the south bank of the river, in areas where the river backs up behind the Mendota Dam.

Globally or State Ranked Vulnerable Vegetation Alliances

Valley Sink Scrub (Iodine bush scrub – Allenrolfea occidentalis alliance)

Status: State ranked as vulnerable (S3) – At moderate risk of extinction or elimination in the State due to a restricted range, relatively few populations, recent and widespread declines, or other factors.

Iodine bush scrub is a vegetation alliance where iodine bush is the dominant or co-dominant in the shrub canopy with other species (*Atriplex canescens, Frankenia salina, Kochia californica, Sarcobatus vermiculatus,* and *Suaeda moquinii*). The plants are often halophytes (i.e., tolerant of alkaline and saline soils). Shrubs form low, open to dense succulent shrublands that are typically less than 7 feet tall. The alliance canopy cover is open to continuous. Herbaceous layer is variable or lacking and may include salt grass (*Distichlis spicata*), alkali sacaton (*Sporobolus airoides*), or occasionally red brome (*Bromus madritensis* ssp. *rubens*). The understory annuals are most active from January to April; the perennials and shrubs from March to September. The alliance occurs in dry lakebed margins, hummocks, playas perched above current drainages, seeps, and alkali sinks. Alkali sinks are drainage basins that have soils high in soluble salts, which may or may not be alkaline (Twisselmann 1967). Playas (shallow, temporary lakes) may form in alkali sinks during periods of heavy rainfall. High ground water supplies provide capillary water for the perennials. Soil surfaces often have a brilliant white salty crust over dark, sticky clay. On less severe sites the alliance may transition into several more common saltbush alliances. The alliance formerly surrounded the large San Joaquin Valley lakes (Kern, Buena Vista, Tulare, Goose) and north along the trough of the San Joaquin Valley through Merced County to the gooselands of the Sacramento Valley (Solano to Glenn County, west of the Sacramento river); but now essentially extirpated

due to flood control, agricultural developments, and ground water pumping (UCSB 2002). Additional information about this vegetation alliance can be found at:

The CNDDB database identifies several large areas of Valley Sink Scrub approximately 8 miles north of the Project area. Based on the *Manual of California Vegetation* (Sawyer 2009) distribution map for the vegetation alliance, the entire Project area and its 10-mile vicinity are within the known distribution area of this alliance. Several *Allenrolfea occidentalis* plants were observed during the vegetation alliance surveys; however, their aerial extent was not large enough to constitute a vegetation alliance. Based on nearby occurrences, known distribution range, field observations and the presence of appropriate habitat, the valley sink scrub alliance has some potential to occur in parts of the study area that were not surveyed due to lack of access.

Northern Claypan Vernal Pool

Based on the current classification (CDFG 2009) this natural terrestrial community consists of the following three alliances and numerous associations:

- Fremont's goldfields–saltgrass alkaline vernal pools–*Lasthenia fremontii–Distichlis spicata* alliance
- Fremont's goldfields–Downingia vernal pools–*Lasthenia fremontii–Downingia* (*bicornuta*) alliance
- Smooth goldfields vernal pool bottoms–*Lasthenia glaberrima* alliance)

Status: The global and State ranking varies based on the species composition from globally and State vulnerable (G3S3) to globally apparently secure and State vulnerable (G4S3). These alliances are at moderate risk of extinction or elimination globally or in the State due to a restricted range, relatively few populations, recent and widespread declines, or other factors.

These vernal pool ecosystems are shallow seasonal water bodies found in depressions (up to several acres in size) among grasslands and open woodlands from Central San Joaquin Valley north to Glenn and Colusa counties. Northern claypan vernal pools include a clay, silicone cemented hardpan layer that retains water inputs throughout some portion of the spring, but typically the depression dries down entirely into early summer months. They tend to be circumneutral to alkaline and slightly saline wetlands with characteristic plant species from genera such as *Downingia, Plagiobothrys, Eryngium, Lasthenia and Spergularia*. Due to draw-down characteristics, vernal pools typically form concentric rings of similar forb-rich vegetation. Given their relative isolation in upland-dominated landscapes, many endemic plant species are common in California vernal pools. They often intergrade with vernal marsh and cismontane alkali marsh, which have water present throughout the year.

The CNDDB database identifies one large area of Northern Claypan Vernal Pool approximately 5 miles west of the Project area, south of Highway 180. Based on the Manual of California Vegetation (Sawyer 2009) distribution map for the vegetation alliance, the entire Project area and its 10-mile vicinity are within the known distribution

area of the three vegetation alliances. No vernal pools were observed during the vegetation alliance surveys. Based on nearby occurrences, known distribution range and the presence of appropriate habitat, the Northern claypan vernal pool community has still some potential to occur in parts of the study area that were not surveyed due to lack of access.

Valley Oak Forests and Woodlands (Valley oak woodland – Quercus lobata woodland alliance)

Status: The global and State ranking varies based on the species composition (Association) from globally and State ranked as vulnerable (G3S3) to globally and State ranked as imperiled (G2S2). The valley oak woodland associations are at high to moderate risk of extinction or elimination in the State due to restricted or a very restricted range, very few or relatively few populations, steep or recent and widespread declines, or other factors.

Valley oak woodland alliance is a vegetation alliance where valley oak is the dominant or co-dominant in the tree canopy with other trees (*Acer negundo, Alnus rhombifolia, Fraxinus latifolia, Juglans hindsii and hybrids, Platanus racemosa, Populus fremontii, Quercus agrifolia, Q. douglasii, Q. kelloggii, Q. wislezeni, Salix gooddingii* and *S. lasiolepis*). Valley oak woodlands are typically up to 100 feet tall and the alliance canopy cover is open to continuous. Shrubs are common to occasional along with vines, such as California grape and pipevine (*Vitis californica, Aristolochia californica*). The herbaceous layer may be grassy. The alliance occurs in valley bottoms, seasonally saturated soils that may be intermittently flooded and summit valleys. Soils are usually alluvial or residual. Early explorers in California noted valley oaks as dense forests and woodlands ranging over 2 miles from the main stems of the large rivers in the mid-1800s. Today, very few upland stands remain (Sawyer 2009). The Project area and its 10-mile vicinity are within the known distribution area of this alliance. The CNDDB database does not identify any valley oak associations in the vicinity of the study area; however, numerous valley oaks were observed during reconnaissance surveys. Several areas of valley oak woodland were observed during the vegetation alliance surveys. Based on field observations, known distribution, and the presence of appropriate habitat, the valley oak forests and woodlands alliance has a high potential to occur in parts of the study area that were not surveyed due to lack of access.

Oregon Ash Riparian Forest (Oregon ash groves – Fraxinus latifolia forest alliance)

Status: State ranked as vulnerable and threatened (S3.2) – At moderate risk of extinction or elimination in the State due to a restricted range, relatively few populations, recent and widespread declines, or other factors.

Oregon ash groves is a vegetation alliance where Oregon ash is the dominant or co-dominant in the tree canopy with other trees (*Acer macrophyllum, Alnus rhombifolia, Quercus kelloggii, Q. wislezeni,* and *S. laevigata*). Oregon ash groves are typically up to 80 feet tall and the alliance canopy cover is open to continuous. Shrubs are sparse to intermittent. The herbaceous layer is variable. The alliance occurs in riparian corridors, seeps, stream banks, and terraces. Soils are usually alluvial (Sawyer 2009). The Project

area and its 10-mile vicinity are within the known distribution area of this alliance. Numerous large areas of Oregon ash groves were observed during the vegetation alliance surveys.

California Sycamore Riparian Forest and Woodland (California sycamore woodlands – Platanus racemosa alliance)

Status: Globally and State ranked as vulnerable (G3S3); however, some associations are ranked as critically imperiled (G1S1) and imperiled (G2S2)–At moderate risk of extinction or elimination globally and in the State due to a restricted range, relatively few populations, recent and widespread declines, or other factors.

California sycamore woodlands are vegetation alliances where California sycamore is the dominant or co-dominant in the tree canopy with other trees (*Alnus rhombifolia, Populus fremontii, Quercus lobata, Salix laevigata, S. gooddingii, S. lasiolepis, S. lutea* and *Umbellularia californica*). California sycamore woodlands are typically up to 120 feet tall and the alliance canopy cover is open to intermittent. Shrubs are open to intermittent. The herbaceous layer is sparse or grassy. The alliance occurs in riparian corridors, intermittent streams, gullies, seeps, springs, stream banks and terraces that are subject to high-intensity flooding. Soils are rocky or cobbly alluvium with permanent moisture at depth. Stands of California sycamore woodland occur sporadically in the Great Valley (Sawyer 2009). The Project area and its 10-mile vicinity are within the known distribution area of this alliance. Therefore, based on the known distribution range and the presence of appropriate habitat, the California sycamore riparian forest and woodland alliance has some potential to occur. Only several trees included within other vegetation alliances were observed during the vegetation alliance surveys. However, other areas of California sycamore woodlands could occur in parts of the study area that were not surveyed due to lack of access.

Fremont Cottonwood Riparian Forests and Woodlands (Fremont cottonwood forest – Populus fremontii alliance)

Status: State ranked as vulnerable and threatened (S3.2) – At moderate risk of extinction or elimination in the State due to a restricted range, relatively few populations, recent and widespread declines, or other factors.

Fremont cottonwood forest is a vegetation alliance where Fremont cottonwood is the dominant or co-dominant in the tree canopy with other trees (*Acer negundo, Fraxinus latifolia, Juglands hindsii, Platanus racemosa, Quercus agrifolia, Q. lobata, Salix exigua, S. laevigata, S. gooddingii, S. lasiolepis,* and *S. lutea*). California sycamore woodlands are typically up to 80 feet tall and the alliance canopy cover is open to continuous. Shrubs are open to intermittent. The herbaceous layer is variable. The alliance occurs in riparian corridors, floodplains, low-gradient rivers, perennial or seasonally intermittent streams, springs, and in valleys with a dependable subsurface water supply that varies considerably during the year. Mixed stands of Fremont cottonwood forest occur sporadically in the Great Valley and are generally small and fragmented. They occur along the San Joaquin River and its major tributaries (Sawyer 2009). The Project area and its 10-mile vicinity are within the known distribution area of

this alliance. Numerous large areas of Fremont cottonwood forest were observed during the vegetation alliance surveys.

Black Willow Riparian Forests and Woodlands (Black willow thickets – Salix gooddingii alliance)

Status: State ranked as vulnerable (S3) with some associations considered rare – At moderate risk of extinction or elimination in the State due to a restricted range, relatively few populations, recent and widespread declines, or other factors.

Black willow thickets is a vegetation alliance where black willow is the dominant or co-dominant in the tree canopy with other trees (*Alnus rhombifolia, Populus fremontii, Salix laevigata, S. lasiolepis, S. lucida* ssp. *Lasiandra,* and *S. lutea*). Black willow thickets are typically up to 100 feet tall and the alliance canopy cover is open to continuous. Shrubs are open to continuous with valley elderberry (*Sambucus nigra*), coyote brush (*Baccharis pilularis*), mulefat (*B. salicifolia*), and redtwig dogwood (*Cornus sericea*). The herbaceous layer is variable. The alliance occurs in riparian corridors, rocky floodplains, small intermittent streams, springs, and seeps. Black willow is an alliance indicator along the San Joaquin River and its tributaries (Sawyer 2009). The Project area and its 10-mile vicinity are within the known distribution area of this alliance. Numerous large areas of black willow thickets were observed during the vegetation alliance surveys.

Red Willow Riparian Forests (Red willow thickets – Salix laevigata woodland alliance)

Status: Globally and State ranked as vulnerable (G3S3) – At moderate risk of extinction or elimination in the State due to a restricted range, relatively few populations, recent and widespread declines, or other factors.

Red willow thickets is a vegetation alliance where red willow is the dominant or co-dominant in the tree canopy with other trees (*Acer negundo, Aesculus californica, Alnus rhombifolia, Platanus racemosa, Populus fremontii, Quercus agrifolia, Q. chrysolepis, Salix goodiingii, S. lasiolepis, S. lucida* ssp. *lasiandra* and *Sambucus nigra*). Black willow thickets are typically up to 70 feet tall and the alliance canopy cover is open to continuous. The shrub layer is open to continuous. The herbaceous layer is variable. The alliance occurs in riparian corridors, floodplains, lake edges, low-gradient depositions along streams. Red willow thickets are scattered throughout the California Great Valley (Sawyer 2009). The Project area and its 10-mile vicinity are within the known distribution area of this alliance. Several areas of red willow thickets were observed during the vegetation alliance surveys.

Spinescale Scrub (Spinescale scrub – Atriplex spinifera alliance)

Status: Globally and State ranked as vulnerable (G3S3) – At moderate risk of extinction or elimination in the State due to a restricted range, relatively few populations, recent and widespread declines, or other factors.

Spinescale scrub is a vegetation alliance where spinescale is the dominant or co-dominant in the shrub canopy with other shrubs (*Ambrosia salsola, Atriplex polycarpa, Frankenia salina, Ephedra californica, Gutierrezia californica, Isocoma acradenia,* and

Picrothamnus desertorum). Spinescale scrub is typically up to 7 feet tall and the alliance canopy cover is open. The herbaceous layer is variable with seasonal annuals reaching high cover. The alliance occurs in alluvial fans, old lake beds perched above current drainages. Soils are moderately sandy clay loams to fine, silty clays that may be carbonate rich. Spinescale scrub is scattered on alkaline soils throughout the San Joaquin Valley adjacent to and above iodine bush scrub alliance (Sawyer 2009). The western portion of the Project area and its 10-mile vicinity are within the known distribution area of this alliance. Several areas of Spinescale scrub were observed during the vegetation alliance surveys.

California Rose Riparian Scrub (California rose briar patches – Rosa californica alliance)

Status: Globally and State ranked as vulnerable (G3S3) – At moderate risk of extinction or elimination in the State due to a restricted range, relatively few populations, recent and widespread declines, or other factors.

California rose briar patches is a vegetation alliance where California rose is the dominant or co-dominant in the shrub canopy with other shrubs (*Artemisia californica, Baccharis pilularis, Rubus armeniacus, Salix lasiolepis, Salvia mellifera, Sambucus nigra,* and *Symphoricarpos mollis*). Emergent red willow and other trees may be present at low cover. California rose briar patches are typically up to 7 feet tall and the alliance canopy cover is open to continuous and may be two-tiered. The herbaceous layer is open. The alliance occurs at creek bottoms, stream terraces, and bordering sloughs and channels, including those in intertidal zones. Soils are mixed alluvium. California rose briar patches are scattered throughout the San Joaquin Valley (Sawyer 2009). The Project area and its 10-mile vicinity are within the known distribution area of this alliance. A number of California rose briar patches were observed during reconnaissance surveys. Numerous areas of California rose briar patches were observed during the vegetation alliance surveys.

Bush Seepweed Scrub (Bush seepweed scrub – Suaeda moquinii alliance)

Status: State ranked as vulnerable and threatened (S3.2) – At moderate risk of extinction or elimination in the State due to a restricted range, relatively few populations, recent and widespread declines, or other factors. The California Great Valley associations are very rare.

Bush seepweed scrub is a vegetation alliance where bush seepweed is the dominant or co-dominant in the shrub canopy with other shrubs (*Allenrolfia occidentalis, Atriplex polycarpa, A. canescens, Frankenia salina, Kochia californica, Sarcobatus vermiculatus,* and *Sporobolus airoides*). Bush seepweed scrub is typically up to 5 feet tall and the alliance canopy cover is open to continuous. The herbaceous layer is sparse to intermittent. The alliance occurs in flat to gently sloping valley bottoms, playas, toe slopes adjacent to alluvial fans, and bajadas. Soils are deep, saline or alkaline. Bush seepweed scrub is scattered throughout the San Joaquin Valley (Sawyer 2009). The Project area and its 10-mile vicinity are within the known distribution area of this alliance. Therefore, based on the known distribution range and the presence of appropriate habitat, the bush seepweed scrub alliance has a high potential to occur.

Several plants of bush seepweed were observed within other alliances during the vegetation alliance surveys; however, their areal extent was not large enough to constitute a vegetation alliance. There is a high potential that this alliance could occur in the portions of the study area that were not surveyed due to lack of access.

Elderberry Scrub and Savanna (Blue elderberry stands – Sambucus nigra shrubland alliance)

Status: Globally and State ranked as vulnerable (G3S3) – At moderate risk of extinction or elimination in the State due to a restricted range, relatively few populations, recent and widespread declines, or other factors.

Blue elderberry stands is a vegetation alliance where blue elderberry is the dominant or co-dominant in the shrub canopy with other shrubs (*Artemisia californica, Baccharis pilularis, B. salicifolia, Ceanothus megacarpus, Diplacus aurantiacus, Fraxinus latifolia, Hazardia squarrosa, Heteromeles arbutifolia, Malosma laurina, Nicotiana glauca, Rhus integrifolia, Ribes speciosum, Rubus* spp., *Salix exigua, S. lasiolepis, Toxicodendron diversilobum,* and *Vitis californica*). Emergent trees, such as California walnut (*Juglans californica*), Fremont cottonwood (*Populus freemontii*), coast live-oak (*Quercus agrifolia*), and valley oak (*Q. lobata*) may be present at low cover. Blue elderberry stands are typically up to 28 feet tall and the alliance canopy cover is open to continuous and may be two-tiered. The herbaceous layer is variable and usually grassy. The alliance occurs on stream terraces and in bottomlands; localized areas in upland settings. Soils are typically gravelly alluvium and intermittently flooded. Blue elderberry stands are scattered throughout the San Joaquin Valley along creeks and stream terraces (Sawyer 2009). The Project area and its 10-mile vicinity are within the known distribution area of this alliance. Several blue elderberry stands were observed during the reconnaissance surveys. Numerous large areas of blue elderberry stands were observed during the vegetation alliance surveys.

Alkali Heath Dwarf Scrub (Alkali heath marsh – Frankenia salina alliance)

Status: State ranked as vulnerable (S3) – At moderate risk of extinction or elimination in the State due to a restricted range, relatively few populations, recent and widespread declines, or other factors.

Alkali heath marsh is a vegetation alliance where alkali heath is the dominant or co-dominant in the herbaceous or subshrub (suffrutescent) layer with other species (*Arthrocnemum subterminale, Atriplex* spp., *Agrostis avenacea, Batis maritime, Cressa truxilensis, Distichlis spicata, Hordeum murinum, Lasthenia* spp., *Lepidium* spp., *Sarcocornia californica,* and *Suaeda taxifolia*). Alkali heath marsh is typically composed of herbs and subshrubs up to 2 feet tall and the alliance canopy cover is open to continuous. The alliance occurs in coastal salt marshes, brackish marshes, alkali meadows, alkali playas. Soils are typically saline, sandy to clayey alluvium. Alkali heath marsh alliance in the San Joaquin Valley includes *Lasthenia* spp., *Lepidium dictyotum,* and *Arthrocnemum subterminale* (Sawyer 2009). The western portion of the Project area and its 10-mile vicinity are within the known distribution area of this alliance. Several areas of Alkali Heath Dwarf Scrub were observed during the vegetation alliance surveys.

Valley Wildrye Grassland (Creeping rye grass turfs – Leymus triticoides herbaceous alliance)

Status: Status: State ranked as vulnerable (S3) – At moderate risk of extinction or elimination in the State due to a restricted range, relatively few populations, recent and widespread declines, or other factors.

Leymus triticoides is the dominant or co-dominant species in the herbaceous layer with other herbs (*Ambrosia psilostachya, Anemopsis californica, Distichlis spicata, Elymus elymoides,* and *Hordeum spp*.). The vegetation alliance occurs on poorly drained floodplains, drainage and valley bottoms, mesic, flat to sloping topography and marsh margins. Valley Wildrye Grassland was observed in numerous areas during the vegetation alliance surveys.

Arrowweed Scrub (Arrow weed thickets – Pluchea sericea shrubland alliance)

Status: State and globally ranked as vulnerable (G3, S3.3) – At moderate risk of extinction or elimination in the State and globally due to a restricted range, relatively few populations, recent and widespread declines, or other factors.

Pluchea sericea is dominant or co-dominant with other species in the shrub canopy (*Allenrolfea occidentalis, Atriplex canescens, Baccharis salicifolia, Salix exigua,* and *Suaeda moquinii*). It typically occurs around springs, seeps, irrigation ditches, canyon bottoms, stream borders or seasonally flooded washes. Pluchea sericea is a facultative wetland plant. This vegetation alliance was observed during the field surveys in floodplain areas on the left bank of the river.

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