Appendix H – Biological Resources Technical Report

RECLAMATION

Managing Water in the West

Biological Resources Technical Report

Proposed 20-Year Extension of the 2005 Mendota Pool Exchange Agreements

U.S. Department of the Interior
Bureau of Reclamation
Mid Pacific Region
South Central California Area Office
Fresno, California

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Mission Statement

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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List of Acronyms

AMEC	AMEC Environment & Infrastructure, Inc.
BGEPA	Bald and Golden Eagle Protection Act
BTR	Biological Resources Technical Report
CCID	Central California Irrigation District
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
cfs	cubic feet per second
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRPR	California Rare Plant Rank
CVP	Central Valley Project
CWA	Clean Water Act
DMC	Delta-Mendota Canal
EC	Electrical Conductivity
EFH	Essential Fish Habitat
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FP	Fully Protected
ID	Irrigation District
ITFMWQ	Intergovernmental Task Force on Monitoring Water Quality
MBTA	Migratory Bird Treaty Act
MPG	Mendota Pool Group
msl	mean sea level
MWA	Mendota Wildlife Area
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOP	Notice of Preparation
ppt	parts per thousand
RWQCB	Regional Water Quality Control Board
SA	Special Animals
SSC	Species of Special Concern
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
TFCF	Tracy Fish Collection Facility
TPP	Tracy Pumping Plant
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USDA	U.S. Department of Agricultural
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WL	Watch List

1.0 INTRODUCTION

AMEC Environment & Infrastructure, Inc. (AMEC) has prepared this Biological Resources Technical Report (BTR) under contract with the Mendota Pool Group (MPG) to allow for the U.S. Bureau of Reclamation's consideration of the potential effects on biological resources resulting from the proposed 20-year extension of the 2005 Mendota Pool Exchange Agreements (Proposed Action) and its alternative, which includes the expansion of the existing recharge canal on Terra Linda Farms River Ranch located in the vicinity of the City of Mendota in Madera County.

Proposed Action

The proposed extension of the existing exchange agreements would allow for the continued exchange of up to 25,000 acre-feet of water per year between the U.S. Bureau of Reclamation and the MPG. The extension would allow MPG farmers to continue the groundwater exchange for an additional 20-year period, from 2015 to 2034 contingent upon completion of the described annual monitoring, reporting, and approvals. Under the extension, the total quantity of water exchanged with the U.S. Bureau of Reclamation over the 20-year period would be capped at 400,000 acre-feet, with no one year transfer quantity in excess of 25,000 acre-feet. The Proposed Action would incorporate guidelines, monitoring, reporting, and approvals present in the existing exchange agreements and also include a new groundwater recharge component intended to replenish the San Joaquin Groundwater Basin.

Terra Linda Farms Alternative

The inclusion of the expansion of the Terra Linda Farms recharge canal is an alternative to the Proposed Action. The recharge basin expansion area (Primary Study Area; see Figure 1-1) is located on River Ranch North within MPG lands immediately adjacent to the existing unlined recharge canal, which is located along the western bank of the Fresno Slough, approximately 1.5 miles south of Mendota Dam (see Figure 1-1). The existing recharge canal is gravity fed and is approximately 9,500 feet long by 70 feet wide, occupying approximately 15 acres.

The Terra Linda Farms recharge canal, is an unlined canal, which is typically dry (left), but provides ephemeral open water habitat as well as isolated emergent vegetation during flood conditions (right) .

The approximate size of the proposed groundwater recharge basin is dependent on the underlying soil types, which constrain percolation of surface waters into the San Joaquin Valley Groundwater Basin. Due to surface soil constraints the maximum potential area for the expanded recharge basin would be approximately 85 acres (see Figures 1-1, 3-1, and 3-2). This acreage estimate would allow for a minimum 25 foot-wide setback of the toe of the outer wall of the recharge basin from property lines and roadways to allow for maintenance and to minimize any potential erosion impacts on adjacent properties. The potential design of the recharge basin on River Ranch North would consist of a single large basin as opposed to numerous small basins (see Figure 1-2). The recharge basin would be constructed through excavation of material from within the basin and use of excess material for construction of berms surrounding the basin. To the extent feasible, excavation and fill would be balanced onsite.

The proposed basin would be approximately five feet three inches in depth, with approximately five feet of this depth comprised of berms that would surround the basin and the remaining three inches comprised of the excavated area below the existing ground surface. This height would allow for a four-foot water depth with one foot and three inches of freeboard to the top of the berm. The side slopes would be approximately 3:1 (i.e., three feet of horizontal distance for every foot of vertical distance). Therefore, when the proposed basin is full there would be over three feet of horizontal distance from the top of the berm to the water's surface, and 12 feet of horizontal distance from the water's surface to the base of the side slope (see Figure 1-2). Recharge would occur along the submerged portions of the side slopes as well as across the floor of the basin.

The proposed recharge basin would require maintenance in order to maintain projected recharge rates. Typical maintenance practices would include annual tiling to control vegetation growth. Additionally, every two to ten years, depending on the flood regime, the basin bottom and portions of the inner banks would be ripped up to six feet in depth to maintain percolation rates.

The berms surrounding the basin would be planted with clusters of native riparian vegetation such as willows (*Salix* spp.), cottonwoods (*Poplar* spp.) and understory species such as wild rose (*Rosa* spp.) or blackberries (*Rubus ursinus*) to provide areas of wildlife habitat along the slopes of these berms, including potential refugia for giant garter snake (*Thamnophis gigas*) and nesting habitat for Swainson's hawk (*Buteo swainsoni*). These clusters of vegetation would be approximately 100 feet long and 10 feet wide with 100 feet of open berm between each cluster to permit periodic ripping of the open unvegetated areas of berms to facilitate recharge. Areas of restored native riparian habitat on the banks of the berms would not be maintained. Tilling or deep ripping activities would be timed to minimize or avoid adverse effects on wildlife. Maintenance activities would likely occur in September to avoid the nesting bird season and the hibernation period for giant garter snake.

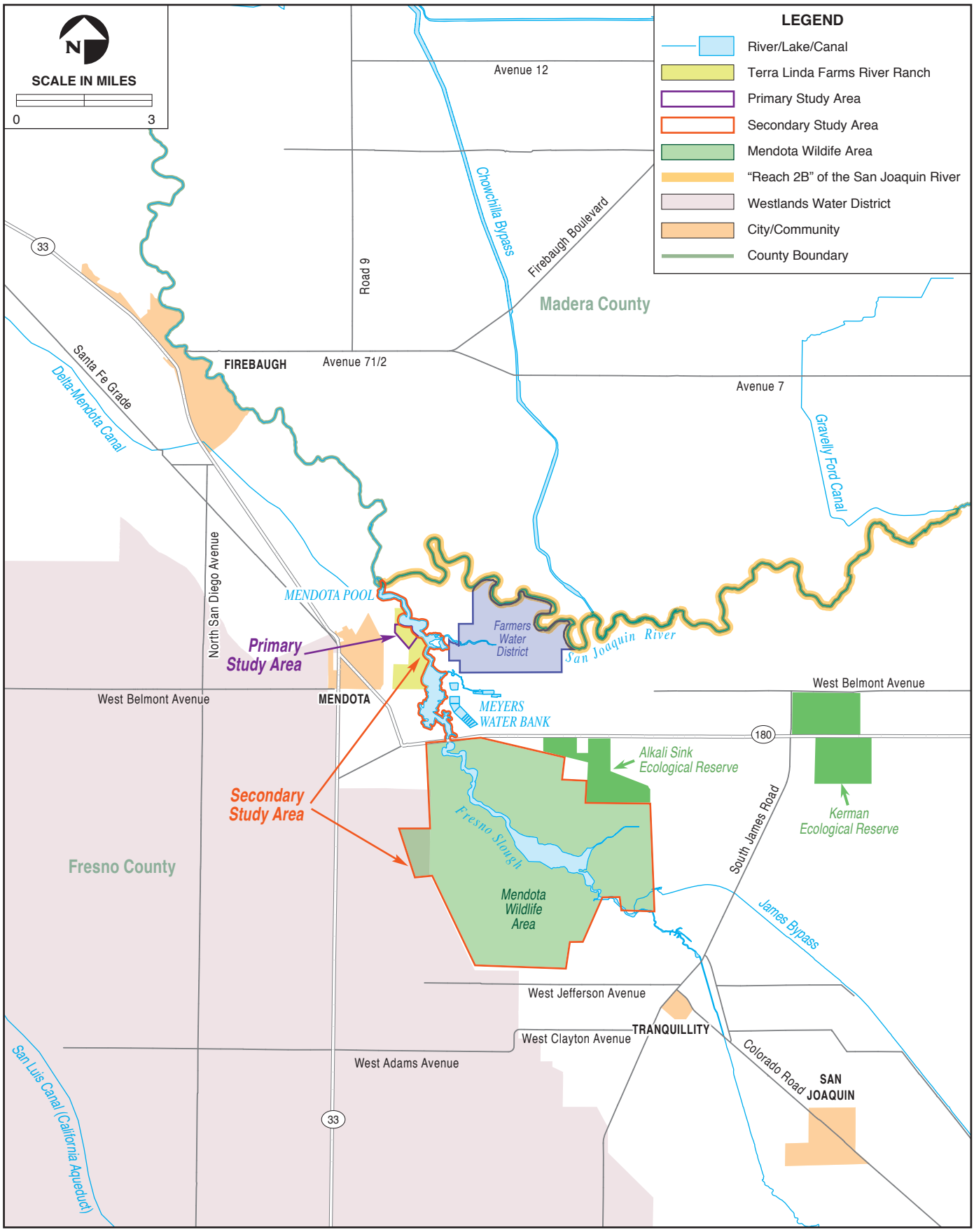
The proposed recharge basin would be used to replenish the San Joaquin Valley Groundwater Basin during periods of flooding within the Kings River or San Joaquin River or when surplus Central Valley Project (CVP) water is available. The recharge program would help address potential issues related to possible groundwater level declines and water quality issues resulting from groundwater production in the region. Water sources potentially available for groundwater recharge at this location include unrestricted flood flows from the North Fork of the Kings River, unrestricted flood flows from the San Joaquin River, and Section 215 surplus CVP water for South of Delta Contractors (i.e., water from San Luis Reservoir). The overall purpose and goal of this alternative is to offset potential impacts to groundwater levels and groundwater quality in the

Mendota Pool area associated with the Proposed Action, and specifically to help reduce the existing groundwater overdraft in Madera County, as well as reduce the further movement of the saline front, improving groundwater quality.

Ongoing operation of the groundwater pumping and exchange program under the existing exchange agreements has the potential to affect water quality and potentially sensitive resources in the Mendota Wildlife Area (MWA), with particular concerns over increased surface water salinity levels. Construction and operation of the proposed groundwater recharge basin would lead to the direct disturbance or removal of vegetation and potential habitat for terrestrial wildlife species; however, it would increase the total area of ephemeral open water habitat. This BTR provides a description of the biological resources associated with the Primary and Secondary Study Areas and the surrounding vicinity. Detailed discussion regarding the direct and indirect impacts to these resources is included in the Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the proposed 20-year extension of the existing 2005 Mendota Pool 10-Year Exchange Agreements.

The Primary and Secondary Study Areas were reviewed for the potential occurrence of any sensitive habitat types as well as any federally and/or state-designated special status species that may potentially occur within the region (see Figure 4-1 and 4-2). In support of the California Environmental Quality Act (CEQA)/National Environmental Policy Act (NEPA) documentation requirements and to address potential U.S. Bureau of Reclamation and local agency concerns as well as those of the California Department of Fish and Wildlife (CDFW) and the U.S. Fish and Wildlife Service (USFWS), this BTR describes sensitive vegetation communities, federally and state-listed species, California Native Plant Society (CNPS) California Rare Plant Rank (CRPR) 1B, 2, 3, and 4 species, CDFW species of special concern, locally sensitive species, wildlife corridors, and wetland resources that may be affected by the expansion of the existing recharge canal.

Approximately 328 acres (i.e., 64 percent) of the 513-acre Terra Linda Farm River Ranch is characterized by fallow agricultural lands (left). The remainder is characterized by ruderal habitat (right) as well as limited areas of disturbed riparian scrub and emergent freshwater marsh.



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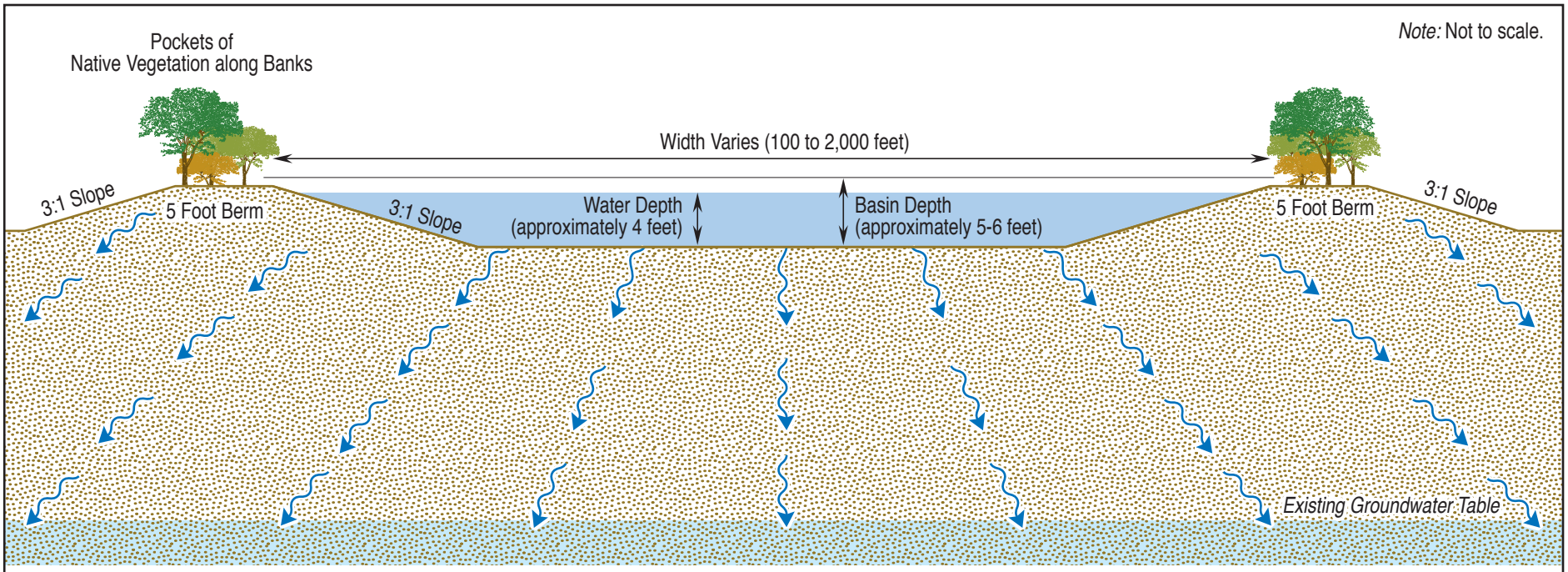
Primary and Secondary Study Areas

FIGURE 1-1



River Ranch Recharge Basin Properties	
Potential Recharge[1] over 20-year Life of Program	19,000 acrefeet (based on 85-acre basin)
Water table depth below ground surface	25 feet (average) – acceptable space for recharge water
Soil conditions in upper 10 feet	Dense soils in top 6 feet in some areas – some excavation or ripping/tilling required
Soil conditions from 10 feet below to water table	Very porous with minimal clay layers
Proximity to the Fresno Slough	Adjacent – could provide new habitat for giant garter snake

1. Total recharge over the 20-year life of the program is based on a 4-foot depth capacity, historic availability of Kings River flood flows, and historic recharge rates in the surrounding area. Average area recharge rate of 0.3 AF per acre per day was used; however, soil conditions indicate recharge may be higher.

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Potential Recharge for Proposed River Ranch North Recharge Basin

FIGURE 1-2

2.0 METHODS

AMEC performed literature and data reviews to identify potential and historically occurring sensitive biological resources within both the Primary and Secondary Study Areas (see Figure 4-1 and 4-2). This included a review of MWA management documents, Kings River water flow data, current and historical aerial photographs, U.S. Geological Survey (USGS) topographic maps, and U.S. Department of Agriculture (USDA) soil survey maps, and the CDFW letter of comment on the Notice of Preparation (NOP) of the EIS/EIR dated 10 May 2013. Additionally, AMEC reviewed the USFWS and CNPS lists for Madera County as well as the California Natural Diversity Database (CNDDB) to identify recorded occurrences of sensitive natural communities, plant species, and wildlife species within a five-mile radius of the Primary Study Area and within the Tranquillity USGS 7.5-minute Quadrangle for the Secondary Study Area. Further, relevant documents including the Biological Evaluation for the 2011 Amendment to the Meyers Groundwater Banking Exchange Agreement were reviewed for relevant information. These documents provided background information on the biological resources in the Primary and Secondary Study Areas.

A field survey of the Primary Study Area was conducted on 26 June 2013 by AMEC biologist Angie Harbin-Ireland. The survey included community-level vegetation mapping and a habitat assessment for sensitive plant and wildlife species. Plant and wildlife species addressed in this report include those considered special status or sensitive by the USFWS, CDFW, or local agencies, including:

- Species listed as threatened or endangered under either the Federal or California Endangered Species Acts
- Species that are candidates for listing under either the Federal or California Endangered Species Acts
- Species designated as Fully Protected (FP) by CDFW
- Species designated as Species of Special Concern (SSC) by CDFW
- Plant taxa which are listed on the CNPS Inventory of Rare and Endangered Plants of California, which is sanctioned by CDFW
- Avian species on CDFW and USFWS Watch Lists (WL)
- Species designated as California Special Animals (SA) and tracked in the CNDDB

Formal legal protection is afforded only to species listed under the Federal and/or California Endangered Species Acts, and those species designated by CDFW as Fully Protected. Although the remaining classifications of special status species do not receive formal legal protection, they typically require evaluation under CEQA, and mitigation measures may be warranted depending on potential impacts.

The field survey was conducted by traversing the entire site on foot with the exception of the interior of agricultural fields and dense marsh vegetation. The suitability, quantity, and quality of habitats within the Primary Study Area were evaluated and adjacent lands up to 500 feet from the Primary Study Area boundary were qualitatively assessed. The boundaries of all agricultural fields were surveyed and any unique habitat features (i.e., structures, trees, and marsh vegetation) were further investigated. The Primary Study Area was surveyed for evidence of wildlife

presence or activity and scanned with binoculars for potential avian nest sites. All distinct plant communities and wildlife habitats present within the Primary Study Area were described and mapped. All wildlife detected by sight or sign during the habitat assessment were recorded and are discussed in Section 3.0, *Existing Conditions*.

This report presents the results of the habitat assessment field survey for the Primary Study Area and background review for the Primary and Secondary Study Areas. It is intended to assist the U.S. Bureau of Reclamation and Westlands Water District (Westlands) in the review process for the Proposed Action and the expansion of the existing Terra Linda Farms recharge canal within the Primary Study Area. The surveys were intended as an evaluation of on-site habitat types and an assessment of the potential for occurrence of special status plant and wildlife species.

Additional surveys for wildlife species within the Primary Study Area may be warranted to further evaluate the presence or absence of special status species on-site prior to construction of the proposed groundwater recharge basin (see Section 6.4, *Additional Surveys and Studies* and Section 6.5, *Preconstruction Surveys*). However, based on the surveys conducted to date and an assessment of habitats on-site, certain special status plant and wildlife species are not expected to occur or can be ruled out entirely.

3.0 EXISTING CONDITIONS

The Primary and Secondary Study Areas are located within the Mendota Dam and Tranquillity USGS 7.5-minute Quadrangle, respectively in Madera County. The Primary Study Area is located approximately 1.5 miles south of Mendota Dam and immediately adjacent to the west bank of the Fresno Slough. The Primary Study Area, River Ranch North, encompasses approximately 85 total acres of fallow or ruderal (i.e., disturbed) MPG-owned farm lands within the River Ranch property owned by Terra Linda Farms (see Figure 1-1). The Primary Study Area is relatively flat with an elevation of approximately 163 feet above mean sea level (msl).

The Secondary Study Area includes the area where existing aquatic and adjacent riparian habitat could be affected by changes in water flow and/or quality. This includes the section of the Fresno Slough that runs from the Mendota Dam south to Highway 180 and continuing on south of Highway 180 to the southern perimeter of the MWA, including the land surrounding the slough on either side. The Secondary Study Area also includes the entirety of the MWA, which is supplied with water from the Fresno Slough (see Figure 1-1).

The existing conditions describe the regional network of water resources that support aquatic and emergent habitats within the Primary and Secondary Study Areas. Additionally, this section describes the existing biological resources within the Primary and Secondary Study Areas, including plant communities and wildlife habitat.

3.1 Regional Aquatic Resources

Regional hydrology in the vicinity of the Primary and Secondary Study Areas is substantially influenced by existing agricultural operations, including water transfers. The Mendota Pool, located immediately adjacent the Primary Study Area, is a small reservoir formed by the Mendota Dam and serves as a managed water supply and distribution reservoir for the CVP as well as for local water transfers (see Figure 3-1).

The Mendota Pool receives water from natural and manmade sources, including the Delta-Mendota Canal (DMC), the San Joaquin River, the Fresno Slough, which is fed by the North Fork of the Kings River, and groundwater pumped into the Mendota Pool from adjacent wells (see Figure 3-1). Agricultural water diversions from the San Joaquin and Kings Rivers have substantially affected area hydrology. Currently, the primary regular water supplies for the Mendota Pool include the DMC, restoration flows from the San Joaquin River, and groundwater pumped from the San Joaquin Valley Groundwater Basin. However, periodic flood flows from the North Fork of the Kings River also deliver occasional high flows to the Mendota Pool. During the agricultural season, the Fresno Slough flows to the south as a result of water drawn from the southern area of the slough. However, the Fresno Slough flows north when the North Fork of the Kings River is in flood stage. Consequently, the Fresno Slough can flow in either direction as a result of water withdrawals or rainfall and flood flows (see Figure 3-1).

Surface waters in the Primary and Secondary Study Areas are highly managed in support of surrounding agricultural operations. However, these surface waters such as the Fresno Slough and surrounding wetlands continue to provide open water habitats and areas of emergent freshwater marsh habitat. Consequently, these surface water resources may provide habitat for wildlife species, including potential habitat for federally or state-listed species such as the giant garter snake. Each of the major surface water bodies in the vicinity of Primary and Secondary

Study Areas are described in more detail below both in terms of their physical and biological characteristics.

Delta Mendota Canal

The 117 mile-long DMC carries water from the Sacramento-San Joaquin River Delta south through the San Joaquin Valley, terminating at the Mendota Pool. The DMC is a heavily managed concrete-lined waterway that is largely devoid of aquatic and emergent vegetation. Consequently, while the canal provides open water habitat for some fish species, it lacks riparian habitat as well as complex in-water habitat characteristic of natural riverine systems.

The DMC delivers CVP water from Check 13 located at the San Luis Reservoir to the Mendota Pool. The canal is concrete-lined to its terminus at the Mendota Pool and while it provides fast moving open water habitat, it provides little or no aquatic or emergent vegetation.

The DMC is located within Essential Fish Habitat (EFH) for Chinook salmon (*Oncorhynchus tshawytscha*) (National Oceanic and Atmospheric Administration [NOAA] 2013); however, the DMC in the vicinity of the Primary Study Area is segmented by Check 21, located at the Mendota Pool, and Check 13, located approximately 45 miles up-stream, which prevent fish passage. Additionally, the Tracy Fish Collection Facility (TFCF), located in the Central Valley of California near Stockton, was developed and built by the U.S. Bureau of Reclamation, with interagency cooperation, to protect Chinook salmon and other native fish species from entering the DMC by way of the Tracy Pumping Plant (TPP) (Dealy 2013). Consequently, intoduced species including threadfin shad (*Dorosoma petense*), inland silverside (*Menidia beryllina*), and blue gill (*Lepomis macrochirus*) are the most abundant fish species in the DMC (U.S. Bureau of Reclamation 2004).

Additionally, the DMC includes large densities of invasive asiatic clams (*Corbicula fluminea*), which inhabitat thin incrustations on the concrete side-lining and disjunct sediment bars on the canal bottom. Densities in the sedmint bars typically range between 10,000-20,000 individuals per square meter. Asiatic clam popuations in the DMC are strongly affected by water current. While flowing water enhances the total volume of nutrients available to benthic communities and is a vehicle for recruitment; however, it also has considerable negative impact. Under heavy flow conditions, sediment bars become unstable and entire clam beds are transported downstream (Eng 1979).

San Joaquin River

The headwaters of the San Joaquin River are located in the Sierra Mountains northeast of the City of Fresno, and flow easterly toward Millerton Lake, which is located approximately 50 miles upstream from Mendota Pool and formed by Friant Dam. Water in Millerton Lake is either diverted to the Friant-Kern or Madera Canals, or released from the dam to continue eastward toward the Chowchilla Bypass and the Mendota Pool. Downstream from the Mendota Dam, the San Joaquin River bends northward and flows northwest to its terminus at the Sacramento-San Joaquin Delta (see Figure 3-1).

The San Joaquin River between Mendota Dam and Chowchilla Bypass is characterized by a narrow, continuous band of riparian vegetation (left) while the segment upstream of the Chowchilla Bypass and Gravelly Ford exhibits sparse or absent riparian vegetation (right). This stark difference in vegetation coverage is largely due to the flow of water as this upstream segment has historically been dry. However, interim flows from Friant Dam have begun to restore the natural hydrology of the San Joaquin River and as a result the riparian communities along these segments of the river are expected to recover over the long-term.

The construction of Friant Dam substantially altered historic flows and habitats along the San Joaquin River within the vicinity of the Primary and Secondary Study Area, extirpating Chinook salmon runs in the San Joaquin River upstream from the confluence with the Merced River (U.S. Bureau of Reclamation 2011). From the Friant Dam's construction in 1942 until recent San Joaquin River restoration efforts, the section of the San Joaquin River between the Gravelly Ford and the Mendota Pool was dry during the irrigation season, except during flood flows, with the section between the Mendota Pool and Chowchilla Bypass often experiencing reverse flows (U.S. Bureau of Reclamation 2011). In 2006 the San Joaquin River Restoration Settlement and accompanying Federal legislation required the provision of water downstream of Friant Dam to restore the Chinook salmon fishery (U.S. Bureau of Reclamation 2011). Restoration activities include releases of water from Friant Dam to the confluence of the Merced River, a combination of channel and structural modifications along the San Joaquin River below Friant Dam, and reintroduction of Chinook salmon (U.S. Bureau of Reclamation 2011).

The San Joaquin River immediately upstream of the Mendota Pool and the Primary Study Area (i.e., Reach 2B; refer to Figure 1-1) supports narrow, patchy, but nearly continuous riparian vegetation. The riparian zone is limited to approximately 10 to 30 feet bordering the channel (U.S. Bureau of Reclamation 2011). Due to the historically dry condition of the San Joaquin River upstream of the Mendota Dam, fish populations within the vicinity of the Primary and Secondary Study Areas have generally been confined to the Mendota Pool, with restricted movement between the Mendota Pool and upstream reaches of the San Joaquin River (U.S. Bureau of Reclamation 2011). Consequently, species observed within the San Joaquin River in the vicinity of the Primary and Secondary Study Areas are similar to those documented in Mendota Pool and include a mix of native and introduced species (U.S. Bureau of Reclamation 2004). However, in 2010 the river was reconnected to the Merced River as a result of the interim

flows from Friant Dam, potentially allowing for intermixing of fish species from upstream reaches of the San Joaquin River.

The most abundant riparian communities present along the San Joaquin River in the vicinity of the Mendota Pool include riparian and willow scrub habitats. Grassland/pasture is relatively abundant, contributing almost 50 percent of the total natural land cover within Reach 2B (excluding urban and agricultural land cover types). Invasive species recorded in this segment in 2000 included large stands of blue gum (*Eucalyptus globulus*), tree-of-heaven (*Ailanthus altissima*), and giant reed (*Arundo donax*) (McBain and Trush, Inc. 2002). Additionally, red sesbania (*Sesbania punicea*) was sparsely distributed in this segment as of 2008.

Downstream of Mendota Dam, between Mendota Dam and Sack Dam, the San Joaquin River flows year-round as this reach conveys flows of up to 800 cubic feet per second (cfs) from the Mendota Pool (U.S. Bureau of Reclamation 2011). Over this reach the San Joaquin River flows through a network of large slough channels traversing extensive riparian woodland, tule (*Schoenoplectus acutus*) marshes, and backwater ponds until it joins with the Merced River (U.S. Bureau of Reclamation 2011). Sampling efforts in this reach of the San Joaquin River have documented one native fish species, Sacramento sucker (*Catostomus occidentalis*) and nine introduced species (U.S. Bureau of Reclamation 2011).

Kings River

The Kings River also originates in the Sierra Mountains, east of the City of Fresno, and flows eastward to Pine Flat Reservoir. Flows released from Pine Flat Dam run eastward to the Central Valley, where the Kings River splits into the South and North Forks. The South Fork discharges in the Tulare Lakebed, which is now usually devoid of surface water and supports intensively cultivated farmland. The North Fork flows north to the Fresno Slough and into its confluence with the San Joaquin River at Mendota Pool. Flows from the North Fork Kings River generally do not continue as far as the Fresno Slough except during flood years (see Figure 3-1).

Fresno Slough

The Fresno Slough stretches for almost 15 miles south of the Mendota Pool past the town of San Joaquin. For much of this reach, the slough is confined between levees, farmed in places, and supports limited native habitat. However, within the Primary and Secondary Study Areas, the Slough broadens into a substantial body of shallow open water, reaching up to 0.5 miles in width within the MWA. The slough continues as a broad open body of water north of SR 180 until it merges with the Mendota Pool adjacent to the Primary Study Area.

The original Fresno Slough south of the San Joaquin River was a small water body that historically did not carry significant flows. However, water diversions and hydrological changes have resulted in the northern end of the Fresno Slough occasionally carrying significant flood flows via the James Bypass off of the Kings River north into the MWA, which is managed by the CDFW (refer to Figure 1-1); however, such flows have occurred on average only once every five years since construction of Pine Flat Dam beginning in 1947 (Kings River Conservation District and Kings River Water Association 2003) (see Section 3.3, *Mendota Wildlife Area*).

As previously described, the historic direction of flow in the Fresno Slough south of the Mendota Dam was from south to north; however, due to the large water deliveries into the Mendota Pool and agricultural withdrawals in the southern portion of Fresno Slough, flow in the Fresno Slough is generally reversed, running from north to south. During the irrigation season, which generally runs from March to September, large water deliveries are made to the Mendota Pool via the DMC for delivery to agricultural users in the Mendota Pool area, including areas to the south along the Fresno Slough. As water is delivered to the north at Mendota Pool and diverted for agricultural use to the south, the direction of flow is from north to south. However, during periodic floods events within the North Fork Kings River, water from the river and James Bypass flows into the Fresno Slough in the MWA creating northerly flow conditions. Northerly flow also occurs during late November or early December outside of irrigation season, particularly if the Mendota Pool is being drained in preparation for maintenance work on Mendota Dam. Northerly flow can also occur if the diversions in the southern portion of the Fresno Slough are insufficient to offset deliveries of groundwater occurring in Mendota Pool and along the Fresno Slough.

The Fresno Slough south of the Mendota Pool broadens into a shallow complex branching water body before it flows into the Mendota Wildlife Area (Secondary Study Area), just south of Highway 180.

The Fresno Slough, south of the Mendota Dam is generally surrounded by agricultural lands to the east and west. However, the slough provides perennial slow moving open water habitat, with vegetated banks and areas of emergent vegetation, including limited riparian vegetation and freshwater emergent marsh areas (see Section 3.2, *Primary Study Area Vegetation Communities*). Approximately 3.25 miles upstream of the Mendota Dam, just north of the MWA boundary and east of the Primary Study Area, the Fresno Slough channel becomes more dendritic (i.e., branching), with more complex habitat including riparian and wetland habitats as well as annual and perennial grasslands.

Mendota Pool

The Mendota Pool is a small reservoir, approximately 1,200 acres in area, formed by the Mendota Dam at the confluence of the San Joaquin River and the Fresno Slough. The Mendota Pool is operated and maintained by the Central California Irrigation District (CCID) and serves as a managed water supply and a distribution reservoir for the CVP as well as for local water transfers. The San Joaquin River enters the Mendota Pool from the east while the Fresno Slough enters the Mendota Pool from the south. In addition to these flows, the Mendota Pool receives water from the CVP at Check 21 of the DMC, serving as the final water distribution point for the DMC. As part of the existing 2005 Mendota Pool Exchange Agreements, the Mendota Pool also receives groundwater that is pumped into the Pool by MPG and other farmers for exchange within the Mendota Pool area and across the CVP system.

The Mendota Pool is surrounded by areas of cultivated and fallow agricultural land which reduce wildlife habitat value of the pool and surrounding lands. However, slower moving water behind the dam supports various aquatic plants such as duckweed (*Spirodela polyrhiza*), western water milfoil (*Myriophyllum hippuroides*), and waterweed (*Elodea* spp.). Additionally the banks and islands within Mendota Pool support some areas of emergent vegetation and upland habitats, including both riparian and wetland vegetation. In these areas the majority of herbaceous groundcover is dominated by cattails (*Typha* spp.) and tules and other native species that have likely become established through downstream dispersal of agricultural plants and seeds (U.S. Bureau of Reclamation 2004, 2011).

The Mendota Pool is formed by the Mendota Dam, first constructed in 1871 and replaced 1919. Depending on the time of year and rainfall, Mendota Pool receives water from the Delta Mendota Canal, San Joaquin River, and Fresno Slough (North Fork Kings River).

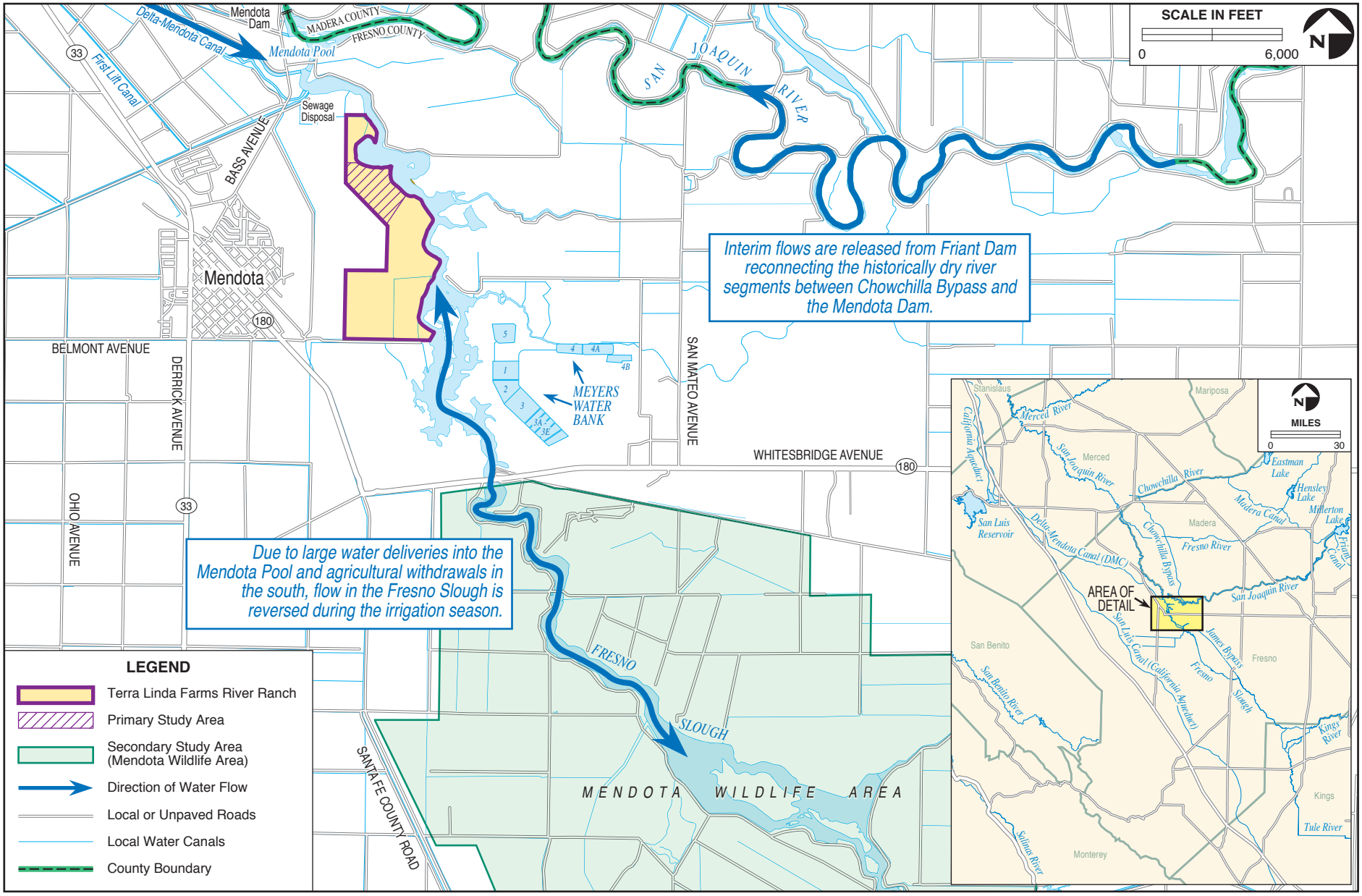
Riparian habitat occurs in the vicinity of Mendota Dam mostly in small bands along the bank of the San Joaquin River and Fresno Slough predominately composed of mature, widely spaced cottonwood and willow trees and decaying snags. Plant species observed near the dam include black willow (*Salix gooddingii*), sandbar or narrowleaf willow (*Salix exigua*), cottonwood (*Populus fremontii*), valley oak (*Quercus lobata*), button brush (*Cephalanthus occidentalis*), species of saltbush (*Atriplex* spp.), and wildrose (*Rosa californica*) (U.S. Bureau of Reclamation 2011). Additionally, a 10-acre, mature cottonwood/willow forest occurs approximately 200 feet east of the Mendota Dam along the San Joaquin River.

The Mendota Pool provides perennially inundated open-water aquatic habitat that may attract migratory ducks such as mallards (*Anas platyrhynchos*), gadwalls (*Anas stepera*), and ruddy ducks (*Oxyura jamaicensis*). Emergent vegetation provides limited habitat for marsh-dwelling species such as rails, herons, and various songbirds (U.S. Bureau of Reclamation 2011). Additionally, vegetation along parts of the Mendota Pool may provide breeding and foraging habitat for groundnesting birds, such as pheasants, ducks, and shorebirds (U.S. Bureau of Reclamation 2011).

Mendota Pool provides open water and emergent marsh habitat that attracts migratory ducks and marsh-dwelling bird species as well as supports a mix of native and introduced fish species.

The shallow backwater areas within Mendota Pool also provide habitat to support a sport fishery for nonnative species such as bass, bluegill, and bullhead. The Mendota Pool was drained in late November 2001 to allow the dam to be inspected and during this time a team of two fisheries biologists visited the Mendota Pool to conduct a qualitative survey of fish species presence and relative

abundances. Approximately 15 fish species were observed, with threadfin shad, bluegill, and inland silverside representing the most abundant species (U.S. Bureau of Reclamation 2004). Historically Mendota Pool was drained regularly by CCID to allow for dam maintenance and repair activities; these abrupt changes in water level reduce the overall fish and wildlife habitat values of the Mendota Pool (U.S. Bureau of Reclamation 2004). However, major repair and retrofits of Mendota Dam completed in 2011 substantially decrease required maintenance, with one inspection anticipated in approximately 2016 and every 20 years thereafter (see Section 6.3, *Cumulative Impacts*).



Regional Aquatic Resources within the Vicinity of Mendota Dam

FIGURE 3-1

3.2 Primary Study Area Vegetation Communities

The Primary Study Area, River Ranch North, includes approximately 85 total acres located within the Terra Linda Farms River Ranch, immediately to the west of the Fresno Slough and south of the Mendota Pool. Terra Linda Farms River Ranch, including the Primary Study Area, is surrounded by areas of cultivated and fallow agricultural land. The Primary Study Area itself is dominated by fallow agricultural land, which covers approximately 73.9 acres within the Primary Study Area and 329 acres within the entirety of Terra Linda Farms River Ranch. The remaining habitat types include ruderal, disturbed, or developed areas, as well as emergent freshwater marsh, disturbed riparian scrub, and invasive giant reed along the banks of the Fresno Slough (see Figure 3-2). Each of these vegetation communities is described in greater detail below.

Fallow Agricultural Land

As part of routine agricultural processes in the San Joaquin Valley some arable lands are fallowed for all or part of a season so that they may retain nutrients and moisture for the next crop year. Fallow lands may be plowed and/or chemically treated for control of weeds and other pests. In contrast, idle lands are areas that are removed from production for extended periods. Extended drought, lowered prices for commodities, increased power costs, and routine rotation of crops are all causes for lands to be fallowed or idled and later replanted (U.S. Bureau of Reclamation 2004).

Fallow agricultural lands are devoid of native vegetation and include low lying weedy species that provide little cover or complex habitat to support wildlife species.

Fallow agricultural land characterizes approximately 64 percent of Terra Linda Farms River Ranch and approximately 87 percent of the Primary Study Area. This habitat type is located immediately adjacent to the west of the existing Terra Linda Farms recharge canal, extending to the western boundary of the Primary Study Area. This habitat type is typically disturbed and dominated by an assemblage of nonnative annual grasses and nonnative forbs and shrubs. Further, tilling and other associated management practices reduce the overall vegetation coverage, leaving fallow lands with relatively sparse vegetation. Within the Primary Study Area much of this area is characterized by bare ground with patchy nonnative grasses and forbs less than two inches in height. Sparse shrubs including alkali weed (*Malvella leprosa*), quail bush (*Atriplex lentiformis*), and salt cedar (*Tamarisk chinensis*) are also found adjacent to the disturbed roadsides.

Although the fallow lands provide relatively low quality habitat, farmland removed from production can provide habitat for wildlife species within the Central Valley, including sensitive species (Hopkins 1999). In particular, fallow land adjacent to or located in the vicinity of permanently protected habitat areas (e.g., MWA) are likely to provide greater wildlife benefits (Rapport et al. 2003). During the habitat assessment survey Swainson's hawk was observed

foraging within the area of fallow land on the southeastern corner of Terra Linda Farms River Ranch, immediately south of the Primary Study Area. Consequently, it is likely that Swainson's hawk and other bird species forage within this area.

Ruderal

Ruderal (i.e., disturbed) habitats are defined where disturbance is sustained, but there is no intentional replacement of vegetation (e.g., cultivation) (Frenkel 1977). This habitat type is characterized by early successional herbaceous weeds, which are the first to colonize disturbed lands. Ruderal species are fast-growing and typically dominate the disturbed area initially, but are succeeded by slow-growing species that more efficiently compete for limited resources. However, in areas characterized by on-going disturbance a ruderal community may become permanently established.

An approximately 55-acre area of ruderal habitat occurs along the southeastern corner of Terra Linda Farms River Ranch, south of the Primary Study Area, and is characterized by low lying herbaceous weedy species that provide upland habitat for transient and resident wildlife species.

Ruderal habitat covers approximately 79 acres within Terra Linda Farms River Ranch and approximately 0.7 acres within the Primary Study Area. This habitat type is found adjacent to roadways and agricultural ditches as well as in larger patches in the southeast and northeast corners of Terra Linda Farms River Ranch. The largest area of contiguous ruderal habitat within Terra Linda Farms River Ranch is located in the southeastern corner (see Figure 3-2). This habitat transitions to the east into disturbed riparian scrub and emergent freshwater marsh which occurs between the ruderal habitat and the open water habitat of the Fresno Slough. This area appears marshy and wet in aerial photos from 2011; however it was dry during the site visit and dominated by weedy plants with the exception of areas that abut the boundaries of what has been mapped as disturbed riparian and freshwater marsh. Patches of dead common tule were observed along the margins. This habitat is characterized by plant species typical of ruderal habitats in the region including nonnative grasses, alkali weed, and quail bush. Additionally, this area is bounded to the north, south, and west by agricultural ditches (see Figure 3-2). A large willow tree is present in the northwest corner of this habitat patch and may be used by bird species for nesting, perching, or passing through into the fallow agricultural land located to the west. Several avian species were observed during the site reconnaissance including American kestrel (*Falco sparverius*), northern mocking bird (*Mimus polyglottos*), bullocks oriole (*Icterus bullockii*), western kingbird (*Tyrannus verticalis*), house finch (*Carpodacus mexicanus*), European starling (*Sturnus vulgaris*), and red-tailed hawk (*Buteo jamaicensis*). Cottontails (*Sylvilagus* sp.) were also observed.

Disturbed Riparian Scrub

Areas classified as riparian scrub consist of woody shrubs and herbaceous species. Within Terra Linda Farms River Ranch this habitat is very patchy and disturbed, located between developed

roads along the slough and the ruderal habitat in the southeastern corner. It does not form a contiguous riparian corridor but is characterized by species that are typical of riparian scrub habitat in the Central Valley including narrowleaf willow (*Salix exigua*) , arroyo willow (*Salix lasiolepis*), and salt cedar, intergraded with minor amounts of freshwater marsh vegetation including species found in this habitat as described below.

Disturbed riparian scrub habitat within the vicinity of Primary Study Area occurs to the south of the existing recharge canal and west of the Fresno Slough. This habitat type covers just 1.98 acres within Terra Linda Farms River Ranch; however it does not occur within the Primary Study Area. Although this habitat area is limited within the Primary Study Area, surrounding disturbed riparian scrub provides nesting, foraging, and roosting habitat for several common wildlife species. The species observed utilizing this habitat during the site visit include those listed above in the ruderal habitat description.

Emergent Freshwater Marsh

Emergent freshwater marsh habitat is located to the south of the Primary Study Area including a relatively large 16-acre habitat patch in the southwestern corner of the Britz Property, adjacent to Fresno Slough. This area includes large dense stands of emergent cattail, common tule, and other aquatic sedges (*Scirups* spp.). Scattered salt cedar and curly dock (*Rumex crispus*) are present along the drier margins of this habitat where it transitions into disturbed ruderal areas. Emergent freshwater marsh also forms a narrow band of vegetation along the southern bank of Fresno Slough extending along approximately one half of the Primary Study Area, until giant reed begins to dominate along the northern portion (see Figure 3-2). The Fresno Slough provides a combination of open water and emergent marsh habitat for wading birds, waterfowl, and other water birds.

This area represents relatively high quality habitat, which supports a number of special status bird species including species of special concern western grebe (*Aechmophorus occidentalis*) and American white pelican (*Pelecanus erythrorhynchos*) as well as watch list species northern harrier (*Circus cyaneus*). Additionally, emergent freshwater marsh habitat supports nesting red-winged black birds (*Agelaius phoeniceu*s) as well as wading bird species, such as great blue herons (*Ardea herodias*) and great egrets (*Ardea alba*), which were observed during the habitat assessment. Further, this area also provides potential habitat for terrestrial and semi-aquatic species, including federally threatened giant garter snake.

Approximately 8,000 feet of unlined irrigation ditches occur within the southern region of the Terra Linda Farms River Ranch. These ditches include open water habitat as well as emergent and aquatic vegetation.

Agricultural Ditch

Agricultural ditch habitat within the Primary Study Area is limited to the existing Terra Linda Farms recharge canal. As previously described, the existing recharge canal is approximately 9,500 feet in length

and provides periodic open water habitat during some flood years. Additionally, the irrigation ditches to the south include an 8,000 linear feet of open water habitat within the remainder of Terra Linda Farms River Ranch. The unlined irrigation ditches, which are three to four feet in height, are characterized by varying densities of herbaceous vegetation along the banks (i.e., bare soil to six foot bands of aquatic vegetation). Aquatic plant species observed growing along the banks of these ditches during the habitat assessment included primarily cattails and water primrose (*Ludwigia* spp.) as well as floating algal mats, duckweed (*Lemna* spp.), and aquatic fern (*Azolla* spp.). Additionally, during the habitat assessment a bullfrog (*Rana catesbeiana*) was heard calling and muskrat (*Ondatra zibethicus*), mosquito fish (*Gambusia affinis*), and carp were observed in the irrigation ditches. Barn swallows (*Hirundo rustica*), cliff swallows (*Petrochelidon pyrrhonota*), and a species of species concern, a loggerhead shrike (*Lanius ludovicianus*), were also observed along the agricultural ditches during the site visit. Additionally a large willow tree was identified in the southwestern end of the Terra Linda Farms River Ranch along the irrigation ditch.

Giant reed

Giant reed occurs along the Fresno Slough immediately to the east of the Primary Study Area, comprising approximately two percent of the total habitat area within the Terra Linda Farms River Ranch. Giant reed is a highly invasive nonnative herbaceous perennial plant that thrives in all types of soils and under a broad range of ecological conditions. After establishing at the water's edge, giant reed quickly moves up the riparian profile and begins establishing in the drier upland surroundings (Bell 1998).

Giant reed is an invasive herbaceous perennial plant that occurs alongside approximately 6,250 feet of the Fresno Slough. Giant reed aggressively outcompetes adjacent native emergent marsh and riparian communities.

Vegetative reproduction occurs through horizontally growing stems lying beneath the soil surface that produce roots and shoots. As the roots spread from the parent plant, new clones sprout up from underground stems and during floods plant fragments may be carried downstream to new sites where they take root and begin forming a new colony (Dudley 2000).

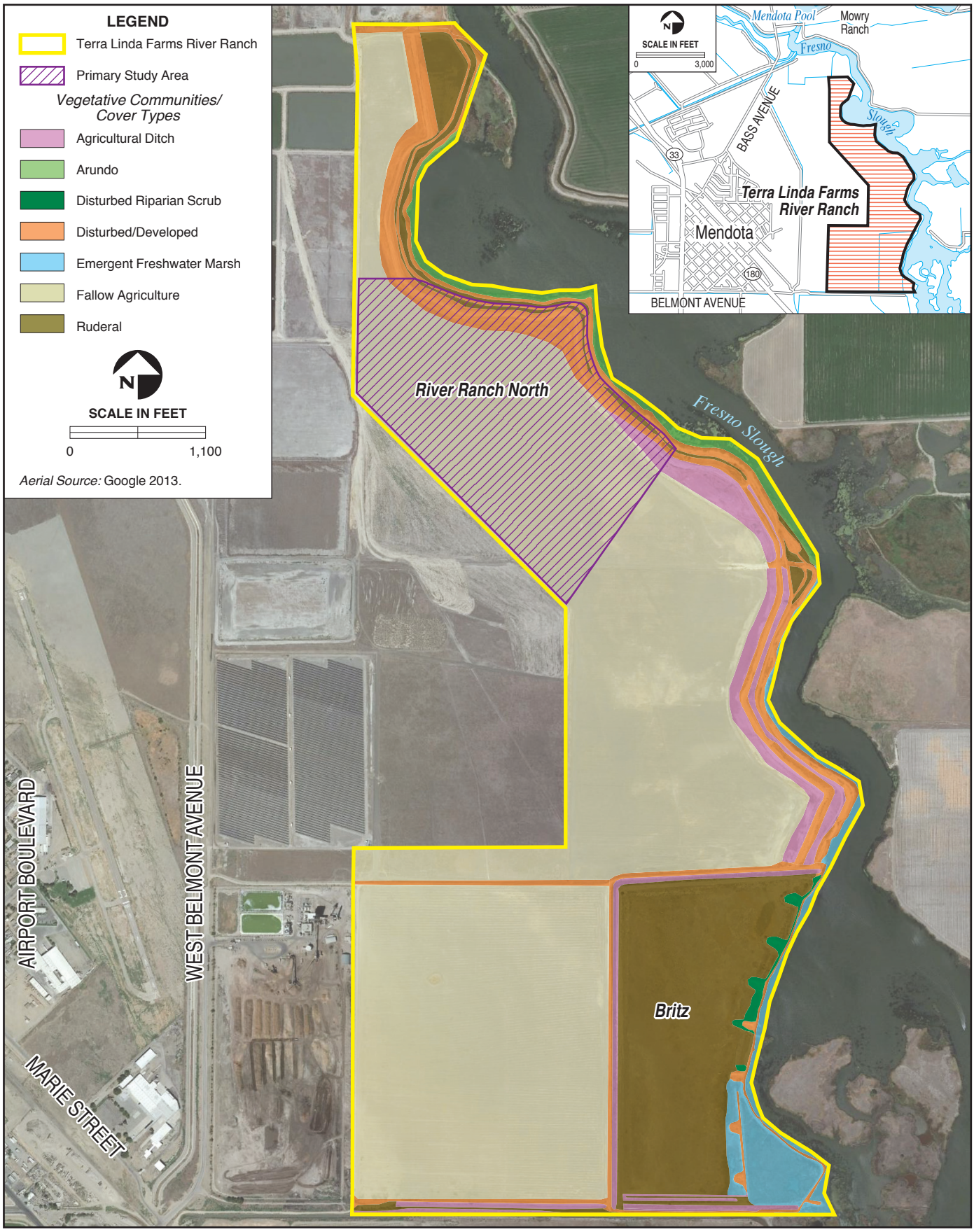
A number of toxic compounds are produced within various plant parts that help to prevent the growth of other plant species (Bell 1998). Additionally, as giant reed replaces native riparian vegetation, it reduces habitat and the food supply, particularly insects, needed by riparian birds (Dudley 2000). Further, although often planted for erosion control, giant reed can promote bank erosion because its shallow root system is easily undercut and bank collapse may follow (Dudley 2000). Densely growing stands of giant reed in the low-flow channel and along stream banks can cause channel constriction that can reduce flood capacity and contribute to flooding and lateral erosion. Further, giant reed exhibits extremely high water demand contributing impacting water availability to both native habitats and farmers. As a result, farming interests sometimes pursue giant reed eradication and native habitat restoration projects to reduce flooding/erosion concerns and limit water demand.

Disturbed/Developed

Disturbed lands are those on which the native vegetation has been completely removed by grading and development. Disturbed areas include paved and unpaved roadways as well as structures and cleared pads for temporary or permanent agricultural equipment. Such areas are not expected to support any naturally occurring vegetation, although invasive native and nonnative plant species frequently colonize disturbed sites. Disturbed areas have little potential to support sensitive plant or wildlife species. However, some species such as western burrowing owls (*Athene cunicularia*) are tolerant of disturbed landscapes if certain habitat requirements are met.

Most disturbed habitats are found primarily along the eastern edge of Terra Linda Farms River Ranch bordering the Fresno Slough. These habitats generally consist of unpaved roads as well as farming equipment pads located in the southeastern corner of the Terra Linda Farms River Ranch. Structures along the Fresno Slough may provide potential habitat to a variety of wildlife species including birds, bats, and opportunistic mammals, which could burrow beneath the structures.

Disturbed habitats in the vicinity of Primary Study Area are limited to permanent agricultural equipment (left) as well unpaved roads, which run along the banks of the Fresno Slough. While the roadway provides no suitable wildlife habitat, the waterside of these roads are often lined with emergent marsh species such as cattails (right).



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Vegetative Communities within Terra Linda Farms River Ranch

FIGURE 3-2

3.3 Mendota Wildlife Area

The Secondary Study Area includes the 12,425-acre MWA, which is bisected by the Fresno Slough for more than five miles (see Figure 3-3). The MWA is a publicly owned and managed wetland located approximately 2.5 miles south of the Primary Study Area (U.S. Bureau of Reclamation 2004). The primary goals of the MWA include providing suitable habitat and living space for the preservation of native species, including nongame and sensitive plant and wildlife species (Center for Natural Lands Management 2004).

The Mendota Wildlife Area is located approximately 2.5 miles south of the Primary Study Area, and includes approximately 8,300 acres of managed wetland habitat. This area, connected to the Primary Study Area by the Fresno Slough, is located along the Pacific Flyway and provides high quality habitat for migratory waterfowl and shorebirds as well as numerous species status species.

The MWA supports approximately 8,300 acres of wetlands, including approximately 6,819 acres managed as seasonally flooded wetlands, 457 acres as semi-permanent wetlands, and 1,194 acres as permanent wetlands (U.S. Bureau of Reclamation 2011). Additional habitats include riparian corridors and several hundred acres of upland and alkali sink habitat as well as farmland. Historic natural water flows within the MWA have been significantly altered as a result of large scale farmland reclamation and diversion of historic river flows. As a result, many of the seasonal wetlands at MWA are sustained by surface irrigation. A series of levees, ditches, culverts, and pumps are used to maintain wetland habitats (Center for Natural Lands Management 2004). Most of the site is seasonally flooded wetland, but attempts are made to keep water year-round on approximately 10 percent of the site, which provides critical habitat for many species of migrant and ground nesting birds as well as warm water fish populations (Center for Natural Lands Management 2004). The MWA is dependent on water pumped out of the Fresno Slough as a key water source for sustaining the wetlands within this refuges (U.S. Bureau of Reclamation 2011). Additionally, periodic flood flows from the Kings River also irregularly flush through the Fresno Slough and MWA (refer to Section 3.1, *Regional Aquatic Resources*).

Vegetation at the MWA is primarily managed to encourage production of native plants that provide food for waterfowl (U.S. Bureau of Reclamation 2004). Major plant communities and habitat types are seasonally flooded brackish emergent wetland, valley foothill riparian, and, to a lesser extent, alkali sink scrub (Center for Natural Lands Management 2004). Other native communities at MWA are valley sink scrub, valley sacaton grasslands, and heavily grazed scalds and vernal pools (U.S. Bureau of Reclamation 2004). The upland areas are limited in size, but are also important in that they provide habitat for threatened and endangered species.

The MWA is located along the Pacific Flyway and provides valuable habitat for migratory waterfowl and shorebirds as well as year-round habitat for resident bird species (U.S. Bureau of Reclamation 2011). Approximately 200 species of migratory and resident birds are known to use the area (Center for Natural Lands Management 2004). During the winter and spring, thousands

of shorebirds, white-faced ibis (*Plegadis chihi*), cattle egret (*Bubulcus ibis*), greater egret, snowy egret (*Egretta thula*), great blue heron, and long-bill curlews (*Numenius americanus*), frequent the MWA and nest in native habitat types (U.S. Bureau of Reclamation 2004). The Audubon Society reports that white-tailed kite (*Elanus leucurus*) and blue grosbeak (*Passerina caerulea*) also maintain sizable populations within the MWA. Mammals commonly found within the MWA include coyote (*Canis latrans*), muskrat (*Ondata zibethicus*), American beaver (*Castor canadensis*), mink (*Mustela* spp.), raccoon (*Procyon lotor*), long-tailed weasel (*Mustela frenata*) (City of Mendota 2009). Additionally, common fish species found at the refuge include black crappie (*Pomoxis nigromaculatus*), bluegill, and common carp (*Cyprinus carpio*) (City of Mendota 2009).

3.4 Alkali Sink Ecological Reserve

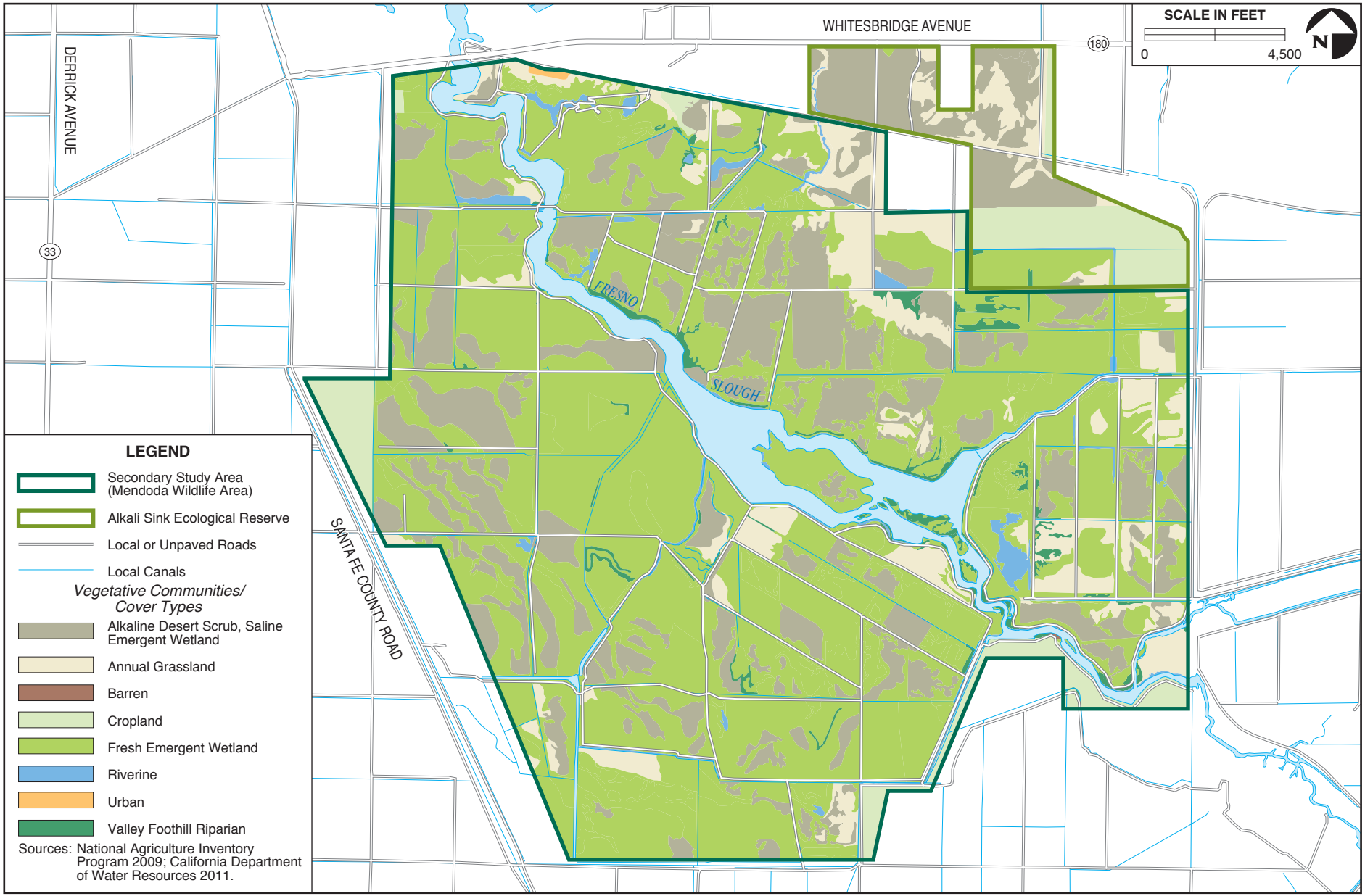
The Alkali Sink Ecological Reserve is an approximately 800-acre protected area located adjacent to the northeast of the MWA (see Figure 3-3). Alkali sink communities in this area are dominated by annual forb and grass vegetation as well as salt basin and high marsh, which is characterized by alkali heath (*Frankenia salina*), iodinebush (*Allenrolfea occidentalis*), alkali seaheath (*Frankenia salina*), saltgrass (*Distichlis spicata*), and pickleweed (*Salicornia virginica*) as well as salt scald and associated sparse vegetation. These communities, which occur in areas of highly alkaline soils, have largely been extirpated from the Central Valley by conversion to agricultural fields, construction of canals and transportation corridors, and urbanization.

The Alkali Sink Ecological Reserve includes critical habitat for the federally and state-endangered Fresno kangaroo rat (*Dipodomys nitratoides exilis*), which was last captured in late 1992 within the boundaries of the Alkali Sink Ecological Reserve (Williams et al. 1998). The Fresno kangaroo rat has narrow habitat requirements and occupies alkali desert scrub communities between 200 and 300 feet above mean sea level (msl) (McBain and Trush, Inc. 2002).

Additionally, the federally and state-endangered palmate bracted bird's beak (*Cordylanthus palmatus*) also occurs within the Alkali Sink Ecological Reserve. Palmate-bracted bird's-beak is known to be extant at only eight localities, most of which are in the Sacramento and Livermore valleys. The Alkali Sink Ecological Reserve population is considered to be crucial to the species' recovery because it incorporates genetic information not found elsewhere (Williams et al. 1998).

Further, the adjacent Alkali Sink Ecological Reserve is regularly used by greater and lesser sandhill cranes (*Grus canadensis* ssp. *tabida* and *Grus canadensis* ssp. *canadensis*), northern harriers (*Circus cyaneus*), Swainson's hawks, mountain plovers (*Eupoda montana*), burrowing owls, and tricolored blackbirds (*Agelaius tricolor*) (U.S. Bureau of Reclamation 2011).

The Alkali Sink Ecological Reserve is not directly included as a part of the Secondary Study Area as the reserve is not hydrologically connected to the Fresno Slough and would not be directly impacted by the Proposed Action or the construction of the proposed groundwater recharge basin. However, the Alkali Sink Ecological Reserve may provide some adjacent habitat suitable for sensitive species located within the MWA.



Mendota Wildlife Area and Alkali Sink Ecological Reserve Vegetative Communities

FIGURE 3-3

4.0 SPECIAL STATUS BIOLOGICAL RESOURCES

Prior to conducting fieldwork, the CNDDB was reviewed for the most recent distribution information regarding special status plant and wildlife species within the Mendota Dam, Tranquillity, and Firebaugh 7.5-minute USGS quadrangles, which include the Primary and Secondary Study Areas. Additionally, existing biological studies, including the Biological Evaluation for the 2011 Amendment to the Meyers Groundwater Banking Exchange Agreement were reviewed for relevant information associated with the Primary Study Area.

Information on special status plant species was compiled through a review of the following:

- *California Natural Diversity Database* (CDFW 2013a)
- *Inventory of Rare and Endangered Plants of California* (CNPS 2010)
- *State and Federally Listed Endangered, Threatened, and Rare Plants of California* (CDFW 2013c)
- *Special Vascular Plants, Bryophytes, and Lichens List* (CDFW 2013b)
- *Federal Endangered and Threatened Species List Listings and Occurrences for California* (USFWS 2013a).

Information on special status wildlife species was compiled through a review of the following:

- *California Natural Diversity Database* (CDFW 2013a)
- *State and Federally Listed Endangered and Threatened Animals of California* (CDFW 2013c) and *Special Animals List* (CDFW 2011)
- *Federal Endangered and Threatened Species List* (USFWS 2013a)

4.1 Special Status Plants

Special status plant species include federally or state-listed endangered, threatened, or candidate species as well as rare species as designated by USFWS, CDFW, and CNPS. The CNPS's ranking is sanctioned by CDFW and serves as a list of candidate plant species. CRPR 1B and CRPR 2 species are considered eligible for state listing as endangered or threatened under the California Department of Fish and Game (CDFG) Code. Such species should be fully considered during preparation of environmental documents subject to CEQA. CRPR 3 species lack sufficient biological information necessary to assign them to one of the other rankings and CRPR 4 species are uncommon enough that their status should be regularly monitored. Such plants may be eligible or may become eligible for state listing, and the CNPS and CDFW recommend that these species be evaluated for consideration during the preparation of CEQA documents.

Plant species considered to be special status for purposes of this report meet at least one of the following criteria:

- Covered under the Federal or California Endangered Species Act (ESA and CESA, respectively)
- Listed as rare under the California Native Plant Protection Act (CDFG Section 1900 *et seq*.)

- CRPR: 1A (presumed extinct in California), 1B (rare, threatened, and endangered in California and elsewhere), or 2 (rare, threatened, or endangered in California, but more common elsewhere) species are considered special status plant species if they meet the definitions of Sec. 1901, Chapter 10 (Native Plant Protection Act) or Sections 2050 through 2098 (CESA)
- CRPR: 3 (plants about which we need more information a review list), or 4 (plants of limited distribution [watch list])

Based on a database and literature review, including the CDFW NOP comment letter dated 10 May 2013, 11 special status plant species have been recorded historically within the vicinity of the Primary and Secondary Study Areas and are considered to have at least some potential to occur within the vicinity of the Primary and Secondary Study Areas.

Figure 4-1 depicts special status plant species that have been observed and recorded within vicinity five mile radius of the Primary and Secondary Study Areas; however, most of the special status plant species occurring in the region are not expected to occur on-site due to a lack of suitable habitat types (refer to Figure 3-2). Most of the land on-site has been disturbed by agricultural operations and the majority of the Primary Study Area (i.e., 87 percent) is currently comprised of fallow agricultural fields. Additionally, approximately nine acres of riparian area along the Fresno Slough has been overtaken by invasive giant reed. Further, the soils in the Primary Study Area are comprised of Tachi clay and Tranquillity clay, which are less saline than the alkali-saline sands and loams that support sensitive plant species in the Alkali Sink Ecological Reserve.

The habitat assessment conducted on 26 June 2013 did not identify any special status plant species. Potentially suitable habitats for sensitive plant species surrounding the Primary Study Area are limited to disturbed riparian scrub and freshwater emergent marsh, located primarily in the southern region of the Terra Linda Farms River Ranch North (refer to Section 3.2, *Primary Study Area Vegetation Communities*). Two CRPR 1B.2 species and one CRPR 4.2 species have a low potential to occur within the Primary Study Area. Additionally, two CRPR 1B.2 species have a very low potential to occur based on their occurrence in the vicinity (see Figure 4-1) and potential habitats on-site.

All species recently or historically identified within a five-mile radius of the Primary Study Area are discussed in more detail below. These species are also summarized in Table 4-1. Due to the highly disturbed nature and general lack of suitable habitat, the potential for occurrence of these species on-site is not expected or considered to be low.

Table 4-1 Special status Plant Species Potentially Occurring in the Primary Study Area

Species Name	Common Name	Federal Status	State Status	CRPR	Potential to Occur within Primary Study Area
Plants					
Cordylanthus palmatus	palmate-bracted bird's-beak	E	E	1B.1	Not Expected
Sagittaria sanfordii	Sanford's arrowhead	-	-	1B.2	Very Low
Layia munzii	Munz's tidy-tips	-	-	1B.2	Not Expected
Atriplex cordulata var. *cordulata*	heartscale	-	-	1B.2	Not Expected
Atriplex coronata var. *vallicola*	Lost Hills crownscale	-	-	1B.2	Not Expected
Atriplex depressa	brittlescale	-	-	1B.2	Not Expected
Atriplex subtilis	subtle orache	-	-	1B.2	Low
Atriplex minuscula	lesser saltscale	-	-	1B.1	Not Expected
Eriastrum hooveri	Hoover's eriastrum	-	-	4.2	Low
Delphinium recurvatum†	recurved larkspur	-	-	1B.2	Low
Monolopia congdonii†	San Joaquin woollythreads	E	-	1B.2	Very Low

Sources: CDFW 2013b; CDFW 2013c.

Notes: †Not identified in the CDFW letter dated 10 May 2013, but documented in the CNDDB five-mile radius search. Blooming periods for plant species are described in the individual species summaries below.

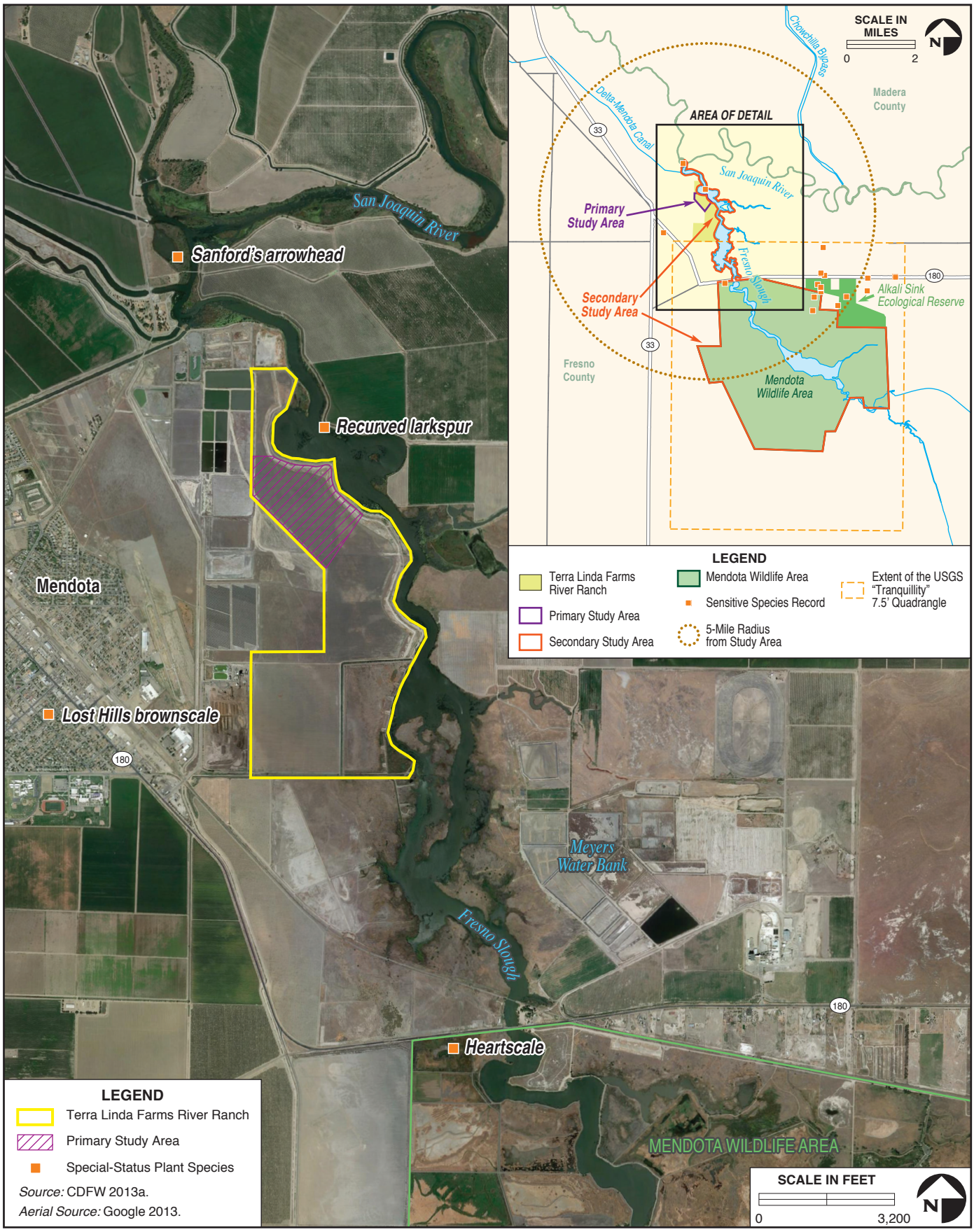
CALIFORNIA RARE PLANT RANK

1B = Plants rare, threatened, or endangered in California and elsewhere

4 = Plants of limited distribution

0.1 = Seriously Threatened in California = Over 80% of occurrences threatened/high degree and immediacy of threat

0.2 = Fairly Threatened in California = 20%- 80% occurrences threatened/high degree and immediacy of threat



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Special-Status Plant Species

FIGURE 4-1

Palmate-bracted bird's-beak

Palmate-bracted bird's beak (*Cordylanthus palmatus*), a federally and state-listed endangered species as well as a CRPR 1B.1 species, is a highly branched annual species with club-shaped petals characterized by short glandular hairs. This species blooms between May and October during which time the upper lips of the petals are hooked-shaped like a bird's beak and the lower lip is inflated like a pouch. Further, the flowers are nearly hidden by bracts, which are leaf-like structures (Williams et al. 1998).

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 (i.e., barren areas with a surface crust of salts), and grassy areas (Williams et al. 1998). Palmate-bracted bird's beak occurs in the Valley Sink Scrub and Alkali Meadow natural communities in association with other halophytes such as iodine bush (*Allenrolfea occidentalis*), alkali heath (*Frankenia salina*), glasswort (*Salicornia subterminalis*), seepweed (*Suaeda moquinii*), and salt grass (Williams et al. 1988). This species was recorded within the MWA as recently as 1997 in saline-alkali soil within a larger upland area.

While the Primary Study Area occurs along the western bank of the Fresno Slough, it does not include suitable alkali soils and associate species. Consequently palmate-bracted bird's beak is not expected to occur within the Primary Study Area.

Sanford's arrowhead

Sanford's arrowhead (*Sagittaria sanfordii*), a CRPR 1B.2 species, is a rhizomatous emergent perennial herb. This species, which blooms between May and October, grows in freshwater marshes, ponds, and ditches as well as various other shallow freshwater habitats (Hickman 1993). Sanford's arrowhead is distributed throughout the northern part of the north coast, Central Valley, and northern part of the south coast of California (Hickman 1993).

Sanford's arrowhead (left) and recurved larkspur (right) have both been recorded within the vicinity of the area of potential effect. However, Sanford's arrowhead and recurved larkspur have not been observed in this area since 1903 and 1948, respectively. Photographs courtesy of the Natomas Basin Conservancy and CNPS.

Sanford's arrowhead has been documented in the Firebaugh, Mendota Dam, and Tranquillity7.5-minute quadrangles. Further, one occurrence of Sanford's arrowhead has been recorded within the immediate vicinity of Mendota Pool (refer to Figure 4-1). However, this species has not been recorded in this area since 1948 and consequently, it has a very low potential for occurrence within the Primary Study Area (CDFW 2013a).

Munz's tidy-tips

Munz's tidy-tips (*Layia munzii*), a CRPR 1B.2 species, is a low-growing annual plant that flowers during March and April. The ray florets of this species are yellow with white tips and its disk florets are yellow. Munz's tidy-tips grows on alkaline clay in low-lying scrublands and on hillsides in grasslands. Associated species may include red brome (*Bromus madritensis* ssp. *rubens*), annual fescue (*Vulpia microstachys*), Lost Hills saltbush (*Atriplex vallicola*), common tidy-tips (*Layia platyglossa*), iodine bush (*Allenrolfea occidentalis*), and spiny saltbush (*Atriplex spinifera*) (Williams et al. 1998).

Munz's tidy tips have been observed just north of the Alkali Sink Ecological Reserve along the north side of Highway 180 as recently as 2008. However, suitable habitat and associate species do not occur within the Primary Study Area. Photograph courtesy of Los Padres Forest Watch.

Historically, Munz's tidy-tips was widespread in the western San Joaquin Valley. However, few of the historical populations in Fresno, Kern, and San Luis Obispo have been confirmed in the past 50 years. Munz's tidy tips were recorded within the Firebaugh 7.5-minute quadrangle in 1941 and within the Tranquillity 7.5-minute quadrangle, approximately 5.5 miles southwest of the Primary Study Area and 0.75 northeast of the MWA, as recently as 2008. Still, suitable alkali habitat and associate species do not occur within the Primary Study Area and consequently, this species is not expected to occur on-site.

Heartscale

Heartscale (*Atriplex cordulata*), a CRPR 1B.2 species, is a gray-scaly, annual herb that grows up to approximately 1.5 feet in height, with one to a few branches arising from its base. This species has ovate heart-shaped leaves, the lower ones with round lobes at the base. This species blooms between April and October. Its flowers are inconspicuous and the plant is most easily identified after flowering (Hickman 1993).

Heartscale grows in sandy, saline or alkaline flats or scalds, in chenopod scrub, meadows, and valley and foothill grassland. It has been found growing with, or near three other special status species including, dwarf downing (*Downingia pusilla*), Carquinez goldenbush (*Isocoma arguta*), and legenere (*Legenere limosa*).

Heartscale is endemic to California, and occurs primarily in the Central Valley. It is known to occur in Alameda, Contra Costa, Colusa, Fresno, Glenn, Merced, Solano, and Yolo Counties, but is believed to be extirpated from San Joaquin, Stanislaus, and Tulare counties (CNPS 2013). This species has been observed and recorded in the Mendota Dam and Tranquillity 7.5-minute quadrangles as recently as 2000 and 2009, respectively. The most recent observations of this species were recorded in the MWA as well as the Alkali Sink Ecological Reserve, more than 2.5 miles to the south of the Primary Study Area. However, suitable habitat, including alkali soils, is not present within the Primary Study Area and consequently, it is not expected to occur on-site.

Lost Hills crownscale

Lost Hills crownscale (*Atriplex coronata* var. *vallicola*), a CRPR 1B.2 species, is an annual herb, which blooms between May and October and is endemic to California. This species occurs in alkaline soil under vernally-flooded conditions at elevations up to 1,000 feet. Lost Hills crownscale was historically found in Fresno, Kern, and San Luis Obispo counties; however the two large remaining populations occur in the Kern-Kings county boundary near the community of Lost Hills, and on the Carrizo Plain in San Luis Obispo County (Williams et al. 1998). Although, much smaller populations are also known from the Lokern McKittrick area of Kern County, southwestern Merced County, and Kerman Ecological Reserve in Fresno County, approximately five miles east of the Alkali Sink Ecological Reserve and 10 miles southeast of the Primary Study Area (Williams et al. 1998).

Lost Hills crownscale has been observed and recorded in the Alkali Sink Ecological Preserve as recently as 2008; however, it has not been recorded within five miles of the Primary Study Area since 1938. Consequently, this species is not expected to occur within the Primary Study Area.

Brittlescale

Brittlescale (*Atriplex depressa*), a CRPR 1B.2 species, is an annual herb that is found alkali soils of the Pescadero and Solano series in chenopod scrub, playas, and valley-foothill grassland habitats. It generally grows prostrate, rarely exceeds eight inches in height and blooms from May through October (Hickman 1993). Brittlescale has is known to occur in Alameda, Contra Costa, Colusa, Fresno, Glenn, Kern, Madera, Merced, Solano, Tulare, and Yolo counties.

Brittlescale has been observed as recently as 2008 just north of the Alkali Sink Ecological Reserve, approximately five miles southwest of the Primary Study Area. However, the Primary Study Area does not include Pescadero or Solano soils and lacks chenopod scrub, playas, and valley-foothill grassland habitats. Consequently, this species is not expected to occur within the Primary Study Area.

Subtle orache

Subtle orache (*Atriplex subtilis*), a CRPR 1B.2 species, is an annual species that blooms between June and October. Subtle orache occurs in grasslands, often in the vicinity of vernal pools, and is similar in appearance to brittlescale and lesser saltscale; its upright stems are often reddish-purple, like the latter. Subtle orache has leaves that are less than 0.25 inches long and smaller than those of brittlescale. The two species also differ in the details of the reproductive parts. Unlike lesser saltscale, subtle orache has primarily opposite leaves and branches. Subtle orache is known to occur in Butte, Merced, Madera, Fresno, Tulare, Kings, and Kern counties.

Subtle orache has been observed approximately 10 miles to the northwest of the Primary Study Area as recently as 2000. However, suitable habitat does not occur in the Primary Study Area. Photograph courtesy of CSU Stanislaus, Endangered Species Recovery Program.

Subtle orache has been observed as recently as 2000; however, these occurrences were recorded approximately 10 miles from the Primary Study Area. Additionally, the Primary Study Area lacks suitable habitat for this species. Consequently, subtle orache is not expected to occur within the Primary Study Area.

Lesser saltscale

Lesser saltscale (*Atriplex minuscule*), a CRPR 1B.1 species, is an annual herb that has egg-shaped leaves and many upright reddish stems that grow up to 16 inches in height. Lesser saltscale, which blooms between May and October, occurs in alkaline soils of chenopod scrub, playa, and grassland habitats (CNPS 2013). Lesser saltscale is known to have occurred historically in the southern San Joaquin Valley (Hickman 1993). Its distribution extended through Fresno, Kern, Madera, Merced, and Tulare counties (CNPS 2013). However, this species is now known to occur only in Merced, Kern, Fresno, and Butte counties (CDFW 2013a).

Lesser saltscale has been recorded as recently as 2009 within the Alkali Sink Ecological Reserve; however, appropriate soils and habitat types do not occur within the Primary Study Area. Therefore, lesser saltscale is not expected to occur within the Primary Study Area.

Hoover's eriastrum

Hoover's eriastrum or Hoover's woolly-star (*Eriastrum hooveri*), a CRPR 4.2 species, is characterized by thread-like leaves that often have two narrow lobes near the base. This species also has wiry stems that vary in height and may branch. Hoover's eriastrum, which blooms between March and June, has small flowers ranging in color from white to pale blue that are nearly hidden in tufts of woolly hair.

Hoover's eriastrum was documented within the boundaries of the MWA in 1986; however, optimal habitat for this species does not occur within the Study Area. Photograph courtesy of R. Bittman, CNPS.

Most of the occurrences of this species are concentrated in four metapopoulations that occur in Fresno County, Kings County, Kern County, and San Luis Obispo County with smaller isolated populations occurring in scattered areas including the Alkali Sink Ecological Reserve. Populations of Hoover's eriastrum occur in alkali sinks, washes, on both north- and south-facing slopes, and on ridgetops. This species occurs in a wide variety of plant communities, most of which are characterized by shrubs including common saltbush (*Atriplex* spp.), seepweed (*Suaeda* spp.), and matchweed (*Gutierrezia californica*). Additionally, herbaceous species frequently found in association with Hoover's eriastrum include red brome, goldfields (*Lasthenia* spp.), many-flowered eriastrum (*Eriastrum pluriflorum*), and red-stemmed filaree (*Erodium ciculatorium*).

Hoover's eriastrum was last documented in the vicinity of the Primary Study Area in 1986 when it was observed within the boundaries of the MWA. However, habitat for this species within the Primary Study Area is of low quality and associate species have not been identified within the boundaries of the Primary Study Area. Therefore, there the potential for occurrence of this species is low.

Recurved larkspur

Recurved larkspur (*Delphinium recurvatum*), a CRPR 1B.2 species, is a perennial herb that grows in seasonal alkali wetlands of chenopod scrub, grassland, and montane woodland communities, typically on valley bottoms on heavy clay alkali soils. It is widely distributed throughout elevations of ranging between approximately 100 to 2,000 feet in the Central Valley (Hickman 1993).

This species grows to heights ranging between seven and 34 inches with basal leaves characterized by three to 11 lobes. Flowers consist of five light blue sepals and four white petals that bloom from March to June (Hickman 1993).

Recurved larkspur was observed within the immediate vicinity of the Primary Study Area in 1903; however, no additional observations have been made since. Consequently, while potential habitat for this species occurs within the ruderal and riparian portions of the Primary Study Area, it is considered to have a low potential for occurrence.

San Joaquin woollythreads

San Joaquin woollythreads (*Monolopia congdonii*), a federally endangered species and CRPR 1B.2 species, is an annual herb with many long trailing stems covered with tangled hairs. This species, which blooms between February and April, has tiny yellow flowers that are clustered at the tips of the stems and branches. This species occurs on sandy, sandy loam, or silty soils in nonnative grassland, valley saltbush scrub, interior coast range saltbush scrub, and upper sonorant subshrub. San Joaquin woollythreads typically occupies microhabitats with less than 10 percent shrub cover, although herbaceous cover may be either sparse or dense (Williams et al. 1998).

Plant species that often occur with San Joaquin woollythreads include red brome (*Bromus madritensis* ssp. *rubens*), red-stemmed filaree (*Erodium cicutarium*), goldfields (*Lasthenia* spp.), Arabian grass (*Schismus* spp.), and mouse-tail fescue (*Vulpia myuros*). Hoover's woolly-star (*Eriastrum hooveri*) often occurs in populations of San Joaquin woollythreads (Williams et al. 1998).

San Joaquin woollythreads was observed approximately 2.5 miles south of the MWA in 1935; however, no additional observations have been made since. Further, potential habitat within the Primary Study Area is of very low quality. Consequently, this species has a very low potential for occurrence on-site.

4.2 Special Status Wildlife

Special status wildlife include federally and state-listed species as well as candidate species for listing. Additional species receive Federal protection under the Bald and Golden Eagle Protection Act (e.g., bald eagle and golden eagle), the Migratory Bird Treaty Act (MBTA) and state protection under CEQA §15380(d).

All birds with the exception of European starlings (*Sturnus vulgaris*), house sparrows (*Passer domesticus*), rock doves (*Columba livia*), and non-migratory game birds such as quail, pheasant, and grouse, are protected under the MBTA. However, non-migratory game birds are protected under CDFG Code §3503. Additionally, the CDFG Code §§3503, 3505, and 3800 prohibits the

take, destruction or possession of any bird, nest or egg of any bird except house sparrows and European starlings unless express authorization is obtained from CDFW.

CDFW further classifies some species under the following categories: Fully Protected, Protected Birds (CDFG Code §3511), Protected Mammals (CDFG Code §4700), Protected Amphibians (CDFG Code §5050 and Chapter 5, §41), Protected Reptiles (CDFG Code §5050 and Chapter 5, §42), and Protected Fish (CDFG Code §5515). These designations indicate that a species may not be taken or possessed except under special permit from CDFW.

Many other species are considered by CDFW to be California Species of Special Concern (SSC) and others are on the American Bird Conservancy, USFWS, or CDFW Watch List (WL) (CDFW 2013a). Further, the CNDDB tracks species within California for which there is conservation concern, including many that are not formally listed. Although California species of special concern, CDFW watch list species, species of local concern or importance, and species that are tracked by the CNDDB, but not formally listed, are afforded no official legal status, they may receive special consideration during the CEQA review process.

Based on a database and literature review, including the CDFW NOP comment letter dated 10 May 2013, 26 special status wildlife species have been historically recorded within the five-mile radius of the Primary Study Area or the Tranquillity USGS 7.5-minute quadrangle, or considered to have at least some potential to occur within the vicinity of the Primary or Secondary Study Area. Species that have been documented outside of the Tranquillity USGS 7.5-minute quadrangle or at a distance greater than five miles from the Primary Study Area and are not expected to be present due to range restrictions are not addressed further in this report. Several special status species occur in the immediate vicinity of the Primary Study Area (see Figure 4-2), although they are not expected to occur within the Primary Study Area due to a lack of suitable habitats. These species, as well as those that have some potential to occur on-site, are addressed in further detail in the section below and are summarized in Table 4-2.

Table 4-2 Special Status Wildlife Species Potentially Occurring in the Primary Study Area

Species Name	Common Name	Federal Status	State Status	Potential to Occur within Primary Study Area
Birds				
Riparia riparia	bank swallow	-	T	Low
Athene cunicularia	burrowing owl	-	SSC	Moderate
Falco columbarius[†]	merlin	-	WL	Low
Charadrius montanus	mountain plover	PT	SSC	Low
Buteo swainsoni	Swainson's hawk	-	T	High (Foraging)
Agelaius tricolor	tricolored blackbird	-	SSC	Low
Coccyzus americanus occidentalis	western yellow-billed cuckoo	C	E	Low
Plegadis chihi[†]	white-faced ibis	-	WL	Low
Herpetofauna				

Species Name	Common Name	Federal Status	State Status	Potential to Occur within Primary Study Area
Gambelia sila	blunt-nosed leopard lizard	E	E	Low
Phrynosoma blainvillii	coast horned lizard	-	SSC	Low
Thamnophis gigas	giant garter snake	T	T	Moderate
Masticophis flagellum ruddocki	San Joaquin whipsnake	-	SSC	Low
Anniella pulchra pulchra	silvery legless lizard	-	SSC	Low
Thamnophis hammondii	two-striped garter snake	-	SSC	Low
Emys marmorata	western pond turtle	-	SSC	Moderate
Spea hammondii	western spadefoot	-	SSC	Low
Fish				
Oncorhynchus tshawytscha	Central Valley Spring Chinook	T	T	Low
Oncorhynchus mykiss irideus	Central Valley Spring Steelhead	T	-	Low
Mammals				
Taxidea taxus	American badger	-	SSC	Moderate
Dipodomys nitratoides exilis	Fresno kangaroo rat	E	E	Low
Ammospermophilus nelsoni	Nelson's antelope squirrel	-	T	Low
Vulpes macrotis mutica	San Joaquin kit fox	E	T	Low
Perognathus inornatus inornatus†	San Joaquin pocket mouse	-	SA	Low
Eumops perotis californicus	western mastiff bat	-	SSC	Moderate (Foraging)
Lasiurus blossevillii†	western red bat	-	SSC	Moderate (Foraging)
Myotis yumanensis†	Yuma myotis	-	SA	Moderate (Foraging)

Source: CDFW 2013a.

Notes: †Not identified in the CDFW letter dated 10 May 2013, but documented in the CNDDB five-mile radius search.

FEDERAL STATUS

E = Endangered = Danger of extinction throughout range
T = Threatened = Likely to become endangered in foreseeable future throughout range
C = Candidate = In process for listing or recommended for listing but currently precluded
PT = Potentially Threatened = A species or subspecies whose survival may potentially be subject to a threat

STATE STATUS

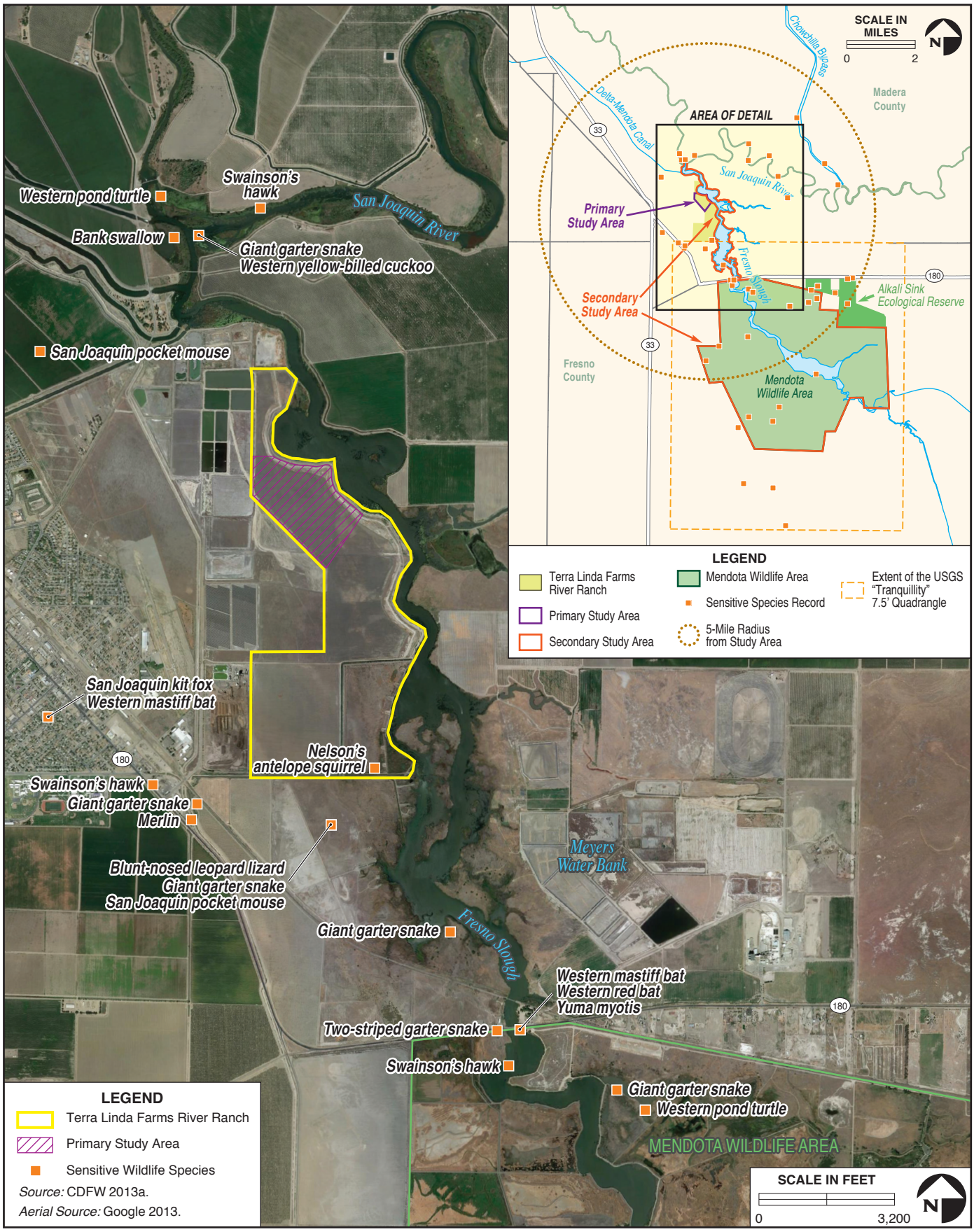
E = Endangered = Applies to a species whose survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, disease, or other factors

T = Threatened = Applies to a species that is existing in such small numbers throughout all or a significant portion of its range that it may become endangered if its environment worsens

SSC = CDFW Species of Special Concern = Species with declining population levels, limited ranges, and/or continuing threats which have made them vulnerable to extinction

WL = Watch List = Species that 1) are not on the current Special Concern list but were on previous lists and they have not been state listed under CESA; 2) were previously state or federally listed and now are on neither list; or 3) are on the list of "Fully Protected" species.

SA = California Special Animal = Species that are uncommon and tracked by the CDFW in the California Natural Diversity Database



amec

Special-Status Wildlife Species

FIGURE 4-2

4.2.1 Birds

Bank swallow

The state-listed threatened bank swallow (*Riparia riparia*) is a relatively small bird with a forked tail. This species is dark brown with white underparts and a dark breast band. Bank swallows nest in sand, dirt, or gravel burrows in tops of banks, often near streams, and return to the same nesting area each year. However, bank swallows may forage up to one to two miles from their nest (InfoNatura 2007). Foraging habitats include aerial areas over lakes, ponds, rivers and streams, meadows, fields, pastures, bogs, and occasionally over forests and woodlands (Garrison 1998).

Bank swallows are particularly affected by stream flow regulation as well as erosion and flood-control projects that may alter the banks used for nesting habitat. However, suitable habitat can also be created by activities including sand and gravel mining as well as road building (InfoNatura 2007).

Bank swallows have been documented within the immediate vicinity of Mendota Pool, approximately 0.75 miles northwest of the Primary Study Area. However, this species has not been recorded in the vicinity of the Primary Study Area, including the Secondary Study Area since 1980. No bank swallows were observed either directly or indirectly during the habitat assessment. Additionally, nesting habitat was not observed within the Primary Study Area and potential foraging habitat within the Primary Study Area was marginal. Consequently, it is unlikely that this species occurs within the Primary Study Area

Burrowing owl

The CDFW species of special concern western burrowing owl (*Thene* cunicularia) occurs in the Central Valley within desert and grassland habitats as well as urban and agricultural landscapes. These habitats are generally flat, open areas characterized by dry vegetation, typical of heavily grazed grasslands, low stature grasslands, or desert vegetation, and also include available burrows (Johnsgard 1988). As burrowing owls require underground burrows or artificial structures for shelter and nesting, they are associated with other burrowing wildlife such as prairie dogs (*Cynomys* spp.), ground squirrels, badgers (*Taxidea taxus*) and some smaller canids. Burrows are used year-round and are an essential component to the life history of burrowing owls.

Burrowing owls forage in areas characterized by cropland, pasture, prairie dog colonies, fallow fields, and sparsely vegetated areas. Burrowing owls have been recorded in the vicinity as recently as 2006, and while no potential burrows were observed within the Primary Study Area this species has a moderate potential for occurrence.

Burrowing owls are chiefly active during the early morning and early evening hours, but may be observed during the day standing above a burrow entrance or on a low perch nearby. Additionally, burrowing owls forage across large areas ranging from approximately 35 to 1,150 acres (Bates 2006).

Nearby occurrences of burrowing owls were recorded as recently as 2006 when eight adults were observed nearby an active burrow along a canal bank located approximately two miles south of the MWA and 10 miles south of the Primary Study Area. Additionally, burrowing owls have been recorded within the MWA in 1980, 1989, and 1991, occurring nearby active burrows along canal banks and gravel roadways. However, burrowing owls have not been recorded within the immediate vicinity of the Mendota Dam, within the Mendota Dam 7.5-minute quadrangle. Potential habitat within the Primary Study Area consists of fallow agricultural fields, ruderal areas where vegetation is low, open banks of the agricultural ditches, and disturbed unpaved roadways. However, no potential burrows were observed within the Primary Study Area and no individuals were observed either directly or indirectly during the habitat assessment.

While potentially suitable habitat occurs within the Primary Study Area, ground squirrel activity was not observed during the site visit and burrows of suitable size for inhabitation by burrowing owl were lacking on-site. Therefore, it is unlikely that burrowing owls currently nest within the Primary Study Area. There is potential for burrowing owls to forage and winter within the Primary Study Area as less optimal habitats are often utilized in winter (e.g., taking cover among structures or bank stabilizing materials). However, if ground squirrels were to colonize the site it would become highly suitable for occupancy by burrowing owls year round.

Merlin

The merlin (*Falco columbarius*) is a small falcon designated as a CDFW watch list species. Merlins breed in wooded areas of the Pacific Northwest, Canada, and Alaska, but winter in California within grasslands, savannas, and other open habitats throughout the state. Merlins prey almost exclusively on small birds, although they may also take small mammals and insects. In California, wintering merlins are concentrated along the coast and in the Central Valley, but occur statewide.

The Primary Study Area generally lacks wooded habitat with only three trees suitable for raptor perching occurring within the immediate vicinity (see specimen willow above). Consequently, species such as merlin are unlikely to occur within the Primary Study Area.

A wintering merlin was documented in 2007 approximately 2.25 miles to the southeast of the Primary Study Area, just north of Highway 180. One adult individual was observed perched in a leafless tree, part of the windrow between Highway 180 and the agricultural field immediately to the north. Merlins have not been recorded within the adjacent Mendota Dam or Firebaugh 7.5-minute quadrangles, however they are often under reported. In addition to the shorter trees and shrubs present within the disturbed riparian habitat, three sizeable trees, one cottonwood (*Populus* spp.) and two willows, occur in the immediate vicinity of the Primary Study Area and would be suitable for perching. Structures associated with the agricultural operations also provide low quality perching opportunities. The majority of the small bird activity within Terra Linda Farms River Ranch was concentrated in the ruderal and disturbed riparian habitats during the site visit, providing a potential prey base for foraging merlins. However, due to the general lack of habitat within merlins are considered to have a low potential to occur within the Primary Study Area during the winter season.

Mountain plover

The mountain plover (*Charadrius montanus*) is a proposed federally threatened species as well as a CDFW species of special concern. Mountain plovers are small birds, similar in size and appearance to a killdeer (*Charadrius vociferous*) but lacking the breast belt common to the killdeer and other plovers. During the breeding season, the mountain plover has a distinct black cap and thin black line between eye and bill (USFWS 1999).

The ruderal portion of the Primary Study Area includes cracks in the soil which provide potentially suitable upland refugia habitat for giant garter snake as well as attractive foraging habitat for mountain plovers.

Mountain plovers breed in the high plains east of the Rocky Mountains, but occur as winter visitors in California, primarily from September to mid-March, with peak numbers from December through February (Shuford and Gardali 2008). During all seasons, this species is strongly associated with short-grass prairie habitats, or their equivalents, that are flat and nearly devoid of vegetation (Shuford and Gardali 2008). Hunting et al. (2001) found wintering plovers most frequently used fallow, grazed, or burned sites with vegetative heights of less than two inches and less than 65 percent cover. In the Central Valley, Knopf and Rupert (1995) observed wintering mountain plover roosting and foraging in alkali flats, recently burned fields, and grasslands heavily grazed by domestic livestock or fossorial mammals. However, research in the San Joaquin Valley, California has determined that while mountain plovers are commonly seen on agricultural lands, they actually prefer the remaining natural landscapes to the agricultural lands (USFWS 1999). Wintering birds also seek invertebrate prey in cracks and crevices in the soil (Knopf 1996), and these features may contribute to higher habitat suitability for wintering birds in noncultivated lands.

Wintering mountain plovers have been recorded within the Tranquillity 7.5-minute quadrangle, approximately one mile south of the MWA. Mountain plovers have been documented wintering at this site for at least three consecutive years, between 2000 and 2002 with as many as 40 wintering birds recorded during one observation. These birds occurred within or immediately adjacent to a restoration area managed under the endangered species recovery plan, characterized by tilled soil with no vegetation.

While the fallowed land and ruderal habitat within the Primary Study Area provides marginal habitat for mountain plover, this species has not been recorded within the immediate vicinity. Additionally, as more suitable habitat occurs to the south, it is likely that mountain plovers would over winter within or adjacent to the MWA. Consequently, mountain plovers have a low potential to occur within the Primary Study Area during winter months.

Swainson's hawk

The Swainson's hawk (*Buteo swainsoni*), a state-listed threatened species, is a medium sized raptor characterized by a stout body and dark plumage. This species can be distinguished from other *Buteo* spp. by its long tail and pointed wings.

Swainson's hawks require large, open foraging habitat with abundant and available prey in association with suitable nest trees, particularly within riparian areas. The majority of Swainson's hawk territories in the Central Valley are associated with riparian systems adjacent to suitable foraging habitats, including native grasslands or agricultural fields (Woodbridge 1998). Swainson's hawk often nests peripherally to riparian systems, but also uses lone trees or groves of trees in agricultural fields and rangelands.

In the Central Valley, Swainson's hawks arrive at nesting areas in late February and early March, and begin to depart for wintering areas in early September (Woodbridge 1998). This species constructs its nest in a variety of tree species in existing riparian forests, remnant riparian trees, shade trees at residences and alongside roads, planted windbreaks, and solitary upland oaks (*Quercus* spp.). However, Swainson's hawks typically do not nest in large continuous patches of woodland other than along edges next to open habitats (England et al. 1997).

Swainson's hawks nest along the San Joaquin River, in close proximity to the Mendota Pool, and utilize foraging areas within the vicinity of the Primary Study Area, including fallow agricultural land. Individuals were observed foraging during the habitat assessment on 26 June 2013. Photograph courtesy of USFWS.

The diet of this raptor species varies considerably during breeding and non-breeding seasons. Swainson's hawks depend largely on small mammals during the breeding season and shift to feeding on insects during the non-breeding season, particularly crickets and grasshoppers. During the breeding season, Swainson's hawks travel long distances (e.g., up to 18 miles) in search of suitable foraging habitat that provides abundant prey (Estep 1989). Swainson's hawks rely on open habitats including grassland and ruderal areas as well as open scrub habitats for foraging (Woodbridge 1998). Additionally, they have become highly dependent on foraging in agricultural fields throughout their range (Woodbridge 1998). The agricultural crops considered as small mammal and insect foraging habitat for Swenson's hawk includes:

- Alfalfa
- Fallow fields
- Beet, tomato, and other low-growing row or field crops
- Dry-land and irrigated pasture
- Rice land (when not flooded)
- Cereal grain crops (including corn after harvest)

Prey availability and abundance varies depending on crop type and timing of harvesting and tilling activities. Estep (1989) found that open fields and crops with low stature have low prey abundances but provide steady prey accessibility relative to more dense vegetation types.

Fallow fields, approximately 329 acres, represent the primary land cover type within Terra Linda Farms River Ranch North. Additionally, fallow fields are the primary land cover type within the Primary Study Area covering approximately 87 percent of the area (i.e., 73.9 acres) (refer to Section 3.2, *Primary Study Area Vegetation Communities*). These areas generally consist of open bare ground, providing little cover for prey species. While habitat is suitable, the foraging quality is lower than surrounding fields with greater cover. Ruderal habitat, which is also suitable for foraging, is also located within the Primary Study Area. Therefore, the total area of suitable foraging habitat for Swainson's hawk present within the Primary Study Area is approximately 75 acres (i.e., approximately 88 percent of the Primary Study Area). In addition to the available foraging areas, the two large willow trees (approximately 30-40 feet tall) and the single large cottonwood tree (approximately 50 feet tall) located along the agricultural ditches within Terra Linda Farms River Ranch, provide potential nesting habitat for Swainson's hawks.

Recorded observations of Swainson's hawks in the vicinity of the Primary and Secondary Study Areas have been made on 16 different occasions between 1994 and 2010. The nearest recorded observation occurred in 2008 approximately 1.5 miles southwest of the Primary Study Area just east of Highway 180, where a single adult individual was documented in a eucalyptus tree (*Eucalyptus* spp.) within a Caltrans maintenance yard. Additionally, another individual was documented in 2008 within the MWA in a cottonwood tree, located approximately 3.5 miles south of the Primary Study Area. Further, five observations of nesting adults were documented in 1999 within willow and cottonwood trees along the San Joaquin River, approximately 2.5 miles northeast of the Primary Study Area. Additional observations have been made along the Chowchilla Bypass as well as within the Firebaugh 7.5-minute quadrangle.

In addition to the previously recorded observations, the AMEC biologist conducting the habitat assessment directly observed Swainson's hawks flying overhead and foraging over the fallow agricultural field less than one mile to the southwest of the Primary Study Area, within Terra Linda Farms River Ranch. Consequently, Swainson's hawks are considered to occur on-site occasionally and given the presence of and proximity to potential nesting areas along the San Joaquin River as well as foraging habitat present within the Primary Study Area, the potential for nesting in the larger trees within Terra Linda Farms River Ranch (particularly the cottonwood) is considered to be high.

Tricolored blackbird

Tricolored blackbird (*Agelaius tricolor*) is a CDFW species of special concern that inhabits coastal areas of central and southern California, as well as the Central Valley. The species typically requires freshwater marshes with emergent vegetation surrounded by water for nesting, although thorny brambles, nettles, dense willows, and agricultural fields near water also provide habitat.

The species' basic requirements for breeding sites are open accessible water, a secure substrate in which to place their nests, and suitable nearby foraging areas that provide adequate food sources (Beedy and Hamilton 1999). Nesting colonies can be highly susceptible to human disturbance; in extreme cases, disturbances can result in entire colonies being abandoned.

Historically, most colonies were located in freshwater marshes dominated by cattails or tules; however, some were also in nettles (*Urtica* spp.), thistles (*Cirsium* spp.), and willows (Neff 1937).

Tricolored blackbirds are regularly observed foraging and roosting in mixed colonies with other blackbird species, especially during the non-breeding season. They forage on seeds and insects in grassland and cropland, the latter primarily during the breeding season (Kester 2007). Most breeding individuals forage within three to four miles of their colony sites, although on rare occasions they have been observed foraging up to eight miles from their colony sites (Orians 1961; Beedy and Hamilton 1997). Ideal foraging conditions for tricolored blackbirds are created when shallow flood-irrigation, mowing, or grazing keeps the vegetation at an optimal height, less than six inches. With the loss of a natural flooding cycle and most native wetland and upland habitats in the Central Valley, breeding individuals now forage primarily in managed habitats including agricultural fields, irrigated pastures, and ripening or cut grain fields (e.g., oats wheat, silage, and rice), as well as annual grasslands, cattle feedlots, and dairies. Individuals also forage in remnant native habitats, including wet and dry vernal pools and other seasonal wetlands, riparian scrub habitats, and open marsh borders (Kester 2007).

CDFW refuge managers have identified tricolored blackbirds within the boundaries of the MWA. Tricolored blackbirds were recorded within the MWA on four separate occasions during 1992, with as many as 800 individual birds recorded during one observation. Tricolored blackbirds have not been recorded in the immediate vicinity of the Mendota Pool within the Mendota Dam 7.5-minute quadrangle. The dense emergent vegetation characterizing freshwater marsh habitat to the southeast of Primary Study Area provides suitable nesting habitat for tricolored blackbirds. This area is a large contiguous patch of relatively undisturbed habitat totaling 16 acres (refer to Figure 3-2). Therefore, there is a moderate potential for tricolored black bird colonies to nest in this area, but low potential for this species to occur within the Primary Study Area.

Western yellow-billed cuckoo

The yellow-billed cuckoo (*Coccyzus americanus occidentalis*) is a federal candidate species and a state-listed endangered species. These birds are streamlined with brown upperparts and creamy white underparts. The under tail is black with prominent white spots, typical of many members of the cuckoo family; however, yellow-billed cuckoos have a characteristic yellow to orange lower mandible contrasting with a black upper mandible.

Yellow-billed cuckoos have one of the most restrictive suites of macro-habitat requirements and the western subspecies has a much smaller range and more restrictive habitat requirements than the eastern subspecies. Not only are western yellow-billed cuckoos restricted to a single habitat type, but the size and configuration of the habitat is also extremely important. During the breeding season western yellow-billed cuckoos are confined to cottonwood-willow riparian habitat. Cuckoos have large home ranges, often exceeding 50 acres, and sometimes approaching 100 acres (Laymon 1985). Gaines and Laymon (1984) concluded that willow-cottonwood habitat of any age with high humidity and a habitat breadth of 325 feet was necessary for suitable yellow-billed cuckoo habitat.

There is one recorded observation of western yellow-billed cuckoo within the immediate vicinity of the Mendota Pool, approximately 0.40 miles upstream of the Mendota Dam and 0.75 miles

north of the Primary Study Area. This observation, recorded in 1950, included three pairs of western yellow-billed cuckoos within shallow lake habitat characterized by marsh with several wooded islands with dense willow thickets and few cottonwoods. However, no observations have been recorded more recently within the vicinity of the Primary or Secondary Study Areas. Additionally, Terra Linda Farms River Ranch is characterized by relatively minimal and very disturbed, discontinuous riparian habitat, with only three large mature cottonwood and willow species among the agricultural habitats. The vegetation within the Primary Study Area, which is dominated by fallow agricultural land, is not considered suitable for use by western yellow-billed cuckoos. Consequently, it is unlikely that this species occurs within or utilizes the Primary Study Area.

Typical western yellow-billed cuckoo habitat includes continuous patches of native woodlands with cottonwoods and willow adjacent to open water (Johnson 2009) (see example to the right of nesting habitat along the Bill Williams River in Arizona). The Study Area only includes two large willows and one large cottonwood. Although western-yellow billed cuckoos were observed near the Mendota Pool in 1950, it is unlikely the western yellow-billed cuckoos currently utilize the Study Area as the habitat consists largely of fallow agricultural land with some small areas of disturbed riparian habitat. Photographs courtesy of USGS.

White-faced ibis

White-faced ibis (*Plegadis chihi*) is designated as a CDFW watch list species. This species is dark, chestnut colored-bird with green or purple on its head and upper parts, and a long, down-curved bill. During the breeding season white-faced ibis can be identified by its narrow boarder of white feathers all around its bare facial skin at the base of the bill. White-faced ibis prefers freshwater marshes for foraging, and during the nesting season this species constructs nests dead reeds among beds of bulrushes on floating mats of dead plants.

In 1979 four nesting pairs were observed in cattails within the MWA. Additionally, in 1983, 24 pairs were observed nesting in this same location. However, no white-faced ibis have been recorded in this area since. There is suitable habitat within the emergent freshwater marsh habitat located along Fresno Slough and the southeast corner of the Terra Linda Farms River Ranch. However, this species has a low potential to occur within the Primary Study Area which primarily consists of fallow agricultural land.

Other Sensitive Bird Species

Other sensitive native bird species protected under CDFG code and the MBTA also have potential to occur within the Primary Study Area. The Primary Study Area as well as the Secondary Study Area provides foraging and nesting habitat for sensitive bird species covered under these regulations. As described below in Section 5.1, *Federal Regulation and Standards*, the MBTA prohibits the taking of any native bird species, with the exception of game birds. Consequently, as the MBTA protects nearly all native birds in the U.S., the potential for occurrence of individual species covered under the MBTA is not discussed in further detail.

4.2.2 Herpetofauna

Blunt-nosed leopard lizard

The blunt-nosed leopard lizard (*Gambelia sila*) is a federally and state-listed endangered species as well as a California fully protected species. This species is endemic to California and typically inhabits open, sparsely vegetated areas of low relief on the San Joaquin Valley floor and in the surrounding foothills (USFWS 2010a). Blunt-nosed leopard lizards use small rodent burrows for shelter from predators and temperature extremes (USFWS 2010a). Due to widespread agricultural development of natural habitat in the San Joaquin Valley, the current distribution of blunt-nosed leopard lizards is restricted to less than 15 percent of its historic range (USFWS 2010a). In the remaining habitat that exists, blunt-nosed leopard lizards occur in alkali sink scrub, saltbush scrub, as well as native and nonnative grasslands on the Central Valley floor and in the surrounding foothills areas (USFWS 2010a).

Blunt-nosed leopard lizards are rarely observed within the vicinity of the Study Area. The last recorded sighting in the vicinity of the Mendota Pool was made over twenty-years ago 1.25 miles to the south of the Primary Study Area. Photograph courtesy of S. Laymon, USFWS.

Blunt-nosed leopard lizards have been recorded in the vicinity of the Primary Study Area on nine separate occasions between 1979 and 1990. The majority of these sitings have been recorded north of Firebaugh Boulevard. However, one individual was observed within the Alkali Sink Ecological Reserve in 1979 and another was observed approximately 1.25 miles south of the Primary Study Area in 1981 in alkali scrub habitat on saline soils. However, habitat within the Primary Study Area is generally not suitable for blunt-nosed leopard lizards as the majority is comprised of fallow agricultural land as well as ruderal and disturbed areas. Additionally, during the habitat assessment no individuals or suitable rodent burrows were observed. Consequently, blunt-nosed leopard lizards are not expected to occur within the Primary Study Area.

Coast horned lizard

The coast horned lizard (*Phrynosoma blainvillii*), a CDFW species of special concern, is a large slender lizard with many pointed spines, prominent occipital horns, two rows of fringe scales and dark bands across a lighter background body color (Sherbrooke 2003). This species occupies a

variety of open habitats including coastal scrub, oak savanna, coniferous and broadleaf woodlands, and grasslands, especially in lowlands characterized by sandy washes, a scattered cover of low shrubs, and open areas for basking and foraging (Stebbins 2003). Coast horned lizards are most active between April and May through October, and typically utilize small mammal burrows or loose soils as refugia or when hibernating (Jennings and Hayes 1994).

Historically, coast horned lizard occurred throughout the Central Valley and Coast Range, at elevations ranging from near sea level to approximately 6,000 feet above msl (Sherbrooke 2003), from Sonoma County south to Santa Barbara, Kern, and Los Angeles Counties where this species likely intergrades with the San Diego horned lizard (*Phrynosoma coronatum blainvillii*). Despite a wide-ranging distribution, the species appears to be restricted to localized populations because of its close association with loose soils that have a high sand content. Additionally, this species does not occur in areas that have been converted to agriculture, so its current distribution throughout the Central Valley is highly restricted (Jennings and Hayes 1994).

Coast horned lizard occurs in the Central Valley in areas with loose sandy soils. The primary cause for coastal horned lizard population decline is the loss of habitat by agricultural and urban conversion. Consequently, this species is not likely to occur within fallow agricultural land within the Primary Study Area. Photograph courtesy of C. Brown, USGS.

Coast horned lizard has been observed twice within the vicinity of the Primary Study Area in 2003 and 2004. Both observations were recorded approximately four miles to the south in the Alkali Sink Ecological Preserve. However, this species is not likely to occur within the Primary Study Area as it is dominated by fallow agricultural land and disturbed ruderal habitats. Loose sandy soils and adequate shrub cover are lacking, therefore habitats on-site are not considered suitable for coastal horned lizards.

Giant garter snake

The giant garter snake (*Thamnophis gigas*), a federally and state-listed threatened species, is one of the largest garter snake species reaching a total length of approximately 64 inches. Dorsal background coloration varies from brown to olive with a cream, yellow, or orange dorsal stripe and two lightcolored lateral stripes. Some individuals have a checkered pattern of black spots between the dorsal and lateral stripes (Hansen 1988).

This species is endemic to the Central Valley floor wetlands of the Sacramento and San Joaquin valleys and inhabits marshes, sloughs, ponds, small lakes, low gradient streams and other waterways as well as agricultural wetlands including rice fields and irrigation and drainage canals (USFWS 2012). The giant garter snake is the most aquatic of the garter snake species; they are active aquatic foragers, feeding primarily on introduced species including carp (*Cyprinus carpio*), mosquitofish (*Garnbusia affinis*), larval and sub-adult bullfrogs (*Rana catesbiana*) (Fitch 1941; Hansen and Brode 1993; Rossman et al. 1996).

While the giant garter snake is highly aquatic, it also occupies a terrestrial niche (Wylie et al. 2004). Terrestrial habitat includes adjacent uplands which provide areas for basking, retreats, and overwintering. Essential habitat components include:

- Wetlands with adequate water during the snake's active season (i.e., early-spring through mid-fall) to provide food and cover;
- Emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season;
- Upland habitat with grassy banks and openings in waterside vegetation for basking; and,
- Higher elevation uplands for overwintering habitat with escape cover and underground refugia (Hansen 1988). Freshwater emergent herbaceous vegetation is an important habitat component for the giant garter snake, as it is needed for foraging habitat and escape cover during the active season.

Giant garter snakes breed in March and April and are inactive or greatly reduce their activities during the late fall and winter months (Wylie et al. 1997). This species typically inhabits small mammal burrows and other soil and/or rock crevices during the colder months of winter (i.e., October to April) (Hansen and Brode 1993; Wylie et al. 1997; Wylie et al. 2003). It also uses burrows as refuge from extreme heat during its active period (Wylie et al. 1997). While individuals generally remain in close proximity to wetland habitats, giant garter snakes have been documented using burrows as far as 165 feet away from the marsh edge to escape extreme heat and as far as 820 feet from the edge of marsh habitat for overwintering habitat (Wylie et al. 1997). Further, individuals have been documented to move up to five miles over a few days in response to dewatering of habitat (Wylie et al. 1997) and to use up to eight miles of linear aquatic habitat over the course of a few months, with a home range as large as 14.5 square miles.

Giant garter snakes are known to occur within the vicinity of the Primary Study Area and may utilize aquatic and upland habitats within the immediate vicinity of the Mendota Pool. Giant garter snakes have been recorded within the Mendota Pool as recently as 2008 (U.S. Bureau of Reclamation 2012). Photograph courtesy of K. Hornaday, USFWS.

The USFWS has identified 13 separate populations of giant garter snakes, with each population representing a cluster of discrete locality records (USFWS 1993). Surveys over the last 25 years suggest that sub-populations of giant garter snakes in the northern parts of its range (i.e., Butte, Colusa, and Sutter counties) are relatively large and stable (Wylie et al.1997; Wylie et al. 2003); however, those sub-populations in the San Joaquin Valley, including populations in Madera and Fresno counties, are have suffered substantial declines and possible extirpations over the last two

decades (Dickert 2002, 2003; Hansen 1988). Consequently, the southern sub-populations are distributed discontinuously in isolated patches, and therefore are highly vulnerable to extinction by random environmental, demographic, and genetic processes (Goodman 1987).

Historically, the Mendota Pool and MWA supported robust populations of the giant garter snake (USFWS 1993). Recorded observations of giant garter snakes were made immediately upstream of the Mendota Dam in 1974. Additional observations were record approximately two miles and three miles south of the Primary Study Area in 1972 and 1976 respectively. Since the late 1970s, the population levels in the area have declined due to a variety of factors, including predatory fish, flooding, vehicular mortality, disturbance, and elevated levels of selenium and salinity (USFWS 1993). The most recent sighting of the giant garter snake within the 7.5-minute Mendota Dam quadrangle was recorded in 1995; however, the population within the vicinity of the Primary Study Area was found to still be extant when 14 individuals were observed during a survey conducted in 2001 and a single snake was found in a survey conducted in 2008 (see Table 4-3, U.S. Bureau of Reclamation 2012).

Table 4-3 Recent Recorded Observations of Giant Garter Snake within Mendota Pool

Year	Number of Individuals Identified in Mendota Pool	Sampling Event
1995	2	Hansen 1996
2001	14	Dickert 2002
2007	0	Hansen 2007
2008	1	Hansen 2008

Source: U.S. Bureau of Reclamation 2012.

Extensive emergent vegetation (i.e., approximately 16 acres), including cattails and tules suitable for giant garter snake, occurs to the southeast of Primary Study Area within Terra Linda Farms River Ranch immediately adjacent to the Fresno Slough (refer to Figure 3-2). This area provides cover and potential foraging opportunities, although the emergent vegetation is very dense and open water, which is a necessary habitat component, is limited to Fresno Slough and agricultural ditches. Agricultural ditches on the southern portion of the site were full of water at the time of the site visit and the banks are lined with emergent vegetation and floating macrophytes. Based on the extensive vegetation growth in some of the ditches it is assumed that water is present year round and would be available to snakes during their active season. These agricultural ditches vary in habitat quality although overall they provide a highly suitable mosaic of open water and aquatic vegetation. Additionally, the AMEC biologist identified cracks in the soils surrounding this habitat that would serve as suitable upland refugia habitat for giant garter snakes. However, surrounding agricultural lands are intensively managed and are devoid of native vegetation. Consequently, these areas to the west are likely not suitable for the giant garter snake. While neither giant garter snakes, nor any indirect sign were identified during the habitat assessment, the emergent freshwater marsh, Fresno Slough, upland, and agricultural ditch habitat complex is considered to be of high quality for this species.

The recharge canal extending along the Primary Study Area and covering approximately 1.3 acres was dry at the time of the site visit and did not appear to suitable habitat for giant garter snake. Additionally, the northern portion of Fresno Slough is invaded by giant reed which is too dense to be utilized by the species as aquatic vegetation cover. Given these characteristics

combined with the predominance of agricultural fields and developed roadways, the Primary Study Area is considered to be of very low quality for giant gartersnake. Consequently, giant garter snakes have only moderate potential to occur within the Primary Study Area.

San Joaquin whipsnake

The San Joaquin whipsnake (*Masticophis flagellum ruddocki*), a CDFW species of special concern, is a slender fast-moving snake with smooth scales, a large head and eyes, and a thin neck. This snake is tan, olive brown, or yellowish brown and lacks the very dark head and neckbands of other subspecies. The San Joaquin whipsnake is endemic to California, ranging from Arbuckle in the Sacramento Valley in Colusa County southward to the Grapevine in the Kern County portion of the San Joaquin Valley and westward into the inner South Coast Ranges.

The San Joaquin whipsnake has been indirectly observed within the Alkali Sink Ecological Reserve as recently as 2004; however, due to a lack of habitat in the Primary Study Area this species has a low potential for occurrence.

Very little is known regarding natural history of the San Joaquin whipsnake. This snake generally occurs in open, dry, treeless areas, including grassland and saltbush scrub habitats, and takes refuge in rodent burrows, under shaded vegetation, and under surface objects. This species is diurnal and hunts crawling with the head held high above the ground, occasionally moving it from side to side. It can be seen moving quickly even on hot sunny days, but often seen basking on roads in early morning. Additionally, San Joaquin whipsnakes are frequently found run over by vehicles, partly due to the tendency of this snake to stop and eat road-kill.

A single adult San Joaquin whipsnake was observed indirectly via a skin shed in 2004 within the Alkali Sink Ecological Reserve. The shed was found in habitat that consisted of iodine bush, suaeda, scalds, and patches of annual grassland. However, no other recorded observations have occurred within the immediate vicinity of the Primary or Secondary Study Areas. Further, the Primary Study Area does not include habitat similar to that within the Alkali Sink Ecological Reserve. Consequently, it is unlikely that San Joaquin whipsnake regularly occurs within the Primary Study Area.

Silvery legless lizard

Silvery legless lizard *(Anniella pulchra)* is a CDFW species of special concern that resembles a snake, but can be distinguished from the latter by the presence of moveable eyelids covered by three scales (Stebbins 2003). The California legless lizard is found along the west coast of North America, from the south shore of the San Joaquin River, south through the Coast Range, Transverse Range, and Peninsular Range, including the San Joaquin Valley floor, and the south Sierras (Stebbins 2003). However, despite the species' widespread range throughout California, the distribution of the species is scattered and, in some places, geographically isolated from outlying populations.

Adults average 4.5 to six inches in length (Miller 1944), and are typically silvery, gray, or beige above, yellow below, and marked by a dark brown middorsal line and fine lengthwise lines between scale rows (Stebbins 2003). Generally, the legless lizard is restricted to moist, loose, sandy soils (Kuhnz 2004) in habitats described locally as sand mounds or interior dunes communities. Gorman (1957) reported their typical habitat to be slightly moist, warm, loose soil or mulchy sand beneath oak trees along south-facing slopes. Generally, common habitat characteristics include a high fraction of sand in the soil and mature leaf litter (Kuhnz 2004). Plants commonly associated with the species include lupines (*Lupinus* sp.), mock heather (*Ericameria ericoides*) (Jennings and Hayes 1994; Kuhnz 2004), and oaks (Gorman 1957; Miller 1944).

Silvery legless lizards most often occur in sand mounds or interior dune communities characterized by lupines, mock heather, and oaks. Consequently, due to a lark of suitable habitat, this species is not expected to occur within the Primary Study Area. Photograph courtesy of California Herps.

Legless lizards burrow into the sand through mostly horizontal burrows that can be as deep as 18 inches (Kuhnz 2004); however, they are more commonly found at depths of approximately four inches (Miller 1944; Kuhnz 2004). Moisture appears to be an important component in suitable habitat (Miller 1944).

A single individual silvery legless lizard observation was recorded in 2000 at the confluence of the San Joaquin River and Willow Slough. This individual was observed in habitat that consists of leaf litter within a riparian area immediately adjacent to the north of the San Joaquin. No observations have been recorded south of the San Joaquin River within the Mendota Dam or Tranquillity 7.5-minute quadrangles. The Primary Study Area is largely characterized by fallow agricultural land as well as disturbed and ruderal habitat, that is not suitable for silvery legless lizards due to the lack of loose sandy soils and adequate shrub or tree leaf litter. Consequently, this species is not expected to occur within the Primary Study Area.

Two-striped garter snake

The two-striped garter snake *(Thamnophis hammondii*) is a CDFW species of special concern that occurs along the California coast from Monterey County to northern Baja California (Jennings and Hayes 1994). Two-striped garter snakes are found in or near permanent or intermittent freshwater, often along streams with rocky beds bordered by willows or other streamside growth (Stebbins 2003). The two-striped garter snake is highly aquatic, primarily active from spring to late fall, and breeds between March and April. During the day this garter snake species often basks on streamside rocks or on densely vegetated stream banks. When disturbed it usually retreats rapidly to water. The preferred nocturnal retreats of this active diurnal snake are thought to be holes, especially mammal burrows, crevices, and surface objects (Rathburn et al. 1993). Populations have been affected by the elimination of natural sloughs and marshy areas, loss of riparian habitat through agricultural practices and urban development, predation by introduced bullfrogs, fishes, and feral pigs, and loss of amphibian prey (Jennings and Hayes 1994).

The only recorded observation of two-striped garter snake within the vicinity of the Primary and Secondary Study Areas occurred in 1990 just north of Highway 180 approximately 2.5 miles south of the Primary Study Area. While no individuals were observed, either directly or indirectly, within the Primary Study Area during the habitat assessment, fresh water marsh and disturbed riparian scrub habitat may provide potential habitat for this species adjacent to the Fresno Slough. However, as the range of the two-striped garter snake is concentrated along coastal California, the probability of occurrence for this species within the Primary Study Area is relatively low.

The two-striped garter snake range is concentrated within coastal California. Consequently, it is unlikely that this species would regularly occur within disturbed habitat along the Fresno Slough. Photograph courtesy of T. Hovey, CDFW.

Western pond turtle

The western pond turtle (*Actinemys marmorata*), a CDFW species of special concern, is an aquatic habitat generalist. This species is characterized by a drab dark brown, olive brown, or blackish smooth shell. The head usually has a black network or spots may show cream to yellowish coloring. Turtles south of the Transverse Ranges tend to be lighter, from yellowish brown to light brown.

Individuals are generally observed in slow-moving rivers and streams (e.g., in oxbows), lakes, reservoirs, permanent and ephemeral wetlands, stock ponds, and sewage treatment plants. They prefer aquatic habitat with refugia such as undercut banks and submerged vegetation (Holland 1994), and require emergent basking sites such as mud banks, rocks, logs, and root wads (Holland 1994). Additionally, western pond turtles regularly utilize upland terrestrial habitats, most often during the summer and winter (Holland 1994). Females have been reported ranging as far as 1,640 feet from a watercourse to find suitable nesting habitat (Reese and Welsh 1997). Nest sites are most often situated on south or west-facing slopes, are sparsely vegetated with short grasses or forbs, and are scraped in sands or hard-packed, dry, silt, or clay soils (Holland 1994; Reese and Hartwell 1997). Western pond turtles exhibit high site fidelity, returning in sequential years to the same terrestrial site to nest or overwinter (Reese 1996).

Western pond turtles have been recorded within the Fresno Slough, in the immediate vicinity of the Primary and Secondary Study Areas, as recently as 1996. Additionally, limited areas of emergent vegetation in the vicinity provide marginal habitat for this species. Photograph courtesy of USGS.

In 1996, one observation of western pond turtle was recorded immediately upstream of the Mendota Dam within the San Joaquin River. However, since that time, no observations have been reported. No individuals were observed either directly or indirectly during the habitat assessment; however, the Fresno Slough and surrounding agricultural ditches holding permanent water provide suitable habitat for western pond turtle within the Primary Study Area. Additionally, the freshwater emergent marsh and riparian scrub habitat adjacent to the Fresno Slough provides refugia and suitable basking sites. Consequently, western pond turtles have a moderate probability of occurrence within the Primary Study Area adjacent to the Fresno Slough and in surrounding agricultural ditches.

Western spadefoot

Western spadefoot toads (*Spa hammondii*), a CDFW species of special concern, are distinguished from the true toads by their cat-like eyes, the single black sharp-edged spade on each hind foot, teeth in the upper jaw, and rather smooth skin (Stebbins 2003). The western spadefoot toad ranges in size from approximately 1.5 to 2.5 inches. They are dusky green or gray above and often have four irregular light-colored stripes on their back, with the central pair of stripes sometimes distinguished by a dark, hourglass-shaped area.

Western spadefoot toads occur in near perennial and ephemeral aquatic habitats including artificial ponds and irrigation ditches. Consequently, there is a moderate potential for this species to occur within the Primary Study Area, which includes irrigation canals is located immediately adjacent to the Fresno Slough. Photograph courtesy of J. Bettaso, USFWS.

Western spadefoot toads primarily occur in lowland habitats such as washes, floodplains of rivers, alluvial fans, playas, and alkali flats (Stebbins 2003). This species prefers areas of open vegetation and short grasses, where the soil is sandy or gravelly. They are found in the valley and foothill grasslands, open chaparral, and pine-oak woodlands. While spadefoot toads require access to aquatic resources, they are primarily terrestrial, and also require upland habitats for feeding and for constructing burrows for their long dry-season dormancy.

Western spadefoot toads have exhibited a capacity to breed in altered wetlands as well as man-made wetlands. Western spadefoot toads, including eggs and larvae, have been observed in vernal pools that have been disturbed by activities such as earthmoving, discing, intensive livestock use, and off-road vehicle use. Western spadefoot toads have also been observed in artificial ponds, livestock ponds, sedimentation and flood control ponds, irrigation and roadside ditches, roadside puddles, tire ruts, and borrow pits.

The western spadefoot toad has been extirpated throughout most of the lowlands of southern California (Stebbins 2003) and from many historical locations within the Central Valley (Jennings and Hayes 1994). However, this species was recorded in 2001 within the MWA, approximately four miles south of the Primary Study Area within alkali sink habitat including iodine bush and goldfields surrounding vernal pools. Additionally, this species was observed in 2004 within the Alkali Sink Ecological Reserve just south of Highway 180 within vernal pool habitat characterized by iodine bush and annual grassland. While western spadefoot toads have

not been observed within the Primary Study Area, the agricultural ditches within the vicinity of the Primary Study Area may provide marginally suitable breeding habitat for this species. Additionally, disturbed riparian or ruderal habitats within the Terra Linda Farms River Ranch and the Primary Study Area may provide suitable upland habitat for the species. However, the emergent freshwater marsh habitat to the south of the Primary Study Area is too densely vegetated to be suitable for breeding and the presence of predatory bull frogs in the agricultural ditches may preclude western spadefoot toads from occurring. Consequently, western spadefoot toads have a low potential to occur within the Primary Study Area.

4.2.3 Fish

As previously described, the DMC is located within EFH for Chinook salmon (NOAA 2013). Additionally, spring run steelhead are listed within the San Joaquin River downstream of the Mendota Pool (National Marine Fisheries Service [NMFS] 2012). However, the DMC in the vicinity of the Primary Study Area is segmented by Check 21, located at the Mendota Pool, and Check 13, located approximately 45 miles up-stream, which prevent fish passage. Due to the historically dry condition of the San Joaquin River upstream of the Mendota Dam, fish populations within the vicinity of the Primary Study Area have generally been confined to the Mendota Pool, with restricted movement between the Mendota Pool and upstream reaches of the San Joaquin River (U.S. Bureau of Reclamation 2011). Consequently, Chinook salmon and steelhead are not known to occur within the Fresno Slough. However, in 2006 the San Joaquin River Restoration Settlement and accompanying Federal legislation required the provision of water downstream of Friant Dam to restore the Chinook salmon fishery (U.S. Bureau of Reclamation 2011). Restoration will include releases of water from Friant Dam to the confluence of the Merced River, a combination of channel and structural modifications along the San Joaquin River below Friant Dam, and reintroduction of Chinook salmon (U.S. Bureau of Reclamation 2011; see additional information in Section 6.3, *Cumulative Impacts*).

4.2.4 Mammals

American badger

The American badger (*Taxidea taxus*) is a CDFW species of special concern. American badgers are widespread, ranging from the Great Lakes to the Pacific Coast. This species can be found in a variety of habitats, including shrub steppes, agricultural fields, open woodland forests, and large grass and sagebrush meadows. Since badgers dig burrows frequently, both in search of prey and for shelter, their burrows are common in badger habitat. The American badger diet consists of a variety of rodents, scorpions, insects, snakes, lizards, birds, and carrion.

American badgers utilize open habitat including undisturbed fallow farmlands which provide bare soil for denning activities. While American badgers have not been documented within the Primary Study Area, it provides suitable habitat for this species.

One adult American badger was observed in the Alkali Sink Ecological Reserve, just south of

Highway 180, in 1985. Since that time, no observations have been recorded within the vicinity of the Primary Study Area. During the habitat assessment no direct or indirect signs (e.g., burrows) of American badger were identified. However, the majority of the 513-acre Terra Linda Farms River Ranch including the 85-acre Primary Study Area is dominated by fallow agricultural land and ruderal areas, which may provide habitat for American badgers. Consequently, while American badger has not been observed within the Primary Study Area, this species has a moderate probability for occurrence.

Fresno kangaroo rat

The Fresno kangaroo rat (*Dipodomys nitratoides exilis*) is a federally and state-listed endangered subspecies of the San Joaquin kangaroo rat. San Joaquin kangaroo rats have elongated hind limbs, a long, tufted tail for balance, a shortened neck, and, compared to typical rodents, a large head. The San Joaquin kangaroo rat is similar in general appearance to the other species of kangaroo rats, but is smaller, and can be distinguished from other kangaroo rats within its geographic range by the presence of four toes on the hind foot. However, individuals of the three subspecies of San Joaquin kangaroo rat, including Fresno kangaroo rat, cannot be reliably distinguished without dissection unless the geographic origin of the individual is known (Williams et al. 1998).

Fresno kangaroo rats occupy sands and saline sandy soils in chenopod scrub and annual grassland communities on the Central Valley floor. Recently they have been found only in alkali sink communities between 200 to 300 feet in elevation. Associated plant species include seepweed (*Suaeda* spp.), iodine bush (*Allenrolfea occidentalis*), saltbushes (*Atriplex* spp.), peppergrass (*Lepidium* spp.), filaree (*Erodium* spp.), wild oats (*Avena* spp.), and mouse-tail fescue (*Vulpia myuros*) (Williams et al. 1998).

There are no known populations within the species' historical geographic range in Merced, Madera, and Fresno Counties (Williams et al. 1998). A single male Fresno kangaroo rat was captured twice in autumn 1992 on the Alkali Sink Ecological Reserve, which is federally designated critical habitat for the species. However, trapping at the reserve in 1993, 1994, and 1995 did not yield additional captures (Williams et al. 1998). Fresno kangaroo rats were previously trapped on the Alkali Sink Ecological Reserve in 1981 and 1985, and on adjacent privately owned land in 1981 (Williams et al. 1998). Though the Alkali Sink Ecological Reserve now includes approximately 945 acres, only 400 acres provide suitable habitat for Fresno kangaroo rats. However, no suitable alkali sink habitat occurs within the Primary Study Area. Consequently, Fresno kangaroo rat is not expected to occur within the Primary Study Area.

Nelson's antelope squirrel

Nelson's antelope squirrel (also known as San Joaquin antelope squirrel) (*Ammospermophilus nelsoni*) is a state-listed threatened species that is grayish brown with one white stripe on each side. Individuals have a characteristic ground-squirrel shape including tiny, rounded ears and a streamlined body with relatively short legs and tail (Williams et al. 1998).

Nelson's antelope squirrel inhabits arid, sparsely-vegetated plains and lower mountain slopes and requires minimally disturbed natural grass and shrub communities for habitat (Ahlborn and White 2005). This species is most numerous in areas with a sparse-to-moderate cover of shrubs such as saltbushes, California ephedra, bladderpod, goldenbushes, matchweed, and others.

Shrubless areas are only sparsely inhabited, especially where giant kangaroo rats are not common. San Joaquin antelope squirrels also require areas with friable soils free from flooding where they can place ground burrows. Substantial colonies investigated by Hawbecker (1953) were almost always confined to loam and sandy-loam soils with moderate amounts of soluble salts, but soils with a wide range of textures are used (Williams et al. 1998).

Nelson's antelope squirrel was last recorded within the vicinity of the Primary Study Area in 1918, within what is now ruderal habitat adjacent to the Fresno Slough and approximately 1.25 south of Primary Study Area. However, given the habitat requirements of this species (i.e., minimally disturbed natural grass and shrub communities), it is unlikely that Nelson's antelope squirrel currently occurs within the Primary Study Area, which is dominated by fallow land as well as disturbed habitats.

San Joaquin kit fox

The San Joaquin kit fox (*Vulpes macrotis mutica*), a federally listed endangered and state-listed threatened species, is the larger of two subspecies of the kit fox (*Vulpes macrotis*), the smallest canid species in North America. This species, on average, weighs approximately five pounds and has a small slim body, characterized by large close-set ears and a long bushy tail which tapers and has a distinctly black tip (USFWS 2010b).

San Joaquin kit fox are known to occur within the vicinity of the Primary Study Area within the City of Mendota and the MWA. However, kit foxes do not den in saturated soils and although they may traverse farmlands, individuals do not utilize farmland for habitat. Photograph courtesy of USFWS.

The San Joaquin kit fox occurs in areas characterized by sparse or absent shrub cover, sparse ground cover, and short vegetative structure (USFWS 2010b). Additionally, San Joaquin kit fox utilize habitat along canals for dispersal. However, this species is generally absent or scarce in areas where soils are shallow due to high water tables, impenetrable hardpans, or proximity to parent material (e.g., bedrock) and they will not den in saturated soils or in areas subject to periodic flooding (USFWS 2010b). The MWA serves as additional satellite habitat for San Joaquin kit fox; however much of this area is comprised of surface water or floodplain that is not suitable for the kit fox (USFWS 2010b).

Historically, San Joaquin kit foxes occurred in several native plant communities of the San Joaquin Valley. Because of extensive land conversions and intensive land use, some of these communities are only represented by small, degraded remnants. Other habitats in which kit foxes are currently found have been extensively modified by humans and include grasslands and scrublands with active oil fields, wind turbines, and an agricultural matrix of row crops, irrigated pasture, orchards, vineyards, and grazed annual grasslands.

Additionally, San Joaquin kit foxes may occur adjacent to and forage in tilled and fallow fields (Bell 1994). The value of fallow lands for kit foxes is highly dependent upon the duration of

fallowing and the location of the lands. Agricultural fields that are fallowed for only one season are likely to have little value while lands that are fallowed for one or more years could have greater value to kit foxes as this time period may be sufficient for the reestablishment of a prey base and the creation of dens (Cypher et al. 2007). Further fallow lands immediately adjacent to natural lands might be used relatively quickly by kit foxes; however, as the distance between fallow lands and occupied habitat increases, the potential for use by kit foxes decreases as individuals face risks when crossing agricultural lands which may preclude colonization or use of fallow lands that are not adjacent to occupied habitat (Cypher et al. 2007).

Two San Joaquin kit fox observations have been recorded in the vicinity of the Primary Study Area in 1947 and 1990. Both of these observations were made in developed agricultural communities, with the most recent observation made in Firebaugh approximately eight miles northwest of the Primary Study Area. Due to the agricultural character of the surrounding vicinity, it is unlikely that San Joaquin kit fox occurs within the fallow agricultural land within the Primary Study Area. Additionally, no burrows or other indirect signs associated with San Joaquin kit foxes were observed during the habitat assessment. Consequently, while San Joaquin kit fox have been observed within the Mendota Dam and Firebaugh 7.5-minute quadrangles as recently as 1947 and 1990, respectively, it is unlikely that this species currently utilizes fallow land within the Primary Study Area.

San Joaquin pocket mouse

The San Joaquin pocket mouse (*Perognathus inornatus inornatus*) is a California special animal tracked in the CNDDB. This small-sized mouse is approximately three inches in length and has buffy to pinkish soft fur with black hairs on its back (Best 1993).

San Joaquin pocket mice occur is sandy or fine-textured soils characterized by grassy or weedy vegetation. This species has not been recorded within the vicinity of the Primary Study Area in nearly 100 years. Photograph courtesy of B. Peterson, Smithsonian National Museum of Natural History.

San Joaquin pocket mice occur throughout the San Joaquin Valley and inhabit arid annual grasslands, savanna, and desert shrub associations (Best 1993). Vegetation comprising San Joaquin pocket mice habitat includes grassy or weedy species as well as sagebrush, sage, filaree, oats, and brome grass. Further, individuals generally burrow within substrates that are sandy or otherwise characterized as fine-textured soils. The San Joaquin pocket mouse is nocturnal and spends the day below ground in a simple burrow and forages at night on the surface of the ground.

Similar to Nelson's antelope squirrel, San Joaquin pocket mice were recorded within the vicinity of the Study Area in 1918. Two recorded observations of this species were made approximately one mile northwest and 1.25 miles south of the Primary Study Area, in what is now ruderal habitat or cultivated agricultural land. San Joaquin pocket mice are not likely to occur within the Primary Study Area due recent agricultural land uses within the Primary Study Area as well as surrounding agricultural land uses, which may limit immigration to the site.

Special Status Bats

California bats are threatened by habitat destruction, especially since a wide variety of habitats are needed for different behaviors (e.g., roosting, foraging, drinking, hibernating, etc.). Many bat species roost in groups and use mature trees, snags, crevices, and man-made structures either for winter roosting (i.e., hibernacula) or for forming summer nursery colonies. Protecting established roost sites is of particular importance to the conservation of bats, and management of these sites is receiving increasing attention from the CDFW.

Three special status bat species were considered to have at least some potential to occur within the Primary Study Area, including the following:

- Yuma myotis bat (*Myotis yumaensis*), California Special Animal
- Western red bat (*Lasiurus blossevillii*), CDFW Species of Special Concern
- Western mastiff bat (*Eumops perotis californicus*), CDFW Species of Special Concern

Potential bat roosting habitat in the vicinity of the Primary Study Area is limited to the three large trees present along the agricultural ditches. Additionally, some agricultural equipment located to the south of the Primary Study Area and along Fresno Slough may provide marginal roosting habitat within Terra Linda Farms River Ranch. However, cliffs, caves, and large rock features are absent from the area.

The area immediately surrounding the Primary Study Area provides foraging opportunities over bodies of standing water within the irrigated agricultural areas. Additionally, the agricultural ditches within the Priamry Study Area provide some marginal foraging habitat where insects might be present in large concentrations. Further, some bat species are known to glean large insects, including crickets, grasshoppers, beetles, and scorpions, from the ground or other surfaces. Open ruderal habitats and fallow agricultural areas, such as those within the Primary Study Area, would support this type of foraging behavior.

Yuma myotis (left), western red bats (middle), and wastern matiff bats (right) have each been documented with the vicinity of the Study Area. In particularly Yuma myotis and western red bats have been documented over the Fresno Slough along the northern boundary of the MWA as recently as 1999. Due to the potential foraging habitat within and surrounding the Primary Study Area, these species have a moderate potential to occur. Photographs courtesy of Bat Conservation International.

Yuma myotis and western red bat have each been recorded within the MWA in close proximity to the Fresno Slough as recently as 1999. Western mastiff bats were also observed within close proximity to the Primary Study Area in 1911. Further Yuma myotis and western mastiff bats have been observed in Firebaugh approximately eight miles to the northwest, roosting in cottonwood and sycamore groves. No bats were observed roosting or foraging within the

Primary Study Area during the habitat assessment, and no bat sign was detected; however, due to the presence of potential foraging habitat, Yuma myotis, western red bat, and western mastiff are considered to have a moderate potential to forage within the Primary Study Area, particularly near the areas characterized by open water.

4.3 Sensitive Natural Communities

The Riparian, Stream, and Freshwater Marsh Natural Community encompass all freshwater, aquatic, marsh, and riparian habitat within or adjacent to the Primary and Secondary Study Area.

Stream and Freshwater Marsh Natural Communities

Aquatic habitats are characterized by the presence of standing or flowing water (Cowardin et al. 1979). Lotic systems include all moving water (i.e., streams or rivers) and lentic systems include stationary water (e.g., lakes, ponds, or pools). Lotic systems within the vicinity of the Primary and Secondary Study Areas include ephemeral, intermittent, and perennial streams and rivers (e.g., San Joaquin River). Ephemeral streams or watercourses flow only in response to precipitation with flows ceasing a few days or weeks after the rains. Conversely, perennial streams have visible water flowing above the streambed year round. Intermittent streams are those that fall in between. The aquatic component of lotic habitats is referred to as the riverine system (Cowardin et al. 1979). Riverine systems typically include all open water areas that occur within a defined channel of a stream as well as along perennial and intermittent stretches of streams and along some major dry washes. In some cases, riverine systems are bounded by palustrine wetlands that develop in the floodplain on either side of the defined channel.

The majority of the palustrine wetlands or floodplains that historically bordered the larger rivers, such as the San Joaquin River or the Kings River and adjacent sloughs and waterways (e.g., Fresno Slough), have been drained over the last century to facilitate agricultural operations. While in some respects, these manmade environments (e.g., drainage ditches and canals) maintain certain characteristics of a natural riverine system (e.g., they contain flowing water) the flow regimes and surrounding banks have been extensively modified. For example, these channels contain the water flow required to support riparian vegetation, but generally lack this vegetation because they are frequently cleared for maintenance purposes. Vegetation along the banks, including the banks of the Fresno Slough, generally consists of nonnative grasses and forbs associated with upland situations with a few water tolerant species in the more saturated zones.

The term lentic refers to a variety of habitats broadly divided into lacustrine and palustrine systems. Lacustrine systems refer to wetland and deepwater habitat, often greater than 20 acres in size and lacking trees, shrubs and persistent emergent vegetation (e.g. lakes and reservoirs). Palustrine systems include all nontidal wetlands dominated by trees, shrubs, and persistent emergent vegetation (e.g., freshwater marshes) and/or are less than 20 acres in size and less than six feet deep at low water. Freshwater marsh habitat is unique in that it falls under the definitions of aquatic and riparian habitat. Typical freshwater marsh habitat develops in shallow, standing, or slow moving water at the edge of ponds and streams, and at other sites that lack currents and are permanently flooded by fresh water. This plant community is typically dominated by up to 12-foot tall, perennial, emergent plants.

Riparian Natural Communities

Riparian habitat is broadly defined as the transitional zone between aquatic and terrestrial (i.e., upland) environments (Intergovernmental Task Force on Monitoring Water Quality [ITFMWQ] 1996). Therefore, riparian vegetation encompasses a wide variety of vegetation community types that may occur along water bodies such as intermittent and perennial streams, lakes, ponds, and floodplains and may also occur in areas, such as seeps and springs, where the water table is sufficiently high to provide water to the roots of plants nearly year round. Given this broad category, riparian vegetation varies widely in plant species composition and structure, depending on the hydrology, flooding regime, climate, soil, light and level of natural disturbance and human disturbance (Keddy 2000). The riparian systems often exhibit characteristics of both aquatic and terrestrial environments; however, they are not as dry as upland environments and similarly not inundated as frequently as aquatic systems. This mixture of upland and aquatic characters make riparian systems highly diverse and productive environments. The riparian communities in the vicinity of the Primary and Secondary Study Areas include riparian woodland and riparian scrub vegetation.

Riparian woodlands consist of dominant trees in riparian zone that are most commonly winter-deciduous, broadleaved trees, with a canopy cover ranging from relatively open to very dense. True riparian species (i.e., species that are dependent on available water year round, are found along major rivers and streams and other freshwater features. Cottonwoods and willows are some of the most commonly occurring true riparian trees in Central California. Riparian scrub is characterized by an open to impenetrable lower growing scrub that is almost always a component of any riparian vegetation. Shrub species vary depending on the geographical location; broad-leaved, deciduous riparian thickets are usually dominated by any of several species of willow forming dense thickets within the riparian corridor.

5.0 REGULATORY CONTEXT

The summaries below provide a brief overview of the Federal and state regulations as well as their respective requirements that are applicable to the resources occurring within or adjacent to the Primary and Secondary Study Areas. The permits or other authorizations that would be required under these regulations, should adverse effects be expected, are also noted where applicable. Specific mitigation measures for the expansion of the recharge canal are included in the EIS/EIR for the proposed 20-year extension of the existing 2005 Mendota Pool 10-Year Exchange Agreements.

5.1 Federal Regulations and Standards

Federal Endangered Species Act

Enacted in 1973, the ESA (U.S. Code [USC] Title 16, Chapter 35, Sections 1531-1544) provides for the conservation of threatened and endangered species and their ecosystems. ESA prohibits the "take" of threatened and endangered species except under certain circumstances and only with authorization from the USFWS through a permit under Section (d), 7, or 10 (a) of the ESA. Under the ESA, "take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The ESA requires Federal agencies to make a finding on all Federal actions, including approval by an agency of a public or private action, as to the potential to jeopardize the continued existence of any listed species. Formal consultation under Section 7 of the ESA would be required if the expansion of the recharge canal would have the potential to adversely affect the federally listed species that have been detected within or adjacent to the Primary and Secondary Study Areas.

Migratory Bird Treaty Act

Congress passed the Migratory Bird Treaty Act (MBTA) (USC Title 16, Chapter 7, Subchapter II, Sections 703-712) in 1918 to prohibit the pursuit, hunting, killing, capture, possession, purchase, barter, or transport of native migratory birds, or any part, nest, or egg of any such bird, unless allowed by another regulation adopted in accordance with the MBTA. The USFWS has jurisdiction over migratory birds. No permit is issued under the MBTA; however, the expansion of the recharge canal would need to comply with the measures that would avoid or minimize adverse effects on migratory bird species.

Bald and Golden Eagle Protection Act

When first enacted in 1940, the Bald and Golden Eagle Protection Act (BGEPA) (USC Title 16, Chapter 5A, Subchapter II, Sections 668 a-d) prohibited the take, transport, or sale of bald eagles, their eggs, or any part of an eagle except where expressly allowed by the Secretary of Interior. The BGEPA was amended in 1962 to extend the prohibitions to the golden eagle. No permit is issued under the BGEPA; however, the expansion of the recharge canal would need to comply with the measures that would avoid or minimize adverse effects on eagles within or adjacent to the Primary and Secondary Study Areas.

Federal Water Pollution Control Act (Clean Water Act)

The Federal Water Pollution Control Act was first passed by Congress in 1948. The act was later amended and became known as the Clean Water Act (CWA) (USC Title 33, Ch.26, Sub-Ch.

IVI). The CWA establishes the basic structure for regulating discharges of pollutants into the waters of the U.S. It gives the U.S. Environmental Protection Agency (USEPA) the authority to implement pollution control programs, including setting wastewater standards for industry and water quality standards for contaminants in surface waters. The CWA makes it unlawful for any person to discharge any pollutant from a point source into navigable waters, without a permit under its provisions. CWA Section 404 permits are issued by the U.S. Army Corps of Engineers (USACE) for dredge/fill activities within wetlands or non-wetland waters of the U.S. CWA Section 401 certifications are issued by the Regional Water Quality Control Board (RWQCB) for activities requiring a Federal permit or license which may result in discharge of pollutants into waters of the U.S. Any proposed discharge of dredge or fill materials into Federal jurisdictional waters within or adjacent to the Study Area would require a Section 404 permit from the USACE and a Section 401 Water Quality Certification from the RWQCB.

5.2 State Regulations and Standards

California Department of Fish and Game Code

The CDFG Code regulates the take or possession of birds, mammals, fish, amphibian, and reptiles as well as natural resources such as wetlands and waters of the State. It includes the California Endangered Species Act (CESA) (Sections 2050-2115) and Streambed Alternation Agreement regulations (Sections 1600-1616) as well as provisions for legal hunting and fishing, and tribal agreements for activities involving take of native wildlife. Any proposed adverse effect to state-listed species or state jurisdictional waters within or adjacent to the Primary or Secondary Study Areas would require a permit under CESA and a Streambed Alternation Agreement from the CDFW, respectively.

California Endangered Species Act

CESA (CDFG Code, Division 3, Chapter 1.5, Sections 2050-2115) generally parallels the main provisions of the ESA and is administered by CDFW. CESA prohibits take of any species that the California Fish and Game Commission determines to be a threatened or endangered species and allows for take incidental to otherwise lawful development projects upon approval from the CDFW. Under the CDFG Code, "take" is defined as to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill. California also has identified wildlife species of special concern. These species are rare, restricted in geographic distribution, or declining throughout their geographic range. Having been so designated, sensitive species are also considered in resource planning and management. Any proposed adverse effect to state-listed species within the Primary or Secondary Study Areas would require a permit under CESA.

Porter-Cologne Water Quality Control Act

Porter-Cologne Water Quality Control Act (California Water Code, Division 7, Sections 13000-14958) provides for statewide coordination of water quality regulations. The Act established the California State Water Resources Control Board as the statewide authority and further established nine separate RWQCBs to oversee water quality on a day-to-day basis at the regional and local levels. Proposed discharges of waste that could affect state waters (that are not Federal waters) within or adjacent to the Primary or Secondary Study Areas would require a Report of Waste Discharge from RWQCB.

6.0 PROJECT IMPACTS AND CONCLUSIONS

As a result of the habitat assessment conducted by AMEC biologists and soil core samples also taken by AMEC, the proposed groundwater recharge basin area is limited to River Ranch North (refer to Figure 3-2). The Britz property and surrounding agricultural ditches have been excluded due to the presence of extensive emergent freshwater marsh and upland habitats, which provide relatively high quality habitat that may support giant garter snake as well as other sensitive aquatic species. Additionally, the area surrounding River Ranch North has been excluded due to the presence of clay soils which would not support use of the area as a percolation basin. Consequently, these areas would not be directly impacted by vegetation removal or ground disturbing activities.

Discussion regarding direct impacts as a result of vegetation removal and ground disturbing activities is limited to the Primary Study Area, River Ranch North. However, the description of indirect impacts as a result of the Proposed Action and the Terra Linda Farms recharge canal expansion alternative includes discussion regarding impacts to the surrounding vicinity, including the Britz Property as well as the Fresno Slough and MWA.

6.1 Direct Impacts

It is anticipated that approximately 85 acres of 513-acre Terra Linda Farms River Ranch (i.e., 16.5 percent) would be developed as a ground water recharge basin. This would include intensive vegetation removal and ground disturbing activity during construction as well as periodic flooding of the area throughout the 20-year life of the recharge basin. A summary of direct impacts to habitat is provided in Table 6-1 and potential direct impacts to special status species are described in more detail below. River Ranch North primarily consists of fallow agricultural fields (i.e., 87 percent of the Primary Study Area), and therefore provides limited habitat value to many special status species recorded in the vicinity. Additionally, no sensitive natural communities or natural aquatic habitats would be directly affected by conversion of these areas to a ground water recharge basin.

Table 6-1 Impacted Habitat within the Study Area

	Habitat Acreage						
	Agricultural Ditch	**Giant reed**	**Disturbed Riparian Scrub**	**Disturbed/ Developed**	**Emergent Freshwater Marsh**	**Fallow**	**Ruderal**
River Ranch North	1.3	-	-	9.4	-	73.9	0.7
Terra Linda Farms River Ranch	25.7	9.2	2.0	51.6	16.2	328.9	79.3
Percentage of Total Habitat	**5.1%**	**0.0%**	**0.0%**	**18.2%**	**0.0%**	**22.5%**	**0.9%**

As previously described, the berms surrounding the proposed recharge basin would be planted with clusters of native riparian vegetation. These clusters of vegetation would be approximately 100 feet long and 10 feet wide with 100 feet of open berm between each cluster. In total, there would be approximately one acre of riparian habitat comprised of the native vegetation clusters surrounding River Ranch North under the Terra Linda Farms recharge canal expansion alternative. These areas would be unmanaged and would provide areas of wildlife habitat along the slopes of the recharge basin berms, including nesting habitat for Swainson's hawk and potential refugia for the giant garter snake. Additionally, while the interior of the basin would be subject to periodic flooding (e.g., once every three years on average given current hydrological conditions) and annual maintenance, these areas would provide additional open terrestrial habitat for the vast majority of the year. Further, to avoid impacts to the federally endangered giant garter snake maintenance activities within the basin would be limited to the active period for the giant garter snake during spring and summer. Additionally, prior to the initiation of maintenance activity or vehicle access, USFWS and CDFW would be notified, and visual surveys would be conducted for giant garter snake.

6.1.1 Special Status Plants

As previously described, the vast majority of habitat within the boundaries of the proposed recharge basin is characterized by fallow agricultural fields or disturbed areas. Consequently, suitable habitat for sensitive species is generally not present or severely limited. Special status plant species were not observed during the habitat assessment conducted within the Primary Study Area on 26 June 2013. While 11 special status plant species have been recorded within the vicinity of the Primary and Secondary Study Areas, only four species have been recorded in the immediate vicinity (refer to Figure 4-1). Additionally, these species including Sanford's arrowhead, recurved larkspur, lost hills brownscale, and heartscale have not been recorded within the vicinity of the Primary Study Area in at least 24 years, and over 100 years in the case of recurved larkspur. Additionally, as summarized in Table 6-1, removal of habitat would be limited to disturbed areas. These areas are unlikely to support sensitive plant species based on a lack of suitable alkali habitats or other natural vegetation types and do not constitute sensitive native communities.

Based on the lack of suitable habitat within the impact area as well as the large period of time since the last recorded observations of sensitive plant species, it is not expected that a loss of special status plant habitat would occur as a result of the conversion of the River Ranch North to a groundwater recharge basin.

6.1.2 Special Status Wildlife

A total of 26 sensitive wildlife species have been recorded within the vicinity of the Primary and Secondary Study Areas, including eight birds, eight herpetofauna, two fish, and eight mammals (refer to Table 4-2). However, based on observations during the habitat assessment, only seven of the recorded species have a moderate potential to occur within the Primary Study Area and only Swainson's hawk has a high potential to occur within the Primary Study Area. These species with potential to occur within the Primary Study Area generally utilize fallow agricultural habitat or aquatic habitats (e.g., agricultural ditches). As previously described, the proposed area for the groundwater recharge basin has been limited as a result of the habitat assessment to exclude all freshwater emergent marsh habitat for the purpose of eliminating

potential impacts to giant garter snake. Additionally, the boundaries of River Ranch North would avoid all riparian habitats and emergent freshwater marsh habitat within the Britz Property located to the southeast, which also provides relatively high quality habitat for giant garter snake (refer to Figure 3-2).

The potential for take of special status species is extremely limited due to the lack of high quality habitat within the River Ranch North boundaries and would be further reduced through the implementation of preconstruction surveys (see Section 6.5, *Preconstruction Surveys*) and additional mitigation as described in the EIR/EIS for the Proposed 20-Year Extension of the 2005 Mendota Pool Exchange Agreements. Consequently, direct impacts to wildlife species would largely be limited to the removal of potential foraging habitat for avian species. These impacts as well as other potential direct impacts to wildlife species are described in greater detail below.

Burrowing owl

No burrowing owls were observed on-site during the habitat assessment; however, adult burrowing owls have been documented in the immediate vicinity of the Primary Study Area within the MWA, the Secondary Study Area. Fallow agricultural lands and disturbed habitat (e.g., unpaved roads) within the Primary Study Area may provide potential winter and nesting habitat for burrowing owls. While no burrows were documented on-site during the habitat assessment, burrowing owls may also use this area as foraging habitat. Within the Primary Study Area fallow land and disturbed habitat totals approximately 83 acres, approximately 98 percent of the Primary Study Area. Consequently, conversion of this habitat to groundwater recharge basin would remove a relatively large area of potential burrowing owl foraging and/or nesting habitat. However, this would result in a less than significant direct impact to burrowing owls as additional foraging habitat, including fallow agricultural land, occurs in vicinity of the Primary and Secondary Study Areas, including within the remainder of the Terra Linda Farms River Ranch. Further, preconstruction surveys for burrowing owl burrows would eliminate the potential for direct take of the species (see Section 6.5, *Preconstruction Surveys*).

Swainson's hawk

Swainson's hawks require large, open foraging habitat with abundant and available prey in association with suitable nest trees, particularly within riparian areas. Swainson's hawks have regularly been observed nesting in riparian habitat within cottonwoods and willows along the San Joaquin River approximately 1.5 miles to the northeast of the Primary Study Area. Additionally, Swainson's hawks were observed during the habitat assessment foraging within fallow agricultural land just north of the agricultural ditches and southeast of the Primary Study Area. Further, in addition to the available foraging areas, the two large willow trees and the single large cottonwood tree located along the agricultural ditches within the immediate vicinity of the Primary Study Area may also provide some marginal nesting habitat for Swainson's hawks. Consequently, Swainson's hawks are considered to occur on-site and given the presence of and proximity to potential nesting areas along the San Joaquin River as well as foraging areas within the Primary Study Area, the habitat is considered to be of relatively high quality.

Conversion of River Ranch North to a groundwater recharge basin would remove approximately 73.9 acres of fallow agricultural land (i.e., 22.5 percent of fallow land within Terra Linda Farms River Ranch). Consequently, the quantity of foraging habitat for Swainson's hawk in the Primary

Study Area would be reduced as a result of the construction of the proposed River Ranch North groundwater recharge basin. However, approximately 225 acres of fallow agricultural lands would remain within Terra Linda Farms River Ranch. Additionally, approximately 72 acres of ruderal habitat, also suitable for Swainson's hawk foraging, would also remain undisturbed by construction activities. Further, additional suitable foraging habitats, including approximately 400 acres of fallow agricultural lands adjacent to the San Joaquin River, occur within the immediate vicinity of the Primary Study Area.

While some foraging habitat would be removed as a result of the construction of the groundwater basin, expansion of the existing Terra Linda Farms recharge canal would include the establishment of riparian habitat along the perimeter, which would provide suitable nest trees for Swainson's hawks. Additionally, the basin would only be flooded approximately one month per flood year (i.e., on average one month every five years). While the potential habitat with the basin would undergo maintenance activities (i.e., disking and ripping), vegetation providing low-quality to marginal foraging habitat would be present at least during some parts of the year within the basin.

Consequently, due to the remaining availability of suitable foraging habitat within the immediate vicinity of the Primary and Secondary Study Areas as well as the establishment of riparian habitat surrounding the basin, removal of fallow agricultural land would constitute a less than significant impact to Swainson's hawks. Additionally, loss of individual Swainson's hawks, or removal or disturbance of their nests would be avoided through the implementation of preconstruction surveys (see Section 6.5, *Preconstruction Surveys*).

Giant garter snake

While no giant garter snakes were observed within the Primary Study Area during the habitat assessment, an extensive area of emergent freshwater marsh vegetation (i.e., approximately 16 acres), including cattails and tules suitable for giant garter snake, was observed to the southeast of the Primary Study Area (refer to Figure 3-2). Additionally, the AMEC biologist identified suitable habitat in agricultural ditches to the south and cracks in the soils of ruderal habitat adjacent to aquatic features that would serve as suitable complex of upland habitat for giant garter snakes. However, River Ranch North is considered to be of low quality for giant garter snake due to lack of permanent water and an adjacent shoreline dominated by invasive giant reed.

Giant garter snakes have been recorded within the Mendota Pool as recently as 2008 approximately one mile north of the Primary Study Area (U.S. Bureau of Reclamation 2012) (refer to Table 4-3). Giant garter snakes have a moderate potential for occurrence within the aquatic habitats adjacent to the Primary Study Area.

However, River Ranch North has been sited in such a way as to avoid disturbance or removal of the 16-acre emergent freshwater marsh habitat to the southeast. Additionally, construction of the proposed groundwater recharge basin would also avoid the vast majority of agricultural ditch habitat, which is also suitable giant garter snake habitat. As proposed, construction of the groundwater recharge basin would remove approximately 1.3 acres of low quality aquatic agricultural ditch habitat, leaving approximately 95 percent of this habitat intact within Terra Linda Farms River Ranch (refer to Figure 3-2). Further, the proposed groundwater recharge basin would also be constructed outside of the disturbed riparian habitat that occurs adjacent to

the Fresno Slough. As previously described, this habitat, including the upland vegetation and soil cracks, may provide complex upland habitat suitable for this species for basking or refugia during the inactive period. Expansion of the existing Terra Linda Farms recharge canal would also include the establishment of riparian vegetation on the banks of the recharge basin, which would be sloped at a 3:1 angle. These unmanaged banks would provide suitable refugia and upland habitats for giant garter snakes. Additionally, maintained vegetation would be permitted to grow within the basin during non-flood years, which may provide additional cover for this species.

Consequently, direct impacts to giant garter snake habitat would be relatively minor; only 1.3 acres of low quality habitat would be affected, and approximately 97 percent of available aquatic habitat within Terra Linda Farms River Ranch would be avoided. Additionally, direct impacts (i.e., take) to giant garter snakes would be avoided by limiting maintenance work to the active season for giant garter snakes (i.e., 1 May – 1 October). Additionally, potential impacts to giant garter snakes would be further reduced through the implementation of preconstruction surveys and the slow dry down of any waterways to be impacted before work begins (see Section 6.5, *Preconstruction Surveys*). However, operation of the groundwater basin may have additional indirect impacts on this species (see Section 6.2, *Indirect Impacts*).

Western pond turtle

Western pond turtles were not observed during the habitat assessment and have not been observed within the vicinity of the Mendota Dam since 1996. However, western pond turtles are known to utilize slow-moving water bodies with refugia and undercut banks, including ephemeral wetlands and stock ponds. The freshwater emergent marsh and riparian scrub habitat adjacent to the Fresno Slough provide refugia and suitable basking sites. Additionally, agricultural ditches provide suitable habitat. Consequently, removal of 1.3 acres of low quality agricultural ditch habitat within River Ranch North would constitute a minor impact to the western pond turtle. However, the majority of aquatic habitat within the Primary Study Area (i.e., 97 percent) would remain intact and the groundwater recharge basin, following completion, would provide additional aquatic habitat. Further, the potential for take of western pond turtles during construction would be avoided through the implementation of preconstruction surveys (see Section 6.5, *Preconstruction Surveys*). Consequently, direct impacts to western pond turtle would be less than significant.

American badger

While no mammal burrows were observed during the habitat assessment, American badgers have a moderate potential to occur within fallow agricultural lands and ruderal habitat within Terra Linda Farms River Ranch, which totals approximately 408 acres. American badgers have been recorded in the Alkali Sink Ecological Reserve, just south of Highway 180, in 1985. As a result of the proposed conversion of River Ranch North from fallow agricultural land to a ground water recharge basin, approximately 75 acres of potential habitat within the Primary Study Area would be removed and periodically flooded. However, direct loss of denning mammals during construction would be avoided through the implementation of preconstruction clearance surveys (see Section 6.5, *Preconstruction Surveys*). Additionally, habitat loss would not be considered a significant direct impact given the amount of available fallow agricultural land in the region.

Special Status Bats

Removal or disturbance of small trees and shrubs throughout the Primary Study Area would result in a loss of potential roosting habitat for three bat species, yuma myotis, western red bat, and western mastiff bat. Additionally, removal of fallow agricultural land may result in the loss of potential foraging habitat for these species.

Roosting habitat loss is not considered a significant impact as roosting opportunities for bats are not unique on site and are available throughout surrounding area. Additionally, removal of the two specimen willow trees as well as the single specimen cottonwood would be avoided and establishment of riparian vegetation along the banks of the groundwater basin may provide additional roosting habitat. Further, foraging habitat is widely available and likely more suitable in areas outside of the Primary Study Area. Direct impacts to individuals (i.e., take) would be avoided through preconstruction surveys and establishment of a 300-foot buffer from any active roost trees during maintenance activities.

6.2 Indirect Impacts

In addition to the direct impacts to sensitive species, the proposed conversion of River Ranch North to a groundwater recharge basin also has the potential for indirect impacts, particularly to aquatic or semi-aquatic species and their habitats. Further, the groundwater transfers associated with the proposed 20-year extension of the 2005 Mendota Pool Exchange Agreements (Proposed Action) may also have indirect impacts on adjacent aquatic habitats within the Fresno Slough, including the segment that flows through the MWA.

6.2.1 Indirect Construction Related Impacts

Construction activities associated with the proposed River Ranch North groundwater basin would have potential temporary indirect impacts including impacts to air quality, ambient noise levels, and increased rates of erosion as a result of grading activities. However, temporary indirect impacts associated with construction would not be expected to differ substantially from on-going agricultural activities such as disking within fallow agricultural land. Construction activity would result in a temporary increase in airborne dust (i.e., particulate matter) as well as minor emissions of criteria pollutants. However, these emissions would be well within National Ambient Air Quality Standards (NAAQS). Additionally, construction activities, which would occur over six months, would increase ambient noise during this period, potentially disrupting wildlife in the immediate vicinity of the Primary Study Area. This could interfere with foraging or reproductive activities of wildlife species within or immediately adjacent to the Primary Study Area. Additionally, there may be minor temporary increases in the rate of soil erosion into the Fresno Slough. While vegetation along the slough banks would remain in place, disturbance of groundcover within River Ranch North would uncover and disturb soils, potentially increasing runoff associated with heavy storm events.

Further, construction- and maintenance-related activities would also have the potential to contribute to long-term indirect impacts. Heavy equipment used for construction of the proposed groundwater recharge basin or maintenance would access the site via existing unpaved roadways, which are categorized as disturbed areas (refer to Figure 3-2) that do not provide high quality habitat for plant or wildlife species. However, construction and heavy equipment movement within the vicinity of giant reed would increase the potential for the spread of this

highly invasive species, potentially resulting in an overall increase in the area dominated by this species, and degrading surrounding habitat values. Giant reed could also spread to the proposed groundwater recharge basin, resulting in additional and more intensive maintenance requirements and water consumption issues. Therefore, to reduce these potential impacts the MPG shall avoid disturbing and spreading giant reed along the banks of the Fresno Slough.

Indirect impacts to wildlife movement in the region are not expected due to the existing disturbed and fragmented nature of the landscape and the marginal habitat value of the Primary Study Area for most native plant and wildlife species. The areas adjacent to the west of the proposed groundwater recharge basin are surrounded by agricultural operations and the City of Mendota further to the west. The east of the Primary Study Area is bound by the Fresno Slough, which provides an aquatic link between the MWA and the Mendota Pool. However, while flows within this habitat may be altered, as discussed in Section 6.2.3, *Flood Flows and Flow Direction in the Fresno Slough*, this linkage would not be interrupted by the construction of the proposed ground water recharge basin. Fresno Slough will be avoided by construction activities with the exception of potential bank enhancement to remove giant reed. Therefore, indirect impacts to wildlife movement in the region would be less than significant.

6.2.2 Surface Water Quality within the MWA

The Mendota Pool was listed by the California State Water Resources Control Board (SWRCB) as an impaired water body on the 2010 California 303(d) List of Water Quality Limited Segments due to elevated concentrations of selenium and mercury. Potential sources for these pollutants within the Mendota Pool include agriculture, agricultural return flows, and groundwater withdrawals, among other sources. Due to its interaction with subsurface rocks and soils, groundwater pumped into the Mendota Pool from the San Joaquin Valley Groundwater Basin contains an increased concentration of dissolved substances relative to surface water sources such as the DMC, North Fork Kings River, and San Joaquin River.

Due to the potential for changes in water quality in the Mendota Pool from the existing groundwater pumping program, design constraints (i.e., management strategies to minimize environmental impacts) were incorporated into the existing agreements. Relevant design constraints associated with the MWA are aimed at maintaining the overall quality of groundwater entering the Mendota Pool, therefore reducing the impacts of low quality water within the Fresno Slough flowing south into the MWA during the irrigation season (see Section 3.1, *Regional Aquatic Resources*). These two design constraints require MPG to:

1. Modify the pumping program based on the results of the surface water monitoring program to reduce overall surface water quality degradation, particularly with respect to salinity (total dissolved solids [TDS] or electrical conductivity [EC]). This will ensure that the quality of water supplied to the MWA and other users in the southern portion of the Mendota Pool will meet applicable water quality criteria. Wells with TDS concentrations greater than 2,000 milligrams per liter (mg/L) will not be pumped into the Mendota Pool. During the fall pumping period, when there is reduced flow in the Mendota Pool and water quality at the MWA is most critical, wells with TDS higher than 1,200 mg/L will not be pumped for transfer.

2. Shut off wells with selenium concentrations equal to or greater than the water quality criterion of 2 micrograms per liter (μg/L).

However, these design constraints, unlike those specific to the intakes at the northern end of the slough, do not require a suspension of the pumping program when surface water quality triggers are exceeded. The surface water quality monitoring program includes 12 monitoring locations (see Table 6-2), including one at the MWA, approximately one mile south of Whites Bridge. The Mendota Pool Group Pumping and Monitoring Program: 2010 Annual Report includes the most current information for sampling performed by MPG.

Table 6-2 2010 Surface Water Grab Sample Results

Sample Location	EC @ 25ºC (µmhos/cm)		Arsenic (µg/L)		Boron (µg/L)		Molybdenum (µg/L)		Selenium (µg/L)	
	Max	Med	Max	Med	Max	Med	Max	Med	Max	Med
North										
Mendota Dam	727	454	2	2	440	180	<1.4	-	<0.4	<1
CCID Outside Canal	709	481	2	-	440	190	<1.4	-	<1	<1
Delta-Mendota Canal	687	477	3	2	430	200	<1.4	-	1.7	<1
CCID Main Canal	651	414	2	2	350	200	<1.4	-	1.1	<1
Firebaugh Intake Canal	760	496	2	2	460	190	<1.4	-	<1	<1
Columbia Canal	614	238	2	2	140	90	3.1	-	0.47	<1
West of Fordel	508	445	2	2	200	200	<1.4	-	0.62	0.6
Central										
Etchegoinberry	581	-	<2	-	200	-	1.7	-	0.64	-
South										
James ID Booster Plant	960	641	3	3	400	200	4.1	-	0.48	-
Tranquillity ID Intake	824	717	3	3	400	350	2.9	-	<0.4	-
Mendota Wildlife Area	**729**	**541**	**2**	**2**	**300**	**200**	**<1.4**	**-**	**<0.4**	**-**
Laterals 6 and 7 Intake	614	238	2	2	140	90	3.1	-	0.47	<1

Source: Luhdorff and Scalmanini 2011.
Notes: Max = maximum; Med = median

The MPG annual monitoring reports indicate that MPG transfer pumping has not had any significant impacts on surface water quality in the northern region of the Mendota Pool. However, the results of surface water quality monitoring indicate that MPG pumping impacts on water quality in the southern portion of the Mendota Pool have increased slightly in recent years due to reduced flow in the Fresno Slough. The southerly flow of water in the Fresno Slough has decreased due to reduced diversions by Westlands and other users in the southern portion of the slough. Therefore, higher quality water from the DMC does not reach the southern end of the Fresno Slough during the irrigation season. In 2010, while arsenic, boron, molybdenum, and selenium were at or below CDFW targets for refuge water, maximum EC, a measure of salinity, was in the severe zone at the MWA and median EC was above target levels (see Tables 6-2 and 6-3).

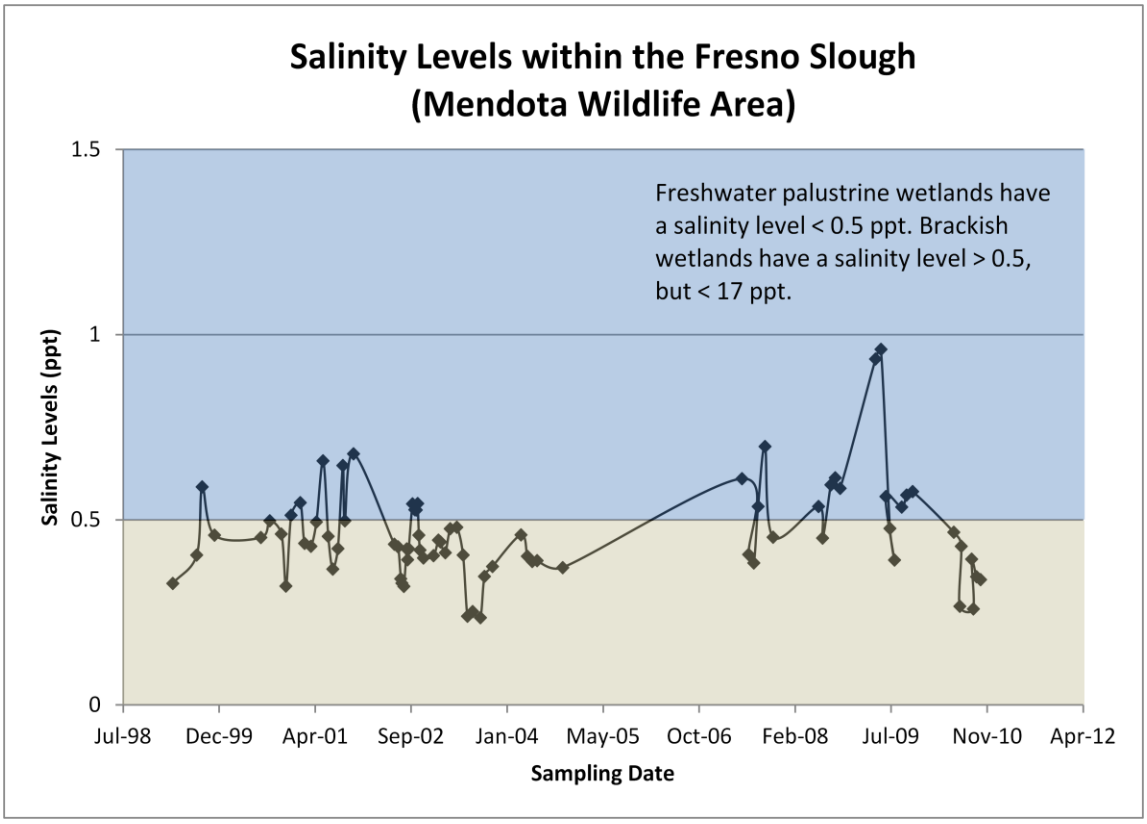
Table 6-3 Surface Water Quality Guidelines

Parameter	Target Value	Severe Value	Reference and Notes
Aquatic Life Protection			
Arsenic	10 µg/L	-	CVRWQCB 1998: Dissolved concentration (Sacramento River and San Joaquin River Basin Plan)
Boron	800 µg/L	-	CVRWQCB 1998: Total concentration; Monthly mean, non-critical year (Sacramento River and San Joaquin River Basin Plan)
Molybdenum	19 µg/ L	-	CVRWQCB 1998: Total concentration; Monthly mean (Sacramento River and San Joaquin River Basin Plan)
Selenium	2 µg/L	-	CVRWQCB 1998: Total concentration; Monthly mean; same as Reclamation (2000) (Sacramento River and San Joaquin River Basin Plan)
EC	150 µmhos/cm	-	CVRWQCB 1998: 90th percentile; @25°C (Sacramento River and San Joaquin River Basin Plan)
Refuge Water Supply			
Arsenic	5 µg/L	10 µg/L	CDFG 2001: Preliminary Draft Water Quality Objectives for Refuge Water Supplies (11/14/1995) (Title 34, P.L. 102-575, Section 3406(d))
Boron	300 µg/L	600 µg/L	CDFG 2001: Proposed California Regional Water Quality Control Board Boron and Salinity Objectives for Full Protection of Beneficial Uses in the Lower San Joaquin River at Vernalis.
Molybdenum	10 µg/L	19 µg/L	CDFG 2001: Preliminary Draft Water Quality Objectives for Refuge Water Supplies (11/14/1995) (Title 34, P.L. 102-575, Section 3406(d))
Selenium	2 µg/L	5 µg/L	CDFG 2001: Draft Environmental Impact Statement (EIS)/Environmental Impact Report (EIR): Grassland Bypass Project, 2001-2009 (U.S. Bureau of Reclamation 2000)
EC	440 µmhos/cm	700-1000 µmhos/cm	CDFG 2001: Proposed California Regional Water Quality Control Board Boron and Salinity Objectives for Full Protection of Beneficial Uses in the Lower San Joaquin River at Vernalis

Source: U.S. Bureau of Reclamation 2004.
Notes: EC = Electrical Conductivity; TDS = Total Dissolved Solids; SAR = Sodium Absorption Ratio

Monitoring results under the existing 2005 Mendota Pool 10-year Exchange Agreements have demonstrated that salinity within the Fresno Slough is highly variable. The average salinity concentration since the beginning of monitoring is approximately 721 EC (i.e., .462 parts per thousand [ppt]), greater than the threshold for refuge water supply; however, salinity content has ranged between 368 EC and 1500 EC. Rapid increases in salt concentration have occurred during at least three major periods, including a sustained period of increased salinity during 2009. It is unclear how the implementation of the existing exchange agreements have affected salinity within the Fresno Slough, as there is no clear trend in salinity levels since the beginning of the monitoring program; however, groundwater pumping under the existing 2005 Mendota Pool 10-year Exchange Agreements may incrementally contribute to periodic increases in salinity content within the Fresno Slough.

On average salinity levels within the Fresno Slough are less than 0.5 ppt, the threshold for sustaining freshwater plaustrine emergent wetlands (USFWS 2013b). Salinity levels have been shown to increase above 0.5 ppt within the Fresno Slough, with a particularly large and sustained increase in 2009; however, during flood years the salinity content is generally low. Consequently, while acute salinity impacts may result in short-term die off of less salt-tolerant species, these species may reestablish during and immediately after flood years when the salinity content is lower. Therefore, long-term vegetation community transitions as a result of the Proposed Action would appear to be unlikely with the continued implementation of existing design constraints and additional recommended mitigation measures.



The direct effects of increased salinity on the giant garter snake are currently unknown and warrant further study (USFWS 2012). Elevated salinity levels are known stresses in resident fish and amphibian populations, the major food source of giant garter snakes (USFWS 2012). As many fish and amphibians species cannot survive in highly saline waters, continued episodic increases in salinity within the MWA may have an indirect impact on giant garter snakes as a result of a reduction in prey population and availability. However, under the Proposed Action, average salinity content within the Fresno Slough would likely remain similar throughout the life of the 20-year pumping program, as no trend toward persistent (as opposed to episodic) increases in salinity have been documented during the monitoring program associated with the existing agreement. Additionally, use of the proposed River Ranch North groundwater recharge basin may slightly improve groundwater quality in the vicinity of some MPG groundwater production wells; however this would not likely result in substantial improvement of the surface water quality within the southern Fresno Slough.

Additionally, selenium contamination has been identified as a threat to the giant garter snake and is a contributing factor in their decline (USFWS 2012). The potential for and severity of the effects of increases selenium on giant garter snakes and their prey species within the MWA have not been subject to study. Very little information is available on the effects of selenium on snakes, and no studies to date have looked specifically at the effects of selenium in giant garter snakes (USFWS 2012). The relative sensitivity of giant garter snakes to selenium is not certain. However, studies conducted on the effects of selenium on two other species of snakes, brown house snake (*Lamprophis fulginosus*) and banded water snake (*Nerodia fasciata*), have found that selenium is bioaccumulated as a result of the ingestion of seleniferous prey, ultimately resulting in maternal transfer of potentially toxic quantities of selenium to their offspring (Hopkins et al. 2001). However, since the beginning of the monitoring program in 1998 selenium concentrations within the Fresno Slough have averaged less than 0.4 µg/L, well below the targets for refuge water supply and aquatic life protection. Therefore, although precise effects cannot be determined, it would appear that the potential for the Proposed Action to exacerbate selenium concentrations within the Fresno Slough would be less than significant.

Addressing Salinity in the Fresno Slough and MWA

The MPG is currently developing a range of solutions to address potential impacts to salinity in the Fresno Slough and the MWA. These solutions are still being refined in coordination with CDFW and other potentially impacted agencies and organizations. The solutions that are currently being considered involve a variety of techniques for reducing salinity, including increasing flow through the Fresno Slough, changing the timing of deliveries from the pumping program, changing the location of pumping, changing pumping limits, changing the method of water delivery to MWA, etc… The agreed upon solution will be included in the project as additional design constraints or as mitigation measures.

The MPG is also addressing salinity in the Fresno Slough and MWA by forming the Mendota Area Water Management Working Group (Group). This Group would enhance communication regarding water management, allowing for improved coordination regarding timing of deliveries and withdrawals to and from the Fresno Slough. The MPG would initiate the formation of the Group by reaching out to water users that deliver water to and/or withdraw water from the Mendota Pool and/or Fresno Slough. Potential members include the MPG, San Joaquin River Exchange Contractors, City of Mendota, Tranquillity Irrigation District (ID), James ID, U.S. Bureau of Reclamation, Westlands, CDFW, and Meyers Groundwater Bank. The Group's activities would include establishing communication protocol so that water users are made aware of each other's activity in the Mendota Pool and Fresno Slough. The MPG would distribute a copy of their annually monitoring report to each member of the Group. Enhancing communication and coordination on water withdrawals and inputs into the Fresno Slough could avoid potential problems associated with use by multiple users with different needs (e.g., large withdrawals reducing water levels such that they are too low for MWA intake pumps).

6.2.3 Flood Flows and Flow Direction in the Fresno Slough

As described in Section 3.1, *Regional Aquatic Resources*, the Fresno Slough generally flows in a southerly direction during irrigation season and in a northerly direction during flood years, in which flood flows from the North Fork of the Kings River enter the Fresno Slough from the south. Flooding conditions in the North Fork of the Kings River occur on average approximately

every three years, with the largest period between flood years occurring over eight years between 1986 and 1994. Flood flows from the Kings River reaching the James Weir, the last diversion point before the Fresno Slough, are on average approximately 563,200 acre-feet per flood year.

The proposed River Ranch North groundwater recharge basin would be approximately five feet in height and approximately 85 acres in area, 81 acres of which would be submersible, providing a recharge rate of approximately 24.3 acre-feet per day. Consequently, operation of the proposed groundwater recharge basin would facilitate the recharge of approximately 2,800 acre-feet per flood year. Therefore, less than one percent of the total North Fork Kings River flood flow reaching James Weir would be used for groundwater recharge within the Primary Study Area.

While 2,800 acre-feet per flood year (i.e., approximately 20,000 acre-feet per flood year over the 20-year life of the recharge program) represents a large input to the groundwater table below, it represents a relatively small percentage of the total flood flow that would reach the Fresno Slough. Additionally, based on the location of the existing pumping infrastructure that would be used to convey the flood flows into the proposed groundwater basin (i.e., downstream of the MWA), there would no impact to flood flows through the MWA.

Further, the proposed extension of the existing ground water exchange agreements as well as the operation of the proposed groundwater recharge basin would have no impact in terms of the direction of flow of the Fresno Slough. The volume of water drawn during flood years would be minor with regard to the total flood flow (i.e., less than one percent). Additionally, input of groundwater into the Mendota Pool, as a part of the groundwater exchange, would occur during the agricultural season and would not impact the direction of flow during this time period as deliveries would occur when the Fresno Slough is already flowing in a southerly direction (refer to Section 3.1, *Regional Aquatic Resources*).

6.2.4 Groundwater Drawdown

The MPG currently operates 64 groundwater wells in the Mendota Pool area, 60 of which draw water exclusively from the upper aquifer of the San Joaquin Valley Groundwater Basin, while the remaining 4 wells draw water from both the upper and lower aquifers. The 60 wells that draw from the upper aquifer are classified as either shallow wells that draw from the shallow zone above the A-clay layer or deep wells that draw from the deep zone below the A-clay layer and above the Corcoran Clay layer. The upper aquifer is significantly less susceptible to subsidence than the lower aquifer; however, some level of subsidence can be expected due to drawdown in the upper aquifer.

The proposed 20-year extension of the existing 2005 Mendota Pool Exchange Agreements would continue to allow the pumping of up to 26,250 acre-feet of groundwater per year of from MPG groundwater wells for delivery to the Mendota Pool via existing pumping infrastructure. The MPG would be limited to pumping a maximum of 400,000 acre-feet over the 20-year life of the program; however, the amount of water to be exchanged each year would vary based on a number of factors, including the frequency of drought and flood years. Over the past 10 years, under the existing 2005 Mendota Pool Exchange Agreements, the MPG has pumped a total of approximately 260,000 acre-feet of groundwater into the Mendota Pool.

As previously described, the proposed groundwater recharge basin would have a total recharge capacity of approximately 20,000 acre-feet over the 20-year life of the recharge program.

Consequently, the total recharge volume would account for between 5.0 (worst case scenario) and 7.6 percent (current pumping regime) of the total produced groundwater during the 20-year program. While the construction of the proposed groundwater basin would reduce the volume of groundwater overdraft, operation of these groundwater basin would only reduce overdraft by approximately 5.0 percent under the worst case scenario (i.e., MPG exchanges their total 400,000 acre-foot allotment).

However, the annual monitoring program and design constraints associated with the existing 2005 Mendota Pool Exchange Agreements, which specifically set limits on groundwater withdrawals and resulting subsidence, would be carried forward as a part of the proposed extension of these agreements. Land subsidence measurements are performed as part of the annual monitoring reports that are required for the existing agreements, which include monitoring of groundwater levels, groundwater quality, surface water flow, surface water quality, sediment quality, and land subsidence. These measurements help to track changes to water levels and resulting compaction, as well as provide monitoring data to ensure compliance with the design constraints. Two design constraints were incorporated in the existing agreements to address potential subsidence due to pumping for the exchange. These two design constraints require the MPG to:

1. Limit total transfer pumping from the deep zone to 12,000 acre-feet per year to reduce subsidence, reduce water level impacts, and minimize the rate of groundwater quality degradation that would otherwise occur. Groundwater pumping from the deep zone is defined as withdrawals from wells that are perforated below 130 feet in depth and draw water from the area between the A-clay layer and the Corcoran Clay layer (U.S. Bureau of Reclamation 2004); and,

2. Limit deep zone drawdowns throughout the pumping program to limit subsidence at the Yearout Ranch and Fordel extensometers caused by transfer pumping to less than an average of 0.005 foot per year over the 10-year period, with a maximum allowable compaction of 0.05 foot over the 10-year period. Compaction data collected from the extensometers is required to be used along with model results from the annual monitoring reports to estimate the amount of subsidence caused by MPG pumping each year. The subsidence threshold of an average of 0.005 foot per year over the 10-year period, with a maximum allowable compaction of 0.05 foot over the entire 10-year period, at each of the extensometers was selected because it is the minimum subsidence that could be detected over the given period (U.S. Bureau of Reclamation 2004).

The 2011 Annual Report evaluated compaction and subsidence at the two extensometers and found that the MPG has remained within the subsidence threshold of an average of 0.005 foot per year over the 10-year period, with a maximum allowable compaction of 0.05 foot over the 10-year period, at each of the extensometers. As of 2000, the cumulative inelastic compaction at the Yearout Ranch extensometer amounts to an annual average of 0.009 feet per year; however, the portion of inelastic compaction that has been attributed to MPG pumping amounts to an average of 0.0026 feet per year, roughly half of the design constraint limit of 0.005 feet per year. The inelastic compaction attributed to all sources at the Fordel extensometer, including MPG pumping as well as other sources, amounts to an average of 0.0005 feet per year; this level of compaction is also well below the design constraint limit.

Consequently, the extension of the 2005 Mendota Pool Exchange Agreements, which would continue to implement the existing design constraints, would not be expected to result in substantial subsidence that would further affect the lift pump inlets at MWA. Therefore, riparian and wetland habitats at the edges of the MWA would not experience significant adverse affects as a result of groundwater drawdown. Further, implementation of the proposed groundwater recharge basin at River Ranch North would be expected to marginally reduce groundwater overdraft and further reduce compaction and associated subsidence. Therefore, special status species which utilize wetland and riparian habitats within the MWA would not be expected to experience indirect impacts as a result of groundwater drawdown associated with the proposed extension of the 2005 Mendota Pool Exchange Agreements and this impact would be less than significant.

6.3 Cumulative Impacts

Cumulative projects include past projects or projects pending approval that may have an impact on biological resources within the Primary Study Area. Cumulative projects identified for analysis include the replacement of the Mendota Dam Sluice Gates and the associated change in the maintenance program from the Mendota Dam and Mendota Pool as well as the San Joaquin River Restoration Program. A detailed discussion regarding cumulative impacts is described in detail below.

Mendota Dam Sluice Gates Replacement

During CCID's 2011-2012 winter dewatering and maintenance activities in Mendota Pool and at Mendota Dam, CCID replaced each of the Calco rectangular cast iron gates on the dam with heavy duty Waterman Gates. The replacement of the gates eliminates the need to refurbish the gates every other year and dramatically reduces the overall maintenance schedule. Additionally, the new gates provide improved flow control capabilities at Mendota Dam to allow for more accurate releases of San Joaquin River Restoration Program flows downstream, while increasing control of Mendota Pool water levels needed by other U.S. Bureau of Reclamation water service contractors and other water diverters.

The replacement of the sluice gates was found to have less than significant temporary construction-related impacts in terms of noise, water quality, and impacts to terrestrial and aquatic biological resources. Additionally, replacement of the gates eliminates the need for annual dewatering and maintenance activities, resulting in a minor overall long-term beneficial impact to aquatic biological resources.

Construction of the proposed groundwater recharge basin would not directly affect the Fresno Slough. While construction of the proposed River Ranch North groundwater basin would have the potential to indirectly impact the Fresno Slough (refer to Section 6.2.1., *Indirect Construction Related Impacts*), these impacts would be less than significant and would not contribute to a cumulatively substantial construction-related impact to the Fresno Slough.

San Joaquin River Restoration Program

As previously described in Section 3.1, *Regional Aquatic Resources*, the 2006 San Joaquin River Restoration Settlement and accompanying Federal legislation requires the provision of water downstream of Friant Dam to restore the San Joaquin River salmon fishery (Pitzer 2011). To achieve the restoration goal, the Settlement calls for releases of water from Friant Dam to the

confluence of the Merced River (referred to as interim and restoration flows), a combination of channel and structural modifications along the San Joaquin River below Friant Dam, and reintroduction of Chinook salmon (Pitzer 2011).

Improvements to Reach 2B, which enters the Mendota Pool from the east (refer to Figure 1-1), would include modifications to the San Joaquin River channel, including the creation of floodplain habitat, from the Chowchilla Bypass Bifurcation Structure to the new Mendota Pool Bypass in order to provide a capacity of at least 4,500 cfs. The bypass could be accomplished by constructing a new channel around Mendota Pool or by limiting Mendota Pool to areas outside of the San Joaquin River. This action would include the ability to divert 2,500 cfs to the Mendota Pool and may consist of a bifurcation structure in Reach 2B. The bifurcation structure (i.e., diversion) would include a fish passage facility to enable up-migrating salmon to pass the structure and a fish screen to direct outmigrating fish into the bypass channel and minimize or avoid fish entrainment to the Mendota Pool.

Implementation of channel modifications as a part of the San Joaquin River Restoration Program may result in short-term removal of trees or shrubs suitable for special status bird species, such as Swainson's hawk. However, the majority of large trees or shrubs that would be suitable for nesting are located in upland areas well above the waterline of the San Joaquin River channel. Further, interim and restoration flows would not substantially inundate upland areas, suitable for raptor foraging. Over the long-term, interim and restoration flows within the San Joaquin River would have a beneficial impact on riparian habitat potentially increasing suitable nesting habitat for Swainson's hawks and other species status bird species.

Additionally, interim and restoration flows from the San Joaquin River would have a beneficial impact on the surface water quality within the Mendota Pool. These surface waters would dilute the groundwater pumped into the Mendota Pool and therefore reduce the salinity related impacts (refer to Section 6.2.2, *Surface Water Quality within the MWA*). However, as the San Joaquin River enters the Mendota Pool from the north, absent the implementation of additional design constraints these beneficial impacts to surface water quality would likely be negligible in the southern reaches of the Fresno Slough (refer to Section 6.2.2, *Surface Water Quality within the MWA*).

Consequently, over the short-term, implementation of the proposed groundwater recharge basin would contribute to cumulatively less than significant removal of habitat, particularly for Swainson's hawk. However, long-term impacts of the proposed groundwater basin would be negligible while long-term impacts of the San Joaquin River Restoration Program would have positive impacts on sensitive species habitat, particularly for Swainson's hawk. Therefore, the proposed groundwater basin would not contribute to cumulatively substantial impacts to habitat or fisheries. Additionally, the San Joaquin River Restoration Project would improve water quality in the northern reach of the Fresno Slough. Consequently, while the extension of the agreements would have adverse impacts on salinity absent the implementation of additional design constraints, the extension of these agreements along with the implementation San Joaquin River Restoration Program would not result in cumulatively substantial impacts with regard to salinity.

6.4 Additional Surveys and Studies

The 513-acre Terra Linda Farms River Ranch includes approximately 16 acres of emergent freshwater marsh habitat and 26 acres of agricultural ditch habitat, including the existing Terra Linda Farms recharge canal. However, while the proposed River Ranch North groundwater basin would impact 1.3 acres of low quality agricultural ditch habitat, it would not impact any of the freshwater marsh habitats. With the exception of the existing recharge canal (approximately 1.3 acres in River Ranch North), the conversion of this area to a ground water recharge basin would not impact any of the agricultural ditches, including those surrounding the Britz Property located to the south of the Primary Study Area. Therefore, no additional wetland analysis or formal delineations would be necessary. Further, with the exception of preconstruction surveys (see Section 6.5, *Preconstruction Surveys*), due to the disturbed nature and limited habitat value within the River Ranch North boundaries, no additional protocol level surveys for sensitive species within the Primary Study Area would be necessary.

6.5 Preconstruction Surveys

Several sensitive wildlife species, including two birds, two reptiles, and four mammals, including three special status bat species, have at least a moderate potential to occur in at least one of the habitat types within River Ranch North, the area proposed for conversion to a groundwater recharge basin (refer to Figure 3-2). Swainson's hawk was the only sensitive species observed during the habitat assessment, during which time individuals were observed foraging within fallow agricultural lands. Additionally, three nearby specimen trees, which have the potential for use as nesting or roosting habitat were observed during the habitat assessment; however these would not be impacted by the construction of the proposed groundwater recharge basin. Further, fallow agricultural lands provide potential habitat for burrowing owl, and American badger as well as marginal foraging habitat for special status bat species.

Aquatic habitats within the Primary Study Area, including the 1.3 acres of agricultural ditch habitat within River Ranch North, provide potential low quality habitat for giant garter snake and western pond turtle. While western spadefoot toads and western pond turtles have not been observed within the vicinity of the Primary Study Area since 1996 and 2001 respectively, one giant garter snake was recorded within the Mendota Pool as recently as 2008. Consequently, giant garter snake has a moderate potential to occur within the Primary Study Area and construction activities would have the potential to impact this species; however, avoidance measures would reduce these impacts to less than significant levels.

As a result of the potential for special status wildlife to occur within River Ranch North, surveys prior to commencement of construction-related activities are recommended within potentially suitable habitats for the following species according to accepted agency methods:

- Burrowing owl
- Swainson's hawk
- Giant garter snake
- Western pond turtle
- American badger
- Special status bats

Surveys can be limited to areas of suitable habitat as defined in this report and summarized in Table 6-4. If any of these species are identified within River Ranch North, mitigation measures including agency notification, relocation (if appropriate), construction monitoring, and/or non-disturbance buffers would be implemented. However, following the removal of suitable habitats, additional surveys would not be necessary.

To the maximum extent feasible, it is recommended that the removal of trees and other potential nest or roost sites occur outside of the avian breeding (i.e., February through August) and bat maternal roost (i.e., March through August) seasons. Burrowing owls, kit foxes, and badgers should be relocated from burrows if necessary prior to the breeding season (i.e., February through August). Contractor education regarding sensitive species that have potential to occur on and adjacent to the site is also recommended.

6.6 Summary of Project Commitments

Native Plantings on Portions of the Recharge Basin Berms

1. The berms surrounding the proposed recharge basin would be planted with clusters of native riparian vegetation. These clusters of vegetation would be approximately 100 feet long and 10 feet wide with 100 feet of open berm between each cluster. In total, there would be approximately one acre of riparian habitat comprised of the native vegetation clusters surrounding River Ranch North. These areas would be unmanaged and would provide wildlife habitat along the slopes of the recharge basin berms.
2. To avoid impacts to the federally endangered giant garter snake, maintenance activities within the basin would be limited to the active period for the giant garter snake during spring and summer (i.e., 1 May – 1 October).
3. Prior to the initiation of maintenance activity or vehicle access, USFWS and CDFW would be notified, and visual surveys would be conducted for giant garter snake.

Preconstruction Surveys

1. Preconstruction surveys would be performed prior to commencement of construction-related activities within potentially suitable habitats for the following species according to accepted agency methods:
    a. Burrowing owl
    b. Swainson’s hawk
    c. Giant garter snake
    d. Western pond turtle
    e. American badger
    f. Special status bats

    Surveys can be limited to areas of suitable habitat as defined in this report and summarized in Table 6-4. If any of these species are identified within River Ranch North, mitigation measures including agency notification, relocation (if appropriate), construction monitoring, and/or non-disturbance buffers would be implemented. However, following the removal of suitable habitats, additional surveys would not be necessary.

2. Direct impacts to Swainson's hawks (i.e., take) would be avoided through preconstruction surveys and establishment of a 300-foot buffers from any active roost trees during maintenance activities.
3. To the maximum extent feasible, the removal of trees and other potential nest or roost sites would occur outside of the avian breeding (i.e., February through August) and bat maternal roost (i.e., March through August) seasons. Burrowing owls, kit foxes, and badgers should be relocated from burrows if necessary prior to the breeding season (i.e., February through August).
4. Contractors shall be educated regarding sensitive species that have potential to occur on and adjacent to the site.
5. The MPG shall avoid disturbing and spreading giant reed along the banks of the Fresno Slough.

Table 6-4 Summary of Potential Habitat Impacts and Pre-Construction Surveys for Sensitive Species

Species Name	Common Name	Suitable Habitat	Approximate Acreage of Habitat Impacts	Su
Birds				
Athene cunicularia	burrowing owl	Burrowing owls occupy open areas including desert and grassland habitats as well as urban and agricultural landscapes characterized by generally flat topography with dry vegetation. Individuals have also been recorded in the immediate vicinity occurring nearby active burrows along canal banks and gravel roadways.	83 acres	A surve disturbe agricult winter s season (so that i relocate survey (conduct individu
Buteo swainsoni	Swainson's hawk	Swainson's hawks require large, open foraging habitat with abundant and available prey in association with suitable nest trees, particularly within riparian areas. Swainson's hawks have been observed foraging within fallow agricultural lands within the Study Area.	85 acres	Nesting Februar least tw conduct Area in spring, month p
Birds Covered under MBTA		Nesting birds protected under the MBTA can occur in a variety of habitat but typically nest in shrubs and trees.	85 acres	Constru activitie the nest 15 Aug during t North a should l birds. If be avoi form th active.
Herpetofauna				

Species Name	Common Name	Suitable Habitat	Approximate Acreage of Habitat Impacts	Su
Thamnophis gigas	giant garter snake	Essential habitat components include, wetlands with adequate water during the snake's active season; emergent, herbaceous wetland vegetation; upland habitat with grassy banks and openings in waterside vegetation for basking; and, higher elevation uplands for overwintering habitat with escape cover and underground refugia.	1 acre	Giant g early-sp breed in Constru activitie giant ga May – 1 should b affected at least ground activitie occur if adjacen suspend or more
Emys marmorata	western pond turtle	Individuals are generally observed in slow-moving rivers and streams, lakes, and permanent as well as ephemeral wetlands. Western pond turtles prefer aquatic habitat with refugia such as undercut banks and submerged vegetation and require emergent basking sites. Additionally, western pond turtles regularly utilize upland terrestrial habitats, most often during the summer and winter.	1 acre	A surve within a habitat any gro activitie occur if adjacen suspend or more
Mammals				
Taxidea taxus	American badger	This species can be found in a variety of habitats, including shrub steppes, agricultural fields, open woodland forests, and large grass and sagebrush meadows Since badgers dig burrows frequently burrows are a common feature in occupied habitat.	74 acres	Americ round w occurri August. conduct agricult winter p establis survey s weeks b activitie
Myotis yumaensis	Yuma myotis	Bat species require roosting habitat adjacent to aquatic or terrestrial foraging habitat. Potential bat roosting habitat in the vicinity is limited to three large trees along agricultural ditches; however the adjacent Fresno Slough, and open habitats within the Study Area provide marginal foraging habitat.	85 acres	Materni betwee A surve within p in the S weeks p
Lasiurus blossevillii	Western red bat			
Eumops perotis californicus	Western mastiff bat			

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United States Department of the Interior

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In Reply Refer to:
08ESMF00-
2019-I-0551

DEC 19 2018

Memorandum

To: Rain Emerson, Environmental Compliance Branch Chief, Bureau of Reclamation, Mid-Pacific Region, South-Central California Area Office, Fresno, California

From: Patricia Cole, San Joaquin Valley Division Chief, Sacramento Fish and Wildlife Office, Sacramento, California

Subject: Informal Consultation on the Mendota Pool Group 20-Year Exchange Agreement (12-009)

This memorandum is in response to the U.S. Bureau of Reclamation's (Reclamation) request for informal consultation with the U.S. Fish and Wildlife Service (Service) on the proposed exchange of up to 25,000 acre feet per year (AFY) over a 20-year period with Mendota Pool Group (MPG) and construction of a recharge basin adjacent to the Fresno Slough. The consultation request was received by the Service on September 10, 2018 and revised on November 26, 2018.

Reclamation has determined that the Project may affect, but is not likely to adversely affect the federally-listed as threatened giant garter snake (*Thamnophis gigas*) and is seeking concurrence from the Service on this determination.

This response is provided under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act) and in accordance with the implementing regulations pertaining to interagency cooperation (50 CFR 402). The findings and recommendations presented in this document are based on Reclamation's initiation request letter which included a biological evaluation dated August 2018, email communication between the Service and Reclamation regarding changes to project design features and minimization measures, and other information available to the Service.

Project Description

The Proposed Action includes two action alternatives: the Proposed Action and an Alternative. Both of these alternatives include the 20-year Mendota Pool Exchange Agreements and the addition of a recharge component.

Under the Proposed Action, Reclamation would exchange up to 25,000 AFY over a 20-year period with MPG. Reclamation would allow MPG to pump groundwater from adjacent wells into the Mendota Pool as follows: MPG could pump a not-to exceed total of 38,316 AFY, which includes up to 26,316 AFY for exchange and the remainder to irrigate Adjacent Overlying Lands. In a year where 26,316 AFY was pumped for exchange, pumping for Adjacent Overlying Lands use would be limited to 12,000 AFY. Over the 20-year period of the Proposed Action, pumping for exchange

would be capped at 421,053 AF, which equates to an annual pumping average of 21,053 AFY for exchange.

The Proposed Action would incorporate: (1) MPG Pumping Program (including modified design constraints and management actions revised since the 10-year Exchange Program), as well as; (2) a new groundwater recharge component (existing Terra Linda Farms Recharge Canal and existing New Columbia Ranch (NCR) Recharge Ponds) intended to replenish the local groundwater basin; and, (3) a Warren Act contract with Reclamation to provide MPG with storage in San Luis Reservoir dependent on available capacity.

The Proposed Action Alternative includes the 20-Year MPG Exchange Program, but in addition to utilizing the existing NCR Recharge Ponds and Terra Linda Farms Recharge Canal for recharge, MPG would also construct, maintain, and operate a groundwater recharge basin adjacent to the canal within Terra Linda Farms called the River Ranch Recharge Basin.

Conservation Measures

In addition to a revised program-wide water quality monitoring program including adaptive management based on monitoring results, the following project design feature and measures will be implemented during construction of the proposed River Ranch Recharge Basin.

- Ground disturbance will be a minimum of 750 feet from the Fresno Slough.
- Construction and maintenance activities will only occur between May 1st and October 1st, within the active season for the giant garter snake.
- If a giant garter snake is found in the work area during project activities work will stop and the Service will be notified within 24 hours.

Conclusion

The Service concurs with your determination that the proposed project and its alternative may affect, but is not likely to adversely affect the giant garter snake. Our concurrence is based on the commitments and conservation measures proposed, including a water quality monitoring program and seasonal work restrictions as well as avoidance of potential giant garter snake habitat adjacent to the Fresno Slough.

This concludes the Service's review of the proposed project. No further coordination with the Service under the Act is necessary at this time. Please note, however, this memo does not authorize take of listed species. As provided in 50 CFR §402.14, initiation of formal consultation is required where there is discretionary Federal involvement or control over the action (or is authorized by law) and if: 1) new information reveals the effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this review; 2) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this review; or 3) a new species is listed or critical habitat designated that may be affected by the action.

If you have any questions regarding this biological opinion, please contact Justin Sloan, Senior Fish and Wildlife Biologist, at the letterhead address or at (559) 221-1828.