CALIFORNIA HIGH-SPEED TRAIN

Project Environmental Impact Report / Environmental Impact Statement

DRAFT

Fresno to Bakersfield

Biological Resources and Wetlands Technical Report

July 2012

CALIFORNIA High-Speed Rail Authority

U.S. Department of Transportation
Federal Railroad Administration

California High-Speed Train Project Technical Report

Biological Resources and Wetlands

Prepared For:

California High-Speed Rail Authority

and

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Prepared by:

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Acronyms

ARRA	American Recovery and Reinvestment Act
Authority	California High-Speed Rail Authority
bgs	below ground surface
BRMP	Biological Resources Management Plan
California ESA	California Endangered Species Act
C.C.R.	California Code of Regulations
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CWA	Clean Water Act
CWHR	California Wildlife Habitat Relationship System
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ER	Ecological Reserve
ESA	Endangered Species Act
federal ESA	Endangered Species Act of 1973
F.R.	Federal Register
FRA	Federal Railroad Administration
GIS	geographic information system
GPS	Global Positioning System
HMF	Heavy maintenance facility
HMMP	Habitat Mitigation and Monitoring Plan
HST	high-speed train
HUC	Hydrologic Unit Code

MBTA	Migratory Bird Treaty Act
mph	mile(s) per hour
NAIP	National Agricultural Imagery Program
NCCP	Natural Community Conservation Plan
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWR	National Wildlife Refuge
OHWM	ordinary high-water mark
PCC	Portland Cement Concrete
PCE	primary constituent element
ROD	record of decision
RTP	Regional Transportation Plan
RWQCB	Regional Water Quality Control Board
SR	State Route
Statewide Program EIR/EIS	Final Program Environmental Impact Report and Environmental Impact Statement for Proposed California High-Speed Train System
SWRCB	State Water Resources Control Board
TPSS	traction power supply station
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
VFR	Valley foothill riparian
waters of the U.S.	waters of the United States
WEAP	Worker Environmental Awareness Program

Chapter 1.0
Introduction

1.0 Introduction

This technical report has been prepared to evaluate the biological resources present in or potentially affected by the proposed California High-Speed Train Project for the section between Fresno and Bakersfield, California.

The California High-Speed Rail Authority (Authority) proposes to construct, operate, and maintain an electric-powered high-speed train (HST) system in California. When completed, the nearly 800-mile train system would provide new passenger rail service to more than 90% of the state's population. More than 200 weekday trains would serve the statewide intercity travel market. The HST would be capable of operating at speeds of up to 220 miles per hour (mph), with state-of-the-art safety, signaling, and automated train control systems. The system would connect and serve the major metropolitan areas of California, extending from San Francisco and Sacramento in the north to San Diego in the south.

In 2005, the Authority and the Federal Railroad Administration (FRA) prepared a Program Environmental Impact Report/Environmental Impact Statement (Statewide Program EIR/EIS) evaluating HST's ability to meet the existing and future capacity demands on California's intercity transportation system (Authority and FRA 2005). This was the first phase of a tiered environmental review process (Tier 1) for the proposed statewide HST System. The Authority and the FRA completed a second Program EIR/EIS in July 2008 to identify a preferred alignment for the Bay Area to Central Valley section (Authority and FRA [2008] 2010).

The Authority and FRA are now undertaking second-tier project environmental evaluations for sections of the statewide HST System. This Biological Resources Technical Report is for the Fresno to Bakersfield Section. The Fresno to Bakersfield Section begins at one of two proposed Fresno HST stations in downtown Fresno and extends east past the proposed Bakersfield HST stations in downtown Bakersfield to Baker Street. Information from this report is summarized in the project EIR/EIS for the Fresno to Bakersfield HST Section and will be part of the administrative record supporting the environmental review of the proposed project.

For the HST System, including the Fresno to Bakersfield Section, the FRA is the lead federal agency for compliance with the National Environmental Policy Act (NEPA) and other federal laws. The Authority is serving as a joint-lead agency under NEPA and is the lead agency for compliance with the California Environmental Quality Act (CEQA). The U.S. Army Corps of Engineers (USACE) is serving as a cooperating agency under NEPA for the Fresno to Bakersfield Section.

The HST section from Fresno to Bakersfield analyzed in this document starts in downtown Fresno and terminates in downtown Bakersfield (Figure 1-1; Figure 1-2). This HST section crosses through parts of Fresno, Kings, Tulare, and Kern counties.

The Statewide Program EIR/EIS process resulted in the selection of the BNSF Railway alignment from Fresno to Bakersfield as the preferred HST corridor for this portion of the Central Valley, with stations in Fresno and Bakersfield. The preferred station locations that resulted from the Statewide Program EIR/EIS are in downtown Fresno along the Union Pacific Rail Road alignment and in downtown Bakersfield east of the new Amtrak station near Truxtun Avenue and Rosedale Street.

The Statewide Program EIR/EIS indicated that the project environmental review for this part of the HST System would study alignment alternatives between Fresno and Bakersfield to determine whether a station could be provided in the vicinity of Visalia. This EIR/EIS evaluates alternative alignments that would facilitate a potential station in the Hanford/Visalia/Tulare area, hereafter referred to as the Kings/Tulare Regional Station—East Alternative or the Kings/Tulare Regional Station—West Alternative.

The program EIRs/EISs committed to subsequent analyses of biological resources for project environmental documents that would focus on project-specific impacts that reflect more precise definitions of the right-of-way, proposed facility locations, and operations. These subsequent analyses would support the overall biological resources mitigation strategy for the HST System which includes the following:

- Field verification of sensitive resources.
- Filling data gaps.
- Project-specific analyses of environmental impacts.
- Consultation with appropriate resource agencies to refine avoidance and mitigation efforts.
- Developing and adopting a mitigation monitoring program.

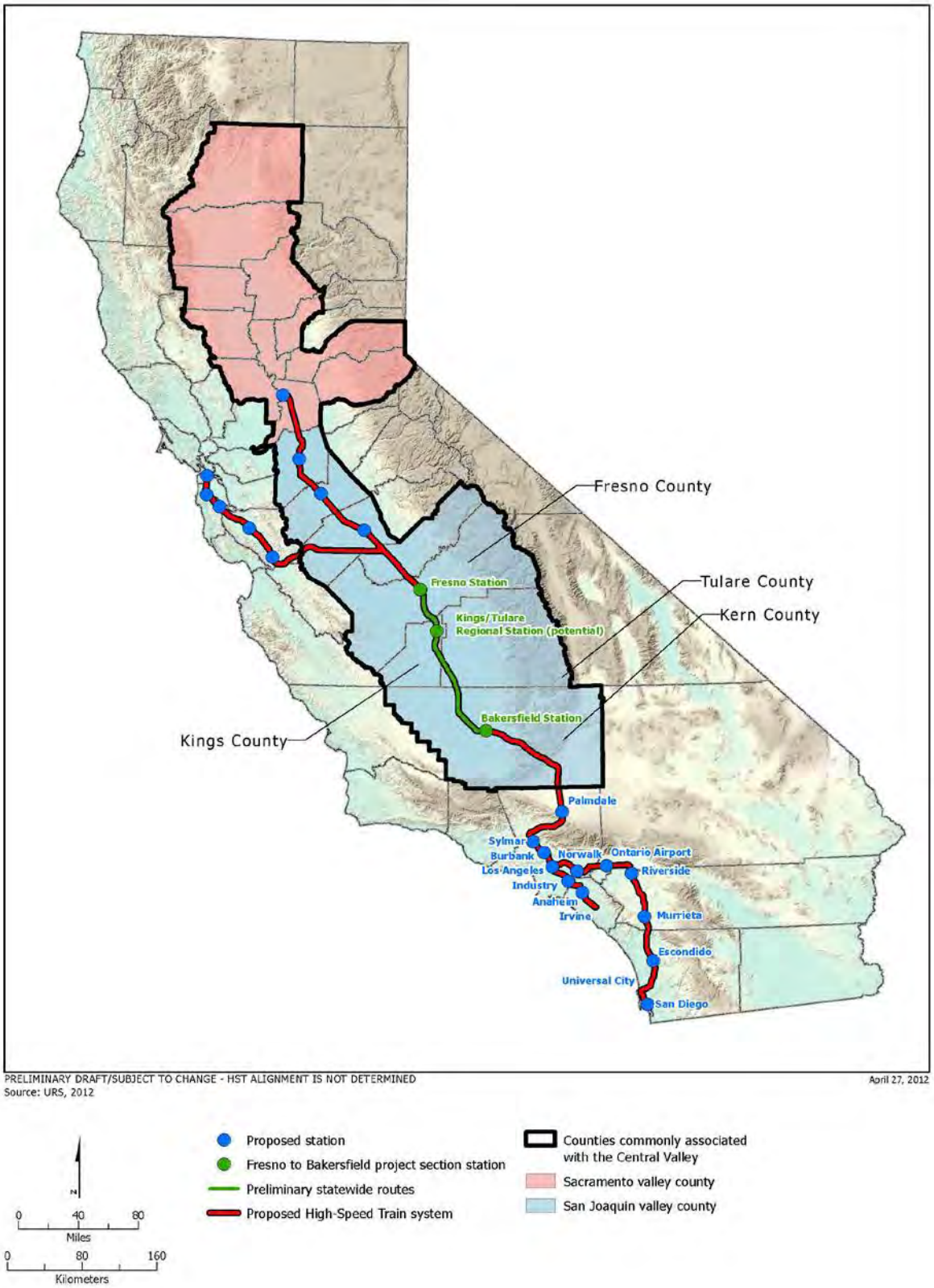
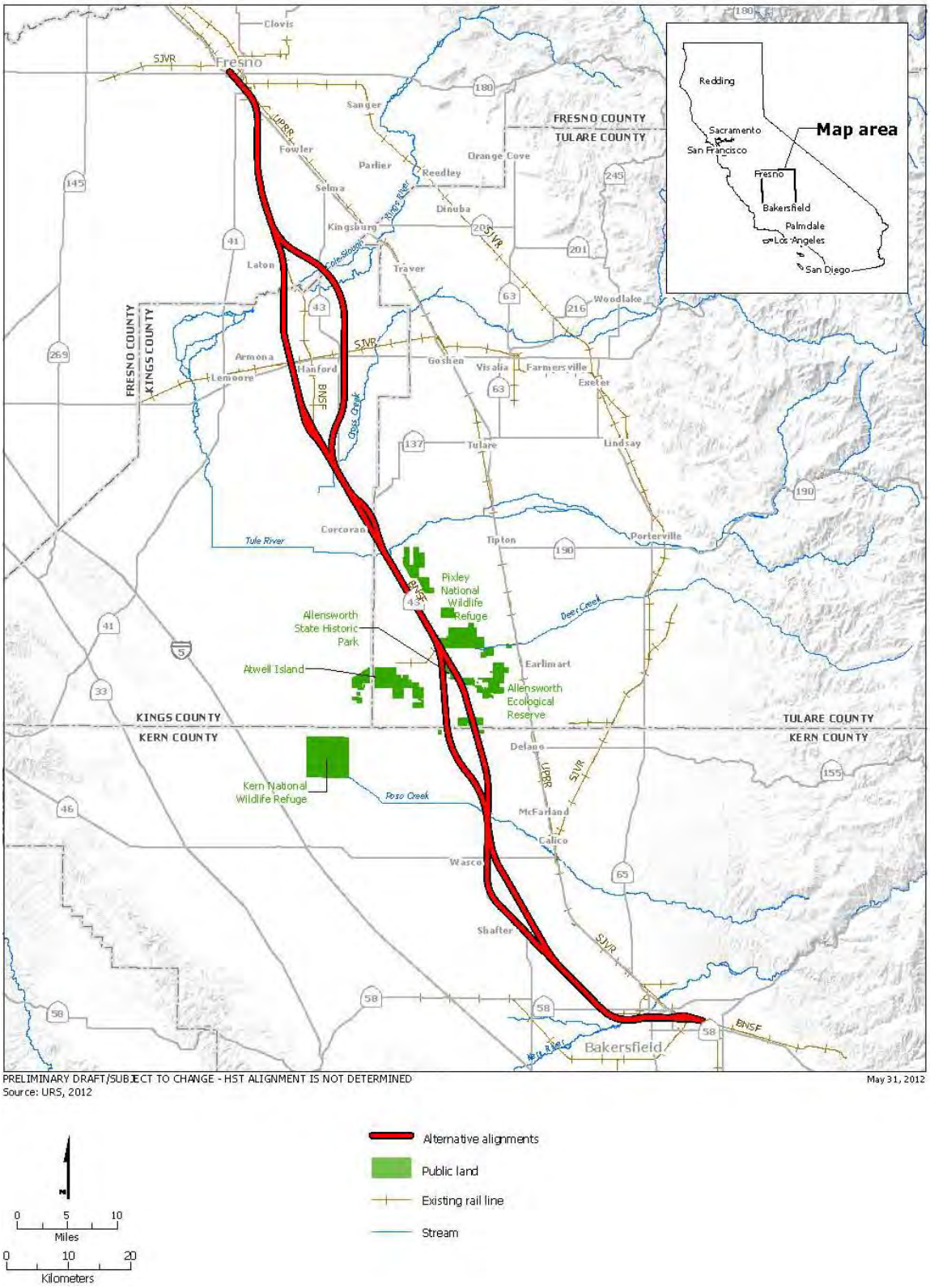


Figure 1-1
Statewide High-Speed Train System



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HST ALIGNMENT IS NOT DETERMINED
Source: URS, 2012

May 31, 2012

Figure 1-2
Overall project study area

Chapter 2.0
Project Description

2.0 Project Description

2.1 Project Introduction

The Fresno to Bakersfield Section of the HST project, hereafter referred to as "project," would be approximately 114 miles long, varying in length by only a few miles depending on the route alternatives selected. To comply with the Authority's guidance to use existing transportation corridors when feasible, the Fresno to Bakersfield HST Section would primarily be located adjacent to the existing BNSF Railway right-of-way. Alternative alignments are being considered where engineering constraints require deviation from the existing railroad corridor, and where necessary to avoid environmental impacts.

The Fresno to Bakersfield HST Section would cross both urban and rural lands and include a station in both Fresno and Bakersfield, a potential Kings/Tulare Regional Station in the vicinity of Hanford, a potential heavy maintenance facility (HMF), and power substations along the alignment. The HST alignment would be entirely grade-separated, meaning that crossings with roads, railroads, and other transport facilities would be located at different heights (overpasses or underpasses) so that the HST would not interrupt nor interface with other modes of transport. The HST right-of-way would also be fenced to prohibit public or vehicle access. The project footprint would primarily consist of the train right-of-way, which would include both a northbound and southbound track in an area typically 120 feet wide. Additional right-of-way would be required to accommodate stations, multiple track at stations, maintenance facilities, and power substations.

The Fresno to Bakersfield Section would include at-grade, below-grade, and elevated track segments. The at-grade track would be laid on an earthen rail bed topped with rock ballast approximately 6 feet off the ground; fill and ballast for the rail bed would be obtained from permitted borrow sites and quarries. Below-grade track would be laid in an open or covered trench at a depth that would allow roadway and other grade-level uses above the track. Elevated track segments would span long sections of urban development or aerial roadway structures and consist of steel truss aerial structures with cast-in-place reinforced-concrete columns supporting the box girders and platforms. The height of elevated track sections would depend on the height of existing structures below, and would range from 40 to 80 feet. Columns would be spaced 60 to 120 feet apart.

2.2 Project Alternatives

2.2.1 Alignment Alternatives

This section describes the Fresno to Bakersfield HST Section project alternatives, including the No Project Alternative. The Project EIR/EIS for the Fresno to Bakersfield HST Section examines alternative alignments, stations, and HMF sites within the general BNSF Railway corridor. Discussion of the HST project alternatives begins with a single continuous alignment (the BNSF Alternative) from Fresno to Bakersfield. This alternative most closely aligns with the preferred alignment identified in the Record of Decision (ROD) for the Statewide Program EIR/EIS. Descriptions of the additional eight alternative alignments that deviate from the BNSF Alternative for portions of the route then follow. The alternative alignments that deviate from the BNSF Alternative were selected to avoid environmental, land use, or community issues identified for portions of the BNSF Alternative (Figure 2-1).

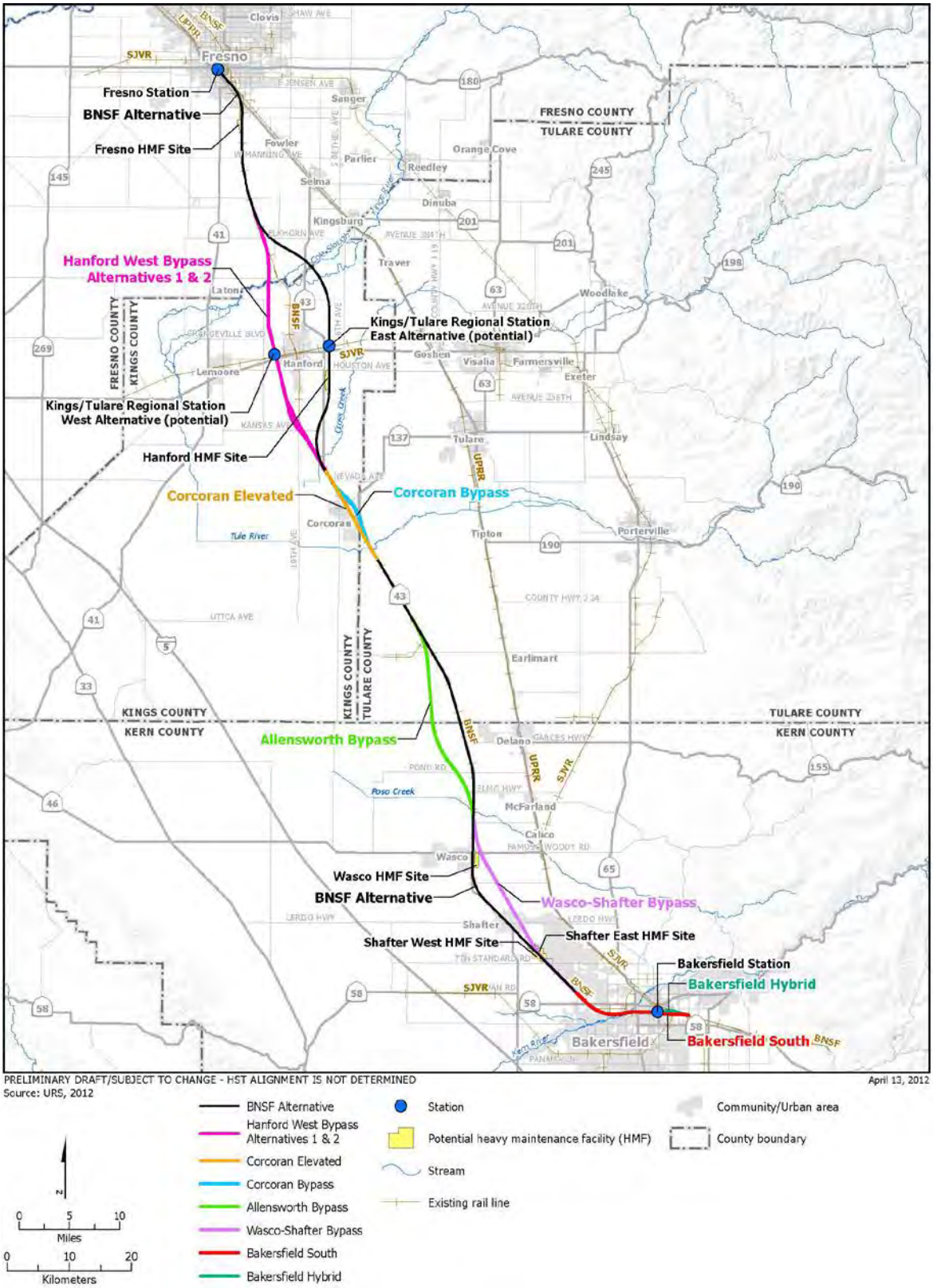


Figure 2-1
Fresno to Bakersfield HST alignments

2.2.1.1 No Project Alternative

Under the No Project Alternative, the HST System would not be built. The No Project Alternative represents the condition of the Fresno to Bakersfield Section as it existed in 2009 (when the Notice of Preparation was issued), and as it would exist without the HST project at the planning horizon (2035). In assessing future conditions, it was assumed that all currently known programmed and funded improvements to the intercity transportation system (highway, rail, and transit), and reasonably foreseeable local development projects (with funding sources identified), would be developed by 2035. The No Project Alternative is based on a review of regional transportation plans (RTPs) for all modes of travel, the State of California Office of Planning and Research CEQAnet Database, the Federal Aviation Administration Air Carrier Activity Information System and Airport Improvement Plan grant data, the State Transportation Improvement Program, airport master plans and interviews with airport officials, intercity passenger rail plans, and city and county general plans and interviews with planning officials.

2.2.1.2 BNSF Alternative

The BNSF Alternative's cross sections include provisions for a 102-foot separation of the HST track centerline from the BNSF Railway track centerline, as well as separations that include swale or berm protection, or an intrusion protection barrier (wall) where the HST tracks are closer. A 102-foot separation between the centerlines of BNSF Railway and HST tracks is provided wherever feasible and appropriate. In urban areas where a 102-foot separation could result in substantial displacement of businesses, homes, and infrastructure, the separation between the BNSF Railway and HST was reduced. The areas with reduced separation require protection to prevent encroachment on the HST right-of-way in the event of a freight rail derailment. The use of a swale, berm, or wall protection would depend on the separation distance.

The BNSF Alternative would extend approximately 114 miles from Fresno to Bakersfield and would lie adjacent to the BNSF Railway route to the extent feasible (Figure 2-1). Minor deviations from the BNSF Railway corridor would be necessary to accommodate engineering constraints, namely wider curves necessary to accommodate the HST (as compared with the existing lower-speed freight line track alignment). The largest of these deviations occurs between approximately Elk Avenue in Fresno County and Nevada Avenue in Kings County. This segment of the BNSF Alternative would depart from BNSF Railway corridor and instead curve to the east on the northern side of the Kings River and away from Hanford, and would rejoin the BNSF Railway corridor north of Corcoran.

Although the majority of the alignment would be at-grade, the BNSF Alternative would include aerial structures in all of the four counties through which it travels. In Fresno County, an aerial structure would carry the alignment over Golden State Boulevard and SR 99, and a second would cross over the BNSF Railway tracks in the vicinity of East Conejo Avenue. The alignment would be at-grade with bridges where it crosses Cole Slough and the Kings River into Kings County.

In Kings County, the BNSF Alternative would be elevated east of Hanford where the alignment would pass over the San Joaquin Valley Railroad (SJVR) and SR 198. The alignment would also be elevated over Cross Creek, and again in the city of Corcoran to avoid a BNSF Railway spur and agricultural facilities located at the southern end of the city. In Tulare County, the BNSF Alternative would be elevated at the Tule River crossing and over Deer Creek and the Stoil railroad spur that runs west from the BNSF Railway mainline. In Kern County, the BNSF Alternative would be elevated through the cities of Wasco, Shafter, and Bakersfield. The BNSF Alternative would be at-grade through the rural areas between these cities.

The BNSF Alternative would provide wildlife crossing opportunities by means of a variety of engineered structures. Dedicated wildlife crossing structures would be provided from

approximately Cross Creek (Kings County) south to Poso Creek (Kern County) in at-grade portions of the railroad embankment at approximately 0.3-mile intervals. In addition to those structures, wildlife crossing opportunities would be available at elevated portions of the alignment, at bridges over riparian corridors, at road overcrossings and undercrossings, and at drainage facilities (i.e., large-diameter [60 to 120 inches] culverts and paired 30-inch culverts). Where bridges, aerial structures, and road crossings coincide with proposed dedicated wildlife crossing structures, such features would serve the function of, and supersede the need for, dedicated wildlife crossing structures.

The preliminary wildlife crossing structure design consists of a modified culvert in the embankment that would support the HST tracks. The typical culvert would be 73 feet long from end to end (crossing structure distance), would span a width of approximately 10 feet (crossing structure width), and would provide 3 feet of vertical clearance (crossing structure height). Additional wildlife crossing structure designs could include circular or elliptical pipe culverts, and larger (longer) culverts with crossing structure distances of up to 100 feet. The design of the wildlife crossing structures may change depending on site-specific conditions and engineering considerations.

2.2.1.3 Hanford West Bypass 1 Alternative

The Hanford West Bypass 1 Alternative would parallel the BNSF Alternative from East Kamm Avenue to approximately East Elkhorn Avenue in Fresno County. At East Conejo Avenue where the BNSF Alternative crosses to the eastern side of the BNSF Railway tracks to pass the city of Hanford to the east, the Hanford West Bypass 1 Alternative continues south on the western side of the BNSF Railway tracks. The Hanford West Bypass 1 would diverge from the BNSF Railway corridor just south of East Elkhorn Avenue and ascend onto an elevated structure just south of East Harlan Avenue, crossing over the Kings River complex and Murphy Slough, and passing the community of Laton to the west. The Hanford West Bypass 1 Alternative would return to grade just north of Dover Avenue. The alignment would continue at-grade and would travel between the community of Armona to the west and the city of Hanford to the east on a southeasterly route toward the BNSF Railway corridor. In order to avoid a large dairy located at the intersection of Kent and 11th avenues, the Hanford West Bypass 1 Alternative must travel to its west and deviate from the BNSF Railway corridor in the area of Kansas Avenue. The alignment would pass to the west of a large complex of BNSF Railway serviced grain silos and loading bays before it rejoins the BNSF Railway corridor adjacent to its western side at about Lansing Avenue. The alignment would continue on the western side of the BNSF Railway corridor and ascend onto another elevated structure, traveling over Cross Creek and special aquatic features that exist north of Corcoran. This alignment would return to grade just north of Nevada Avenue and would connect to the BNSF Alternative traveling through Corcoran at-grade, maintaining an alignment on the western side of the BNSF Railway corridor. The total length of the Hanford West Bypass 1 Alternative would be approximately 28 miles.

The Hanford West Bypass 1 Alternative includes a design option where the alignment would be below-grade between Grangeville Boulevard and Houston Avenue. The alignment would travel below-grade in an open cut with side slopes as it transitions to a retained-cut profile. As the alignment transitions back to grade just north of Houston Avenue, the open-cut profile would be used once more. The alignment would cross SR 198 and several local roads. South Peach Avenue, East Clarkson Avenue, East Barrett Avenue, Elder Avenue, and South Tenth Avenue would be closed at the HST right-of-way, while the other roads would be realigned and/or grade-separated from the HST with overcrossings/undercrossings. Grade separations at Grangeville Boulevard, Thirteenth Avenue, and West Lacey Boulevard would be determined based on the alignment design option selected (at-grade or below-grade).

The potential Kings/Tulare Regional Station–West Alternative would be located along this alignment, east of Thirteenth Avenue between Lacey Boulevard and the SJVR railroad spur. This potential station includes an at-grade and below-grade design option as well.

2.2.1.4 Hanford West Bypass 2 Alternative

The Hanford West Bypass 2 Alternative would be the same as the Hanford West Bypass 1 Alternative from East Kamm Avenue to just north of Jackson Avenue. The Hanford West Bypass 2 Alternative would then curve away from the Hanford West Bypass 1 Alternative to travel to the east of the dairy located at the intersection of Kent and 11th avenues toward the BNSF Railway corridor, approximately 0.3 mile east of the Hanford West Bypass 1 route. The Hanford West Bypass 2 Alternative would ascend over Kent Avenue and then cross over the BNSF Railway right-of-way to the northeast of the large complex of grain silos and loading bays located north of Kansas Avenue. The alignment would remain elevated for approximately 1.5 miles and parallel the BNSF Railway to the east, then cross over Kansas Avenue. The alignment would return to grade north of Lansing Avenue and continue along the BNSF Railway corridor on its eastern side. Similar to the Hanford West Bypass 1 Alternative, the Hanford West Bypass 2 Alternative would travel over Cross Creek and the special aquatic features located north of Corcoran and return to grade north of Nevada Avenue; however, the Hanford West Bypass 2 would be located on the eastern side of the BNSF Railway tracks in order to connect to either of the two Corcoran alternatives that would travel on the eastern side of the BNSF Railway corridor, the Corcoran Elevated Alternative or the Corcoran Bypass Alternative, described below. Like the Hanford West Bypass 1 Alternative, the total length of the Hanford West Bypass 2 Alternative would be approximately 28 miles.

The Hanford West Bypass 2 Alternative includes the same below-grade design option between Grangeville Boulevard and Houston Avenue as the Hanford West Bypass 1 Alternative, as well as either the at-grade or below-grade potential Kings/Tulare Regional Station–West Alternative. Similar to the Hanford West Bypass 1 Alternative, Hanford West Bypass 2 would cross SR 198 and several local roads. Road closures would be the same as those for the Hanford West Bypass 1, and roadway modifications at Grangeville Boulevard, Thirteenth Avenue, and West Lacey Boulevard would depend on the alignment design option selected.

2.2.1.5 Corcoran Elevated Alternative

The Corcoran Elevated Alternative would be the same as the corresponding section of the BNSF Alternative from approximately Nevada Avenue to Avenue 136, except that it would pass through the city of Corcoran on the eastern side of the BNSF Railway right-of-way on an aerial structure. The aerial structure would begin at Niles Avenue and return to grade south of Fourth Avenue. The total length of the Corcoran Elevated Alternative would be approximately 10 miles. Dedicated wildlife crossing structures would be provided from approximately Cross Creek south to Avenue 136 in at-grade portions of the railroad embankment at intervals of approximately 0.3 mile. Dedicated wildlife crossing structures would also be placed between 100 and 500 feet to the north and south of both the Cross Creek and Tule River crossings.

This alternative alignment would pass over several local roads on an aerial structure. Santa Fe Avenue and Avenue 136 would be closed at the HST right-of-way.

2.2.1.6 Corcoran Bypass Alternative

The Corcoran Bypass Alternative would diverge from the BNSF Alternative at Nevada Avenue and swing east of Corcoran, rejoining the BNSF Railway route at Avenue 136. The total length of the Corcoran Bypass would be approximately 10 miles. Similar to the corresponding section of the BNSF Alternative, most of the Corcoran Bypass Alternative would be at-grade. However, one elevated structure would carry the HST over SR 43, the BNSF Railway, and the Tule River.

Dedicated wildlife crossing structures would be provided from approximately Cross Creek south to Avenue 136 in at-grade portions of the railroad embankment at intervals of approximately 0.3 mile. Dedicated wildlife crossing structures would also be placed between 100 and 500 feet to the north and south of each of the Cross Creek and Tule River crossings.

This alternative alignment would cross SR 43, Whitley Avenue/SR 137, and several local roads. SR 43, Waukena Avenue, and Whitley Avenue would be grade-separated from the HST with an overcrossing/undercrossing; other roads would be closed at the HST right-of-way.

2.2.1.7 Allensworth Bypass Alternative

The Allensworth Bypass Alternative would pass west of the BNSF Alternative, avoiding Allensworth Ecological Reserve and the Allensworth State Historic Park. This alignment was refined over the course of environmental studies to reduce impacts to wetlands and orchards. The total length of the Allensworth Bypass Alternative would be approximately 21 miles, beginning at Avenue 84 and rejoining the BNSF Alternative at Elmo Highway. The Allensworth Bypass Alternative would be constructed on an elevated structure only where the alignment crosses Deer Creek and the Stoil railroad spur. The majority of the alignment would pass through Tulare County at-grade. Dedicated wildlife crossing structures would be provided from approximately Avenue 84 to Poso Creek at intervals of approximately 0.3 mile. Dedicated wildlife crossing structures would also be placed between 100 and 500 feet to the north and south of both the Deer Creek and Poso Creek crossings.

The Allensworth Bypass would cross several roads including County Road J22, Avenue 24, Garces Highway, Woollomes Avenue, Magnolia Avenue, Pond Road, and Elmo Highway. Avenue 24, Woollomes Avenue, and Elmo Highway would be closed at the HST right-of-way, while the other roads would be realigned and/or grade-separated from the HST with overcrossings.

2.2.1.8 Wasco-Shafter Bypass Alternative

The Wasco-Shafter Bypass Alternative would diverge from the BNSF Alternative between Taussig Avenue and Zachary Avenue, crossing over to the eastern side of the BNSF Railway tracks and bypassing Wasco and Shafter to the east. The Wasco-Shafter Bypass Alternative would be at-grade except where it travels over 7th Standard Road and the BNSF Railway to rejoin the BNSF Alternative. The total length of the Wasco-Shafter Bypass Alternative would be approximately 21 miles.

The Wasco-Shafter Bypass was refined to avoid the Occidental Petroleum tank farm as well as a historic property potentially eligible for listing on the National Register of Historic Places. The Wasco-Shafter Bypass would cross SR 43, SR 46, East Lerdo Highway, and several local roads. Roads, including SR 46, Kimberlina Road, Shafter Avenue, Beech Avenue, Cherry Avenue, and Kratzmeyer Road, would be grade-separated from the HST with overcrossings/undercrossings; other roads would be closed at the HST right-of-way.

2.2.1.9 Bakersfield South Alternative

From the Rosedale Highway (SR 58) in Bakersfield, the Bakersfield South Alternative would parallel the BNSF Alternative at varying distances to the north. At Chester Avenue, the Bakersfield South Alternative would curve south and run parallel to California Avenue. As with the BNSF Alternative, the Bakersfield South Alternative would begin at-grade and become elevated starting at Country Breeze Place through Bakersfield to its terminus at Oswell Street. Dedicated wildlife crossing structures would not be required because this alternative would be elevated to the north and south of the Kern River.

The Bakersfield South Alternative would be approximately 12 miles long and would cross many of the same roads as the BNSF Alternative. This alternative includes the Bakersfield Station–South Alternative.

2.2.1.10 Bakersfield Hybrid Alternative

From Rosedale Highway (SR 58) in Bakersfield, the Bakersfield Hybrid Alternative would follow the Bakersfield South Alternative and parallel the BNSF Alternative at varying distances to the north. At approximately A Street, the Bakersfield Hybrid Alternative would diverge from the Bakersfield South Alternative, cross over Chester Avenue and the BNSF right-of-way in a southeasterly direction, then curve back to the northeast to parallel the BNSF Railway tracks towards Kern Junction. After crossing Truxtun Avenue, the alignment would curve to the southeast to parallel the UPRR tracks to its terminus at Oswell Street. As with the BNSF and Bakersfield South alternatives, the Bakersfield Hybrid Alternative would begin at-grade and become elevated starting at Country Breeze Place through Bakersfield to Oswell Street. Dedicated wildlife crossing structures would not be required because this alternative would be elevated to the north and south of the Kern River.

The Bakersfield Hybrid Alternative would be approximately 12 miles long and would cross many of the same roads as the BNSF and Bakersfield South alternatives. This alternative includes the Bakersfield Station–Hybrid Alternative.

2.2.2 Station Alternatives

The Fresno to Bakersfield HST Section would include a new station in Fresno and a new station in Bakersfield. A potential third station, the Kings/Tulare Regional Station, is under consideration.

Stations would be designed to address the purpose of the HST, particularly to allow for intercity travel and connection to local transit, airports, and highways. Stations would include the station platforms, a station building, and associated access structure, as well as lengths of bypass tracks to accommodate local and express service at the stations. All stations would contain the following elements:

- Passenger boarding and alighting platforms.
- Station head house with ticketing, waiting areas, passenger amenities, vertical circulation, administration and employee areas, and baggage and freight-handling service.
- Vehicle parking (short-term and long-term) and "kiss-and-ride."[1]
- Motorcycle/scooter parking.
- Bicycle parking.
- Waiting areas and queuing space for taxis and shuttle buses.
- Pedestrian walkway connections.

2.2.2.1 Fresno Station Alternatives

Two alternative sites are under consideration for the Fresno Station.

Fresno Station–Mariposa Alternative

The Fresno Station–Mariposa Alternative would be located in Downtown Fresno, less than 0.5 mile east of SR 99 on the BNSF Alternative. The station would be centered on Mariposa Street and bordered by Fresno Street on the north, Tulare Street on the south, H Street on the east,

[1] "Kiss-and-ride" refers to the station area where riders may be dropped off or picked up before or after riding the HST.

and G Street on the west. The station building would be approximately 75,000 square feet, with a maximum height of approximately 64 feet.

The two-level station would be at-grade; with passenger access provided both east and west of the HST guideway and the UPRR tracks, which would run parallel to one another next to the station. The first level would contain the public concourse, passenger service areas, and station and operation offices. The second level would include a mezzanine, a pedestrian overcrossing above the HST guideway and the UPRR tracks, and an additional public concourse area. Entrances would be located at both G and H streets. A conceptual site plan of the Fresno Station–Mariposa Alternative is provided in Figure 2-2.

The majority of station facilities would be east of the UPRR tracks. The station and associated facilities would occupy approximately 20.5 acres, including 13 acres dedicated to the station, short-term parking, and kiss-and-ride accommodations. A new intermodal facility, not a part of this proposed undertaking, would be located on the parcel bordered by Fresno Street to the north, Mariposa Street to the south, Broadway Street to the east, and H Street to the west (designated "Intermodal Transit Center" in Figure 2-2). Among other uses, the intermodal facility would accommodate the Greyhound facilities and services that would be relocated from the northwestern corner of Tulare and H streets.

The site proposal includes the potential for up to three parking structures that would occupy a total of approximately 5.5 acres. Two of the three potential parking structures would each sit on 2 acres, and each would have a capacity of approximately 1,500 cars. The third parking structure would be slightly smaller in footprint (1.5 acres), with five levels and a capacity of approximately 1,100 cars. An additional 2-acre surface parking lot would provide approximately 300 parking spaces.

Under this alternative, the historic Southern Pacific Railroad depot and associated Pullman Sheds would remain intact. While these structures could be used for station-related purposes, they are assumed not to be functionally required for the HST project, and are therefore not proposed to be physically altered as part of the project. The Mariposa station building footprint has been configured to preserve views of the historic railroad depot and associated sheds.

Fresno Station–Kern Alternative

The Fresno Station–Kern Alternative would be similarly situated in Downtown Fresno and would be located on the BNSF Alternative, centered on Kern Street between Tulare Street and Inyo Street (Figure 2-3). This station would include the same components as the Fresno Station–Mariposa Alternative, but under this alternative, no station facilities would be located adjacent to the historic Southern Pacific Railroad depot and relocation of existing Greyhound facilities would not be required.

The station building would be approximately 75,000 square feet, with a maximum height of approximately 64 feet. The station building would have two levels and house the same facilities as the Fresno Station–Mariposa Alternative (UPRR tracks, HST tracks, mezzanine, and station office). The approximately 18.5-acre site would include 13 acres dedicated to the station, bus transit center, short-term parking, and kiss-and-ride accommodations.

Two of the three potential parking structures would each sit on 2 acres, and each would have a capacity of approximately 1,500 cars. The third structure would be slightly smaller in footprint (1.5 acres) and have a capacity of approximately 1,100 cars. Surface parking lots would provide approximately 600 additional parking spaces. Like the Fresno Station–Mariposa Alternative, the majority of station facilities under the Kern Alternative would be sited east of the HST tracks.

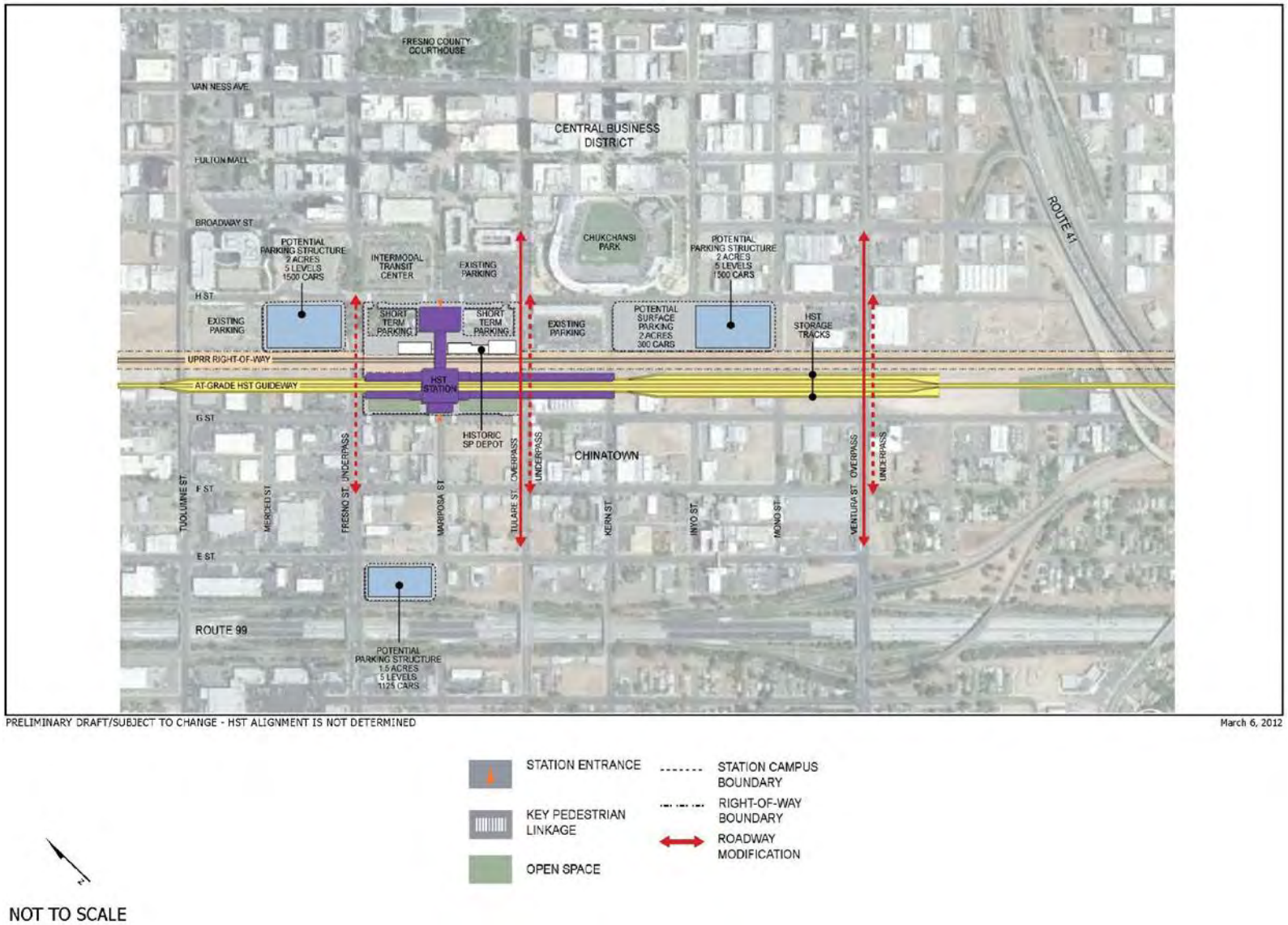


Figure 2-2
Fresno Station–Mariposa Alternative

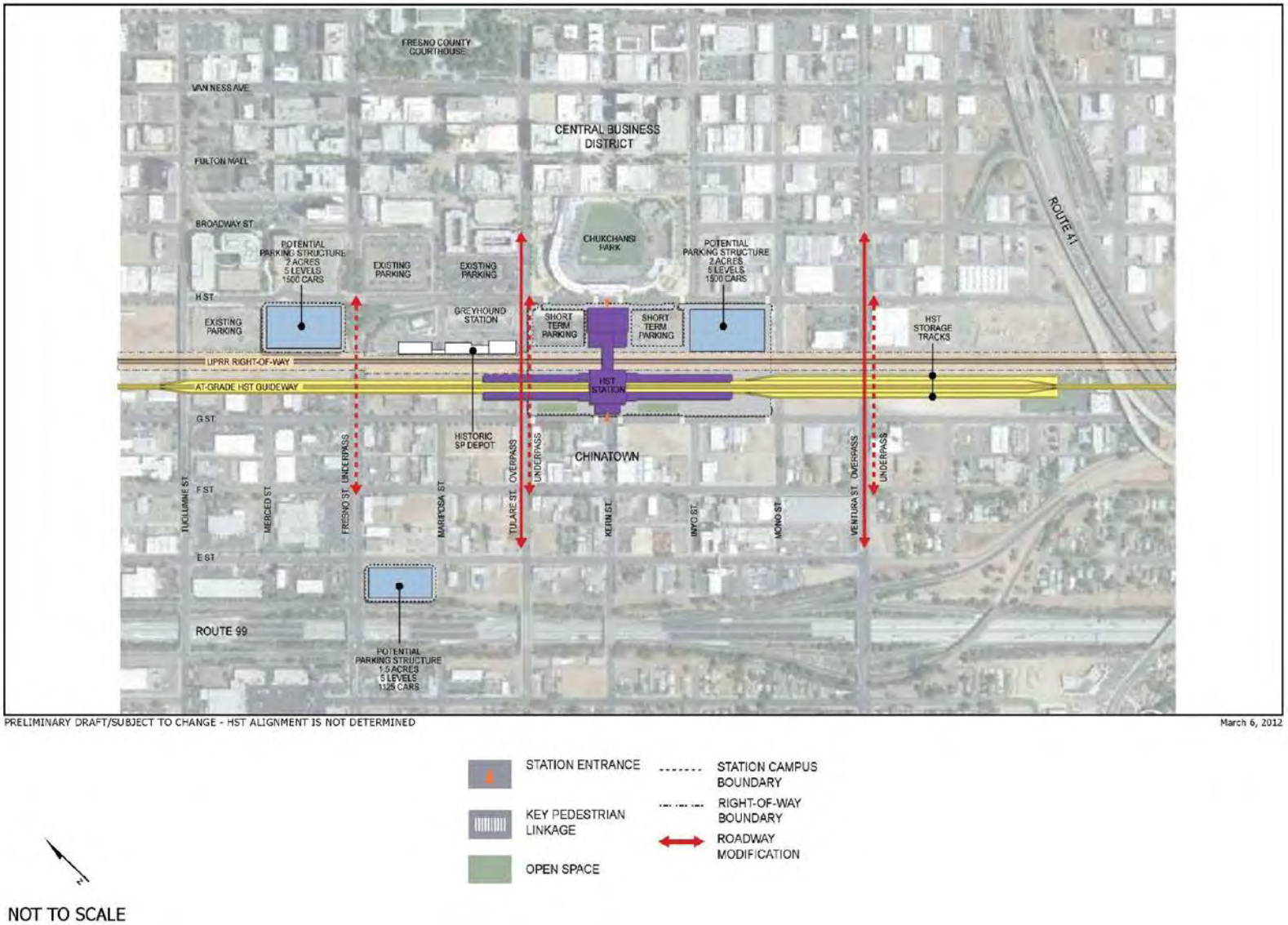


Figure 2-3
Fresno Station–Kern Alternative

2.2.2.2 Kings/Tulare Regional Station

Two alternative sites are under consideration for the potential Kings/Tulare Regional Station.

Kings/Tulare Regional Station–East Alternative

The potential Kings/Tulare Regional Station would be located east of SR 43 (Avenue 8) and north of the SJVR on the BNSF Alternative (Figure 2-4). The station building would be approximately 40,000 square feet with a maximum height of approximately 75 feet. The entire site would be approximately 25 acres, including 8 acres designated for the station, bus transit center, short-term parking, and kiss-and-ride. An additional approximately 17.25 acres would support a surface parking lot with approximately 2,280 spaces.

Kings/Tulare Regional Station–West Alternative

The potential Kings/Tulare Regional Station–West Alternative would be located east of Thirteenth Avenue and north of the SJVR on the Hanford West Bypass 1 and 2 alternatives. The station would be located either at-grade or below-grade depending on which Hanford West Bypass alignment design option is chosen.

The at-grade Kings/Tulare Regional Station–West Alternative would include a station building of approximately 100,000 square feet with a maximum height of approximately 36 feet. The entire site would be approximately 48 acres, including 6 acres designated for the station, bus bays, short-term parking, and kiss-and-ride areas. Approximately 5 acres would support a surface parking lot with approximately 700 spaces. An additional 3.5 acres would support two parking structures with a combined parking capacity of 2,100 spaces (Figure 2-5).

The below-grade Kings/Tulare Regional Station–West Alternative would include a station building of approximately the same size and height. The below-grade station site would include the same components as the at-grade station option on the same number of acres; however, the station platform would be located below-grade instead of at ground level. Approximately 4 acres would support a surface parking lot with approximately 600 spaces and an additional 4 acres would support two parking structures with a combined parking capacity of 2,200 spaces (Figure 2-6).

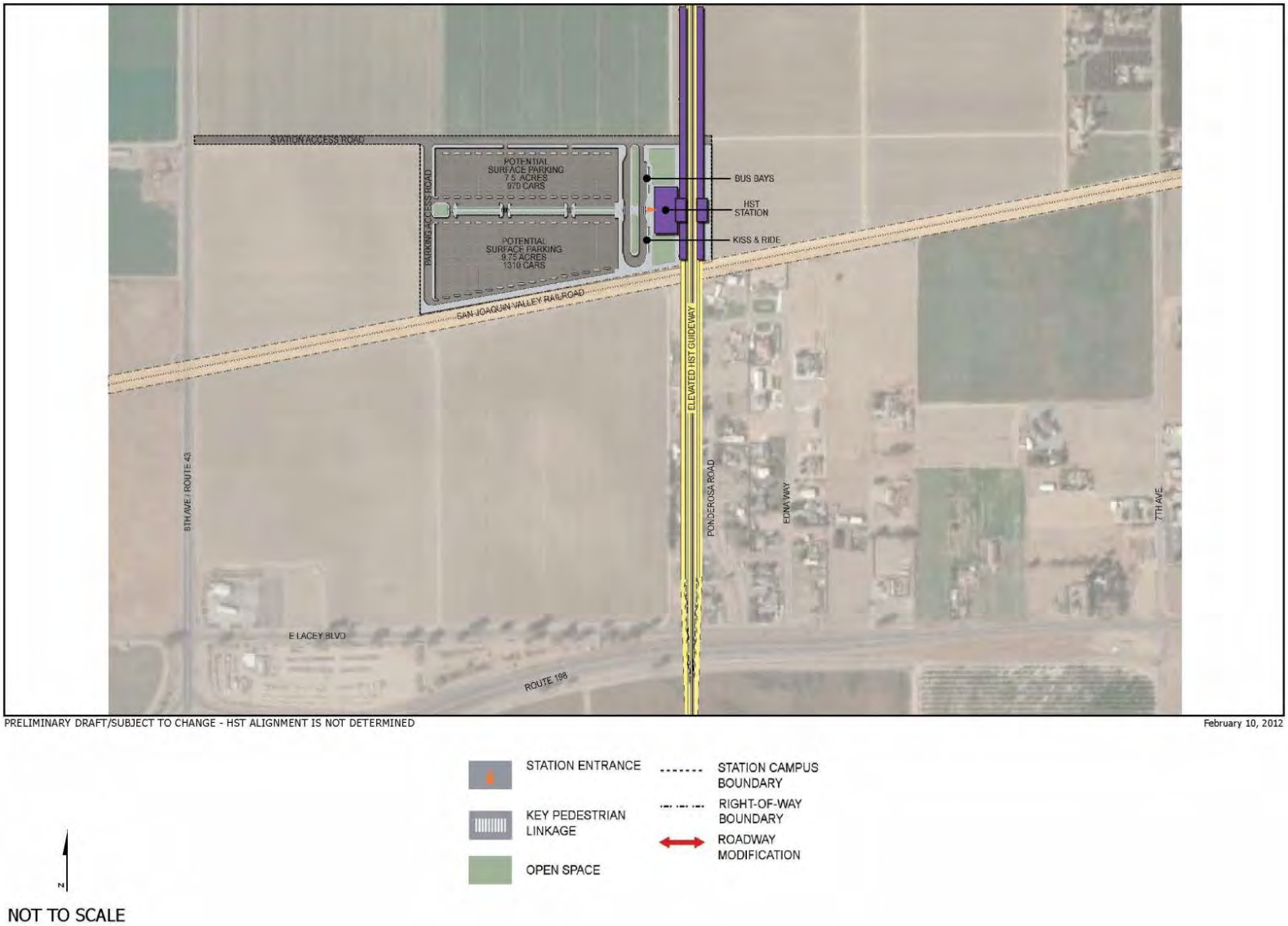


Figure 2-4
Kings/Tulare Regional Station–East Alternative (potential)

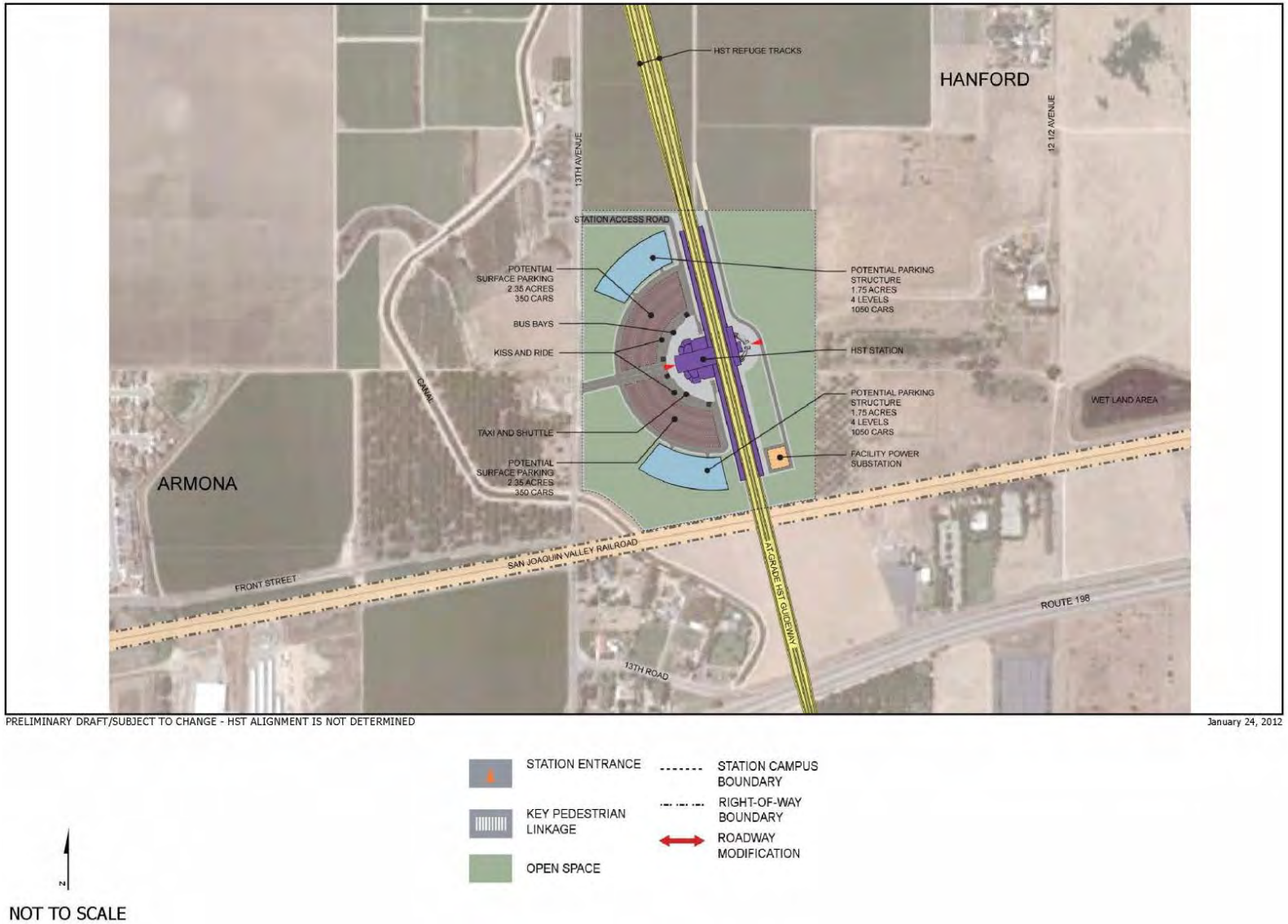


Figure 2-5
Kings/Tulare Regional Station–West Alternative (potential) (at-grade option)

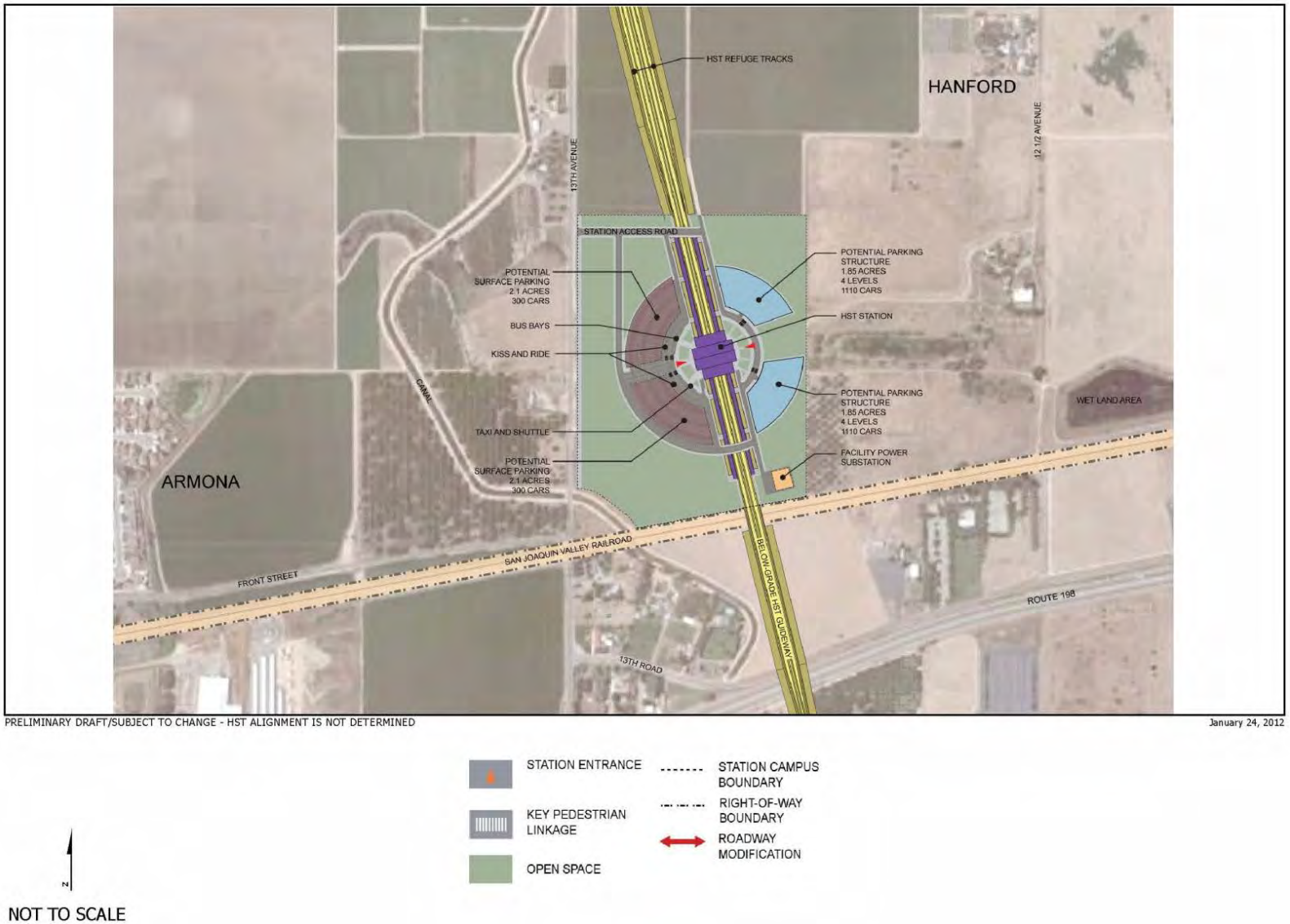


Figure 2-6
Kings/Tulare Regional Station–West Alternative (potential) (below-grade option)

2.2.2.3 Bakersfield Station Alternatives

Three options are under consideration for the Bakersfield Station.

Bakersfield Station–North Alternative

The Bakersfield Station–North Alternative would be located at the corner of Truxtun and Union Avenue/SR 204 along the BNSF Alternative (Figure 2-7). The three-level station building would be 52,000 square feet, with a maximum height of approximately 95 feet. The first level would house station operation offices and would also accommodate trains running along the BNSF Railway line. The second level would include the mezzanine; the HST platforms and guideway would pass through the third level. Under this alternative, the station building would be located at the western end of the parcel footprint. Two new boulevards would be constructed to access the station and the supporting facilities.

The 19-acre site would designate 11.5 acres for the station, bus transit center, short-term parking, and kiss-and-ride. An additional 7.5 acres would house two parking structures that together would accommodate approximately 4,500 cars. The bus transit center and the smaller of the two parking structures (2.5 acres) would be located north of the HST tracks. The BNSF Railway line would run through the station at-grade, with the HST alignment running on an elevated guideway.

Bakersfield Station–South Alternative

The Bakersfield Station–South Alternative would be would be similarly located in downtown Bakersfield, but situated on the Bakersfield South Alternative along Union and California avenues, just south of the BNSF Railway right-of-way (Figure 2-8). The two-level station building would be 51,000 square feet, with a maximum height of approximately 95 feet. The first floor would house the concourse, and the platforms and the guideway would be on the second floor. Access to the site would be from two new boulevards, one branching off from California Avenue and the other from Union Avenue.

The entire site would be 20 acres, with 15 acres designated for the station, bus transit center, short-term parking, and kiss-and-ride. An additional 5 acres would support one six-level parking structure with a capacity of approximately 4,500 cars. Unlike the Bakersfield Station–North Alternative, this station site would be located entirely south of the BNSF Railway right-of-way.

Bakersfield Station–Hybrid Alternative

The Bakersfield Station–Hybrid Alternative would be in the same area as the North and South Station alternatives, and located at the corner of Truxtun and Union Avenue/SR 204 on the Bakersfield Hybrid Alternative (Figure 2-9). The station design includes an approximately 57,000 square-foot main station building and an approximately 5,500 square-foot entry concourse located north of the BNSF Railway right-of-way. The station building would have two levels with a maximum height of approximately 95 feet. The first floor would house the concourse, and the platforms and guideway would be on the second floor. Additionally, a pedestrian overcrossing would connect the main station building to the north entry concourse across the BNSF right-of-way.

The entire site would be approximately 24 acres, with 15 acres designated for the station, bus transit center, short-term parking, and kiss-and-ride areas. Approximately 4.5 of the 24 acres would support three parking structures with a total capacity of approximately 4,500 cars. Each parking structure would be seven levels; one with a planned capacity of 1,750 cars, another with a capacity of 1,315 cars, and the third with a planned capacity of 1,435 cars. An additional 460 parking spaces would be provided in surface lots covering a total of approximately 4.5 acres of

the station site. Access to the station site would be from Truxtun and Union avenues, as well as from Hayden Court. Under this alternative, the BNSF Railway track runs through the station site, and the main station building and majority of station facilities would be sited south of the BNSF Railway right-of-way.

Figure 2-7
Bakersfield Station–North Alternative

Figure 2-8
Bakersfield Station–South Alternative

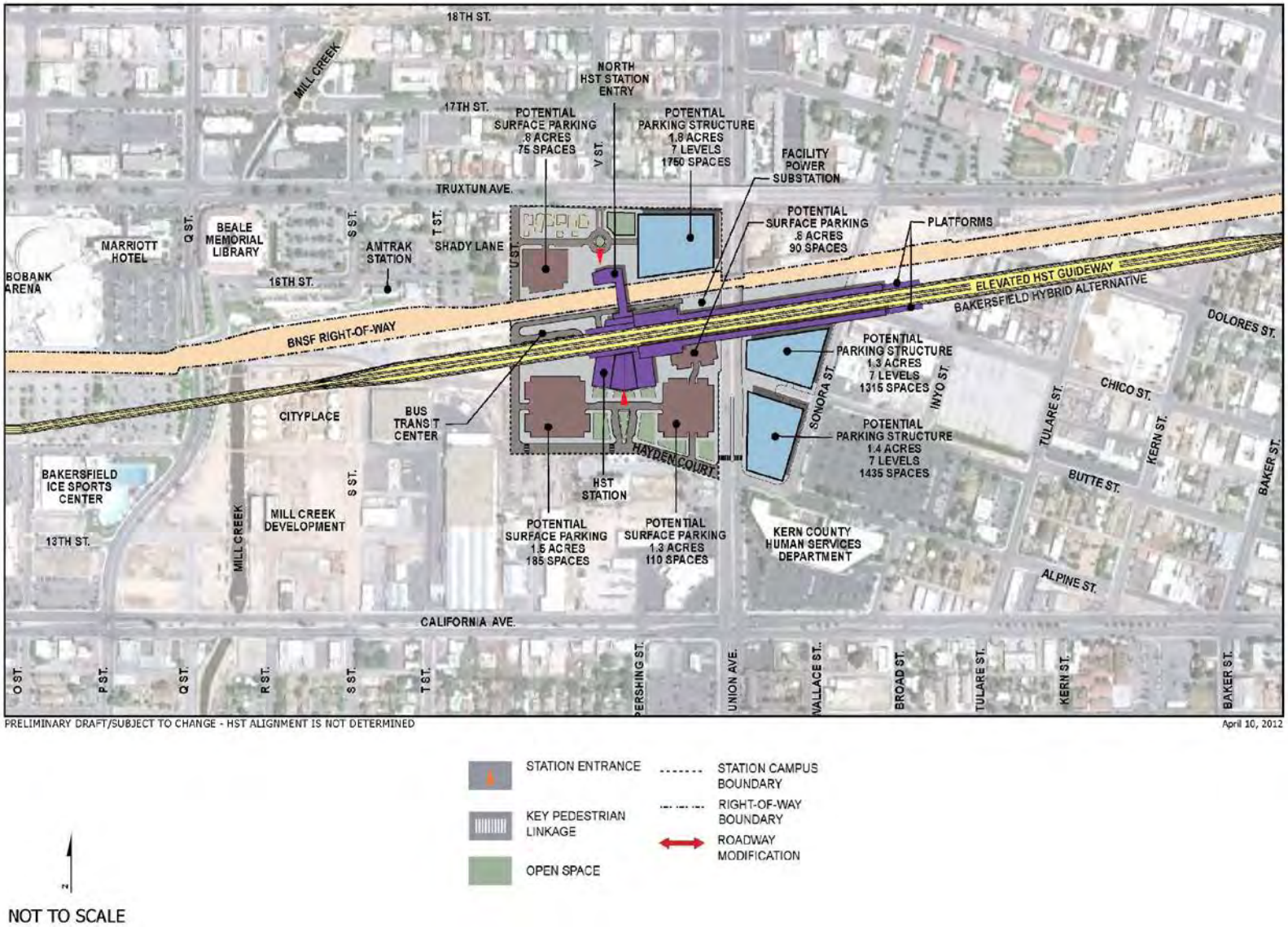


Figure 2-9
Bakersfield Station–Hybrid Alternative

2.2.3 Heavy Maintenance Facility (HMF)

One HST heavy vehicle maintenance and layover facility would be sited along either the Merced to Fresno or Fresno to Bakersfield HST section. Before the start-up of initial operations, the HMF would support the assembly, testing, commissioning, and acceptance of high-speed rolling stock. During regular operations, the HMF would provide maintenance and repair functions, activation of new rolling stock, and train storage. The HMF concept plan indicates that the site would encompass approximately 154 acres to accommodate shops, tracks, parking, administration, roadways, power substation, and storage areas. The HMF would include tracks that allow trains to enter and leave under their own electric power or under tow. The HMF would also have management, administrative, and employee support facilities. Up to 1,500 employees could work at the HMF during any 24-hour period.

The Authority has determined that one HMF would be located between Merced and Bakersfield; however, the specific location has not yet been finalized. The property boundaries for each HMF site would be larger than the acreage needed for the actual facility because of the unique site characteristics and constraints of each location. Five HMF sites are under consideration in the Fresno to Bakersfield Section (Figure 2-1):

- The Fresno Works–Fresno HMF site lies within the southern limits of the city of Fresno and county of Fresno next to the BNSF Railway right-of-way between SR 99 and Adams Avenue. Up to 590 acres are available for the facility at this site.
- The Kings County–Hanford HMF site lies southeast of the city of Hanford, adjacent to and east of SR 43, between Houston and Idaho avenues. Up to 510 acres are available at the site.
- The Kern Council of Governments–Wasco HMF site lies directly east of Wasco between SR 46 and Filburn Street. Up to 420 acres are available for the facility at this site.
- The Kern Council of Governments–Shafter East HMF site lies in the city of Shafter between Burbank Street and 7th Standard Road to the east of the BNSF Railway right-of-way. This site has up to 490 acres available for the facility.
- The Kern Council of Governments–Shafter West HMF site lies in the city of Shafter between Burbank Street and 7th Standard Road to the west of the BNSF Railway right-of-way. This site has up to 480 acres available for the facility.

2.3 Power

Power for the HST System would be drawn from California's electricity grid and distributed to the trains via an overhead contact system. The project would not include the construction of a separate power source, although it would include the extension of power lines to a series of power substations positioned along the HST corridor. The transformation and distribution of electricity would occur in three types of stations:

- Traction power substations (TPSSs) transform high-voltage electricity supplied by public utilities to the train operating voltage. TPSSs would be sited adjacent to existing utility transmission lines and the HST right-of-way, and would be located approximately every 30 miles along the route. Each TPSS would be 200 feet by 160 feet.
- Switching stations connect and balance the electrical load between tracks, and switch power on or off to tracks in the event of a power outage or emergency. Switching stations would be located midway between, and approximately 15 miles from, the nearest TPSS. Each

switching station would be 120 feet by 80 feet and be located adjacent to the HST right-of-way.

- Paralleling stations, or autotransformer stations, provide voltage stabilization and equalize current flow. Paralleling stations would be located every 5 miles between the TPSSs and the switching stations. Each paralleling station would be 100 feet by 80 feet and located adjacent to the HST right-of-way.

2.4 Project Construction

The construction plan developed by the Authority and described below would maintain eligibility for eligibility for federal American Recovery and Reinvestment Act (ARRA) funding. For the Fresno to Bakersfield Section, specific construction elements would include at-grade, below-grade, and elevated track, track work, grade crossings, and installation of a positive train control system. At-grade track sections would be built using conventional railroad construction techniques. A typical sequence includes clearing, grubbing, grading, and compacting the rail bed; applying crushed rock ballast; laying track; and installing electrical and communications systems.

The precast segmental construction method is proposed for elevated track sections. In this construction method, large concrete bridge segments would be mass-produced at an onsite temporary casting yard. Precast segments would then be transported atop the already completed portions of the elevated track and installed using a special gantry crane positioned on the aerial structure. Although the precast segmental method is the favored technique for aerial structure construction, other methods may be used, including cast-in-place, box girder, or precast span-by-span techniques.

Preconstruction activities would be conducted during final design and include geotechnical investigations, identification of staging areas, initiation of site preparation and demolition, relocation of utilities, and implementation of temporary, long-term, and permanent road closures. Additional studies and investigations to develop construction requirements and worksite traffic control plans would be conducted as needed.

Major construction activities for the Fresno to Bakersfield Section would include earthwork and excavation support systems construction, bridge and aerial structure construction, railroad systems construction (including trackwork, traction electrification, signaling, and communications), and station construction. During peak construction periods, work is envisioned to be underway at several locations along the route, with overlapping construction of various project elements. Working hours and workers present at any time will vary depending on the activities being performed.

The Authority intends to build the project using sustainable methods that:

- Minimize the use of nonrenewable resources.
- Minimize the impacts on the natural environment.
- Protect environmental diversity.
- Emphasize the use of renewable resources in a sustainable manner.

The approximate schedule for construction is provided in Table 2-1.

Table 2-1
Construction Schedule

Activity	Tasks	Duration
Right-of-way Acquisition	Per Assembly Bill 3034, proceed with right-of-way acquisitions once State Legislature appropriates funds in annual budget	12–24 months
Survey and Preconstruction	Locate utilities, establish right-of-way and project control points and centerlines, establish or relocate survey monuments	6–8 months
Mobilization	Safety devices and special construction equipment mobilization	March–October 2013
Site Preparation	Utilities relocation; clearing/grubbing right-of-way; establishment of detours and haul routes; preparation of construction equipment yards, stockpile materials, and precast concrete segment casting yard	April–August 2013
Earthmoving	Excavation and earth support structures	August 2013–August 2015
Construction of Road Crossings	Surface street modifications, grade separations	June 2013–December 2017
Construction of Elevated Structures	Elevated structure and bridge foundations, substructure, and superstructure	June 2013–December 2017
Track Laying	Includes backfilling operations and drainage facilities	January 2014–August 2017
Systems	Train control systems, overhead contact system, communication system, signaling equipment	July 2016–November 2018
Demobilization	Includes site cleanup	August 2017–December 2019
HMF Phase 1[a]	Test track assembly and storage	August–November 2017
Maintenance-of-Way Facility	Potentially co-located with HMF[a]	January–December 2018
HMF Phase 2[a]	Test track light maintenance facility	June–December 2018
HMF Phase 3[a]	Heavy Maintenance Facility	January–July 2021
HST Stations	Demolition, site preparation, foundations, structural frame, electrical and mechanical systems, finishes	Fresno: December 2014–October 2019 Kings/Tulare Regional: TBD[b] Bakersfield: January 2015–November 2019

Notes:
[a] The HMF would be sited along either the Merced to Fresno or Fresno to Bakersfield section.
[b] Right-of-Way would be acquired for the Kings/Tulare Regional Station; however, the station itself would not be part of initial construction.
Acronym: TBD = to be determined

Chapter 3.0
Study Methods

3.0 Study Methods

This chapter presents the methods used to identify biological resources in the project region. In addition, this chapter provides an overview of the various regulatory requirements, definitions of terms used, background review conducted, field surveys, post-field data processing, personnel and survey dates, and coordination efforts with agency and professional contacts. It also summarizes the study limitations and how they may influence the results presented in this report.

3.1 Regulatory Requirements

A review of the various federal, state, regional, and local government regulatory requirements was conducted to identify regulations that provide protection of biological resources.

3.1.1 Federal

The following subsections describe the federal laws and regulations governing the protection of biological resources.

3.1.1.1 Endangered Species Act of 1973

The Endangered Species Act of 1973 (federal ESA) (16 U.S.C. Sections 1531 to 1543) and subsequent amendments provide guidance for the conservation of federally listed species and the ecosystems on which they depend.

Prohibited Acts

Section 9 of the federal ESA prohibits the "take" of any fish or wildlife species listed under the federal ESA unless otherwise authorized by federal regulations. The term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Two processes whereby take is allowed when it is incidental to an otherwise legal activity are described in Section 7 and Section 10, respectively. Section 9 of the federal ESA also prohibits the unlawful removal, damage or destruction of any endangered plant under federal jurisdiction, or where in non-federal areas, in knowing violation of any state law.

Interagency Consultation and Biological Assessments

Section 7 of ESA provides a means for authorizing the "take" of threatened or endangered species by federal agencies, and applies to actions that are conducted, permitted, or funded by a federal agency. The statute requires federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS), as appropriate, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat for these species. If a proposed project "may affect" a listed species or destroy or modify critical habitat, the lead agency is required to prepare a biological assessment evaluating the nature and severity of the potential effect.

Habitat Conservation Plans

Section 10 of the federal ESA requires the obtaining of an Incidental Take Permit from the USFWS by non-federal landowners for activities that might incidentally harm (or "take") endangered or threatened wildlife on their land. To obtain a permit, an applicant must develop a Habitat Conservation Plan that is designed to offset any harmful impacts the proposed activity might have on the species.

3.1.1.2 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. Section 1801 et seq.) requires all federal agencies to consult with the NMFS on all actions or proposed actions (permitted, funded, or undertaken by the agency) that may adversely affect fish habitats. It also requires cooperation among NMFS, the councils, fishing participants, and federal and state agencies to protect, conserve, and enhance essential fish habitat, which is defined as those waters and substrates needed by fish for spawning, breeding, feeding, and growth to maturity.

3.1.1.3 Clean Water Act

Section 401 of the Clean Water Act

Section 401 of the CWA (33 U.S.C. 1341) requires that an applicant for a federal license or permit for activities resulting in a discharge to waters of the United States (waters of the U.S.) must obtain a state certification that the discharge complies with other provisions of the CWA. The RWQCB, under the oversight of the SWRCB, administers the certification program in California.

Section 402 of the Clean Water Act

Section 402 of the CWA (33 U.S.C. Section 1342) establishes the National Pollutant Discharge Elimination System (NPDES) permit program to regulate point source discharges of pollutants into waters of the United States. A NPDES permit sets specific discharge limits for point sources discharging pollutants into waters of the U.S. and establishes monitoring and reporting requirements, as well as special conditions. The Regional Water Quality Control Board (RWQCB), under the oversight of the State Water Resources Control Board (SWRCB), administers the permit program in California.

Section 404 of the Clean Water Act

The Clean Water Act (CWA) (33 U.S.C. Sections 1251 to 1376) serves as the primary federal law protecting the quality of the nation's surface waters, including wetlands. Under Section 404, USACE, and the U.S. Environmental Protection Agency (EPA) regulate the discharge of dredged and fill materials into the waters of the U.S. These waters are defined as oceans, bays, rivers, streams, lakes, ponds, and wetlands, including seasonal and perennial wetlands and coastal wetlands.

Project sponsors must obtain a permit from the USACE for all discharges of dredged or fill materials before proceeding with a proposed activity. Section 404 permits may only be issued for a least environmentally damaging practicable alternative. Compliance with CWA Section 404 requires compliance with several other environmental laws and regulations. The USACE cannot issue an individual permit or authorize the use of a general or nationwide permit until the requirements of NEPA, ESA, and the National Historic Preservation Act have been met. Additionally, no permit can be issued or verified until a water quality certification, or waiver of certification, has been issued pursuant to CWA Section 401.

Section 10 of the Clean Water Act

Section 10 of the Rivers and Harbors Act of 1899 requires authorization from the USACE for the construction of any structure in or over any navigable waters of the U.S.

3.1.1.4 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (16 U.S.C. Sections 661 to 667e et seq.) applies to any federal project where any body of water is impounded, diverted, deepened, or otherwise

modified. Project proponents are required to consult with the USFWS and the appropriate state wildlife agency.

3.1.1.5 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (U.S.C. Sections 703 to 712) makes it unlawful, unless expressly authorized by permit pursuant to federal regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export at any time, or in any manner, any migratory bird, or any part, nest, or egg of any such bird."

This includes direct acts with the exception of harassment and habitat modification, which are not included unless they result in direct loss of birds, nests, or eggs. Most bird species occurring in California fall under the protection of the MBTA except those species that belong to the families not listed in any of the four treaties, such as wrentit (*Chamaea fasciata*), European starling (*Sturnus vulgaris*), California quail (*Callipepla californica*), ring-necked pheasant (*Phasianus colchicus*), and chukar (*Alectoris chukar*), among others less common in California. The MBTA is administered by the USFWS Division of Migratory Bird Management.

Migratory Bird Treaty Reform Act

The Migratory Bird Treaty Reform Act (Division E, Title I, Section 143 of the Consolidated Appropriations Act, 2005, PL 108–447) amends the Migratory Bird Treaty Act (16 U.S.C. Sections 703 to 712) such that nonnative birds or birds that have been introduced by humans to the United States or its territories are excluded from protection under the Act. It defines a native migratory bird as a species present in the United States and its territories as a result of natural biological or ecological processes. This list excluded two additional species commonly observed in the United States, the rock pigeon (*Columba livia*) and domestic goose (*Anser domesticus*).

3.1.1.6 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C. Sections 668 to 668d, 54 Statute 250) prohibits the destruction of bald and golden eagles and their occupied and unoccupied nests.

3.1.1.7 Protection of Wetlands

Executive Order 11990 aims to avoid direct or indirect new construction in wetlands when a practicable alternative is available. If wetland impacts cannot be avoided, all practicable measures to minimize harm must be included.

3.1.1.8 Protection of Migratory Bird Populations

Executive Order 13186 directs each federal agency taking actions that have or may have adverse impacts on migratory bird populations to work with the USFWS to develop a memorandum of understanding that will promote the conservation of migratory bird populations. This includes avoiding and minimizing adverse impacts on migratory bird resources when conducting agency actions; restoring and enhancing migratory bird habitats; and preventing or abating the pollution or detrimental alteration of the environment for the benefit of migratory birds.

3.1.1.9 Invasive Species

Executive Order 13112 requires federal agencies to work cooperatively to prevent and control the introduction and spread of invasive plants and animals.

3.1.2 State

The following subsections describe the state laws and regulations governing the protection of biological resources.

3.1.2.1 California Fish and Game Code

California Endangered Species Act

The California Endangered Species Act (California ESA) (Sections 2050 to 2085) establishes the policy of the state to conserve, protect, restore, and enhance threatened or endangered species and their habitats by protecting "all native species of fishes, amphibians, reptiles, birds, mammals, invertebrates, and plants, and their habitats, threatened with extinction and those experiencing a significant decline which, if not halted, would lead to a threatened or endangered designation." Animal species are listed by the CDFG as threatened or endangered, and plants are listed as rare, threatened, or endangered. However, only those plant species listed as threatened or endangered receive protection under the California ESA.

It mandates that state agencies do not approve a project that would jeopardize the continued existence of these species if reasonable and prudent alternatives are available that would avoid a jeopardy finding. There are no state agency consultation procedures under the California ESA. For projects that would affect a species that is federally and state listed, compliance with ESA satisfies the California ESA if the California Department of Fish and Game (CDFG) determines that the federal incidental take authorization is consistent with the California ESA under Section 2080.1. For projects that would result in take of a species that is state listed only, the project sponsor must apply for a take permit, in accordance with Section 2081(b).

Fully Protected Species

Four sections of the California Fish and Game Code (CFGC) list 37 fully protected species (CFGC Sections 3511, 4700, 5050, and 5515). These sections prohibit take or possession "at any time" of the species listed, with few exceptions, and state that "no provision of this code or any other law will be construed to authorize the issuance of permits or licenses to 'take' the species," and that no previously issued permits or licenses for take of the species "shall have any force or effect" for authorizing take or possession.

Bird Nesting Protections

Bird nesting protections (Sections 3503, 3503.5, 3511, and 3513) in the CFGC include the following:

- Section 3503 prohibits the take, possession, or needless destruction of the nest or eggs of any bird.
- Section 3503.5 prohibits the take, possession, or needless destruction of any nests, eggs, or birds in the orders Falconiformes (new world vultures, hawks, eagles, ospreys, and falcons, among others), or Strigiformes (owls).
- Section 3511 prohibits the take or possession of fully protected birds.
- Section 3513 prohibits the take or possession of any migratory nongame bird or part thereof, as designated in the MBTA. To avoid violation of the take provisions, it is generally required that project-related disturbance at active nesting territories be reduced or eliminated during the nesting cycle.

Lake and Streambed Alteration

Lake and Streambed Alteration (Section 1600 et seq.) requires notifying CDFG before any project activity that would do any of the following:

- Substantially divert or obstruct the natural flow of any river, stream, or lake.
- Substantially change or use any material from the bed, channel, or bank of any river, stream, or lake.
- Deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

The notification requirement applies to any work undertaken in or near a river, stream, or lake that flows at least intermittently through a bed or channel. This includes ephemeral streams, desert washes, and watercourses with a subsurface flow. It may also apply to work undertaken in the flood plain of a body of water. Preliminary notification and project review generally occur during the environmental process.

When an existing fish or wildlife resource may be substantially adversely affected, the CDFG is required to propose reasonable modifications to the project to protect the resources. These modifications, or conditions, are formalized in a Lake or Streambed Alteration Agreement that becomes part of the plans, specifications, and bid documents for the project.

California Native Plant Protection Act

The California Native Plant Protection Act (Sections 1900 to 1913) requires all state agencies to use their authority to carry out programs to conserve endangered and rare native plants. It prohibits importation, take, and sale of such plants. Currently, the California Native Plant Protection Act takes precedence over California ESA regulations of plants.

Natural Communities Conservation Planning Act

This act was enacted to encourage broad-based planning to provide for effective protection and conservation of the state's wildlife resources while continuing to allow appropriate development and growth (CFGC Sections 2800 to 2835). Natural Community Conservation Plans (NCCP) may be implemented, which identify measures necessary to conserve and manage natural biological diversity within the planning area, while allowing compatible and appropriate economic development, growth, and other human uses.

3.1.2.2 Porter-Cologne Water Quality Act

The Porter-Cologne Water Quality Act (the Act) established nine RWQCBs to oversee water quality on a day-to-day basis at the local and/or regional level, which includes preparing and updating water quality control plans and issuing Section 401 water quality certifications. The Act also grants ultimate authority to the State Water Resources Control Board over state water rights and water quality policy.

3.1.3 Regional and Local

The following subsections describe the county and city laws and regulations governing the protection of biological resources. The laws and ordinances are separated by county and city as appropriate.

The following subsections describe the county and city laws and regulations governing the protection of biological resources. The laws and ordinances are separated by county and city as appropriate.

County and city laws and regulations pertaining to the protection of biological resources relevant to the project are summarized in Table 3-1. The table is organized by the county immediately followed by cities within that county to provide an overall framework for the geographic area.

The agencies with local jurisdiction along the Fresno to Bakersfield Section include the cities of Fresno, Hanford, Corcoran, Wasco, Shafter, and Bakersfield and the counties of Fresno, Tulare, Kings, and Kern. Local regulations related to biological resources are generally included in general plans, ordinance codes, and in park master plans.

Table 3-1
Regional and Local Regulations

Policy Title	Summary
Fresno County	
Fresno County General Plan, Open Space and Conservation Element, Policies OS-A.18 through OS-A.20, OS-A.25; OS-B.1 through OS-B.2; OS-D.1 through OS-D.8; OS-E.1 through OS-E.18, OS-F.1 through OS-F.11 (Fresno County 2000)	The Fresno County General Plan seeks to protect and promote the careful management of the county's natural resources, including its wildlife and habitat, to maintain the county's environmental quality. Specific protections for water resources, forest resources, wetland and riparian areas, fish and wildlife habitat, and vegetation are included in the Open Space and Conservation Element.
Fresno County Municipal Code, Title 1, Chapter 1.13, Administrative Fines (Fresno County 2010)	The municipal code requires that for a land use permit to be issued there are no violations of county ordinances. Relevant ordinances regulate grading, vegetation removal or tree removal and the permit can be withheld until that property has been restored to its pre-violation state.
Fresno County Municipal Code, Title 10, Section V, Chapter 10.32, Destroying Flowers (Fresno County 2010)	The code states that it is unlawful on public lands to mutilate, dig up or destroy any of the following plants: Spanish bayonet or yucca plant (*Yucca* spp.), redbud (*Cercis occidentalis*), slippery elm (*Fremontodendron californicum)*, or white-stem lupine (*Lupinus albifrons*).
Fresno County Municipal Code, Title 13, Chapter 13.12, Trees and Shrubs; Chapter 13.16, Parks and Recreation Areas; Chapter 13.32, Use of Public Waters; Chapter 13.40, Uses Unlawful on Public Waters (Fresno County 2010)	The code has ordinances detailing provisions: for the planting of trees or shrubs, making it unlawful for any person to pick or damage any flowers, foliage, fruit, tree, shrub, plant, or grass, making it unlawful for any person to kill, wound, chase or capture any wild bird or animal, the proper use of public waters, and making it unlawful to dump debris on public lands.
Fresno County Municipal Code, Title 14, Chapter 14.24, Regulations for Stormwater Discharges (Fresno County 2010)	This chapter includes provisions for: the violation of municipal NPDES stormwater permits; best management practices; illicit discharges; illicit connections; requirements to remediate; requirements to monitor and analyze; notification of violations; administrative hearings and appeals; enforcement procedures and penalties; compensatory actions; violations deemed a public nuisance; and provisions for acts potentially resulting in a violation of the federal Clean Water Act and/or California Porter-Cologne Act. This section of the code also establishes the authority for access, inspections, sampling, and to establish sampling devices and tests.

Table 3-1
Regional and Local Regulations

Policy Title	Summary
Fresno County Municipal Code, Title 17, Chapter 17.20, Maps – Generally (Fresno County 2010)	This chapter provides for rejection of maps when "the design of the subdivision or the proposed improvements are likely to cause substantial environmental damage or substantially unavoidably injure fish or wildlife or their habitat."
City of Fresno	
2025 Fresno General Plan, Resource Conservation Element, Native Plants and Wildlife, Objective G-12, Policies G-12-c through G-12-l (City of Fresno Planning and Development Department 2002)	Policies in this section of the Fresno 2025 General Plan provide for the long-term preservation, enhancement, and enjoyment of plant, wildlife, and aquatic habitat resources in the Fresno area by protecting, improving, and restoring these resources.
City of Fresno Code of Ordinances, Chapter 5, Article 5, Parks and Playground Regulations (City of Fresno 2010)	This chapter of the municipal code states that no person shall: cut, break, injure, deface, or disturb any tree, shrub, plant; pluck, pull up, cut, take or remove any shrub, bush, plant, or flower; or carry any flowers, shrubs, or branches into or through any park; cut or remove any wood, turf, grass, soil, rock, sand, or gravel; or fish in any park except in lakes provided for that purpose and at the times designated by the park superintendent.
City of Fresno Code of Ordinances, Chapter 13, Article 3, Street Trees and Parkways (City of Fresno 2010)	These chapters of the municipal code state: it shall be the city's policy to utilize whatever techniques, methods, and procedures that are required to preserve, whenever feasible, all trees in the city and authorizes the development and maintenance of a list of trees of special interest; which should be given special treatment and care to retain and protect them.
Kings County	
2035 Kings County General Plan, Land Use Element, LU Objective A1.2, LU Policy A1.2.1 (Kings County Planning Department 2010a)	This Land Use Element objective and policy seek to protect natural waterways by designating water channels and riparian habitat along the Kings River and Cross Creek as "Natural Resource Conservation." The "Natural Resource Conservation" land use designation is used to define natural resource areas that primarily consist of high slope areas of the Coast Ranges, and waterway channels of the Kings River and Cross Creek. These areas serve as natural watershed and waterflow areas within the county, and represent some of the county's most natural aesthetic beauty.
2035 Kings County General Plan, Resource Conservation Element, RC Goal A2, RC Objective A2.1, RC Policies A2.1.2 through A2.1.3; RC Goal D1, RC Objective D1.1; RC Goal D2, RC Objective D2.1, RC Policies D2.1.1 through D2.1.3; RC Goal D3, RC Objective D3.1, RC Policy D3.1.1, D3.1.3 through D3.1.5; RC Goal E1, RC Objective E1.1, RC Policies E1.1.1 through E1.1.3 (Kings County Planning Department 2010b)	The Resource Conservation Element identifies natural resources throughout the County and establishes guiding policies for the conservation and utilization of these resources. Objectives and policies, relevant to plant and animal habitat and threatened and endangered species, provide regulations that support the following goals: protect natural waterway channels that serve as part of the county's critical floodwater conveyance system; preserve land that contains important natural plant and animal habitats; maintain the quality of existing natural wetland areas; protect and manage riparian environments as valuable resources; preserve healthy native oaks; and balance the protection of the county's diverse plant and animal communities with the county's economic needs.

Table 3-1
Regional and Local Regulations

Policy Title	Summary
Kings County Code of Ordinances, Chapter 16, Article II, Parks (Kings County 2010)	This chapter indicates that it is unlawful for any person within any park to cut, mar, deface, remove, alter, or damage any foliage, tree, shrub, grass, building, structure improvement or natural terrain feature including rocks, bodies of water, and rivers.
City of Hanford	
Hanford General Plan Update 2002, Open Space, Conservation, and Recreation Element, Policies OCR 7.3, OCR 7.6 (City of Hanford 2002)	Policies in this section encourage the establishment of permanent mechanisms to protect wetlands and riparian corridors and promote the preservation of existing mature trees and encourage the planting of appropriate shade trees in new developments.
Hanford Municipal Code, Title 12, Chapter 12.12, Street Trees and Shrubs (City of Hanford 2004)	This section of the code provides regulations to encourage the planting of new trees and the proper maintenance of existing street trees, plants and shrubs within the city. It further indicates that it is prohibited to take actions to any tree or the soil surrounding it which will injure the tree or in any way cause it harm.
City of Corcoran	
Corcoran City Code, Title 7, Chapter 3, Parks and Recreational Areas; Chapter 4, Trees And Shrubbery (City of Corcoran 2009)	This chapter indicates that non-city employees are prohibited to cut, break, injure, deface or disturb any tree, shrub, or plant; or to pluck, pull up, cut, take or remove any shrub, plants, bush or flower within any public place.
Tulare County	
Tulare County General Plan 2030 Update, Chapter 8 – Environmental Resource Management, Goal ERM-1, Policies ERM-1.1, ERM-1.2, ERM-1.4, ERM-1.6 through ERM-1.8, ERM-1.12, Implementation Measures 2, 3, 4, 6, and 9 (Tulare County 2010a)	The general plan has regulations to preserve and protect sensitive significant habitats, enhance biodiversity, and promote healthy ecosystems throughout the county. Policies seek to ensure the protection of environmentally sensitive wildlife and plant life through compatible land use development; limit or modify proposed development within areas that contain sensitive habitat for special-status species and direct development into less significant habitat areas; control development in natural habitats so as to minimize erosion and maximize beneficial vegetative growth; protect riparian areas through habitat preservation, designation as open space or recreational land uses, bank stabilization, and development controls; support the preservation and management of wetland and riparian plant communities; encourage the planting of native trees, shrubs, and grasslands; require buffer areas between development projects and significant watercourses, riparian vegetation, wetlands, and other sensitive habitats and natural communities; and support the conservation and management of oak woodland communities and their habitats.

Table 3-1
Regional and Local Regulations

Policy Title	Summary
Tulare County Code, Part II, Chapter 5, Article 5, Use of County Parks and Recreation Areas (Tulare County 2010b)	This chapter of the code outlines the uses and regulation of parks and recreation facilities within the county including: the unlawful act to hunt, kill, wound, frighten, capture, injure, tease or otherwise molest any bird or animal the unlawful act to remove, injure, destroy, pick, dig, break, uproot, dislodge or carry away any plant, tree, flower, shrub, bush, or any branch, limb, bud, shoot or leaf thereof, or any wood, earth, leaf mold, rock or stone, or any building, bench, fence, wall, railing, seat, sign, marker or other structure or to destroy, injure or deface any natural formation, historical feature or archeological feature in a county park or recreation area.
Kern County	
Kern County General Plan, Land Use, Conservation and Open Space Element, General Provisions, Section 1.10.5 - Threatened and Endangered Species, Policies 27 through 32, Implementation Measures Q through S; Section 1.10.10 - Oak Tree Conservation, Policies 65 and 66, Implementation Measure KK (Kern County Planning Department 2007)	General plan policies are designed to: avoid or minimize impacts to fish, wildlife, and botanical resources; that riparian areas will be managed to enhance the drainage, flood control, biological, recreational, and other beneficial uses; and that oak woodlands and large oak trees be protected where possible and incorporated into project developments.
Kern County Valley Floor Habitat Conservation Plan (Kern County Planning Department 2006)	This plan is a long-term program designed to conserve federally protected species, state-protected species, and/or other species of concern. The plan establishes conditions under which Kern County; the California Division of Oil, Gas, and Geothermal Resources; and other program beneficiaries seek authorization to allow the taking of multiple federally and state-protected species incidental to development and other land use activities. Once the plan is adopted, it will be a voluntary program that provides an option for project proponents to comply with the Environmental Species Act and California Environmental Species Act.
Kern County Municipal Code, Title 13, Chapter 13.16, Nature Preservation Areas (Kern County 2010)	This chapter outlines regulations for the use of county parks, recreational facilities, and public places. The policies state that: it is unlawful to trap, hunt, shoot or attempt to shoot or molest in any manner, any bird or wild fowl, or to rob bird nests in the North Edwards Bird Sanctuary; it is unlawful to molest or damage any flora or fauna located within the Kern River County Park; and that it is also unlawful to operate a vehicle of any type within this area without prior written permission.

Table 3-1
Regional and Local Regulations

Policy Title	Summary
Kern County Municipal Code, Title 19, Chapter 19.73, Kern River Combining District (Kern County 2010)	This chapter deals with the preservation of riparian habitat and open space values, the preservation and maintenance of the Kern River floodway, and to provide for public access to and the enjoyment of the Kern River Corridor. It further indicates that development within the KRC district is to comply with the following minimum standards: Except for the removal of dead or diseased vegetation, removal of native vegetation within the designated floodway is prohibited, except as authorized in writing by a responsible public agency with jurisdiction; the removal of weeds or other vegetation determined to constitute a potential fire hazard by the Kern County Fire Department is not prohibited; the introduction or placement of fill, boulders, or other material into the designated floodway that could impede or divert flows is prohibited, except as authorized in writing by a responsible public agency with jurisdiction; and that natural topography, vegetation, and scenic features is to be retained to the greatest feasible extent, as determined by the planning director.
The Kern River Plan Element, Chapter 3, Section 3.3 - Riparian Vegetation and Wildlife Habitat, Goals, and Policies 1 through 10 (Kern County Planning Department 1985)	The plan identifies the following goals related to wildlife and botanical resources: to protect and enhance both rare and endangered plant and animal species and their habitat as may occur in the river area, and also the variety of nonendangered indigenous wildlife and wildlife habitat of the river; to avoid destruction of habitats and improve wildlife habitat; and to provide opportunities for studies, research, and observation of wildlife in the River area. Policies that support these goals include the following: areas which have well-defined unique vegetative or wildlife habitat value should be the subject of long range preservation and enhancement; all development proposals are to be evaluated by a competent biologist to identify any significant biological areas necessary for protection; native vegetation is to be protected by minimizing introduced species; existing significant plants are to be protected to the greatest extent feasible; riparian vegetation and wildlife habitat are to be protected within the primary floodway area to the degree that the floodway would not be obstructed; the placement of structures and related uses is to respect wildlife corridors and is not to obstruct nor hinder the movement or migration of wildlife; a plan for maintenance and enhancement of areas identified by CDFG and USFWS as special and unique biological resources is to be adopted as a general plan amendment by both the City of Bakersfield and Kern County.
Metropolitan Bakersfield Habitat Conservation Plan (Kern County and City of Bakersfield 1994)	The Metropolitan Bakersfield Habitat Conservation Plan is a joint program of the City of Bakersfield and Kern County to assist urban development applicants in complying with federal and state endangered species regulations. The program uses mitigation fees paid by applicants for grading or building permits to fund the purchase and maintenance of habitat land to compensate for the impact of urban development on endangered species habitat.

Table 3-1
Regional and Local Regulations

Policy Title	Summary
City of Wasco	
Wasco Municipal Code, Title 12, Chapter 12.20, Trees and Shrubs (City of Wasco 2010)	This section of the code outlines regulations for the use of streets, sidewalks, and public places. It indicates that it is unlawful for any person to remove, injure, prune or in any way damage trees and shrubs owned by the city or situated on city property, city easements or city parkways, without first securing a permit to do so from the building department. This section shall apply likewise to any animal or instrumentality owned by or controlled by said person.
City of Shafter	
City of Shafter General Plan, Section 6.4, Biological Habitats and Wildlife Resources, Policies 1 through 3 (City of Shafter 2005)	Policies in this section provide for the protection of biological resources within the General Plan study area.
Shafter Code of Ordinances, Title 12, Chapter 12.28, Trees and Shrubs (City of Shafter 2010)	This section of the code outlines regulations for the use of streets, sidewalks, and public places. It indicates that it is unlawful for any person, not the owner thereof, or without lawful authority so to do, willfully to injure, deface, defigure or destroy any tree or shrub, or to injure, destroy, cut or pick any flower or plant, located either on private ground or on any public place or thoroughfare.
City of Bakersfield	
Metropolitan Bakersfield General Plan, Conservation Element, Section A – Biological Resources, Goals 1 through 2, Policies 1, 2, 4, and 5 (City of Bakersfield 2007)	Policies in this section seek to conserve and enhance Bakersfield's biological resources in a manner which facilitates orderly development and reflects the sensitivities and constraints of these resources.
Bakersfield Municipal Code, Title 12, Chapter 12.40, Street Trees; and Chapter 12.56, Parks (City of Bakersfield 2010)	This section of the code outlines regulations for the use of streets, sidewalks, and public places. It indicates that no person, firm or corporation, expect for an authorized city employee shall, in any way, harm, injure, destroy or kill any tree, shrub or plant by any method whatsoever; nor allow any brine water, oil, liquid dye or any other substance to lie, leak, pour, flow or drip on or into the soil so that such soil may injure, destroy or kill such tree, shrub or plant; placement or maintenance of stone, cement or other substance which might impede the free access of water or air to the roots of any tree, shrub or plant in any street, parkway or public place in the city. Further it indicates that it is unlawful for any lot, piece or parcel of land within the city, to plant, grow or permit to be planted or grown any female cottonwood, fruiting variety of mulberry tree, or tree of heaven within the city.

3.2 Definitions

To define the extent of the various project features for all of the Fresno to Bakersfield Section, this technical report uses several distinct but related terms, such as project footprint and study area. Each of these areas may have differences in their extent based on the resources (e.g., jurisdictional waters and biological resources) under consideration. The definitions of the various study areas, special-status species, jurisdictional waters, and special-status plant communities are provided in the following subsections.

- The project footprint is the area directly affected by the proposed project activities. The project footprint is the same for all biological resource disciplines. The project footprint includes the stations, tracks, maintenance and equipment storage areas, temporary access roads, road overcrossings, substations, and related features.
- The study area encompasses the entire potential area of disturbance associated with the project footprint, including the proposed HST right-of-way and associated facilities (traction power substations, switching and paralleling stations, and areas associated with modifying or relocating roadways for those facilities—including overcrossings and interchanges), the station alternatives, the HMF site alternatives, and construction areas (including laydown, storage, and similar areas). The study areas for the various biological resources include a varied buffer and are described as the Wetland Study Area, Special-Status Plant Study Area, and Habitat Study Area. Based on methods used during the investigation, the Habitat Study Area is further divided into a core, auxiliary, and supplemental Habitat Study Area. These areas are further described in Section 3.2.1.

3.2.1 Study Areas

The study areas for the various biological resources (jurisdictional waters, plants, wildlife, and habitats that occur or have the potential to occur in the study area) are as follows:

- The Wetland Study Area is the project footprint plus a 250-foot buffer to evaluate direct and indirect impacts on wetlands and special-status wildlife using vernal pools. Direct impacts on wetlands are within the project footprint and indirect impacts are within the 250-foot buffer.
- The Special-Status Plant Study Area is the project footprint to evaluate direct and indirect impacts plus a 100-foot buffer to evaluate indirect impacts on sensitive plant resources (including special-status plants, special-status plant communities, protected trees, and elderberry shrubs).
- The Habitat Study Area is the project footprint plus a 1,000-foot buffer (review of aerial photos only if between 250 feet and 1,000 feet from buffer) to evaluate direct and indirect impacts on habitats and the special-status wildlife species that use them. The Habitat Study Area was divided into two areas: a core Habitat Study Area and an auxiliary Habitat Study Area. A third, or supplemental Habitat Study Area was identified for select species that required further analysis based on agency- or protocol-recommended species-specific buffers:
  - The core Habitat Study Area includes the proposed project footprint and a 250-foot buffer. This was the area that was physically surveyed.
  - The auxiliary Habitat Study Area, which extends from the edge of the core area laterally 750 feet, was surveyed through extrapolation of observations made in the core Habitat Study Area, from aerial photograph interpretation, and in windshield surveys.

- The supplemental Habitat Study Area extends laterally from the project footprint up to 1.24 miles, depending on the target species, and identifies species-specific habitats based on aerial photograph interpretation and documented occurrences of the species, and on observations of special-status species and their habitats made in the field.

3.2.2 Special-Status Species

Special-status species are plants or animals that are legally protected under the federal ESA, the California ESA, or other regulations, as well as species considered sufficiently rare by the scientific community to qualify for such listing. Special-status species include the following:

- Species listed or proposed for listing as threatened or endangered under the federal ESA (50 CFR 17.12 [listed plants]); 50 CFR 17.11 (listed animals); and various notices in the *Federal Register* (proposed species).
- Species that are candidates for possible future listing as threatened or endangered under the federal ESA (76 Fed. Reg. 66370, October 26, 2011).
- Species listed or proposed for listing by the State of California as threatened or endangered under the California ESA (14 California Code of Regulations [C.C.R.] 670.5).
- Species that meet the definitions of "rare" or "endangered" under the California Environmental Quality Act (CEQA Guidelines Sections 15380 and 15125).
- Plants presumed by the California Native Plant Society (CNPS) to be "extinct in California" (Lists 1A, CNPS 2012).
- Plants considered by the CNPS to be "rare, threatened, or endangered in California" (Lists 1B and 2, CNPS 2012).
- Plants listed by CNPS as plants about which more information is needed to determine their status (List 3, CNPS 2012), and which may be included as special-status species on the basis of local significance or recent biological information.
- Plants listed by CNPS as plants of limited distribution or infrequent throughout a broader area in California (List 4, CNPS 2012); these plants are not "rare" from a statewide perspective but are uncommon enough that they are recommended for inclusion in environmental documents.
- Plant species listed as rare under the California Native Plant Protection Act (California Fish and Game Code 1900, et seq.).
- Animal species of special concern to the CDFG (CDFG 2011).
- Bird species of conservation concern as identified by USFWS in *Birds of Conservation Concern 2008* (USFWS 2008).
- Animals that are fully protected in California (California Fish and Game Code Sections 3511 [birds], 4,700 [mammals], 5050 [amphibians and reptiles], and 5515 [fish]) (CDFG 2011).

3.2.3 Jurisdictional Waters

Wetlands and other waters in the project vicinity, including waters of the U.S., waters of the state, and state streambeds, are regulated by the federal government (USACE) and the State of California (SWRCB and CDFG). When considering wetlands and other waters, these features are

collectively termed jurisdictional waters. Wetlands and other waters, as delineated during the jurisdictional delineation (see the *Fresno to Bakersfield Preliminary Jurisdictional Waters and Wetlands Delineation Report* [Authority and FRA 2011b] and *Fresno to Bakersfield Supplemental Preliminary Jurisdictional Waters and Wetlands Delineation Report* [Authority and FRA 2012]), are assumed to fall under the jurisdiction of the USACE, SWRCB, and CDFG for purposes of this discussion. The jurisdictional status of these waters will be confirmed by the USACE, SWRCB, and CDFG when the regulatory permitting process is conducted. Further definitions are presented below.

- **Wetlands**: According to the USACE Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987) and the recently published Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0) (USACE 2008b), three criteria must be satisfied to classify an area as a jurisdictional wetland: (1) a predominance of plant life that is adapted to life in wet conditions (hydrophytic vegetation), (2) soils that saturate, flood, or pond long enough during the growing season to develop anaerobic conditions in the upper part (hydric soils), and (3) permanent or periodic inundation or soils saturation, at least seasonally (wetland hydrology).

- **Waters of the U.S.**: The CWA defines waters of the U.S. as follows: (1) all waters that are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide; (2) all interstate waters including interstate wetlands; (3) all other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce; (4) all impoundments of waters otherwise defined as waters of the U.S.; (5) tributaries to the foregoing types of waters; and (6) wetlands adjacent to the foregoing waters (33 CFR 328.3[a]).

- **Waters of the state**: Waters of the state are broadly defined by the Porter-Cologne Water Quality Control Act (Section 1305[e]). Under this definition, isolated wetlands that may not be subject to regulations under federal law are considered waters of the state. On March 9, 2012, the California Water Boards released a preliminary draft of their Wetland Area Protection Policy, which includes a proposed wetland definition. Under their proposed definition, an area is a wetland if, under normal circumstances, it (1) is continuously or recurrently inundated with shallow water or saturated within the upper substrate; (2) has anaerobic conditions within the upper substrate caused by such hydrology; and (3) either lacks vegetation or the vegetation is dominated by hydrophytes (SWRCB 2012).

- **State streambeds**: CDFG has not released an official definition of lake or streambed and therefore the extent of the area regulated under Section 1602 remains undefined. However, CDFG jurisdiction generally includes the streambed and bank, together with the adjacent floodplain and riparian vegetation.

3.2.4 Special-Status Plant Communities

Special-status plant communities are plant communities that are of limited distribution statewide or within a county or region, and that are often vulnerable to the environmental impacts of projects (CDFG 2009a). The list of special-status plant communities in California is currently maintained by the CDFG in their *Vegetation Classification and Mapping Program List of California Terrestrial Natural Communities Recognized by the CNDDB* (CDFG 2003). This list was updated by CDFG in September 2010 (CDFG 2010).

These communities are described based on a vegetation classification system developed by Sawyer and Keeler-Wolf, which was published in the first edition of the *Manual of California*

Vegetation (Sawyer and Keeler-Wolf 1995). The vegetation classification system was expanded on in the second edition, which was published in 2009 (Sawyer et al. 2009).

Special-status plant communities include those communities that are ranked as S1, S2, or S3 based on rarity. The rarity ranking of special-status plant communities is based on NatureServe's Heritage Program methodology:

- S1: Fewer than 6 viable occurrences and/or up to 1,280 acres statewide.
- S2: 6 to 20 viable occurrences and/or more than 1,280 to 6,400 acres statewide.
- S3: 21 to 100 viable occurrences and/or more than 6,400 to 32,000 acres statewide.

Sometimes the rarity ranking is modified by an additional threat ranking:

- 0.1: Very threatened.
- 0.2: Threatened.
- 0.3: No current threat known.

Some natural communities were included as special-status plant communities when they were determined, by best professional judgment, to be uncommon in the region and/or provided potential habitat for special-status plant species.

3.2.5 Locally Protected Biological Resources

Cities and counties traversed by the proposed project alternatives include Fresno, Kings, Tulare, and Kern counties, and the cities of Fresno, Hanford, Corcoran, Wasco, Shafter, and Bakersfield. Many of these cities and counties have local codes and ordinances protecting biological resources such as wildflowers, wildlife, riparian habitat, open space, and trees. Ordinances vary in the level of detail they provide about the types of protected resources and the kinds of prohibited activities. Regulations vary by city and county, and are summarized in Table 3-2.

Table 3-2
Biological Resources Regulations by City and County Jurisdiction

County/ City	Resource	Specifications	Regulatory Guidance
Fresno County	All trees, plants, grasses, protected flowers, and animals	Within county parks and recreation areas; along county highways; in public areas	Cannot be harmed or removed without permit.
	Landmark trees	All	Preserved and protected where possible
	Oaks	Within oak woodlands	Promote preservation; develop an Oak Woodland Management Plan
	Riparian habitat	Native	Preserve and enhance unless public safety concerns require removal.
City of Fresno	All trees, plants, grasses, and animals	Within city parks and recreation areas	Cannot be harmed or removed.
	All trees (unless dead or 50% dying)	On public property	Cannot be removed. Require a permit for trimming.

Table 3-2
Biological Resources Regulations by City and County Jurisdiction

County/ City	Resource	Specifications	Regulatory Guidance
Tulare County	All birds, fish, and animals	On city parks and recreation areas	Cannot be disturbed or harmed except in designated hunting areas.
	Plants, grasses, and trees	On city parks and recreation areas	Cannot be harmed or removed.
Kings County	Birds, fish, animals, trees, plants or grasses	Within county parks and recreation areas	Cannot be harmed or removed.
	Healthy native trees/oaks	All	Preservation is a primary objective in project development.
City of Hanford	Trees, shrubs, or plant	All	Cannot be removed without permit.
City of Corcoran	Trees, shrubs, or plant	Within city parks	Cannot be injured or defaced.
Kern County	Individual oaks	All	Must retain oak canopy cover > 30% within oak woodlands and where canopy cover is < 10%, all oaks DBH ≥ 12 inches must be identified on plot plans.
Kern River Area	Native vegetation, natural topography, and natural flow channel	Within the Kern River Corridor	Cannot be removed/manipulated without proper authorization and approval of the planning director.
Bakersfield	All trees	On city property, city easements, and city parks and recreation areas	Cannot be harmed or removed.
	Female Fremont cottonwood, fruiting mulberry, tree of heaven, and any other tree-bearing seeds that are wingy or downy	City property	The planting of these trees is prohibited.
Shafter	All trees, shrubs, plants, and flowers	Within city parks and recreation areas	Cannot be harmed or removed.
	Trees or shrubs	On private ground or in public place or thoroughfare	Unlawful to injure, deface, disfigure, or destroy.
Wasco	All trees and shrubs	On city property/ easements	Cannot be removed or pruned without a permit.

Abbreviation:
DBH = diameter at breast height

3.3 Methods: Background Review

Before conducting field surveys, existing background information was reviewed to identify the locations of jurisdictional waters, special-status plant and wildlife species, special-status plant communities, protected (heritage) trees, wildlife movement areas, natural lands, and federally designated or proposed critical habitat units recorded or potentially occurring in the Fresno to Bakersfield Section. This section summarizes the background information that was reviewed.

3.3.1 Jurisdictional Waters

URS/HMM/Arup Joint Venture conducted a background review to identify locations of jurisdictional water features potentially present in the Wetland Study Area at both a watershed level and a project level. The geographic extent of the background review for jurisdictional waters consisted of an area defined by the centerline of the alternative alignments plus a 0.5-mile buffer. The 0.5-mile buffer was chosen to include jurisdictional waters that may be present and to encompass the general nature of the jurisdictional waters surrounding the alternative alignments. The background review was conducted using information available in the geographic information system (GIS) and conventional sources to determine the potential locations, types, and extent of known jurisdictional waters. The background review relied on information from the following sources:

- Natural Resources Conservation Service Hydrologic Unit Code Basins dataset (USDA and NRCS 1999), for identification of watersheds in the region.
- *Water Quality Control Plan for the Tulare Lake Basin* (CVRWQCB 2004), which identifies watershed and sub-watershed areas, surface water features, and beneficial uses.
- National Wetlands Inventory (USFWS 2009), which identifies the approximate location and type of wetlands at the project level.
- National Hydrography Dataset (USGS and EPA 1999), which identifies the approximate location and type of river, stream, canal, ditch, and artificial path at the project level.
- Holland Central Valley Vernal Pool Complexes data layer, also known as the CDFG Central Valley Vernal Pool Habitat dataset (Holland 2009), which identifies vernal pool areas at the project level.
- Recent aerial photographs (ESRI 2009; DigitalGlobe 2009; Bing 2010).
- National List of Plant Species That Occur in Wetlands (Reed 1988).
- Soil Surveys of Eastern Fresno, Tulare, Kings, and Kern Counties (USDA 1971, 1982, 1986, and 1988).
- U.S., Geological Survey 7.5-minute (1:24,000) topographical quadrangle sheets (Fresno North, Malaga, Fresno South, Conejo, Caruthers, Burris Park, Laton, Remnoy, Waukena, Taylor Weir, Corcoran, Pixley, Alpaugh, Hacienda Ranch NE, Delano West, Allensworth, Pond, Famoso, Wasco, Oil Center, Oildale, Rosedale, Rio Bravo, Edison, Lamont, Gosford, and Stevens).
- Precipitation records, including current and annual average rainfall for the region (USDA and NRCS 2010).

3.3.2 Special-Status Species and Special-Status Plant Communities

A list of special-status species, designated and proposed critical habitat, special-status plant communities, and wildlife movement corridors known or potentially occurring in the project footprint was reviewed based on existing federal, state, and private databases, and agency information. Database queries included all reported occurrences within 10 miles of the alternative alignments or potentially within the various U.S. Geological Survey 7.5-minute quadrangles (quads) that overlapped with the alternative alignments and their eight surrounding quads (collectively referred to as a nine-quad search area) for the Fresno to Bakersfield Section. The following data sources were reviewed:

- USFWS Sacramento Field Office Web Site: A list of federal candidate, proposed, threatened, and endangered special-status wildlife and plant species, and their federally designated or proposed critical habitats, known or having the potential to occur within a nine-quad search area around the Fresno to Bakersfield alternative alignments was generated (USFWS 2012) (Appendix A [USFWS Species List / CNDDB Results]).
- California Natural Diversity Database (CNDDB)/RareFind: A list of special-status plant and wildlife species, CDFG-designated special-status plant communities, and CNPS-listed special-status plant species was prepared through a two-fold inquiry consisting of a standard nine-quad search using the RareFind program and a GIS mapping exercise of all occurrences within 10 miles of the alternative alignments. This two-fold inquiry was performed to ensure that all special-status species, including those listed by the CDFG as "sensitive," whose geographic location data had been suppressed, were captured in the query (CDFG 2012a) (Appendix A [USFWS Species List / CNDDB Results]).
- CNPS's Online Inventory of Rare and Endangered Plants of California: A list of CNPS special-status plant species that may occur in the nine-quad search area was generated using the online inventory database (CNPS 2012).
- California Wildlife Habitat Relationship (CWHR) System: The list of CDFG special-status wildlife species was augmented through a GIS exercise that overlaid the Fresno to Bakersfield alternative alignments with wildlife species (amphibians, reptiles, birds, and mammals) range maps available through the CWHR System (CDFG 2005). This query captured additional special-status species whose known geographic range occurs within 10 miles of the alternative alignments (CDFG 2008a).
- USFWS Recovery Plans: *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998) and the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005b), and a number of Federal Register publications, public agency technical reports, survey guidelines, and other published reports.
- USFWS Birds of Conservation Concern (BCC) for Region 8 (California and Nevada) (USFWS 2008).

Figure 3-1 and Figures 3-2a and 3-2b provide a visual depiction and summary of those special-status plant and wildlife species reported to the CNDDB. Figure 3-1 provides the species, location, and occurrence number of special-status plant species and special-status plant communities. Figures 3-2a and 3-2b show the location (point or polygon) of documented occurrences of special-status wildlife species and the corresponding occurrence number. Figure 3-2a summarizes the CNDDB occurrences for invertebrates, fish, amphibians, reptiles, birds, and designated critical habitat. Figure 3-2b summarizes the CNDDB occurrences for mammals.

3.3.3 Protected Trees

To identify the requirements for protected trees, county and city ordinances and codes were reviewed, as well as available general plans and habitat conservation plans. Protected trees in the Special-Status Plant Study Area were identified based upon the regulations summarized in Table 3-1.

3.3.4 Wildlife Movement Corridors

Known wildlife movement corridors were identified through a review of published technical reports and information available from regulatory agencies. The following data sources were obtained and used as a preliminary guide to understanding the location and species-specific requirements of the wildlife movement corridors that have been identified in the vicinity of the Fresno to Bakersfield Section:

- Wildlife movement corridors identified in *Missing Linkages: Restoring Connectivity to the California Landscape* (Penrod et al. 2001), which was prepared in response to the 2000 Missing Linkages conference.
- *South Coast Missing Linkage: A Linkage Design for the Tehachapi* (Penrod et al. 2003), which provided a more in-depth analysis of the Bakersfield/Tehachapi region based on the earlier *Missing Linkages* report.
- *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998), San Joaquin Valley Endangered Species Recovery Program (ESRP 2009), and *San Joaquin Kit Fox (*Vulpes macrotis mutica*) 5-Year Review: Summary and Evaluation* (USFWS 2010a), which identified core, satellite, and linkage areas.
- *California Essential Habitat Connectivity Project* (Spencer et al. 2010), which identifies natural land blocks and essential connectivity areas.

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Figure 3-1 contains confidential information and has therefore not been included on the website.

Figure 3-2a contains confidential information and has therefore not been included on the website.

Figure 3-2b contains confidential information and has therefore not been included on the website.

3.4 Methods: Field Surveys

This section describes the various field surveys conducted in the study areas and summarizes the methods used to complete the field surveys. The names of the surveyors, their education, years of experience, and knowledge areas are outlined in Section 8 (Preparer Qualifications).

3.4.1 Reconnaissance Field Trip

A reconnaissance field trip was conducted to review and obtain preliminary information for the purpose of planning the various field survey efforts and to determine health and safety hazards, resources present, and potential biological or jurisdictional water issues. The reconnaissance survey was conducted on February 2, 2010.

3.4.2 Delineation of Jurisdictional Waters

The delineations of jurisdictional waters were conducted according to the methods described in the *Central Valley Biological Resources and Wetland Survey Plan*, which was prepared in part for the Fresno to Bakersfield Section (Authority and FRA [2009] 2010a). Wetland scientists conducted a detailed delineation of jurisdictional waters of the Wetland Study Area. The delineations of jurisdictional waters were conducted for the purposes of obtaining a *Preliminary Jurisdictional Delineation* according to USACE Regulatory Guidance Letter 08-02 (USACE 2008) and satisfying SWRCB and CDFG criteria for mapping waters of the state. The delineation of jurisdictional waters did not require or attempt to determine the jurisdictional status of the various features.

Teams of qualified wetland scientists recorded all jurisdictional waters both manually on map sheets and electronically on sub-meter-accuracy Global Positioning System (GPS) units using the methods described in the *USACE Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008a). The field maps covered the Wetland Study Area in the form of aerial photographs at a scale of 1 inch equals 200 feet. The Wetland Study Area, which encompassed different survey environments, warranted varying survey techniques during the on-site investigation.

The primary delineations of jurisdictional waters were conducted at the optimal period to observe and record the various jurisdictional waters. These surveys were conducted over two 10-day periods, between March 1 and March 15, 2010, and between March 15 and March 24, 2010. A jurisdictional water methodology meeting was held on March 1 and March 2, 2010. Subsequently, on March 2 and March 6, 2010, the personnel who were to conduct the delineations of jurisdictional waters took a field trip to review methods in the field and to discuss problem areas. Additionally, supplemental surveys were conducted in late 2010 and 2011, as described in Section 3.4.8.

A separate technical report, the *Fresno to Bakersfield Preliminary Jurisdictional Waters and Wetlands Delineation Report* (Authority and FRA 2011b), and a report supplement, the *Fresno to Bakersfield Supplemental Preliminary Jurisdictional Waters and Wetlands Delineation Report* (Authority and FRA 2012), were prepared for the Fresno to Bakersfield Section. This report and supplement describe the delineation of jurisdictional waters in extensive detail. The *Wetland Delineation Report* and supplement contain additional information, including more-detailed descriptions of the methods and results. The following subsection briefly summarizes the specific methods for the onsite investigation and aerial photograph interpretation.

3.4.2.1 Survey Methods

Different survey methods were used during the delineations of jurisdictional waters, depending on the type of feature being delineated (e.g., wetland, other waters of the U.S., or waters of the state). Methods also varied depending on land use and on whether the surveyors had permission to enter a given area. Survey methods employed during the surveys are described in the following subsections.

Wetlands

Wetlands in the Wetland Study Area were delineated using the methods and guidelines from USACE. Additionally, all wetlands were described using the Cowardin classification system (Cowardin et al. 1979). Wetland boundaries were determined by using paired data points in wetland and adjacent upland areas. The characteristic vegetation at each sample point was recorded, and soil test pits were hand-excavated at each point to determine groundwater hydrology and soil conditions at those points. For large complexes of features, or repeated features of the same type, paired points were recorded at representative features, but not at each individual feature.

Other Waters of the U.S.

Other waters of the U.S. in the Wetland Study Area were delineated using the methods described in *A Field Guide to the Identification of the Ordinary High Water Mark in the Arid West Region of the Western United States* (USACE 2008c) and in USACE Regulatory Guidance Letter No. 05-05 (USACE 2005), where appropriate. These methods provide an approach for identifying the lateral limits of jurisdictional other waters of the U.S. using stream geomorphology and vegetation response to the dominant stream level (USACE 2008b). Indicators of ordinary high-water mark (OHWM) evaluated in the field included natural lines impressed on banks, stain lines, depositional features, shelving, changes in soil character, changes in vegetation, destruction of terrestrial vegetation, and the presence of litter and debris. Wetland scientists recorded relevant information for indicators of OHWM on the OHWM data sheets, taking GPS points and photographs for each feature, as well as field notes, where necessary. In the case of man-made other waters (e.g., canals and ditches) where the OHWM is difficult to identify, the extent of the feature was mapped as the top of bank.

Guidance from the USACE in August 2010 stated that any feature displaying an OHWM should be deemed as meeting USACE jurisdiction and therefore considered as "other water of the U.S." (Simmons 2010, personal communication).

Waters of the State and CDFG Lakes and Streambeds

No formal guidelines exist for the identification of the extent of SWRCB or CDFG jurisdiction (waters of the state). Generally, wetlands under state jurisdiction are delineated in the same manner as federal waters (including *Corps of Engineers Wetlands Delineation Manual* [Environmental Laboratory 1987] and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* [USACE 2008b]). However, no guidance or policy is in place with respect to the identification or mapping of waters of the state. The extent of these regulated areas in some instances extends beyond that of waters of the U.S. (above the OHWM). For example, isolated water bodies and stream channels up to the top of the stream bank or to the riparian drip line qualify as waters of the state.

The SWRCB, which oversees California's Regional Water Control Boards, views the stream channel and the surrounding biological community as providing important functions that affect water quality, including groundwater recharge, surface water supply, nutrient cycling, water filtration, temperature control, maintenance of plant and animal communities, sediment transport

and storage, stream channel dynamic equilibrium, and stream bank stabilization (Polhemus 2009, personal communication). Both the SWRCB and CDFG view the areas between the bed and the top of the bank, as well as adjacent floodplain and riparian habitat (to the maximum extent of the riparian drip line), as important for flood conveyance and wildlife movement (Perry 2009, personal communication). As such, the extent of the area regulated as waters of the state and CDFG varies.

Aerial Photograph Interpretation

When wetland scientists could not access properties in the Wetland Study Area due to lack of permission to enter, field crews used public roads, adjacent parcels to which they had been granted permission to enter, or public property to conduct visual surveys and to compare background information to aerial signatures identified on high-resolution aerial imagery. Wetland scientists recorded the lateral extent of jurisdictional waters on GPS by digitizing the feature and by recording the extent on field maps. Where public access was limited, a GIS specialist, with the assistance of qualified wetland scientists, estimated the extent of the jurisdictional waters remotely.

Field observations and visual inspection of aerial imagery revealed that some inaccessible areas in the vicinity of Cross Creek and the town of Allensworth contain vernal pool complexes. For these areas, a GIS specialist used image processing software to perform a spectral classification of 2005 and 2009 National Agricultural Imagery Program (NAIP) natural-color aerial imagery. Natural-color NAIP imagery was used rather than available color-infrared NAIP imagery because the acquisition date of the natural-color imagery provided ground conditions that were better for detection of jurisdictional waters.

To prepare the imagery for supervised classification, the GIS specialist performed a principal component analysis to simplify and reduce redundancy in the imagery (Campbell 2002). Using knowledge of the Wetland Study Area, along with known characteristics of aquatic resources, a wetland scientist helped the GIS specialist identify potentially jurisdictional waters to create spectral training data to be used for classifying the imagery. The training data were then used to classify the restricted-access areas into specific aquatic and upland cover classes. The resulting classified image was then generalized using a geospatial statistical process (specifically, neighborhood majority within a six-cell radius) to better represent the natural boundaries of ground features. The final processed image was then converted into a vector geospatial format to be used for analysis and map production. Lastly, additional refinements to the classified data were made, as appropriate, using manual image interpretation and field observations. The classification results were then reviewed by wetland scientists and confirmed by other project ecologists to be appropriately representative of ground conditions.

3.4.3 Botanical Surveys

Botanical surveys were conducted according to the methods described in the *Central Valley Biological Resources and Wetland Survey Plan*, which was prepared in part for the Fresno to Bakersfield Section (Authority and FRA [2009] 2011a). In general, the botanical surveys were floristic in nature and conducted in general accordance with the *CNPS Botanical Survey Guidelines* (CNPS 2001), the *Protocols for Surveying and Evaluating Impacts on Special Native Plant Populations and Natural Communities* (CDFG 2009a), and *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants* (USFWS 1996).

Before initiating the botanical surveys, botanical survey team leaders visited the California Academy of Sciences in San Francisco to review the key characteristics of species that were federally or state listed and were identified as having potential to occur, based on the

background review (Section 5). In addition, reference populations were identified for the following federally listed species:

- Kern mallow (*Eremalche kernensis*).
- San Joaquin woolly threads (*Monolopia congdonii*).
- San Joaquin adobe sunburst (*Pseudobahia peirsonii*).
- Hoover's woolly-star (*Eriastrum hooveri*).
- California jewel-flower (*Caulanthus californicus*).

These populations were not visited due to conflicts with the survey schedule. However, local land managers were contacted before the early season surveys to determine if the reference populations had begun blooming (Brian 2010, personal communication; Harding 2010, personal communication; Kearns 2010, personal communication; O'Dell 2010, personal communication; Warrick 2010, personal communication).

Three teams conducted the botanical surveys, and in some instances all teams surveyed complex areas simultaneously. Botanical methodology meetings and preliminary field visits to calibrate team tasks were held on March 14, March 15, April 19, and May 17, 2010.

Surveys for special-status plants, special-status plant communities, elderberry shrubs, and protected trees located in the Special-Status Plant Study Area were conducted in the early spring, late spring, and early summer bloom periods, which corresponded to March 15 through April 2, April 19 through April 23, April 26, and May 17 through May 28, 2010. Late summer botanical surveys were conducted July 5 through July 9, 2010, to identify six annual *Atriplex* species and one *Eryngium* species that were identified during the spring and early summer survey period but could not be keyed to species because the specimens had not flowered or fruited, necessary characteristics for species identification. Additionally, supplemental surveys were conducted in late 2010 and 2011, as described in Section 3.4.8.

During these periods all vascular plant species encountered were identified and keyed out to species-level. Special-status plant species identified were mapped using a Trimble GeoXH GPS, and recorded on CNPS Rare Plant Treasure Hunt Field Survey Forms. Botanical surveys were conducted to identify rare plants, special-status plant communities, protected trees, and elderberry shrubs in the Special-Status Plant Study Area. A vehicle survey of the Special-Status Plant Study Area was conducted via public roads and private roads where permission to enter was granted. Areas lacking the potential to support special-status plants species (e.g., urban and active agricultural areas) were eliminated from further review. In areas with potential special-status plant habitat, pedestrian transects were walked by botanists working in teams of two to six and spaced 20 to 100 feet apart or as necessary to visually assess the Special-Status Plant Study Area. These meandering surveys were conducted throughout the Special-Status Plant Study Area in areas determined to have potential for special-status plant species and where permission to enter had been granted.

During the early-season surveys, urban landscapes and other large portions of the Special-Status Plant Study Area were determined to contain unsuitable habitat for special-status plant species and special-status plant communities due to active agricultural activities, including herbicide use, controlled burns, and frequent ground disturbance. In subsequent survey periods (mid- and late-season periods) these areas were not revisited.

Special-status plant communities ranked as S1, S2, or S3, or determined to be sensitive based on best professional judgment were mapped based on the dominant vegetation with a Trimble GeoXH GPS and recorded on CNPS Rapid Assessment Forms. Special-status plant communities are based on the classification put forth in the *Manual of California Vegetation*, 2nd Edition, which is the California expression of the national vegetation classification (Sawyer et al. 2009). The

exact boundaries of special-status plant communities were identified in greater detail during post processing using ArcGIS software and photo interpretation based on aerial signatures. These refined boundaries were verified in the field during subsequent rounds of surveys. Special-status plant communities and special-status plant species were not surveyed or mapped in areas where permission to enter had not been obtained, further discussed in Section 3.7, Limitations That May Influence Results.

3.4.4 Trees

During the botanical surveys, protected trees in the Special-Status Plant Study Area were identified based on the regulations summarized in Table 3-1. When permission to enter was granted, surveyors classified trees into groups, such as landscape/ornamental trees, or by species such as Fremont cottonwood. In areas where permission to enter was not granted, survey crews mapped "unknown" trees, using photo interpretation and ArcGIS software.

3.4.5 Elderberry Shrubs

Elderberry (*Sambucus* spp.) shrubs, the sole host plant for the federally endangered valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (Section 5.5.1), were mapped during the botanical surveys. Elderberry shrubs were only identified in areas where permission to enter was granted.

3.4.6 Wildlife Habitat Assessment

Wildlife habitat assessments were conducted according to the methods described in the *Central Valley Biological Resources and Wetland Survey Plan*, which was prepared in part for the Fresno to Bakersfield Section (Authority and FRA [2009] 2011a). Wildlife habitat assessment field surveys were conducted throughout the core and auxiliary Habitat Study Areas to identify and map CWHR wildlife habitat types using the wildlife habitat descriptions presented in *A Guide to Wildlife Habitats of California* (CDFG 1988) and the CWHR (CDFG 2008a). The wildlife habitat assessment was general in nature; it was not intended to be a substitute for protocol-level surveys.

Mapping of wildlife habitat and general wildlife surveys were conducted between March 8 and March 27, 2010, excluding a four-day period between March 18 and March 21. The wildlife habitat assessment was conducted by either two teams of five or three teams of three. Each team operated separately; however, in some instances all teams surveyed complex areas simultaneously. A wildlife methodology meeting and preliminary field visit to calibrate team tasks was held on March 8, 2010. Additionally, supplemental surveys were conducted in late 2010 and 2011, as described in Section 3.4.8.

Wildlife habitat assessment surveys were conducted by a combination of meandering pedestrian transect surveys of the core and auxiliary Habitat Study Areas and windshield surveys from existing public roads, where permitted, and from individual parcels, depending on their permission-to-enter status. In areas where pedestrian or windshield surveys were prohibited, the wildlife habitat field assessment was augmented with aerial photo interpretation and extrapolation of observations made on adjacent and nearby parcels.

Primary activities of the wildlife habitat assessment included the following:

- Mapping and ground-truthing wildlife habitats at a 0.5-acre minimum mapping unit (with exception of the Fresh Emergent Wetland CWHR wildlife habitat, which was recorded during the delineations of jurisdictional waters in units smaller than the standard 0.5-acre minimum mapping unit).

- Reviewing and/or identifying jurisdictional waters.
- Mapping macro- and micro-habitat elements that may be suitable for special-status wildlife species.
- Confirming, identifying, and describing known or previously unreported suitable wildlife habitat.
- Identifying and mapping locations of observed special-status wildlife species.
- Mapping and describing the presence of primary constituent element in areas of federally designated or proposed critical habitat units.

Supplemental habitat assessments were performed for the following five special-status species:

- Swainson's hawk (*Buteo swainsoni*)
- Bald eagle (*Haliaeetus leucocephalus*)
- Golden eagle (*Aquila chrysaetos*)
- California red-legged frog (*Rana draytonii*)
- California tiger salamander (*Ambystoma californiense*)

Although these supplemental wildlife habitat assessments were performed in general accordance with the various protocol-level assessments for these species (SHTAC 2000; USFWS 2005b; USFWS and CDFG 2003), they were limited to desktop surveys beyond the auxiliary Habitat Study Area. The desktop component of these habitat assessments included a review of existing data and aerial identification and interpretation of suitable habitat in the known range of each species, based on a review of CWHR (CDFG 2008a) and CNDDB (CDFG 2012) data.

A supplemental habitat assessment for raptors (i.e., Swainson's hawk, bald eagle, and golden eagle) was conducted within 0.5 mile of the alternative alignment footprint. The assessment also included an evaluation of the habitat conditions, in general accordance with *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (SHTAC 2000). Protocol-level surveys for these species were not proposed or conducted during field survey efforts. Raptor nests and potential nest site locations were identified and mapped in the field in the core and auxiliary Habitat Study Areas. Potential nest trees outside of the core and auxiliary Habitat Study Areas were identified and mapped based on a desktop review and interpretation of aerial photographs. Areas of potential foraging habitat in the core and auxiliary Habitat Study Areas were identified as part of the general wildlife habitat assessment field surveys.

The habitat assessment for the California red-legged frog and California tiger salamander included an evaluation of potential aquatic and upland habitat within 1.0 and 1.24 miles, respectively, of the alternative alignments. The assessment identified, described, and evaluated habitat conditions in general accordance with agency guidelines (e.g., USFWS 2005c; USFWS and CDFG 2003). Aquatic features that could provide potential breeding habitat were mapped in the core Habitat Study Area as part of the jurisdictional delineation, and in the auxiliary and supplemental Habitat Study Areas based on a desktop review and interpretation of aerial photographs coupled with available databases of jurisdictional waters, which included the National Wetlands Inventory, the National Hydrography Dataset, and the Holland vernal pool complexes dataset (Holland 2009). Areas of upland aestivation and dispersal habitat in the core and auxiliary Habitat Study Areas were identified as part of the general wildlife habitat assessment field surveys, including micro-habitat features that could provide refugia or aestivation habitat like small mammal burrows. Areas of upland aestivation and dispersal habitat were not mapped in the area beyond the auxiliary Habitat Study Area.

The locations of special-status wildlife species observed in the Habitat Study Area were recorded using a Trimble GeoXH GPS unit or hand-mapped, as appropriate. Observations included those species that were directly observed and those species whose presence can be inferred based on

diagnostic signs such as burrows, fresh tracks, bird songs or calls, scat, or nests. Raptor nest sites were identified to species if possible; signs, including nest type, skeletal remains, feathers, and direct observation, were recorded. All wildlife species observed, regardless of listing status, were identified to the species level and recorded according to nomenclature found in *Complete List of Amphibian, Reptile, Bird, and Mammal Species in California* (CDFG 2008b).

A habitat assessment for special-status fish species was conducted through a desktop review of CalFish: A Cooperative Anadromous Fish and Habitat Data Program (CalFish 2009), coupled with distribution and status reports on species ranges to identify occupied habitats and known barriers to up- and downstream migration. A fish biologist reviewed the project alignment to identify all river/creek crossings in the Habitat Study Area and to determine their potential to support special-status fish species based on features such as watershed boundaries, stream and habitat types, creek/stream/river substrates, and migration barriers such as dams.

3.4.7 Wildlife Movement Corridors

The background review of wildlife movement/migration corridors was ground-truthed in the Habitat Study Area to ascertain the utility of identified movement corridors on both a local- and meta-population level. This field evaluation of potential movement corridors addressed their availability and suitability for migratory species, and identified changes in corridor quality on a rough landscape level. This evaluation was further augmented through a review of existing wildlife passages (such as culverts, washes, and automobile and train bridges) in the habitat survey area for signs of local wildlife movement. Potential migration barriers such as canals and roadways were also noted in the field.

3.4.8 Supplemental Surveys

3.4.8.1 BNSF Surveys

Because permission to enter the BNSF Railway rights-of-way was not granted until the completion of the various biological resource surveys, two multidisciplinary survey teams were established to survey the rights-of-way for jurisdictional waters and botanical and wildlife resources. The surveys were conducted by two teams composed of three or four people the first week (April 12 to April 16, 2010), and one team of three the second week (April 19 to April 25, 2010). Teams surveyed the entire BNSF right-of-way on the side of the track centerline where the train is proposed. The far side (portion of the right-of-way beyond the alternative alignment) of the BNSF right-of-way was also surveyed in the area between Corcoran and Wasco. The areas on the far side of the BNSF right-of-way between Fresno and Corcoran and between Wasco and Bakersfield were not surveyed.

3.4.8.2 Engineering Design Considerations Surveys

The information obtained in the course of the jurisdictional delineations, botanical surveys, and wildlife resource surveys was used to help site the Allensworth Bypass alignments in the vicinity of Allensworth State Historical Park and Allensworth Ecological Reserve. Based on the result of these surveys, which identified high-quality biological and wetland resources, the Allensworth Bypass was sited to avoid significant impacts to these resources. An additional minor adjustment due to engineering considerations was made in the vicinity of Kimberlina Road (north of the town of Wasco). During the week of July 12, 2010, a multidisciplinary team conducted surveys for jurisdictional waters and botanical and wildlife resources within the Allensworth Bypass Alternative and Kimberlina Road adjustments.

3.4.8.3 Cost Containment Engineering Surveys

In the spring of 2011, engineering changes were made to the alternative alignment in the vicinity of the Corcoran Bypass and along the Wasco-Shafter Bypass to avoid impacts to the Tulare Lakebed Mitigation Site, to seasonal wetlands associated with Cross Creek, and to local development plans. To examine the modifications to the project footprint resulting from these engineering changes, a multidisciplinary team conducted surveys between March 15 and March 17, 2011. These surveys were performed within the vicinity of the Wasco-Shafter Bypass Alternative and in the area between the Kings River and the city of Corcoran. The multidisciplinary team conducted surveys for jurisdictional waters and botanical and wildlife resources to maintain continuity with the previous survey efforts. Data were collected by windshield surveys from existing public roads. In areas where a lack of public access prevented windshield surveys, the field assessment was augmented with aerial photo interpretation and extrapolation of observations made from adjacent and nearby parcels.

3.4.8.4 Hanford West Bypass Alternatives and Engineering Design Considerations Surveys

In the fall of 2011, engineering changes were made to the alternative alignments, including the incorporation of the Hanford West Bypass alternatives and new station alternatives. To examine the modifications to the project footprint resulting from these engineering changes, a multidisciplinary team conducted surveys from November 7 through November 11, 2011, and from November 28 through December 2, 2011. These surveys were performed within the vicinity of the Hanford West Bypass Alternative, in the area between the Kings River and the city of Corcoran, and in the vicinity of Allensworth. These surveys consisted of a combination of windshield surveys from existing public roads and of the ground surveys where permission to enter was granted. In areas where a lack of public access prevented windshield surveys, the field assessment was augmented with aerial photo interpretation and extrapolation of observations made from adjacent and nearby parcels.

3.5 Methods: Post-Field Data Processing

Information gathered in the field was organized in the office using ArcGIS software and summarized in tables for future reference. All GPS data were differentially corrected to achieve sub-meter accuracy. All hand-drawn locations of jurisdictional waters, botanical resources, wildlife habitats, observations of special-status species, key macro- or micro-habitat elements, and migration corridors or other relevant field notes were digitally converted from the field maps.

Where public access was extremely limited, a GIS specialist, with the assistance of qualified biologists, estimated the extent of the jurisdictional waters remotely using background information, manual image interpretation, and image processing. For these areas, a GIS specialist used image-processing software to perform a spectral classification of 2005 and 2009 National Agricultural Imagery Program natural-color aerial imagery (see Section 3.4.1 for a more detailed description of image processing methods).

3.6 Agency Coordination and Professional Contacts

The following agency coordination and professional contacts contributed to the development of the survey methods and the results presented in this report:

On September 25, 2009, the URS/HMM/Arup Joint Venture, along with representatives from CH2M HILL, and ICF Jones and Stokes, held a project workshop with the natural resources regulatory agencies (EPA, USFWS, National Marine Fisheries Service, USACE, CDFG, and the Central Valley RWQCB) to introduce the HST System and elicit agency feedback regarding HST

alignment alternatives in the Central Valley. One of the key requests from the agencies was the consistency and approval of the proposed biological resources survey methods to be used for surveys in the Central Valley.

The Central Valley regional environmental consultants prepared a survey plan entitled, *Central Valley Biological Resources and Wetlands Survey Plan* (Survey Plan). The Survey Plan was prepared and transmitted to the resource agencies on October 2009 (Authority and FRA [2009] 2011a).

On October 29, 2009, Jan Novak of URS/HMM/Arup Joint Venture received an email from Leah Fisher at USACE suggesting that the Central Valley Delineation be conducted as a Preliminary Determination, as opposed to an Approved Determination (Fisher 2009, personal communication). The Preliminary Jurisdictional Determination would eliminate the need for significant nexus determinations to be conducted in the field and documented on Rapanos forms.

On November 5, 2009, the California High-Speed Rail Authority along with its consultants held a meeting with resource agencies, including USFWS, USACE, and CDFG, to discuss the October 2009 *Central Valley Biological Resources and Wetland Survey Plan* (Authority and FRA [2009] 2011a). Revisions were made based on comments received during that meeting and subsequent written comments received from agencies not in attendance.

On December 7, 2009, Justin Whitfield of the URS/HMM/Arup Joint Venture spoke with Katie Perry of the CDFG to discuss methods for the identification and delineation of CDFG lakes and streambeds (Perry 2009, personal communication).

On March 8, 2010, URS/HMM/Arup Joint Venture biologists Todd Lemein, Casey Stewman, and Ivan Parr conducted a visit to the California Academy of Sciences Herbarium to view specimens of special-status species with the potential to occur in the Special-Status Plant Study Area. The purpose of this visit was to determine diagnostic characteristics of federally and state-listed plants as well as some CNPS 1B plants for easier identification in the field (Authority and FRA [2009] 2011a).

To determine the bloom status of sensitive plant species in the Special-Status Plant Study Area, local land managers with known occurrences of rare or endangered plant species on their property and in the vicinity of the Special-Status Plant Study Area were contacted. The following is a list of the land managers, the property they manage, the resource of interest, and the dates of contact:

- Patrick Brian, Fresno Metropolitan Flood Control District. Contacted by survey personnel in January, February, March, and April of 2010 about a population of San Joaquin adobe sunburst (*Pseudobahia peirsonii*) that bloomed in mid-April (Brian 2010, personal communication).
- Greg Warrick, Center For Natural Lands Management. Contacted by survey personnel January and March 2010 about Kern mallow (*Eremalche kernensis*) and Hoover's woolly-star. Both populations bloomed during our botanical survey effort (Warrick 2010, personal communication).
- Dennis Kearns and Ryan O'Dell, Bureau of Land Management Bakersfield Field Office. Contacted in February regarding reported occurrences of California jewel-flower (*Caulanthus californicus*) (Kearns 2010, personal communication; O'Dell 2010, personal communication).
- Cheryl Harding, Kern Water Bank Authority. Contacted by survey personnel February and March 2010 about population of San Joaquin woolly threads that bloomed in mid-March, 2010 (Harding 2010, personal communication).

After the botanical surveys, several annual saltbush (*Atriplex* sp.) were identified, including one species resembling a special-status species: San Jacinto Valley crownscale (*Atriplex coronata* var. *nototior*). Samples of the suspected San Jacinto Valley crownscale were sent to Elizabeth Zacharias, Ph.D., for genetic testing to confirm the identification because the taxonomy within the *Atriplex* genus is complex and identification based on physical features is often difficult. Additionally, the fact that the closest known occurrence of San Jacinto Valley crownscale is from Riverside County put the identification in question. Dr. Zacharias is currently rewriting the *Atriplex* key for the revised edition of the Jepson Manual (unreleased) (Zacharias 2010a, personal communication; 2010b, personal communication; Hrusa 2010, personal communication). Results of genetic testing could not confirm the species identification as *A. coronata* var. *notatior*. Instead, the genetic testing and analysis of physical features (lack of dense tubercles on the fruiting bracts) led Dr. Zacharias to believe the specimens are *A. coronata* var. *coronata*.

During the late-season botanical surveys, a population of Kern mallow (*Eremalche parryi* ssp. *kernensis*) was identified. This species taxonomy is continually under review with the Jepson Manual and the USFWS guidance conflicting on nomenclature and species identification (Cypher 2010a, personal communication). Ellen Cypher, currently a botanist with CDFG and author of the *Supplemental Survey Methods for Kern Mallow* (Cypher 2002), was contacted on May 27, 2010, to provide guidance on reporting this population. To date, correspondence with Joseph Terry and other botanists of the USFWS Sacramento Field Office has not resulted in an official determination or guidance regarding regulations of the Kern mallow (*E. parryi* ssp. *kernensis)*. For the purposes of this report Kern mallow is being reported as *Eremalche parryi* ssp. *kernensis* until further guidance is provided by USFWS.

Throughout 2010 and 2011, URS/HMM/Arup Joint Venture biologists Matthew Bettelheim, Justin Whitfield, and Jessie Golding were in contact with California State University, Stanislaus, Endangered Species Recovery Plan biologist Brian Cypher, Ph.D., to guide the design and placement of suitable wildlife corridor structures.

During the spring 2010 field surveys, URS/HMM/Arup Joint Venture biologist Matthew Bettelheim was contacted by CDFG biologist Anni Feranti, manager of the Allensworth Ecological Reserve. Ms. Feranti and CDFG biologist Krista Tomlinson later prepared an informal list detailing the biological resources known by CDFG in the Allensworth Ecological Reserve (Tomlinson 2010, personal communication).

On September 23, 2010, a meeting with the various regulatory agencies was held regarding the Central Valley HST sections (San Jose to Merced, Merced to Fresno, and Fresno to Bakersfield) to discuss development of a comprehensive mitigation strategy.

On November 10, 2010, URS/HMM/Arup Joint Venture met with representatives of the USFWS and CDFG to discuss survey methods, impacts to special-status wildlife species, approach to impacts, permitting efforts, and avoidance, minimization and compensatory mitigation.

On June 23 and subsequently on August 12, 2010, Jan Novak corresponded with Zachary Simmons of the USACE in an email to confirm Leah Fisher's guidance regarding the mapping and delineation of stock ponds and retention basins for a Preliminary Jurisdictional Delineation (Simmons 2010, personal communication). Zachary Simmons requested that all features exhibiting either an OHWM or meeting the three parameter test be considered jurisdictional. He noted that this categorization may include waters that may not otherwise be jurisdictional under a jurisdictional delineation.

On February 22, 2011, Zachary Simmons (USACE, Sacramento District) contacted Bryan Porter, among others, to request shape files (.shp) for all delineated jurisdictional waters within the

Wetland Study Area (Simmons 2011a, personal communication). In addition, Mr. Simmons requested that all future delineation maps not have any shading of aerial photography.

On March 1, 2011, Zachary Simmons (USACE, Sacramento District) contacted Jan Novak to share "Attachment 1," a High Speed Train specific document describing the suggestions by the USACE for the HST wetland determination process. Subsequently, Galen Peracca contacted Zachary Simmons to request a copy of the original letter that preceded Attachment 1 (Simmons 2011b, personal communication).

On March 1, 2011, URS/HMM/Arup Joint Venture met with representatives of the CAHSR, FRA, and USFWS to discuss an overview of the Section 7 process and the HSRA/FRA Scope of Work – Agreement for funding a USFWS staff position.

On April 26, 2011, URS/HMM/Arup Joint Venture met with representatives of the USFWS, CDFG, USACE, EPA, and Tulare Basin Working Group to discuss mitigation opportunities pertaining to Conceptual Area Protection Plans (CAPPs) and to solicit input on identifying and prioritizing lands for compensatory mitigation.

On May 5, 2011, Zachary Simmons (USACE, Sacramento District) contacted Jan Novak to clarify that the standard USACE preliminary determination form has been modified by the Sacramento District (Simmons 2011c). Mr. Simmons attached the updated form.

On May 12, 2011, URS/HMM/Arup Joint Venture met with representatives of the CAHSR, DOJ, Wildlife Conservation Board, Grassland WD Counsel, CDFG, and CH2M Hill to discuss options for how the Wildlife Conservation Board could help facilitate the Authority's obligations to acquire mitigation properties.

On May 24, 2011, Zachary Simmons (USACE, Sacramento District) provided Lupe Jimenez (Authority) with the USACE's comments on the jurisdictional water features delineated in the Wetland Study Area (Simmons 2011d, personal communication). Over the next month, URS/HMM/Arup Joint Venture corresponded by email and by phone with Zachary Simmons to (1) clarify the USACE's findings from its April 2011 field verification visit, and (2) reach a shared understanding of the requirements for submitting a Preliminary Jurisdictional Determination to the USACE.

On May 26, 2011, Kevin Melanephy (URS/HMM/Arup Joint Venture) and the Authority met with Zachary Simmons (USACE) regarding preparation of a USACE Section 404 Individual Permit Application for the HST Fresno to Bakersfield Section.

On January 3, 2012, Justin Whitfield (URS/HMM/Arup Joint Venture) spoke with Zachary Simmons (USACE) regarding the mapping and designations of jurisdictional water features.

On November 22, 2011, URS/HMM/Arup Joint Venture met with representatives of the Authority, FRA, CDFG, EPA, NMFS, and USACE to introduce the Conceptual Mitigation Plan/Mitigation Strategy Implementation Plan and get agency feedback regarding mitigation options in the Central Valley. URS/HMM/Arup Joint Venture received initial approval for its proposed landscape approach to mitigation site selection.

On December 2, 2011, URS/HMM/Arup Joint Venture met with representatives of the Authority, FRA, and USFWS to provide updates on the proposed Conceptual Mitigation Plan/Mitigation Strategy Implementation Plan.

On March 2, 2012, URS/HMM/Arup Joint Venture met with representatives of the Authority, CDFG, and USFWS to discuss information needs for the issuance of the USFWS Biological Opinion and CDFG Incidental Take Permit for the HST sections.

On March 28, 2012, URS/HMM/Arup Joint Venture met with representatives of the Authority, FRA, CDFG, and USFWS to discuss wildlife movement and habitat connectivity and to get agency feedback regarding engineering and mitigation options to facilitate landscape permeability in the Central Valley.

On April 18, 2012, URS/HMM/Arup Joint Venture met with representatives of the Authority and CDFG to introduce the layout, covered species, and avoidance and minimization measures proposed in the Incidental Take Permit applications for the Merced to Fresno and Fresno to Bakersfield sections.

3.7 Limitations That May Influence Results

Several limitations that may influence the results of the studies presented in this report were identified. These limitations are beyond the California High-Speed Rail Authority's control and are associated with permission to enter private property and the BNSF right-of-way, with the use and interpretation of aerial photography, and with the timing of the botanical surveys.

In general, permission to enter the properties in the various study areas was requested on behalf of the Authority by Bender Rosenthal Inc. Requests for permission to enter were not made for urban areas (Fresno, Corcoran, Wasco, Shafter, or Bakersfield), for properties less than 0.5 acre in size or for properties zoned as industrial. Requests for permission to enter in urban areas were not made because the effort required to obtain permission to enter into the thousands of parcels would not likely result in additional biological findings. Due to their developed nature, urban areas are not likely to provide suitable habitat for special-status species and do not likely support jurisdictional waters.

In many instances, permission to enter was granted by landowners; however, permission to enter was not available for numerous properties because the request was either not made or because the request was denied (not granted), no response was received, or the property owner requested indemnification. The result of the access limitations are as follows: data could not be collected on the ground, and estimations and assumptions regarding the potential for jurisdictional waters and special-status species were based on assessments from adjacent areas and in some instances solely on aerial photography. These limitations could result in over- or underestimation of the jurisdictional waters or biological resources.

Permission to enter the BNSF Railway right-of-way was not granted until after the completion of the delineations of jurisdictional waters, wildlife habitat assessment, and early-season botanical surveys. Due to the later timing of permission to enter BNSF Railway right-of-way, no early spring season botanical surveys were completed in this area. For the majority of the Special-Status Plant Study Area, this limitation does not likely influence the results, because the BNSF Railway right-of-way is disturbed and parallels areas that have been significantly altered by agricultural activities. However, natural wildlife habitats in the BNSF Railway right-of-way, including annual grasslands, alkali desert scrub, and valley foothill riparian areas (present predominately in the vicinity of Allensworth, north of the town of Corcoran, and to a lesser degree in other areas) could support early-blooming, special-status plant species.

Several properties in the vicinity of Cross Creek, located north of the town of Corcoran, are of special interest because they appear to be natural land. However, permission to enter was denied for this area. Therefore, photo interpretation and remote sensing were used to map resources in this area. Both photo interpretation and remote sensing have inherent limitations and could have either over- or underestimated the extent of jurisdictional waters. Although these methods were used in other areas, this area has the most potential to present unconfirmed and potentially inaccurate information.

Aerial photograph interpretation and remote sensing rely heavily on the quality and date of the photography. The best aerial imagery used for this current effort is estimated to be approximately 5 years old. Although more recent photography is available, the recent photography was taken during the summer after a drought year and does not provide optimal characteristics for remote sensing. The older photography analyzed was from a winter month and provided appropriate characteristics for identifying and mapping jurisdictional waters. Because the date of this photography is unknown, some features or landscapes shown may have changed. This limitation is only present in select areas and does not affect the majority of the jurisdictional waters data collected because the analysis of the data was informed by observations and direct verification.

The early-, mid-, and late-season botanical surveys were planned and conducted during times when the majority of special-status plant species identified as having potential to occur would be blooming. Because of engineering design changes, special-status plant surveys were not completed during the spring of 2010 within the Allensworth Bypass, Kimberlina Road, and Hanford West Bypass adjustments. For the Allensworth Bypass and Kimberlina Road areas, botanical surveys were conducted in adjacent areas during the blooming period, however, and special-status species identified then have potential to occur in the Allensworth Bypass Alternative. In addition, the supplemental surveys conducted in July 2010 and November 2011 identified potential suitable habitats that could support special-status plant species in the Allensworth Bypass, Kimberlina Road, and Hanford West Bypass adjustments. The identification of potentially suitable habitats likely overestimates the extent and amount of habitat present that could potentially support special-status plant species.

Chapter 4.0
Results: Environmental Setting

4.0 Environmental Setting

This chapter describes the environmental setting identified in the various study areas for biological resources. It describes the location and orientation of the study areas and their existing physical and biological characteristics, including the topography, climate, hydrology, soils, and biological conditions (i.e., wildlife and vegetation communities present). Although the exact limits of the various study areas vary slightly (Section 3.2.1), the variation is inconsequential at the level of discussion in this chapter. Therefore, the various study areas are referred to in this chapter collectively as "the study areas."

4.1 Study Areas

The study areas are located between downtown Fresno and downtown Bakersfield in the San Joaquin Valley of California. In general, they parallel the existing BNSF Railway and SR 43 (Figure 1-2). The study areas are located west of SR 99 and east of Interstate 5.

The study areas include portions of Fresno, Kings, Tulare, and Kern counties. The study areas occur in the vicinity of the cities of Fresno and Bakersfield and pass near or through multiple smaller rural communities, including Hanford, Corcoran, Wasco, and Shafter. The northern extent of the study areas begins at Amador Street in Fresno. The southern extent of the study areas terminates at Oswell Street in downtown Bakersfield. The alternative alignments generally occur along portions of the existing BNSF Railway and SR 43. However, in a few locations, the route diverges from both the BNSF Railway and SR 43.

The study areas include the BNSF Alternative (Fresno to Bakersfield); eight alternative alignment bypasses, Hanford West Bypass 1 (at-grade and below-grade options), Hanford West Bypass 2 (at-grade and below-grade options), Corcoran Elevated, Corcoran Bypass, Allensworth Bypass, Wasco-Shafter Bypass, Bakersfield South, and Bakersfield Hybrid (Figures 1-1 and 1-2); the various associated stations, tracks, maintenance and equipment storage areas, temporary access roads, road overcrossings, substations, and a varied buffer (depending on the resource) to accommodate project indirect effects.

The alignment trends in an overall northwest to southeast direction for approximately 118 miles with a minimum study area width of 300 feet. The study areas cross a number of major rivers, canals, agricultural ditches, smaller creeks, and ephemeral drainages, including the Kings River (including Cole Slough and Dutch John Slough), Cross Creek, Deer Creek, Tule River, Poso Creek, and Kern River (Figure 1-2). The study areas are primarily composed of agricultural lands, urban and rural communities, and scattered fragments of undeveloped natural habitat.

Major land uses between Fresno and Bakersfield include urban (industrial, commercial, and residential), rural residential, and agricultural; some undeveloped natural areas are in the vicinity of Allensworth, California. Several public lands, including Colonel Allensworth State Historic Park, Allensworth Ecological Reserve, and Pixley National Wildlife Refuge (NWR) occur in or immediately adjacent to the study areas (Figure 1-2). These public lands are managed for a variety of reasons: for historical preservation, sensitive aquatic resources, and special-status species. Additionally, the Tulare Lakebed Mitigation Site, a conservation easement, occurs adjacent to the study areas and is managed for the preservation of shorebirds and other migrating waterfowl.

4.2 Description of the Existing Physical and Biological Conditions

This section describes the existing physical and biological conditions of the study areas. The descriptions are general in nature, and specific resources are addressed in more detail in Chapter 5, Results: Biological Resources, Discussion of Impacts, and Mitigation.

4.2.1 Physical Conditions

This section describes the physical conditions of the study areas, including their climate, topography, hydrology, and soils. These characteristics are the context for the biological conditions and the biological resource descriptions that follow. Hydrology and soils-related topics are discussed specifically for the Wetland Study Area because these features are especially relevant for jurisdictional water features. Figure 4-1 provides an overview of the general soil types and watersheds (based on Natural Resources Conservation Service Hydrologic Unit Code [HUC]-8 code) within the Fresno to Bakersfield Section.

4.2.1.1 Topography

The study areas are broadly located in the San Joaquin Valley between SR 99 and Interstate 5. The San Joaquin Valley trends from the Tulare Basin at the southern end to the Sacramento–San Joaquin Delta to the north. The eastern edge of the valley meets the western slope of the Sierra Nevada, while the western edge of the valley meets the eastern slope of the Temblor and Diablo ranges that together comprise the southern interior Coast Range ecoregion.

At a macro scale, the topography of the study areas is relatively flat, although there are micro topographic changes associated with canals, roads, and the various rivers. Trending from Fresno south to Bakersfield, the elevation gradually decreases from approximately 300 feet to approximately 200 feet near the town of Allensworth. From the vicinity of Allensworth, the elevation rises gradually to Wasco and Shafter where it plateaus briefly (near 350 feet), and climbs again into Bakersfield (near 430 feet). Segments of the San Joaquin Valley floor are at or near sea level, whereas areas in the south eastern corner of the valley floor are upwards of 1,000 feet in elevation. Nearly half of the valley floor has undergone varying levels of subsidence due to a variety of causes, including aquifer-system compaction induced by groundwater mining, hydro-compaction of dry soils, fluid removal due to oil and gas exploration, and tectonic activity.

4.2.1.2 Climate

The study areas are dominated by an arid to semi-arid climate. Summers are generally hot and dry; the majority of rainfall occurs during the mild winter months. Rainfall stations show that upwards of 80% of annual precipitation occurs between November and April. Rainfall in the San Joaquin Valley and the eastern flanks of the interior Coast Range is limited due to the Coast Range rain shadow effect. Generally speaking, rainfall increases from south to north across the valley floor. Mean annual precipitation records from the San Joaquin Valley range from fewer than 5 inches in the south to upwards of 16 inches in the north (USGS 2009).

The majority of water in the San Joaquin Valley arrives as snowmelt from the Sierra Nevada (which lies east of the San Joaquin Valley) during the spring and summer. Warm, moisture-laden air masses generated over the Pacific Ocean condense and cool as they are pushed upward over the Sierra Nevada, resulting in heavy precipitation on the western slopes. The resulting snowpack ranges from 20 to 80 inches as elevation increases from the lower foothills to the Sierran crest.

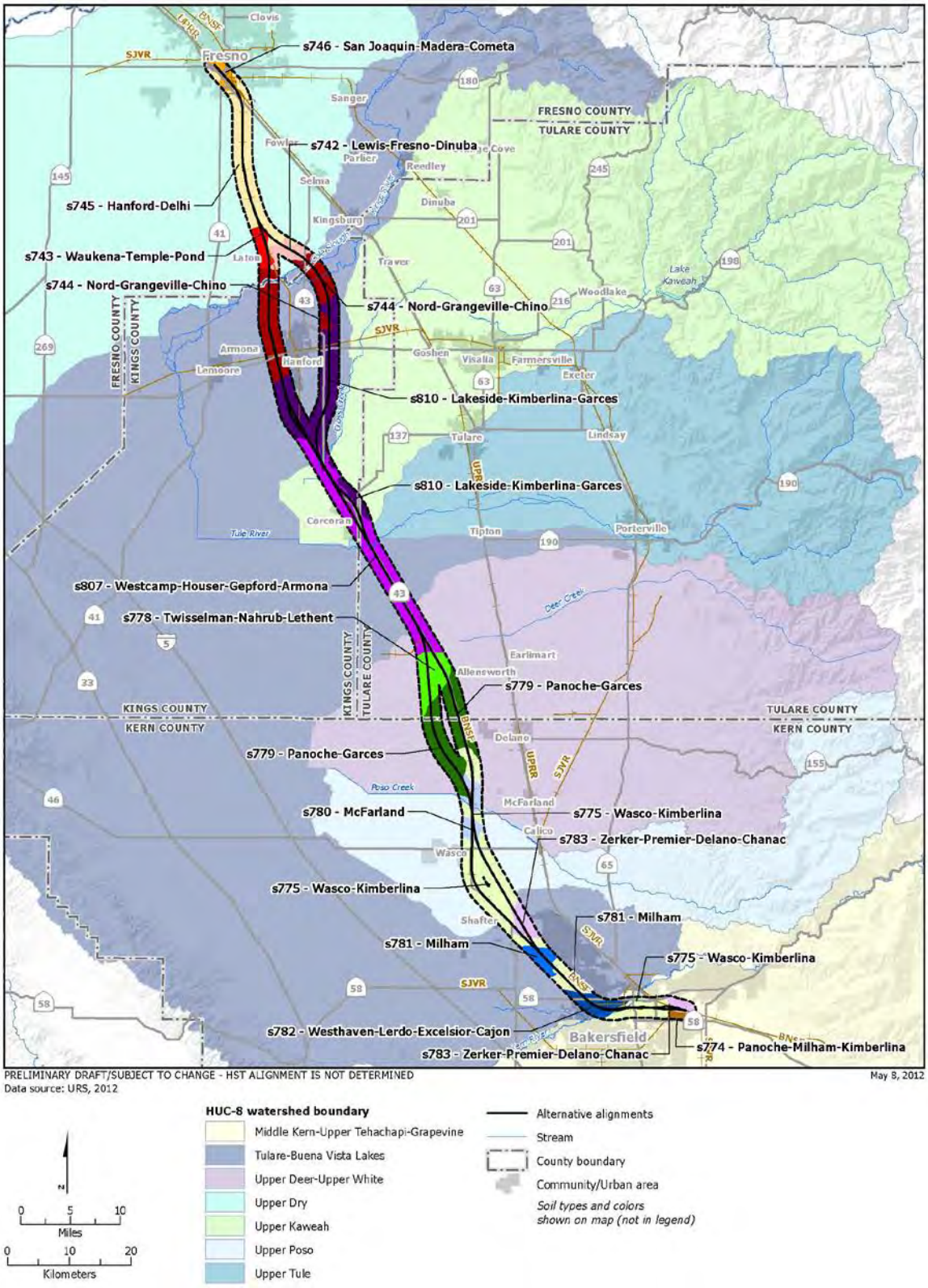


Figure 4-1
Environmental setting: Soils and watersheds

The northern and southern portions of the San Joaquin Valley are similar with respect to daily temperatures throughout the year. Northern valley and southern valley temperature records were collected at the National Climate Data Center stations in Fresno and Bakersfield, respectively. Average daily temperature fluctuation in the study areas (as measured between the coolest and hottest months) varies annually by ~36°F between December (average air temperature of 46°F) and July (average air temperature of 83°F). Temperature extremes in the study areas have been recorded as high as 115°F and as low as 18°F (WRCC 2010).

4.2.1.3 Hydrology

Hydrology within the Wetland Study Area is very complicated due to significant human-induced alteration and manipulations. Most of the data represented in this section, including large- and small-scale water diversion and infrastructure projects, are from the *Fresno-Bakersfield Section: Hydrology and Water Resources Technical Report* (Authority and FRA 2011c) and the local soil surveys (USDA 1982, 1986, 1988, 1998).

Watershed Hydrology

The San Joaquin Valley has a drainage area of approximately 34,100 square miles, and is divided into the San Joaquin River Basin and the Tulare Lake Basin (17,400 square miles). The Wetland Study Area is entirely in the Tulare Lake Basin. This area is generally flat and used extensively and intensively for agriculture. The Tulare Lake Basin is essentially closed, because water only drains north to the San Joaquin River during periods of extremely high rainfall. The contributing rivers are normally dewatered before reaching the Central Valley floor (USDA 1982).

The Wetland Study Area occurs within seven HUC-8 watersheds (Figure 4-1). Significant drainage features running through the Wetland Study Area include Kings River, Cross Creek, Deer Creek, Tule River, Poso Creek, and Kern River (Figure 1-2). The names of the various HUC-8 watersheds and the major surface water features within each watershed are summarized in Table 4-1.

Table 4-1
Watersheds in the Wetland Study Area

Subbasin (HUC-8 No.)	Major Water Features	Watershed Area (acres)
Upper Dry (18030009)	Kings River	1,360,539
Tulare-Buena Vista Lakes (18030012)	Kings River, Cross Creek, Tule River	2,423,853
Upper Kaweah (18030007)	Cross Creek	974,462
Upper Tule (18030006)	Tule River	604,506
Upper Deer–Upper White (18030005)	Deer Creek, Friant-Kern Canal	782,998
Upper Poso (1803004)	Poso Creek Friant Kern Canal	368,178
Middle Kern-Upper Tehachapi-Grapevine (1803003)	Kern River	1,675,939
Total		**8,190,475**
HUC = Hydrologic Unit Code		

Historic Hydrology

Before agricultural development, the Tulare Lake Basin was dominated by four large, shallow, and mainly seasonal lakes (Tulare, Buena Vista, Goose, and Kern lakes). Tulare Lake and Goose Lake covered large portions of the Wetland Study Area. The historic Tulare Lake was originally one of the largest lakes in California, occupying much of southern Kings and Tulare counties and northern Kern County (USDA 1986). Tulare Lake was historically fed by the Kings River, Kaweah River (the source of Poso Creek), Tule River, and the Kern River from the Sierra Nevada. It was a terminal lake, having no natural outlet in dry years, and overflowing to reach the San Joaquin River during wet years (USDA 1982).

The Kern River once flowed south and west across the San Joaquin Valley through a complex system of sloughs, creeks, ponds, and permanent wetlands, and fed Buena Vista and Kern lakes. Evaporation of these historic lakes through water diversions and climate change has resulted in a wide area of saline-sodic soils on the southern Central Valley floor.

Large portions of the southern Central Valley floor were historically subject to frequent flood events, either from intense fall/winter rainfall, or from late-spring/early-summer snowmelt originating in the Sierra Nevada. Regular flooding is now largely controlled by dams, diversions, levees, and dredging. The previous floodplain and riparian habitat has also largely been replaced by agriculture or urban development. Infrequent but catastrophic floods now occur in parts of the San Joaquin Valley, made more severe by the loss of the flood-attenuating functions of riparian and wetland habitats (USDA 1982; Vileisis 1997).

Present-Day Hydrology

The Wetland Study Area is within the San Joaquin Valley Groundwater Basin. Most of the San Joaquin Valley floor is underlain by several thousand feet of sediments, including coarse-grained, water-bearing zones. Groundwater exists under both unconfined and semi-confined conditions. Groundwater levels vary with seasonal rainfall, withdrawal, and recharge. Depth to groundwater in the valley ranges from a few inches to more than 100 feet.

Depth to groundwater ranges from 90 feet to 150 feet below ground surface (bgs) near Fresno, 115 feet bgs near Hanford, 110 feet bgs near Corcoran, and 150 feet bgs near Bakersfield (Authority and FRA 2011c). Groundwater recharge occurs through percolation of applied irrigation water and leaking water from agricultural ditches, and infiltration of stream flow. High levels of soluble salts and/or nitrates in the groundwater are of local concern.

All of the streams and rivers within the Wetland Study Area have been dredged, culverted, diverted, dewatered, channelized, or have had their active floodplains severely reduced by construction of levees. These areas once sustained rich riparian wetland habitats and shallow groundwater in the deltas of the major rivers draining into the San Joaquin Valley (USDA 1982), which are now greatly reduced or eliminated. Groundwater pumping for large agricultural and urban demands has resulted in groundwater subsidence in many areas of the Central Valley. Water levels in the Kings subbasin have declined up to 50 feet since 1982. Regular flooding, where implemented, is now largely controlled by dams, diversions, levees, and dredging. The previous floodplain and riparian habitat have largely been replaced by agriculture or urban development (USDA 1982; Vileisis 1997).

Wetland Hydrology

Alterations to both surface- and groundwater in the region have resulted in a significant decline in historic wetland area. This is reflected in the high proportion of "drained" or "partially drained" hydric soils mapped in the area, as discussed below under Soils.

Hydrology within the Wetland Study Area is highly manipulated. Most of the water present in the Wetland Study Area is diverted from the numerous irrigation canals that are found throughout the valley. Therefore, most of the surface water in the Wetland Study Area is found in either irrigation canals or water retention/detention basins, and occasionally in river channels or in precipitation-fed wetlands and vernal pools. The remaining wetlands are largely unrelated to the historic floodplains or regional aquifers.

Vernal pools have developed in mostly isolated depressions that receive water from precipitation and local surface and shallow subsurface, or sheet flow. Water is retained in these depressions by a shallow perching layer (largely clay pans), and is unconnected or only partially connected to deeper groundwater layers (Holland 2009).

Vernal pools can vary widely in the frequency, timing, depth, and duration of their wet phase. The vegetation, hydrology, and soils of these pools are unique, due to the fact that they occur in an alkali-scrub–type habitat, rather than in true grassland, which is the case for vernal pools to the north (Solomeshch et al. 2007).

Most vernal pools in the Wetland Study Area probably remain inundated for no more than 2 months each year, some for much shorter periods. Soil moisture is recharged beginning in November and, typically, inundation occurs sometime between January and March. Inundation may not be continuous if a dry spell occurs during this time. Significant inundation may not occur at all during drought years. By April, rainfall has dropped, and temperatures have risen sufficiently to dry out the pools. By May, available soil moisture has declined and annual wetland plants begin to desiccate. The pools range in depth from a few inches to no more than 2 feet.

4.2.1.4 Soils

Soils are natural bodies that develop over time through the integration of parent materials, organisms, relief, aspect, and climate—the classic "soil forming factors" (Jenny 1941). This section is intended to provide a general conceptual framework for understanding the dominant influences on soil development in the Wetland Study Area, and why certain (particularly hydric) soils occur where they do.

Soil Surveys

The Wetland Study Area extends over four counties and four soil survey areas:

- Soil Survey of Eastern Fresno Area (1971).
- Soil Survey of Tulare County, Western Part (1982).
- Soil Survey of Kings County (1986).
- Soil Survey of Kern County, Northwestern Part (1988).

A map of the soil map units within a 1-mile buffer of the alternative alignments is provided on Figure 4-1. Appendix B (Soil Map Unit Descriptions) provides descriptions of these soil map units (NRCS 2009, 2010a, 2010b; California Soil Resource Lab 2005).

Most of the soils and/or landscapes in the Wetland Study Area have been disturbed by development for agriculture, transportation, or other infrastructure. Many of the soils have been leveled, drained, and/or protected from floods for agricultural purposes. Drainage systems and levees in the San Joaquin Valley date back many decades, but these were not always as efficient as modern systems in de-watering soils. Local water tables have also dropped as a result of groundwater extraction (Authority and FRA 2011c; USDA 1971, 1982, 1986, 1988). Soils that previously had high water tables, or frequent flooding or ponding, are still considered hydric soils by convention even if they are no longer wet. Some of these soils would revert to their prior

condition if the drainage or flood protection were removed. These hydric soils that are no longer wet are designated in the soil surveys by drained or partially drained phases.

A total of 96 detailed soil map units occur within the Wetland Study Area; of these, only 21 have named dominant (greater than 50% composition) components that are hydric. Although only 21 map units are named for hydric soils, an additional 30 map units with hydric soil inclusions are listed in the NRCS lists of state hydric soils (NRCS 2010a).

Of the 21 map units in the Wetland Study Area with dominant hydric components, 3 are miscellaneous land types (riverwash) and not necessarily soils. Twelve (12) of the 21 map units feature drained or partially drained hydric soils (as indicated by the phase at the end of the map unit name); therefore, these soils would most likely not support wetlands. As a result, only six map units in the Wetland Study Area are named for hydric soils that are not drained. However, Grangeville soil occurs in three of the surveys (those of Fresno, Tulare, and Kings counties) and is represented by four different map units. Therefore, three undrained hydric map units are mapped in the Wetland Study Area.

In addition to the Grangeville series, the other hydric soil series are the Nahrub soil series and the Dello soil series. The Grangeville and the Nahrub soils appear to be hydric due to frequent flooding, rather than a high water table. These soils are listed as "somewhat poorly drained," with seasonal high-water tables of 24 inches or more bgs. According to the Natural Resources Conservation Service (NRCS) Official Series Descriptions, neither of these soils meets hydric soil indicators (USDA and NRCS 2006). The Dello soil mainly occurs in depressions in sandy eolian deposits in the extreme northern part of the Wetland Study Area. This landscape has been highly modified by agricultural development.

Hydric soils mapped in the Wetland Study Area include a range of soil orders: mollisols, aridisols, vertisols, entisols, and inceptisols. Common diagnostic subsurface horizons found in these hydric soils include salic, natric, and calcic horizons. Soil particle size classes ranged from sandy and coarse-loamy, to fine-silty, fine-loamy, and fine. The soil temperature regime is thermic, with an assumed growing season of February through October. A xeric moisture regime occurs in approximately the northern half of the Wetland Study Area. Precipitation decreases sufficiently in the south half of the Wetland Study Area to produce an aridic soil moisture regime.

The concentration and depth of free calcium carbonates in the soil profile follow the north-south moisture gradient: soils in the southern part of the Wetland Study Area have a high calcium carbonate percentage at the soil surface, whereas soils in the northern part have a lower calcium carbonate percentage with carbonates deeper in the soil profile. Soluble salts and sodium are found in the basin rim landscape positions where evaporative concentration of saline waters was historically a dominant process.

Wetland Soil Landscapes

Hydric soils (and wetlands) historically occurred over a much broader portion of the San Joaquin Valley than they do today. Large portions of the region were essentially marshland, wet prairie, or seasonally flooded riparian areas. Over a century of draining, land-leveling, ripping, dredging, flood protection, and groundwater pumping have significantly altered the natural conditions (USDA 1982).

Soil landscapes that continue to support wetlands are now rare in the Wetland Study Area. Aside from artificially created detention/treatment ponds, the majority of wetlands are confined to the undeveloped saline-sodic soils in the southern part of the Wetland Study Area, in the vicinity of the town of Allensworth. Where not leveled for agriculture, these areas have a mound-depression type topography and much of this area is sparsely vegetated by salt-tolerant herbaceous and shrub vegetation. The depressions, where underlain by a restrictive soil layer, are seasonally

ponded and known as "vernal pools." Most of the wetlands in the Wetland Study Area are vernal pools.

Problematic Soils

Problematic hydric soils are those whose hydric nature is difficult to determine in the field. Soils in the Wetland Study Area have developed under several biogeochemical conditions which normally preclude or slow the development of readily apparent hydric soil indicators. Most indicators used for delineation of jurisdictional water boundaries rely on changes in the soil resulting from the reduction of iron and/or manganese (redoximorphic features). These changes normally produce diagnostic colors which persist in the soil from year to year. The hydric soil indicators given in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008b) assume a certain level of expression of this iron/manganese reduction-oxidation. At the same time, the Regional Supplement acknowledges that many hydric soils in the arid west either do not form redoximorphic features at all, or form them only to a minimal degree that does not meet the technical requirements of the indicators (USACE 2008b).

Most hydric saline and alkaline soils in the arid west do not develop hydric soil indicators due to: 1) high pH (low redox potentials are required to reduce iron and manganese); 2) low amounts of iron and manganese; and 3) low activity of microorganisms (Boettinger 1997). Alkalinity and salinity also create a harsh environment for the microbes responsible for the redox reactions, by causing dehydration and micronutrient deficiencies. This results in low plant biomass, which limits the supply of organic carbon also necessary for redox reactions to occur. Where soluble salts (salic or Az/Bz horizons) and calcium carbonates (calcic or Bk horizons) are present in the soil, any redoximorphic features that may form are easily masked.

Some soils in the southern portion of the Wetland Study Area (between the cities of Corcoran and Wasco) are saline, sparsely vegetated, and have very thin A horizons with low levels of organic matter. Soils in the Wetland Study Area also tend to be wettest when soil temperatures are low (a characteristic of Mediterranean climates), further reducing microbial activity and development of redoximorphic features. In addition, many parent materials in the arid west are naturally low in iron and will therefore not form redoximorphic features, even when reducing conditions are present. These low-chroma parent materials include lacustrine and some alluvial deposits that are low in iron due to a formerly reducing environment. This applies to many of the basin landforms in the San Joaquin Valley and the Wetland Study Area (USDA 1971, 1982, 1986, 1988).

4.2.2 Biological Conditions in the Study Areas

This section describes the general biological conditions in and around the study areas, with particular emphasis on the wildlife habitats (based on the CWHR), and wildlife with the potential to occur in the Habitat Study Area. Much of the discussion focuses specifically on the Habitat Study Area because habitat conditions are particularly relevant to wildlife. Overall, the study areas are highly disturbed and fragmented because of urban, agricultural, railroad, highway, and local road and land uses. In a few areas native vegetation and quality wildlife habitat remain relatively undisturbed.

4.2.2.1 Wildlife Habitat and Land Use Types

The study areas are located in the San Joaquin Valley subregion of the California Floristic Province's (i.e., a geographic area, made of six regions, defined by the continuity of its vegetational, topographic, geologic, and climatic features) Great Central Valley region (Hickman 1993). This subregion extends from the northern border of Contra Costa and San Joaquin

counties south to the northern border of Ventura and Santa Barbara counties. The majority of land in the study areas is actively being used for agriculture. Parcels whose agricultural use could not be determined to specific CWHR wildlife habitat types (e.g., dryland grain crops, irrigated grain crops, irrigated hayfield, irrigated row and field crops) were designated under the umbrella designation of cropland. Urban areas are the second greatest land use, including large cities such as Fresno and Bakersfield as well as multiple smaller cities such as Corcoran, Wasco, and Shafter. In these areas native vegetation is absent or highly disturbed, and the more typical vegetation consists of a variety of planted trees such as eucalyptus (*Eucalyptus* spp.) and mulberry (*Morus* spp.), and other nonnative or ornamental vegetation.

Wildlife habitats and land uses throughout the entire Habitat Study Area were mapped in accordance with *A Guide to Wildlife Habitats of California* (CDFG 1988) and *California Wildlife Habitat Relationship System* (CDFG 2008a) (Figure 4-2). Land use and wildlife habitat types identified in the Habitat Study Area are listed in Table 4-2.

Table 4-2
Wildlife Habitat Types, Land Uses, and Typical Vegetation

Wildlife Habitat Type/Land Use Type	Typical Vegetation
Tree-Dominated Habitats	
Valley Oak Woodland (VOW)	Valley oak, wild oats, brome species, California blackberry, fiddleneck, filaree
Valley Foothill Riparian (VFR)	Fremont cottonwood, western sycamore, valley oak, white alder, California blackberry, elderberry, poison oak, button bush, willows, rushes, mugwort, poison hemlock, stinging nettle
Shrub- Dominated Habitats	
Alkali Desert Scrub (ASC)	Cattle saltbush, spinescale saltbush, iodine bush, bush seepweed, golden bush, goldfields, tarweed, saltgrass
Herbaceous-Dominated Habitats	
Annual Grassland (AGS)	Wild oats, brome species, barley, annual fescues, California oatgrass, hairgrass, sweet vernal grass
Fresh Emergent Wetland (FEW)	Cattail, bulrush
Pasture (PAS)	Grasses
Aquatic Habitats	
Riverine (RIV)	Unvegetated, rushes
Lacustrine (LAC)	Unvegetated, willows, rushes
Developed Habitats	
BNSF Urban	Unvegetated pavement, grass lawns, ornamental trees, and hedges in the BNSF Railway right-of-way
Cropland (CRP)	Recently disturbed but unidentifiable crops
Dryland Grain Crops (DGR)	Wheat
Irrigated Grain Crops (IGR)	Wheat
Irrigated Hayfield (IRH)	Alfalfa
Irrigated Row and Field Crops (IRF)	Onions

Table 4-2
Wildlife Habitat Types, Land Uses, and Typical Vegetation

Wildlife Habitat Type/Land Use Type	Typical Vegetation
Deciduous Orchard (DOR)	Almonds, apricots
Evergreen Orchard (EOR)	Citrus
Vineyards (VIN)	Grapes
Urban (URB)	Unvegetated pavement, grass lawns, ornamental trees, hedges
Non-vegetated Habitats	
Barren (BAR)	Unvegetated, rock, gravel, soil

Figure 4-2 contains confidential information and has therefore not been included on the website.

Tree-Dominated Habitats

Two tree-dominated habitats were identified in the Habitat Study Area: valley oak woodland and valley foothill riparian.

Valley Oak Woodland

Valley oak woodland (VOW) in the Habitat Study Area was located along the floodplain of the Kings River and associated sloughs and side channels (in the Hanford West Bypass Alignment alternatives in this area. This habitat is characterized by well-spaced stands of mature valley oak (*Quercus lobata*) with little or no subcanopy, and a well-developed herbaceous layer. Dominant herbaceous species include brome, annual fescues (*Vulpia* spp.), oats (*Avena* spp.), and barleys. Other herbaceous plants including soap root (*Chlorogalum pomeridianum*), filaree, miner's lettuce, prickly ox-tongue (*Picris echioides*), and spiny sow thistle (*Sonchus asper*) may be present. In the Habitat Study Area, valley oak woodland may intergrade with valley foothill riparian vegetation, or abruptly transition to developed areas such as cropland or orchard.

Valley oak woodland provides food, cover, nesting sites, and dispersal habitat for a wide variety of wildlife. The large oak trees present in this habitat provide nesting opportunities for many birds of prey, including Swainson's hawk. Typical wildlife species observed in this vegetation community during the wildlife habitat assessment included California ground squirrel, western fence lizard (*Sceloporous occidentalis*), western scrub jay (*Aphelocoma californica*), California quail, northern flicker (*Colaptes auratus*), northern mockingbird (*Mimus polyglottos*), mourning dove (*Zenaida macroura*), American kestrel (*Falco sparverius*), and red-tailed hawk (*Buteo jamaicensis*).

One special-status plant community is associated with this habitat type: valley oak woodland.

Valley Foothill Riparian

Valley foothill riparian (VFR) in the Habitat Study Area was located along the riparian corridors and associated floodplains or terraces of the Kings River, Cross Creek, Tule River, Poso Creek, and Kern River, and along their associated sloughs and side channels. These areas were characterized by a dominance of tall trees, including Fremont cottonwood, western sycamore (*Platanus racemosa*), and valley oak. Subcanopy trees included white alder (*Alnus rhombifolia*) and ash (*Fraxinus* sp.). Understory shrubs and herbaceous species typically included California blackberry (*Rubus ursinus*), elderberry, poison oak (*Toxicodendron diversilobum*), button bush (*Cephalanthus occidentalis*), willows (*Salix* spp.) rushes (*Juncus* spp.), mugwort (*Artemisia douglasiana)*, poison hemlock (*Conium maculatum*), and stinging nettle (*Urtica dioica* ssp. *holosericea*). In the Habitat Study Area there is generally an abrupt transition to non-valley foothill riparian vegetation, such as cropland or orchard, away from the riparian corridor, resulting in narrow bands of vegetation restricted by the bordering agricultural land.

Valley foothill riparian habitat provides food, water, migration and dispersal corridors, and escape, nesting, and thermal cover for an abundance of wildlife. Protected insects like the valley elderberry longhorn beetle are native to these habitats (CDFG 1988). Typical wildlife species observed in this vegetation community during the wildlife habitat assessment included cottontail (*Sylvilagus* sp.), raccoon (*Procyon lotor*), muskrat (*Ondatra zibethicus*), western fence lizard, western skink (*Eumeces skiltonianus*), Pacific treefrog (*Pseudacris regilla*), western toad (*Bufo boreas*), western scrub jay, California quail, yellow-rumped warbler (*Dendroica coronata*), northern mockingbird, house sparrow (*Passer domesticus*), Cooper's hawk (*Accipiter cooperii*), and red-tailed hawk.

Several special-status plant communities overlap with this habitat type, including valley oak woodland, Fremont cottonwood forest, Goodding's willow thickets, and red willow thickets.

Shrub-Dominated Habitats

One shrub-dominated habitat was identified in the Habitat Study Area: Alkali desert scrub.

Alkali Desert Scrub

Alkali desert scrub vegetation in the Habitat Study Area was characterized by members of the chenopod (Chenopodacea) family, dominated by shrublands with understory cover of herbs and forbs, and by vernally inundated or saturated areas lacking a shrub layer (vernal pools). Vernal pools are micro-topographic depressions that are often unequally distributed in annual grasslands. Vernal pools are typically dry for the majority of the year and are only inundated or saturated during the spring. These vernal pool areas were characterized by herbs and forbs interspersed with barren, vernally inundated, or saturated alkali patches. Primary plant species observed during the various surveys included spinescale saltbush (*Atriplex spinifera*), cattle saltbush (*Atriplex polycarpa*), iodine bush (*Allenrolfea occidentalis*), goldenbush (*Isocoma acradenia*), and bush seepweed (*Suaeda moquinii*). The diversity and presence of succulents and cacti in this vegetation community is relatively low to absent.

Typical herbaceous species included alkali heath (*Frankenia salina)*, goldfields (*Lasthenia* spp.), Menzie's fiddleneck (*Amsinckia menziesii)*, alkali weed (*Cressa truxillensis)*, fescue (*Vulpia* spp.), pepperweed (*Lepidium* spp.), common tarweed (*Hemizonia pungens),* saltgrass (*Distichlis spicata),* bromes (*Bromus* spp.), and barley (*Hordeum* spp.). Notably, cacti were absent from this habitat. In the Habitat Study Area, this habitat was concentrated in the vicinity of Allensworth and in relatively undisturbed areas. Overall, alkali desert scrub provides the best example of native habitat for special-status species and special-status plant communities found in the Habitat Study Area. Historically, this was probably a very extensive habitat type in the Habitat Study Area, but its extent has been vastly reduced, likely due to agricultural or urban conversion. Portions of this habitat type remain on public lands, conservation lands, and individual parcels that have not been developed.

Alkali desert scrub supports a wide variety of wildlife species, including special-status species such as the blunt-nosed leopard lizard (*Gambelia sila*), the San Joaquin kit fox, and the Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*). Many wildlife species found in this habitat type are burrowers or burrow-dependent species, such as western burrowing owls (*Athene cunicularia*), western spadefoot toad (*Spea hammondii*), badgers (*Taxidea taxus*), foxes (*Vulpes* sp.), coyote (*Canis latrans*), California ground squirrel (*Spermophilus beecheyi*), and a variety of kangaroo rat (*Dipodomys* spp.) species. Reptiles found in this habitat include the western rattlesnake (*Crotalus oreganus*), side-blotched lizards (*Uta stansburiana*), and coast horned lizards *(Phrynosoma coronatum blainvillii*). Horned larks (*Eremophila alpestris*), meadowlarks (*Sturnella* spp.), and burrowing owls may breed here, and many raptors may use these areas for foraging (CDFG 1988).

Wildlife observed in this habitat during surveys included badger, coyote, kangaroo rats, burrowing owls, ravens (*Corvus corax*), red-tailed hawk, loggerhead shrike (*Lanius ludovicianus*), western kingbird (*Tyrannus verticalis*), savannah sparrow (*Passerculus sandwichensis*), horned lark, western meadowlark (*Sturnella neglecta*), side-blotched lizard, coast horned lizard, California whiptail (*Aspidoscelis tigris*), and western rattlesnake. Wildlife observed in association with vernal pool features included black-necked stilt (*Himantopus mexicanus*), cinnamon teal (*Anas cyanoptera*), great white egret (*Ardea alba*), western spadefoot toad, Pacific treefrog, tiger beetles, and vernal pool branchiopods.

Special-status plant communities mapped within the extent of this habitat include iodine bush scrub, spinescale scrub, salt grass flats, alkali goldenbush scrub, alkali goldfield flower fields, and bush seepweed scrub.

Herbaceous Habitats

Three herbaceous habitats were identified in the Habitat Study Area: Annual grassland, fresh emergent wetland, and pasture.

Annual Grassland

In the Habitat Study Area, annual grasslands are typically characterized by nonnative annual grass species. Dominant species include several species of brome, annual fescues, oats, and barleys. Native species may be present but in lower densities, including goldfields, owl's clover (*Castilleja* spp.), tarweed, pepperweed, saltgrass, fiddleneck (*Amsinckia menziesii*), and popcorn flower (*Plagiobothrys* spp.). On occasion, shrub species, including saltbush (*Atriplex* spp.), iodine bush, bush seepweed, and goldenbush, may occur at very low percent cover (generally less than 2%). Annual grasslands in the Habitat Study Area have typically experienced some level of disturbance in the past that was associated with the various agriculture practices, row cropping, or grazing. Although these areas typically have a history of disturbance, they continue to provide suitable habitat for a number of special-status plant and wildlife species. Like the alkali desert scrub habitats, annual grasslands that appear to have experienced lower levels of disturbance often exhibit vernally inundated or saturated areas (vernal pools).

Many wildlife species are known to use annual or perennial grasslands for foraging, but some require special habitat characteristics such as cliffs, caves, ponds, or habitats with woody plants for breeding, resting, and escape cover. Due to the scarcity of woody vegetation, grasslands often support a variety of burrowing animals. Typical species observed during the field surveys in grassland habitats include black-tailed jackrabbit (*Lepus californicus*), California ground squirrel, Botta's pocket gopher (*Thamnomys bottae*), California vole (*Microtus californicus*), American badger, coyote, savannah sparrow, burrowing owl, horned lark, western meadowlark, turkey vulture (*Cathartes aura*), northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), western fence lizard, and Northern Pacific rattlesnake. Wildlife observed in association with vernal pool features included black-necked stilt, cinnamon teal, great white egret, western spadefoot toad, Pacific treefrog, tiger beetles, and vernal pool branchiopods.

Fresh Emergent Wetland

Fresh emergent wetland in the Habitat Study Area was observed in small patches associated with man-made structures, including detention basins, groundwater recharge reservoirs, and irrigation and drainage ditches. Typical species in these areas included willows, rushes, bulrushes (*Scirpus* sp.), cattails (*Typha* spp.), and docks (*Rumex* spp.). Based on aerial photography and windshield surveys, a large complex of fresh emergent wetland exists in the vicinity of Cross Creek. Permission to enter this area was not granted, so the extent of fresh emergent wetland was mapped through photo interpretation of aerial photographs. Otherwise, fresh emergent wetland habitats outside of the Cross Creek area were typically small vegetated areas that experience year-round ponding from irrigation water or, less frequently, seasonally during the winter rain events.

Many species rely on fresh emergent wetlands for their entire or a portion of their life cycle. The federally delisted Aleutian Canada goose (*Branta canadensis leucopareia*), bald eagle, and peregrine falcon (*Falco peregrinus*) use fresh emergent wetlands as feeding areas and roost sites (CDFG 1988). Typical species observed in association with this habitat type during the field surveys include red-winged blackbird (*Agelaius phoeniceus*), marsh wren (*Cistothorus palustris*), great white egret, great blue heron (*Ardea herodias*), bullfrog (*Rana catesbeiana*), and Pacific treefrog.

Pasture

Pastures in the Habitat Study Area are actively grazed fields associated with private property. Generally these areas are characterized by a mix of annual grasses such as bromes, barley, oats, and annual fescues with other herbaceous species. These pasture grasses are either grazed low to the ground or may grow unchecked, depending on the frequency of grazing. Typically, these areas were actively grazed by cattle and horses but not irrigated. These areas provide some habitat for special-status wildlife species and very little habitat for special-status plant species because of the high level of disturbance.

During the field surveys, wildlife observed in this habitat type included California ground squirrel, Botta's pocket gopher, black-tailed jackrabbit, long-tailed weasel (*Mustela frenata*), house sparrow, American crow (*Corvus brachyrhynchos*), American goldfinch (*Carduelis tristis*), mourning dove (*Zenaida macroura*), western scrub jay, western skink, and western fence lizard.

Aquatic Habitats

Two aquatic habitats were identified in the Habitat Study Area: riverine and lacustrine.

Riverine

Riverine habitat in the Habitat Study Area consists of open-water areas in canals and irrigation ditches, and open-water areas in the flow channel of rivers, such as the Kings and Kern rivers, and creeks, such as the Tule, Cross, and Poso. Due to extensive water diversion for agricultural purposes, riverine habitats in the Habitat Study Area do not exhibit natural flow regimes and may be dry throughout a given year. In these areas vegetation was either absent or sparse along sandy bottoms due to water-level fluctuations, vehicle disturbance, or maintenance activities in an irrigation canal or ditch. Typical vegetation, when present, was dominated by weedy species such as mustards (Brassicaceae) and grasses. Vegetation on the banks and on levees above the riverine areas was mapped separately as valley foothill riparian or other habitat type.

Wildlife species observed in riverine habitats during the various field surveys included bullfrog (*Rana catesbeiana*), mosquito fish, carp, dragonflies, red swamp crayfish (*Procambarus clarkii*), and Asian clam (*Corbicula fluminea*).

Lacustrine

Lacustrine habitat in the Habitat Study Area is limited to man-made basins used for water storage and groundwater recharge. These basins range in size from less than 1,000 square feet to hundreds of acres. These basins typically have earthen berms and little or no emergent vegetation. There are no natural permanent lakes in the Habitat Study Area. One large basin observed was partially bordered by a narrow band of willows and other riparian vegetation, and supported large colonies of nesting birds, such as cormorants and egrets. Other small basins had little or no sign of use by wildlife. Many of the smaller basins were surrounded by fences, limiting wildlife access.

Based on the agricultural practices observed during the various field surveys, lacustrine habitats are regularly exposed to a variety of agriculture uses and likely include heavy loads of pollutants such as fertilizers, pesticides, rodenticides, and other toxic chemicals. As with riverine areas, basins used for water storage and groundwater recharge are subject to fluctuations in water level, depending on the needs of the landowner, and may be dry during portions of the year.

Although lacustrine habitats in the Habitat Study Area are man-made and controlled, they provide important habitat for many wildlife species. The larger detention basins observed were used by a variety of water birds, including American coot, double-crested cormorant, egrets,

Clark's grebe, and several species of duck. Large flocks of swallows were observed feeding over these features. Wildlife observations at small detention basins were limited and included bullfrogs, mosquito fish, egrets, mallards, curlew, and red winged blackbird. Additionally, special-status plant species were observed along the berms of basins and in basins that had been drained. For example, little mouse tail (*Myosurus minimus* ssp. *apus*) was found in a dry basin that was later inundated, and *Atriplex* is often found along the edges of reservoirs.

Land Uses

Nine land use types were identified in the Habitat Study Area: cropland, dryland grain crops, irrigated grain crops, irrigated hayfield, irrigated row and field crops, deciduous orchard, evergreen orchard, vineyard, and urban. These land uses characterize the overwhelming majority of land in the Habitat Study Area. Comparison of 2005 and 2009 aerial imagery to observations made during field survey efforts revealed that natural habitats, such as alkali desert scrub, valley foothill riparian, and annual grassland habitats, continue to decline through conversion to agricultural land uses.

Cropland

Croplands were mapped when a distinction between dryland grain crops, irrigated grain crops, irrigated hayfield, or irrigated row and field crops could not be made. This was the case when a field had been recently tilled and it was not clear what would be planted. This habitat type is very disturbed and is characterized by little to no native vegetation, pesticide and herbicide use, and management.

During the survey effort, typical wildlife observed in cropland habitats included American crow, red-tailed hawk, mourning dove, European starling, and killdeer (*Charadrius vociferus*).

Dryland Grain Crops

Dryland grain crop in the Habitat Study Area is characterized by nonirrigated fields of wheat (*Triticum* spp.). Wheat is an annual species and is usually planted by drilling in rows that produce solid stands, forming 100% cover at maturity in good stands. In many areas of the state a dryland crop is grown one year, and then the land may be fallowed (not planted) for one or more years. If the land is fallowed, a combination of dropped grain and volunteer native or naturalized herbaceous species may grow.

Many species of rodents and birds have adapted to this type of cropland, and may be controlled by fencing, trapping, and poisoning to prevent excessive crop losses. Hawks, owls, and other predators feed on the rodents in these areas. Dryland grain crops may provide short-term cover and foraging, and longer-term movement corridors for wildlife.

Irrigated Grain Crops

Irrigated grain crops in the Habitat Study Area are characterized by irrigated fields predominantly of wheat. As with dryland grain crops, wheat is usually managed in a crop-rotation system and grown in rows. The primary difference between areas mapped as irrigated grain crops and dryland grain crops is the presence of water, which results in more robust fields generally with greater cover of the particular crop. Some fields may form 100% cover, while others may have significant bare areas between rows.

Due to the heavy disturbance from agriculture management activities, irrigated grain crops do not typically provide suitable habitat for special-status plant species, although these areas may serve in place of freshwater wetlands for a variety of associated aquatic habitat-dependent

wildlife, including shorebirds, wading birds, and gulls. The availability of irrigation water during the summer months may provide benefits to wildlife species as a source of water (CDFG 1988).

Irrigated Hayfield

Irrigated hayfield in the Habitat Study Area includes alfalfa (*Medicago sativa*) fields and grass hayfields. Generally, alfalfa fields are maintained unplowed for approximately 3 years or more and are then followed by a cereal grain crop, vegetables, potatoes, or tomatoes for 1 to 4 years before being planted to alfalfa again. Most hay fields in the warmer parts of California are monocultures of alfalfa. Designation of a hayfield as irrigated hayfield depends more on management of the site than on plant composition. Except for the 2- to 6-month initial growing period, depending on climate and soil, this habitat is dense, with nearly 100% cover. Plowing may occur annually, but is usually less often. In the San Joaquin Valley, alfalfa field growth begins during February, and harvesting occurs six to eight times per season.

Irrigated hayfields provide seasonal forage and refugia for blackbirds, deer, doves, egrets, foxes, garter snakes, gophers, gopher snakes, hawks, king snakes, owls, sandhill cranes (*Grus canadensis*), voles, waterfowl, and others. However, where harvesting is constant, reproduction values for ground-nesting wildlife species are reduced to zero. If rotational cropland is adjacent, this habitat can provide cover during seasonal disking and planting on the rotated fields. Alfalfa fields are a preferred foraging habitat for the Swainson's hawk, a state-listed, threatened raptor species (CDFG 1988).

Irrigated Row and Field Crops

Irrigated row and field crops in the Habitat Study Area include root vegetables (such as onions) or cotton. Most crops are grown in rows, although the structure of these areas is variable. Some crops may form 100% cover while others may have bare areas.

In general, these crops have eliminated all aspects of natural habitat for native wildlife species, and are managed to minimize crop depredation by wildlife through fencing, trapping, and poisoning. Where such controls are less stringent, this habitat may support populations of rodents such as California ground squirrel and rabbits. This habitat may also support rodent predators (including snakes, hawks, fox, and coyote), deer elk, raccoon, possum (*Didelphimorphia* sp.), insects, and a wide variety of birds and bats, both fruit-eating and insectivorous (CDFG 1988).

Deciduous Orchard

Deciduous orchards in the Habitat Study Area include rows of almonds (*Prunus dulcis*), apricot trees (*Prunus armeniaca*), and pistachios (*Pistacia vera*). The majority of deciduous orchards observed during the field surveys had little or no understory vegetation. Generally, these areas are heavily managed with fertilizers, pesticides, herbicides, and other mechanical means to control the understory vegetation. As a result these areas do not provide suitable habitat for special-status plant species.

Deciduous orchards where wildlife are not strictly or intensely controlled may provide some habitat value. Wildlife such as deer and rabbits may browse on the trees or vines; squirrels and birds feed on fruit or nuts. Some wildlife (e.g., mourning dove and California quail) use the habitat for cover and nesting sites. In many orchards, nest boxes had been installed along the orchard perimeters to attract raptors such as barn owls and American kestrels that feed on rodents and other crop pests. Similarly, rodent control measures in the way of bait boxes and poison traps were regularly observed. In the Habitat Study Area nearly all deciduous orchards are irrigated either by flood, drip, or spray irrigation systems that may provide water for wildlife during the dry months.

Typical wildlife species observed during surveys in deciduous orchards include the California ground squirrel, Botta's pocket gopher, American crow, European starling, house finch, sparrows, and Argentine ants.

Evergreen Orchard

Evergreen orchards in the Habitat Study Area are typically characterized by citrus species such as oranges (*Citrus aurantium*) or lemons (*Citrus limon*). These are usually low, bushy trees with a maintained open understory to facilitate harvest. The understory is usually composed of low-growing grasses, legumes, and other herbaceous plants, but may be managed to prevent understory growth totally or partially, such as along tree rows (CDFG 1988).

Benefits to wildlife are similar to those described for the deciduous orchard except that evergreen orchards generally do not provide the food for wildlife that many of the deciduous fruit and nut trees provide. However, evergreen orchards may provide beneficial shelter during inclement weather in winter or in hot summer periods. As described for deciduous orchards, nest boxes had been installed along the perimeters of many orchards to attract raptors that feed on common agricultural pests, and rodent control devices such as bait boxes and poison traps were regularly observed. In the Habitat Study Area nearly all evergreen orchards are irrigated either by flood, drip, or spray irrigation systems that may provide water for wildlife during the dry months.

Vineyard

Vineyards in the Habitat Study Area are typically characterized by grapes planted in rows, usually supported on wood and wire trellises. Vines are normally intertwined in the rows but open between rows. Areas under the vines are usually sprayed with herbicides to prevent the growth of herbaceous plants. Between the rows of vines, grasses, and other herbaceous plants may be planted or allowed to grow as a cover crop to control erosion (CDFG 1988).

Benefits to wildlife are generally similar to those described for deciduous orchards. However, deer and rabbits are known to browse on the vines, and squirrels and birds are known to feed on the fruit. Vineyards can be especially beneficial as cover to wildlife during hot summer periods, but because the vines are deciduous and relatively short compared to orchard trees, they do not provide significant cover during cold and wet winter months. Many wildlife species act as biological control agents by feeding on weed seeds and insect pests (CDFG 1988). Wildlife movement and migration is limited in vineyards. Intertwined vines and the wood and wire trellises restrict the movement of larger mammals in all but one linear direction, depending on the direction of the rows. In addition, the tight rows of trellises are a deterrent to raptors that drop down on their prey from above.

As described for deciduous orchards, nest boxes had been installed along the perimeters of many vineyards to attract raptors that feed on common agricultural pests (e.g., rodents).

Urban

Urban areas in the Habitat Study Area include municipalities, industrial, residential, and agricultural structures (e.g., feedlots and poultry farms), and adjacent dedicated areas such as yards, roads and, road shoulders, highways, parking lots, and stockpiles. In urban municipalities, the majority of land is covered by impervious materials; vegetated areas include landscape plantings and shade trees along roads and buildings. Species richness and diversity are extremely low in urban centers, but adaptive native and nonnative wildlife species like the rock dove (*Columba livia*), house sparrow, and starling have acclimated to these areas (CDFG 1988). Within urban areas, mapped wetland features such as ditches and seasonal wetlands are present.

In the vicinity of towns and cities, the extent of urban areas was delineated based on the urbanized area and urban cluster boundaries identified during the 2000 U.S. Census. During the field surveys, biologists observed a number of wildlife species that have adapted and become acclimated to urban areas, including the California ground squirrel, Botta's pocket gopher, black-tailed jackrabbit, long-tailed weasel, house sparrow, American crow, mourning dove, western scrub jay, and western fence lizard. In Bakersfield, special-status species like the San Joaquin kit fox have also become acclimated to developed urban areas (CDFG 2012a).

BNSF Urban

The BNSF Railway right-of-way travels along the length of the Central Valley in a north-south direction, extends south from Fresno through Hanford, and parallels SR 43 from north of Corcoran to the town of Greenacres just west of Bakersfield, a distance of roughly 62 miles. In general, the BNSF Railway right-of-way is 50 feet in width, and the rail tracks are set on an embankment that is a minimum of 5 feet above the surrounding grade. The embankment is constructed of compacted soil and imported gravel fills. Numerous culverts bisect the base of the berms for drainage purposes. Crossings of larger drainages exist as freestanding bridges. Most road crossings of the BNSF Railway right-of-way consist of at-grade crossings that allow vehicles to drive over the berms and tracks.

For the purposes of this analysis, all developed lands (e.g., crop, urban) in the BNSF Railway right-of-way were mapped under the BNSF Railway classification. All areas of developed habitats (crop, urban) in the right-of-way are controlled by BNSF Railway, which retains the right to modify land use within the right-of-way, such as the removal of orchard trees or structures. All riverine, canal, and natural upland habitats (i.e., annual grassland, alkali desert scrub, and valley foothill riparian) in the BNSF Railway right-of-way were mapped as such. Vegetation in the BNSF Railway right-of-way varies along its length. At any given point along the BNSF Railway right-of-way, wildlife use is largely determined by adjacent habitats. However, in areas dominated by frequent soil disturbance, especially cropland habitats, the railroad berms may provide habitat for fossorial animals. The BNSF Railway right-of-way contains mapped wetland features such as seasonal wetlands and vernal pools.

4.2.2.2 Non-Vegetated Habitats

One non-vegetated habitat was identified in the Habitat Study Area: Barren.

Barren

Barren areas in the Habitat Study Area are defined by the permanent absence of vegetation. This includes any habitat with less than 2% total vegetation cover by herbaceous or non-wildland species and with less than 10% cover by tree or shrub species. Areas mapped as barren during the field survey include areas of bare earth resulting from industrial activities such as gravel extraction. Barren habitats support few native wildlife or plant species, although rock dove, Brewer's blackbird (*Euphagus cyanocephalus*), killdeer, and western fence lizard were observed in barren areas during the field survey effort.

Chapter 5.0
Impacts and Mitigation

5.0 Impacts and Mitigation

This chapter provides the results of the background review and various jurisdictional waters, botanical, and wildlife resource surveys, including surveys of special-status species, special-status plant communities, and wildlife movement corridors. It provides detailed information regarding the protected resources and a summary of the survey results.

Project-level analysis of impacts, conservation measures, compensatory mitigation, and cumulative impacts are discussed in terms of the construction and operation of the Fresno to Bakersfield Section of the HST System. General construction and operational impacts, conservation measures, compensatory mitigation, and cumulative impacts are summarized in the introduction to each resource-specific discussion. Any additional resource-specific results are described thereafter. As with other tables in this technical report, the tables in this chapter summarize project-related results by alternative alignment.

5.1.1.1 Impact Analysis

The methods used to determine potential impacts on biological resources associated with the HST alternative alignments (including the proposed stations) and the HMF site alternatives and definitions of specific terms are discussed in this section.

Potential impacts on jurisdictional waters, special-status plant communities, protected trees, special-status plant and wildlife species (including critical habitat), and wildlife movement corridors were analyzed using both qualitative and quantitative methods:

- Each resource was evaluated for its presence or absence, and for the presence of habitat that could support the resource or provide habitat for the resource. Suitable habitat was determined based on background review and identification of species-specific life-history requirements.
- Potential impacts on special-status wildlife species were determined using a habitat-based approach where the presence of the species was assumed in suitable habitat. Habitats in the project footprint and vicinity were determined through a combination of background review, habitat mapping during field surveys, and aerial photograph interpretation.
- Where permission to enter was granted, impacts on jurisdictional waters, special-status plant communities, protected trees, and special-status plant species were based on actual observation (i.e., presence) and mapping of the resource during field surveys.
- Where permission to enter was not granted and field surveys were not conducted, potential impacts were determined through several methods: (1) the presence of jurisdictional waters and protected trees was evaluated based on observations from adjacent properties and aerial photograph interpretation; (2) the presence of special-status plant communities and special-status plant species was assumed in unsurveyed areas of potential suitable habitat that could support special-status plant species identified during the wildlife habitat assessment; and (3) the presence and limits of jurisdictional waters based on discussions with agency personnel.
- Potential impacts on designated critical habitat were based on the location of the critical habitat relative to the project footprint and the primary constituent elements (PCEs) associated with the critical habitat designation.
- Potential impacts on wildlife movement corridors were based on a combination of background review, communication with scientific experts, field survey mapping, and aerial photograph interpretation.

Where impacts could be quantified, impact acreages were calculated using ArcGIS software. Calculations were based on counts or locations of observations of sensitive resources, acreages of sensitive resources (e.g., jurisdictional waters), or acreages of suitable habitat for resources (e.g., special-status wildlife species). For the majority of the biological resources discussed in the subsequent sections (e.g., jurisdictional waters, special-status plant communities, protected trees, special-status wildlife species), the impacts are quantified in tables. Within each table the column under the BNSF Alternative header represents the acreage of impacts on the particular resource (e.g., special-status plant species) for the entire alignment between Fresno and Bakersfield. The subsequent columns for the remaining HST alternatives (i.e., Hanford West Bypass 1, Hanford West Bypass 2, Corcoran Elevated, Corcoran Bypass, Allensworth Bypass, Wasco-Shafter Bypass, Bakersfield South, and Bakersfield Hybrid) indicate both the total acreage of the impact for that alternative alone (value on the left), and the net change, or acreage difference, that would result from selection of that alternative alignment over the corresponding segment of the BNSF Alternative (value on the right). This net change is titled the "Difference Compared to Corresponding BNSF Area" and represents the difference in impact acreages between an alternative alignment and its corresponding segment in the BNSF Alternative. Positive (+) differences indicate that the alternative alignment results in a greater number of acres impacted than its corresponding segment in the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in fewer impacted acres than its corresponding segment in the BNSF Alternative.

For the impact analysis, resources were considered to be impacted if the development envisioned under the HST alternatives would impact the resources themselves or their suitable habitats (i.e., special-status plant communities, special-status wildlife species, and special-status plant species). Impacts were considered in context with the various regulatory requirements and permitting needs under each of the natural resources regulatory agencies.

In determining the potential direct and indirect impacts associated with construction and operation impacts on biological resources, a number of assumptions and limitations were identified:

- Construction and operation impacts were considered temporary if they can be fully restored to pre-disturbance conditions following construction. Temporary impacts would include construction staging areas, construction laydown, relocation of underground utilities, and other work space that would not be occupied by HST facilities during project operation.
- Impacts were considered permanent when they have lasting effects beyond the project construction period, or cannot be fully restored following construction. Permanent impacts included right-of-way for at-grade track segments, elevated structure track segments (everything under the aerial extent of the structure), road crossings, electrical substations, facilities for maintenance-of-way and stations.
- Certain jurisdictional waters types (vernal pools, vernal swales, and vernal pool and swale complexes) are especially sensitive to disturbance; therefore, impacts on these features were considered permanent regardless of the type of activity that would occur because it is unlikely that these features could be restored to their pre-project condition.
- Impacts associated with the stations are included within the appropriate alternative. However, impacts associated with HMFs are not quantified as part of the construction and operation impacts because either none or only one of the proposed HMFs may be constructed. Impacts associated with HMFs are described separately from the alternative alignments and stations, both qualitatively and quantitatively.

- Assuming presence of special-status wildlife species, based on a habitat-level assessment, could overestimate the magnitude and severity of the impacts on these resources.
- Assuming presence of biological communities and special-status plant species in potentially suitable habitats where permission to enter was not granted could overestimate the magnitude and severity of the impacts on these resources.
- A low-to-moderate level of maintenance activities was assumed to occur during operation of the proposed project.
- Construction and operational or maintenance activities outside of the current permanent impact area of the project footprint were not considered in this impact analysis.

5.1.1.2 General Avoidance and Minimization Measures

Because the project would result in impacts on biological resources, mitigation measures were designed to avoid or reduce the impacts on these resources. The mitigation strategies were developed in accordance with the *Final Program Environmental Impact Report and Environmental Impact Statement for Proposed California High Speed Train System* (Authority and FRA 2005). The mitigation strategy includes avoidance of impacts on biological resources to the extent possible: field verification of sensitive resources and filling data gaps; the formulation of alternative alignments; limiting modifications to access and egress points to facilities; designing cuts, fills, and aerial structures to minimize impacts on biological resources; and incorporating wildlife crossings to facilitate known wildlife movement corridors.

5.1.1.3 Compensatory Mitigation

When impacts on biological resources or wetlands, including jurisdictional waters, special-status plant species, and special-status wildlife species appeared unavoidable, compensatory mitigation was proposed. Compensatory mitigation will reduce direct and indirect impacts on these resources resulting from project construction and operation.

Compensatory mitigation for permanent and temporary impacts will be required by the regulatory agencies and will occur at locations determined through consultation under the appropriate regulatory requirements. Compensatory mitigation will be accomplished through one of the following:

- Purchase of credits from an agency-approved mitigation bank.
- Fee-title-acquisition of natural resources regulatory agency-approved property.
- Purchase or establishment of a conservation easement with an endowment for long-term management of the property-specific conservation values.
- In-lieu fee contribution determined through negotiation and consultation with the various natural resources regulatory agencies.

Compensatory mitigation for biological resources will occur through creation, restoration, enhancement, or preservation of lands through one of the above mechanisms. The amount of compensatory mitigation required will be based on a ratio of the amount of disturbance to biological resources and the amount of land required to offset or reduce the impacts. Resource- and/or species-specific compensatory mitigation ratios are discussed under each resource; however, compensatory mitigation ratios and the exact amount of compensatory mitigation required will be determined through consultation with the natural resources agencies.

5.1.1.4 Cumulative Impacts

The study area for cumulative impacts on biological resources is the Tulare Basin because it encompasses all of the HST alternatives. Before European settlement and the subsequent large-scale agricultural conversion of the area, the Tulare Basin was a vast, ecologically rich landscape that contained a diverse assemblage of habitats covering over 2.5 million acres. The basin contained over 250,000 acres of freshwater wetlands and seasonal lakes; during the peak spring runoff, up to approximately 625,000 acres of the basin floor would be inundated. Upland vegetation, including alkali desert scrub and annual grasslands found in the basin, collectively covered over 1.75 million acres. Oak woodlands covered approximately 437,000 acres (Werschkull et al. 1984). This assemblage of habitats supported abundant terrestrial and aquatic wildlife and plant species. Historically, the major rivers and creeks that emptied into the basin (i.e., Kings, Tule, Kaweah, White, and Kern rivers, and Cross and Poso creeks) directly fed large seasonal lakes (Tulare, Buena Vista, Kern, and Goose lakes).

During the nineteenth century, immigrants to the basin began clearing suitable lowland areas for agriculture. Because the prevailing climate in the valley is semi-arid, the limited precipitation that does occur is too sparse to support large-scale crop cultivation. Water diversion was necessary to accommodate agricultural development. Over the past century, sophisticated water transport networks were developed; these networks turned the basin into one of the most agriculturally productive areas in the world. The success of agriculture in the basin has led to a substantial fragmentation and loss of native habitats, including jurisdictional waters, special-status plant communities, special-status plant species, special-status wildlife species, and wildlife movement corridors, including Tulare, Buena Vista, Kern, and Goose lakes. Fewer than 5% of the historical or restored sensitive biological communities—about 200,000 acres—currently remain (Bureau of Reclamation 1990). Also, growth in the metropolitan areas of Fresno and Bakersfield has substantially increased human population and disturbance to the surrounding natural communities. For these reasons, substantial and significant impacts have occurred to biological resources in the Tulare Basin.

The Fresno to Bakersfield Section would be the largest project to be constructed in the Tulare Basin in the foreseeable future. Although the project follows a narrow linear corridor, project impacts would occur over a large area (i.e., the length of the project). Construction of the Fresno to Bakersfield Section would contribute to the overall degradation of biological resources. Other past, present, and reasonably foreseeable future actions would exacerbate the impacts from the project. Therefore, when combined with other past, present, and reasonably foreseeable future actions, the impact of the project on biological resources is judged to be considerable.

Successful implementation of proposed mitigation measures would reduce the nature and magnitude of project impacts. Compliance with federal, state, and local regulations through regulatory agency consultation and permitting would result in further development of specific avoidance and minimization measures, best management practices, and identification of locations for compensatory mitigation that would further reduce the contribution of the project to cumulative impacts. This mitigation and regulatory compliance would reduce the project's contribution to cumulative impacts on biological resources.

5.2 Jurisdictional Waters

Based on the background review and subsequent field surveys, a number of jurisdictional waters occur in the Wetland Study Area, including U.S. Geological Survey blue-line streams and rivers, namely the Kings River, Cross Creek, Tule River, Deer Creek, Poso Creek, and the Kern River. The National Wetlands Inventory identifies a number of jurisdictional waters in the Wetland Study Area, including freshwater emergent wetlands and freshwater forested/shrub. The Holland Vernal

Pool dataset (Holland 2009) identifies vernal pools in the vicinity of Cross Creek and the Allensworth Bypass area. Additional jurisdictional waters were identified in the field.

5.2.1 Survey Results

Field surveys identified 1,021 jurisdictional water features totaling 711.86 acres in the Wetland Study Area. All jurisdictional waters in the Wetland Study Area are depicted on Figure 5-1. Jurisdictional waters identified during the field surveys included wetlands, other waters of the U.S., and waters of the state. Identified wetland features included emergent wetlands, seasonal wetlands, vernal pools, vernal swales, and vernal pool and swale complexes. Waters of the U.S., other waters of the U.S., and waters of the state identified in the Wetland Study Area included canals, ditches, reservoirs, retention and detention basins, riparian areas, and seasonal riverine. Table 5-1 provides a summary of the jurisdictional waters identified based on the Cowardin classification system, HST water classification, and the jurisdictional status of the features found in the Wetland Study Area.

The majority of wetlands identified in the Wetland Study Area are found in the Upper Kaweah Basin and Upper Deer–Upper White Basin (within annual grasslands in the vicinity of Cross Creek and alkali desert scrub near the town of Allensworth, respectively). Other waters of the U.S. and waters of the state are found throughout the Wetland Study Area. Significant amounts (greater than 50 acres) of other waters occurred in the Upper Deer-Upper White Basin, the Upper Kaweah Basin, and the Tulare-Buena Vista Lake Basin watersheds. The largest acreage of waters of the state occurred in the Tulare-Buena Vista Lakes Basin Watershed. Table 5-2 presents a summary of jurisdictional waters in the Wetland Study Area, organized by watershed. Jurisdictional water features found in the Wetland Study Area are described below.

Figure 5-1 contains confidential information and has therefore not been included on the website.

Table 5-1
Jurisdictional Waters in the Wetland Study Area

Cowardin Classification	HST Water Classification	Jurisdiction
Riverine unconsolidated bottom	Canal[a]	Other waters of the U.S. and waters of the state[b]
Riverine unconsolidated bottom	Ditch[a]	Other waters of the U.S. and waters of the state[b]
Palustrine persistent emergent	Emergent Wetland	Wetlands (waters of the U.S.) and waters of the state
Lacustrine unconsolidated bottom	Reservoir[a]	Other waters of the U.S., and waters of the state
Lacustrine unconsolidated bottom	Retention/detention basin[a]	Other waters of the U.S. and waters of the state
Not applicable	Riparian	Waters of the state
Riverine unconsolidated bottom	Seasonal riverine	Other waters of the U.S. and waters of the state
Palustrine emergent nonpersistent	Seasonal wetland	Wetlands (waters of the U.S.) and waters of the state
Palustrine emergent nonpersistent	Vernal pool and potential vernal pools	Wetlands (waters of the U.S.) and waters of the state
Palustrine emergent nonpersistent	Vernal swale	Other waters of the U.S. and waters of the state
Palustrine emergent nonpersistent	Vernal swale and pool complex	Other waters of the U.S. and waters of the state

Notes:
[a] Man-made environment.
[b] Wherever possible, federal and state jurisdictions were separated: federal jurisdiction was delineated to the ordinary high water mark, while state jurisdiction was delineated to either top of bank or edge of the riparian drip line.

5.2.1.1 Canals/Ditches

Canals are linear features, often concrete-lined and ranging from approximately 10 to 50 feet in width; they are, in most instances, features that are named in the National Hydrography Dataset (USGS 2009). Ditches share many characteristics with canals but are typically narrower, exhibit lower water-carrying capacity, and cover shorter distances. They are typically unlined, earthen features with regulated, intermittent, or near-continuous hydrology. Within the Wetland Study Area, canals/ditches occur in all segments of the Fresno to Bakersfield alternatives. Their purpose is to transport quantities of water, typically for irrigation or drainage purposes.

Canals are typically linked to seasonal riverine areas and reservoirs by a series of ditches and culverts. These connections typically occur outside of the Wetland Study Area. Canals are typically devoid of vegetation and lack natural soils (because they are lined), although sediments often deposit at the bottom. They are regularly maintained, and are frequently bounded by parallel access roads. Ditches typically have a bed and bank, and display evidence of an OHWM or other forms of visible hydrology. A series of pumps are often used to transport water between canals, ditches, or under roads and other infrastructure. In general, canals/ditches are in relatively poor ecological condition due to a poor landscape position, have a highly manipulated

hydrological regime, offer few biological resources to plants and wildlife, and are physically engineered to the extent that they are devoid of natural characteristics. Due to this manipulation and the lack of natural characteristics, the extent of these features is mapped to the top of the bank. Although there is not a Cowardin classification that suits canals because they are lined, canals/ditches most closely resemble and are considered for the purpose of this report to be riverine unconsolidated bottom.

5.2.1.2 Emergent Wetlands

Emergent wetlands occur in two locations: (1) west of the town of Hanford and (2) in Bakersfield. They are characterized by topographic depressions that flood frequently or hold ponded water long enough to support hydrophytic vegetation, and they typically feature hydric soils. The presence of vegetation separates these features from retention/detention basins. Emergent wetlands present in the Wetland Study Area appear to be man-made or highly manipulated. They are bounded by earthen walls and receive hydrologic input from surrounding canals, agricultural fields, and urban development. The emergent wetland within the Hanford West Bypass Alternatives occurs in a large depression surrounded by riparian vegetation. It appears to receive input from the adjacent canal and may be a remnant of a historic natural drainage system. This emergent wetland offers some habitat for wading birds and waterfowl. The emergent wetlands in the Bakersfield South Alternative are associated with retention/detention basins. They either comprise vegetated portions of basins or have replaced former basins that are now vegetated. In general, the emergent wetlands are in poor to fair ecological condition due to a poor landscape position. They have a highly manipulated hydrologic regime, offer few biological resources to plants and wildlife, and are physically engineered to the extent that they retain few natural characteristics. The Cowardin classification for emergent wetlands is palustrine persistent emergent.

5.2.1.3 Retention/Detention Basins

Retention/detention basins are man-made features that are square, rectangular, round, or triangular in shape, often with constructed earthen walls, and always devoid of vegetation. Retention/detention basins are typically several hundred square feet but can be much larger. The spatial extent of retention/detention basins is determined by the location of the OHWM. Retention/detention basins are classified as other waters of the United States and are given the Cowardin classification of lacustrine unconsolidated bottom.

These features are closely associated with agriculture activities and in most instances are used as water storage or retention facilities. In urban areas, retention/detention basins are used to retain urban storm water runoff. Surface water within the basins may be seasonal or perennial, depending on the location and use of the feature. These features are often associated with agriculture land uses including pasture, cropland, irrigated grain crops, irrigated hayfield, irrigated row and field crops, deciduous orchard, evergreen orchard, vineyard, and urban. In general, retention/detention basins are in relatively poor ecological condition due to a disturbed environmental setting, have a highly manipulated hydrological regime, offer few biological resources to plants and wildlife, and are physically engineered to the extent that they are devoid of natural characteristics.

5.2.1.4 Reservoirs

Reservoirs are large, steep-sided, man-made impoundments that store drinking water or irrigation water. Reservoirs are significantly larger than retention/detention basins. Five reservoirs occur in the Wetland Study Area, including the Tulare Lake Bed Mitigation Site, which was developed and is maintained by the Kaweah Delta Water Conservation District for waterfowl. One reservoir in the vicinity of Tule Creek is managed by the Alpaugh Irrigation District. The reservoir

is a large open-water feature that is largely devoid of vegetation; however, this feature provides important habitat for wading birds and waterfowl. Reservoirs are in relatively poor to fair ecological condition due to a disturbed environmental setting, have a highly manipulated hydrological regime, offer few biological resources to plants and non-avian wildlife, and are physically engineered to the extent that they are devoid of natural characteristics. They are rectangular-shaped and surrounded by earthen berms. Hydrologically speaking, reservoirs are perennial water bodies.

Several other waters of the U.S. were identified in conjunction with the reservoir feature, including a number of ditches, seasonal wetland features, and retention/detention basins. The Cowardin classification for reservoirs is lacustrine unconsolidated bottom.

5.2.1.5 Riparian

Riparian areas are associated with the seasonal riverine jurisdictional waters and are identified as waters of the State. Riparian features are the areas that lie between the maximum extent of other waters of the U.S. and the outer drip line of riparian vegetation. Riparian areas in the Wetland Study Area are characterized by cottonwood, sycamore, valley oak, and willow trees. Riparian areas occur between the outer levee and the seasonal riverine communities along Kings River, Cole Slough, Deer Creek, Poso Creek, Tule River, and Kern River. Riparian vegetation supports physical and biological processes, including temperature regulation and valuable aquatic food web services (inputs for nutrient cycling and food availability). They are generally in relatively fair to good ecological condition; are associated with waterways that have varying levels of hydrologic manipulation; provide fair to good biological resources for plants and wildlife; and due to existing land uses in the region, have been physically reduced and restricted to narrow areas along seasonal riverine features. There is no Cowardin classification for riparian areas.

5.2.1.6 Seasonal Riverine

Seasonal riverine waterways occur as discrete features throughout the Wetland Study Area and include Kings River Complex, Mussel Slough, Oak Slough, Cross Creek, Tule River, Deer Creek, Poso Creek, Kern River, and other unnamed waterways. Many of these features originate in the Sierra Nevada where their hydrology is less affected by water developments. Although their hydrology is affected by water storage and hydroelectric development in the headwaters, the upper reaches of these streams are less affected by water developments than the reaches in the Wetland Study Area. By the time these features reach the Wetland Study Area, they are highly manipulated for municipal and agricultural purposes, and much of their surface water and groundwater has been diverted, pumped, or captured. In the Wetland Study Area, these resources are often seasonally dry.

Banks and floodplains of seasonal riverine features in the Wetland Study Area have largely been channelized, and adjacent riparian vegetation has been removed, except where levees protect the upper floodplain. In general, the streambeds are unvegetated and are composed primarily of sandy or gravelly substrate. For these reasons, seasonal riverine features are in fair to good ecological condition due to landscape positions that have connectivity upstream and downstream. They function with altered and natural hydrological regimes, provide some biological resources to plants and wildlife, and are physically altered, which reduces their natural characteristics. The Kings River contained flowing surface water at the time of the jurisdictional waters surveys in March 2010 and during subsequent surveys in July 2010.

Seasonal riverine areas were mapped as other waters of the U.S. based on the extent of the OHWM. The extent of waters of the state in these seasonal riverine areas is delineated between the OHWM and the top of bank where riparian vegetation is absent. Many of these features were

located immediately adjacent to narrow bands of valley foothill riparian, and often these bands occurred outside of the OHWM and the mapped extent of other waters of the U.S. However, where adjacent riparian vegetation is present, additional waters of the state were delineated based on the extent of the riparian vegetation beyond the top of the bank. The Cowardin classification for seasonal riverine is riverine unconsolidated bottom.

5.2.1.7 Seasonal Wetlands

Seasonal wetlands in the Wetland Study Area occur in disturbed habitats. These disturbed habitats include fallow agricultural areas, drainage ditches along the BNSF right-of-way, retention/detention basins, active agricultural fields, and roadside ditches.

Seasonal wetlands in the Wetland Study Area are found where the soils have sufficient clay content or sufficient compaction to allow water to pond. Typical vegetation includes broadleaf cattail (*Typha latifolia*), field horsetail (*Equisetum arvense*), barley (*Hordeum* spp.), saltgrass (*Distichlis spicata)*, meadow barley (*Hordeum brachyantherum*), bush seepweed (*Sueda moquinii*), asthmaweed (*Conyza bonariensis), Chenopodium* sp., summer Cyprus (*Kochia scoparia*), and fivehook bassia (*Bassia hyssopifolia*). In the most-manipulated areas, inundation is hydrologically controlled by pumps, weirs, and/or storm drain systems. In less-manipulated systems, natural inundation or saturation occurs during the winter and springs seasons and the seasonal wetlands are dry during the summer and fall. Although sharing a similar hydrologic regime, seasonal wetlands are distinguished from vernal pool wetlands by their lack of the distinctive floristic components and by the absence of a distinctive claypan or hardpan. The Cowardin classification for seasonal wetlands is Palustrine emergent nonpersistent.

Seasonal wetlands were identified within the BNSF right-of-way and various roadside ditches from southern Corcoran south to SR 46, in a ruderal field in the urban Fresno area, in two urban stormwater retention/detention basins in urban Bakersfield, and in two disturbed grassland/pasture areas north of Corcoran. The majority of the seasonal wetlands present in the Wetland Study Area were found within the BNSF right-of-way. These wetlands appear to pond shallow water seasonally and to support herbaceous hydrophytic vegetation. Urban retention/detention basins were observed to contain hydric vegetation, such as rushes (*Juncus* sp.) and broadleaf cattail, and appear to collect runoff or irrigation water seasonally within the earthen basin. In general, seasonal wetlands are in relatively fair ecological condition due to a poor landscape position; function with altered and natural hydrological regimes; provide some biological resources to plants and wildlife; and are physically altered, which reduces their natural characteristics.

5.2.1.8 Vernal Pools

Vernal pools within the Wetland Study Area typically occur as a result of the saline-sodic soils. The dispersed clay particles allow water to pond long enough for hydric vegetation to germinate. At the time of the jurisdictional waters surveys, the most prominent hydric plants present were several species of goldfields (*Lasthenia* spp.). Other prominent hydric vegetation found within vernal pools included alkali weed (*Cressa truxillensis)*, pepperweed (*Lepidium* spp.), common tarweed, saltgrass, and alkali heath (*Frankenia salina)*. Upland areas surrounding the vernal pools were dominated by Menzie's fiddleneck (*Amsinckia menziesii)*, bromes (*Bromus* spp.), barley, and foxtail (*Vulpia* spp.). The Cowardin classification for vernal pools is palustrine emergent nonpersistent.

Soil saturation, ponding, prominent sediment deposits, and biotic crust were the most common hydrology indicators of the vernal pool resources. Soils in these areas exhibited pH greater than 8, which masked redoximorphic features that may have been present. Because positive wetland vegetation and hydrology were present, these naturally disturbed soils meet USACE criteria as

problematic hydric soils with faint or no indicators (moderately to very strongly alkaline soils; USACE 2008a).

Within the Wetland Study Area, vernal pools occurred within alkali desert scrub and annual grassland habitat. They were located primarily in the Allensworth area and in the Upper Deer-Upper White watershed. In general these features are in good ecological condition due to their location in natural landscapes away from developed land uses; function within a natural hydrological regime, although some features are affected by a number of hydrological barriers (e.g., BNSF right-of-way, SR 43); provide considerable biological resources to plants and wildlife; and have an unaltered, natural physical structure.

5.2.1.9 Vernal Swales

Vernal swales are shallow depressions with vegetation, hydrology, and soils similar to vernal pools. They were geographically located near the town of Allensworth and occurred exclusively within the BNSF right-of-way. These features were likely man-made due to construction of the BNSF and are likely affected by routine maintenance of the BNSF right-of-way. For these reasons, these features are generally in fair ecological condition. Due to a lack of riverine characteristics (absence of vegetation, lack of a distinguishable bed and bank, and lack of an ordinary high water mark), vernal swales are classified as wetlands (waters of the U.S. and waters of the State). Vernal swales within the Wetland Study Area were found primarily in alkali desert scrub habitat. The Cowardin classification for vernal swales is also palustrine emergent nonpersistent.

Table 5-2
Jurisdictional Water Features in the Wetland Study Area: Totals by Watershed

Watershed	Wetlands		Other Waters of the U.S.		Waters of the State	
	Number of Features	Acreage	Number of Features	Acreage	Number of Features	Acreage
Upper Dry Basin	11	0.71	78	26.90	7	2.57
Tulare-Buena Vista Lakes Basin	112	12.83	221	147.47	17	29.53
Upper Kaweah Basin	5	5.20	45	42.24	—	—
Upper Tule Basin	9	4.49	11	9.22	4	2.49
Upper Deer-Upper White Basin	318	112.60	79	216.47	3	1.14
Upper Poso Basin	—	—	58	19.71	6	5.99
Middle Kern-Upper Tehachapi-Grapevine Basin	2	0.24	30	59.75	5	12.30
Subtotal	457	136.08	522	521.76	42	54.02
Jurisdictional Water Totals	**Number of Features**		**1021**			
	Acreage		**711.86**			

Notes:
— = Not present or not applicable
Calculations based on the Wetland Study Area. Wetland Study Area is based on 15% engineering design project footprint and includes linear and auxiliary project construction features (i.e., TPSS, switching stations, paralleling stations, road overcrossings, and Heavy Maintenance Facility sites) plus a 250-foot buffer.

5.2.2 Project Impacts

Jurisdictional waters, including canals/ditches, culverts, retention/detention basins, seasonal wetlands, vernal pool wetlands, and riverine features, are present at various locations throughout the HST Alternatives (Figure 5-1). The construction of roads, rail track, and associated infrastructure would remove or alter jurisdictional waters through filling, hydrological interruption, or other manners that will disturb these resources. Impact to jurisdictional waters would occur under all HST Alternatives. In the case of man-made features, these impacts would remove or disrupt the limited biological functions these features provide. In natural areas, these activities would remove or disrupt the hydrology, vegetation, wildlife utilization, water quality conditions, and other biological functions provided by these resources. Table 5-3 quantifies permanent and temporary direct impacts as well as indirect impacts on jurisdictional waters under the HST alternatives. As summarized in Chapter 5.0, Impacts and Mitigation, impact Analysis, the "Difference Compared to Corresponding BNSF Area" in Table 5-3 represents the difference in impact acreages between an alternative alignment and its corresponding segment in the BNSF Alternative: positive (+) differences indicate that the alternative alignment results in a greater number of acres impacted than its corresponding segment in the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in fewer impacted acres than its corresponding segment in the BNSF Alternative.

Due to their sensitivity to disturbance, vernal pool features, including vernal pools and vernal swales, are difficult to restore to their pre-project condition following temporary impacts. Therefore, all impacts on these features are considered permanent and are quantified solely under permanent impacts. For all jurisdictional water features, indirect impacts were quantified by calculating the acreage of the features within a 250-foot buffer of the project footprint (including temporary and permanent disturbance areas). For vernal pools and vernal swales, an additional category, "indirect bisected," is presented under indirect impacts to quantify impacts on features that are bisected by the boundary of the project footprint (i.e., where a vernal pool or swale straddles the project footprint boundary). This category presents the acreage for the portion of these features that lies outside the project footprint but within 250 feet.

Table 5-3
Comparison of Impacts on Jurisdictional Waters by Alternative

Wetlands and Other Waters (TYPE/HST water type)	Impact Type[A]	High-Speed Train Alternatives										
		BNSF Impact Acreage	Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
			Impact Acreage / Difference Compared to Corresponding BNSF Area[B]									
WETLANDS TOTAL	Permanent	37.30	0.01 / +0.01	0.01 / +0.01	—	—	5.89 / -1.14	1.62 / -5.42	7.38 / -20.38	—	0.01 / -0.11	0.01 / -0.12
	Temporary	*0.82*	—	—	—	—	—	—	*— / -0.16*	—	—	—
	Indirect	78.89	0.93 / +0.93	0.93 / +0.93	1.25 / +1.25	1.25 / +1.25	3.92 / +1.14	1.68 / -1.09	22.33 / -43.6	—	0.55 / -0.09	0.51 / -0.13
Emergent wetland	Permanent	—	—	—	—	—	—	—	—	—	—	—
	Temporary	—	—	—	—	—	—	—	—	—	—	—
	Indirect	<0.01	0.49 / +0.49	0.49 / +0.49	0.49 / +0.49	0.49 / +0.49	—	—	—	—	— / -<0.01	<0.01 / -<0.01
Seasonal wetland	Permanent	1.30	0.01 / +0.01	0.01 / +0.01	—	—	0.05 / +0.05	0.43 / +0.43	0.12 / -0.43	—	0.01 / -0.11	0.01 / -0.12
	Temporary	*0.82*	—	—	—	—	—	—	*— / -0.16*	—	—	—
	Indirect	40.11	0.44 / +0.44	0.44 / +0.44	0.76 / +0.76	0.76 / +0.76	2.14 / -0.05	0.13 / -2.06	10.75 / -22.69	—	0.55 / -0.08	0.50 / -0.13
Vernal pool	Permanent	15.74	—	—	—	—	5.85 / 0.00	—/ -5.85	2.04 / -7.86	—	—	—
	Temporary	—	—	—	—	—	—	—	—	—	—	—
	Indirect	9.48	—	—	—	—	0.59 / —	1.56 / +0.97	2.14 / -6.76	—	—	—
Vernal swale	Permanent	4.80	—	—	—	—	— / -1.19	1.19 / 0.00	5.01 / +3.16	—	—	—
	Temporary	—	—	—	—	—	—	—	—	—	—	—
	Indirect	7.99	—	—	—	—	1.19 / +1.19	—	2.85 / -2.76	—	—	—
Vernal pool and swale complex	Permanent	15.47	—	—	—	—	—	—	0.21 / -15.26	—	—	—
	Temporary	—	—	—	—	—	—	—	—	—	—	—
	Indirect	21.31	—	—	—	—	—	—	6.59 / -11.4	—	—	—
OTHER WATERS OF THE U.S. TOTAL	Permanent	82.27	15.56 / +3.75	14.04 / +2.23	12.12 / +0.31	10.6 / -1.20	13.53 / -5.45	12.14 / -6.84	21.10 / -6.57	3.36 / -3.26	5.65 / +0.01	5.77 / +0.12
	Temporary	*11.66*	*0.49 / -0.01*	*0.49 / -0.01*	*0.59 / +0.09*	*0.59 / +0.09*	*0.90 / +<0.01*	*4.71 / +3.82*	*2.53 / +1.20*	*1.15 / -1.46*	*2.61 / -1.09*	*3.51 / -0.19*
	Indirect	253.26	32.13 / +0.71	25.85 / -5.57	43.40 / +11.98	37.13 / +5.71	31.33 / +8.56	24.95 / +2.17	126.68 / +9.95	13.83 / -7.21	29.18 / -9.36	29.08 / -9.46
Canal	Permanent	16.30	14.11 / +9.32	13.00 / +8.21	9.78 / +4.99	8.67 / +3.88	5.03 / -0.42	4.87 / -0.58	0.84 / 0.00	—	2.60 / +0.42	3.09 / +0.91
	Temporary	*0.82*	*0.06 / -0.19*	*0.06 / -0.19*	*0.16 / -0.09*	*0.16 / -0.09*	*<0.01 / -0.02*	*— / -0.02*	—	—	*0.47 / +0.26*	*0.96 / +0.75*
	Indirect	45.62	19.13 / +12.69	18.79 / +12.35	19.01 / +12.56	18.67 / +12.22	11.14 / +4.98	6.21 / +0.05	17.35 / +0.28	—	12.26 / +2.26	12.50 / +2.50

Table 5-3
Comparison of Impacts on Jurisdictional Waters by Alternative

Wetlands and Other Waters (TYPE/HST water type)	Impact Type[A]	High-Speed Train Alternatives										
		BNSF Impact Acreage	Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
			Impact Acreage / Difference Compared to Corresponding BNSF Area[B]									
Ditch	Permanent	28.05	0.25 / -1.87	0.22 / -1.90	0.77 / -1.35	0.74 / -1.38	4.26 / -4.26	3.50 / -5.02	3.72 / -2.55	1.78 / -1.85	0.02 / 0.00	0.02 / 0.00
	Temporary	*2.36*	*0.05 / -0.21*	*0.05 / -0.21*	*0.05 / -0.20*	*0.05 / -0.20*	*0.90 / +0.02*	*1.02 / +0.14*	—	*0.05 / +0.04*	—	—
	Indirect	29.73	2.47 / -3.94	2.05 / -4.35	2.52 / -3.88	2.11 / -4.30	8.02 / +3.64	7.92 / +3.53	3.74 / -4.03	5.66 / -2.00	0.13 / +0.09	0.13 / +0.09
Reservoir	Permanent	6.84	—	—	—	—	—	—	10.47 / +3.63	—	—	—
	Temporary	—	—	—	—	—	—	—	—	—	—	—
	Indirect	51.30	—	—	10.70 / +10.70	10.70 / +10.70	0.13 / +0.13	0.13 / +0.13	69.16 / +18.98	—	—	—
Retention/detention basin	Permanent	25.17	0.53 / -0.35	0.35 / -0.54	0.51 / -0.37	0.32 / -0.56	4.00 / -0.78	3.64 / -1.14	5.93 / -7.47	1.58 / -1.41	2.20 / +0.09	1.82 / -0.29
	Temporary	*7.57*	—	—	—	—	—	*3.55 / +3.55*	*2.45 / +1.14*	*1.10 / -1.50*	*1.49 / -1.09*	*1.91 / -0.68*
	Indirect	89.96	5.45 / +1.03	0.79 / -3.64	6.03 / +1.6	1.36 / -3.07	11.24 / -0.02	7.97 / -3.29	35.18 / -4.95	8.17 / -5.22	4.38 / -4.13	4.04 / -4.48
Seasonal riverine	Permanent	5.91	0.66 / -3.36	0.47 / -3.55	1.07 / -2.95	0.88 / -3.14	0.24 / 0.00	0.14 / -0.10	0.13 / -0.18	—	0.83 / -0.50	0.83 / -0.50
	Temporary	*0.92*	*0.38 / +0.38*	*0.38 / +0.38*	*0.38 / +0.38*	*0.38 / +0.38*	—	*0.14 / +0.14*	*0.09 / +0.07*	—	*0.64 / -0.26*	*0.64 / -0.26*
	Indirect	36.66	5.07 / -9.07	4.21 / -9.92	5.15 / -8.99	4.29 / -9.84	0.80 / -0.17	2.72 / +1.75	1.25 / -0.33	—	12.40 / -7.57	12.40 / -7.57
WATERS OF THE STATE TOTAL	Permanent	4.05	0.91 / -1.55	0.97 / -1.49	0.91 / -1.55	0.97 / -1.49	0.38 / -0.01	0.24 / -0.15	0.29 / -0.79	—	0.46 / +0.34	0.46 / +0.34
	Temporary	*0.24*	*0.93 / +0.85*	*0.93 / +0.85*	*0.93 / +0.85*	*0.93 / +0.85*	—	*0.47 / +0.47*	*0.19 / +0.15*	—	*0.34 / +0.22*	*0.36 / +0.24*
	Indirect	30.93	9.87 / -7.79	9.59 / -8.07	9.87 / -7.79	9.59 / -8.07	1.02 / -0.11	1.84 / +0.70	2.62 / -1.37	—	3.67 / -4.49	6.34 / -1.82
Riparian	Permanent	4.05	0.91 / -1.55	0.97 / -1.49	0.91 / -1.55	0.97 / -1.49	0.38 / -0.01	0.24 / -0.15	0.29 / -0.79	—	0.46 / +0.34	0.46 / +0.34
	Temporary	*0.24*	*0.93 / +0.85*	*0.93 / +0.85*	*0.93 / +0.85*	*0.93 / +0.85*	—	*0.47 / +0.47*	*0.19 / +0.15*	—	*0.34 / +0.22*	*0.36 / +0.24*
	Indirect	30.93	9.87 / -7.79	9.59 / -8.07	9.87 / -7.79	9.59 / -8.07	1.02 / -0.11	1.84 / +0.70	2.62 / -1.37	—	3.67 / -4.49	6.34 / -1.82
TOTAL IMPACTS	**Permanent**	**123.63**	**16.48 / +2.21**	**15.02 / +0.75**	**13.03 / -1.24**	**11.57 / -2.70**	**19.80 / -6.61**	**14.00 / -12.41**	**28.76 / -27.74**	**3.36 / -3.26**	**6.12 / +0.23**	**6.23 / +0.35**
	Temporary	***12.72***	***1.42 / +0.84***	***1.42 / +0.84***	***1.52 / +0.94***	***1.52 / +0.94***	***0.90 / +<0.01***	***5.18 / +4.29***	***2.72 / +1.20***	***1.15 / -1.46***	***2.95 / -0.87***	***3.87 / +0.05***
	Indirect	**363.08**	**42.92 / -6.15**	**36.36 / -12.71**	**54.52 / +5.45**	**47.97 / -1.11**	**36.27 / +9.59**	**28.47 / +1.79**	**151.63 / -35.02**	**13.83 / -7.21**	**33.4 / -13.93**	**35.92 / -11.41**

Table 5-3
Comparison of Impacts on Jurisdictional Waters by Alternative

Wetlands and Other Waters (TYPE/HST water type)	Impact Type[A]	High-Speed Train Alternatives										
		BNSF Impact Acreage	Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
			Impact Acreage / Difference Compared to Corresponding BNSF Area[B]									

Notes:

— = No impact or not applicable

[A] Indirect impacts are calculated within a 250-foot buffer of the project footprint, which includes areas of permanent and temporary impacts.

[B] The "Difference Compared to Corresponding BNSF Area" represents the difference in impact acreages between an alternative alignment and its corresponding segment in the BNSF Alternative: positive (+) differences indicate that the alternative alignment results in greater impact acres than its corresponding segment in the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in fewer impact acres than its corresponding segment in the BNSF Alternative.

Impact calculations in this table include alignment alternatives and station alternatives, but do not include HMF alternatives.

All impacts were calculated based on the 15% engineering design project footprint.

Acronyms and Abbreviations:

BNSF = BNSF Railway
HST = high-speed train

Table 5-4
Permanent Impact of Heavy Maintenance Facility Site Alternatives on Jurisdictional Waters

Jurisdictional Water Type	Fresno Works–Fresno HMF Site	Kings County–Hanford HMF Site	Kern Council of Governments–Wasco HMF Site	Kern Council of Governments–Shafter East HMF Site	Kern Council of Governments–Shafter West HMF Site
Wetlands (in acres)					
Emergent wetland	—	—	—	—	—
Seasonal wetland	0.67	—	—	—	—
Vernal pool	—	—	—	—	—
Vernal swale	—	—	—	—	—
Vernal swale and pool complex	—	—	—	—	—
Other Waters of the U.S. (in acres)					
Canal	2.41	—	—	—	—
Ditch	1.88	1.88	0.27	—	—
Reservoir	—	—	—	—	—
Retention/detention basins	1.66	—	1.00	1.14	—
Seasonal riverine	—	—	—	—	—
Waters of the State (in acres)					
Riparian	—	—	—	—	—
Total	**6.61**	**1.88**	**1.27**	**1.14**	—

— = No impact or not applicable
All impacts were calculated based on the 15% engineering design project footprint.
HMF = heavy maintenance facility

No impacts on jurisdictional waters from operation and maintenance activities are anticipated because these features would be removed from the project footprint as a result of construction. No impacts on jurisdictional waters are anticipated to occur as a result of construction of the Station alternatives. If the HMF is constructed in the Fresno to Bakersfield Section, potential impacts on jurisdictional waters would occur with all of the HMF site alternatives except the Kern Council of Governments–Shafter West HMF site. Table 5-4 summarizes the permanent impacts on jurisdictional waters that would result from construction of the HMFs.

The construction of various project components (e.g., embankments, rail beds, road overcrossings, and aerial structure footings) would result in direct impacts on jurisdictional waters. Construction would require the use of heavy machinery to contour the landscape and place fill materials (such as culverts, dirt, and/or engineering structures) in both man-made jurisdictional waters (such as basins and canals/ditches) and in natural features (wetlands, riverbeds, and riparian corridors). The contouring and placement of fill in jurisdictional waters would result in the permanent loss of jurisdictional water functions and values in some places, and only temporarily reduce jurisdictional water functions and values in other locations. Thus, construction would have both permanent and temporary direct impacts on jurisdictional waters.

Additional permanent impacts on jurisdictional waters would occur during construction of bridges and elevated structures (e.g., viaducts) over natural jurisdictional waters such as rivers, creeks (e.g., Kings River, Dutch John Slough, Cole Slough, Cross Creek, Tule River, Deer Creek, and the Kern River), and wetlands as well as over man-made ditches and basins. Permanent impacts would result from the shading of jurisdictional waters by elevated structures (where the elevated structure is in close proximity to the ground), the placement of piles to support the elevated structures and bridges (e.g., Kings River), and the permanent removal of vegetation.

Many of the jurisdictional waters (canals/ditches and seasonal riverine) are heavily managed by local irrigation districts, which serve public water needs and agricultural production. As a result, these jurisdictional waters support few natural biological functions and values. The biological functions of these man-made features include limited habitat for wildlife and capacity for water storage or release. A number of these jurisdictional waters have been previously degraded or impacted by existing roads and BNSF Railway infrastructure. The construction of the BNSF Alternative would eliminate or further degrade these man-made jurisdictional waters.

Direct impacts on natural and man-made features include the removal or modification of local hydrology, the redirection of flow, and the placement of fill material. In the case of man-made features, these impacts would remove or disrupt the limited biological functions that these features provide. In natural areas, these activities would remove or disrupt the hydrology, vegetation, wildlife use, water quality conditions, and other biological functions provided by the resources.

Temporary impacts on jurisdictional waters in all HST alternatives include the placement of temporary fill during construction in both man-made and natural jurisdictional waters. Temporary fill could be placed during the construction of access roads and staging/equipment storage areas. The temporary fill would result in a temporary loss of jurisdictional waters and could potentially increase erosion and sediment transport into adjacent areas.

Potential indirect impacts on jurisdictional waters include a number of water-quality-related impacts: erosion and transport of fine sediments or fill downstream of construction to unintentional release of contaminants into jurisdictional waters that are outside of the project footprint. These discharges would indirectly impact adjacent or downstream jurisdictional waters.

5.2.3 Avoidance and Minimization Measures

The following avoidance and minimization measures are proposed to lessen the project impacts on sensitive biological resources, including jurisdictional waters, special-status plant communities, protected trees, special-status wildlife and plant species, and wildlife movement corridors. Where appropriate, specific information pertinent to jurisdictional waters is provided. These measures are referenced and/or expanded on in the "Avoidance and Minimization Measures" section for each biological resource.

Worker Environmental Awareness Program

Personnel who work onsite will attend a Worker Environmental Awareness Program (WEAP). The awareness program is likely to be required by the regulatory agencies and will cover the following: discussion of the federal ESA, the California ESA, the Bald and Golden Eagle Protection Act, and the MBTA; consequences and penalties for violation or noncompliance with these laws and regulations and project permits; identification and value of special-status plants, special-status wildlife, jurisdictional waters, and special-status plant communities; hazardous substance spill prevention and containment measures; the contact person in the event of the discovery of a dead or injured wildlife species; and review of mitigation measures. In the WEAP, construction timing will be detailed in relation to habitat and species' life-stage requirements, and project maps showing areas of planned minimization and avoidance measures will be included. Construction crews will be informed during the WEAP training that, to the extent possible, travel within the marked project site will be restricted to established roadbeds.

The WEAP will be conducted before the initiation of construction activities and repeated, as needed, when new personnel begin work within the project limits. Daily updates and synopsis of the program will be performed during the daily safety ("tailgate") meeting. All personnel who attend the program will be required to sign an attendance list stating that they have attended the WEAP. HST maintenance crews will be required to attend a WEAP annually.

Biological Monitor

A biological monitor (or monitors) will be present onsite during construction activities that could result in direct or indirect impacts on biological resources to oversee permit compliance and monitoring efforts for all sensitive natural resources. A biological monitor (qualified biologist) is any person who has a bachelor's degree in biological sciences, zoology, botany, ecology, or a closely related field and/or has demonstrated field experience with and knowledge about the identification and life history of the special-status species or jurisdictional waters that could be affected by project activities. In the case of jurisdictional waters, the biological monitor(s) will be responsible for monitoring and documenting the Contractor to ensure compliance with the Section 404 Individual Permit, Section 401 Water Quality Certification, and the Lake and Streambed Alteration Agreement. Activities to ensure compliance would include performing construction-monitoring activities, including monitoring environmental fencing, identifying areas where jurisdictional waters are or may be present, and advising the Contractor of methods that may minimize or avoid impacts on these resources.

A biological monitor will be required to be present in all areas during ground disturbance activities and for all construction activities conducted within or adjacent to identified Environmentally Sensitive Areas and Environmentally Restricted Areas.

Environmentally Sensitive Areas and Environmentally Restricted Areas

Two types of areas will be delineated to protect sensitive biological resources: Environmentally Sensitive Areas and Environmentally Restricted Areas. Environmentally Sensitive Areas are areas within the construction zones containing jurisdictional waters or other resources, such as suitable

habitat for special-status species, where construction activities may be allowed but such activities have restrictions based on the presence of these resources at the time of construction. Environmentally Restricted Areas are areas outside the construction footprint that must be protected in-place during all construction activities. Before starting ground-disturbing activities, these areas will be marked with high-visibility temporary fencing, flagging, or other barrier to prevent encroachment of construction personnel and equipment. These areas will be maintained and monitored by the biological monitor in accordance with the construction work window restrictions. The extent of these areas will be determined through consultation and permitting with the various natural resources regulatory agencies (e.g., USFWS, USACE, SWRCB/RWQCB, and CDFG).

The specific location of these areas will be depicted on the project plans and delineated in the field by the biological monitor. The Contractor will ensure that all areas that have Environmentally Restricted Area fencing are off-limits to construction personnel and equipment. Any breaches, gaps, or failures of the fencing will be remediated immediately.

Wildlife Exclusion Fencing

Exclusion barriers (e.g., silt fences) will be installed at the edge of the construction footprint and along the outer perimeter of Environmentally Sensitive Areas and Environmentally Restricted Areas to restrict special-status species from entering the construction area. The design specifications of the exclusion fencing will be determined through consultation with the USFWS and/or CDFG. Clearance surveys will be conducted for special-status species after the exclusion fence is installed. If necessary, clearance surveys will be conducted daily.

Restoration of Temporarily Disturbed Areas

Temporarily disturbed special-status plant communities, habitats that could support special-status wildlife or plant species, and jurisdictional waters will be restored to pre-project conditions. Restoration activities will be outlined in a restoration and revegetation plan. Restoration activities will include:

- Restoring disturbed jurisdictional waters to original topography using stockpiled and segregated soils.
- Grading landform contours to pre-disturbance conditions that approximate the original elevations.
- Revegetating temporarily disturbed areas to preconstruction conditions. Native plant species appropriate to the type of disturbed feature (e.g., wetland) will be used to the extent possible.
- Using certified weed-free straw and mulch, thus reducing the potential to introduce and spread nonnative, invasive plant species.

A site restoration plan will be prepared, and may be required by regulatory agencies, to identify appropriate restoration activities, establish a monitoring schedule, describe the materials that should be used, identify timing of the work, identify monitoring requirements and success criteria, and recommend contingency measures.

Regulatory Compliance

Compliance with the following regulations for water quality protection and hazardous waste management should also reduce anticipated impacts on biological resources:

- The U.S. Environmental Protection Agency National Pollutant Discharge Elimination System Storm Water Program calls for the development of a Storm Water Pollution Prevention Plan and development of water quality best management practices that will reduce indirect impacts on biological resources.

- Federal regulations for the management and storage of hazardous waste, including the Oil Pollution Control Act and the Resource Conservation and Recovery Act, should reduce potential impacts s associated with material and hazardous waste discharge into the natural environment on biological resources.

Furthermore, impacts on biological resources will be permitted or authorized through consultation with the various natural resource regulatory agencies (USFWS, USACE, SWRCB/RWQCB, and CDFG). Both formal and information consultation with these agencies will result in additional project-specific avoidance and minimization measures.

Regulatory Agency Access

If requested, before, during, or on completion of ground-disturbing activities, access to the construction site will be provided to USFWS, USACE, SWRCB/RWQCB, and CDFG staff. Because of safety concerns, agency personnel will check in with the Contractor before accessing the construction site. If agency personal access the construction site, the biological monitor will prepare a memorandum within 1 day of the visit that documents agency access and issues raised during the field meeting.

Weed Control Plan

A Weed Control Plan will be prepared and implemented to minimize or avoid the spread of weeds during ground-disturbing activities. In the Weed Control Plan, the following topics will be addressed:

- Schedule for noxious weed surveys.

- Weed control treatments, including permitted herbicides, and manual and mechanical methods for application; herbicide application will be restricted in Environmentally Sensitive Areas.

- Timing of the weed control treatment for each plant species.

- Fire prevention measures.

- Success criteria for noxious and invasive weed control as established by a qualified biologist. The success criteria will be linked to the Habitat Mitigation and Monitoring Plan (HMMP) for compensatory mitigation sites, and the standards for onsite work during construction will limit highly invasive species, as defined by the California Invasive Plant Council species, to less than 5% in areas that were temporarily affected by construction activities. If these success criteria have not been met by the end of the Biological Resources Management Plan (BRMP) monitoring and implementation period, monitoring and control efforts would continue and remedial actions would be identified and implemented until success criteria are met. Based on monitoring results, additional or revised measures may be needed to ensure the introduction and spread of noxious weeds are not promoted by the construction and operation of the HST.

Biological Resources Management Plan

During final design, a BRMP will be prepared to assemble the biological resources mitigation measures. The BRMP will include terms and conditions from applicable permits and agreements and make provisions for monitoring assignments, scheduling, and responsibility. The BRMP will also discuss habitat replacement and revegetation, protection during ground-disturbing activities, performance (growth) standards, maintenance criteria, and monitoring requirements for temporary and permanent native plant community impacts. The parameters of the BRMP will be formed with the mitigation measures from the project-level EIR/EIS, including terms and conditions as applicable from the USFWS, USACE, SWRCB/RWQCB, and CDFG.

The goal of the BRMP is to ensure that mitigation measures and terms and conditions are implemented in a timely manner and are reported on. These include all avoidance, minimization, repair, mitigation, and compensatory actions stated in the mitigation measures or terms and conditions from the permits issued by the agencies referenced above. These measures and conditions are tracked through final design, implementation, and post-construction phases. Specific performance standards are habitat-based and are related to the success of onsite or offsite repair of temporary impacts or to more permanent impacts that are compensated for at an offsite location. Habitat-based mitigation applies to compensatory mitigation or permittee-responsible mitigation for impacts on special-status plants, special-status wildlife, special-status plant communities, or jurisdictional waters. Those impacts are generally addressed as part of the HMMP.

Performance standards are targets for determining the effectiveness of the mitigation and assessing the need for adaptive management (e.g., mitigation design or maintenance revisions). Success criteria are formal criteria that must be met after a specific timeframe to meet regulatory requirements of the permitting agencies. These are habitat-based performance standards that include consideration of the establishment of a species or habitat. Since species are nested within habitats, the performance standards are primarily based on vegetation, substrate, and hydrology conditions. Performance standards and success criteria specific for each resource category will be included as part of the HMMP. The overarching goal is to neutralize the impacts with respect to affected species and habitat.

The BRMP will help the long-term perpetuation of biological resources within the temporarily disturbed areas as well as protect adjacent targeted habitats. The BRMP will contain, but not be limited to, the following information:

- Specific measures for the protection of special-status species.
- Identification (on construction plans) of the locations and quantity of habitats to be avoided or removed, along with the locations where habitats are to be restored.
- Procedures for vegetation analyses of temporarily affected habitats to approximate their relative composition and procedures for site preparation, irrigation, planting, and maintenance. This information may be used to determine the requirements of the revegetation areas for both onsite temporary impacts and off-site compensatory sites.
- Sources of plant materials and methods of propagation.
- Identification of specific parameters consistent with mitigation ratios and permit conditions for determining the amount of replacement habitat for temporary disturbance areas.
- Specification of parameters for maintenance and monitoring of re-established habitats, including weed control measures, frequency of field checks, and monitoring reports for temporary disturbance areas.

- Specification of performance standards for the re-established plant communities within the construction limits.
- Specification of the remedial measures to be taken if performance standards are not met (e.g., a form of adaptive management).
- Methods and requirements for monitoring restoration/replacement efforts, which will be a combination of qualitative and quantitative data consistent with mitigation measures and permit conditions.
- Measures to preserve topsoil and control erosion.
- Design of protective fencing around environmentally sensitive areas (ESAs), environmentally restricted areas (ERAs), and the construction staging areas.
- Specification of the locations and quantities of gallinaceous guzzlers (catch basin/artificial watering structures) and the monitoring of water levels in them.
- Locations of trees to be protected as wildlife habitat (roosting sites) and locations for planting replacement trees.
- Specification of the purpose, type, frequency, and extent of chemical use for insect and disease control operations as part of vegetative maintenance within sensitive habitat areas.
- Specific construction monitoring programs for habitats of concern and special-status species, as needed.
- Specific measures for the protection of vernal pool habitat and riparian areas. These measures may include erosion and siltation control measures, protective fencing guidelines, dust control measures, grading techniques, construction area limits, and biological monitoring requirements.
- Provisions for biological monitoring during ground-disturbing activities to confirm compliance and success of protective measures. The monitoring procedures will (1) identify specific locations of wildlife habitat and sensitive species to be monitored; (2) identify the frequency of monitoring and the monitoring methods (for each habitat and sensitive species to be monitored); (3) list required qualifications of biological monitor(s), and (4) identify the reporting requirements.

Equipment Staging Areas

Staging areas for construction equipment will be located outside sensitive biological resources areas, including habitat for special-status species, jurisdictional waters, and wildlife movement corridors, to the maximum extent possible.

Mono-Filament Netting

Plastic mono-filament netting (erosion-control matting) or similar material will not be used in erosion control materials to prevent potential harm to wildlife. Materials such as coconut coir matting or tackified hydroseeding compounds will be used as substitutes.

Vehicle Traffic

During ground-disturbing activities, project-related vehicle traffic will be restricted within the construction area to established roads, construction areas, and other designated areas to prevent avoidable impacts. A 20-mph speed limit will be observed within construction areas with potential

special-status species habitat. Access routes will be clearly flagged and off-road traffic will be prohibited.

Entrapment Prevention

All excavated, steep-sided holes or trenches more than 8 inches deep will be covered at the close of each working day with plywood or similar materials, or a minimum of one escape ramp per 10 feet of trenching constructed of earth fill will be provided to prevent the entrapment of wildlife. Before such holes or trenches are filled, they will be thoroughly inspected for trapped animals.

All culverts or similar enclosed structures with a diameter of 4 inches or greater will be covered, screened, or stored more than 1 foot off the ground to prevent use by wildlife. Stored material will be cleared for common and special-status wildlife species before the pipe is subsequently used or moved.

Work Stoppage

During ground-disturbing activities, work will be halted in the event that a special-status wildlife species gains access to the construction footprint. Ground-disturbing activities in the immediate construction area that could reasonably result in a take of special-status wildlife species will be suspended; other work may continue in other areas. The suspension will continue until the individual leaves voluntarily or is relocated to a release area using USFWS- and/or CDFG-approved handling techniques and relocation methods, or will continue as required by the USFWS or CDFG.

"Take" Notification and Reporting

USFWS and/or CDFG will be notified immediately in the case of an accidental death or injury to a federal- or state-listed species during project-related activities.

Post-Construction Compliance Reports

After each construction phase is completed, post-construction compliance reports consistent with the appropriate agency (e.g., UFSWS, CDFG) protocols will be submitted.

Jurisdictional Waters Seasonal Restrictions

Seasonal restrictions for seasonal wetlands are discussed in Section 5.5.3, Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp.

As part of the additional specific avoidance and minimization measures, dewatering and water diversion would be implemented as described below, and additional best management practices to reduce potential water-quality-related indirect impacts on jurisdictional waters will be implemented as determined through consultation with the USACE, CDFG, and SWRCB/RWQCB. The additional best management practices would include the placement of additional straw wattles, silt fencing, or protective barriers as necessary.

Dewatering/Water Diversion

Open or flowing water may be present during construction. If construction occurs where there is open or flowing water, a strategy that is approved by the resource agencies (e.g., USACE, SWRCB/RWQCB), such as the creation of cofferdams, will be used to dewater or divert water from the work area. If cofferdams are constructed, implementation of the following cofferdam or water diversion measures is recommended to avoid and lessen impacts on jurisdictional waters during construction:

- The cofferdams, filter fabric, and corrugated steel pipe are to be removed from the creek bed after completion of the project.
- The timing of work within all channelized waters is to be coordinated with the regulatory agencies.
- The cofferdam is to be placed upstream of the work area to direct base flows through an appropriately sized diversion pipe. The diversion pipe will extend through the Contractor's work area, where possible, and outlet through a sandbag dam at the downstream end.
- Sediment catch basins immediately below the construction site are to be constructed when performing in-channel construction to prevent silt- and sediment-laden water from entering the main stream flow. Accumulated sediments will be periodically removed from the catch basins.

Jurisdictional Water Preconstruction Surveys

A jurisdictional water preconstruction survey will be conducted at least 1 year before the start of ground-disturbing activities to identify and map all jurisdictional waters in the project footprint and if possible within a 250-foot buffer. The purpose of this survey is to confirm the extent of jurisdictional waters in areas where permission to enter was not previously granted and where aerial photograph interpretation was used to estimate the extent of these features. If possible, surveys would be performed during the spring, when plant species are in bloom and hydrological indicators are most readily identifiable. These results would then be used to calculate impact acreages and determine the amount of compensatory mitigation required to offset the loss of wetland functions and values.

Habitat Mitigation and Monitoring Plan

As part of the USFWS, USACE, SWRCB/RWQCB, and CDFG permit applications and before ground-disturbing activities, a Habitat Mitigation and Monitoring Plan (HMMP) will be prepared to mitigate for temporary and permanent impacts on jurisdictional waters and state streambeds. The HMMP will detail the acreage basis, restoration ratios, and the combination of onsite and/or offsite mitigation and will give preference to conducting the mitigation within the same watershed where the impact occurs. The USACE, SWRCB/RWQCB, and CDFG will be consulted to develop appropriate avoidance, minimization, mitigation, and monitoring measures for incorporation into the HMMP. The HMMP will outline the intent to mitigate for the lost functions and values of impacts on jurisdictional waters and state streambeds consistent with resource agency requirements and conditions presented in Sections 401 and 404 of the CWA and Section 1600 of the CFGC. The HMMP will incorporate the following standard requirements consistent with USACE, SWRCB/RWQCB, and CDFG guidelines:

- Description of the project impact/site.
- Goal(s) (i.e., functions and values) of the compensatory mitigation project.
- Description of the proposed compensatory mitigation site.
- Implementation plan for the proposed compensatory mitigation site.
- Maintenance activities during the monitoring period.
- Monitoring plan for the compensatory mitigation site.
- Completion of compensatory mitigation.
- Contingency measures.

In addition, the following will be included at a minimum in the implementation plan:

- Site analysis for appropriate soils and hydrology.
- Site preparation specifications based on site analysis, including but not limited to grading and weeding.
- Soil and plant material salvage from impact areas that is appropriate to the timing of the impact and restoration as well as the location of restoration sites.
- Specifications for plant and seed material appropriate to the locality of the mitigation site.
- Specifications for site maintenance to establish the habitats, including but not limited to weeding and temporary irrigation.

Habitat preservation, enhancement, and/or establishment or restoration activities will be conducted on some of the compensatory (i.e., selected permittee-responsible) mitigation sites to achieve the mitigation goals. A detailed design of the mitigation habitats will be created in coordination with the permitting agencies and will be described in the HMMP. It is recognized that several HMMPs will be developed consistent with the selected mitigation sites and the resources mitigated at each. Construction will be implemented in a manner that minimizes disturbance of such areas to the extent feasible. Temporary fencing will be used during construction to avoid sensitive biological resources that are located adjacent to construction areas and can be avoided.

Performance standards are targets for determining the effectiveness of the mitigation and assessing the need for adaptive management (e.g., mitigation design or maintenance revisions). The performance standards are developed so that progress towards meeting final success criteria can be assessed on an annual basis; the standard for each year is progressively closer to the final criteria (e.g., vegetation cover standards may increase annually until reaching the success criteria objective in the final year of monitoring). Success criteria are formal criteria that must be met after a specific timeframe to meet regulatory requirements of the permitting agencies. Where applicable, replacement planting/seeding will be implemented if monitoring demonstrates that performance standards or success criteria are not met during a particular monitoring interval.

The performance standards will be used to determine whether the habitat improvement is trending toward sustainability (i.e., reduced human intervention) and to assess the need for adaptive management. These standards must be met for the habitat improvement to be declared successful, both during a particular monitoring year and at the end of the establishment period. These performance standards will be developed in consultation with the permitting agencies and will be described in the HMMP.

The final success criteria will be developed in coordination with the regulatory agencies and will be presented in the HMMP. Examples of success criteria, which could be included in the HMPP and would be assessed at the end of the monitoring period (assumed to be 5 years or as directed by agencies), include:

- Percent survival of planted trees (65 to 85%, depending on species and habitat).
- Percent absolute cover of highly invasive species, as defined by the California Invasive Plant Council (<5%).
- Percent total absolute cover of plant species (50 to 80%, depending on habitat type).
- Designed wetlands will meet USACE criteria for hydrophytic vegetation, hydric soils, and hydrology as defined in the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987).
- Designed vernal pools and seasonal wetlands will meet inundation and seasonal drying requirements as specified in the design and indicated by agencies.

- Species composition and community diversity relative to reference sites and/or as described in the guidelines issued by permitting agencies (e.g., USFWS conservation guidelines for valley elderberry longhorn beetle).

Performance standards and success criteria will be provided for each of the years of monitoring and will be specific to habitat types at each permittee-responsible mitigation site. The monitoring schedule will be detailed in the site-specific HMMPs. To be deemed successful, the site may be required to meet the performance standards only in selected years. However, if performance standards are not met in specific years, remedial measures such as regrading, adjustment to modify the hydrological regime, and/or replacement planting or seeding must be implemented and that year's monitoring must be repeated the following year until the performance standards are met. The success criteria specified must be reached without human intervention (e.g., irrigation, replacement plantings) aside from maintenance practices described in the site-specific HMMPs for maintenance during the establishment period.

Vernal Pool Protection

Vernal pool protection measures are discussed in Section 5.5.3, Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp.

5.2.4 Compensatory Mitigation

Permanent and temporary impacts on jurisdictional waters will be mitigated through compensation determined in consultation with the USFWS, USACE, SWRCB/RWQCB, and CDFG, to be consistent with the HMMP. Compensation could include one of the following:

- Purchase of credits from an agency-approved mitigation bank.
- Fee-title-acquisition of natural resource regulatory agency-approved property.
- Purchase or establishment of a conservation easement with an endowment for long-term management of the property-specific conservation values.
- In-lieu fee contribution determined through negotiation and consultation with the various natural resource regulatory agencies.

The following ratios (acres of mitigation to acres of impact) are proposed as a minimum for compensation for impacts; final ratios will be determined in consultation with the appropriate agencies:

- Vernal pools: 2:1
- Seasonal wetlands: between 1.1:1 and 1.5:1, based on impact type and function and values lost.
  - 1:1 off site for permanent impacts
  - 1:1 on site and 0.1:1 to 0.5:1 off site for temporary impacts
- Where the HST alternative affects an existing conservation area (e.g., Allensworth Ecological Reserve [ER]), the mitigation ratios will be modified to meet the vernal pool mitigation requirement. The affected portion of the conservation area will be relocated or compensation will be provided to the holder of Allensworth ER in accordance with the Uniform Relocation and Real Property Policy Act of 1970, as amended.

5.3 Special-Status Plant Communities

The background review and the results of the botanical surveys show that a number of special-status plant communities are present in the Special-Status Plant Study Area. A full list of sensitive communities that were identified during the background review is found in Appendix C, Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur. Table 5-5 presents the special-status plant communities identified in the Special-Status Plant Study Area. These plant communities are described in more detail in the body of this report.

5.3.1 Survey Results

Field surveys identified a total of seven special-status plant communities in the Special-Status Plant Study Area. The special-status plant communities identified during the field surveys were:

- Iodine bush scrub (*Allenrolfea occidentalis* Shrubland Alliance [G4/S3]).
- Alkali goldenbush scrub (*Isocoma acradenia* Shrubland Alliance [Not ranked]).
- Bush seepweed scrub (*Suaeda moquinii* Shrubland Alliance [G5 S3.2]).
- Saltgrass flats (*Distichlis spicata* Herbaceous Alliance [G5/S4]).
- Fremont cottonwood forest (*Populus fremontii* Forest Alliance [G4/S3.2]).
- Black willow thickets (*Salix gooddingii* Woodland Alliance [G3/S3]).
- Red willow thickets (*Salix laevigata* Woodland Alliance [G3/S3]).

In addition to occurrences of special-status plant communities described above, where permission to enter was not granted, potentially suitable habitats that could support special-status plant communities were identified through the analyses of aerial photographs and visual surveys. Figure 5-2 depicts the identified locations of various special-status plant communities and potentially suitable habitats that could support this resource, and Table 5-5 provides a summary of the observed communities and their acreage by HST alternative. The majority of the land in the Special-Status Plant Study Area was found to be significantly disturbed and does not support special-status plant communities. A number of special-status plant communities were primarily identified in association with the various major rivers and creeks of the Special-Status Plant Study Area (Fremont cottonwood forest and black and red willow thickets). Other special-status plant communities were identified in the vicinity of Pixley NWR and Allensworth ER.

Four special-status plant communities have the potential to occur in potentially suitable habitats where permission to enter was not granted; however, their presence in the Special-Status Plant Study Area has not been confirmed:

- Alkali-sink goldfields vernal pools (*Lasthenia chrysantha* Herbaceous Alliance [Not ranked]).
- Spinescale scrub (*Atriplex spinifera* Shrubland Alliance [G3/S3]).
- Valley oak woodland (*Quercus lobata* Woodland Alliance [G3/S3]).
- Western sea-purslane marshes (*Sesuvium verrucosum* Herbaceous Alliance [G3?/S2]).

Figure 5-2 contains confidential information and has therefore not been included on the website.

Table 5-5
Special-Status Plant Communities: Survey Results

Special-Status Plant Community	High-Speed Train Alternative										
	BNSF	Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
	Acreage										
Iodine bush scrub	8.40	—	—	—	—	—	—	7.60	—	—	—
Alkali goldenbush scrub	0.08	—	—	—	—	—	—	—	—	—	—
Bush seepweed scrub	25.16	1.63	1.63	—	—	0.33	0.33	0.54	—	—	—
Saltgrass flats	9.29	—	—	—	—	0.47	0.06	3.37	—	—	—
Fremont cottonwood forest	0.70	—	—	—	—	—	—	—	—	—	—
Black willow thickets	13.55	0.51	0.51	0.51	0.51	1.09	1.49	2.15	—	1.83	1.83
Red willow thickets	0.54	—	—	—	—	—	—	—	—	—	—
Potential suitable habitat that could support special-status plant communities	682.41	92.84	86.36	102.83	96.35	105.85	92.54	261.28	75.25	251.63	251.13

Notes:
— = Not present or not applicable
Calculations based on the Special-Status Plant Study Area. Special-Status Plant Study Area based on the 15% engineering design project footprint.

5.3.1.1 Iodine Bush Scrub

In the iodine bush scrub alliance (*Allenrolfea occidentalis* Shrubland Alliance), iodine bush scrub is the dominant species (greater than 2% absolute cover) or co-dominant species (no other species has greater or equal cover) in the shrub canopy (Sawyer et al. 2009). This alliance has a state rarity ranking of S3, and stands occurring with bush seepweed (*Suaeda moquinii*) are considered very rare in the Central Valley (Sawyer et al. 2009). In the Special-Status Plant Study Area, iodine bush scrub was mapped within the BNSF Alternative and the Allensworth Bypass alternatives (Figure 5-2).

This alliance typically occurred in the slightly elevated areas surrounding vernal pools and was dominated by iodine bush with minor components of bush seepweed, alkali heath, and spinescale. The herbaceous layer was dominated by a combination of alkali goldfields (*Lasthenia chrysantha*), shining peppergrass (*Lepidium nitidum*), burclover (*Medicago* sp.), and/or red brome (*Bromus madritensis*). These stands were identified where there was a history of disturbance but where there was no disturbance in the recent past, as evidenced by the maturity of the observed shrub species. These areas included fallow fields, potentially abandoned irrigation reservoirs, and the sides of roads or railways. These areas typically contained a high percentage of nonnative annuals, such as bromes or barleys, along with the native species.

5.3.1.2 Alkali Goldenbush Scrub

Alkali goldenbush scrub (*Isocoma acradenia* Shrubland Alliance) is not identified in the *Manual of California Vegetation*, 2nd Edition (Sawyer et al. 2009), but is similar in distribution and composition in the Special-Status Plant Study Area to iodine bush scrub. Although alkali goldenbush scrub is not described in the *Manual of California Vegetation*, 2nd Edition, its occurrence was distinct from the adjacent alliances, and its distribution was very limited throughout the Plant Study Area. For these reasons it was mapped and considered here of a rarity equal to that of iodine bush scrub. Typically, these alliances occur together. Alkali goldenbush scrub was mapped when alkali goldenbush was present in a stand at 5% or greater absolute cover, with 1% or less cover of other shrub species such as spinescale or iodine bush.

In the Plant Study Area, this alliance was mapped in one location near the town of Allensworth, along the BNSF Railway right-of-way (Figure 5-2). This stand of alkali goldenbush scrub occurred adjacent to iodine bush scrub and was moderately disturbed from railroad maintenance activities. The dominant species in this alliance is alkali goldenbush scrub, though small components of iodine bush scrub, spinescale scrub, and bush seepweed were sometimes present. Common species in the herbaceous layer included goldfields, tarweed, fiddleneck, peppergrass (*Lepidium* spp.), and annual grasses such as bromes and barleys.

5.3.1.3 Bush Seepweed Scrub

In the bush seepweed scrub alliance (*Suaeda moquinii* Shrubland Alliance), bush seepweed scrub is either the dominant species (greater than 2% absolute cover in the shrub canopy) or co-dominant species (no other species has greater or equal cover in the shrub canopy) (Sawyer et al. 2009). This alliance has a state rarity ranking of S3.2, and is considered very rare in the Central Valley (Sawyer et al. 2009). In the Special-Status Plant Study Area, this alliance was mapped within the BNSF right-of-way near the town of Corcoran, Pixley NWR, and Allensworth ER, within the Hanford West Bypass 1 and Hanford West Bypass 2, Corcoran Bypass and Allensworth Bypass alternatives (Figure 5-2). This alliance was typically mapped in patches along the BNSF right-of-way in areas that were moderately disturbed from railroad maintenance activities. Neighboring alliances typically included saltgrass flats and iodine bush scrub. In this alliance, bush seepweed was often the only shrub species present, and ranged from 10% to 15% absolute cover. Herbaceous species associated with this alliance included tarweed, fiddleneck,

barleys, bromes, annual fescues, alkali heath, red-stem filaree (*Erodium cicutarium*), and goldfields.

5.3.1.4 Saltgrass Flats

In saltgrass flats alliance (*Distichlis spicata* Herbaceous Alliance), saltgrass is either the dominant species (greater than 50% relative cover with higher cover than any other grass species) or co-dominant species (greater than 30% relative cover) with pickleweed (*Salicornia* spp.) (Sawyer et al. 2009). Although this alliance has a state rarity ranking of S4, it is considered uncommon throughout the Special-Status Plant Study Area because its extent has been greatly reduced through land conversion. This alliance provides suitable habitat for several special-status plant species. In the Special-Status Plant Study Area, this alliance was identified within the BNSF Alternative near Corcoran, Pixley, and Allensworth, and within the Allensworth Bypass and Corcoran Bypass Alternative (Figure 5-2). This alliance was most commonly identified in disturbed areas in shallow depressions where water would seasonally pond. Numerous occurrences of this alliance were found along the BNSF railway right-of-way, irrigation canals, and within fallow fields. Soils were generally saline in these areas. Typical species in this alliance included saltgrass, bromes, and barleys.

5.3.1.5 Fremont Cottonwood Forest

In the Fremont cottonwood forest alliance (*Populus fremontii* Forest Alliance), Fremont cottonwood is the dominant species in the tree layer (greater than 50% relative cover or greater than 5% absolute cover in the tree layer) or co-dominant species (greater than 30% relative cover in the tree layer) with willows (Sawyer et al. 2009). This alliance has a state rarity ranking of S3.2. In the Special-Status Plant Study Area, this alliance was identified within the BNSF Alternative on the banks of Poso Creek (Figure 5-2). At this location, several large cottonwoods stood opposite a bank of red willows (*Salix laevigata*) adjacent to an active orchard.

5.3.1.6 Black Willow Thickets

In the black willow thickets alliance (*Salix gooddingii* Woodland Alliance), black willow is the dominant species (greater than 50% relative cover) or co-dominant species (greater than 30% relative cover) with other willows or Fremont cottonwood (Sawyer et al. 2009). This alliance has a state rarity ranking of S3. In the Special-Status Plant Study Area, this alliance was identified within the BNSF, Hanford West Bypass 1 and Hanford West Bypass 2, Corcoran Bypass, Allensworth Bypass, and Bakersfield South Bypass alternatives. Stands of this alliance were identified along the Tule River, irrigation reservoirs, a seasonal riverine course in Hanford, and the Kern River in Bakersfield (Figure 5-2). Black willows were dominant in the tree canopy, while the lower canopy contained a sparse shrub layer of buttonbush and a dense herbaceous layer of ripgut brome, mugwort, fiddleneck, and mosquito fern (*Azolla filiculoides*). The Tule River stand was only moderately disturbed, while the stands near the irrigation reservoir, along the seasonal riverine course in Hanford, and along the Kern River were highly disturbed and subject to various land use activities.

5.3.1.7 Red Willow Thickets

In the red willow thickets alliance (Salix laevigata Woodland Alliance), red willow thickets has greater than 50% relative cover in the tree layer or i co-dominant (greater than 30% relative cover) with arroyo willow (*Salix lasiolepis*) in the subcanopy (Sawyer et al. 2009). This alliance has a state rarity ranking of S3. In the Special-Status Plant Study Area, this alliance was identified within the BNSF Alternative in the riparian corridor of the Kings River between the active channel and an adjacent agriculture field (Figure 5-2). Most of the vegetation in this alliance was located on the top of the steep river bank. Red willow was co-dominant with Oregon ash (*Fraxinus latifolia*), valley oak, and box elder. The understory contained a mix of shrub and

herbaceous species, including sandbar willow (*Salix exigua*), California blackberry (*Rubus ursinus*), blue elderberry, mugwort, wild oats (*Avena fatua*), and giant reed. Areas adjacent to this alliance consisted of cultivated fields and the dry sandy channel of the Kings River. A second stand was identified opposite a stand of Fremont cottonwood forest along the riparian corridor of Poso Creek.

5.3.2 Project Impacts

Construction of the project may result in direct and indirect impacts on special-status plant communities that occur within the project footprint. The following seven special-status plant communities would be impacted by the HST alternatives: iodine bush scrub, alkali goldenbush scrub, bush seepweed scrub, saltgrass flats, Fremont cottonwood forest, black willow thickets, and red willow thickets (Table 5-6). As summarized in Chapter 5.0, Impacts and Mitigation, the "Difference Compared to Corresponding BNSF Area" in Table 5-6 represents the difference in impact acreages between an alternative alignment and its corresponding segment in the BNSF Alternative. Positive (+) differences indicate that the alternative alignment results in a greater number of acres impacted than its corresponding segment in the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in fewer affected acres than its corresponding segment in the BNSF Alternative.

In addition to the special-status plant communities that have been observed within the Special-Status Plant Study Area, a number of special-status plant communities have the potential to occur in potentially suitable habitats where permission to enter was not granted. If special-status plant communities are present in these areas and within the project footprint, they would experience the same impacts as described below, for those communities known to be present.

No impacts on special-status plant communities are anticipated from operation and maintenance activities or construction of the station alternatives. These features are located in either urban or agricultural environments, which do not support special-status plant communities.

Table 5-6
Comparison of Impacts on Special-Status Plant Communities by Alternative

Special-Status Plant Community Type (Common Name/Scientific Name/Status)	Impact Type	High-Speed Train Alternatives										
		BNSF Impact Acreage	Hanford West Bypass 1—At-Grade	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
			Impact Acreage / Difference Compared to Corresponding BNSF Area[a]									
Iodine bush scrub/*Allenrolfea occidentalis* Shrubland Alliance G4, S3	Permanent	5.81	—	—	—	—	—	—	2.90 / -2.91	—	—	—
	Temporary	—	—	—	—	—	—	—	—	—	—	—
Alkali goldenbush scrub/*Isocoma acradenia* Shrubland Alliance Not ranked	Permanent	<0.01	—	—	—	—	—	—	— / -<0.01	—	—	—
	Temporary	—	—	—	—	—	—	—	—	—	—	—
Bush seepweed scrub/*Suaeda moquinii* Shrubland Alliance G5, S3.2	Permanent	14.94	0.24 / +0.24	0.24 / +0.24	—	—	—	—	0.54 / -12.78	—	—	—
	Temporary	*0.63*	—	—	—	—	—	—	*— / -0.63*	—	—	—
Saltgrass flats/*Distichlis spicata* Herbaceous Alliance G5, S4	Permanent	2.26	—	—	—	—	0.09 / +0.09	<0.01 / 0.00	2.64 / +0.43	—	—	—
	Temporary	*0.17*	—	—	—	—	*0.01 / +0.01*	*0.04 / +0.04*	—	—	—	—
Fremont cottonwood forest/*Populus fremontii* Forest Alliance G4, S3.2	Permanent	0.37	—	—	—	—	—	—	— / -0.37	—	—	—
	Temporary	—	—	—	—	—	—	—	—	—	—	—
Black willow thickets/*Salix goodingii* Woodland Alliance G3, S3	Permanent	2.97	—	—	—	—	0.46 / -0.03	0.29 / -0.20	1.22 / +1.22	—	0.50 / -1.99	0.17 / -2.32
	Temporary	*1.65*	—	—	—	—	—	*0.18 / +0.18*	—	—	*— / -1.65*	*0.33 / -1.32*
Red willow thickets/*Salix laevigata* Woodland Alliance G3, S3	Permanent	0.28	—	—	—	—	—	—	— / -0.28	—	—	—
	Temporary	—	—	—	—	—	—	—	—	—	—	—
Potential suitable habitat that could support special-status plant communities	Permanent	221.58	48.46 / +33.94	48.26 / +33.73	55.71 / +41.18	55.50 / +40.97	60.68 / +33.10	52.03 / +24.45	92.30 / +0.41	40.40 / +17.90	23.59 / -0.47	21.58 / -2.48
	Temporary	*210.99*	*1.62 / -0.02*	*1.62 / -0.02*	*3.75 / +2.11*	*3.75 / +2.11*	*1.04 / +0.96*	*0.57 / +0.49*	*65.36 / +63.28*	*20.38 / +9.49*	*189.27 / +0.37*	*191.53 / +2.63*
Total Impact	**Permanent**	**248.22**	**48.71 / +34.18**	**48.50 / +33.97**	**55.71 / +41.18**	**55.50 / +40.97**	**61.23 / +33.17**	**52.32 / +24.26**	**99.61 / -14.28**	**40.40 / +17.9**	**24.09 / -2.45**	**21.75 / -4.79**
	Temporary	***213.44***	***1.62 / -0.02***	***1.62 / -0.02***	***3.75 / +2.11***	***3.75 / +2.11***	***1.05 / +0.97***	***0.79 / +0.71***	***65.36 / +62.66***	***20.38 / +9.49***	***189.27 / -1.28***	***191.86 / +1.31***

Table 5-6
Comparison of Impacts on Special-Status Plant Communities by Alternative

Special-Status Plant Community Type (Common Name/Scientific Name/Status)	Impact Type	High-Speed Train Alternatives										
		BNSF Impact Acreage	Hanford West Bypass 1—At-Grade	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
			Impact Acreage / Difference Compared to Corresponding BNSF Area[a]									

Notes:
— = No impact or not applicable

[a] The "Difference Compared to Corresponding BNSF Area" represents the difference in impact acreages between an alternative alignment and its corresponding segment in the BNSF Alternative: positive (+) differences indicate that the alternative alignment results in greater impact acres than its corresponding segment in the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in fewer impact acres than its corresponding segment in the BNSF Alternative.

Impact calculations in this table include alignment alternatives and station alternatives, but do not include HMF alternatives.

All impacts were calculated based on the 15% engineering design project footprint.
Global Rank
G1 = Less than 6 viable element occurrences (EOs) OR less than 2,000 acres.
G2 = 6-20 EOs OR 2,000-10,000 acres.
G3 = 21-100 EOs OR 10,000-50,000 acres.
G4 = Apparently secure; this rank is clearly lower than G3 but factors exist to cause some concern; i.e., there is some threat, or somewhat narrow habitat.
G5 = Population or stand demonstrably secure to ineradicable due to being commonly found in the world.

State Rank
S1 = Less than 6 EOs OR less than 2,000 acres
S1.1 = very threatened
S1.2 = threatened
S1.3 = no current threats known
S2 = 6-20 EOs OR 2,000-10,000 acres
S2.1 = very threatened
S2.2 = threatened
S2.3 = no current threats known
S3 = 21-100 EOs OR 10,000-50,000 acres
S3.1 = very threatened
S3.2 = threatened
S3.3 = no current threats known
S4 - Apparently secure within California; this rank is clearly lower than S3 but factors exist to cause some concern; i.e., there is some threat, or somewhat narrow habitat. NO THREAT RANK.
S5 - Demonstrably secure to ineradicable in California. NO THREAT RANK.

Special-status plant communities have a low to moderate potential to occur in three of the HMF site alternatives (i.e., the Fresno Works–Fresno, Kings County–Hanford, and Kern Council of Governments–Shafter East HMF sites) because of the presence of fragments of unsurveyed, potentially suitable habitats within each of their footprints. However, these habitats are located mostly in urban and agricultural lands. No unsurveyed habitats capable of supporting special-status plant communities are present within or directly adjacent to the Kern Council of Governments–Wasco or the Kern Council of Governments–Shafter West HMF site alternatives.

Construction impacts may result from all permanent ground-disturbing activities, including construction of the track, access roads, road crossings, and buildings. Impacts would result largely from the use of heavy machinery (including bulldozers, motor graders, scrapers, excavators, earth compaction equipment, and cranes) to clear, grub, excavate, compact, or otherwise prepare the ground surface for the construction of permanent features. The construction of these features would result in permanent loss of special-status plant communities in the project footprint.

Identified special-status plant communities and unsurveyed habitats that could support special-status plant communities would be directly and temporarily impacted by construction (e.g., aerial structure construction, construction staging areas). These impacts would result from clearing vegetation or grubbing in areas that would be allowed to reestablish following construction.

Permanent and temporary indirect construction impacts on special-status plant communities would include fragmentation and introduction of nonnative, invasive plant species. These changes would result in decreased viability and gradual loss of special-status plant communities. Fragmentation would result from the construction of permanent features, especially linear features, including track and access roads that bisect special-status plant communities. Construction activities could facilitate the spread of nonnative invasive plant species through introduction of seeds by construction equipment, vehicles, and personnel, and could provide ample habitat for colonization where permanent and temporary ground-disturbing activities occur.

5.3.3 Avoidance and Minimization Measures

In addition to the avoidance and minimization measures described under "Jurisdictional Waters" (in Section 5.1.3, Avoidance and Minimization Measures), the following avoidance and minimization measures are proposed to lessen the project impacts on special-status plant communities. Certain measures that were described in detail in Section 5.1.3 are expanded on below with additional information pertinent to special-status plant communities.

Botanical Preconstruction Surveys

Preconstruction botanical surveys for special-status plant communities and special-status plant species will be conducted in potentially suitable habitats where permission to enter was not forthcoming. The preconstruction surveys will be conducted according to the methods identified in this technical report (see Section 3.4.3, Botanical Surveys) and in general accordance with the various established regulatory guidelines, including conducting floristic surveys corresponding to the approximate bloom period for special–status plant species. In areas that were not previously surveyed because of access or timing issues or project design changes, pre-construction surveys for special-status plant communities and special-status plant species will be conducted before the start of ground-disturbing activities during the appropriate blooming period(s) for the species.

Clean Construction Equipment

During construction, equipment will be washed before entering the project footprint to reduce potential indirect impacts from inadvertent introduction of nonnative invasive plant species. Mud

and plant materials will be removed from construction equipment when working in native plant communities, near special-status plant communities, or in areas where special-status plant species have been identified.

Environmentally Sensitive Areas and Environmentally Restricted Areas

This avoidance and minimization effort is described under "Jurisdictional Waters" (see Section 5.1.3, Avoidance and Minimization Measures). Additionally, before the start of ground-disturbing activities, all populations of special-status plant species and special-status plant communities identified during preconstruction surveys within 100 feet of the construction footprint will be protected as Environmentally Restricted Areas. The Environmentally Restricted Areas will prevent inadvertent impacts on special-status plant communities outside of the project footprint.

Restoration of Temporarily Disturbed Areas

This avoidance and minimization effort is described under "Jurisdictional Waters" (see Section 5.1.3, Avoidance and Minimization Measures). Additionally, special-status plant communities and riparian areas that will be temporarily disturbed will be restored onsite to pre-construction conditions. Pre-construction conditions will be documented (e.g., species composition and richness, percent cover of key species) and photo points will be established or identified in an agency approved restoration plan.

5.3.4 Compensatory Mitigation

Permanent impacts on riparian habitats (i.e., valley foothill riparian) will be mitigated through compensation, as determined in consultation with the appropriate agencies (e.g., CDFG), by restoring nearby areas to suitable habitat and/or by purchasing credits in a mitigation bank. The HMMP will provide the planning details. Compensation will be based on the following ratios (acres of mitigation to acres of impact), pending agency confirmation:

- Valley foothill riparian: 2:1.

5.4 Protected Trees

5.4.1 Survey Results

Based on field surveys and GIS analysis of potential tree locations, as many as 430 trees are present in the Special-Status Plant Study Area (Figure 5-3) (Table 5-7). Although the majority of these trees are not protected, a number of them are protected under local ordinances, regulations, and policies. Where possible, these trees have been categorized based on whether they are native and on local government policies, ordinances, and regulations. Many of the trees identified are landscape and ornamental trees that are in the urban environment throughout the Special-Status Plant Study Area. Native trees observed (that are afforded protection) include valley oaks and Fremont cottonwoods. Additional trees may be present in areas where permission to enter was not granted.

Figure 5-3 contains confidential information and has therefore not been included on the website.

Table 5-7
Approximate Number of Trees in the Special-Status Plant Study Area

Tree Type	High-Speed Train Alternative										
	BNSF	Hanford West Bypass 1—At-Grade	Hanford West Bypass 1 – Below-Grade	Hanford West Bypass 2—At-Grade	Hanford West Bypass 2—Below-Grade	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
	Number of Trees Identified										
Eucalyptus species	2	—	—	—	—	—	—	—	—	—	—
Landscape / Ornamental / Non-native	185	20	20	20	20	—	—	—	—	45	49
Oak species	3	44	44	44	44	1	4	—	—	—	—
Unknown[a]	310	46	19	46	19	13	10	6	64	71	66
Total	**500**	**110**	**83**	**110**	**83**	**14**	**14**	**6**	**64**	**116**	**115**

Notes:
— = Not present or not applicable
[a] Clumps of trees identified in the field as "numerous unknown" were estimated to represent 4 trees and counted within the "unknown" category.

5.4.2 Project Impacts

Protected trees are present in the HST Alternatives, and project construction activities will both alter and remove some portion of these resources. Construction of the project will result in the permanent removal or modification of all trees that are located within the project footprint (Table 5-8). As summarized in Chapter 5.0, Impacts and Mitigation, the "Difference Compared to Corresponding BNSF Area" in Table 5-8 represents the difference in impact acreages between an alternative alignment and its corresponding segment in the BNSF Alternative: positive (+) differences indicate that the alternative alignment results in a greater number of acres impacted than its corresponding segment in the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in fewer impacted acres than its corresponding segment in the BNSF Alternative.

Table 5-8
Comparison of Impacts on Protected Trees by Alternative

Protected Tree	Impact Type	BNSF Impact Acreage	High-Speed Train Alternatives									
			Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1 – Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
			Impact Number / Difference Compared to Corresponding BNSF Area[a]									
Eucalyptus species	Permanent	—	—	—	—	—	—	—	—	—	—	—
	Temporary	*1*	—	—	—	—	—	—	—	—	—	—
Landscape, Ornamental, Non-native	Permanent	72	2 / +2	2 / +2	2 / +2	2 / +2	—	—	—	— / -1	19 / +6	22 / +9
	Temporary	*25*	—	—	—	—	—	—	—	—	*12 / +7*	*11 / +6*
Oak species	Permanent	2	2 / +2	2 / +2	2 / +2	2 / +2	—	—	—	— / -2	—	—
	Temporary	—	*8 / +8*	*8 / +8*	*8 / +8*	*8 / +8*	—	*4 / +4*	—	—	—	—
Unknown species[B]	Permanent	81	30 / +6	12 / -12	30 / +6	12 / -12	6 / -6	4 / -8	1 / -3	39 / +37	32 / +19	26 / +13
	Temporary	66	—	—	—	—	*— / -1*	*1 / 0*	*1 / 0*	—	*11 / -1*	*10 / -2*
TOTAL IMPACTS	**Permanent**	155	34 / +10	16 / -8	34 / +10	16 / -8	6 / -6	4 / -8	1 / -3	39 / +34	51 / +25	48 / +22
	Temporary	*92*	*8 / +8*	*8 / +8*	*8 / +8*	*8 / +8*	*— / -1*	*5 / +4*	*1 / 0*	—	*23 / +6*	*21 / +4*

Notes:
— = No impact or not applicable
Impact calculations in this table include alignment alternatives and station alternatives, but do not include HMF alternatives.
All impacts were calculated based on the 15% engineering design project footprint.
[A] The "Difference Compared to Corresponding BNSF Area" represents the difference in impact acreages between an alternative alignment and its corresponding segment in the BNSF Alternative: positive (+) differences indicate that the alternative alignment results in greater impact acres than its corresponding segment in the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in fewer impact acres than its corresponding segment in the BNSF Alternative.
[B] Clumps of trees identified in the field as "numerous unknown" were estimated to represent 4 trees and counted within the "Unknown species" category.

All or most of the protected trees currently in areas where permanent infrastructure (e.g., rail track and road overpasses) and temporary activities (e.g., materials staging, temporary access roads, and construction rights-of-way) are proposed will need to be removed during construction. Where the alignment is located at-grade, removal or trimming of all protected trees is anticipated. In urban areas and where the alignment is located on an elevated structure and where the majority of the landscaped ornamental trees are located, trimming and limited removal of protected trees would occur.

Because some trees could not be identified due to lack of permission to enter, some of these trees are likely protected by local regulations, while others likely are not.

No impacts on protected trees are anticipated from operation and maintenance activities or from the construction of the Kings/Tulare Regional Station. A small to moderate number of protected trees would be affected by the Fresno Station-Mariposa (14 trees), Fresno Station-Kern (5 trees), Bakersfield Station-North (12 trees) and Bakersfield Station-South (5 trees) alternatives.

If an HMF is constructed in the Fresno to Bakersfield Section, construction of the Fresno Works–Fresno HMF alternative would result in the removal of numerous protected trees (76 trees); however, no protected trees are present at the remaining HMF site alternatives (i.e., the Kings County–Hanford, Kern Council of Governments–Wasco, Kern Council of Governments–Shafter East, or Kern Council of Governments–Shafter West HMF sites).

5.4.3 Avoidance and Minimization Measures

In addition to the avoidance and minimization measures described under "Jurisdictional Waters" (Section 5.1.3, Avoidance and Minimization Measures), the following avoidance and minimization measures are proposed to lessen the project impacts on protected trees. Certain measures that were described in Section 5.1.3 are discussed below with additional specific information pertinent to protected trees.

Monitoring of Protected Trees

Before, during, and after construction, the Contractor will implement the following methods to preserve and/or mitigate for potential impacts on protected trees:

- Conduct preconstruction surveys to evaluate the condition of all protected trees within areas directly and indirectly affected by the Fresno to Bakersfield Section.
- Fence protected trees that may be indirectly affected by construction activities 5 feet from their drip lines to form exclusion zones.

Restoration of Temporarily Disturbed Areas

This avoidance and minimization effort is described under "Jurisdictional Waters" (Section 5.1.3, Avoidance and Minimization Measures). Also, in areas where protected trees would be trimmed or otherwise temporarily disturbed, the vegetation removed will be replaced with native trees and shrubs of the same species, or acceptable substitutes. Details regarding the tree replacement would be identified in the site-restoration plan.

5.4.4 Compensatory Mitigation

Compensatory mitigation will be required to compensate for permanent and temporary impacts on protected trees. Compensation for the removal and/or trimming of naturally occurring native protected trees and protected landscape or ornamental trees will be conducted in accordance

with the various city and county policies, ordinances, and regulations through one of the following mechanisms:

- Transplant all directly affected protected trees that are judged by an arborist to be in good condition to a suitable site outside the zone of impact.
- Tree planting or replacement at an onsite or offsite location, based on the number of protected trees removed, at a ratio to be determined through consultation with the various city and county governmental agencies, but not to exceed replacement ratios (which may be lower than planting ratios) of 3:1 for native trees or 1:1 for landscape or ornamental trees.
- Contribution to a city or county tree planting fund within the jurisdiction of a regulatory agency.

Also, a compensatory mitigation plan that includes details about compensatory mitigation for protected trees will be prepared and implemented. This plan will identify the compensatory mitigation locations, monitoring requirements, success criteria, and reporting requirements. The plan will be submitted to the appropriate local and county government offices for review and approval.

5.5 Special-Status Plant Species

After a background review, 56 special-status plant species were evaluated for their potential to occur in the Special-Status Plant Study Area (see Appendix C, Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur). These special-status plant species include 8 federally and state listed species, 3 federally listed species, 2 state listed species, and an additional 43 special-status species that have been listed by the CNPS. Three out of five of the federally-listed plant species have designated critical habitat within portions of Fresno and Tulare counties, although none occurs within the Special-Status Plant Study Area.

Of the 56 special-status plant species evaluated, 30 species were ruled out based on the lack of suitable habitat, local or regional extirpations, and/or because the Special-Status Plant Study Area lies outside of the known geographic or elevation range of these species. These species are identified as having no potential to occur or are not likely to occur in the Special-Status Plant Study Area. The remaining 26 special-status plant species that have the potential to occur in the Special-Status Plant Study Area are listed in Table 5-9, and are further evaluated in this technical report.

Table 5-9
Special-Status Plant Species with Potential to Occur in the Special-Status Plant Study Area

Common Name	Scientific Name	Federal Status	State/CNPS Status	Habitat[a]
Federally and State listed Species				
Bakersfield smallscale	*Atriplex tularensis*	—	SE/1B.1	Alkali desert scrub, annual grasslands, vernal pools, pasture; Tulare and Kern counties; 300–655 feet
California jewel-flower	*Caulanthus californicus*	FE	SE/1B.1	Alkali desert scrub, annual grassland, pasture; Kings, Tulare and Kern counties; 240–2,950 feet
Hoover's spurge	*Chamaesyce hooveri*	FT	1B.2	Alkali desert scrub, annual grasslands, vernal pools, pasture; Tulare County; 80–130 feet

Table 5-9
Special-Status Plant Species with Potential to Occur in the Special-Status Plant Study Area

Common Name	Scientific Name	Federal Status	State / CNPS Status	Habitat[a]
Kern mallow	*Eremalche kernensis*	FE	1B.1	Alkali desert scrub, annual grasslands, vernal pools, pasture; Tulare and Kern counties; 300–900 feet
San Joaquin woolly-threads	*Monolopia congdonii*	FE	1B.2	Alkali desert scrub, annual grassland, pasture; Kings and Kern counties; 200–2,600 feet
Bakersfield cactus	*Opuntia basilaris* var. *treleasei*	FE	SE/1B.1	Chenopod scrub, valley and foothill grassland; Kern County; 460-1,800 feet
Other Special-Status Plant Species				
Horn's milk-vetch	*Astragalus hornii* var. *hornii*	—	1B.1	Alkali desert scrub, annual grassland, pasture; Tulare and Kern counties; 200–2,790 feet
Heartscale	*Atriplex cordulata*	—	1B.2	Alkali desert scrub, annual grasslands, vernal pools, pasture; Kings, Tulare and Kern counties; 0–1,000 feet
Lost Hills crownscale	*Atriplex coronata* var. *vallicola*	—	1B.2	Alkali desert scrub, annual grasslands, vernal pools, pasture; Kings, Tulare and Kern counties; 0–1,000 feet
Brittlescale	*Atriplex depressa*	—	1B.2	Alkali desert scrub, annual grasslands, vernal pools, pasture; Kings, Tulare and Kern counties; 0–1,050 feet
Earlimart orache	*Atriplex erecticaulis*	—	1B.2	Alkali desert scrub, annual grasslands, vernal pools, pasture; Kings, Tulare and Kern counties; 130–330 feet
Lesser saltscale	*Atriplex minuscula*	—	1B.1	Alkali desert scrub, annual grasslands, vernal pools, pasture; Kings, Tulare and Kern counties; 50–660 feet
Vernal pool smallscale	*Atriplex persistens*	—	1B.2	Alkali desert scrub, annual grasslands, vernal pools, pasture; Kings, Tulare and Kern counties; 30–380 feet
Subtle orache	*Atriplex subtilis*	—	1B.2	Alkali desert scrub, annual grasslands, vernal pools, pasture; Kings, Tulare and Kern counties; 130–330 feet
Round-leaved filaree	*California macrophylla*	—	1B.1	Annual grassland, valley foothill riparian, pasture; Fresno, Kings, Tulare, and Kern counties, 50–4,000 feet
Alkali mariposa lily	*Calochortus striatus*	—	1B.2	Alkali desert scrub, pasture; Tulare and Kern counties; 300-5,230 feet
Slough thistle	*Cirsium crassicaule*	—	1B.1	Alkali desert scrub, fresh emergent wetland, valley foothill riparian, riverine, lacustrine, annual grasslands, pasture; Kings and Kern counties; 10-328 feet

Table 5-9
Special-Status Plant Species with Potential to Occur in the Special-Status Plant Study Area

Common Name	Scientific Name	Federal Status	State / CNPS Status	Habitat[a]
Recurved larkspur	*Delphinium recurvatum*	—	1B.2	Alkali desert scrub, annual grasslands, vernal pools, pasture; Kings and Tulare counties; 0-4,000 feet
Hoover's woolly-star	*Eriastrum hooveri*	FD	4.2	Alkali desert scrub, annual grasslands, pasture; Kings, Tulare and Kern counties; 165-3,000 feet
Spiny-sepaled button-celery	*Eryngium spinosepalum*	—	1B.2	Alkali desert scrub, annual grasslands, vernal pools, pasture; Tulare County; 260-1,300 feet
California satintail	*Imperata brevifolia*	—	2.1	Alkali desert scrub, annual grassland, pasture; Tulare and Kern counties; 0–1,500 feet
Coulter's goldfields	*Lasthenia glabrata* ssp. *coulteri*	—	1B.1	Alkali desert scrub, annual grasslands, vernal pools, pasture; Tulare and Kern counties; 0–4,600 feet
Munz's tidy-tips	*Layia munzii*	—	1B.2	Alkali desert scrub, annual grasslands, pasture; Kern County; 150–2,500 feet
Little mouse tail	*Myosurus minumus* ssp. *apus*	—	3.1	Alkali desert scrub, annual grasslands, vernal pools, pasture; Kings, Tulare and Kern counties; 65–3,000 feet
Mud nama	*Nama stenocarpum*	—	2.2	Marshes and swamps, lake shores, river banks, intermittently wet areas; Kings County; 15-1,500 feet
King's gold	*Tropidocarpum californicum*	—	1B.1	Alkali desert scrub, annual grasslands, pasture; Kings and Kern counties; 0–215 feet

Notes:
"—" signifies "no status designation."
[a] This table does not include special-status plant species that were determined to have "no potential to occur" or are "not likely to occur" within the Special-Status Plant Study Area.

Federal Status
FD: Delisted. Status to be monitored for 5 years
FE: Listed as endangered under the Endangered Species Act
FT: Listed as threatened under the Endangered Species Act
State Status
SE: Listed as endangered under the California Endangered Species Act
ST: Listed as threatened under the California Endangered Species Act

CNPS
1B: Rare, threatened, or endangered in California and elsewhere
2: Rare, threatened, or endangered in California, but more common elsewhere
3: More information is needed
4: Limited distribution or infrequent throughout California
0.1: Seriously endangered in California
0.2: Fairly endangered in California
0.3: Not very endangered in California

Abbreviations:
CNPS = California Native Plant Society

5.5.1 Survey Results

The floristic surveys conducted in 2010 in the Special-Status Plant Study Area identified more than 400 vascular plant species (see Appendix D, List of Vascular Plant Species Identified in the Special-Status Plant Study Area). The majority of the vascular plant species were common plant species. Of the 26 special-status plant species identified as having the potential to occur in the Special-Status Plant Study Area, two species were observed during the floristic surveys:

- Heartscale (*Atriplex cordulata*): CNPS 1B.2
- Little mouse tail (*Myosurus minimus* ssp. *apus*): CNPS 3.1

The majority of the occurrences of special-status plant species were observed in relatively undisturbed portions of the Special-Status Plant Study Area in areas identified as alkali desert scrub or annual grasslands and/or where vernal pools occurred. Special-status species were also located in fallow fields and drained reservoirs. Figure 5-2 depicts the locations of identified special-status plant species populations in the Special-Status Plant Study Area. Table 5-10 provides a summary of the observed species and their acreage by HST alternative. The acreage of special-status plant species is based on the extent of observed populations.

Since permission to enter portions of the Special-Status Plant Study Area was not granted, definitive presence/absence conclusions cannot be made for all special-status plant species. However, unsurveyed habitats that could support special-status plant species were identified in these areas through visual surveys and aerial interpretation. Therefore, the remaining 22 special-status plant species that were not observed in the Special-Status Plant Study Area have the potential to occur in the identified unsurveyed areas of potentially suitable habitat. Special-status plant species observed or that have potential to occur in the unsurveyed areas of potentially suitable habitat of the Special-Status Plant Study Area are described below.

Table 5-10
Special-Status Plant Species Present in the Special-Status Plant Study Area

Common Name / Scientific Name (Rarity)	High-Speed Train Alternative										
	BNSF	Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
	Acreage										
Heartscale – *Atriplex cordulata* (CNPS List 1B.2)	1.18	—	—	—	—	—	—	—	—	—	—
Little mouse tail – *Myosurus minimus* ssp. *apus* (CNPS List 3.1)	0.73	—	—	—	—	—	—	0.05	—	—	—
Unsurveyed potential suitable habitat that could support special-status plant species	692.59	94.94	88.46	103.30	96.82	106.72	93.03	261.74	75.25	251.63	251.13

Notes:
— = Not present or not applicable
Acreages reported represent area present within the Special-Status Plant Study Area. Extent of the Special-Status Plant Study Area is based on the 15% engineering design project footprint.
Abbreviations:
CNPS = California Native Plant Society

5.5.1.1 Bakersfield Smallscale

Bakersfield smallscale (*Atriplex tularensis*) is a state-endangered and CNPS List 1B.1 species in the chenopod family (Chenopodiaceae). This species is included in the USFWS *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998). This annual herb, which blooms from June to October, is most frequently found at elevations between 300 and 315 feet, although it has been reported as high as 655 feet (CNPS 2010). It is typically found on the subalkaline margins of alkali sinks in grasslands or scrub-shrublands. Species co-occurring with Bakersfield smallscale may include alkali heath, iodine bush, pickleweed, scratchgrass (*Muhlenbergia asperifolia*), and saltgrass.

Background Review and Survey Results

Currently Bakersfield smallscale is only known to occur at a single location, Gator Pond, in the Kern Lake Preserve. Observations of this species at this site have decreased. Its current status is in question; recent observations indicate that it may have hybridized with bractscale (*A. serenana*) or has been extirpated (CDFG 2012a). Gator Pond is approximately 18 miles south of the Special-Status Plant Study Area, near the town of Lakeview.

Historically, Bakersfield smallscale is known from three additional occurrences in Kern County. Populations at these sites are considered extirpated. One of these historic occurrences is reported within 10 miles of the alignments. This occurrence was located in the vicinity of Greenfield near the junction of McKee and Union Roads, and is approximately 6 miles from the Special-Status Plant Study Area in the vicinity of Bakersfield. It was observed in 1921 growing on alkali plains with saltgrass, alkali heath, and bractscale (*Atriplex serenana*). Suitable habitat in the area of this occurrence has been converted to agriculture (CDFG 2012a).

Bakersfield smallscale was not observed in the Special-Status Plant Study Area during the 2010 floristic surveys conducted where permission to enter was granted. Suitable habitat for Bakersfield smallscale may occur in areas where permission to enter was not granted in Kern County, but which appeared to support natural vegetation (Figure 5-2). However, it is unlikely that Bakersfield smallscale is present in the Special-Status Plant Study Area as this species is currently only known from a single population at Gator Pond that may have been extirpated (CDFG 2012a).

5.5.1.2 California Jewel-flower

California jewel-flower (*Caulanthus californicus*) is a federally endangered, state-endangered, CNPS List 1B.1 species in the mustard family (Brassicaceae). This species is included in the USFWS *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998). California jewel-flower, an annual herb that generally blooms between February and May, is generally associated with desert scrub, annual or perennial grasslands, and juniper and juniper-pinyon woodland between 240 and 2,950 feet. Historically, this species may also have been associated with alkali desert scrub.

Species that may co-occur with California jewel-flower include annual fescues, clovers (*Trifolium* spp.), red maids (*Calandrinia ciliata*), and goldfields. Currently, California jewel-flower is known to occur in Fresno, San Luis Obispo, and Santa Barbara counties. Historically, this species also occurred in Kings, Tulare, and Kern counties.

Background Review and Survey Results

California jewel-flower was not observed in the Special-Status Plant Study Area during the 2010 floristic surveys conducted where permission to enter was granted. Seven occurrences of California jewel-flower are reported within 10 miles of the alignments; three of these occurrences

are in the Special-Status Plant Study Area (CDFG 2012a). All of these occurrences are considered extirpated except for one, Occurrence 39, which is considered possibly extirpated and is located approximately 9.8 miles from the BNSF Alternative, along Caliente Creek near the foot of the Tehachapi Grade in Kern County. These populations are possibly extirpated due to agricultural conversion and urban development (CDFG 2012a).

Although suitable habitat for the California jewel-flower exists in the Special-Status Plant Study Area along the upland margins of vernally inundated, herbaceous, and scrub-dominated alkali areas with saltbush, iodine bush, goldfields, fiddleneck, and saltgrass, this species was not observed during surveys of the Special-Status Plant Study Area. The type of suitable habitat found in the species' current distribution in Fresno County is absent in the Special-Status Plant Study Area. However, suitable habitat may be present in Fresno, Kings, Tulare, and Kern counties in areas where permission to enter was not granted. This species has the potential to occur in these areas (Figure 5-2).

5.5.1.3 Hoover's Spurge

Hoover's spurge (*Chamaesyce hooveri*) is a federally threatened and CNPS List 1B.2 species in the spurge family (Euphorbiaceae). This species is included in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005a). Hoover's spurge is an annual herb that blooms between May and October, depending on location and hydrologic conditions. This species is an obligate wetland plant, but will not grow in standing water (Alexander and Schlising 1998).

Hoover's spurge may be found at elevations from 80 to 130 feet in hardpan or claypan vernal pools. Occupied vernal pools range in size from 0.47 acre to 600 acres, with the species occurring along the margins of the deepest section of dried pools. In the San Joaquin Valley this species is typically found in soils that are neutral to saline-alkaline with clay to sandy loam textures. The two most common associates of Hoover's spurge are Greene's tuctoria and hairy Orcutt grass (*Orcuttia pilosa*), although these species occur in different locations in the vernal pool. Hoover's spurge is primarily threatened by the conversion of suitable habitat to agriculture and by changes in hydrology from nearby agricultural activities. Competition with invasive species and destruction from grazing cattle are also threatening this species (USFWS 2005a).

Background Review and Survey Results

Currently this species is believed to occur in Tehama, Butte, Tulare, Stanislaus, Glenn, and Merced counties. Of the 26 occurrences that are presumed extant, the majority of these occurrences have not been confirmed since the late 1980s; none occur within 10 miles of the alignments (CDFG 2012a).

Hoover's spurge was not observed in the Special-Status Plant Study Area during the 2010 floristic surveys in areas where permission to enter was granted. However, suitable habitat for this species occurs in areas mapped as alkali desert scrub, vernal pools, and annual grasslands. Although the Special-Status Plant Study Area (203 feet to 430 feet in elevation) is above the known elevation range of this species this species cannot be discounted because the habitats present within the Special-Status Plant Study Area are similar to those found at elevations where this species is known to occur. This species may occur in areas of potentially suitable habitat where permission to enter was not granted.

5.5.1.4 Kern Mallow

The Kern mallow (*Eremalche kernensis*) is a federally endangered and CNPS List 1B.1 species in the mallow family (Malvaceae). This species is included in the USFWS *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998). Kern mallow typically blooms

between March and May, and is usually found in grasslands or in areas dominated by alkali scrub at elevations between 300 and 900 feet, although it has been reported as high as 3,280 feet (CNPS 2010).

Kern mallow is generally found on alkaline sandy loam or clay loam soils in areas dominated by other herbaceous species (less than 25% shrub cover). Associated species typically include foxtail brome, red-stemmed filaree, woolly goldfields (*Lasthenia minor*), and white Sierran layia *(Layia pentachaeta* ssp. *albida*). Shrubs commonly associated with this species include spinescale saltbush and cattle saltbush (*Atriplex polycarpa*). Kern mallow is threatened by the conversion of suitable habitat into other land uses. Petroleum interests, including oil exploration, pipeline maintenance, and utility corridor maintenance, have also been cited as leading to the fragmentation of existing populations. Conservation efforts for this species have focused on preserving its remaining habitat and on increasing the amount of research that is applied to studying its demography (USFWS 1998).

The taxonomy of this species is currently uncertain. Both the first and second editions of the Jepson Manual do not recognize the nomenclature *E. kernensis* and instead list the species as a subspecies of Parry's mallow (*E. parryi* ssp. *kernensis*) (Hickman 1993; Andreasen 2010). According to the *Supplemental Survey Methods for Kern Mallow* (Cypher 2002), the strictest definition of Kern mallow describes the species as gynodioecious, with generally white to pale lavender flowers, located in the vicinity of Lokern in Kern County. However, the same document recommends that all populations west of the Sierra crest with gynodioecious or small-flowered characteristics should be reported, regardless of flower color or apparent gender.

Background Review and Survey Results

One occurrence of Kern mallow is reported within 10 miles of the alignments (CDFG 2012a). The exact location of this occurrence is unknown; however, the CNDDB places it in the Special-Status Plant Study Area about 5 miles northwest of Delano along SR 43. This occurrence was located in a saline valley grassland community and is presumed extant, although it was last observed in 1962.

Kern mallow *(Eremalche parryi* ssp. *kernensis)* was not identified in the Special-Status Plant Study Area during the 2010 surveys in areas where permission to enter was granted. However, it was observed in a fallow field near the intersection of SR 155 and SR 43 in Kern County during the late botanical surveys in May 2010, just outside of the Special-Status Plant Study Area (Figure 5-2). Populations as described under the strictest definition of Kern mallow (*E. kernensis*) were not identified, and are not expected to occur in the Special-Status Plant Study Area.

The population of *E. parryi* ssp. *kernensis* was gynodioecious and small-flowered, but it occurred approximately 30 miles north of Lokern and had light to medium purple flowers. The dominant cover in the field was foxtail brome, and the area appeared to have been heavily disturbed in the past. However, shrub recruitment of bush seepweed indicated that the field had not been disturbed for at least a complete growing season.

Based on the location of this *E. parryi* ssp. *kernensis* population in an area of marginal habitat, this species may occur in areas of potentially suitable habitat in Kern County where permission to enter was not granted, or it may colonize into the Special-Status Plant Study Area over time (Figure 5-2). However, because of taxonomic uncertainties and the focus of conservation efforts on the white-flowered population in the vicinity of Lokern (*E. kernensis*), conservation efforts to protect this subspecies (*E. parryi* ssp. *kernensis*) are not currently warranted.

5.5.1.5 San Joaquin Woollythread

San Joaquin woollythread (*Monolopia congdonii*) is a federally endangered and CNPS List 1B.2 species in the composite family (Asteraceae). This species is included in the USFWS *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998). This annual herb is generally found in neutral to subalkaline soils of sand to sandy loam texture, in alkali shrub or grasslands at elevations between 200 and 2,600 feet. It typically flowers between late February and early April, depending on precipitation levels (USFWS 1998).

Species that may co-occur with San Joaquin woollythreads include red brome, red-stemmed filaree, goldfields, Mediterranean grass (*Schismus* spp.), and fescue (*Vulpia myuros*). Currently this species is known to occur in San Luis Obispo, Kern, Kings, Fresno, San Benito, and Santa Barbara counties. Historically, this species was also known to occur in Tulare County. The primary threat to the San Joaquin woollythread is habitat destruction resulting from agricultural and urban development. Conservation efforts have focused on preserving the remaining populations and on funding demographic studies and monitoring programs (USFWS 1998). Oil activity, grazing by sheep, vehicle traffic, urban development, and agricultural conversion are continued threats to this species (CDFG 2012a).

Background Review and Survey Results

Twelve occurrences of San Joaquin woollythreads have been reported within 10 miles of the alignments. Two of these CNDDB occurrences, Occurrences 22 and 26, are located in the Special-Status Plant Study Area, but are possibly extirpated due to agricultural and urban development (CDFG 2012a). San Joaquin woollythreads were not identified in the Special-Status Plant Study Area during the 2010 surveys in areas where permission to enter was granted. However, suitable habitat for the San Joaquin woollythread occurs in the Special-Status Plant Study Area, primarily in Kern County, in areas mapped as alkali desert scrub and annual grasslands, which are characterized by goldfields, fiddleneck, red brome, red-stemmed filaree, Mediterranean grass, and mouse-tail fescue. This species is not likely to occur in areas that have been degraded or destroyed by residential, agricultural, or oil development, but may occur in areas of potentially suitable habitat in Kings, Tulare, and Kern Counties where permission to enter was not granted (Figure 5-2).

5.5.1.6 Bakersfield Cactus

Bakersfield cactus (*Opuntia basilaris* var. *treleasei*) is a federally endangered, state-endangered, and CNPS 1B.1 species in the cactus family (Cactaceae). It is a succulent shrub that blooms from April to May and is found at elevations of 400 to 1,800 feet in chenopod scrub, valley and foothill grassland, cismontane woodland, and saltbush scrub communities on floodplains, bluffs, ridges, and rolling hills in sandy to gravelly or cobbly soils. At some locations, vegetation may be generally sparse. Bakersfield cactus is endemic to Kern County. Populations and/or occurrences have been reported and confirmed in the Central Valley in the vicinity of Bakersfield and Arvin, in the Sierra Nevada, and in the foothills of the Tehachapis.

Approximately one-third of the historical occurrences have been extirpated. As a result, the remaining populations have become fragmented within Kern County. Habitat loss due to agricultural, urban, and residential development has been and continues to be the greatest threat to Bakersfield cactus. Many of the extant populations occur on private land that is commercially desirable. Conservation efforts have focused on attempting to preserve the remaining populations and relocating populations from sites that were going to be disturbed. Bakersfield cactus is included in the USFWS *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998)

Background Review and Survey Results

Twenty-three occurrences of Bakersfield cactus have been reported within 10 miles of the alignments; however, most historical occurrences are considered extirpated due to urban development.. Three of these occurrences are located within 2 miles of the BNSF Alternative; one of these occurrences has been extirpated due to agricultural and urban development, while the other two are presumed extant and were observed in 1989 (CDFG 2012a).

No individuals of Bakersfield cactus were observed in the Special-Status Plant Study Area during 2010 field surveys on properties where permission to enter was granted. Properties within the Special-Status Plant Study Area where permission to enter was not granted and that overlap with the range of this species are heavily disturbed from urbanization and active agriculture; therefore, the potential for this species to occur is low.

5.5.1.7 Horn's Milk Vetch

Horn's milk-vetch (*Astragalus hornii* var. *hornii*) is a CNPS List 1B.1 species in the pea family (Fabaceae). It is an annual herb that blooms from May to October and is typically found at elevations ranging from 200 feet to 2,790 feet in lake margins and alkaline soils. Horn's milk-vetch is generally associated with alkali playa, meadows, and seeps. Currently this species is known to occur in Inyo, Tulare, Kern, San Bernardino, and Nevada counties. In the early 1900s, this species was the focus of intentional eradication due to its toxicity to sheep. Since then, habitat loss resulting from developmental pressure continues to be the primary threat to this species (CNPS 2010).

Background Review and Survey Results

Five occurrences of Horn's milk-vetch are reported within 10 miles of the alignments, one of which is in the Special-Status Plant Study Area near Bakersfield. All of these occurrences are considered extant. Although the CNDDB lists the occurrence within the Special-Status Plant Study Area as extant, it has not been observed since 1939 and its exact location is unknown (CDFG 2012a). During the botanical surveys, no *Astragalus* species were identified at this location; the survey team presumes that this occurrence of the species is extirpated due to urbanization. This species may occur in areas of potentially suitable habitat in Tulare and Kern counties where permission to enter was not granted.

Horn's milk- vetch was not identified in the Special-Status Plant Study Area during the 2010 surveys in areas where permission to enter was granted. Suitable habitat for this species was surveyed in Kern and Tulare counties in areas mapped as annual grasslands and alkali desert scrub. Typical species in these areas include spinescale saltbush, bush seepweed, saltgrass, goldfields, fiddleneck, and annual grasses such as bromes and barleys.

5.5.1.8 Heartscale

Heartscale (*Atriplex cordulata*) is a CNPS List 1B.1 species in the chenopod family (Chenopodiaceae). It is an annual herb that blooms from April to October and is typically found at elevations ranging from 0 feet to 1,000 feet in sandy saline or alkaline soils. Heartscale is generally found in chenopod scrub or grassland communities characterized by shrubs such as alkali heath, iodine bush, bush seepweed, saltbush, and forbs, and grass species such as tarweed, saltgrass, barley, and other annual *Atriplex* species. Currently this species is known to occur in Alameda, Butte, Colusa, Fresno, Merced, San Joaquin, San Luis Obispo, Solano, Stanislaus, Tulare, and Yolo counties. This species is primarily threatened by loss of suitable habitat to agricultural and urban development, competition with invasive species, and trampling.

Background Review and Survey Results

Five populations of heartscale were identified during the late summer period in the Special-Status Plant Study Area in areas where permission to enter was granted in Kings and Tulare counties (Table 5-11; Figure 5-2). Populations were typically found near the BNSF Railway right-of-way in the Allensworth region in disturbed areas that were mapped as annual grasslands and alkali desert scrub or that were within vernal pools. Characteristic species in these areas include alkali heath, iodine bush, bush seepweed, saltgrass, goldfields, annual grasses such as bromes and barley, and tarweed. Based on the presence of this species within the Special-Status Plant Study Area and in nearby areas, additional populations may occur in areas of potentially suitable habitat in Fresno, Kings, and Tulare counties where permission to enter was not granted.

Table 5-11
Heartscale Populations Observed within the Special-Status Plant Study Area

Figure 5-2 Map Sheet #	Notes
10	Very small population found near a canal alongside the railroad. Population is highly disturbed and subject to railroad maintenance activities.
13	Small population along the railroad in a highly disturbed area subject to railroad maintenance activities.
14	A non-continuous population alongside railroad and access road in fallow field. Highly disturbed and subject to maintenance activities.
18	A non-continuous population occurring along the railroad in a relatively undisturbed area. Patches closer to the railroad are subject to railroad maintenance activities.

5.5.1.9 Lost Hills Crownscale

Lost Hills crownscale (*Atriplex coronata* var. *vallicola*) is a CNPS List 1B.2 species in the chenopod family (Chenopodiaceae). It is an annual herb that blooms from April to August and is typically found at elevations ranging from 0 to 1,000 feet in powdery, alkaline soils that are vernally moist. Lost Hills crownscale is generally found in alkali desert scrub, vernal pools, and annual and perennial grassland areas characterized by alkali heath, iodine bush, saltgrass, red brome, and other annual and perennial *Atriplex* species. Currently, this species is known to occur in Fresno, Kings, Kern, Merced, and San Luis Obispo counties. This species is primarily threatened by grazing, agricultural conversion, competition with invasive species, and energy development.

Background Review and Survey Results

Lost Hills crownscale was not identified during the floristic surveys of the Special-Status Plant Study Area in areas where permission to enter was granted, including the July 2010 surveys that focused on identifying annual *Atriplex* species. However, Lost Hills crownscale was identified in close proximity to the Special-Status Plant Study Area during floristic surveys conducted to site the Allensworth Bypass Alternative. The observed populations outside of the Special-Status Plant Study Area were found in a large vernal pool complex characterized by alkali desert scrub and annual grasslands. Although no occurrences of Lost Hills crownscale are recorded in the CNDDB within 10 miles of the alignments (CDFG 2012a), the observations of the species near the town of Allensworth and the presence of suitable habitat within the Special-Status Plant Study Area indicate that the Lost Hills crownscale may occur in areas of potentially suitable habitat in Fresno, Kings, Tulare, and Kern counties in areas where permission to enter was not granted.

5.5.1.10 Brittlescale

Brittlescale (*Atriplex depressa*) is a CNPS List 1B.2 species in the chenopod family (Chenopodiaceae). This annual herb blooms from April to October and is typically found at elevations ranging from sea level to 1,050 feet in vernal pools in clay and alkaline soils. Brittlescale is generally found in scrub or grassland communities characterized by shrubs such as alkali heath and bush seepweed, and by forbs and grasses such as tarweed, saltgrass, goldfields, and barley. Currently this species is known to occur in Alameda, Contra Costa, Colusa, Fresno, Glenn, Kern, Merced, Solano, Stanislaus, Tulare, and Yolo counties. This species is primarily threatened by grazing and trampling.

Background Review and Survey Results

The CNDDB reports two occurrences of brittlescale within 10 miles of the Special-Status Plant Study Area. The closest occurrence is in Laton along the Hanford West Bypass Alternative. However, this record is from an undated collection with an unknown location. CNDDB mapped it in Laton but reports that fieldwork is needed for verification. The other occurrence is less than 1 mile east of the Allensworth Bypass Alternative. This occurrence of brittlescale was observed at this location in 1987, and is presumed extant (CDFG 2012a).

Brittlescale was not identified in the Special-Status Plant Study Area during the 2010 floristic surveys in areas where permission to enter was granted, including the July 2010 surveys that focused on identifying annual *Atriplex* species. However, during surveys conducted to site the Allensworth Bypass Alternative, this species was identified in close proximity to the Special-Status Plant Study Area. Suitable habitat for brittlescale exists in areas mapped as annual grasslands and alkali desert scrub or within or near vernal pools in Kings, Tulare, and Kern counties. Characteristic species in these areas include alkali heath, iodine bush, bush seepweed, saltgrass, goldfields, annual grasses such as bromes and barley, and tarweed. Given the current distribution of this species, the presence of nearby occurrences, and the presence of suitable habitat, this species may be present in the Special-Status Plant Study Area in areas of potentially suitable habitat in Fresno, Kings, Tulare, and Kern counties where permission to enter was not granted.

5.5.1.11 Earlimart Orache

Earlimart orache (*Atriplex erecticaulis*) is a CNPS List 1B.2 species in the chenopod family (Chenopodiaceae). It is an annual herb that blooms from August to September and is typically found at elevations ranging from 131 to 328 feet. Earlimart orache is generally associated with annual and perennial grasslands. Currently this species is known to occur in Kings, Tulare, and Kern counties. This species is primarily threatened by off-road vehicles. The Jepson Manual does not recognize the nomenclature of *A. erecticaulis* and instead designates this species as a variation of *A. cordulata* (var. *erecticaulis*).

Background Review and Survey Results

Sixteen occurrences of Earlimart orache occur within 10 miles of the alignments. One occurrence is in the vicinity of Allensworth along the BNSF Alternative north of Wasco. This occurrence of Earlimart orache was observed in 1987 and is presumed extant (CDFG 2012a). This occurrence was not confirmed during the July 2010 floristic surveys and may be extirpated. Earlimart orache was not identified during floristic surveys of the Special-Status Plant Study Area in areas where permission to enter was granted, including the July 2010 surveys that focused on identifying annual *Atriplex* species. The habitat characteristics of this species are similar to those of brittlescale, as previously described. Given the current distribution of this species, the presence of suitable habitat, and previously documented occurrences within 10 miles of the Special-Status Plant Study Area, this species may be present in the Special-Status Plant Study Area in areas of

potentially suitable habitat in Kings, Tulare, and Kern counties where permission to enter was not granted.

5.5.1.12 Lesser Saltscale

Lesser saltscale (*Atriplex minuscula*) is a CNPS List 1B.1 species in the chenopod family (Chenopodiaceae). This species is included in the USFWS *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998). It is an annual herb that blooms from May to October and is typically found at elevations ranging from 50 to 660 feet, in sandy, alkaline soils. Lesser saltscale is generally associated with alkaline playas, grasslands, and chenopod scrub communities. Currently this species is known to occur in Butte, Fresno, Kern, Madera, Merced, Stanislaus, and Tulare counties. This species is primarily threatened by loss of habitat due to agricultural conversion and urban development. Most of the historical occurrences of this species have been extirpated.

Background Review and Survey Results

The CNDDB reports three occurrences of lesser saltscale within 10 miles of the alignments. The closest occurrence, Occurrence 22, is located near Raisin City approximately 7 miles west of the Special-Status Plant Study Area. Lesser saltscale was last observed in this location in 1937. Its exact location was not mapped, but this occurrence is presumed extant (CDFG 2012a). Lesser saltscale was not identified during floristic surveys of the Special-Status Plant Study Area in areas where permission to enter was granted, including July 2010 surveys that were focused on identifying annual *Atriplex* species. However, lesser saltscale was identified in close proximity to the Special-Status Plant Study Area during floristic surveys in the vicinity of Allensworth, within areas mapped as alkali desert scrub and annual grasslands in a large vernal pool complex. Based on the findings of the surveys, this species could occur within the Special-Status Plant Study Area in areas of potentially suitable habitat in Fresno, Kings, Tulare, and Kern counties where permission to enter was not granted.

5.5.1.13 Vernal Pool Smallscale

Vernal pool smallscale (*Atriplex persistens*) is a CNPS List 1B.2 species in the chenopod family (Chenopodiaceae). This species is included in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005a). This annual herb blooms from June to October and is typically found in alkaline soils at elevations ranging from 30 feet to 380 feet. Vernal pool smallscale is generally associated with large, alkaline vernal pools and commonly occurs with alkali weed, hyssop-leaved bassia (*Bassia hyssopifolia*), alkali heath, tarweed, and saltgrass. It also co-occurs with Hoover's spurge. Historically, this species was only known from Merced, Tulare, and Stanislaus counties. Twenty-seven new populations of vernal pool smallscale were observed between 1990 and 2005 (USFWS 2005a). Currently this species is known to occur in Glenn, Madera, Merced, Solano, Stanislaus, and Tulare counties. This species is primarily threatened by loss of habitat due to agriculture and flood control practices.

Background Review and Survey Results

Vernal pool smallscale was not identified during floristic surveys of the Special-Status Plant Study Area in areas where permission to enter was granted, including July 2010 surveys that were focused on identifying annual *Atriplex* species. The habitat characteristics of this species are similar to those of brittlescale, which was previously described. One occurrence of vernal pool smallscale is reported within 10 miles of the alignments. This occurrence is located near Pixley approximately 5 miles east of the Special-Status Plant Study Area. Vernal pool smallscale was last observed in this location in 1963, and this population is possibly extirpated (CDFG 2012a). Although this is the only occurrence within 10 miles of the Special-Status Plant Study Area, suitable habitat is present within the Special-Status Plant Study Area. The Special-Status Plant

Study Area falls within the known range of the species and it may occur in areas of potentially suitable habitat in Tulare County where permission to enter was not granted.

5.5.1.14 Subtle Orache

Subtle orache (*Atriplex subtilis*) is a CNPS List 1B.2 species in the chenopod family (Chenopodiaceae). It is an annual herb that blooms from June to August and is typically found at elevations ranging from 130 feet to 330 feet. Subtle orache is generally associated with valley and foothill grassland. Currently this species is known to occur in Butte, Fresno, Kings, Kern, Madera, Merced, and Tulare counties. This species is threatened by loss of habitat due to agricultural conversion.

Background Review and Survey Results

The CNDDB reports 10 occurrences of subtle orache within 10 miles of the alignments. The closest occurrence to the Special-Status Plant Study Area (Occurrence 6) is approximately 1.7 miles west of the town of Corcoran. Subtle orache was last observed in this location in 1994, and this population is presumed extant (CDFG 2012a). Subtle orache was not identified during the floristic surveys of the Special-Status Plant Study Area in areas where permission to enter was granted, including the July 2010 surveys that were focused on identifying *Atriplex* species. However, subtle orache was identified in close proximity to the Special-Status Plant Study Area during the floristic surveys. The observed populations were found outside of the Special-Status Plant Study Area within a large vernal pool complex characterized by alkali desert scrub and annual grasslands. Given the current distribution of this species, the presence of nearby occurrences, and the presence of suitable habitat, this species may be present in areas of potentially suitable habitat in Fresno, Kings, Tulare, and Kern counties where permission to enter was not granted.

5.5.1.15 Round-Leaved Filaree

Round-leaved filaree (*California macrophylla*) is a CNPS List 1B.1 species in the geranium family (Geraniaceae). It is an annual herb that blooms from March to May and is typically found in clay soils at elevations ranging from 49 feet to 3,937 feet. Round-leaved filaree is generally associated with blue oak and valley oak woodlands, juniper communities, and annual and perennial grasslands. This species may also be found in disturbed places. Currently this species is known to occur throughout the Central Valley and coastal areas of California. This species is primarily threatened by urbanization, habitat alteration, vehicles, pipeline construction, feral pigs, competition with invasive species, and grazing (CNPS 2010).

Background Review and Survey Results

Round-leaved filaree was not observed during 2010 floristic surveys of the Special-Status Plant Study Area in areas where permission to enter was granted. However, suitable habitat for round-leaved filaree occurs in the Special-Status Plant Study Area in areas mapped as annual grasslands and valley foothill riparian. Even though this species was not identified during the botanical surveys and no occurrences are known within 10 miles of the alignments (CDFG 2012a), this species may occur in areas of potentially suitable habitat where permission to enter was not granted.

5.5.1.16 Alkali Mariposa Lily

Alkali mariposa lily (*Calochortus striatus*) is a CNPS List 1B.2 species in the lily family (Liliaceae). It is a perennial bulb that blooms between April and June and is typically found at elevations from 300 feet to 5,230 feet in alkaline meadows and ephemeral washes. Currently this species is known to occur in Kern, Los Angeles, San Bernardino, Tulare, and Nevada counties. Common

associates of alkali mariposa lily include saltbush, bush seepweed, and honey mesquite (*Prosopis glandulosa*). This species is primarily threatened by the conversion of suitable habitat for urban development, road construction, and changes in the water table due to hydrologic diversions. Conservation efforts have focused on preserving the known extant populations.

Background Review and Survey Results

Two presumed extant occurrences of alkali mariposa lily are reported within 10 miles of the alignments. One occurs approximately 2 miles east of the BNSF Alternative near Allensworth, and the other occurs approximately 9 miles southwest of Bakersfield. The occurrences were observed in 1997 and 2006, respectively, and are both presumed extant. Associates for these two occurrences include bush seepweed and saltbush, both of which occur throughout the Special-Status Plant Study Area in areas mapped as alkali desert scrub. Alkali mariposa lily was not observed during the 2010 floristic surveys of the Special-Status Plant Study Area where permission to enter was granted. However, suitable habitat for alkali mariposa lily occurs in the Special-Status Plant Study Area in areas mapped as annual grasslands and alkali desert scrub. Although this species was not observed during botanical surveys, it has the potential to occur in areas of potentially suitable habitat in Kern and Tulare counties where permission to enter was not granted.

5.5.1.17 Slough Thistle

Slough thistle (*Cirsium crassicaule*) is a CNPS List 1B.1 species in the composite (Asteraceae) family. It is an annual or perennial herb that is generally found in alkali desert scrub, marshes and swamps, and riparian scrub communities in sloughs and along riverbanks areas at elevations from 10 feet to 328 feet. Slough thistle typically blooms between May and August, and it is currently known from Kings, Kern, and San Joaquin counties. Threats to the species include agricultural and hydrological conversion of suitable habitat and competition with invasive species.

Background Review and Survey Results

Slough thistle was not observed during the 2010 floristic surveys of the Special-Status Plant Study Area in areas where permission to enter was granted. However, suitable habitat for slough thistle occurs in the Special-Status Plant Study Area in Kings, Tulare, and Kern counties in areas mapped as alkali desert scrub or as fresh emergent wetland, valley foothill riparian, riverine, lacustrine, or annual grassland. One occurrence of slough thistle is reported approximately 9 miles southwest of the town of Wasco. Although this population was last observed in 1954, it is still presumed extant (CDFG 2012a). Despite the lack of occurrences and negative findings of the botanical surveys, this species may occur in areas of potentially suitable habitat in Kings, Tulare, and Kern counties where permission to enter was not granted.

5.5.1.18 Recurved Larkspur

Recurved larkspur (*Delphinium recurvatum*) is a CNPS 1B.2 listed species. It is endemic to California, and its historical range is primarily in the Central Valley. This species generally blooms from March through May. Recurved larkspur is typically found at elevations ranging from 0 feet to 4,400 feet, in alkaline grasslands or scrub areas characterized by a sparse cover of saltbush or other shrubs in the chenopod family (Chenopodiaceae). This wildflower reaches a maximum height of about 1.6 feet. Its deeply lobed leaves are mainly basal, and those located farther up the dark purple stem are much smaller. The flowers are often blue, with sepals and lower petals that are darker than the upper petals. The sepals are usually curved back, the trait that gives the plant its name. Currently this species is known from Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kings, Tulare, Kern, Madera, Merced, Monterey, San Joaquin, San Luis Obispo, and Solano counties (CDFG 2012a). Habitat loss due to agricultural and urban development and to cattle grazing and trampling is the largest threat to this species (CNPS 2010).

Background Review and Survey Results

Recurved larkspur was not observed in the Special-Status Plant Study Area during the 2010 floristic surveys in areas where permission to enter was granted. However, recurved larkspur was identified in close proximity to the Special-Status Plant Study Area during floristic surveys conducted to site the Allensworth Bypass Alternative. Based on these findings, populations may occur in areas that could be characterized as alkali desert scrub or where vernal pools are present, where permission to enter was not granted. Co-occurring species include goldfields, fiddleneck, tarweed, bush seepweed, and saltbush.

There are 21 CNDDB occurrences of recurved larkspur within 10 miles of the alignments (CDFG 2012a). Six of these, (Occurrences 15, 16, 18, 21, 22, and 23) are within the Special-Status Plant Study Area and project footprint, although one occurrence (Occurrence 16) is possibly extirpated (Figure 5-2). Occurrence 23 along the BNSF Alternative was revisited, but no populations of recurved larkspur were identified. Suitable habitat was still present, and this species may still occur. Occurrence 81, which falls outside the Special-Status Plant Study Area between the Allensworth Bypass and BNSF alternatives, was confirmed and had greatly expanded (CDFG 2012a). Due to the observations of this species near the Special-Status Plant Study Area and the presence of suitable habitat, recurved larkspur may occur in areas of potentially suitable habitat in Kings and Tulare Counties where permission to enter was not granted.

5.5.1.19 Hoover's Woolly-Star

Hoover's woolly-star (*Eriastrum hooveri*) is a CNPS List 4.2 species in the phlox family (Polemoniaceae). It was previously listed as threatened by USFWS, but was delisted in 2003. It is described in the *Recovery Plan for the Upland Species of the San Joaquin Valley, California* (USFWS 1998). This annual herb typically blooms between March and June. It is found at elevations between 165 feet and 3,000 feet, generally in chenopod scrub, annual and perennial grasslands, and woodlands characterized by pinyon (*Pinus monophylla*) and juniper (*Juniperus* spp.) on sparsely vegetated, alkaline alluvial fans or sandy soils. Historically, this species was known from Fresno, Kern, Santa Barbara, and San Luis Obispo counties. It is currently known from Fresno, Kings, Kern, and Los Angeles counties (CNPS 2010; CDFG 2012a). Loss of habitat due to residential, agricultural, and energy development, as well as due to grazing is the primary threat to this species (USFWS 1998; CNPS 2010).

Background Review and Survey Results

There are nine reported occurrences of Hoover's woolly-star within 10 miles of the alignments, six of which are presumed extant, and three are extirpated. The nearest extant occurrence of Hoover's woolly-star reported in the CNDDB is approximately 4 miles southwest of the Bakersfield South Alternative, and it was last reported observed in 1986 (CDFG 2012a). Hoover's woolly-star was not observed during the 2010 floristic surveys of the Special-Status Plant Study Area in areas where permission to enter was granted. However, suitable habitat for Hoover's woolly-star occurs in the Special-Status Plant Study Area in Kings and Kern counties in areas mapped as alkali desert scrub. Annual grasslands dominated by bromes and barley may also provide suitable habitat for this species. Despite the negative findings of the botanical surveys, this species has the potential to occur in areas of potentially suitable habitat in Kings, Tulare, and Kern counties where permission to enter was not granted.

5.5.1.20 Spiny-Sepaled Button-Celery

Spiny-sepaled button-celery (*Eryngium spinosepalum*) is a CNPS List 1B.2 species in the parsley family (Apiaceae). It is an annual or perennial herb that is generally found in vernal pools in annual and perennial grasslands, in clay soils, at elevations from 260 feet to 1,300 feet. Spiny-sepaled button-celery may bloom from April to May, and it is currently and historically known

from Fresno, Madera, Merced, Stanislaus, Tulare, and Tuolumne counties (CNPS 2010; CDFG 2012a). Threats to this species include agricultural and urban development, grazing, road maintenance, and hydrological alteration.

Background Review and Survey Results

There are no reported occurrences of spiny-sepaled button-celery reported within 10 miles of the alignments (CDFG 2012a). Spiny-sepaled button-celery was not observed during the 2010 floristic surveys of the Special-Status Plant Study Area where permission to enter was granted. Suitable habitat for spiny-sepaled button-celery occurs in the Special-Status Plant Study Area in Tulare County in areas mapped as alkali desert scrub and annual grasslands containing vernal pools. This species has the potential to occur in areas of potentially suitable habitat in Fresno and Tulare counties where permission to enter was not granted.

5.5.1.21 California Satintail

California satintail (*Imperata brevifolia*) is a CNPS List 2.1 species in the grass family (Poaceae). It is a rhizomatous grass that is generally found in chaparral, coastal scrub, riparian scrub, desert scrub, meadows, and alkali seeps at elevations from 0 feet to 1,500 feet. California satintail typically blooms from May to September. This species is known from Butte, Fresno, Imperial, Inyo, Kern, Lake, Los Angeles, Orange, Riverside, San Bernardino, Tehama, Tulare, and Ventura counties (CNPS 2010). Many of the collections of this species are old, however, and records from Butte, Tehama, and Lake counties may represent escapees of this species from ornamental plantings (CNPS 2010). This species is threatened by urban development and agricultural conversion of suitable habitat, and was mistakenly classified as a noxious weed in California from 1960 to 2004 (CNPS 2010).

Background Review and Survey Results

Two occurrences of California satintail (Occurrences 12 and 22) have been reported in the Special-Status Plant Study Area. Both of these are historic occurrences that were reported in the late 1890s. The exact locations of these occurrences are not known, although the CNDDB reports their general location as Fresno and Bakersfield. These areas have been subject to urbanization, but the occurrences are presumed extant by the CDFG; both require fieldwork for verification (CDFG 2012a).

California satintail was not observed during the 2010 floristic surveys of the Special-Status Plant Study Area in areas where permission to enter was granted. However, marginally suitable habitat for this species may exist in areas mapped as annual grasslands and alkali desert scrub. Irrigation ditches and riparian corridors may also provide some habitat, although these areas are typically very disturbed in the Special-Status Plant Study Area. Given marginally suitable habitat in the Special-Status Plant Study Area and historical occurrences in the vicinity, this species may occur in areas of potentially suitable habitat in Fresno, Tulare, and Kern counties where permission to enter was not granted.

5.5.1.22 Coulter's Goldfields

Coulter's goldfields (*Lasthenia glabrata* ssp. *coulteri*) is a CNPS List 1B.1 species in the composite family (Asteraceae). This annual herb is generally found at elevations between 0 and 4,600 feet in alkali playa, coastal salt marshes, and vernal pools in alkaline grasslands. Coulter's goldfields typically bloom between February and June. Historically, this species was known from Colusa, Kern, Los Angeles, Merced, Orange, Riverside, Santa Barbara, San Bernardino, San Diego, San Luis Obispo, Ventura, and possibly Tulare counties, and from Santa Rosa Island. Currently it is known from Colusa, Merced, Orange, Riverside, Santa Barbara, San Diego, San Luis Obispo, Ventura, and possibly Kern and Tulare counties, and from Santa Rosa Island (CNPS 2010).

Populations of this species had shown significant declines by 1966, and this species continues to be seriously threatened by urbanization and agricultural development (CNPS 2010; CDFG 2012a).

Background Review and Survey Results

A single occurrence of Coulter's goldfields is known within 10 miles of the alignments along the Allensworth Bypass Alternative, approximately 6 miles northeast of the town of Allensworth. However, this site has not been visited since 1965, and it is not known if individuals of Coulter's goldfields still occur (CDFG 2012a). This species was not observed during the 2010 floristic surveys of the Special-Status Plant Study Area in areas where permission to enter was granted. However, suitable habitat for Coulter's goldfields occurs in Kern and Tulare counties in areas that were mapped as alkali desert scrub and annual grassland where vernal pools occur. A closely related species, yellow-rayed goldfields (*Lasthenia glabrata* ssp. *glabrata*), was identified, but this subspecies is not considered a special-status species. Given that suitable habitat is present in the Special-Status Plant Study Area and that this species is historically known to occur in the vicinity of the Special-Status Plant Study Area, there is a potential for this species to occur in areas of potentially suitable habitat in Kern and Tulare counties where permission to enter was not granted.

5.5.1.23 Munz's Tidy-Tips

Munz's tidy-tips (*Layia munzi*) is a CNPS List 1B.2 species in the composite family (Asteraceae). It is described in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998). This annual herb is generally found at elevations from 150 feet to 2,500 feet in white-grey alkaline clay soils in low-lying areas and on hillsides in grassland communities. Associated species include red brome, iodine bush, and spinescale saltbush. Munz's tidy-tips typically bloom between March and April. Historically, this species was widespread in the western San Joaquin Valley and inner Coast Range from Fresno south (USFWS 1998). This species is currently known from Fresno, Kern, and San Luis Obispo counties (CNPS 2010; CDFG 2012a). Threats to this species include agricultural and urban development, grazing, and competition from invasive species (USFWS 1998; CNPS 2010).

Background Review and Survey Results

Two occurrences of Munz's tidy-tips were reported within 10 miles of the alignments, although both are considered extirpated. One of these occurrences (Occurrence 18) was documented along the BNSF Alternative, approximately 5.5 miles north of Wasco. However, the area of this occurrence is now intensively farmed and the population at this site is considered extirpated by CDFG (CDFG 2012a). Although occurrences of this species were not observed during the 2010 floristic surveys of the Special-Status Plant Study Area in areas where permission to enter was granted, suitable habitat for this species occurs in the Special-Status Plant Study Area in Kern County in areas that were mapped as alkali desert scrub and annual grasslands. This species may occur in areas of potentially suitable habitat in Kern County where permission to enter was not granted.

5.5.1.24 Little Mouse Tail

Little mouse tail (*Myosurus minimus* ssp. *apus*) is a CNPS List 3.1 species in the buttercup family (Ranunculaceae). It is an annual herb that blooms from March to June, and is typically found at elevations ranging from 65 feet to 3,000 feet. Little mouse tail is generally found in alkaline vernal pools in valley grassland or coastal sage scrub, or in alkaline marshes (USFWS 2005a). Historically, this species was known from Alameda, Fresno, Merced, San Benito, San Luis Obispo, to Stanislaus counties, and from one site along the border of Colusa and Glenn counties. Currently the distribution of this species is uncertain (USFWS 2005a). The CNPS lists this species as occurring in Alameda, Contra Costa, Colusa, Lake, Merced, Riverside, San Bernardino, San

Diego, Solano, Tulare, and Yolo counties. The CNPS also lists it as occurring in Oregon and Baja California (CNPS 2010). In contrast, the CNDDB lists this species as currently occurring in San Diego and Riverside counties (CDFG 2012a).

Little mouse tail is primarily threatened by the loss of vernal pools to agricultural and urban development, off-road vehicle use, grazing, and competition with invasive species (USFWS 2005a).

Background Review and Survey Results

Six populations of little mouse tail were identified during the early (March) and mid-season (April) survey periods within the Special-Status Plant Study Area in areas where permission to enter was granted. These occurrences are shown on Figure 5-2 and summarized in Table 5-12. By the late-season (May) surveys, individuals had fruited, dried out, and become unidentifiable. These populations are new occurrences of this species, as no other occurrences of little mouse tail are recorded within 10 miles of the Special-Status Plant Study Area. Populations ranged from as few as five individuals to several thousand.

During surveys conducted to site the Allensworth Bypass Alternative, several populations of this species were identified within a large vernal pool complex near the town of Allensworth. These species would have been in the Special-Status Plant Study Area, but the alignment was shifted and these populations were avoided. The greatest concentration of this species typically occurred in vernal pools in areas mapped as alkali desert scrub and annual grasslands. However, there were also populations mapped in a reservoir that is periodically filled with water (inundated during the late-season surveys but not during the early- or mid-season surveys) and in disturbed areas along the BNSF Railway right-of-way. Based on the habitat where this species was observed, additional populations may occur in areas of potentially suitable habitat in Fresno and Tulare counties where permission to enter was not granted.

Table 5-12
Little Mouse Tail Populations Observed within the Special-Status Plant Study Area

Figure 5-2 Map Sheet #	Notes
11	Very small population next to railroad and highway. Subject to railroad and highway maintenance activities.
14	Small population near railroad in a moderately disturbed but unmaintained fallow field. Second small population found adjacent to an access road through a fallow field; highly disturbed.
15	Small patches found along the western edge of the railroad. Subject to railroad maintenance activities.
16	Very small patches found along an access road between properties. Highly disturbed.
18	Small patches found in relatively undisturbed areas between active agricultural fields.

5.5.1.25 Mud nama

Mud nama (*Nama stenocarpum*) is a CNPS List 2.2 species in the borage family (Boraginaceae). It is an annual herb that blooms from January to July and is typically found in marshes and swamps, lake shores, river banks, and intermittently wet areas from 16 to 1,640 feet. This species is currently known from Kings County.

Background Review and Survey Results

One CNDDB occurrence of mud nama is reported within 10 miles of the alignments. This occurrence was reported in 1999 west of Guernsey in a flood control channel that is within 1 mile of the Hanford West Bypass 1 and Hanford West Bypass 2 alternatives (CDFG 2012a). Although mud nama was not observed during the 2010 floristic surveys of the Special-Status Plant Study Area in areas where permission to enter was granted, suitable habitat for mud nama exists in the Special-Status Plant Study Area in areas that were mapped as riverine or seasonal wetlands. Suitable habitat is present in unsurveyed portions of the Special-Status Plant Study Area, and this species may occur in areas of potentially suitable habitat in Fresno, Kings, and Kern counties where permission to enter was not granted.

5.5.1.26 Kings Gold

Kings gold (*Tropidocarpum californicum*) is a CNPS List 1B.1 species in the mustard family (Brassicaceae). It is an annual herb that blooms in March and is typically found around the 215-foot elevation. Kings gold is generally associated with chenopod scrub. Currently, this species is known to occur in Kings and Kern counties. The species is primarily threatened by development (CNPS 2010).

Background Review and Survey Results

No CNDDB occurrence of Kings gold are reported within 10 miles of the alignments (CDFG 2012a). Although Kings gold was not observed during the 2010 floristic surveys of the Special-Status Plant Study Area in areas where permission to enter was granted, suitable habitat for Kings gold exists in the Special-Status Plant Study Area in areas that were mapped as alkali desert scrub and annual grasslands. Potential suitable habitat is present in unsurveyed portions of the Special-Status Plant Study Area, and this species may occur in areas of potentially suitable habitat in Kings, Tulare, and Kern counties where permission to enter was not granted.

5.5.2 Project Impacts

Impacts on special-status plant species would occur as a result of project construction. Construction of the project will result in direct and indirect impacts on populations of heartscale and little mouse tail that occur and have been identified within the project footprint (Table 5-13). No temporary impacts on these identified special-status plant species populations are currently anticipated. However, temporary construction is proposed in areas of potentially suitable habitat that were not surveyed because permission to enter was not available. Therefore, temporary construction related impacts may occur if these species are observed in these areas.

As summarized in Section 5.0(A), Impact Analysis, the "Difference Compared to Corresponding BNSF Area" in Table 5-13 represents the difference in impact acreages between an alternative alignment and its corresponding segment in the BNSF Alternative: positive (+) differences indicate that the alternative alignment results in a greater number of acres impacted than its corresponding segment in the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in fewer impacted acres than its corresponding segment in the BNSF Alternative.

Table 5-13
Comparison of Impacts on Special-Status Plant Species by Alternative

Special-Status Plant Species (Common Name / Scientific Name / Status)	Impact Type	High-Speed Train Alternatives										
		BNSF Impact Acreage	Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
			Impact Acreage / Difference Compared to Corresponding BNSF Area[a]									
Heartscale *Atriplex cordulata* CNPS 1B.2	Permanent	0.64	—	—	—	—	—	—	— / -0.63	—	—	—
	Temporary	*0.07*	—	—	—	—	—	—	—	—	—	—
Little mouse tail *Myosurus minimus* ssp. *apus* CNPS 3.1	Permanent	0.47	—	—	—	—	—	—	— / -0.20	—	—	—
	Temporary	*<0.01*	—	—	—	—	—	—	—	—	—	—
Unsurveyed potential suitable habitat that could support special-status plant species	Permanent	226.42	48.71 / +34.18	48.50 / +33.97	55.71 / +41.18	55.50 / +40.97	60.88 / +33.17	52.16 / +24.45	92.76 / -2.49	40.40 / +17.90	23.59 / -0.47	21.58 / -2.48
	Temporary	*211.26*	*1.62 / -0.02*	*1.62 / -0.02*	*3.75 / +2.11*	*3.75 / +2.11*	*1.04 / +0.96*	*0.57 / +0.49*	*65.36 / +63.11*	*20.38 / +9.49*	*189.27 / +0.37*	*191.53 / +2.63*
Total Impacts	**Permanent**	**227.53**	**48.71 / +34.18**	**48.50 / +33.97**	**55.71 / +41.18**	**55.50 / +40.97**	**60.88 / +33.17**	**52.16 / +24.45**	**92.76 / -3.33**	**40.40 / +17.9**	**23.59 / -0.47**	**21.58 / -2.48**
	Temporary	***211.34***	***1.62 / -0.02***	***1.62 / -0.02***	***3.75 / +2.11***	***3.75 / +2.11***	***1.04 / +0.96***	***0.57 / +0.49***	***65.36 / +63.11***	***20.38 / +9.49***	***189.27 / +0.37***	***191.53 / +2.63***

Notes:
— = No impact or not applicable
[a] The "Difference Compared to Corresponding BNSF Area" represents the difference in impact acreages between an alternative alignment and its corresponding segment in the BNSF Alternative. Positive (+) differences indicate that the alternative alignment results in greater impact acres than its corresponding segment in the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in fewer impact acres than its corresponding segment in the BNSF Alternative.
Impact calculations in this table include alignment alternatives and station alternatives, but do not include HMF alternatives.
All impacts were calculated based on the 15% engineering design project footprint.
CNPS Status
1B: Rare, threatened, or endangered in California and elsewhere.
2: Rare, threatened, or endangered in California, but more common elsewhere.
3: More information is needed.
4: Limited distribution or infrequent throughout California
0.1: Seriously endangered in California
0.2: Fairly endangered in California
0.3: Not very endangered in California
Abbreviations:
CNPS = California Native Plant Society

Similar impacts on the remaining 24 special-status plant species that have the potential to occur in the Special-Status Plant Study Area (Table 5-9) could occur in potentially suitable habitats where surveys have not been completed because permission to enter was not available. The impacts on both known and currently unknown populations of the special-status plant species or on habitat that could support these species would be both temporary and permanent, and direct and indirect.

No impacts on special-status plant species are anticipated to occur as a result of construction of the station alternatives. These features are located in either urban or agricultural environments, which do not support special-status plant species. Special-status plant species have a low potential to occur in three of the HMF site alternatives (i.e., the Fresno Works–Fresno, Kings County–Hanford, and Kern Council of Governments–Shafter East HMF sites) because of the presence of fragments of unsurveyed, potentially suitable habitats within each of their footprints. However, these habitats are located mostly in urban and agricultural lands. No unsurveyed habitats capable of supporting special-status plant species are present within the Kern Council of Governments–Wasco or the Kern Council of Governments–Shafter West HMF site alternatives.

Direct impacts from construction may result from permanent ground-disturbing activities, including construction of the track, access roads, road crossings, and buildings such as the traction power station that may directly impact individuals or populations of special-status plant species. These impacts may result largely from the use of heavy machinery to clear, grub, excavate, compact or otherwise prepare the ground surface for the construction of permanent features. The construction of these features may result in the removal, destruction, covering, or unearthing of individuals, populations, or suitable habitat of the identified special-status species. Similar impacts may also occur in temporary construction areas such as temporary access roads or staging areas as a result of vegetation clearing or grubbing. In these areas, vegetation would be allowed to reestablish following construction, which may be feasible, since the several special-status plant species known to be present can naturally persist in a soil seed bank (USFWS 2005c).

Indirect impacts resulting from construction activities may lead to degradation of habitat for special-status plants species. Habitat degradation may take the form of changes in hydrology, fragmentation, and the introduction of nonnative, invasive plant species, each of which could significantly disrupt the habitat and result in decreased viability of the individuals or the population. Changes in hydrology may result from activities such as the pile driving of elevated structures and track construction that would potentially alter the natural ground or surface water flows. Several of the special-status plant species rely on flooding to disperse seeds and facilitate germination; therefore, changes in hydrology may greatly alter the suitability of the habitat (USFWS 2005c).

Fragmentation may result from the construction of permanent features, especially linear features including track and access roads that bisect natural habitats. Construction activities may facilitate the spread of nonnative, invasive plant species through the introduction of seeds by construction equipment and vehicles. Both permanent and temporary ground disturbances would also create a more suitable habitat for nonnative invasive plants species that may spread and compete with special-status species or destructively alter their habitat.

5.5.3 Avoidance and Minimization

The following avoidance and minimization measures are proposed to lessen project impacts on special-status plant species. These measures are described in detail under "Jurisdictional Waters" (see Section 5.1.3, Avoidance and Minimization Measures) and under "Special-Status Plant Communities" (see Section 5.2.3, Avoidance and Minimization Measures). Additional, specific information pertinent to special-status plant species is provided where appropriate. The

avoidance and minimization measures presented below would be implemented to lessen impacts on identified populations of special-status plant species.

Preconstruction Botanical Surveys

As initially discussed in Section 5.2, Special-Status Plant Communities, preconstruction floristic surveys for special-status plant species will be conducted in general accordance with the regulatory guidance outlined in the methods section of this technical report (see Section 3.4.3 [Botanical Surveys]). In areas of potentially suitable habitat where permission to enter was not granted and in areas where surveys were restricted in terms of timing or where project design changed after key special-status plant species' bloom periods, preconstruction surveys for special-status plant species will be conducted before the start of ground-disturbing activities during the appropriate blooming period(s) for the species. The floristic surveys will be timed to correspond to the bloom periods of the special-status plant species that have potential to occur in the Special-Status Plant Study Area (Appendix C, Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur). If populations of special-status plant species are observed, the remaining avoidance and minimization measures will be implemented.

Environmentally Sensitive Areas, Wildlife Exclusion Fencing, and Non-Disturbance Zones

This avoidance and minimization effort is described under "Jurisdictional Waters" (see Section 5.1.3, Avoidance and Minimization Measures). Additionally, before the start of ground-disturbing activities, all populations of special-status plant species identified during preconstruction surveys within 100 feet of the construction footprint will be protected, and the areas where they are located will be designated Environmentally Restricted Areas. These Environmentally Restricted Areas will prevent inadvertent impacts on special-status plant communities outside of the project footprint.

Contractor Education and Environmental Training

Personnel who work onsite will attend a Contractor Education and Environmental Training session. The environmental training is likely to be required by the regulatory agencies and will cover general and specific biological information on the special-status plant species, including the distribution of the resources, the recovery efforts, the legal status of the resources, and the penalties for violation of project permits and laws.

The Contractor Education and Environmental Training sessions will be given before the initiation of construction activities and repeated, as needed, when new personnel begin work within the project limits. Daily updates and synopsis of the training will be performed during the daily safety ("tailgate") meeting. All personnel who attend the training will be required to sign an attendance list stating that they have received the Contractor Education and Environmental Training.

HST maintenance crews will be required to attend a Contractor Education and Environmental Training annually.

Biological Monitor to Be Present during Construction Activities to Verify Compliance with Mitigation Measures and Permit Conditions

A biological monitor (or monitors) will be present onsite during construction activities that could result in direct or indirect impacts on biological resources to oversee permit compliance and monitoring efforts for all special-status plant resources. A biological monitor (qualified biologist) is any person who has a bachelor's degree in biological sciences, zoology, botany, ecology, or a closely related field and/or has demonstrated field experience in and knowledge about the identification and life history of the special-status species or jurisdictional waters that could be

affected by project activities. In the case of special-status plant species, the biological monitor(s) will be responsible for monitoring the Contractor to ensure compliance with the Section 404 Individual Permit, Section 401 Water Quality Certification and the Lake and Streambed Alteration Agreement. Activities to ensure compliance would include performing construction-monitoring activities, including monitoring environmental fencing, identifying areas where special-status plant species are or may be present, and advising the Contractor of methods that may minimize or avoid impacts on these resources.

Biological monitor(s) will be required to be present in all areas during ground disturbance activities and for all construction activities conducted within or adjacent to identified Environmentally Sensitive Areas, Wildlife Exclusion Fencing, and Non-Disturbance Zones.

Restoration of Temporarily Disturbed Areas

Areas supporting special-status plant species that are temporarily disturbed by project construction will be restored on site to pre-construction conditions. Before the start of ground-disturbing activities, pre-construction conditions will be documented, species composition and richness will be described, percent cover of key species will be presented, and photo points will be established. Success criteria for restored areas will be determined in coordination with the appropriate natural resource agency.

Clean Construction Equipment

This minimization effort is described in Section 5.2 (Special-Status Plant Communities) (see Section 5.2.3 [Avoidance and Minimization Measures]).

5.5.4 Compensatory Mitigation

Permanent impacts on special-status plants will be mitigated through the purchase of credits from an existing mitigation bank or through a special-status plant re-establishment program within the same watershed or in proximity to the impact area at a 1:1 ratio. The specific form of compensation will be determined in consultation with the appropriate agencies and in accordance with the USFWS Biological Opinion and/or CFGC Section 2081(b).

5.6 Special-Status Wildlife Species

Based on the background review, 112 special-status wildlife species were initially evaluated for their potential to occur in the Habitat Study Area (Appendix E, Special-Status Wildlife Species with Potential to Occur). Among these special-status wildlife species, there were 33 federally and state-listed species, including 8 fully protected species, 3 species for which critical habitat has been federally designated, and 79 other special-status species.

Of the 112 special-status wildlife species initially evaluated, 58 wildlife species were ruled out based on the lack of suitable habitat, the extensive areas converted by human development, the extensive water diversions, local or regional extirpations, or because the Habitat Study Area lies outside of these species' known geographic range. The remaining 54 special-status wildlife species, listed in Table 5-14, are further evaluated in the body of this technical report for their potential to occur in the Habitat Study Area.

Table 5-14
Special-Status Wildlife Species with Potential to Occur in the Habitat Study Area

Common Name	Scientific Name	Federal Status[a]	State Status[b]
Federally and State-Listed Species			
Vernal pool fairy shrimp	*Branchinecta lynchi*	FT, CH	—
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT	—
Vernal pool tadpole shrimp	*Lepidurus packardi*	FE	—
California tiger salamander	*Ambystoma californiense*	FT	ST
Blunt-nosed leopard lizard	*Gambelia (=Crotaphytus) sila*	FE	SE/FP
Golden eagle	*Aquila chrysaetos*	—	FP
Swainson's hawk	*Buteo swainsoni*	—	ST
Western snowy plover	*Charadrius alexandrinus nivosus*	FT	CSC
White-tailed kite	*Elanus leucurus*	—	FP
American peregrine falcon	*Falco peregrinus anatum*	Delisted	SE/FP
Greater sandhill crane	*Grus canadensis tabida*	—	ST/FP
Bald eagle	*Haliaeetus leucocephalus*	Delisted	SE/FP
Nelson's (= San Joaquin) antelope squirrel	*Ammospermophilus nelsoni*	—	ST
Ringtail	*Bassariscus astutus*	—	FP
Fresno kangaroo rat	*Dipodomys nitratoides exilis*	FE	SE
Tipton kangaroo rat	*Dipodomys nitratoides nitratoides*	FE	SE
San Joaquin kit fox	*Vulpes macrotis mutica*	FE	ST
Other Special-Status Wildlife Species			
Kern brook lamprey	*Lampetra hubbsi*	—	CSC
Western spadefoot toad	*Spea (=Scaphiopus) hammondii*	—	CSC
Western pond turtle	*Actinemys (=Clemmys/Emys) marmorata*	—	CSC
Silvery legless lizard	*Anniella pulchra pulchra*	—	CSC
San Joaquin whipsnake	*Masticophis flagellum ruddocki*	—	CSC
Coast (California) horned lizard	*Phrynosoma coronatum frontale*	—	CSC
Tricolored blackbird	*Agelaius tricolor*	—	CSC
Grasshopper sparrow	*Ammodramus savannarum*	—	CSC
Short-eared owl	*Asio flammeus*	—	CSC
Long-eared owl	*Asio otus*	—	CSC
Western burrowing owl	*Athene cunicularia*	—	CSC
Redhead	*Aythya americana*	—	CSC
Oak titmouse	*Baeolophus inornatus*	BCC	—
Mountain plover	*Charadrius montanus*	—	CSC
Black tern	*Chlidonias niger*	—	CSC
Northern harrier	*Circus cyaneus*	—	CSC

Table 5-14
Special-Status Wildlife Species with Potential to Occur in the Habitat Study Area

Common Name	Scientific Name	Federal Status[a]	State Status[b]
Yellow rail	*Coturnicops noveboracensis*	BCC	CSC
Fulvous whistling duck	*Dendrocygna bicolor*	—	CSC
Yellow warbler	*Dendroica petechia brewsteri*	—	CSC
Lesser sandhill crane	*Grus canadensis canadensis*	—	CSC
Yellow-breasted chat	*Icteria virens*	—	CSC
Least bittern	*Ixobrychus exilis*	—	CSC
Loggerhead shrike	*Lanius ludovicianus*	—	CSC
Lewis's woodpecker	*Melanerpes lewis*	BCC	—
Long-billed curlew	*Numenius americanus*	BCC	—
Nuttall's woodpecker	*Picoides nuttallii*	BCC	—
Oregon vesper sparrow	*Pooecetes gramineus affinis*	—	CSC
Purple martin	*Progne subis*	—	CSC
Le Conte's thrasher	*Toxostoma lecontei*	—	CSC
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	—	CSC
Pallid bat	*Antrozous pallidus*	—	CSC
Dulzura pocket mouse	*Chaetodipus californicus femoralis*	—	CSC
Townsend's big-eared bat	*Corynorhinus townsendii*	—	CSC
Western mastiff bat	*Eumops perotis californicus*	—	CSC
Western red bat	*Lasiurus blossevillii*	—	CSC
Tulare grasshopper mouse	*Onychomys torridus tularensis*	—	CSC
American badger	*Taxidea taxus*	—	CSC

Notes:
[a] Federal Status
FE = Endangered
FT = Threatened
CH = Critical Habitat designated by the U.S. Fish and Wildlife Service
BCC = Birds of Conservation Concern designated by the U.S. Fish and Wildlife Service
[b] State Status
SE = Endangered
ST = Threatened
CSC = California Species of Special Concern designated by the California Department of Fish and Game
FP = Fully Protected species designated by the California Department of Fish and Game

Among those special-status wildlife species that were determined not to occur within the Habitat Study Area, the following two federally and state-listed species required further analysis to warrant this determination: the California red-legged frog *(Rana draytonii*), federally listed as threatened and a California species of special concern, and the giant garter snake (*Thamnophis gigas*), federally and state listed as threatened.

A review of the CNDDB (CDFG 2012a) and the CWHR (CDFG 2005) databases confirmed that the project footprint is located approximately 11 miles to the east of the California red-legged frog's

current known geographic range. Historically, the California red-legged frog ranged throughout the San Joaquin Valley's western margins and valley floor. However, these San Joaquin Valley populations have since been regionally extirpated, and the current distribution of the species is primarily restricted to the Coast Range (Jennings and Hayes 1994). Because the Habitat Study Area occurs well outside of the current geographic range of the California red-legged frog (closest CNDDB occurrence is approximately 45 miles away), this species is not expected to occur in the Habitat Study Area and is not further evaluated in this document.

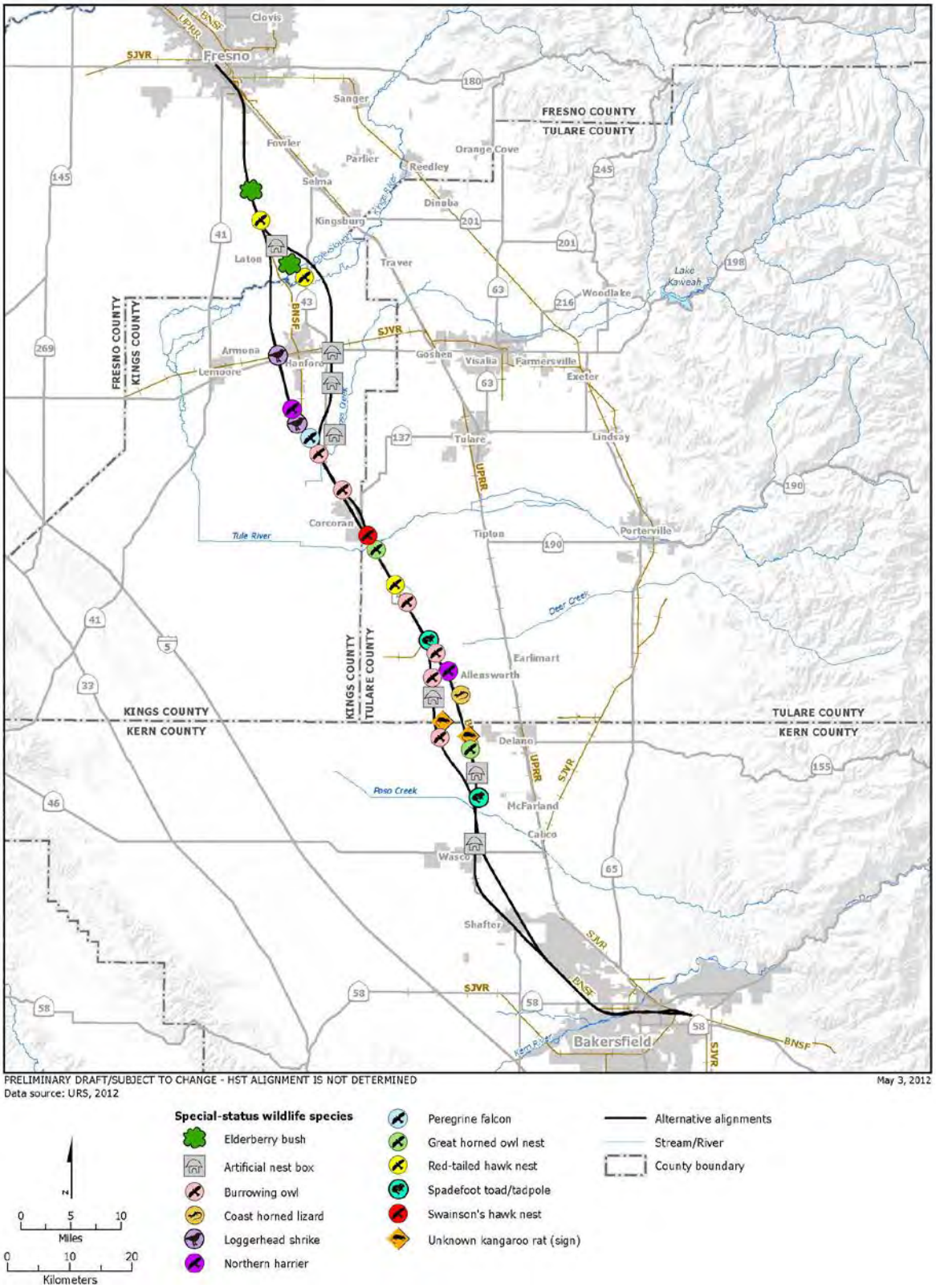
The giant garter snake once ranged throughout the San Joaquin Valley as far south as the historic Tulare, Kern, and Buena Vista lakebeds, but it has been extirpated from many areas due to habitat conversion. The alternative alignments are in the San Joaquin and South Valley recovery units for the giant garter snake. In the San Joaquin Recovery Unit, existing populations are limited to the western side of the Central Valley, and in the South Valley Recovery Unit no extant populations of the species are known.

The recovery plan identifies several areas of privately and publicly owned freshwater marshes where repatriation of this species is possible, in particular, wetlands associated with the Tulare basin, which are in the vicinity of the Habitat Study Area. However, extirpation of the southernmost populations in the San Joaquin Valley has since been confirmed, and the southernmost range of the species is currently restricted to Burrel (Fresno County) (USFWS 1999a). Therefore, this species is not expected to occur in the Habitat Study Area and is not evaluated further in this document.

5.6.1 Survey Results

Of the remaining special-status wildlife species evaluated for their potential to occur in the Habitat Study Area, 17 species were observed or identified by diagnostic signs in the Habitat Study Area during field survey efforts (see Figure 5-4; Appendix F, List of Wildlife Species Observed in the Habitat Study Area):

- American badger (*Taxidea taxus*)
- Coast horned lizard (*Phrynosoma coronatum*)
- Common yellow-throat (*Geothlypis trichas*)
- Golden eagle (*Aquila chrysaetos*)
- Greater sandhill crane (*Grus canadensis tabida*)
- Lesser sandhill crane (*Grus canadensis canadensis*)
- Loggerhead shrike (*Lanius ludovicianus*)
- Long-billed curlew (*Numenius americanus*)
- Northern harrier (*Circus cyaneus*)
- Peregrine falcon (*Falco peregrinus*)
- San Joaquin kit fox (*Vulpes macrotis mutica*)
- Swainson's hawk (*Buteo swainsoni*)
- Tricolored blackbird (*Agelaius tricolor*)
- Western burrowing owl (*Athene cunicularia*)
- Western spadefoot toad (*Spea hammondii*)
- White-tailed kite (*Elanus leucurus*)
- Yellow-headed blackbird (*Xanthocephalus xanthocephalus*)



PRELIMINARY DRAFT/SUBJECT TO CHANGE - HST ALIGNMENT IS NOT DETERMINED
Data source: URS, 2012
May 3, 2012

Figure 5-4
Special-status species (wildlife) within the Habitat Study Area

In addition to the species observed or identified by diagnostic signs listed above, sign and observation indicated the possible presence of additional special-status wildlife species. Unidentified *Branchinecta* sp. fairy shrimp were observed in vernal pool complexes. Signs of kangaroo rats and mice, consisting of fresh diggings, appropriately sized burrows, and kangaroo rat and mouse tracks, scat, and tail drags (kangaroo rat), were observed predominantly in alkali desert scrub habitats. Focused surveys would be required to document whether vernal pool fairy shrimp (*Branchinecta lynchi*), Fresno kangaroo rat (*Dipodomys nitratoides exilis*), Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*), short-nosed kangaroo rat (*Dipodomys nitratoides brevinasus*), Dulzura pocket mouse (*Chaetodipus californicus femoralis*), and Tulare grasshopper mouse (*Onychomys torridus tularensis*) occur in the Habitat Study Area.

Forty-nine elderberry shrubs (*Sambucus* spp.) were identified at five discrete locations in Fresno and Kings counties, primarily along the Kings River, Cole Slough, and Dutch John Slough. These shrubs provide potential habitat for the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*). However, focused surveys would be necessary to determine whether the valley elderberry longhorn beetle is present at these locations.

The majority of special-status wildlife species were observed in relatively undisturbed portions of the Habitat Study Area in areas that were mapped as alkali desert scrub, annual grassland, and valley foothill riparian communities. Special-status species like the western burrowing owl were also observed in the vicinity of barren, urban, or agricultural areas; species like the western spadefoot toad were found breeding in seasonal, man-made wetlands, or roadside ditches. All of these species are discussed in the remainder of Section 5.5 as are other species identified as having some potential to occur or that have been previously recorded in the Habitat Study Area (Table 5-14).

Based on the results of the wildlife habitat assessment, 19 vegetation and wildlife and land use habitat types were mapped in the Habitat Study Area. The distribution of these habitats is provided in Table 5-15. The potential for special-status wildlife species to occur in the Habitat Study Area is based on the availability of these wildlife habitat types and the natural distribution and range of each species, as determined through a review of species-specific CWHR range maps (CDFG 2005).

Fifty-eight special-status wildlife species and one critical habitat designation are known to occur or have the potential to occur in the Habitat Study Area (Appendix E, Special-Status Wildlife Species with Potential to Occur). The special-status wildlife species discussed in the remainder of this section include the following:

- Three invertebrate species (plus one related critical habitat designation).
- One fish species.
- Two amphibian species.
- Five reptile species.
- Thirty-four bird species.
- Fourteen mammal species.

Descriptions of each special-status species' life history and the results of the field survey and habitat assessment are provided below. Federal and state listed species are addressed first in order of taxonomy, alphabetically by their scientific name, followed by other special-status species in the same order.

5.6.1.1 Vernal Pool Fairy Shrimp

Vernal pool fairy shrimp (*Branchinecta lynchi*) is federally listed as threatened. This species occurs in grasslands from Oregon south to Riverside County, California. Vernal pool fairy shrimp occupies a variety of different vernal pool habitats, from small, clear, sandstone rock pools to

large, turbid, alkaline, grassland valley floor pools. Although the species has been collected from large vernal pools, including pools that exceed 25 acres, it tends to occur in small swales or vernal pools in unplowed grasslands (Eriksen and Belk 1999). It is most frequently found in pools measuring less than 0.05 acre. Vernal pool fairy shrimp is a filter-feeder, typically taking microscopic algae, bacteria, and diatoms (USFWS 1994).

Survey Results

A review of the CNDDB (CDFG 2012a) and the USFWS Recovery Plan for this species (USFWS 2005a) showed that the entire Habitat Study Area occurs in the known geographic range of the species. All HST alternative alignments fall in the San Joaquin Valley Vernal Pool Region identified in the Recovery Plan (USFWS 2005a). Portions of the BNSF Alternative run parallel to and, in some portions, within 1,000 feet of areas with vernal pool complexes near the Pixley NWR and the Allensworth ER (USFWS 2005c). The Pixley NWR constitutes the two individual Pixley core areas identified in the Recovery Plan (USFWS 2005a) and designated vernal pool fairy shrimp critical habitat. Near the town of Allensworth, the BNSF Alternative is within 250 feet of Critical Habitat Unit 27B, Critical Habitat Unit 27C, and the Pixley core area (Figure 3-2a, Sheet 3). However, the project does not overlap these critical habitat units or the Pixley core area (Figure 3-2a, Sheet 3).

Table 5-15
Wildlife Habitats and Land Use Types in the Core Habitat Study Area by Alternative

Wildlife Habitat/Land Use Type	High-Speed Train Alternative										
	BNSF	Hanford West Bypass 1—At-Grade	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
	Acreage										
Alkali Desert Scrub (ASC)	182.34	—	—	—	—	—	—	46.30	—	34.79	34.79
Annual Grassland (AGS)	829.22	133.79	125.24	127.89	119.34	109.16	117.33	440.39	61.01	75.97	73.34
Barren (BAR)	370.63	9.45	9.45	15.92	15.92	47.70	10.69	—	2.12	185.54	185.55
Cropland (CRP)	1403.37	274.91	256.39	268.39	249.87	196.36	140.62	204.36	499.94	—	—
Deciduous Orchard (DOR)	3889.48	887.99	846.89	881.87	840.77	210.13	401.72	471.38	1779.58	—	—
Dryland Grain Crops (DGR)	495.80	5.06	0.19	5.06	0.19	42.38	57.82	79.24	67.98	—	—
Evergreen Orchard (EOR)	17.51	—	—	—	—	—	—	—	—	—	—
Fresh Emergent Wetland (FEW)	1.28	0.49	0.49	0.89	0.89	0.01	0.01	0.85	—	0.56	0.51
Irrigated Grain Crops (IGR)	1277.25	630.24	621.45	483.44	474.64	121.65	94.57	173.93	200.24	—	—
Irrigated Hay (IRH)	1121.33	678.70	640.96	769.36	731.63	171.20	320.02	295.39	153.73	—	—

Table 5-15
Wildlife Habitats and Land Use Types in the Core Habitat Study Area by Alternative

Wildlife Habitat/Land Use Type	High-Speed Train Alternative										
	BNSF	Hanford West Bypass 1—At-Grade	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
	Acreage										
Irrigated Row and Field Crops (IRF)	551.37	73.70	76.77	89.51	92.58	—	34.18	—	169.03	—	—
Lacustrine (LAC)	185.41	6.00	1.13	17.61	12.75	16.81	16.98	123.39	15.51	8.08	7.77
Pasture (PAS)	187.60	50.32	46.87	35.78	32.33	0.38	12.68	—	—	5.06	5.06
Riverine (RIV)	165.96	43.02	40.53	38.51	36.02	31.81	27.55	24.23	7.82	29.38	30.72
Valley Riparian Foothill (VRI)	37.98	25.49	19.02	25.49	19.02	1.21	2.31	3.08	—	4.52	8.00
Vineyard (VIN)	1583.65	108.73	108.73	108.73	108.73	7.67	0.52	297.50	164.32	—	—
Urban (URB)	4257.48	465.77	350.91	478.14	363.28	354.30	297.52	80.66	417.57	1043.00	1055.25
Urban/BNSF (URB/BNSF)	1076.62	121.08	121.08	152.42	152.42	147.80	64.08	23.42	97.21	63.12	63.12

Notes:
— = Not present or not applicable

Calculations represent acres present within the core Habitat Study Area. The extent of the core Habitat Study Area is based on the 15% engineering design project footprint. Calculations include alignment alternatives and station alternatives, but do not include the HMF site alternatives.

Nine vernal pool fairy shrimp occurrences have been reported to the CNDDB within 10 miles of the alternatives. None of these occurrences is within 250 feet of the HST alternative alignments (CDFG 2012a). The closest occurrence (Occurrence 177) is located approximately 0.3 mile northeast of the BNSF Alternative (Figure 3-2a, Sheet 3); individuals were last observed there in 1998 in a seasonal wetland in the Pixley NWR (CDFG 2012a). In 1993, vernal pool fairy shrimp were found in vernal pools on the Two Well Unit of Pixley NWR (USFWS 2005c), which is approximately 3 miles east of the BNSF Alternative (Figure 3-2a, Sheet 3). Vernal pool fairy shrimp have also been confirmed present within the boundaries of the Allensworth ER by CDFG (Tomlinson 2010, personal communication).

The surveys of jurisdictional waters identified wetlands and vernal pools that could provide habitat for vernal pool fairy shrimp (Section 5.1). During the spring 2010 field surveys, unidentified fairy shrimp (and seed shrimp, or common ostracods) were observed in the vicinity of the Allensworth Bypass Alternative in offsite vernal pools and associated seasonal wetlands in relatively natural habitat dominated by alkali desert scrub and annual grassland. However, no vernal pool branchiopods were observed within the Habitat Study Area. Jurisdictional water types that could support vernal pool fairy shrimp include seasonal wetlands, vernal pools, potential vernal pools, vernal swales, and vernal pool and swale complexes. Vernal pool fairy shrimp habitat is present in these jurisdictional water types and typically occurs in the following CWHR wildlife habitat types: alkali desert scrub, annual grassland, and pasture. The jurisdictional water and wildlife habitat types present within the Habitat Study Area that could support this species are scattered throughout the alternative alignments. These jurisdictional waters may be natural (seasonal wetlands, vernal pools and swales, and vernal complexes) or man-made (depressions and scrapes), and the quality and availability of these aquatic features could vary over time depending on factors such as rainfall or agricultural practices that may alter the natural landscape or hydrologic regime. The total acreage of habitats that may support this species is summarized in Table 5-15. No protocol-level habitat assessment or focused presence/absence surveys were conducted during field survey efforts.

5.6.1.2 Vernal Pool Fairy Shrimp – Critical Habitat

Critical habitat is a specific geographic area(s), designated by the USFWS or NMFS, that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection. Critical habitat is based on the species' PCEs, which are those physical and biological features of a landscape that a species needs to survive and reproduce.

Critical habitat was designated for the federally threatened vernal pool fairy shrimp in 2003 (USFWS 2006a). The designation includes a total of 310,664 acres in California and Oregon. Twenty-nine units of designated critical habitat for vernal pool fairy shrimp are located throughout 21 California counties, including Fresno, Kings, and Tulare counties. The PCEs of vernal pool fairy shrimp critical habitat include vernal pools, swales, and other ephemeral wetlands and depressions that become dry in the summer but maintain inundation and moisture long enough to support the full cycle of the fairy shrimp's life; and vernal pool complexes, including networks of pools, swales, and other ephemeral features that are hydrologically and ecologically connected to those vernal pools, swales, and other ephemeral wetlands and depressions (USFWS 2003).

Survey Results

The Habitat Study Area overlaps designated critical habitat for vernal pool tadpole shrimp. Near the town of Allensworth, the BNSF Alternative is within 250 feet of Critical Habitat Unit 27B and Critical Habitat Unit 27C (Figure 3-2a, Sheet 3). However, the project does not overlap either of these critical habitat units (Figure 3-2a, Sheet 3).

The project is separated physically and hydrologically from Critical Habitat Unit 27C by the presence of the existing SR 43 and BNSF right-of-way, and is primarily separated from Critical Habitat Unit 27B by this existing infrastructure (Figure 3-2a, Sheet 3). Where Critical Habitat Unit 27B crosses SR 43 and the BNSF right-of-way, it is composed of ruderal and annual grassland habitat that does not contain the primary constituent elements for this species (i.e., vernal pools, swales, and other ephemeral wetlands and depressions).

5.6.1.3 Vernal Pool Tadpole Shrimp

Vernal pool tadpole shrimp (*Lepidurus packardi*) is federally listed as endangered. While vernal pool tadpole shrimp are endemic to California's Central Valley, the majority of the populations are in the Sacramento Valley. This species is found mainly in the northern and eastern portions of the Central Valley in vernal pools and swales containing highly turbid water, often in unplowed grasslands. These seasonal pools contain old alluvial soils underlain by hardpan, or occur in sandstone depressions; water in the pools has very low alkalinity and conductivity. Vernal pool tadpole shrimp are known to prey on fairy shrimp, and although it has not been documented, vernal pool tadpole shrimp likely preys on vernal pool fairy shrimp when they co-occur (Eriksen and Belk 1999). Vernal pool tadpole shrimp feeds on small invertebrates, amphibian eggs, and some vegetation (USFWS 1994).

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and USFWS Recovery Plan for this species (USFWS 2005a) confirmed that the entire Habitat Study Area occurs in the known geographic range of the species. All alternative alignments are in the San Joaquin Valley Vernal Pool Region identified in the Recovery Plan (USFWS 2005a). Portions of the BNSF Alternative run parallel to and, in some portions, within 1,000 feet of areas with vernal pool complexes near the Pixley NWR and the Allensworth ER (USFWS 2005c). The Pixley NWR constitutes the two individual Pixley core areas identified in the Recovery Plan (USFWS 2005a). However, the project does not overlap the Pixley core area (Figure 3-2a, Sheet 3). The closest known vernal pool tadpole shrimp records include five occurrences in Tulare County, two occurrences in Kings County, and three occurrences in Fresno County (CDFG 2012a). To date, these occurrences constitute the southernmost extent of the vernal pool tadpole shrimp's known range. Three vernal pool tadpole shrimp occurrences (Occurrences 129, 139, and 140) have been reported within 10 miles of the alternatives, none of which is within 250 feet of the project footprint (CDFG 2012a). These three occurrences are located east of the town of Hanford, in close proximity to each other. The closest occurrence (Occurrence 139) was reported approximately 5 miles east of the alternative alignments (Figure 3-2a, Sheet 2) and consisted of hundreds of vernal pool tadpole shrimp observed in vernal pools in a nonnative grassland area near Cross Creek (CDFG 2012a).

Although other vernal pool crustaceans were observed during the 2010 field surveys (i.e., ostracods [seed shrimp] and fairy shrimp), the vernal pool tadpole shrimp was not observed. Jurisdictional water types that could support vernal pool tadpole shrimp include seasonal wetlands, vernal pools, potential vernal pools, vernal swales, and vernal pool and swale complexes. Vernal pool tadpole shrimp habitat is present in these jurisdictional water types and typically occurs in the following CWHR wildlife habitat types: alkali desert scrub, annual grassland, and pasture. The jurisdictional water and wildlife habitat types present within the Habitat Study Area that could support this species are concentrated in the vicinity of Corcoran and Allensworth. These jurisdictional waters may be natural (seasonal wetlands, vernal pools and swales, vernal complexes) or man-made (depressions and scrapes), and the quality and availability of these aquatic features could vary over time depending on factors such as rainfall or agricultural practices that may alter the natural landscape or hydrologic regime. The total acreage of habitats that may support this species is summarized in Table 5-15. No protocol-level

habitat assessment or focused presence/absence surveys were conducted during field survey efforts.

5.6.1.4 Valley Elderberry Longhorn Beetle

Although the USFWS is currently considering a proposal to delist the species, valley elderberry longhorn beetle *(Desmocerus californicus dimorphus*) is federally listed as threatened. It has only been found in association with elderberry shrubs (*Sambucus* spp.), which are often found in or close to riparian habitats along the Central Valley's rivers and their tributaries. Beetles remain hidden in the stems and trunks of elderberry shrubs as larvae and pupae for 1 to 2 years. Adults emerge from the shrubs from mid-March through June at about the same time that the elderberry shrub produces flowers (Barr 1991; USFWS 1984; USFWS 2006b). Elderberry shrubs often occur in clumps that consist of several stems attached to a main trunk. Stems and trunks must be equal to or greater than 1 inch in diameter to provide suitable habitat for the beetles (USFWS 1999b). When the recovery plan for this species was published in 1984, core areas were established in the Sacramento Valley where the species was known to be extant. At the time, there were no existing populations known in the San Joaquin Valley, and no core areas were identified in the vicinity of the Habitat Study Area (USFWS 1984). The Habitat Study Area does not occur within any core area.

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and the USFWS Recovery Plan for this species (USFWS 1984) showed that the entire Habitat Study Area occurs in the known geographic range of the valley elderberry longhorn beetle. Four occurrences of this species have been reported to the CNDDB within 10 miles of the alternatives. None of the occurrences are within 100 feet of the alternative alignments (CDFG 2012a). The closest reported occurrence of this species (Occurrence 67) is located approximately 3 miles east of the Hanford West Bypass 1 Alternative (Figure 3-2a, Sheet 2(CDFG 2012a).

Elderberry shrub locations were recorded as part of the botanical surveys in the Special-Status Plant Study Area. One elderberry shrub was identified along the BNSF Alternative (Figure 5-4). Forty-seven elderberry shrubs were observed near the Special-Status Plant Study Area in the vicinity of the King's River.

No focused presence/absence surveys for valley elderberry longhorn beetle were proposed or conducted during 2010. No elderberry shrubs were identified in other riparian areas of the Special-Status Plant Study Area; however, they may be present and may support valley elderberry longhorn beetles in natural areas where permission to enter was not granted.

5.6.1.5 California Tiger Salamander

California tiger salamander (*Ambystoma californiense*) is federally and state listed as a threatened species. California tiger salamander is distributed throughout the Central Valley and central Coast Range, from Colusa County south to San Luis Obispo and Kern counties, and from sea level to 3,460 feet in elevation. It inhabits lowland grasslands, oak savannah, and mixed woodland habitats, and requires vernal pools, seasonal ponds, or semi-permanent calm waters that hold water for a minimum of 3 to 4 months in duration for breeding and larval maturation. The salamanders begin migrating to breeding sites following the onset of autumn rains, typically in November (Austin and Shaffer 1992). Eggs are laid singly or in small clusters on the pond bottom, or are attached to strands of vegetation (Storer 1925; Barry and Shaffer 1994; Jennings and Hayes 1994). Metamorphosis occurs a minimum of 10 weeks following hatching, and young migrate en masse in late spring or early summer to upland refugia habitat (Feaver 1971; Jennings and Hayes 1994; Stebbins 2003). Adults have been documented traveling distances up to 1.3 miles from breeding sites (Trenham and Shaffer 2005) to adjacent upland habitat where

they occupy the burrows of small mammals such as California ground squirrels (*Spermophilus beecheyi*) and Botta's pocket gopher (*Thamnomys bottae*) (Storer 1925; Barry and Shaffer 1994; Stebbins 2003).

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) databases confirmed that the known geographic range of California tiger salamander overlaps the northern portion of the BNSF Alternative (north of the town of Corcoran), the Hanford West Bypass 1 and Hanford West Bypass 2 alternatives, and portions of the Corcoran Elevated and Corcoran Bypass alternatives. This roughly corresponds with the historical range of the species in the Central Valley where, despite the single extirpated occurrence in Kings County reported in the CNDDB, limited museum records and verified sightings from Fresno and Tulare counties suggest the species may still be extant (Jennings and Hayes 1994). In the San Joaquin Valley, the southeastern-most extent of the species' known range occurs in the vicinity of the town of Corcoran (Figure 5-5). California tiger salamander is not expected to occur farther south.

Four California tiger salamander occurrences have been reported to the CNDDB within 10 miles of the alternatives. Of these, three have been reported within a 5-mile radius. Occurrence 583, which includes two records reported together, is located in the vicinity of Fresno, between Cole Slough and Kings River west of the Habitat Study Area (Figure 3-2a, Sheet 1). The second occurrence, Occurrence 612, was reported at an undisclosed date along the Kings River below Kingsburg, approximately 3.5 miles east of the BNSF Alternative (Figure 3-2a, Sheet 2). These historical records date back to the period between 1879 and 1936 and have since been extirpated. The third occurrence, Occurrence 522, was reported in 1999, west of Cross Creek, approximately 4.5 miles east of the BNSF Alternative (Figure 3-2a, Sheet 2). The occurrence consisted of California tiger salamander egg masses observed in a complex of vernal pools surrounded by nonnative annual grasslands (CDFG 2012a; Figure 3-2a, Sheet 2).

No protocol-level presence/absence surveys were conducted during field survey efforts. However, because the alternative alignments lie within the range of the Central California Distinct Population Segment of the California tiger salamander, a preliminary habitat assessment was performed as part of field survey efforts in the core, auxiliary, and supplemental Habitat Study Areas.

In the species' range, California tiger salamander breeding habitat could be present in fresh emergent wetlands habitat, and could also be present in seasonal wetlands, vernal pools, vernal swales, and vernal pool and swale complexes that may occur in associated upland habitats (i.e., in CWHR wildlife habitat types [annual grassland, alkali desert scrub, valley oak woodland, and pasture]). These upland habitats could be used for dispersal and refugia (if suitable burrows are present).

Based on the results of the supplemental habitat assessment, the only potential breeding habitat within the species' range in the vicinity of the project footprint is seasonal ponds (mapped as lacustrine) south of Cross Creek. This potential breeding habitat occurs outside of the project footprint. These seasonal ponds are managed, in part, for wildlife use, unlike most water features identified in the supplemental habitat assessment. While permission to enter was not granted in this area, a review of aerial photography confirmed that the seasonal ponds appear to be surrounded by suitable upland habitat in the form of annual grassland and pastures.

Elsewhere in the Habitat Study Area, detention and retention basins, irrigation ditches, and canals, (mapped as lacustrine, riverine, and fresh emergent wetlands) provide suboptimal breeding habitat for California tiger salamanders because the hydrologic regime of these unnatural water bodies would interrupt breeding activity or key aquatic life stages. During field

survey efforts, the basins inspected showed signs of continual interruption by small- and large-scale pump systems, which could result in mortality at all life stages of the species through entrainment or during the periodic seasonal drawdown of water levels. In perennial waters where bullfrogs and mosquito fish (among other fish species) were observed, high levels of predation could limit reproductive efforts of the California tiger salamander. Aerial spraying of fertilizers and pesticides could also affect egg, larval, and adult salamanders. Similarly, water features such as seasonal wetlands in heavily urbanized areas between the cities of Fresno and Corcoran are not expected to support breeding habitat for California tiger salamanders, given the high levels of disturbance, habitat conversion, and fragmentation associated with urbanization and agricultural development in the San Joaquin Valley.

Although the CWHR lists riparian woodlands as suitable wildlife habitat types for California tiger salamanders, riparian woodlands in the Habitat Study Area were limited to narrow bands of riparian vegetation along creek beds used for irrigation purposes, and are bordered by agricultural lands or other developed areas. Altogether, these conditions and practices do not provide suitable upland or breeding habitat for the California tiger salamander; therefore, this habitat type was removed for this species. However, the CWHR wildlife habitat type pasture was added for this species, since pastures can provide upland habitat and refugia (small mammal burrows) in the absence of annual grasslands.

Within the Habitat Study area and the known range of the species, habitat that could support this species is limited to the Corcoran Bypass Alternative south of Cross Creek where both suitable breeding habitat and surrounding uplands are present. Potential suitable California tiger salamander breeding and upland habitats were identified as the seasonal ponds south of Cross Creek and all alkali desert scrub, annual grassland, valley oak woodland, and pasture wildlife habitat types within 1.24 miles of these seasonal ponds (Figure 5-5). The total acreage of habitats that may support this species is summarized in Table 5-15.

Figure 5-5 contains confidential information and has therefore not been included on the website.

5.6.1.6 Blunt-Nosed Leopard Lizard

Blunt-nosed leopard lizard (*Gambelia sila*) is federally and state listed as endangered, and is a California fully protected species. It is restricted in range to the San Joaquin Valley, at elevations from the Central Valley floor up to 2,600 feet in the surrounding foothills (Germano and Williams 1992; Stebbins 2003; USFWS 1985). The blunt-nosed leopard lizard occurs in alkali sink scrub, saltbush scrub, *Ephedra* scrub, and grasslands (sparse), often in areas with alkaline or saline soils (Montanucci 1965; Stebbins 2003). Washes and dirt road corridors may be important in otherwise poor habitat (e.g., thick grass habitat) (Warrick et al. 1998). In general, this species is absent from areas of steep slope, dense vegetation, and seasonal flooding (Montanucci 1965).

Adults are active during the breeding season between April and July, and typically lay between two and six eggs in mid-June or July. Juveniles hatch from late July to August, but rarely in September, and may remain active typically through October (Montanucci 1965; Stebbins 2003). While dormant during non-breeding seasons and at night, the blunt-nosed leopard lizard inhabits small mammal burrows of species such as California ground squirrels and kangaroo rats (*Dipodomys* spp.). However, in areas of low mammal burrow density they can construct their own shallow burrows (USFWS 1998). The diet of blunt-nosed leopard lizard consists of arthropods and small lizards (USFWS 1985; Germano and Williams 1992; Stebbins 2003).

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) database confirmed that the known geographic range of blunt-nosed leopard lizard overlaps the BNSF Alternative between Allensworth and Wasco, and portions of the Alternative Bypass and Wasco Shafter Bypass alternatives. The Pixley NWR and Allensworth ER area has been identified as a core area for the recovery of blunt-nosed leopard lizard (USFWS 1998). The Recovery Plan (USFWS 1998) recommends protecting natural and retired agricultural lands around Pixley NWR, with an objective of expanding and connecting the Refuge units with each other and with the Allensworth ER, and maintaining and establishing linkages (or movement corridors) in existing natural lands and between islands of habitat on the valley floor.

Fifty-three CNDDB occurrences of this species have been reported within 10 miles of the alternatives. These records begin west of the Hanford West Bypass 1 and Hanford West Bypass 2 alternatives and extend southward. Six extant occurrences (Occurrences 12, 129, 194, 203, 206, and 375) lie within the project footprint (Figure 3-2a, Sheets 3 and 4). These occurrences were reported between 1974 and 2005 in scrub and grassland habitats (CDFG 2012a). Occurrence numbers 194, 203, and 375 overlap the BNSF Alternative in the vicinity of Allensworth. Occurrences 12, 129, 203, and 206 overlap the Allensworth Bypass Alternative. Blunt-nosed leopard lizards have also been observed in the Deer Creek East Unit of Pixley NWR (USFWS 2005a). Blunt-nosed leopard lizard surveys were conducted as recently as 2011 on the Pixley NWR. In 2011, eight individuals were detected, which indicates that there is a fairly robust population on contiguous parcels north of Deer Creek within the Pixley NWR (Van Horn et al. 2011). Blunt-nosed leopard lizards have been reported and confirmed present in the Allensworth ER by the CDFG (CDFG 2011; Tomlinson 2010, personal communication).

The Habitat Study Area does not intersect or further isolate the separate units of Pixley NWR, nor does it isolate Pixley NWR from Allensworth ER; however, the BNSF Alternative in the vicinity of Allensworth parallels the existing SR 43 and BNSF right-of-way, which would further fragment a parcel in the Allensworth ER. Both the BNSF Alternative and Allensworth Bypass Alternative cross two linkages identified in the Recovery Plan for blunt-nosed leopard lizard: the Garces Highway and Highway 43 linkages.

Although this species was not observed during the field survey efforts, extensive small mammal activity was observed in the vicinity of the Allensworth Bypass Alternative as well as within the Habitat Study Area in the vicinity of Pixley NWR and Allensworth ER, which provides suitable refugia habitat. In the species range, blunt-nosed leopard lizard habitat could potentially be present in the core and auxiliary Habitat Study Areas where suitable burrows for refugia exist in the following CWHR wildlife habitat types: alkali desert scrub, annual grassland, and barren. Within the Habitat Study Area, these wildlife habitat types where this species is most likely to occur are largely concentrated in the vicinity of Allensworth. Table 5-15 summarizes the total acreage of habitats that may provide suitable habitat for this species. No protocol-level presence/absence surveys were conducted for blunt-nosed leopard lizard during field survey efforts.

5.6.1.7 Golden Eagle

The Golden eagle (*Aquila chrysaetos*) is a California fully protected species, and is protected under the Bald Eagle Protection Act, the Migratory Bird Treaty Act, and the Migratory Bird Treaty Reform Act. Golden eagles inhabit grasslands, savannahs, oak and pine woodlands, and agricultural fields. They nest on cliffs and in large trees in open areas. Golden eagles exhibit strong site fidelity and will reuse the same nest from year to year. However, it is not uncommon for a breeding pair to have several alternate nest sites in the same territory. Breeding season begins between February and May, depending on the latitude. Golden eagles are single-brooded. They may take more than 6 months to completely rear a single young. During the nonbreeding season they occupy open habitats in the Central Valley, such as grasslands, savannahs, scrub, and oak woodlands. Elsewhere in California, golden eagles inhabit the region year-round. Prey consists of small- to medium-sized mammals, including black-tailed jackrabbits, cottontails (*Sylvilagus* spp.), and California ground squirrels (Kochert and Steenhoff 2002).

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) databases confirmed that the wintering range of golden eagle includes the entire San Joaquin Valley; therefore, the entire Habitat Study Area (i.e., core, auxiliary, and supplemental) occurs in the wintering range of golden eagle. One occurrence has been reported within 10 miles of the alternatives (CDFG 2012a). At this occurrence (Occurrence 123), which is located approximately 3 miles southwest of the BNSF Alternative (Figure 3-2a, Sheet 3), one individual was observed sitting on a canal headgate in a disked agricultural field (CDFG 2012a). Golden eagles have also been confirmed present within the boundaries of the Allensworth ER by CDFG (Tomlinson 2010, personal communication).

During field survey efforts, a single golden eagle was observed in the vicinity of the core and auxiliary Habitat Study Areas; however, no breeding behavior or nesting activity was observed. Although trees identified during the supplemental eagle habitat assessment provide potential nesting habitat, the core and auxiliary Habitat Study Areas fall outside of the species' breeding range. The highly disturbed agricultural land in the San Joaquin Valley is not expected to provide nesting habitat, but likely provides suitable foraging habitat for the species. Golden eagles are not expected to nest in the core, auxiliary, and supplemental Habitat Study Areas, but are expected to forage occasionally in the San Joaquin Valley. Golden eagle foraging habitat in the core, auxiliary, and supplemental Habitat Study Areas includes the following CWHR wildlife habitat types: alkali desert scrub, annual grassland, barren, fresh emergent wetlands, irrigated hayfield, crop, pasture, urban, and valley foothill riparian. These wildlife habitat types are present at various locations throughout the Habitat Study Area. Table 5-15 summarizes the total acreage of habitats that can support foraging habitat for this species.

5.6.1.8 Swainson's Hawk

Swainson's hawk (*Buteo swainsoni*) is state listed as a threatened species. Swainson's hawks are open-country birds that nest in the Central Valley of California. Nests are typically found in scattered trees or along riparian corridors adjacent to annual grasslands, pastures, alfalfa, and other crops that provide foraging habitat (CDFG 1994). Swainson's hawks also nest in urban areas, although the reproductive success of pairs in urban areas has been shown to be lower than that of birds that nest in rural areas (England et al. 1995). Agricultural areas are most often used by foraging Swainson's hawks just after harvest or irrigation when prey populations become exposed or brought to the surface (Smallwood 1995). Swainson's hawks forage primarily on small rodents and reptiles during the breeding season (March to July), and on insects during the non-breeding period (England et al. 1997). Swainson's hawks typically migrate to and overwinter in South America between September and February, returning to North America in the spring to nest.

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) databases confirmed that the summer range of the Swainson's hawk includes the entire San Joaquin Valley, and the entire Habitat Study Area occurs in the summer range of the species. Twenty-four Swainson's hawk occurrences have been reported within 10 miles of the alternatives, five of which are within 1 mile of the alternative alignments (Figure 3-2a). Thirteen occurrences are within 5 miles of the alternative alignments (CDFG 2012a).

Occurrence 776, which lies in the Corcoran Elevated Alternative (Figure 3-2a, Sheet 3), consists of a pair of Swainson's hawks observed in May 1999 in an oak tree along the Tule River; one of the hawks was perched in a nest. Two individuals were seen in the same tree twice in May 1999; the site was inactive in 2000. As of July 2003, the former nest tree had been cut down and removed. Just east of Occurrence 776, two additional Swainson's hawk nest site occurrences (numbers 826 and 241) were reported northeast of the Corcoran Bypass Alternative along the Tule River riparian corridor as recently as 1999 and 2003 (Figure 3-2a, Sheet 3). Swainson's hawk Occurrence 779, which lies in the BNSF Alternative (Figure 3-2a, Sheet 3), was identified in 1999 and consisted of an active Swainson's hawk nest in a nest tree just east of SR 43 in the vicinity of Pixley NWR in a tree that fell before 2003 (CDFG 2012a). Occurrence 1210, which is in the vicinity of the Hanford West Bypass 1 and Hanford West Bypass 2 alternatives, (Figure 3-2a, Sheet 2), consists of a nest site that was active in 2003 (CDFG 2012a).

Of the remaining 12 CNDDB occurrences within 5 miles of the alternative alignments, the majority of these occurrences were near water features (e.g., the Kern River, Tule River, Cross Creek, Cameron Creek, and Alpaugh Canal), and are reports of active nest sites. Swainson's hawks have also been confirmed present within the boundaries of the Allensworth ER by the CDFG (Tomlinson 2010, personal communication).

During the spring 2010 field surveys and preliminary habitat assessment for Swainson's hawk, five Swainson's hawk pairs were observed tending active nests, in flight, or foraging in the core, auxiliary, and supplemental Habitat Study Areas or the surrounding area. All five nest sites were identified within 4 miles of the Tule River, including two nests within the river corridor. Three of the nests were located within the core Habitat Study Area, two were located in the auxiliary Habitat Study Area, and another was located just outside the auxiliary Habitat Study Area (see Figure 5-6). Swainson's hawk pairs were observed at all five sites on repeated occasions displaying various stages of breeding behavior, including aerial displays, copulation, nest construction, and roosting near or tending one or more newly constructed stick nests. No protocol-level presence/absence surveys were performed during field survey efforts.

Suitable nest trees are present and known to provide potential nesting habitat throughout the core, auxiliary, and supplemental Habitat Study Areas (Figure 5-6). In addition, agricultural fields and natural areas throughout the core and auxiliary Habitat Study Areas likely provide suitable foraging habitat. Swainson's hawks can be expected to nest and forage in suitable habitats throughout the core and auxiliary Habitat Study Areas where nest trees and foraging habitat coincide. The proximity of the four active Swainson's hawk nests and past CNDDB occurrences suggests that riparian areas, such as the Kings River, Cross Creek, Tule River, Poso Creek, and Kern River riparian corridors, may provide optimal nesting habitat for Swainson's hawk; however, Swainson's hawks could nest in any mature tree in the Habitat Study Area and forage in the adjacent lands.

Potential Swainson's hawk foraging habitat in the core and auxiliary Habitat Study Areas could be present in the following CWHR wildlife habitat types: annual grassland, barren, irrigated hayfield, crop, lacustrine, pasture, urban, and valley foothill riparian. These wildlife habitat types are present at various locations throughout the Habitat Study Area. Figure 5-6 shows the locations of potential nest trees. Three types of potential nest sites are identified: riparian tree clusters, urban tree clusters, and individual trees that were identified during surveys and are associated with either riparian or urban areas. Table 5-15 summarizes the total acreage of habitats that may support foraging habitat for this species.

Figure 5-6 contains confidential information and has therefore not been included on the website.

5.6.1.9 White-Tailed Kite

White-tailed kite (*Elanus leucurus*) is a California fully protected species. White-tailed kites inhabit open grasslands and savannahs. They breed in a variety of habitats, including grasslands, cultivated fields, oak woodlands, and suburban areas where prey is abundant. Nests are typically built in trees near a water source and may occur in suburban areas adjacent to open habitats with abundant prey. Breeding occurs between February and July, and white-tailed kites may be double-brooded in some years. During the non-breeding season, white-tailed kites may roost communally. This species inhabits California year-round west of the Sierra Nevada and is most commonly seen in the Central Valley and foothills. White-tailed kites prey on small mammals, reptiles, and occasionally on birds (Baicich and Harrison 2005).

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) databases showed that the year-round range of the white-tailed kite includes the entire San Joaquin Valley; therefore, the entire Habitat Study Area occurs within the year-round range of the species. One occurrence of white-tailed kite has been reported within 10 miles of the alternatives (CDFG 2012a). This occurrence (Occurrence 106) is located approximately 4 miles southwest of the BNSF Alternative and the city of Bakersfield (Figure 3-2a, Sheet 5) and consisted of two adults and five juveniles observed in July 1992 on the north side of the Kern River (CDFG 2012a).

During the 2010 field surveys, white-tailed kites were observed over the vicinity of the core and auxiliary Habitat Study Areas; however, no breeding behavior or nesting activity was observed. A preliminary habitat assessment for Swainson's hawk and eagle species was performed as part of the field survey efforts. Trees that could provide nesting habitat for hawks and raptors, including white-tailed kites, are located throughout the core and auxiliary Habitat Study Areas (Figure 5-6). In addition, the agricultural fields and natural areas throughout the core and auxiliary Habitat Study Areas likely provide suitable foraging habitat for species like the white-tailed kite.

Despite the fact that no white-tailed kites were observed breeding or nesting in the core and auxiliary Habitat Study Areas during the field surveys, the species can be expected to nest and forage throughout the core and auxiliary Habitat Study Areas. Potential foraging habitat for the species could be present in the following CWHR wildlife habitat types: alkali desert scrub, annual grassland, barren, deciduous orchard, dryland grain crops, evergreen orchard, fresh emergent wetland, irrigated grain crop, irrigated hayfield, irrigated row and field crops, crop, pasture, urban, valley foothill riparian, and vineyard. These wildlife habitat types are present at various locations throughout the Habitat Study Area. White-tailed kite could nest in suitable trees in these vegetation communities. Figure 5-6 shows the locations of potential nest trees. Table 5-15 summarizes the total acreage of habitats that may support this species.

5.6.1.10 American Peregrine Falcon

American peregrine falcon (*Falco peregrinus anatum*) has been federally delisted, but remains state listed as endangered and is a California fully protected species. Once believed to use open habitats primarily, peregrines also inhabit forests and, increasingly, cities. They nest on a variety of natural and man-made sites. Nests, which are usually a scrape or a depression, may be located on cliffs, ledges, banks, dunes, mounds, trees, bridges, or tall buildings. Peregrines typically breed from early March through late August. During the non-breeding season, peregrines inhabit riparian areas and coastal and inland wetlands. They prey primarily on birds as large as ducks but will occasionally eat small mammals, reptiles, and insects (Peeters and Peeters 2005).

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) databases confirmed that the winter range of American peregrine falcon includes the entire San Joaquin Valley; therefore, the entire Habitat Study Area occurs within the winter range of American peregrine falcon. No occurrences of this species have been reported to the CNDDB within 10 miles of the alternatives (CDFG 2012a) or in Fresno, Kings, Tulare, and Kern counties (CDFG 2012a).

During the spring 2010 field surveys, an American peregrine falcon was observed in flight in the vicinity of the core and auxiliary Habitat Study Areas; however, no breeding behavior or nesting activity was observed. The core and auxiliary Habitat Study Areas fall outside of the species' breeding range and as such, American peregrine falcons are not expected to nest in the Habitat Study Area. Suitable foraging habitat is present in the San Joaquin Valley and the Habitat Study Area. Potential American peregrine falcon foraging habitat in the core and auxiliary Habitat Study Areas could be present in the following CWHR wildlife habitat types: annual grassland, barren, fresh emergent wetland, irrigated grain crop, irrigated hayfield, crop, lacustrine, riverine, pasture, urban, and valley foothill riparian. These wildlife habitat types are present at various locations throughout the Habitat Study Area. Table 5-15 summarizes the total acreage of habitats that may provide foraging habitat for this species.

5.6.1.11 Greater Sandhill Crane

Greater sandhill crane (*Grus canadensis tabida*) is state listed as threatened and is a California fully protected species. Greater sandhill crane inhabit sites with freshwater near grasslands, open wetlands, moist croplands, rice, or corn stubble. Greater sandhill cranes breed in the northern latitudes in Siberia and Canada to northeastern California, migrating south to winter in California, the southwestern states, and northern Mexico. In winter, greater sandhill cranes forage in irrigated pasture and annual grasslands in the Central Valley, including Pixley NWR. Cranes feed on plants, including grasses, forbs, and especially cereal crops, and small vertebrates and invertebrates.

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) databases confirmed that the winter range of greater sandhill crane includes the entire San Joaquin Valley; therefore, the entire Habitat Study Area is in the winter range of greater sandhill crane. No occurrences of this species have been reported to the CNDDB within 10 miles of the alternatives (CDFG 2012a). However, this species is known to roost in wetlands at the Pixley NWR and to forage in the surrounding grazed and agricultural lands (USFWS 2005c). The Pixley NWR is located immediately east of the BNSF Alternative (Figure 3-2a, Sheets 3 and 4). In the winter of 2000-2001, more than 5,000 sandhill cranes were seen roosting in the Pixley NWR. Both greater sandhill cranes and lesser sandhill cranes are known to occur there. The majority of the birds using the wildlife refuge are lesser sandhill cranes (a California species of special concern addressed under "Special-Status Wading Bird, Shorebird, and Duck Species" [Section 5.5.1.AA]) (USFWS 2005c).

During the 2010 field surveys, a flock of sandhill cranes was observed in flight in the vicinity of the BNSF Alternative in the general vicinity of the town of Hanford. No sandhill cranes were observed roosting or foraging in the Habitat Study Area in 2010; however, this survey period did not overlap with the overwintering period for the greater sandhill crane, which is mid-September through early March.

Greater sandhill crane wintering habitat is present in the Habitat Study Area in the following CWHR wildlife habitat types: annual grassland, dryland grain crops, fresh emergent wetlands, irrigated grain crops, irrigated hayfield, irrigated row and field crops, crop, lacustrine, and valley

foothill riparian. These wildlife habitat types are present at various locations throughout the Habitat Study Area and may vary in quality depending on the degree of habitat fragmentation or disturbance, land-use, and whether the lands are natural or agricultural. Table 5-15 summarizes the total acreage of habitats that may provide suitable foraging habitat for this species. Greater sandhill cranes are not expected to nest in the Habitat Study Area. Table 5-15 summarizes the total acreage of habitats that may support this species.

5.6.1.12 Bald Eagle

Bald eagle (*Haliaeetus leucocephalus*) has been federally delisted, but remains state listed as endangered and is a California fully protected species. For nesting, bald eagles prefer large, old growth trees or snags in remote locations near water, or dominant live trees such as pines, usually with open foliage, 50 feet to 200 feet above the ground where they build stick-platform nests. Bald eagles typically begin breeding in February, and adults will abandon nests in response to human activity in the vicinity (Peeters and Peeters 2005).The breeding range of the bald eagle includes most of the continent, but they now nest mainly in Alaska, Canada, the Pacific Northwest states, the Great Lakes states, Florida, and the Chesapeake Bay. In California, the breeding range is increasing and expanding; breeding territories are found in the northern part of the state and some are scattered in southern California. Most of California's breeding bald eagles remain near their nest areas all year. Smaller groups of wintering eagles occur throughout the state near reservoirs and typically in close proximity to large concentrations of overwintering migratory waterfowl. Wintering eagles forage on fish, waterfowl, mammals, and a variety of carrion. They require large bodies of water or rivers for hunting because they swoop from hunting perches, such as tall snags, to snatch prey from the water (Peeters and Peeters 2005).

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) databases confirmed that the wintering range of the bald eagle includes the entire San Joaquin Valley, and the entire Habitat Study Area is in the winter range of the bald eagle. No occurrences of this species have been reported to the CNDDB within 10 miles of the alternatives (CDFG 2012a). The closest reported occurrence (Occurrence 257) is located in Kern County approximately 27 miles south of the BNSF Alternative (CDFG 2012a).

Bald eagles were not observed during field survey efforts. Although trees that could provide nesting habitat are present, the highly disturbed agricultural land in the San Joaquin Valley, which lacks coastal habitat, large fish-bearing lakes, or perennial rivers, likely provides poor-to-marginal nesting habitat for the species, and the Habitat Study Area is outside of the known breeding range. In addition, because of the highly disturbed agricultural land in the Habitat Study Area, and lack of large water bodies, foraging opportunities are limited and existing habitats provide marginal value. Therefore, bald eagles are not expected to nest in the Habitat Study Area. Potential bald eagle foraging habitat in the Habitat Study Area could be present in the following CWHR wildlife habitat types: annual grassland, barren, fresh emergent wetlands, lacustrine, riverine, and valley foothill riparian. These wildlife habitat types are present at various locations throughout the Habitat Study Area. Table 5-15 summarizes the total acreage of habitats that may support this species.

5.6.1.13 Nelson's Antelope Squirrel

Nelson's (= San Joaquin) antelope squirrel (*Ammospermophilus nelsoni*) is state listed as threatened. In Kern County, the historical distribution of this species included much of the valley floor. The current distribution in Kern County primarily includes Lokern, Elk Hills, Buena Vista Valley, the Taft-Maricopa area, and a few locations in and near the Semitropic Preserve. Currently, substantial populations of this species occur only in Lokern and the Elk Hills. Since

1979, Nelson's antelope squirrels have disappeared from many smaller islands of habitat on the valley floor (USFWS 1998).

The species is often found in the same locations as the giant kangaroo rat, and antelope squirrels are known to use giant kangaroo rat burrows. Typical habitat is flat to gently sloping terrain in grassland and saltbush scrub. The squirrels need widely scattered shrubs, forbs, and grasses in broken terrain with gullies and washes. They typically avoid alkaline and seasonally flooded areas. Their breeding period coincides with the period of the year when green vegetation is present, typically late winter through early spring. Young are born between March and April and weaned by the end of May (USFWS 1998).

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) databases and the *Recovery Plan for Upland Species of the San Joaquin Valley* (USFWS 1998) confirmed that the alternative alignments from approximately the town of Allensworth south to Bakersfield in the Habitat Study Area are within the known geographic range of Nelson's antelope squirrel. The Pixley NWR and Allensworth ER area has been identified as a conservation area for the recovery of the Nelson's antelope squirrel (USFWS 1998). The Recovery Plan (USFWS 1998) recommends protecting habitat around Pixley NWR and Allensworth ER to help conserve the species.

Twelve CNDDB occurrences of this species have been reported within 10 miles of the alternatives (Figure 3-2b). The closest occurrence (Occurrence 193) is approximately 0.17 mile west of the Allensworth Bypass Alternative. An unknown number of individuals were observed in incidental sightings in 1988 in valley sink scrub. The next closest occurrence (Occurrence 292) is approximately 0.18 mile southwest of the BNSF Alternative in the vicinity of Allensworth. It consisted of an individual Nelson's (= San Joaquin) antelope squirrel observed in 1991 in Allensworth State Historic Park (CDFG 2012a).

As of 2005, the last confirmed Nelson's (= San Joaquin) antelope squirrel sighting in the Pixley NWR was in 1985 (USFWS 2005c). The species was also confirmed present within the boundaries of the Allensworth ER by CDFG (Tomlinson 2010, personal communication).

The Habitat Study Area does not intersect or further isolate the separate units of Pixley NWR, nor does it isolate Pixley NWR from Allensworth ER; however, the BNSF Alternative in the vicinity of Allensworth parallels the existing SR 43 and BNSF right-of-way, which would further fragment a parcel in the Allensworth ER. Both the BNSF Alternative and Allensworth Bypass Alternative cross a linkage identified in the Recovery Plan for Nelson's antelope squirrel: the Garces Highway linkage.

This species was not observed during field survey efforts. However, small mammal activity, such as active burrows and freshly excavated soils, fresh scat, and fresh tracks, was observed outside of the Habitat Study Area in the vicinity of the Allensworth Bypass Alternative and within the Habitat Study Area in the vicinity of the BNSF Alternative (south of the town of Allensworth) (Figure 5-4). The activity observed could indicate Nelson's (= San Joaquin) antelope squirrel activity. In the area between the town of Allensworth and Bakersfield, Nelson's antelope squirrel habitat could be present in the following CWHR wildlife habitat types: alkali desert scrub, annual grassland, barren, and pasture. Within the Habitat Study Area, these wildlife habitat types where this species is most likely to occur are largely concentrated in the vicinity of Allensworth and west of Bakersfield. Table 5-15 summarizes the total acreage of habitats that may provide suitable habitat for this species.

5.6.1.14 Ringtail

Ringtail (*Bassariscus astutus*) is a California fully protected species. It ranges throughout California, with the majority of distribution data aggregated in the Coast Range and the western Sierra Nevada. Ringtails typically inhabit forest and shrubland habitats in close association with rocky areas and riparian corridors at low to middle elevations. Ringtails are nocturnal, sleeping in their dens during the day. As omnivores, they forage on a variety of items, including arthropods, fruits, berries, mammals, reptiles, birds, and eggs, depending on the season. Ringtails den in rock crevices, boulder piles, underground, and in tree cavities. Breeding occurs in late March, and kits are born in May or June (Belluomini 1980; Orloff 1980).

Background Review and Survey Results

A review of the CWHR database (CDFG 2005) confirmed that the known geographic range of ringtail does not overlap the alternative alignments. However, the true distribution and range of ringtail is at present unclear. This may be because the species is elusive and difficult to detect. This is partially due to its habitat preferences and nocturnal habits and also because it typically occurs at low densities.

Few data sources track ringtail occurrence records. Grinell mapped records of the species in 1937, and this work was updated in 1980 by the CDFG (Belluomini 1980); however, none of these records overlaps with the Habitat Study Area. The CNDDB does not track this species (CDFG 2012a). This species was not observed during the 2010 field survey efforts.

Recently, a ringtail was detected in the Kern River corridor in Bakersfield (under Mohawk Avenue bridge) by Jim Lowery (SJVC 2012). This occurrence is a few hundred feet downstream from where the BNSF Alternative crosses the Kern River and approximately 0.2 mile downstream from where the Bakersfield South Alternative crosses the Kern River.

In the vicinity of the Kern River, ringtail foraging habitat could be present in annual grassland, riverine, and valley foothill riparian CWHR wildlife habitat types. Within these habitats (excluding riverine), ringtail may den in hollow trees, abandoned burrows, or large rock recesses, including those made by rock slope protection placed along the Kern River. Table 5-15 summarizes the total acreage of habitats that may provide suitable habitat for this species.

5.6.1.15 Fresno Kangaroo Rat

Fresno kangaroo rat (*Dipodomys nitratoides exilis*) is federally and state listed as endangered. The smallest of the kangaroo rats, this species inhabits the alkali desert scrub and grassland plant community of western Fresno County. Although the historic range of the species is not entirely known, it most likely extended to the Merced River in Merced County in the north, to the edge of the valley floor in the east, to the wetlands of the Fresno Slough and San Joaquin River in the west, and to the northern edge of marshes around Tulare Lake, Kings County in the south (USFWS 1998a). Recent genetic studies have shown that the Fresno kangaroo rat only occurs north of the Kings River (Cypher 2010b, personal communication). Little is known about this species' current range. According to the Upland Species Recovery Plan (USFWS 1998), no extant populations of the Fresno kangaroo rat are known. A single male was trapped west of Fresno in the Alkali Sink Ecological Reserve in 1992, 25 miles west of the project footprint. No Fresno kangaroo rats have been trapped within the species' historical range since 1992, despite multiple trapping efforts.

This animal, unlike other kangaroo rats, is not known to use areas that have been cultivated or irrigated. Fresno kangaroo rats feed primarily on seeds, which they carry in large cheek pouches (Hoffman 1974).

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and the *Recovery Plan for Upland Species of the San Joaquin Valley* (USFWS 1998) confirmed that the portion of the alternative alignment in Fresno County in the Habitat Study Area occurs in the historical geographic range of the Fresno kangaroo rat. No USFWS Recovery Plan core areas have been identified for this species in the Habitat Study Area (USFWS 1998).

Two occurrences have been reported within 10 miles of the alternatives. The closest occurrence (Occurrence 15) is historical, from 1898, and is now considered extirpated. This historical occurrence is northwest of the city of Fresno and approximately 3 miles northwest of the BNSF Alternative (Figure 3-2b, Sheet 1) in an area that is now developed. The other reported occurrence (Occurrence 10), which is approximately 9 miles west of Hanford (Figure 3-2b, Sheet 1), has also been converted to agriculture and is considered extirpated (CDFG 2012a).

This species was not observed during field survey efforts. Although kangaroo rat signs, including active kangaroo-rat-sized burrows and freshly excavated soils, fresh scat, and fresh tracks, were observed outside of the Habitat Study Area in the vicinity of the Allensworth Bypass Alternative and within the Habitat Study Area in the BNSF Alternative (in the vicinity of the Pixley NWR and the town of Allensworth) (Figure 5-4), these locations are outside of the known range of the species. Potential Fresno kangaroo rat habitat could be present in the core and auxiliary Habitat Study Areas, north of the Kings River, in the following CWHR wildlife habitat types: alkali desert scrub, annual grassland, barren, and pasture. The potential habitat for this species between Fresno and the Kings River is limited, patchy, and generally disturbed, and includes isolated areas of pasture, barren, and annual grassland. Table 5-15 summarizes the total acreage of habitats that may support this species.

5.6.1.16 Tipton Kangaroo Rat

Tipton kangaroo rat (Dipodomys nitratoides nitratoides) is federally and state listed as endangered. The range of Tipton kangaroo rat encompasses the south San Joaquin Valley south of the Kings River, and generally along the SR 43 and SR 99 corridors (USFWS 2010b). Important vegetation communities for Tipton kangaroo rat include valley sink scrub and valley saltbush scrub. Much of the occupied habitats have sparsely scattered woody shrubs and a groundcover of annual grasses and forbs. Although it is not uncommon for occupied habitat to become seasonally flooded, terrain that is not subject to flooding is important for population persistence. Tipton kangaroo rat reproduction begins in winter and peaks in late March and early April. Tipton kangaroo rat feeds mostly on seeds, with small amounts of green herbaceous vegetation and insects when available (USFWS 1998).

Background Review and Survey Results

Historically, Tipton kangaroo rats ranged throughout much of the southern San Joaquin Valley from Kings County to central Kern County, primarily on the floor of the Tulare Lake basin (USFWS 1998). A review of the CNDDB (CDFG 2012a), the *Recovery Plan for Upland Species of the San Joaquin Valley* (USFWS 1998), and *Tipton Kangaroo Rat (*Dipodomys nitratoides nitratoides*) 5-Year Review: Summary and Evaluation* (USFWS 2010b) confirmed that the portions of the alternative alignments within Tulare and Kern counties occur in the known geographic range of Tipton kangaroo rat. The Pixley NWR and Allensworth ER area has been identified as a conservation area for the recovery of the Tipton kangaroo rat (USFWS 1998). The Recovery Plan (USFWS 1998) recommends protecting, connecting, and expanding habitat around Pixley NWR and Allensworth ER to help conserve the species.

Forty-four occurrences of this species have been reported to the CNDDB within 10 miles of the alternatives (Figure 3-2b). Seven occurrences (Occurrences 9, 28, 29, 31, 32, 35, and 36) of Tipton kangaroo rat intersect the BNSF Alternative and Allensworth Bypass Alternative in Allensworth SHP and Allensworth ER. Occurrence 9, from 1929, is considered extirpated. However, the six other occurrences are presumed extant by the CNDDB: four of them were from 1985, one was from 1990, and the remaining one was from 2003. These occurrences are observations of adults, including males and females, their burrows, and their breeding, wintering, and foraging sites (CDFG 2012a). Tipton kangaroo rats have also been confirmed present within the boundaries of the Allensworth ER by the CDFG (Tomlinson 2010, personal communication) where reintroduction of this species has been ongoing.

According to the USFWS (1998), Pixley NWR provides some of the best remaining habitat for the Tipton kangaroo rat. The Endangered Species Recovery Program has been conducting surveys twice per year in the refuge since 1992. Population numbers in Pixley NWR crashed in the mid-1990s when the areas were flooded two winters in a row. As of 2005, few or no individuals have been trapped in recent years (USFWS 2005c).

The Habitat Study Area does not intersect or further isolate the separate units of Pixley NWR, nor does it isolate Pixley NWR from Allensworth ER; however, the BNSF Alternative in the vicinity of Allensworth parallels the existing SR 43 and BNSF right-of-way, which would further fragment a parcel in the Allensworth ER. Both the BNSF Alternative and Allensworth Bypass Alternative cross two linkages, the Garces Highway and SR 43 linkages, while the BNSF Alternative and Bakersfield South alternative cross the Kern River Alluvial Fan linkage, all of which have been identified in the Recovery Plan for Tipton kangaroo rat (USFWS 1998).

Kangaroo rat including active kangaroo rat-sized burrows and freshly excavated soils, fresh scat, and fresh tracks were observed within the Habitat Study Area in the BNSF Alternative (in the vicinity of the Pixley NWR and the town of Allensworth) and outside of the Habitat Study Area in the vicinity of the Allensworth Bypass Alternative (Figure 5-4).Potential Tipton kangaroo rat habitat could be present in the core and auxiliary Habitat Study Areas in the following CWHR wildlife habitat types: alkali desert scrub, annual grassland, barren, and pasture. Within the Habitat Study Area, these wildlife habitat types where this species is most likely to occur are largely concentrated in the vicinity of Pixley, Allensworth, and west of Bakersfield. Table 5-15 summarizes the total acreage of habitats that may provide suitable habitat for this species.

5.6.1.17 San Joaquin Kit Fox

San Joaquin kit fox (*Vulpes macrotis mutica*) is federally listed as endangered and state listed as threatened. Its historic range included the San Joaquin Valley, western Sacramento Valley and portions of the inner Coast Range, such as the Carrizo Plain, Salinas Valley, Temblor Range, Cholame Hills, and Elkhorn Plain (USFWS 1998). San Joaquin kit fox has declined throughout its range primarily because of habitat loss, but other possible factors include predator and pest control programs, and competition, primarily with coyotes (Cypher et al. 2000).

The present-day distribution in the San Joaquin Valley consists of fragmented populations in Fresno, Kings, Tulare, and Kern County that use the remaining natural lands southward to the foothills of the Tehachapi Mountains. In the San Joaquin Valley, San Joaquin kit fox are concentrated on the west side of the valley from the Lokern natural area to Maricopa and in other locations, including: (1) areas south and east of the Kern National Wildlife Refuge; (2) areas north and west of Bakersfield; and (3) areas along the Kern River floodplain. Present-day San Joaquin kit fox abundance in the San Joaquin Valley is highly dynamic, which has led to recommendations of habitat preservation in large blocks (Cypher et al. 2000).

San Joaquin kit fox inhabits valley and foothill grasslands, sparsely vegetated shrubby habitats, and some agricultural and urban areas (Morrell 1972). Habitats most frequently used by the species are comprised mostly of grassland and saltbush scrub. San Joaquin kit fox use complex dens for shelter and protection (USFWS 1998). Most of their dens are located in flat terrain or on the lower slopes of hills. Common locations for dens include washes, drainages, and roadside berms.

Kit foxes are reputed to be poor diggers and are usually found in areas with loose-textured, friable soils (Morrell 1972). Some studies have suggested that where hardpan layers predominate, kit foxes create dens by enlarging California ground squirrel or American badger (*Taxidea taxus*) burrows (Morrell 1972; Orloff et al. 1986). They also commonly den in man-made structures such as small-diameter culverts. Kit fox are quite tolerant of human disturbances and will, to an extent, use oil fields and cultivated agricultural lands. A diet of small rodents such as kangaroo rats and California ground squirrels is common for the San Joaquin kit fox (Jameson and Peeters 2004).

Adult foxes are usually solitary during the late summer and fall. By September and October adult females (vixens) have begun to excavate and enlarge natal dens. Adult males join the vixens in October or November (Morrell 1972), and mating probably occurs near the first of the year (Egoscue 1956). Pups typically are born in late February or early March (Egoscue 1962; Morrell 1972). They begin foraging for themselves at about 4 to 5 months, dispersing shortly thereafter (Morrell 1972).

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) databases and of the *Recovery Plan for Upland Species of the San Joaquin Valley* (USFWS 1998) confirmed that the entire Habitat Study Area is in the known geographic range of San Joaquin kit fox. The BNSF Alternative and Allensworth Bypass Alternative pass through a satellite area for this species in the vicinity of the Pixley NWR and Allensworth ER, and the BNSF Alternative and Bakersfield South alternative pass through a satellite area for this species in the vicinity of Bakersfield along the Kern River (USFWS 1998). Additionally, four linkage areas have been identified within the Habitat Study Area that connect these satellite areas to core areas in the west: the Kern River Alluvial Fan linkage, the Poso Creek linkage, the Garces Highway linkage, and the SR 43 linkage. The Recovery Plan (USFWS 1998) recommends expanding and connecting existing refuges and reserves, and maintaining and establishing linkages/movement corridors. One hundred and ninety-eight occurrences of this species have been reported within 10 miles of the alternatives. Ten occurrences (Occurrences 218, 255, 355, 490, 497, 507, 788, 799, 820, and 912) have been reported within the project footprint (i.e., in the vicinity of the BNSF, Allensworth Bypass, Hanford West Bypass 1 and Hanford West Bypass 2, and Corcoran Elevated alternatives) (Figure 3-2b). Kit fox individuals, their dens, and/or signs of their presence were observed at these sites between 1972 and 2004.

Kit fox dens have been found at the Pixley NWR (CDFG 2012a, USFWS 2005c) (near the BNSF Alternative and Allensworth Bypass Alternative) before the wet winters of the mid-1990s, after which their prey population numbers in the refuge collapsed. Kit fox denning has not been confirmed there since that time. Dead San Joaquin kit foxes are occasionally found on the roads near the refuge (USFWS 2005c). San Joaquin kit fox are presumed present within the boundaries of the Allensworth ER by the CDFG (Tomlinson 2010, personal communication).

The Habitat Study Area does not intersect or further isolate the separate units of Pixley NWR, nor does it isolate Pixley NWR from Allensworth ER; however, the BNSF Alternative in the vicinity of Allensworth parallels the existing SR 43 and BNSF right-of-way, which would further fragment a parcel in the Allensworth ER. In urban Bakersfield, the BNSF Alternative, Bakersfield Hybrid

Alternative, and Bakersfield South Alternative would be elevated for all but 0.9 mile of the area where they cross the satellite area in Bakersfield. The BNSF Alternative, Allensworth Bypass Alternative, Corcoran Bypass Alternative, Wasco-Shafter Alternative, Bakersfield Hybrid Alternative, and Bakersfield South Alternative cross the four linkages identified in the Recovery Plan for San Joaquin kit fox: the Kern River Alluvial Fan, Poso Creek, Garces Highway, and SR 43 linkages.

During field survey efforts, medium and large-mammal burrows that could provide suitable denning or refugia habitat for San Joaquin kit fox were identified based on signs that included possible kit fox scat and tracks, and medium-sized mammal burrows with dimensions in accordance with typical kit fox dens (i.e., greater than or equal to 4 inches in diameter). Potential San Joaquin kit fox burrows were identified outside of the Habitat Study Area in relatively undisturbed alkali desert scrub habitats characterized by an abundance of small-, medium-, and large-mammal burrow complexes. However, medium and large-sized burrows or burrow complexes that could provide suitable denning or refugia habitat for the species were observed at various locations throughout the Habitat Study Area. No protocol-level presence/absence surveys were conducted during field survey efforts.

Potential San Joaquin kit fox foraging and denning habitat in the core and auxiliary Habitat Study Areas could be present in the following vegetation communities: alkali desert scrub, annual grassland, barren, and pasture, and within the urban vegetation community of the City of Bakersfield, which San Joaquin kit fox are at present known to inhabit. Although agricultural lands are suboptimal for kit fox denning, San Joaquin kit foxes may use agricultural lands for foraging and dispersal habitat. Within the Habitat Study Area, these wildlife habitat types where this species is most likely to inhabit and breed are largely concentrated in the vicinity of Pixley, Allensworth, and Bakersfield, although the species can be expected to forage and disperse throughout the surrounding agricultural wildlife habitat types. Table 5-15 summarizes the total acreage of habitats that may provide suitable habitat for San Joaquin kit fox.

5.6.1.18 Kern Brook Lamprey

Kern brook lamprey (*Lampetra hubbsi*) is a California species of special concern. The distribution of this species has not been well documented, but it is believed to be endemic to the east side of the San Joaquin Valley and to be found only in the San Joaquin River drainage (Moyle et al. 1995). Populations, which are thinly scattered and isolated from one another, have been found in the San Joaquin River below Friant Dam, the Merced River, the Kaweah River, and the Kings River above and below Pine Flat Dam (Brown and Moyle 1993). Despite considerable efforts to find Kern brook lamprey in the Kern, Tule, Tuolumne, and Stanislaus rivers, Brown and Moyle (1993) were unable to find this species in those streams. Kern brook lampreys are known from the Friant-Kern Canal in their larval (ammocete) stage, and have been sampled in the canal east of Delano, California (CDFG 2012a).

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) database and other sources (Brown and Moyle 1993; Moyle et al. 1995; Moyle 2002) confirmed that the known distribution of the Kern brook lamprey is limited to the San Joaquin River, Merced River, Kaweah River, Kings River, and the Friant-Kern Canal. Of these watercourses, only the Kings River and Friant-Kern Canal cross the alternative alignments at the BNSF Alternative and Bakersfield South Alternative. In the Habitat Study Area, the Kings River is an ephemeral system that only carries water during flood events. As a result, it is not considered suitable habitat for the Kern brook lamprey. The Kern brook lamprey may also be present in the Kaweah River drainage. However, this waterway does not intersect the Habitat Study Area, presumably due to upstream water diversions and groundwater infiltration. With

respect to the Kaweah River, the project footprint does not overlap the potential range of this species.

The only CNDDB occurrence of the species within 10 miles of the alternatives, Occurrence 1, was in the Friant-Kern Canal, approximately 8 miles east of the alternative alignments. This occurrence, from 1972, consisted of 11 metamorphosed specimens and 1 ammocete in the canal, which the observer noted was not normal habitat for this species (CDFG 2012a). Such ammocetes may not contribute to the survival of the species because this canal is a dead-end habitat that lacks suitable spawning substrate (Moyle 2002). Similarly, according to CNDDB records, the canal should not be considered normal habitat for this species (CDFG 2012a). Although the project footprint intersects with the Friant-Kern Canal in Bakersfield, approximately 30 miles downstream of Delano (where ammocetes were last collected), the habitat present at this intersection of the canal and corridor is similar to and hydrologically linked to those areas where collections have occurred. No other water bodies, ditches, canals, or riverine areas provide suitable habitat within the species' known range. As a result, Kern brook lamprey ammocetes have the potential to occur in the Habitat Study Area in the Friant-Kern Canal.

5.6.1.19 Western Spadefoot

Western spadefoot toad (*Scaphiopus hammondii*) is a California species of special concern. This amphibian occurs in the central and southern parts of the Coast Range, the Central Valley, and the foothills of the Sierra Nevada (Stebbins 1985). The western spadefoot toad primarily inhabits grasslands, frequenting washes, floodplains of rivers, alluvial fans, playas, and alkali flats. However, this species also ranges into the foothills and mountain valleys up to 3,000 feet. It prefers areas of open vegetation and short grasses where the soil is sandy or gravelly (Stebbins 1985). Breeding habitat consists of seasonally inundated pools or occasionally low-gradient seasonal streams (Jennings and Hayes 1994). Pools where this species is known to reproduce successfully lack introduced fishes, bullfrogs, and crayfish. Western spadefoot toads are strictly nocturnal. During the day and during long, dry periods they hide in deep, almost vertical burrows (Stebbins 1972). Juveniles hide in drying mud cracks and under boards and other surface objects, which can include decomposing cow dung (Weintraub 1980). Breeding occurs in late winter or spring, and larval development is completed in 3 to 11 weeks, depending on food availability and water temperature (Jennings and Hayes 1994).

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) databases confirmed that the entire Habitat Study Area occurs in the known geographic range of western spadefoot toad. Eleven occurrences of this species have been documented within 10 miles of the alternatives. The closest occurrence (Occurrence 74) is approximately 2.6 miles east of the BNSF Alternative (Figure 3-2a, Sheet 4), where in 1992 tadpoles were observed in pools (CDFG 2012a). During the 2010 field surveys, western spadefoot toad adults and tadpoles were observed directly adjacent to and within the footprint of the BNSF Alternative near Allensworth in vernal pools, roadside ditches, and seasonally ponded waters in areas dominated by alkali desert scrub and annual grassland habitats (Figure 5-4). Jurisdictional water types that could support western spadefoot toad include seasonal wetlands, vernal pools, vernal swales, and vernal pool and swale complexes. Western spadefoot toad habitat is present in these jurisdictional water types, which typically occur in the following CWHR wildlife habitat types: alkali desert scrub and annual grassland. The jurisdictional water and wildlife habitat types present within the Habitat Study Area that could support this species are concentrated in the vicinity of Corcoran and Allensworth. These jurisdictional waters may be natural (seasonal wetlands, vernal pools, vernal swales, vernal pool and swale complexes) or man-made (depressions and scrapes). The quality and availability of these aquatic features could vary over time, depending on factors such as rainfall

or agricultural practices that may alter the natural landscape or hydrologic regime. The total acreage of habitats that may support this species is summarized in Table 5-15.

5.6.1.20 Western Pond Turtle

Western pond turtle (*Clemmys marmorata*) is a California species of special concern. Western pond turtles are habitat generalists and are typically found in slow-moving rivers (e.g., in oxbows), ephemeral and perennial streams, lakes, ponds, reservoirs, permanent and ephemeral wetlands, stock ponds, sewage treatment plants, marshes, vernal pools, freshwater and brackish estuaries, and man-made or modified water bodies, such as drainage ditches and ornamental park ponds (Holland 1994; Buskirk 2002).

Western pond turtles prefer aquatic habitat with refugia, such as undercut banks, submerged vegetation, rocks, logs, and mud banks (Holland 1994). Despite their name, western pond turtles regularly use terrestrial habitats throughout the year, especially for nesting (females) and mate-seeking (males), overwintering, and overland dispersal (Reese 1996; Reese and Welsh 1997; Holland 1994). They take advantage of mud banks, rocks, logs, root wads, and other opportunistic basking sites (Holland 1994; Bash 1999). Females will range as far as 1,300 feet from a watercourse to find suitable nesting habitat (Holland 1994). Preferred nest sites are characteristically excavated in areas with sparse vegetation of short grasses or forbs, in hard-packed clay or silt soils, and along south- or west-facing slopes (Rathbun et al. 1992; Holland 1994; Reese and Welsh 1997).

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) databases confirmed that the entire Habitat Study Area occurs in the known geographic range of the western pond turtle. Seven occurrences of this species have been reported within 10 miles of the alternatives. The closest reported occurrence (Occurrence 10) is approximately 0.2 mile east of the Hanford West Bypass alternatives in the vicinity of Corcoran (Figure 3-2a, Sheet 2). This record is considered extant (CDFG 2012a).

Although this species was not observed during field survey efforts, suitable aquatic habitat is present for this species in permanent and seasonally inundated water bodies, including detention basins, reservoirs, irrigation canals and ditches, rivers, and creeks. If present, western pond turtles may nest up to 1,300 feet from aquatic habitat in adjacent uplands in loose, sandy soils to hard-packed ground with little-to-no vegetative cover. Potential western pond turtle aquatic and nesting habitat in the core and auxiliary Habitat Study Areas could be present in these vegetation communities: annual grassland, alkali desert scrub, fresh emergent wetlands, lacustrine, riverine, pasture, and valley foothill riparian. Within the Habitat Study Area, these wildlife habitat types where this species is most likely to occur are largely concentrated in the vicinity of major riparian corridors and other water bodies. The ability for western pond turtles to persist in water bodies in the San Joaquin Valley is dependent on the availability of permanent water, the presence of predators such as largemouth bass and bullfrogs, and access to undisturbed nesting grounds.

5.6.1.21 Silvery Legless Lizard

Silvery legless lizard (*Anniella pulchra pulchra*) is a California species of special concern. It is found from the south southern edge of California's San Joaquin River in Contra Costa County south through the Coast Range, Transverse Range, and Peninsular Range to Baja California Norte, Mexico. The species is found on the San Joaquin Valley floor and in the south Sierra foothills (Jennings and Hayes 1994; Stebbins 2003). The silvery legless lizard is typically restricted to moist, loose, mulchy, sandy soils (Burt 1931; Gorman 1957; Kuhnz 2004) such as sand, loam, or humus (Stebbins 2003) typically in undisturbed, loose soils with a high fraction of sand in the soil and mature leaf litter (Kuhnz 2004). They are commonly found in washes, loose

soil near the base of slopes, and in the vicinity of streams. Their preferred habitats include coastal dunes and oak woodlands (Miller 1944), beaches, desert scrub, chaparral, pine-oak woodland, and streamside growth of sycamores, cottonwoods, and oaks (Stebbins 2003).

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) confirmed that the entire Habitat Study Area occurs in the known geographic range of silvery legless lizard. Three occurrences (Occurrences 22, 67, and 92) of this species have been reported to the CNDDB within 10 miles of the alternatives. These occurrences are at the southern end of the alignment (Figure 3-2a, Sheet 5), and the closest occurrence (Occurrence 92) is approximately 0.5 mile southwest of the BNSF Alternative (CDFG 2012a). Although this species was not observed during field survey efforts, suitable sandy soils were present for this species along all rivers and creeks. If present, silvery legless lizards may inhabit sandy soils in the Kings River, Cross Creek, Tule River, Poso Creek, and Kern River riparian corridors and adjacent uplands. Potential silvery legless lizard habitat in the core and auxiliary Habitat Study Areas could be present within and along these riparian corridors in the following CWHR wildlife habitat type: annual grassland and valley foothill riparian. Within the Habitat Study Area, this wildlife habitat type where this species is most likely to occur is largely concentrated in the vicinity of major riparian corridors. The ability of silvery legless lizards to persist in riparian areas is dependent on the availability of undisturbed, sandy soils. Table 5-15 summarizes the total acreage of habitats that may provide suitable habitat for this species.

5.6.1.22 San Joaquin Whipsnake

San Joaquin whipsnake (*Masticophis flagellum ruddocki*) (also known as the San Joaquin coachwhip) is a California species of special concern. Its known range is limited to California and extends from Arbuckle (Colusa County) in the Sacramento Valley south to the Grapevine (Kern County), and to the west into the southern Coast Range at elevations from 66 feet to 2,953 feet. Very little is known of this species' life history. San Joaquin whipsnakes are believed to inhabit the burrows of any number of small mammal species in open, dry vegetation with little to no tree cover in such habitats as valley grassland and saltbush scrub associations. After emerging in April and early May, the snake becomes active in late morning up until temperatures become excessive, at which point they adapt by emerging in the early morning and later in the evenings. San Joaquin whipsnakes are believed to mate in May and deposit eggs in June and July. By August, individuals begin to retreat to overwintering sites in response to a diminishing prey base and the coming cold. Prey items include lizards (including blunt-nosed leopard lizards, western whiptails, and side-blotched lizards), eggs and young from bird and mammal nests, carrion, and Nelson's antelope squirrels (Jennings and Hayes 1994).

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) databases confirmed that the areas south of Corcoran to Bakersfield of the Habitat Study Area occur in the known geographic range of the San Joaquin whipsnake. Seven occurrences of this species have been reported within 10 miles of the alternatives. The closest documented occurrence of this species (Occurrence 22) is approximately 3.5 miles west of the BNSF Alternative in the Allensworth ER (Figure 3-2a, Sheet 3 where in 1991 and 1992 several individuals, including juveniles, were observed in alkali sink scrub habitat (CDFG 2012a; Tomlinson 2010, personal communication).

Although this species was not observed during field survey efforts, small mammal activity that included extensive active burrow complexes was observed in the Habitat Study Area and could provide suitable habitat for refugia. Potential San Joaquin whipsnake habitat in the core and auxiliary Habitat Study Areas could be present in the following CWHR wildlife habitat types: alkali

desert scrub, annual grassland, pasture, and valley foothill riparian. Within the Habitat Study Area, these wildlife habitat types are largely concentrated in the vicinity of major riparian corridors and in the vicinity of Corcoran, Pixley, and west of Bakersfield. Table 5-15 summarizes the total acreage of habitats that may provide suitable foraging habitat for this species.

5.6.1.23 Coast Horned Lizard

Coast (California) horned lizard (*Phrynosoma coronatum frontale*) is a California species of special concern. It is spottily distributed from Kennett in Shasta County southward along the edges of the Sacramento Valley and portions of the southern Coast Range, San Joaquin Valley, and Sierra Nevada foothills to northern Los Angeles, Santa Barbara, and Ventura counties at elevations ranging from near sea level to 6,500 feet. Although coast horned lizards prefer sandy loam areas and alkali flats, they can also inhabit exposed gravelly sandy substrates vegetated with scattered shrubs or annual grassland, or clearings in riparian woodlands (Jennings and Hayes 1994).

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) databases confirmed that the entire Habitat Study Area occurs in the known geographic range of the coast horned lizard. Fifteen occurrences of this species have been reported to the CNDDB within 10 miles of the alternatives. The project footprint overlaps one occurrence of the species (Occurrence 582), in the BNSF Alternative in the vicinity of Allensworth (Figure 3-2a, Sheet 4). The individual was observed in 1991 (CDFG 2012a).

Coast horned lizard has been reported in Allensworth ER and Pixley NWR (Occurrences 605, 606, 607, 611, 646, 657), approximately 4 miles east of the BNSF Alternative and in between the BNSF Alternative and the Allensworth Bypass Alternative in the Allensworth ER (Occurrence 646) (CDFG 2012a, Tomlinson 2010, personal communication) (Figure 3-2a, Sheet 4).

During the spring 2010 field surveys, four coast (California) horned lizards were observed in close proximity to the Habitat Study Area in alkali flat areas dominated by alkali desert scrub and annual grassland habitats (Figure 5-4). Coast (California) horned lizard habitat in the core and auxiliary Habitat Study Areas is present in the following CWHR wildlife habitat types: alkali desert scrub, annual grassland, and valley foothill riparian. Within the Habitat Study Area, these natural wildlife habitat types are largely concentrated in the vicinity of Corcoran, Pixley, and west of Bakersfield. Table 5-15 summarizes the total acreage of habitats that may provide suitable foraging habitat for this species.

5.6.1.24 Western Burrowing Owl

Western burrowing owl (*Athene cunicularia*) is a California species of special concern. Burrowing owls range throughout the Central Valley, the inner and outer coastal regions, portions of the San Francisco Bay Area, the California coast from southern California to the Mexican border and the Imperial Valley, and in portions of the desert and high-desert habitats in southeastern and northeastern California. They inhabit areas with low vegetation in agricultural fields, grasslands, and desert communities, and also occur in urban and suburban areas subject to regular human disturbance. Burrowing owls require fossorial mammal burrows, typically those created by California ground squirrels, for escape cover and nesting. However, piles of rock, concrete debris, and other materials are also used in lieu of burrows. The breeding season occurs from February 1 to August 31, and peaks between late April and July in most years.

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) databases confirmed that the year-round range of the western burrowing owl includes the entire San Joaquin Valley, and the

entire Habitat Study Area occurs in the known year-round range of the western burrowing owl. Seventy-seven occurrences of this species have been reported within 10 miles of the alternatives. Six occurrences of this species (Occurrences 41, 78, 603, 847, 850, and 903) have been reported within the project footprint (Figure 3-2a). Occurrence 603 in Allensworth State Historic Park was an active burrow site observed in 2000 along railroad tracks on the west side of SR 43 (CDFG 2012a). Western burrowing owl has also been reported in the Pixley NWR and the Allensworth ER (CDFG 2012a), which are east of the BNSF Alternative (Figure 3-2a, Sheets 3 and 4). Occurrences 41 and 78 were recorded just west of Bakersfield in 1987. Occurrence 847 was recorded in 2009 near the vicinity of the Route 43 and Avenue 96 intersection; active burrows and nesting were recorded at this occurrence (CDFG 2012a). Between 1993 and 2001, as many as 48 burrowing owls were observed in the Pixley NWR in a day (USFWS 2005c). The CDFG has also confirmed the presence of western burrowing owls within the boundaries of the Allensworth ER (Tomlinson 2010, personal communication).

During field survey efforts, 15 burrowing owl sightings, consisting of a combination of a single owl or paired owls, were observed in areas typically dominated by alkali desert scrub and annual grassland habitats. Within the Habitat Study Area, burrowing owls were seen along the BNSF Alternative and the Corcoran Elevated Alternative in the vicinity of Corcoran and the Pixley NWR, and in significant numbers along the entire length of the Allensworth Bypass Alternative (Figure 5-4).

No protocol-level presence/absence surveys were conducted during field survey efforts. Potential burrowing owl habitat in the core and auxiliary Habitat Study Areas is present in the following CWHR wildlife habitat types: alkali desert scrub, annual grassland, barren, pasture, urban, and valley foothill riparian. These wildlife habitat types are present at various locations throughout the Habitat Study Area, where even small, ruderal road-side shoulder habitats or levees could be used for nesting or overwintering as long as small mammal burrows are present. Table 5-15 summarizes the total acreage of habitats that may provide suitable foraging habitat for this species.

5.6.1.25 Other Special-Status Raptor Species

Three special-status raptor species, other than those species previously discussed, are known to occur or have the potential to occur in the core and auxiliary Habitat Study Areas: short-eared owl (*Asio flammeus*), long-eared owl (*Asio otus*), and northern harrier (*Circus cyaneus*). All three are California species of special concern.

Northern harriers are year-round residents of the San Joaquin Valley, breeding and foraging in habitats that provide adequate vegetative cover, an abundance of suitable prey and scattered hunting, plucking, and lookout perches such as shrubs or fence posts. They nest on the ground largely within dense, tall vegetation in undisturbed areas. Harriers feed on a variety of small to medium-sized vertebrates, primarily rodents and passerines. Short-eared owls are winter residents of the San Joaquin Valley, requiring open country with habitat that supports rodents for foraging. Long-eared owls are year-round residents of California outside of the Central Valley floor, nesting in conifer, oak, riparian, pinyon-juniper, and desert woodland that are either open or are adjacent to grasslands, meadows, or shrublands where dense cover for nesting and roosting and open foraging areas are present (California Bird Species of Special Concern 2008).

The year-round range of northern harrier and the winter range of short-eared owl include the entire San Joaquin Valley, and the entire Habitat Study Area occurs in the range of these two species. The year-round range of the long-eared owl is limited to the vicinity of Bakersfield.

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) databases confirmed that the alternative alignments occur in the known geographic range of these raptor species. However, no individual of these species has been observed and reported to the CNDDB within 10 miles of the alternatives (CDFG 2012a).

During the field survey efforts, northern harriers were observed in flight and foraging in the core and auxiliary Habitat Study Areas. They can be expected to forage, nest, summer, and overwinter throughout the Habitat Study Area in areas with suitable habitat. Potential northern harrier habitat in the core and auxiliary Habitat Study Areas could be present in the following CWHR wildlife habitat types: alkali desert scrub, annual grassland, pasture, valley foothill riparian, vineyard, dryland grain crop, irrigated grain crop, irrigated hayfield, and irrigated row and field crop.

Similarly, short-eared owl can be expected to forage and overwinter throughout the project footprint in areas with suitable habitat, while long-eared owl can be expected to forage, nest, summer, and overwinter in the vicinity of Bakersfield in areas with suitable habitat. These species were not observed during the field survey efforts. Potential short-eared owl and long-eared owl habitat in the core and auxiliary Habitat Study Areas could be present in the following CWHR wildlife habitat types: alkali desert scrub, annual grassland, pasture, valley foothill riparian, dryland grain crop, irrigated grain crop, irrigated hayfield, irrigated row and field crop, and crop. These wildlife habitat types are present at various locations throughout the Habitat Study Area and may vary in quality depending on the degree of habitat fragmentation or disturbance, prey-availability, land-use, and whether the lands are natural or developed. Table 5-15 summarizes the total acreage of habitats that may provide suitable foraging habitat for these species.

5.6.1.26 Special-Status Passerine Species

Twelve special-status passerine bird species are known to occur or have the potential to occur in the core and auxiliary Habitat Study Areas: tricolored blackbird, grasshopper sparrow (*Ammodramus savannarum*), oak titmouse (*Baeolophus inornatus*), yellow warbler (*Dendroica petechia brewsteri*), yellow-breasted chat (*Icteria virens*), loggerhead shrike (*Lanius ludovicianus*), Lewis's woodpecker (*Melanerpes lewis*), Nuttall's woodpecker (*Picoides nuttallii*), Oregon vesper sparrow (*Pooecetes gramineus affinis*), purple martin (*Progne subis*), Le Conte's thrasher (*Toxostoma lecontei*), and yellow-headed blackbird. These species have been designated as either federal birds of conservation concern or California species of special concern.

Tricolored blackbird, loggerhead shrike, and Nuttall's woodpecker are year-round residents of the San Joaquin Valley. Yellow-headed blackbird is a summer resident of the San Joaquin Valley and a year-round resident near the town of Allensworth. Yellow-breasted chat is a summer resident in the vicinity of Fresno. Oregon vesper sparrow is a winter resident in the vicinity of Fresno and Bakersfield. Lewis's woodpecker is a winter resident between Fresno and Hanford and in the vicinity of Bakersfield. Le Conte's thrasher is a year-round resident in the vicinity of Bakersfield, while purple martin, grasshopper sparrow, and yellow warbler are summer residents and oak titmouse a winter resident in the vicinity of Bakersfield. Both yellow warbler and purple martin have been largely extirpated from the Central Valley and San Joaquin Valley regions. Most of these passerine species rely heavily on invertebrates such as spiders, grasshoppers, and other insects for a prey base, but they may also forage on seeds and grains. Nest sites vary with species, from ground nests to shrubs and trees to cavity nests. The overlap of these passerine species' summer, winter, and year-round ranges within the Habitat Study Area will vary by season and the availability of suitable habitat.

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) databases confirmed that the alternative alignments occur in the known geographic range of these passerine species. However, only two of these species are tracked or have been reported to the CNDDB within 10 miles of the alternatives (CDFG 2012a): Le Conte's thrasher and tricolored blackbird. One occurrence (considered extant) of Le Conte's thrasher (Occurrence 52) was reported within 10 miles of the alternatives. This occurrence, where an egg set was observed in a nest in 1932, is approximately 9 miles west of the towns of Wasco and Shafter (Figure 3-2a, Sheet 4). Nine occurrences of tricolored blackbird have been reported to the CNDDB within 10 miles of the alternatives. Occurrences 377, 378, and 379 are approximately 0.5 mile east of the BNSF Alternative in the vicinity of the Pixley NWR boundary (Figure 3-2a, Sheet 3); 3 breeding colonies of between 8,000 and 30,000 birds were observed in 2001 (CDFG 2012a). Loggerhead shrike has also been confirmed present within the boundaries of the Allensworth ER by the CDFG (Tomlinson 2010, personal communication).

Of the 12 special-status passerine species discussed here, only yellow-headed blackbird and loggerhead shrike were observed during field survey efforts. Yellow headed blackbirds were observed along the BNSF Alternative in the vicinity of the Pixley NWR. Loggerhead shrike were observed in the vicinity of the Allensworth Bypass and Hanford West Bypass 1 and Hanford West Bypass 2 alternatives. With the exception of the tricolored blackbird, yellow-headed blackbird, and loggerhead shrike, the remaining nine species have a low potential to occur in the Habitat Study Area due to the scarcity of suitable natural habitats such as oak woodlands, seasonal lakes, and freshwater marsh. Of these nine species, several species are likely to be extirpated from the San Joaquin Valley floor due to the conversion of natural lands to agricultural lands, but they may occur in low numbers. In general, suitable foraging, roosting, nesting, overwintering, and oversummering habitat for all 12 special-status passerine bird species in the core and auxiliary Habitat Study Areas could be present in the following CWHR wildlife habitat types: alkali desert scrub, annual grassland, pasture, valley foothill riparian, fresh emergent wetlands, lacustrine, riverine, dryland grain crop, irrigated grain crop, irrigated hayfield, irrigated row and field crop, and crop. These wildlife habitat types are present at various locations throughout the Habitat Study Area and may vary in quality depending on the degree of habitat fragmentation or disturbance, prey-availability, land-use, and whether the lands are natural or developed. Table 5-15 summarizes the total acreage of habitats that may provide suitable foraging habitat for these species.

5.6.1.27 Special-Status Wading Bird, Shorebird, and Duck Species

In addition to the greater sandhill crane, nine special-status wading bird, shorebird, and duck species are known to occur or have the potential to occur in the core and auxiliary Habitat Study Areas: redhead (*Aythya americana*), western snowy plover (*Charadrius alexandrinus nivosus*), mountain plover (*Charadrius montanus*), black tern (*Chlidonias niger*), yellow rail (*Coturnicops noveboracensis*), fulvous whistling duck (*Dendrocygna bicolor*), lesser sandhill crane (*Grus canadensis canadensis*), least bittern (*Ixobrychus exilis*), and long-billed curlew (*Numenius americanus*). These species are either federal birds of conservation concern or California species of special concern. Although the Pacific coast population of western snowy plover (those individuals who nest adjacent to tidal waters of the Pacific Ocean) is federally listed as threatened, western snowy plovers in the San Joaquin Valley constitute a population that nests at inland sites. Therefore, western snowy plovers nesting in the San Joaquin Valley would receive protection as a California species of special concern, but are not considered part of the federally threatened Pacific coast population.

Lesser sandhill crane and long-billed curlew are winter residents of the San Joaquin Valley. Redhead is a year-round resident between Pixley and Wasco, while western snowy plover,

fulvous whistling duck and least bittern are summer residents and mountain plover a winter resident between Pixley and Wasco. Black tern is a summer resident between Allensworth and Wasco. While yellow rail is considered a former winter resident of the San Joaquin Valley, little is known about its historical or current range. Lesser sandhill crane, least bittern, yellow rail, black tern, western snowy plover, and mountain plover all forage on insects, fish, and invertebrates, while redhead and fulvous whistling duck forage on pond weeds, submerged plant matter, and grains. Long billed curlew feeds almost exclusively on invertebrates. Nest sites vary with species, from ground nests on bare soil and low-lying vegetation to those hidden in stands of tules and grasses.

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) databases confirmed that all alternative alignments occur in the known geographic range of wading bird, shorebird, and duck species. Mountain plover (four occurrences) has been observed and reported within 10 miles of the alternatives (CDFG 2012a). The closest occurrence (Occurrence 6) is approximately 1 mile east of the Corcoran Bypass Alternative (Figure 3-2a, Sheet 3). Mountain plovers were observed there from 1982 to 1985 (from 88 to 116 individuals) and in 1987 (43 individuals) in nonmarshy areas of the Creighton Ranch Preserve (CDFG 2012a). The Pixley NWR, which is east of the BNSF Alternative and Allensworth Bypass Alternative provides habitat for wintering mountain plovers. Mountain plover population numbers at the refuge have fluctuated over the years (USFWS 2005c).

Small numbers of lesser sandhill crane have also been observed at the Pixley NWR, overwintering with flocks of greater sandhill crane. During the spring 2010 field survey, redheads were observed in a wetland swale in the auxiliary Habitat Study Area of the BNSF Alternative, and long-billed curlew were observed in ponds near the north end of the Allensworth Bypass Alternative and the BNSF Alternative in the vicinity of the town of Allensworth in the core and auxiliary Habitat Study Areas. A great egret (*Ardea alba*) rookery was observed north of the town of Allensworth in a row of trees bordering a large impoundment, which suggests that other colonial wading birds and shorebirds may establish rookeries within the Habitat Study Area.

Four occurrences of western snowy plover have been documented within 10 miles of the alternatives (Figure 3-2a). The closest (Occurrence 130), from 1987, is of nesting western snowy plovers along Homeland Canal, approximately 2 miles west of the BNSF Alternative (CDFG 2012a). All of the nine special-status wading birds, shorebirds, or duck species discussed in this section have the potential to occur throughout the alternative alignments in the following CWHR wildlife habitat types, which contain suitable habitat: alkali desert scrub, annual grassland, pasture, dryland grain crop, irrigated grain crop, irrigated hayfield, irrigated row and field crop, crop, riverine (drainage ditches and canals), and lacustrine (detention basins and reservoirs). These wildlife habitat types are present at various locations throughout the Habitat Study Area and may vary in quality depending on the degree of habitat fragmentation or disturbance, prey-availability, land-use, and whether the lands and water bodies are natural or developed.

5.6.1.28 Bird Species Protected Under the Migratory Bird Treaty Act

In addition to those special-status bird species previously discussed, all migratory bird species are afforded protection under the Migratory Bird Treaty Act (16 U.S.C. 703-712).

Background Review and Survey Results

Many species of migratory birds were observed throughout the alternative alignments during field survey efforts, including western meadowlark (*Sturnella neglecta*), savannah sparrow (*Passerculus sandwichensis*), red-winged blackbird (*Agelaius phoeniceus*), killdeer (*Charadrius vociferus*), great blue heron (*Ardea Herodias*), black-necked stilt (*Himantopus mexicanus*), white-

faced ibis (*Plegadis chihi*), American coot (*Fulica Americana*), and common raven (*Corvus corax*). Raptor species such as red-tailed hawk, red-shouldered hawk, American kestrel, turkey vulture, great horned owl, and barn owl were also observed in the core and auxiliary Habitat Study Areas during field survey efforts. Nest boxes had been installed along many orchard perimeters to attract raptors such as barn owls and American kestrels that feed on rodents and other crop pests (Figure 5-4). In general, these migratory bird and raptor species may be present in any area that provides suitable nesting or foraging habitat, including urban areas, agricultural lands, and natural lands.

5.6.1.29 Dulzura Pocket Mouse

Dulzura pocket mouse (*Chaetodipus californicus femoralis*), a subspecies of the California pocket mouse (*C. californicus*), is a California species of special concern. California pocket mouse occurs in chaparral (and occasionally desert grassland) communities in the Sierra Nevada, Coast, Transverse, and Peninsular ranges of southern California and northern Baja California, Mexico. The distribution of *C.c. femoralis* spans the United States-Mexico border, and Dulzura pocket mouse is predominantly found in San Diego County, with scattered occurrences in the San Joaquin Valley.

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) databases confirmed that two HST alternatives that run south of the town of Allensworth, the BNSF Alternative and Allensworth Bypass Alternative, occur in the known geographic range of the Dulzura pocket mouse. One occurrence of this species (Occurrence 52) within 10 miles of the alternatives was reported to the CNDDB. This occurrence was approximately 1 mile east of the BNSF Alternative in the Allensworth ER (Figure 3-2b, Sheet 4); one individual was captured over 477 trap nights in October 2002 (CDFG 2012a).

Although this species was not observed during the field survey efforts, small mammal activity that included burrows, freshly excavated soils, fresh scat, and fresh tracks was observed outside of the Habitat Study Area in the vicinity of the Allensworth Bypass Alternative. Additionally, small mammal activity was also identified adjacent to the BNSF Alternative within the Habitat Study Area. The small mammal activity could indicate that Dulzura pocket mouse or other small mammals (including other special-status small mammal species) are present in the area. Potential Dulzura pocket mouse habitat in the core and auxiliary Habitat Study Areas could be present in two CWHR wildlife habitat types: annual grassland and alkali desert scrub. Within the Habitat Study Area, these wildlife habitat types where this species is most likely to occur are largely concentrated in the vicinity of Allensworth. Table 5-15 summarizes the total acreage of habitats that may provide suitable foraging habitat for this species.

5.6.1.30 Tulare Grasshopper Mouse

Tulare grasshopper mouse (*Onychomys torridus tularensis*) is a California species of special concern. The species historically ranged in shrublands and grasslands from Merced County south throughout the San Joaquin Valley (USFWS 1998; CSU Stanislaus 2006). Its decline is attributed mainly to habitat loss, degradation, and fragmentation. Tulare grasshopper mice are known to occur at present in western Kern County. They feed primarily on smaller mammals and insects, nest in ground burrows, and inhabit arid grassland and shrubland communities. These communities include the following:

- Blue oak woodlands at or below 1,476 feet.
- Upper Sonoran subshrub scrub community.

- Alkali sink and mesquite associations on the valley floor.
- Grassland associations on the sloping margins of the San Joaquin Valley (CSU Stanislaus 2006).

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 1988, 2005) databases and of the *Recovery Plan for Upland Species of the San Joaquin Valley* (USFWS 1998) confirmed that the entire Habitat Study Area occurs in the known geographic range of Tulare grasshopper mouse. Four occurrences of this species within 10 miles of the alternatives have been reported to the CNDDB. The closest occurrence (54) is approximately 7 miles southwest of the BNSF Alternative, where in 1999 an individual was captured during surveys in the Buttonwillow Ecological Reserve (CDFG 2012a). Although this species was not observed during field survey efforts, small mammal activity, including active burrows, freshly excavated soils, fresh scat, and fresh tracks, was observed outside of the Habitat Study Area in the vicinity of the Allensworth Bypass Alternative as well as within the Habitat Study Area adjacent to the BNSF Alternative and could indicate Tulare grasshopper mouse activity. Potential Tulare grasshopper mouse habitat could be present in the core and auxiliary Habitat Study Areas in the following CWHR wildlife habitat types: alkali desert scrub, annual grassland, barren, and valley foothill riparian. Within the Habitat Study Area, these wildlife habitat types where this species is most likely to occur are largely concentrated in the vicinity of major riparian corridors and in the vicinity of Hanford, Corcoran, Pixley, Allensworth, and west of Bakersfield. Table 5-15 summarizes the total acreage of habitats that may provide suitable foraging habitat for this species.

5.6.1.31 American Badger

American badger (*Taxidea taxus*) is a California species of special concern. American badgers are fossorial mammals that inhabit open grasslands and generally treeless regions. They burrow in friable soils in habitats with drier open shrubland, open forests, grasslands, savannah, desert, and herbaceous habitats (Larsen 1987; CDFG 2005). Badgers typically occupy home ranges of between 2 acres in winter to 850 acres in summer, and excavate burrows for dens, escape, and predation (foraging). Badgers are carnivorous and feed on mammals such as ground squirrels (*Spermophilus* spp.), pocket gophers (*Thamnomys* spp.), and jackrabbits (*Lepus* spp.), as well as reptiles, insects, amphibians, and carrion.

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) databases confirmed that all alternative alignments occur in the known geographic range of American badger. Nine occurrences of this species within 10 miles of the alternatives have been reported to the CNDDB. Occurrence 255 overlaps the project footprint in the vicinity of the city of Bakersfield (Figure 3-2b, Sheet 5), although the database reports that mapping for this historical occurrence is accurate only within 5 miles. Other records in the vicinity of Occurrence 255 are much more recent, such as Occurrence 420 from 2008, recorded in habitat dominated by nonnative grassland and saltbush scrub (CDFG 2012a). American badgers have also been confirmed present within the boundaries of the Allensworth ER by CDFG (Tomlinson 2010, personal communication).

During the spring 2010 field surveys, two active badger dens were identified based on signs that included scat, claw marks, a musky mustelid scent, and large-mammal burrow dimensions that accord with typical badger dens (i.e., with a diameter typically greater than or equal to 6 inches). Both den sites were detected outside of the Habitat Study Area in the vicinity of the Allensworth Bypass Alternative in two isolated, relatively undisturbed alkali desert scrub habitats characterized by an abundance of small-, medium-, and large-mammal burrow complexes. No

active badger dens were identified within the Habitat Study Area. Potential American badger habitat could be present in the core and auxiliary Habitat Study Areas in the following CWHR wildlife habitat types: alkali desert scrub, annual grassland, barren, pasture, and valley foothill riparian. Within the Habitat Study Area, these wildlife habitat types where this species is most likely to occur are largely concentrated in the vicinity of major riparian corridors and in the vicinity of Hanford, Corcoran, Pixley, Allensworth, and west of Bakersfield. Table 5-15 summarizes the total acreage of habitats that may provide suitable foraging habitat for this species.

5.6.1.32 Special-Status Bat Species

Four special-status bat species, all California species of special concern, are known to occur or have the potential to occur in the core and auxiliary Habitat Study Areas: pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*), western mastiff bat (*Eumops perotis californicus*), and western red bat (*Lasiurus blossevillii*) (CDFG 2005, 2012a).

Pallid bats inhabit low-elevation (6,000 feet), rocky, arid deserts, canyon lands, shrub-steppe grasslands, karst formations, and higher-elevation coniferous forests (greater than 7,000 feet). Pallid bats roost alone, in small groups (2 to 20 bats), or gregariously (greater than 100 individuals). Day and night roosts are typically situated in crevices in rocky outcrops, cliffs, caves, mines, trees such as the bole cavities of oaks, and in or on various human structures, including bridges and barns. Pallid bats typically mate between October and February, and they may take up to 8 months to rear a pup. They forage over open shrub-steppe grasslands, oak savannah grasslands, open Ponderosa pine forests, talus slopes, gravel roads, lava flows, fruit orchards, and vineyards (Sherwin and Rambaldini 2005). Townsend's big-eared bats inhabit a wide variety of habitat types ranging from sea level to 10,800 feet including coniferous forests, deserts, native prairies, riparian communities, active agricultural areas, and coastal zones. Populations are strongly correlated with the presence of caves or cave-like roosting habitat, including man-made structures. This species has been reported to use buildings, bridges, rock crevices, and hollow trees as roost sites. Colonies range in size from a few individuals to several hundred animals. Townsend's big-eared bats typically mate between October and February, and they may take up to 8 months to rear a pup. Foraging associations include edge habitats along streams, adjacent to and in a variety of wooded habitats (Sherwin and Piaggio 2005).

The western mastiff bat is typically present only where there are significant rock features offering suitable roosting habitat. They also roost in human constructions, including buildings and bridges. The species is found in a variety of habitats, including desert scrub, chaparral, oak woodland, and the ponderosa pine belt, and high-elevation meadows of mixed conifer forests. Surveys in California have documented roosts in areas up to 4,600 feet in elevation, as well as foraging animals at more than 8,800 feet (Siders 2005). Roosts are generally high above the ground and may number from a few dozen to several hundred animals. Western mastiff bats begin mating in the late winter or early spring, and they may take up 8 months to rear a pup. In California, western mastiff bats are most frequently encountered in broad open areas. Its foraging habitat includes dry desert washes, floodplains, chaparral, oak woodland, open ponderosa pine forest, grassland, and agricultural areas (Bolster 2005; Siders 2005).

Western red bats primarily inhabit edge habitats adjacent to streams, open fields, orchards, and occasionally urban areas. They commonly roost in trees and shrubs and less frequently in caves. While roosting is generally solitary, they may migrate and forage in groups. Western red bats typically begin mating in late summer or early fall, and they may take up eight months to rear a pup. Western red bats often forage around bright light sources. They also forage in areas that coincide with roost habitats (Bolster 2005).

Background Review and Survey Results

A review of the CNDDB (CDFG 2012a) and CWHR (CDFG 2005) databases confirmed that all alternative alignments occur in the known geographic range of special-status bat species. Only the pallid bat and western mastiff bat have been observed and reported within 10 miles of the alternatives (CDFG 2012a), including one occurrence of pallid bat and seven occurrences of western mastiff bat.

The occurrence of pallid bat (Occurrence 147) is approximately 1.5 miles northeast of the city of Fresno (Figure 3-2b, Sheet 1) where one specimen was collected in 1909. This occurrence is still considered extant (CDFG 2012a). Of the seven western mastiff bat occurrences, Occurrence 164 overlaps the Bakersfield South Alternative (Figure 3-2b, Sheet 5). Including Occurrence 164, five of the western mastiff bat occurrences are historical, ranging from the early 1900s to the 1960s. The exact locations are largely unknown, but are considered extant. Occurrences 46 and 47 are historical occurrences near the city of Fresno, adjacent to the BNSF Alternative (Figure 3-2b, Sheet 1).

Although special-status bat species were not observed during field survey efforts, suitable breeding, foraging, and roosting habitat may be present throughout the core and auxiliary Habitat Study Areas in a number of suitable habitats. The type of CWHR wildlife habitat types that special-status bat species could potentially use differs by species. For the four special-status bat species tracked by the CWHR database with ranges that overlap the alternative alignments, potential suitable habitat could be found in the following CWHR wildlife habitat types:

- Pallid bat: alkali desert scrub, annual grassland, barren, deciduous orchard, dryland grain crops, evergreen orchard, irrigated grain crops, irrigated hayfield, irrigated row and field crops, crop, vineyard, pasture, riverine, urban, and valley foothill riparian.
- Western mastiff bat: alkali desert scrub, annual grassland, barren, deciduous orchard, dryland grain crops, evergreen orchard, fresh emergent wetlands, irrigated grain crops, irrigated hayfield, irrigated row and field crops, vineyard, crop, pasture, urban, and valley foothill riparian.
- Western red bat: annual grassland, fresh emergent wetlands, irrigated hayfield, crop, lacustrine, pasture, riverine, urban, and valley foothill riparian.
- Townsend's big-eared bat: alkali desert scrub, annual grassland, barren, deciduous orchard, evergreen orchard, irrigated grain crops, irrigated hayfield, irrigated row and field crops, vineyard, pasture, riverine, urban, and valley foothill riparian.

Within the Habitat Study Area, these wildlife habitat types where these species are most likely to occur may be concentrated near major riparian corridors, but could be scattered throughout the BNSF alternatives where suitable roost sites and foraging habitat coincide. Table 5-15 summarizes the total acreage of habitats that may provide suitable foraging habitat for this species.

5.6.2 Project Impacts

The construction and operation of the project may result in direct impacts and indirect impacts on special-status wildlife species. The extent and nature of impacts on special-status wildlife species varies depending on the species under consideration, their range, and the type and quality of suitable habitats present.

In general, permanent and temporary direct impacts on special-status wildlife species during construction of the project include mortality or injury, and disturbances to suitable habitats for

special-status wildlife species, including disruption or penetration of the underlying hardpan soils (in vernal pool areas); water pollution; amphibian breeding pool disturbance; and reptile, bird, and mammal burrow or nest disturbance. These habitat disturbances could lead to the permanent or temporary abandonment of these habitats by special-status species, a disruption in the life cycle of these species, or mortality or injury of these species. Because it is difficult to determine the number or extent of these kinds of impacts, direct impacts on special-status wildlife species are based on the amount of suitable habitat that would be permanently or temporarily impacted by project construction activities.

Table 5-16 provides a summary of the permanent and temporary direct impacts from construction based on the amount of suitable habitat that will be disturbed for each special-status wildlife species. As summarized in Chapter 5.0, Impacts and Mitigation, the "Difference Compared to Corresponding BNSF Area" in Table 5-16 represents the difference in impact acreages between an alternative alignment and its corresponding segment in the BNSF Alternative: positive (+) differences indicate that the alternative alignment results in a greater number of acres impacted than its corresponding segment in the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in fewer impacted acres than its corresponding segment in the BNSF Alternative.

Table 5-16
Comparison of Impacts on Special-Status Wildlife Species by Alternative

Special-Status Wildlife Species (Common Name / Scientific Name / Status)	CWHR Vegetation Community or Wildlife Association	Impact Type	High-Speed Train Alternatives										
			BNSF Impact Acreage	Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
				Impact Acreage / Difference Compared to Corresponding BNSF Area[a]									
Federally and State Listed Species													
Vernal pool fairy shrimp (*Branchinecta lynchi*) FT	Vernal pools/seasonal wetlands	Permanent	37.30	0.01 / +0.01	0.01 / +0.01	—	—	5.89 / -1.14	1.62 / -5.42	7.38 / -20.38	—	0.01 / -0.11	0.01 / -0.12
		Temporary	*0.82*	—	—	—	—	—	—	*— / -0.16*	—	—	—
		Indirect	78.89	0.44 / +0.44	0.44 / +0.44	0.76 / +0.76	0.76 / +0.76	3.92 / +1.14	1.68 / -1.09	22.33 / -43.60	—	0.55 / -0.08	0.50 / -0.13
Valley elderberry longhorn beetle *(Desmocerus californicus dimorphus)* FT	Elderberry shrubs (*Sambucus* spp.)	Permanent	1	(P) —	(P) —	(P) —	(P) —	(P) —	(P) —	(P) —	(P) —	(P) —	(P) —
		Temporary	—	*(P) —*	*(P) —*	*(P) —*	*(P) —*	*(P) —*	*(P) —*	*(P) —*	*(P) —*	*(P) —*	*(P) —*
Vernal pool tadpole shrimp (*Lepidurus packardi*) FE	Vernal pools/seasonal wetlands	Permanent	37.30	0.01 / +0.01	0.01 / +0.01	—	—	5.89 / -1.14	1.62 / -5.42	7.38 / -20.38	—	0.01 / -0.11	0.01 / -0.12
		Temporary	*0.82*	—	—	—	—	—	—	*— / -0.16*	—	—	—
		Indirect	78.89	0.44 / +0.44	0.44 / +0.44	0.76 / +0.76	0.76 / +0.76	3.92 / +1.14	1.68 / -1.09	22.33 / -43.60	—	0.55 / -0.08	0.50 / -0.13
California tiger salamander (*Ambystoma californiense*) FT, ST	Aquatic: vernal pools/seasonal wetlands in Corcoran Irrigation Water District	Permanent	—	—	—	—	—	—	—	— [c]	— [c]	— [c]	— [c]
		Temporary	—	—	—	—	—	—	—	— [c]	— [c]	— [c]	— [c]

Table 5-16
Comparison of Impacts on Special-Status Wildlife Species by Alternative

Special-Status Wildlife Species (Common Name / Scientific Name / Status)	CWHR Vegetation Community or Wildlife Association	Impact Type	High-Speed Train Alternatives										
			BNSF Impact Acreage	Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
				Impact Acreage / Difference Compared to Corresponding BNSF Area[a]									
California tiger salamander *(cont'd.)*	UPLAND: ASC, AGS, PAS, VOW surrounding vernal pools/seasonal wetlands in Corcoran Irrigation Water District	Permanent	0.34	— / -0.33	— / -0.33	4.32 / +3.99	4.32 / +3.99	1.17 / +1.16	1.17 / +1.16	—[c]	—[c]	—[c]	—[c]
		Temporary	—	—	—	—	—	—	—	—[c]	—[c]	—[c]	—[c]
Blunt-nosed leopard lizard (*Gambelia* [=*Crotaphytus*] *sila*) FE, SE/FP	ASC, AGS, BAR, VRI	Permanent	98.05	—[c]	—[c]	—[c]	—[c]	—[c]	—[c]	26.20 / -71.85	—[c]	—[c]	—[c]
		Temporary	—	—[c]	—[c]	—[c]	—[c]	—[c]	—[c]	*1.40 / +1.40*	—[c]	—[c]	—[c]
Golden eagle (*Aquila chrysaetos*) FP	ASC, AGS, BAR, CRP, FEW, IRH, PAS, URB, VRI, VOW	Permanent	2199.10	506.75 / +100.93	454.37 / +48.55	514.64 / +108.82	462.25 / +56.43	215.13 / -23.34	196.64 / -41.83	222.38 / -33.24	297.38 / -117.87	252.13 / -61.41	252.74 / -60.80
		Temporary	*1083.28*	*31.40 / -312.53*	*27.22 / -316.71*	*108.90 / -235.03*	*104.73 / -239.2*	*200.22 / +22.92*	*207.06 / +29.76*	*78.51 / +35.19*	*66.44 / -45.83*	*271.23 / +5.74*	*288.33 / +22.84*
Swainson's hawk (*Buteo swainsoni*) ST	AGS, BAR, CRP, IRH, PAS, URB, VRI, VOW	Permanent	2152.18	506.75 / +100.93	454.37 / +48.55	514.64 / +108.82	462.25 / +56.43	215.13 / -23.34	196.64 / -41.83	214.91 / -1.27	297.38 / -117.87	243.72 / -62.33	245.63 / -60.42
		Temporary	*1080.51*	*31.40 / -312.53*	*27.22 / -316.71*	*108.90 / -235.03*	*104.73 / -239.20*	*200.22 / +22.92*	*207.06 / +29.76*	*78.51 / +35.19*	*66.44 / -45.83*	*268.48 / +5.76*	*284.29 / +21.57*

Table 5-16
Comparison of Impacts on Special-Status Wildlife Species by Alternative

Special-Status Wildlife Species (Common Name / Scientific Name / Status)	CWHR Vegetation Community or Wildlife Association	Impact Type	High-Speed Train Alternatives										
			BNSF Impact Acreage	Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
				Impact Acreage / Difference Compared to Corresponding BNSF Area[a]									
Western snowy plover (*Charadrius alexandrinus nivosus*) FT, CSC	LAC	Permanent	27.50	0.10 / +0.10	0.10 / +0.10	0.07 / +0.07	0.07 / +0.07	4.00 / -0.78	3.64 / -1.14	16.40 / -3.84	0.16 / -1.39	—	—
		Temporary	*3.14*	—	—	—	—	—	*3.55 / +3.55*	*2.45 / +1.14*	*0.67 / -1.16*	—	—
White-tailed kite (*Elanus leucurus*) FP	ASC, AGS, CRP, BAR, DOR, DGR, EOR, FEW, IRH, IRF, IGR, URB, VRI, VIN, VOW	Permanent	3879.57	904.62 / -114.47	853.58 / -165.51	882.89 / -136.20	831.85 / -187.24	253.86 / -133.69	271.50 / -116.04	447.20 / -86.64	629.39 / -148.95	251.62 / -61.10	252.22 / -60.49
		Temporary	*2004.00*	*71.32 / -418.03*	*67.17 / -422.18*	*161.78 / -327.58*	*157.63 / -331.73*	*357.21 / +23.03*	*368.20 / +34.02*	*152.18 / +12.41*	*347.04 / -285.10*	*270.91 / +5.67*	*288.02 / +22.77*
American peregrine falcon (*Falco peregrinus anatum*) Delisted, SE/FP	AGS, BAR, CRP, FEW, IGR, IRH, LAC, RIV, URB, VRI, VOW	Permanent	2576.31	673.73 / +47.51	620.71 / -5.51	648.68 / +22.46	595.66 / -30.56	257.33 / -125.84	221.45 / -161.73	274.21 / +16.96	349.13 / -85.02	248.87 / -62.18	250.94 / -60.10
		Temporary	*1142.52*	*32.20 / -361.65*	*28.02 / -365.83*	*115.44 / -278.41*	*111.26 / -282.59*	*202.43 / +23.04*	*215.82 / +36.43*	*81.50 / +36.85*	*67.87 / -47.28*	*270.77 / +4.59*	*287.50 / +21.31*
Greater sandhill crane (*Grus Canadensis tabida*) ST/FP	AGS, DGR, CRP, FEW, IGR, IRH, IRF, LAC, VRI	Permanent	1341.97	484.08 / -73.46	477.70 / -79.83	465.04 / -92.50	458.67 / -98.87	114.14 / -118.52	145.26 / -87.40	261.34 / +61.59	249.37 / +107.44	10.43 / +1.28	7.94 / -1.22
		Temporary	*574.24*	*20.48 / -270.72*	*16.11 / -275.09*	*101.29 / -189.91*	*96.93 / -194.27*	*161.88 / -0.49*	*195.59 / +33.21*	*80.79 / +41.72*	*27.09 / +9.51*	*34.46 / -3.61*	*36.89 / -1.18*

Table 5-16
Comparison of Impacts on Special-Status Wildlife Species by Alternative

Special-Status Wildlife Species (Common Name / Scientific Name / Status)	CWHR Vegetation Community or Wildlife Association	Impact Type	BNSF Impact Acreage	High-Speed Train Alternatives									
				Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
				Impact Acreage / Difference Compared to Corresponding BNSF Area[a]									
Bald eagle (*Haliaeetus leucocephalus*) Delisted, SE/FP	AGS, BAR, FEW, LAC, RIV, VRI, VOW	Permanent	352.82	67.37 / +48.16	65.68 / +46.46	73.01 / +53.80	71.32 / +52.11	49.08 / +0.02	57.47 / +8.41	105.39 / -33.31	22.33 / -23.58	20.63 / +2.95	18.47 / +0.79
		Temporary	*307.29*	*2.11 / -84.50*	*2.11 / -84.50*	*4.30 / -82.31*	*4.30 / -82.31*	*15.44 / +13.33*	*6.49 / +4.38*	*6.78 / +3.83*	*2.37 / -1.52*	*198.15 / -5.22*	*201.30 / -2.07*
Nelson's (= San Joaquin) antelope squirrel (*Ammospermophilus nelsoni*) ST	ASC, AGS, BAR, PAS	Permanent	173.10	— [c]	— [c]	— [c]	— [c]	— [c]	— [c]	53.62 / -60.29	18.93 / -20.34	23.42 / +3.49	19.80 / -0.13
		Temporary	*203.56*	*— [c]*	*— [c]*	*— [c]*	*— [c]*	*— [c]*	*— [c]*	*1.27 / +1.27*	*1.04 / +0.03*	*198.26 / -4.29*	*201.78 / -0.77*
Ringtail (*Bassariscus astutus*)	AGS, RIV, VRI	Permanent	0.12	— [c]	— [c]	— [c]	— [c]	— [c]	— [c]	— [c]	— [c]	0.46 / +0.34	0.46 / +0.34
		Temporary	*0.12*	*— [c]*	*— [c]*	*— [c]*	*— [c]*	*— [c]*	*— [c]*	*— [c]*	*— [c]*	*0.34 / +0.22*	*0.36 / +0.24*
Fresno kangaroo rat (*Dipodomys nitratoides exilis*) FE, SE	ASC, AGS, BAR, PAS, VOW	Permanent	25.60	2.60 / +2.60	2.60 / +2.60	2.60 / +2.60	2.60 / +2.06	— [c]	— [c]	— [c]	— [c]	— [c]	— [c]
		Temporary	*4.79*	*— / -4.49*	*— / -4.49*	*— / -4.49*	*— / -4.49*	*— [c]*	*— [c]*	*— [c]*	*— [c]*	*— [c]*	*— [c]*
Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*) FE, SE	ASC, AGS, BAR, PAS, VOW	Permanent	239.84	— [c]	— [c]	— [c]	— [c]	— [c]	— [c]	90.74 / -64.20	18.93 / -20.34	23.42 / +3.49	19.80 / -0.13
		Temporary	*205.53*	*— [c]*	*— [c]*	*— [c]*	*— [c]*	*— [c]*	*— [c]*	*4.07 / +2.48*	*1.04 / +0.03*	*198.26 / -4.29*	*201.78 / -0.77*

Table 5-16
Comparison of Impacts on Special-Status Wildlife Species by Alternative

Special-Status Wildlife Species (Common Name / Scientific Name / Status)	CWHR Vegetation Community or Wildlife Association	Impact Type	BNSF Impact Acreage	High-Speed Train Alternatives										
				Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
				Impact Acreage / Difference Compared to Corresponding BNSF Area[a]									
San Joaquin kit fox (*Vulpes macrotis mutica*) FE, ST	ASC, AGS, BAR, PAS, VOW	Permanent	348.49	54.45 / +37.91	57.71 / +41.17	59.54 / +43.00	62.79 / +46.25	35.22 / +5.60	47.49 / +17.87	90.74 / -64.20	18.93 / -20.34	23.42 / +3.49	19.80 / -0.13
		Temporary	*302.67*	*0.31 / -91.16*	*0.31 / -91.16*	*2.40 / -89.07*	*2.40 / -89.07*	*13.34 / +13.33*	*0.11 / +0.10*	*4.07 / +2.48*	*1.04 / +0.03*	*198.26 / -4.29*	*201.78 / -0.77*
	URB (Bakersfield)	Permanent	267.12	—	—	—	—	—	—	—	0.26 / 0.00	202.62 / -64.24	206.49 / -60.37
		Temporary	*61.76*	—	—	—	—	—	—	—	—	*70.98 / +9.22*	*84.79 / +23.03*
Other Special-Status Species													
Kern brook lamprey (*Lampetra hubbsi*) CSC	Friant-Kern Canal (Bakersfield)	Permanent	0.06	—	—	—	—	—	—	—	—	0.33 / +0.27	0.25 / +0.19
		Temporary	*0.11*	—	—	—	—	—	—	—	—	*— / -0.11*	*0.08 / -0.03*
Western spadefoot toad (*Spea [=Scaphiopus] hammondii*) CSC	ASC, AGS, FEW, RIV, VOW	Permanent	308.04	58.57 / +45.31	61.15 / +47.88	58.86 / +45.59	61.43 / +48.16	33.96 / -2.84	49.74 / +12.95	95.49 / -61.25	20.74 / -3.35	19.62 / +1.75	16.75 / -1.12
		Temporary	*51.20*	*0.62 / -0.18*	*0.62 / -0.18*	*2.86 / +2.06*	*2.86 / +2.06*	*2.45 / +0.36*	*2.47 / +0.38*	*4.16 / +2.55*	*1.09 / +0.10*	*36.48 / -2.77*	*40.29 / +1.03*
Western pond turtle (Actinemys [=*Clemmys/Emys*] *marmorata*) CSC	AGS, FEW, LAC, PAS, RIV, URB, VRI, VOW	Permanent	1653.2	265.22 / +70.05	217.09 / +21.92	253.55 / +58.38	205.42 / +10.25	165.79 / -15.57	140.98 / -40.38	131.94 / -80.21	170.11 / -148.79	242.64 / -64.29	244.93 / -62.01
		Temporary	*391.99*	*13.38 / -15.17*	*13.57 / -14.98*	*25.42 / -3.12*	*25.62 / -2.93*	*27.92 / +10.91*	*25.35 / +8.34*	*7.41 / -1.10*	*44.48 / -68.41*	*108.52 / +6.26*	*125.03 / +22.76*

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Special-Status Wildlife Species (Common Name / Scientific Name / Status)	CWHR Vegetation Community or Wildlife Association	Impact Type	High-Speed Train Alternatives										
			BNSF Impact Acreage	Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
				Impact Acreage / Difference Compared to Corresponding BNSF Area[a]									
Silvery legless lizard (*Anniella pulchra pulchra*) CSC	VRI, VOW	Permanent	4.81	6.44 / +3.21	2.36 / -0.86	6.44 / +3.21	2.36 / -0.86	0.31 / -0.01	0.20 / -0.12	0.28 / -0.86	—	0.46 / +0.34	0.46 / +0.34
		Temporary	*0.19*	*1.44 / +1.42*	*1.44 / +1.42*	*1.44 / +1.42*	*1.44 / +1.42*	—	*0.46 / +0.46*	*0.18 / +0.14*	—	*0.34 / +0.22*	*0.36 / +0.24*
San Joaquin whipsnake (*Masticophis flagellum ruddocki*) CSC	ASC, AGS, PAS, VRI, VOW	Permanent	298.57	59.07 / +41.14	58.25 / +40.33	58.76 / +40.84	57.95 / +40.02	24.71 / +1.94	43.8 / +21.02	91.03 / -65.06	18.93 / -1.53	17.13 / +2.02	13.72 / -1.39
		Temporary	*52.02*	*1.71 / -4.01*	*1.71 / -4.01*	*3.84 / -1.88*	*3.84 / -1.88*	*0.36 / +0.36*	*0.58 / +0.58*	*4.25 / +2.63*	*1.04 / +0.07*	*36.03 / -2.47*	*39.35 / +0.85*
Coast (California) horned lizard (*Phrynosoma coronatum frontale*) CSC	ASC, AGS, VRI, VOW	Permanent	205.11	— / -0.33	— / -0.33	3.45 / +3.12	3.45 / +3.12	24.71 / +2.11	41.56 / +18.96	90.84 / -58.67	—[c]	2.50 / +2.37	0.39 / +0.26
		Temporary	*25.64*	—	—	—	—	*0.36 / +0.36*	*0.58 / +0.58*	*4.12 / +2.49*	—[c]	*21.85 / -1.77*	*23.87 / +0.25*
Western burrowing owl (*Athene cunicularia*) CSC	ASC, AGS, PAS, BAR, URB, VOW	Permanent	1667.73	243.77 / +61.77	201.20 / +19.2	241.90 / +59.91	199.33 / +17.34	162.75 / -6.17	132.66 / -36.26	117.29 / -106.06	166.70 / -164.37	251.66 / -61.63	252.27 / -61.02
		Temporary	*632.28*	*11.53 / -102.27*	*11.72 / -102.08*	*23.42 / -90.37*	*23.61 / -90.18*	*38.81 / +23.88*	*18.98 / +4.05*	*4.70 / -2.45*	*43.14 / -66.90*	*270.89 / +5.52*	*287.97 / +22.61*
SPECIAL-STATUS RAPTOR SPECIES	ASC, AGS, CRP, PAS, VRI, DGR, IGR, IRH, IRF, VOW	Permanent	1392.48	493.90 / -75.10	487.11 / -81.89	469.91 / -99.09	463.12 / -105.88	110.14 / -117.92	143.86 / -84.20	251.06 / +27.07	247.78 / +108.87	17.13 / +2.02	13.72 / -1.39
		Temporary	*575.12*	*20.58 / -276.01*	*16.21 / -280.38*	*101.39 / -195.20*	*97.03 / -199.57*	*161.88 / -0.49*	*192.04 / +29.66*	*78.34 / +40.58*	*25.81 / +11.09*	*36.03 / -2.47*	*39.35 / +0.85*

Table 5-16
Comparison of Impacts on Special-Status Wildlife Species by Alternative

Special-Status Wildlife Species (Common Name / Scientific Name / Status)	CWHR Vegetation Community or Wildlife Association	Impact Type	High-Speed Train Alternatives										
			BNSF Impact Acreage	Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
				Impact Acreage / Difference Compared to Corresponding BNSF Area[a]									
SPECIAL-STATUS PASSERINE SPECIES	ASC, AGS, CRP, PAS, VRI, FEW, LAC, RIV, DGR, IGR, IRH, IRF, VOW	Permanent	1474.67	510.74 / -70.05	502.47 / -78.33	482.33 / -98.46	474.06 / -106.74	123.69 / -123.66	155.88 / -91.47	272.21 / +21.14	251.18 / +105.63	22.80 / +1.87	19.55 / -1.38
		Temporary	*588.25*	*21.03 / -276.07*	*16.67 / -280.43*	*101.96 / -195.14*	*97.59 / -199.51*	*163.98 / -0.49*	*197.95 / +33.48*	*80.87 / +41.79*	*27.14 / +9.55*	*38.63 / -3.58*	*42.87 / +0.66*
SPECIAL-STATUS WADING BIRDS, SHOREBIRDS, AND DUCK SPECIES	ASC, AGS, CRP, PAS, DGR, IGR, IRH, IRF, RIV, FEW, LAC	Permanent	1469.87	504.31 / -73.27	500.10 / -77.47	475.90 / -101.68	471.69 / -105.88	123.38 / -123.65	155.68 / -91.35	271.92 / +22	251.18 / +105.63	22.34 / +1.53	19.09 / -1.72
		Temporary	*588.06*	*19.59 / -277.48*	*15.23 / -281.85*	*100.51 / -196.56*	*96.15 / -200.93*	*163.98 / -0.49*	*197.48 / +33.02*	*80.69 / +41.64*	*27.14 / +9.55*	*38.29 / -3.80*	*42.51 / +0.43*
Pallid bat (*Antrozous pallidus*) CSC	ASC, AGS, BAR, CRP, DGR, IGR, IRH, IRF, PAS, RIV, URB, VRI, VIN, VOW	Permanent	2923.97	710.94 / -121.61	657.03 / -175.52	664.80 / -167.75	610.88 / -221.67	213.10 / -139.35	229.10 / -123.34	346.47 / +35.53	397.64 / -7.16	229.95 / -60.54	230.74 / -59.75
		Temporary	*1256.5*	*24.14 / -415.38*	*19.96 / -419.56*	*110.00 / -329.52*	*105.82 / -333.69*	*200.44 / +21.62*	*212.53 / +33.70*	*148.13 / +31.56*	*59.17 / -55.28*	*270.70 / +5.14*	*288.55 / +22.99*
Dulzura pocket mouse (*Chaetodipus californicus femoralis*) CSC	AGS, VOW	Permanent	61.26	—[c]	—[c]	—[c]	—[c]	—[c]	—[c]	38.41 / -22.85	—[c]	—[c]	
		Temporary	—	—[c]	—[c]	—[c]	—[c]	—[c]	—[c]	*1.27 / +1.27*	—[c]	—[c]	

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Special-Status Wildlife Species (Common Name / Scientific Name / Status)	CWHR Vegetation Community or Wildlife Association	Impact Type	High-Speed Train Alternatives										
			BNSF Impact Acreage	Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
				Impact Acreage / Difference Compared to Corresponding BNSF Area[a]									
Townsend's big-eared bat (*Corynorhinus townsendii*) CSC	ASC, AGS, BAR, CRP, IGR, IRH, IRF, PAS, VRI, URB, VIN RIV, VOW	Permanent	3108.04	720.09 / -93.19	667.03 / -146.25	690.14 / -123.13	637.08 / -176.19	253.33 / -125.24	233.82 / -144.76	328.71 / +21.07	397.46 / -81.91	255.57 / -61.43	256.72 / -60.28
		Temporary	*1280.91*	*32.3 / -414.85*	*28.12 / -419.02*	*122.98 / -324.17*	*118.8 / -328.34*	*202.43 / +23.04*	*212.97 / +33.57*	*148.13 / +31.08*	*67.77 / -58.28*	*272.34 / +5.73*	*289.95 / +23.34*
Western mastiff bat (*Eumops perotis californicus*) CSC	ASC, AGS, BAR, CRP, FEW, IGR, IRH, IRF, PAS, URB, VRI, VIN, VOW	Permanent	1105.09	— / -90.52	— / -90.52	— / -90.52	— / -90.52	— [c]	— [c]	— [c]	145.56 / +10.04	252.13 / -61.41	252.74 / -60.80
		Temporary	*426.59*	*— / -3.74*	*— / -3.74*	*— / -3.74*	*— / -3.74*	*— [c]*	*— [c]*	*— [c]*	*52.37 / +36.35*	*271.23 / +5.74*	*288.33 / +22.84*
Western red bat (*Lasiurus blossevillii*) CSC	AGS, FEW, IRH, LAC, PAS, RIV, URB, VOW, VRI	Permanent	1922.53	454.52 / +132.87	405.51 / +83.86	454.32 / +132.67	405.31 / +83.65	202.40 / -23.49	204.76 / -21.13	205.83 / -29.87	200.42 / -146.47	242.64 / -64.29	244.93 / -62.01
		Temporary	*459.89*	*31.23 / -39.50*	*27.33 / -43.40*	*108.97 / +38.24*	*105.07 / +34.34*	*51.64 / +10.03*	*76.00 / +34.39*	*8.61 / +0.10*	*44.48 / -69.52*	*108.52 / +6.26*	*125.03 / +22.76*
Tulare grasshopper mouse (*Onychomys torridus tularensis*) CSC	ASC, AGS, VRI	Permanent	262.69	48.71 / +43.13	48.50 / +42.92	53.38 / +47.80	53.17 / +47.59	24.71 / +2.11	41.56 / +18.96	91.03 / -60.02	18.93 / -1.53	16.62 / +2.33	13.21 / -1.08
		Temporary	*46.08*	*1.61 / +1.28*	*1.61 / +1.28*	*3.74 / +3.42*	*3.74 / +3.42*	*0.36 / +0.36*	*0.58 / +0.58*	*4.25 / +2.63*	*1.04 / +0.07*	*35.71 / -2.54*	*39.03 / +0.78*
American badger (*Taxidea taxus*) CSC	ASC, AGS, BAR, PAS, VRI, VOW	Permanent	353.30	60.89 / +41.13	60.07 / +40.31	65.97 / +46.21	65.16 / +45.39	35.53 / +5.59	47.69 / +17.75	91.03 / -65.06	18.93 / -20.34	23.88 / +3.83	20.25 / +0.21
		Temporary	*302.86*	*1.75 / -89.74*	*1.75 / -89.74*	*3.84 / -87.66*	*3.84 / -87.66*	*13.34 / +13.33*	*0.58 / +0.56*	*4.25 / +2.63*	*1.04 / +0.03*	*198.60 / -4.07*	*202.14 / -0.53*

Table 5-16
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Special-Status Wildlife Species (Common Name / Scientific Name / Status)	CWHR Vegetation Community or Wildlife Association	Impact Type	High-Speed Train Alternatives										
			BNSF Impact Acreage	Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
				Impact Acreage / Difference Compared to Corresponding BNSF Area[a]									

Notes:

— = No impact or not applicable (e.g., alterative does not overlap species range)

(P) = Impacts could occur, elderberry shrubs have not been identified but could occur in natural areas where permission to enter was not available.

Impact calculations in this table include alignment alternatives and station alternatives, but do not include HMF alternatives.

All impacts were calculated based on 15% engineering design project footprint.

[a] The "Difference Compared to Corresponding BNSF Area" represents the difference in impact acreages between an alternative alignment and its corresponding segment in the BNSF Alternative: positive (+) differences indicate that the alternative alignment results in greater impact acres than its corresponding segment in the BNSF Alternative; negative (-) differences indicate that the alternative alignment results in fewer impact acres than its corresponding segment in the BNSF Alternative.

[b] Represents the number of locations where elderberry shrubs may be removed.

[c] Alternative does not overlap species range.

Impacts on all special-status wildlife species are based on the CWHR determinations of habitats and range, except as follows:

{vernal pool tadpole shrimp and vernal pool fairy shrimp} Disturbances based on vernal pools/seasonal wetlands in the Wetland Study Area. Indirect impacts are calculated within a 250-foot buffer of the project footprint, which includes areas of permanent and temporary impacts.

{elderberry longhorn beetle} Data presented as number of identified elderberry shrubs within Plant Study Area.

{California tiger salamander} Potential aquatic habitat limited to the Corcoran Irrigation Water District; potential upland habitat determined by identifying associated vegetation communities within a 1.24-mile radius of potential aquatic habitat.

{Fresno kangaroo rat} Range limited to the San Joaquin and Kings rivers based on distribution data provided by Brian Cypher, ESRP (Cypher 2010b, personal communication) and areas potentially suitable to support this species within that range.

{Tipton kangaroo rat} Range data taken from the Endangered Species Recovery Program distribution data. *Tipton Kangaroo Rat* (Dipodomys nitratoides nitratoides) *5-Year Review: Summary and Evaluation* (USFWS 2010)

{San Joaquin kit fox} Disturbances are provided separately for urban communities in the vicinity of Bakersfield. Range is based on CWHR.

{Kern brook lamprey} Impacts are based on disturbances to the Friant-Kern Canal in Bakersfield.

{silvery legless lizard} Potential habitat determined to be all VRI habitat in the Habitat Study Area.
{coast horned lizard } The coast horned lizard was observed in the Allensworth Bypass Alternative during the 2010 field surveys; due to these observations, the species' range has been extended beyond the range map provided by the CWHR to include both the Corcoran Bypass and Allensworth Bypass alternatives because of the presence of natural habitat areas in these alternatives.

Table 5-16
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			BNSF Impact Acreage	Hanford West Bypass 1—At-Grade Option	Hanford West Bypass 1—Below-Grade Option	Hanford West Bypass 2—At-Grade Option	Hanford West Bypass 2—Below-Grade Option	Corcoran Elevated	Corcoran Bypass	Allensworth Bypass	Wasco-Shafter Bypass	Bakersfield South	Bakersfield Hybrid
				Impact Acreage / Difference Compared to Corresponding BNSF Area[a]									

Acronyms and Abbreviations:

AGS: Annual grassland (includes vernal pools)
ASC: Alkali desert scrub (includes vernal pools)
BAR: Barren
CRP: Cropland
DGR: Dryland grain crops
DOR: Deciduous orchard
EOR: Evergreen orchard
FEW: Fresh emergent wetland
IGR: Irrigated grain crops
IRF: Irrigated row and field crops
IRH: Irrigated hayfield
LAC: Lacustrine
PAS: Pasture
VRI: Valley foothill riparian

Federal Status
FE – Endangered
FT – Threatened
CH – Critical Habitat designated by the U.S. Fish and Wildlife Service
BCC – Birds of Conservation Concern designated by the U.S. Fish and Wildlife Service

State Status
SE – Endangered
ST – Threatened
CSC – California Species of Special Concern designated by the California Department of Fish and Game
FP – Fully Protected species designated by the California Department of Fish and Game

BNSF = BNSF Railway
CWHR = California Wildlife Habitat Relationship System

Permanent and temporary indirect impacts on special-status wildlife species would occur through construction of the HST in a number of ways depending on the species and type of disturbance. Potential indirect impacts include erosion, soil compaction, increased siltation and sedimentation, fractures in the hardpan soils, alteration of jurisdictional water hydrology, dust aerosolization, host plant stress, destruction of native vegetation, habitat fragmentation, and noise and light pollution. These indirect impacts could lead to the disturbance of special-status wildlife species such as a temporary shift in foraging patterns or territories, refugia abandonment, increased predation, decreased reproductive success, and reduced population viability. Because it is difficult to quantify and measure these kinds of impacts, indirect impacts on special-status wildlife species are described qualitatively.

Construction of the station alternatives should only result in mostly minimal impacts on special-status wildlife species, because only a limited amount of marginal habitat for special-status wildlife species would be impacted by this activity. All stations except the Fresno Station–Mariposa Alternative would impact only barren, urban, or agricultural areas and thus construction would potentially impact only the special-status wildlife species that use urban areas in Fresno or Bakersfield, or that are known to use agricultural areas (e.g., special-status bird species, special-status mammal species, special-status bat species). The Fresno Station–Mariposa Alternative would additionally impact 0.40 acres of annual grassland; however, the habitat is marginal and impacts would likely be minimal.

Table 5-17 and Table 5-4 summarize the terrestrial and aquatic habitat types (e.g., agricultural land, annual grassland, pasture, vernal pools) that would be impacted if the HMF were constructed on one of site alternatives within the Fresno to Bakersfield Section. These areas, which may be suitable for special-status wildlife species (e.g., vernal pool branchiopods, amphibians, reptiles, birds, mammals), would be disturbed and special-status wildlife species that use these habitats could be impacted. Also, if the Fresno HMF is selected, mature trees would be removed that could impact special-status wildlife species that inhabit trees (e.g. special-status bird species).

During operation of the train, maintenance activities requiring ground disturbance, clearing, or grubbing could cause erosion and sedimentation that could indirectly affect the hydrology of nearby jurisdictional waters and the species that depend on these resources. Chemical runoff from trucks or equipment along the primary right-of-way could indirectly degrade suitable habitat used by these species that are present adjacent to the rail. If operational maintenance requires weed abatement activities, such as the use of herbicides, these activities could also contribute to chemical runoff and pollution of adjacent suitable habitats. However, maintenance activities that have potential impacts on special-status wildlife species are limited to the at-grade portion of the project footprint.

Impacts on special-status wildlife species are discussed by species-specific guilds below.

Table 5-17
Terrestrial Communities Potentially Affected by the Heavy Maintenance Facility Alternatives (acres): Permanent Impacts

Heavy Maintenance Facility Alternative	Developed Areas		Agricultural Lands	Annual Grassland	Valley Foothill Riparian	Alkali Desert Scrub	Pasture
	Barren	Urban					
Impact Acreage							
Fresno Works–Fresno	—	194.85	316.36	—	—	—	68.28
Kings County–Hanford	—	28.67	454.82	—	—	—	26.40
Kern Council of Governments–Wasco	—	18.03	396.81	—	—	—	—
Kern Council of Governments–Shafter East	—	10.22	483.26	0.04	—	—	—
Kern Council of Governments–Shafter West	—	27.85	448.44	—	—	—	—

Notes:
— = No impact or not applicable
All impacts were calculated based on the 15% engineering design project footprint.

5.6.2.1 Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

Impacts to vernal pool fairy shrimp or vernal pool tadpole shrimp would not occur in areas where suitable habitat is not present or in areas located outside of the species' known geographic range. However, as a direct result of the construction of the project, individual vernal pool tadpole shrimp and vernal pool fairy shrimp may be disturbed, injured, or killed in suitable aquatic habitats (e.g. vernal pools, seasonal wetlands, and swales) when the waters and underlying hardpan soils of these habitats are disturbed, penetrated, filled, polluted, or otherwise destroyed or degraded by construction equipment, siltation and sedimentation. Construction equipment traveling off road in suitable aquatic habitats could create tire ruts, erosion, soil compaction, increased siltation, fractures in the hardpan soils, destruction of native vegetation, and alteration of pool hydrology that could affect the vernal pool tadpole shrimp and vernal pool fairy shrimp where suitable habitats are present.

In upland areas surrounding vernal pool tadpole shrimp and vernal pool fairy shrimp aquatic habitat (i.e., within 250 feet), indirect impacts could occur as a result of construction activities such as piling driving, excavation, rail bed buildup, placement of permanent and temporary structures, and vehicle traffic which could result in changes in the habitat's hydrology. Indirectly, these construction activities could alter the amount and quality of water available above and below ground, change the inflow of water to particular pools or decrease or increase inundation. These changes in hydrology could impact the reproductive success and survival of these species and their food. The accidental introduction of pollutants like petroleum products in chemical-laden runoff into suitable habitats during construction could affect the water chemistry and could result in branchiopod mortality.

Potential impacts on these species from operational activities, such as maintenance activities, would be as described in the Project Impact Summary, above.

Vernal Pool Fairy Shrimp Critical Habitat

While the project footprint does not overlap designated critical habitat for the vernal pool fairy shrimp, Critical Habitat Unit 27B falls within 50 to 100 feet of the footprint along its western border. Where it is adjacent to the project footprint, Critical Habitat Unit 27B is composed of ruderal and annual grassland habitat that does not support PCEs (vernal pools, swales, and other ephemeral wetlands and depressions). The project footprint is physically and hydrologically disconnected from the majority of Critical Habitat Unit 27B by SR 43 and the BNSF right-of-way. Due to the degraded nature of the critical habitat adjacent to the project footprint, the absence of PCEs, and the disconnected nature of the area, no indirect impacts would be anticipated on vernal pool fairy shrimp in designated Critical Habitat Unit 27B.

The BNSF Alternative does not overlap Critical Habitat Unit 27C but is within 250 feet of it; however, the unit is on the far side of SR 43 and the portion of the unit within 250 feet of the BNSF Alternative does not support the PCEs for vernal pool fairy shrimp. No direct or indirect impacts would be anticipated on designated vernal pool fairy shrimp critical habitat with suitable required habitat characteristics (i.e., the PCEs) as a result of construction activities. Furthermore, no temporary impacts would occur on designated critical habitat for the vernal pool fairy shrimp.

The project footprint would not overlap Critical Habitat Unit 27C, but it is within 250 feet of it; however, the unit is on the far side of SR 43 and the portion of the unit within 250 feet of the project footprint does not support the PCEs for vernal pool fairy shrimp. No direct or indirect impacts on designated vernal pool fairy shrimp Critical Habitat Unit 27C are expected as a result of project activities.

5.6.2.2 Valley Elderberry Longhorn Beetle

No impacts to valley elderberry longhorn beetle are anticipated in areas where no suitable habitat is present or in areas located outside of the species' known geographic range. As a direct result of the construction of the project, individual elderberry shrubs and resident valley elderberry longhorn beetles, if present, may be disturbed, injured, or killed, and the surrounding native vegetation otherwise destroyed or degraded by construction equipment from habitat fragmentation.

Indirectly, construction equipment could stress elderberry shrubs by creating dust that when aerosolized could coat elderberry shrub leaves. Construction equipment could also alter the site's natural hydrology, causing stress to the shrubs through erosion and soil compaction, which could interfere with the plants' roots or water uptake.

Construction activities such as pile driving, excavation, rail bed buildup, placement of permanent and temporary structures, and vehicle traffic could also result in changes in the hydrology of this habitat by altering the amount and quality of water available above and below ground or by altering water flow patterns. These activities could also decrease or increase inundation.

Potential impacts on this species from operational activities, such as maintenance activities, would be as described in the Project Impact Summary above (Section 5.5.2).

5.6.2.3 California Tiger Salamander, Western Spadefoot Toad, Blunt-Nosed Leopard Lizard, Western Pond Turtle, Silvery Legless Lizard, San Joaquin Whipsnake, Coast Horned Lizard

No impacts on special-status amphibian and reptile species would occur in areas where no suitable habitat is present or in areas located outside of the species' known geographic range. As a direct result of the construction of the project, individual special-status amphibian and reptile species may be injured or killed. In addition suitable breeding, nesting, refugia or aquatic

habitats may be disturbed or destroyed by construction equipment and personnel, or during earthmoving activities. These impacts would occur through ground disturbance, habitat degradation, or land conversion from suitable aquatic, natural, bare-earth or otherwise suitable habitats to developed, hardscaped land uses.

Potential permanent and temporary indirect impacts on special-status amphibian and reptile species include temporary shifts in foraging patters or territories, refugia abandonment, and increased predation as a result of increased noise, light, infrastructure and ground vibrations where suitable habitat is present.

During operations, at-grade portions of the HST have some potential to result in injury or mortality if amphibians and reptiles gain access to the tracks through small openings in the security fencing and are struck by a moving train. In addition, the fragmentation of the habitats and landscapes resulting from the construction of the project components may interfere with the daily and seasonal movement and dispersal of the special-status amphibian and reptile species. Indirectly, project components such as security fencing, electrical infrastructure, and elevated structures could attract predators like raptors by providing artificial perch sites in the landscape.

5.6.2.4 Kern Brook Lamprey

No impacts on Kern brook lamprey are anticipated in areas where no suitable habitat is present or in areas located outside of the species' known geographic range. The construction of the project may result in direct and indirect impacts on the Kern Brook lamprey. This species is only expected to occur in the Friant-Kern Canal in Kern County, where spawning habitat is absent. As a direct result of the construction of the project, individual lamprey may be disturbed, injured, or killed, or the waters of the Friant-Kern Canal disturbed, degraded, or polluted by sedimentation, construction equipment spills or leaks, and shading from overhead elevated structures . Indirect impacts that could result from project construction include temporary shifts in foraging patterns or territories, noise or light pollution, and sedimentation in the Friant-Kern Canal. Furthermore, the construction and operation of project components such as electrical infrastructure, fencing, and elevated structures could attract predators like raptors by providing artificial perch sites in the landscape, all of which could lead to an increase in Kern Brook lamprey predation where the project crosses this short segment of the canal.

5.6.2.5 Special-Status Bird Species

No impacts on special-status bird species would occur in areas where no suitable habitat is present or in areas located outside of the species' known geographic range. The construction and operation of the project may result in direct impacts and/or indirect impacts where suitable nesting, foraging, or over wintering habitat is present. Direct impacts include bird mortality or injury, nest disturbance or nest abandonment during the incubation, nestling or fledgling stages of these species. These direct impacts could occur as a result of construction equipment and personnel or during earthmoving activities. Indirect impacts include permanent disturbance or temporary displacement of special-status bird species as a result of noise, vibration, visual stimuli, and from the actual fragmentation of the landscape resulting from the construction of security fences, elevated structures, rail beds, and associated facilities. These indirect impacts could interfere with the daily movement, foraging, and dispersal of these bird species.

Similarly, operation of the project at-grade or on elevated structure could result in injury or mortality from bird strikes or bird interactions with the electrical systems, as well as by permanent disturbance or temporary displacement from noise, vibration, wind, or visual stimuli. Fragmentation of the landscape resulting from project components could interfere with special-status bird daily or seasonal movement, foraging, and dispersal.

5.6.2.6 Nelson's (= San Joaquin) Antelope Squirrel, ringtail, Fresno Kangaroo Rat, Tipton Kangaroo Rat, San Joaquin Kit Fox, American Badger

No impacts on Nelson's (= San Joaquin) antelope squirrel, ringtail, Fresno kangaroo rat, Tipton kangaroo rat, San Joaquin kit fox, or American badger are anticipated where no suitable habitat is present or in areas located outside of the species' known geographic range. The construction and operation of the project may result in direct and indirect impacts on these species in habitat types where suitable burrowing or denning and foraging habitat is present.

Direct impacts could be temporary or permanent and include mammal mortality, injury, burrow or den disturbance or abandonment, and loss of or disturbance to breeding or rearing of young. As a direct result of the construction of the project, individual mammals may be injured or killed or burrows and dens disturbed or destroyed by construction equipment and personnel or during earthmoving activities, and burrowing or denning and foraging habitat will be lost through ground disturbance and/or habitat degradation or land conversion from natural and bare-earth habitats to developed, hardscaped land uses. Furthermore, construction and operational project components like security fencing and Environmentally Sensitive Area fencing could result in injury or mortality if mammals become trapped by predators (e.g., coyotes, domestic/wild dogs) while traveling parallel to fence lines, which could lead to an increase in mammal predation along the length of the HST alignment.

Indirect impacts could be temporary or permanent and include permanent or temporary shifts in foraging patterns or territories, changes in behavior, nest abandonment or increased predation. Construction and operation of the project at-grade could result in permanent disturbance or temporary displacement of these species from noise, vibration, wind, and visual stimuli and from the actual fragmentation of the landscape as a result of the construction of the project components. These effects could interfere with daily movement, foraging, dispersal, and reproduction of these species.

5.6.2.7 Pallid Bat, Townsend's Big-Eared Bat, Western Mastiff Bat, Western Red Bat

No impacts on pallid bat, Townsend's big-eared bat, western mastiff bat, and western red bat are anticipated where no suitable habitat is present or in areas located outside of the species' known geographic range. The construction and operation of the project may result in direct and indirect impacts on these species in habitat types where suitable breeding, roosting, and/or foraging habitat is present. Direct impacts may include bat mortality or injury, and roost disturbance or abandonment during breeding and pupping periods. These impacts could occur as a result of construction equipment and personnel or during structure demolition or tree removal activities. In addition, breeding, roosting, and foraging habitat will be lost through structure and tree removal, habitat degradation, or land conversion. Indirect impacts may occur as a result of noise, vibrations, or light pollution that could result in permanent or temporary shifts in foraging patterns, territories, roosts, or roost abandonment.

Similarly, operation of the project at-grade or on elevated structure could result in injury or mortality from bat strikes or bat interactions with the electrical systems. The permanent disturbance or temporary displacement of these species could occur from noise, vibration, wind, and visual stimuli resulting from the operation of the project and from the actual fragmentation of the landscape resulting from construction of the project components, which interfere with daily movement, foraging, and dispersal of these species.

5.6.3 Avoidance and Minimization Measures

In addition to the general avoidance and minimization measures described under "Jurisdictional Waters" (Section 5.1.3) and "Special-Status Plant Communities" (Section 5.2.3), the following

general avoidance and minimization measures are proposed to lessen the project impacts on special-status wildlife species. Certain measures that were described in detail in Sections 5.1.3 and 5.2.3 are discussed in more detail below and supplemented with additional specific information pertinent to special-status wildlife.

Biological Monitor

This avoidance and minimization effort is described in general terms under "Jurisdictional Waters" (Section 5.1.3 [Avoidance and Minimization Measures]). Also, the biological monitor(s) will be responsible for monitoring the Contractor to ensure compliance with the various permit requirements of the CDFG Incidental Take Permit and the USFWS Biological Opinion.

Environmentally Sensitive Areas and Environmentally Restricted Areas

This avoidance and minimization effort is described under "Jurisdictional Waters" (Section 5.1.3 [Avoidance and Minimization Measures]). In addition, Environmentally Sensitive Area fencing will be installed around specific areas in the project footprint, including areas in the vicinity of vernal pool fairy shrimp and vernal pool tadpole shrimp breeding habitat (during the wet season), valley elderberry longhorn beetle host plants (elderberry shrubs), and active bird nests, mammal dens, and bat roosts (limited as appropriate to within the project footprint), and along the perimeter of the project footprint in natural areas (alkali desert scrub, pasture, and annual grassland).

Prohibition of Firearms

No firearms will be allowed on the project footprint.

Food and Trash

All food-related trash items (e.g., wrappers, cans, bottles, food scraps) will be disposed of in closed containers and removed at least once a week from the construction site.

Pets

No pets will be permitted on the project footprint.

Rodenticides and Herbicides

Use of rodenticides and herbicides in the project footprint will be restricted. This measure is necessary to prevent poisoning of special-status species and the potential reduction or depletion of the prey populations of special–status wildlife species.

Preconstruction Surveys for Vernal Pool Fauna

Before the start of ground-disturbing activities, a preconstruction aquatic assessment and sampling will be conducted in seasonal wetlands and vernal pools in the construction footprint. Approved biologists will visit the sites after initial storm events to determine when seasonal wetlands and vernal pools have been inundated. A seasonal wetland/vernal pool is considered to be inundated when it holds greater than 3 centimeters of standing water 24 hours after a rain event. Approximately 2 weeks after the pools are inundated, the approved biologists will conduct general aquatic surveys in appropriate seasonal wetland and vernal pool habitats. The sampling will be of use in determining the species that are present (e.g., vernal pool branchiopods and western spadefoot toad), and the results of the assessment will guide measures to be implemented to avoid, minimize, and compensate for impacts and effects on special-status species (see "Species-Specific Measures," below) already assumed to be present in seasonal wetlands in the construction footprint.

Preconstruction Surveys for Special-Status Reptile and Amphibian Species

Before the start of ground-disturbing activities, preconstruction surveys will be conducted in suitable habitats to determine the presence or absence of special-status reptiles and amphibian species within the construction footprint. Surveys will be conducted no more than 30 days before the start of ground-disturbing activities and will be phased with project build-out. The results of the preconstruction survey will be used to guide the placement of the Environmentally Sensitive Areas, Environmentally Restricted Areas, and wildlife exclusion fencing.

Species-Specific Measures

Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

The following measures will be taken for vernal pool fairly shrimp and vernal pool tadpole shrimp:

- Construction activities within 250 feet of vernal pool fairy shrimp and vernal pool tadpole shrimp breeding habitat will be prohibited during the wet season (October 15 to June 1) or as determined through informal or formal consultation with the USFWS or USACE. Ground-disturbing activities may begin once the habitat is no longer inundated for the season and it is after April 15. If any work remains to be completed after October 15, exclusion fencing will be installed and erosion control measures will be implemented in those areas where construction activities need to be completed.
- Construction activities in vernal pool fairy shrimp and vernal pool tadpole shrimp breeding habitat will be permissible during the dry season (June 2, or after April 15 if the habitat is no longer inundated, to October 14).
- If temporary impacts on vernal pool(s) can be avoided, the vernal pool(s) will be protected by erecting exclusion fencing.
- For temporary impacts on vernal pools that cannot be avoided (where the area may be excluded from the permanent project footprint), rinsed gravel will be placed in the affected vernal pool(s), and the affected vernal pool(s) will be covered with geotextile fabric before the start of ground-disturbing activities to minimize damage to the soils and to protect the contours. This measure will be implemented in temporary impact areas adjacent to or within the construction footprint. Resource agency consultations with the USFWS and USACE will occur as needed and based on permit conditions.
- If temporary impacts take more than two full wet-dry season cycles, soil storage and/or offsite mitigation will be implemented. A representative sampling of soils from the vernal pool(s) will be taken before initiating ground-disturbing activities within vernal pools. The representative soil sample(s) will contain viable plant seeds and vernal pool branchiopod cysts to be preserved from the vernal pool(s). These samples may be incorporated into other vernal pools, as applicable, with USFWS and/or CDFG consultation.

Valley Elderberry Longhorn Beetle

The following measures will be taken for valley elderberry longhorn beetle:

- Protocol-level surveys will be conducted for elderberry shrubs and valley elderberry longhorn beetle exit holes per the *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (USFWS 1999b) no less than 1 year before the start of ground-disturbing activities.

- A non-disturbance zone will be established, as follows:
  - In temporary impact areas, a 100-foot non-disturbance zone will be established during construction around all elderberry shrubs with stems at ground level of 1-inch diameter or greater.
  - If encroachment within the 100-foot non-disturbance zone is unavoidable, a 20-foot non-disturbance zone will be established around the drip line of each elderberry shrub.
  - If encroachment occurs within the 20-foot non-disturbance zone, appropriate compensatory mitigation, as described in Section 5.5.4 (Compensatory Mitigation) will be required.
- Elderberry shrubs will be relocated and disturbed buffer areas surrounding elderberry shrubs will be restored according to the *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (USFWS 1999b).

California Tiger Salamander

The following measures will be implemented for California Tiger Salamander in the Cross Creek grassland region:

- Construction activities within 250 feet of potential California tiger salamander breeding habitat will not be conducted during the wet season (October 15 to June 1); however, construction activities may begin once the habitat is no longer inundated for the season and April 15 has passed.
- A 250-foot non-disturbance zone will be established around all potential California tiger salamander breeding habitat during the wet season.
- In the unlikely event that California tiger salamander individuals are found within the construction footprint, the Authority will contact the USFWS and the CDFG to identify appropriate avoidance and minimization measures to be implemented for this species.

Special-Status Bird Species

Preconstruction surveys for nesting special-status bird species will be conducted during the nesting season (February 1 through August 15) within the project footprint and the appropriate buffer will be established as detailed in Table 5-17. The preconstruction nesting surveys will be conducted no more than 30 days before the start of ground-disturbing activities and phased with project build-out. If ground-disturbing activities are delayed or suspended for more than 30 days, an additional preconstruction nesting and special-status bird species survey will be conducted. If active nests are found within the appropriate buffer of the project footprint during the nesting season (February 1 through August 15), the following steps will be implemented:

- A qualified biologist (or biologists) will determine through non-invasive methods whether the birds have begun egg laying and incubation or whether juveniles are foraging independently and are capable of independent survival; if it is determined that the nest is in an active breeding status, the following steps will be implemented:
  - A nest-avoidance buffer will be established in accordance with Table 5-18 around the active nests and will be monitored by a qualified biologist or biologists throughout the nesting season (February 1 through August 15) until hatchlings successfully fledge.
  - If construction activities cannot be avoided within the non-disturbance zone of active nests during the nesting season, a qualified biologist or biologists will monitor active nest

sites during construction to determine whether the nesting pair shows signs of disturbance in response to construction activities; if nesting pairs show signs of disturbance, construction will cease within the non-disturbance zones until hatchlings successfully fledge.

- Outside of the nesting season or when a qualified biologist determines that nests are inactive, the following measures will be implemented:
  - Project-related activities will be permissible between August 16 and January 31, without preconstruction nesting or special-status bird species surveys.
  - Nest and nest tree removal for special-status birds (excluding active Swainson's hawk nest trees) is permissible during the fall and winter months (between August 16 and January 31) with agency approval.

Table 5-18
Preconstruction Nesting and Special-Status Wildlife Species Survey Buffers and Non-Disturbance Zones

Species Name	Survey Buffer	Non-Disturbance Zone
Fully protected raptor species (e.g., white-tailed kite)	0.5 mile	0.5 mile
Swainson's hawk	0.5 mile	500 feet – 0.25 mile
Special-status raptor species (not Fully Protected)	300 feet	300 feet
Nesting birds protected by MBTA	150 feet	150 feet
Note: Surveys will be conducted in the project footprint, and where possible in a survey buffer (where permission to enter is granted), or otherwise will be conducted in areas of public access. MBTA = Migratory Bird Treaty Act		

Swainson's Hawk

In addition to the nesting and special-status bird species preconstruction surveys and non-disturbance zones, the following measures will be implemented to avoid and minimize potential impacts on Swainson's hawks.

A qualified biologist will conduct preconstruction surveys for Swainson's hawks as described in the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (Swainson's Hawk Technical Advisory Committee 2000). Surveys will be performed during the nesting season (March 1 through August 1) within the project footprint and within a 0.5 mile buffer where access is permitted. The preconstruction nest surveys will be conducted at least 30 days before the start of ground-disturbing activities and will be phased with project build-out. The preconstruction surveys will determine the status (i.e., active, inactive) of the observed nest(s).

If active Swainson's hawk nests (defined as a nest used one or more times in the last five years) are found within 0.5 mile of the project footprint during the nesting season (March 1 to August 1), the following steps will be taken:

- Active nests within a 0.25-mile buffer of the project footprint will be monitored daily by a qualified, agency-approved biologist to assess whether the nest is occupied. If the nest is

occupied, the health and status of the nest will be monitored until the young fledge or for the length of construction, whichever occurs first.

- Buffers will be established restricting construction activities within 500 feet and 0.25 mile of the active nest, depending on the nest activity, as feasible. Active nests within a 0.25-mile buffer of the construction footprint will be monitored daily by a qualified, agency-approved biologist to assess whether the nest is occupied. If the nest is occupied, the health and status of the nest will be monitored until the young fledge or for the length of construction, whichever occurs first. Adjustments to the buffer(s) will be made in consultation with the CDFG.

If an occupied Swainson's hawk nest tree must be removed, the Authority will obtain take authorization through a Section 2081 Incidental Take Permit (including compensatory mitigation to offset the loss of the nest tree) from the CDFG. If ground-disturbing activities or other project-related activities could cause nest abandonment by a Swainson's hawk or forced fledging within the specified buffer area, monitoring of the nest site by a qualified, agency-approved biologist will be conducted to determine if the nest is abandoned. Removal of nesting trees outside of the nesting season (generally between October 1 and February 1) does not require authorization under the Section 2081 Incidental Take Permit.

Western Burrowing Owl

In addition to the nesting and special-status bird species preconstruction surveys and non-disturbance zones, the following measures will be implemented to avoid and minimize potential impacts on western burrowing owls per the *California Department of Fish and Game Staff Report on Burrowing Owl Mitigation* (CDFG 2012b):

- Protocol-level surveys following the *California Department of Fish and Game Staff Report on Burrowing Owl Mitigation* (CDFG 2012b) will be conducted at the appropriate timeframes within the construction footprint. The surveys will be conducted within suitable habitat of the construction footprint and within a approximately 500-foot (150-meter) buffer.

Avoidance and Minimization Measures

Burrowing owl avoidance and minimization measures that follow the California Department of Fish and Game *Staff Report on Burrowing Owl Mitigation* (CDFG 2012b) will be conducted. During the nesting season (February 1 through August 31), occupied burrowing owl burrows will not be disturbed unless it is verified that either the birds have not begun egg-laying and incubation or the juveniles from the occupied burrows are foraging independently and are capable of independent survival. Eviction outside the nesting season may be permitted pending evaluation of eviction plans and receipt of formal written approval from the CDFG authorizing the eviction.

Unless otherwise authorized by the CDFG, buffers will be established (as an Environmentally Sensitive Area) between the construction work area and occupied burrowing owl nesting sites, as described in Table 5-19.

Table 5-19.
California Department of Fish and Game Recommended Restricted Activity Dates and Setback Distances by Level of Disturbance for Burrowing Owls

Location	Time of Year	Level of Disturbance		
		Low	Medium	High
Nesting Sites	April 1–Aug 15	200 m	500 m	500 m
Nesting Sites	Aug 16-Oct 15	200 m	200 m	500 m
Nesting Sites	Oct 16-March 31	50 m	100 m	500 m

Adjustments to the buffer(s) will require prior approval by the CDFG.

Relocation:

If owls must be moved away from the project footprint, a qualified biologist will undertake passive relocation measures in accordance with CDFG's *Staff Report on Burrowing Owl Mitigation* (CDFG 2012b).

Blunt-Nosed Leopard Lizard

Blunt-nosed leopard lizard is a California Fully Protected Species. As such, measures must be taken to completely avoid (not just minimize) take (as defined under the California ESA) of this species.

Protocol-level surveys for blunt-nosed leopard lizard will be completed by qualified biologists within 1 year of the start of ground-disturbing activities. These surveys will be conducted in areas of suitable habitat according to the *Approved Survey Methodology for the Blunt-Nosed Leopard Lizard* (CDFG 2004).

Preconstruction surveys will be conducted within 30 calendar days before the start of ground-disturbing activities and will be phased with project build-out.

If blunt-nosed leopard lizard is detected on site at any time during these surveys, the USFWS and CDFG will be contacted to discuss ways to proceed with the project and avoid take to the maximum extent practicable.

Active Season:

In areas where blunt-nosed leopard lizard or blunt-nosed leopard lizard sign are present, construction activities will occur during blunt-nosed leopard lizard active season (April 15 through October 15), and when air temperatures are between 75 and 95 degrees Fahrenheit. The active season corresponds to the period when this species is moving around and can avoid danger.

Following the preconstruction survey for blunt-nosed leopard lizard within the construction footprint, if active burrows or egg clutch sites are identified within the construction footprint, a 50-foot non-disturbance buffer will be established, maintained, and monitored around these active burrows and egg clutch sites. The 50-foot buffers will be established by routing the high-visibility construction fence and wildlife exclusion fence around the active burrow and clutch sites in a manner that enables the blunt-nosed leopard lizard to leave the construction footprint after its young have hatched. Project-related activities within the 50-foot buffers, including vegetation

clearing and grubbing (as described below), will be prohibited until the eggs have hatched and blunt-nosed leopard lizards have left the construction footprint.

Following the preconstruction survey for the blunt-nosed leopard lizard within the construction footprint, if no active burrows or egg clutch sites are identified, vegetation clearing and grubbing activities will be performed with hand tools. Cleared vegetation will be cut to 4 inches above the ground level, and all trimmings will be removed from the construction footprint. The vegetation-free work area will be allowed to sit undisturbed for a minimum of 72 hours to allow blunt-nosed leopard lizards to passively relocate from the site. A follow-up preconstruction survey will be conducted in the vegetation-free work area to look for blunt-nosed leopard lizards or their sign. Any blunt-nosed leopard lizards observed during the follow-up survey will be allowed to leave the work site of their own volition. Immediately after the follow-up preconstruction survey of the vegetation-free work area (assuming no blunt-nosed leopard lizards are detected), the construction footprint will be delineated with a high-visibility construction fence and a wildlife exclusion fence. The vegetation-free work area within the wildlife exclusion fence will be maintained and monitored daily.

If blunt-nosed leopard lizards are observed at any time during preconstruction surveys or the construction period, the USFWS and CDFG will be contacted. Appropriate measures to avoid take of the species will be established through consultation with the USFWS and CDFG.

Non-Active Season:

During the non-active season (October 16 through April 14), suitable blunt-nosed leopard lizard burrows identified during protocol level and preconstruction surveys will be avoided during construction activities. A 50-foot no-work buffer will be established around burrows to prevent impacts until the active season when blunt-nosed leopard lizards will be able to leave the vegetation-free work area on their own accord. The no-work buffer will be established by routing the high-visibility construction fence and wildlife exclusion fence around the suitable burrow sites in a manner that enables the blunt-nosed leopard lizards to leave the construction footprint during the active season. If construction activities are required during this period, appropriate measures will be established through consultation with the USFWS and CDFG.

Western Spadefoot Toad, Western Pond Turtle, Silvery Legless Lizard, San Joaquin Whipsnake, Coast Horned Lizard

A qualified biologist will conduct preconstruction surveys in suitable habitats in the project footprint to detect these species. These surveys will be conducted no more than 48 hours before the start of ground-disturbing activities.

If special-status reptiles or amphibians are found on site, a qualified biologist(s) will relocate adults, juveniles, and egg masses from impact areas to locations outside of the project footprint pending CDFG approval, or as determined through consultation with the CDFG.

Nelson's Antelope Squirrel, Tipton Kangaroo Rat, Dulzura Pocket Mouse, Tulare Grasshopper Mouse

Before the start of construction, a qualified, agency-approved biologist, will conduct a habitat assessment in potentially suitable habitat within the project footprint to determine presence of special-status small mammal species burrows or their signs. The habitat assessment surveys will be conducted within 2 years and no more than 14 days before the start of construction or ground-disturbing activities, and may be phased with project build-out. If no burrows or signs of special-status small mammal species are detected, no further measures will be required.

If during the habitat assessment, burrows or signs of special-status small mammal species are detected, non-disturbance exclusion zones will be established (i.e., wildlife exclusion fencing [e.g., a silt fence or a fence of similar material]) in areas where special-status small mammal species are believed to be present. Non-disturbance exclusion zones will be established at least 14 days before the start of ground-disturbing activities. The non-disturbance exclusion fence with one-way exit/escape points will be placed to exclude the special-status small mammals from the construction area.

Additional measures, such as one or both of the following, will be implemented after the exclusion fencing is installed:

- The vegetation will be trimmed and cleared to the ground by hand or using hand-operated equipment to discourage the presence of special-status small mammal species in the construction footprint. The cleared vegetation will remain undisturbed by project construction equipment for 14 days to allow species to passively relocate through the one-way exit/escape points along the wildlife exclusion fencing.
- A qualified, agency-approved biologist will conduct small mammal trapping and relocation in general accordance with the *Survey Protocol for the Morro Bay Kangaroo Rat* (USFWS and CDFG 1996) or as determined in consultation with the CDFG and USFWS. The small-mammal trapping surveys will occur within the construction footprint in potentially suitable habitat for special-status small-mammal species. The trapping will be conducted before the start of construction and phased with project build-out; trapping will be limited to the dry summer months on evenings when the nightly low temperature is forecast to exceed 50°F.

Fresno Kangaroo Rat

Before the start of ground-disturbing activities, a qualified agency-approved biologist, will conduct a habitat assessment on any parcels within the project footprint that may support the Fresno kangaroo rat to determine the presence of kangaroo rat burrows or their signs.

If no burrows or signs of kangaroo rats are detected and kangaroo rats are confirmed to be absent from the construction footprint, the following actions will be implemented:

- Exclusion fencing will be installed, maintained, and monitored along the perimeter of the construction footprint to ensure that no take of Fresno kangaroo rat or destruction of their potential habitat outside of the project footprint occurs.
- Vegetation will be trimmed and cleared to the ground by hand or using hand-operated equipment to discourage small-mammal presence in the construction footprint. The area from which the vegetation was cleared will remain undisturbed by project construction equipment for 14 days to allow other small-mammal species to passively relocate through the one-way exit/escape points along the wildlife exclusion fencing.

In the unlikely event that kangaroo rat individuals, their burrows, or their signs are found within the project footprint during the habitat assessment, the USFWS and CDFG will be notified immediately, and the FRA will reinitiate consultation to identify appropriate avoidance and minimization measures to be implemented for this species.

Ringtail, San Joaquin Kit Fox, American Badger

The following measures will be implemented to avoid and minimize potential impacts on ringtail, San Joaquin kit fox, and American badger. Furthermore, the measures identified in the *USFWS Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to and During*

Ground Disturbance (USFWS 1999c) will be implemented. Ringtail is a California Fully Protected Species. As such, measures must be taken to completely avoid (not just minimize) take (as defined under the California ESA) of this species.

- Preconstruction surveys will be conducted within the project footprint in areas of suitable habitat to identify dens or signs of ringtail, San Joaquin kit fox, or American badger. These surveys will be conducted no more than 30 days before the start of ground-disturbing activities and will be phased with project build-out. If ringtail is detected on site at any time during these surveys, the CDFG will be contacted to discuss ways to proceed with the project and to avoid take to the maximum extent practicable.
- If American badger or ringtail individuals, dens, or diagnostic signs are detected, non-disturbance zones will be implemented as follows (adjustments to the buffer[s] will require prior approval by the appropriate agency [e.g., USFWS, CDFG]):
  - A 50-foot buffer around occupied dens.
  - A 100-foot buffer around American badger maternity dens through the pup-rearing season (February 15 through July 1).
  - A 100-foot buffer around ringtail maternity dens during the pup-rearing season (May 1 through June 15).
- If San Joaquin kit fox individuals, burrows, or diagnostic signs are detected, non-disturbance zones will be implemented as follows (adjustments to the buffer(s) will require prior approval by the appropriate agency (e.g., USFWS, CDFG):
  - A 50-foot non-disturbance zone will be established for potential dens (natural dens that have an entrance with the appropriate dimensions for the species) or atypical dens (known dens in man-made structures).
  - A 100-foot non-disturbance zone will be established for known dens (any existing den that is currently or has been used in the past)
  - At least a 100-foot non-disturbance zone (distance to be determined through consultation with the USFWS and CDFG) will be established around natal/pupping dens for San Joaquin kit fox (any known den used to whelp and/or rear their young).
- Disturbance to ringtail, San Joaquin kit fox, or American badger dens should be avoided to the maximum extent possible. Limited disturbance to San Joaquin kit fox, ringtail, and American badger dens may be allowed through consultation with the USFWS and CDFG and by following the USFWS *Standardized Recommendations for Protection of the San Joaquin Kit Fox Prior to or During Ground Disturbance* (USFWS 1999c).
- All construction activities near any occupied dens will cease one-half hour before sunset and will not begin earlier than one-half hour before sunrise, when feasible.

Natal Dens:

Natal or pupping dens will not be destroyed until the pups and adults have vacated, and can only be disturbed after consultation with the USFWS and CDFG.

Known Dens:

Known den sites will be monitored for a minimum of three days with scent stations, track plates, and/or camera stations to determine den status. If no ringtail, San Joaquin kit fox, or American

badger activity is observed during this period the den will be destroyed immediately to preclude subsequent use. If activity is observed, the dens should be monitored for an additional 5 consecutive days to allow any resident animal to move to another den during its normal activity. Use of the den can be discouraged during this period by partially plugging its entrance with soil in a manner where the animal can escape easily. When the den is determined to be unoccupied by a qualified biologist it may then be excavated or removed under the direction of a qualified biologist. If the animal is still present after the 5-day monitoring period, the den may be excavated when it is temporarily vacant, as determined by the qualified biologist.

San Joaquin Kit Fox Potential Dens:

If take authorization/permit for San Joaquin kit fox has been obtained from the USFWS and CDFG, den destruction may proceed without monitoring, unless other restrictions are issued with the take authorization/permit.

If no take authorization/permit for San Joaquin kit fox has been issued then potential dens will be monitored as if they were known dens. If any den is considered to be a potential den, but is later determined during monitoring or destruction to be currently or previously used by San Joaquin kit fox, then destruction will cease and the USFWS and CDFG will be notified.

Ringtail Potential Dens:

Potential ringtail dens will be monitored as if they were known dens. If any den is considered to be a potential den, but is later determined during monitoring or destruction to be currently or previously used by ringtail, then destruction will cease and the CDFG will be contacted to discuss ways to proceed with the project and to avoid take to the maximum extent practicable.

Special-Status Bat Species

Visual and acoustic preconstruction surveys will be conducted within the project footprint in all areas that provide suitable bat roosting habitat, including all structures or bridges and mature trees scheduled for demolition or removal. The surveys will be conducted by a qualified biologist no more than 30 days before the start of ground-disturbing activities, and will be phased with project build-out.

If active special-status bat roosts are found within the project footprint, the following measures will be implemented:

Breeding Season:

A 50-foot non-disturbance zone, or a buffer size as determined in consultation with USFWS and CDFG, will be established around active special-status bat roosts during the breeding season (April 1 to July 31). Non-disturbance zones will be monitored by a qualified biologist throughout the breeding season until the pups are fully volant.

Non-Breeding Season:

Construction activities will be permissible outside of the breeding season (August 1 to March 31). If active roost sites are identified outside of the breeding season or when it is determined that pups are fully volant, roost site relocation activities will be permissible between September 1 and March 31 with agency approval.

Relocation:

If the removal of special-status bat roost sites cannot be avoided, the following steps will be taken:

- Roost site relocation activities will be limited to daylight hours.
- Relocation activities will be conducted under the guidance of a qualified biologist, and will consist of partially day-lighting structures/bridges/trees (i.e., removing external walls, roofing material, and secondary tree branches) to increase air circulation and light exposure, proceeding in a step-wise fashion over 3 consecutive days to allow time for resident bats to relocate to an alternative roost site.

If passive relocation measures are ineffective, additional measures will be negotiated through consultation with CDFG.

Pipes and Culverts:

Pipes, culverts, or similar enclosed structures with a diameter of 4 inches or greater will either be screened, covered, or stored more than 1 foot off the ground to prevent their use by wildlife. All stored material will be cleared for common and special-status wildlife species before the pipe is subsequently used or moved.

5.6.4 Compensatory Mitigation

To compensate for impacts on special-status wildlife species and/or their suitable habitat, compensatory mitigation will be required. The amount of compensatory mitigation required will be based on a ratio of the amount of disturbance to the special-status wildlife species and/or their habitat that occur within the species geographic range. In some instances compensatory mitigation for one special-status wildlife species (upland habitat for California tiger salamander) may also compensate for impacts on other special-status wildlife species (San Joaquin kit fox). This overlap is dependent on the location and habitat of the compensatory mitigation site and exact location of which will be determined through consultation with the natural resources agencies. The mitigation ratios presented in this section are proposed as a minimum to compensate for project impacts; final ratios will be determined in consultation with appropriate agencies.

5.6.4.1 Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

Unavoidable direct and indirect (including temporary and permanent) impacts on vernal pool branchiopod habitat would be mitigated through compensation determined in consultation with the appropriate resource agencies. Compensation for vernal pool branchiopods habitat (e.g., vernal pools, seasonal wetlands) are addressed under compensation for impacts on jurisdictional waters (Section 5.1.4).

5.6.4.2 Valley Elderberry Longhorn Beetle

If elderberry shrubs are removed as a result of project construction, compensatory mitigation measures will be implemented following the USFWS "*Conservation Guidelines for the Valley Elderberry Longhorn Beetle*" (USFWS 1999b), as summarized below:

- Elderberry shrubs must be transplanted if they cannot be avoided by the project. All elderberry shrubs with one or more stems measuring 1 inch or greater in diameter (at ground level) will be will be transplanted to a USFWS approved conservation area during the dormancy period (November 1 to February 15). A USFWS-approved conservation area will be established that provides at least 1,800 square feet for each transplanted elderberry shrub.
- Compensatory mitigation ratios will be based on the characteristics of the various elderberry shrubs and stems removed. These characteristics included the habitat, number of stems, stem diameter at ground level, and presence or absence of exit holes. Compensatory

mitigation includes both elderberry seedling/cuttings and planting of associated native plants. Table 5-20 summarizes the compensatory mitigation ratios identified in the *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (USFWS 1999b).

Table 5-20
Summary of Compensatory Mitigation Ratios for Impacts to Suitable Habitat for the Valley Elderberry Longhorn Beetle

Habitat[A]	Stem Size Class (maximum diameter at ground level, in inches)	Exit Holes on Shrub[B]	Elderberry Seedling / Cutting Ratio[C]	Associated Native Plant Ratio[D]
Riparian	Stems 1 to 3	Yes	1:1	1:1
		No	2:1	2:1
	Stems 3 to 5	Yes	2:1	1:1
		No	4:1	2:1
	Stems > 5	Yes	3:1	1:1
		No	6:1	2:1
Non-riparian	Stems 1 to 3	Yes	2:1	1:1
		No	4:1	2:1
	Stems 3 to 5	Yes	3:1	1:1
		No	6:1	2:1
	Stems > 5	Yes	4:1	1:1
		No	8:1	2:1

Notes:
[a] Mitigation ratios were determined following the guidelines in the U.S. Fish and Wildlife Services "*Conservation Guidelines for the Valley Elderberry Longhorn Beetle*", established in July 1999.

[b] All stems measuring at least 1inch in diameter at ground level on a single shrub are considered occupied when exit holes are present anywhere on the shrub.

[c] Ratios in the *Elderberry Seedling Ratio* column correspond to the number of cuttings or seedlings to be planted per elderberry stem (at least 1 inch in diameter at ground level) affected by the proposed project.

[d] Ratios in the *Associated Native Plant Ratio* column correspond to the number of associated native species to be planted per elderberry (seedling or cutting) planted.

5.6.4.3 California Tiger Salamander

If compensatory mitigation is required to offset the loss of habitat for the California tiger salamander, compensatory mitigation will be determined through consultation with the USFWS and CDFG. Compensatory mitigation could include one of the following:

- Purchase of credits from an agency-approved mitigation bank.
- Fee-title-acquisition of natural resource regulatory agency–approved property.
- Purchase or establishment of a conservation easement with an endowment for long-term management of the property-specific conservation values.
- In-lieu fee contribution determined through negotiation and consultation with USFWS.

5.6.4.4 Swainson's Hawk

Compensatory mitigation for Swainson's hawk will be based on the number of trees with "active" nests that are removed by construction activities or where construction activities create a significant habitat modification that leads to reduced reproductive success or nest abandonment. If project construction occurs within 0.5 mile of a documented or observed active nest, the Authority will acquire and preserve 150 acres of natural habitat per active nest tree removed by construction activities or where construction activities create a significant habitat modification that leads to reduced reproductive success or nest abandonment. At a minimum, the habitat preserved will contain trees suitable for supporting nesting and natural foraging habitat for Swainson's hawk.

5.6.4.5 Western Burrowing Owl

To compensate for permanent impacts on nesting, occupied, and satellite burrows and/or burrowing owl habitat, compensatory mitigation will be provided according to the CDFG *Staff Report on Burrowing Owl Mitigation* (CDFG 2012a).

5.6.4.6 Blunt-Nosed Leopard Lizard, Tipton Kangaroo Rat, San Joaquin Antelope Squirrel

To offset the loss of suitable habitat for blunt-nosed leopard lizard, Tipton kangaroo rat and San Joaquin antelope squirrel, compensatory mitigation will be provided based on the amount and type of impact incurred (temporary or permanent). Compensatory mitigation ratios will be determined in consultation with the USFWS and/or CDFG and could include one of the following:

- Purchase of credits from an agency-approved mitigation bank.
- Fee-title-acquisition of natural resource regulatory agency–approved property.
- Purchase or establishment of a conservation easement with an endowment for long-term management of the property-specific conservation values.
- In-lieu fee contribution determined through negotiation and consultation with USFWS..

5.6.4.7 San Joaquin Kit Fox

To offset the loss of suitable habitat for San Joaquin kit fox, compensatory mitigation will be provided based on the amount of habitat, type of habitat, and type of impact. Habitat will be replaced at a minimum of a 1:1 ratio to provide additional protection and habitat in a location that is consistent with the recovery of the species. Impacts on San Joaquin kit fox will be mitigated in accordance with the USFWS Biological Opinion and/or CDFG 2081(b).

5.6.5 Cumulative Impacts

Impacts from the project and other proposed projects in the Tulare Basin could result in cumulative impacts on special-status wildlife species. The proposed project would be the largest project to be constructed in the Tulare Basin, seconded only by the construction and operation of the Merced to Fresno and Bakersfield to Palmdale sections of the HST. Other cumulative projects in the Tulare Basin region include various transportation, residential, agricultural, commercial, and industrial projects.

Cumulative impacts from these projects could contribute to the overall loss or degradation of wildlife resources in the Tulare Basin. Disturbances could be direct and indirect, and temporary and permanent. They could include the following:

- Impairment to special-status wildlife species populations, dynamics, behavior and ability to carry out species life cycle.
- Impairment of wildlife movement corridors, including impacts on species genetic variation, on population gene flow, and on the ability for species to migrate to areas that are required to carry out the species important life history events (including breeding).
- Adverse effects to the various functions and values provided by special-status wildlife species habitats.
- Potential adverse modification of special-status wildlife species habitat or conflict with the provisions of a conservation plan relevant to a special-status wildlife species.

The successful implementation of the general avoidance and minimization measures discussed in Section 5.5.3, along with the specific avoidance and minimization measures discussed for each special-status wildlife species would considerably reduce the nature and magnitude of project impacts on special-status wildlife species.

The proposed project would also comply with federal, state, and local regulations through regulatory agency consultation and permitting, which would result in further development of specific avoidance and minimization measures, best management practices, and compensatory mitigation options to be implemented. Other cumulative projects in the Tulare Basin would also be required to comply with regulatory requirements such as federal, state, and local government laws and regulations that protect special-status wildlife species and wildlife movement corridors. Therefore, impacts associated with the cumulative projects would be mitigated through consultation and permitting with the appropriate regulatory agency.

5.7 Migration and Movement Corridors

The importance of habitat connectivity and corridors that facilitate this connectivity is well documented and generally accepted (Chester and Hilty 2010). Studies have shown that habitat connectivity is important in biodiversity conservation, particularly because of the role it plays in maintaining gene flow (Beier and Noss 1998), maintaining ecological processes (Bennett 1999), and reducing species extinction risk (Crooks et al. 2011).

Maintaining habitat connectivity among the natural lands that exist among agricultural land in California's San Joaquin Valley is recognized as a key tool in ensuring the long-term population viability of California's San Joaquin Valley special-status and non-special-status species. This is a high conservation priority identified by both regulatory agencies and conservation groups.

5.7.1 Regional Context: Natural Land and Existing Connectivity in the Southern San Joaquin Valley

Connectivity between natural lands in the southern San Joaquin Valley is currently low; agricultural and urban land uses separate the majority of natural habitat on the southern San Joaquin Valley floor from the surrounding natural habitat within the foothills bordering the southern San Joaquin Valley. However, efforts to maintain or restore connectivity among this remaining natural habitat have resulted in a network of natural lands under state (CDFG), federal (USFWS, Bureau of Land Management, and Bureau of Reclamation), or private ownership (The Nature Conservancy and mitigation banks) that spans the southern San Joaquin Valley from the floor to the surrounding foothills, including the following:

- Pixley NWR
- Allensworth ER

- Atwell Island Land Retirement Demonstration Project (LRDP)
- Kern NWR
- Semitropic Ridge Preserve
- Designated critical habitat for vernal pool species

Although these protected public lands do not represent the only natural habitat available on the southern San Joaquin Valley floor, they are important for connectivity in the southern San Joaquin Valley because they are managed for native plant and wildlife species. The *California Essential Habitat Connectivity Project* identified additional natural habitats in the southern San Joaquin Valley and called them "natural landscape blocks." These natural landscape blocks capture natural habitat or areas of land that support native biodiversity that are greater than 2,000 acres and meet specified ecological criteria (Caltrans 2009). The network of managed natural land and the natural landscape blocks are shown on Figure 5-7a to provide a regional view of natural habitat in the southern San Joaquin Valley.

In an effort to help guide landscape-level planning to maintain habitat connectivity among the patchy network of natural habitat described above, many organizations have identified habitat linkages and wildlife movement corridors. Habitat linkages are defined as areas that provide a spatial link between two habitats (Penrod et al. 2001). Wildlife movement corridors are areas defined by wildlife use for movement events on varying scales (e.g., daily foraging, seasonal migration, or dispersal). The wildlife movement corridors referenced in this document refer to wildlife movement corridors that have been modeled for specific species based on different physical and biological parameters and published in statewide reports. For purposes of this document, the term habitat linkage is used synonymously with wildlife movement corridor (corridor). Habitat linkages and wildlife movement corridors provide the following functions to plant and wildlife species (Beier and Loe. 1992):

- Travel routes for wide-ranging animals, allowing animals to either migrate or come into contact with mates.
- Routes for the propagation of plant species.
- Spatial arrangement for genetic exchange between individuals.
- Areas where populations can move in response to environmental changes or natural disasters.
- Routes by which recolonization can occur where populations have been locally extirpated.

Habitat linkages have been identified as part of recent state- and regional-level studies addressing wildlife connectivity and wildlife movement in California. The *Missing Linkages: Restoring Connectivity to the California Landscape Conference Proceedings* (Penrod et al. 2001) identified habitat linkages on a landscape scale throughout California. The *South Coast Missing Linkages: A Linkage Design for the Tehachapi Connection* (Penrod et al. 2003) and the *California Essential Habitat Connectivity Project* (Spencer et al. 2010) used multicriteria GIS modeling to define habitat linkages in the Tehachapi Mountains and throughout California. In general, these habitat linkages were identified for specific species, with the exception of the *California Essential Habitat Connectivity Project*, which used statewide wildlife information from the CDFG (Spencer et al. 2010). These studies identify habitat linkages that are generally consistent with the habitat linkage areas described in the *Recovery Plan for Upland Species of the San Joaquin Valley*. The *Recovery Plan for Upland Species of the San Joaquin Valley* relies on key special-status species to define core areas, which are portions of habitat large enough to sustain long-term populations of specific species, and satellite areas, which are portions of habitat that support isolated populations of a species but may be too isolated to support populations of species in the wake of significant climatic or environmental events.

Figure 5-7a contains confidential information and has therefore not been included on the website.

Seven major linkages, as defined by the studies described above, intersect the alternative alignments:

- Kings River riparian corridor (Kings River Linkage).
- St. John's River–Cross Creek riparian corridor (St. John's Cross Creek Linkage).
- SR 43/SR 155 area (SR 43/SR 155 Linkage).
- Tule River riparian corridor (Tule River Linkage).
- Allensworth area (Deer Creek–Sand Ridge Linkage).
- Poso Creek riparian corridor (Poso Creek Linkage).
- Kern River riparian corridor (Kern River Linkage).

These linkages and the natural lands that they connect are shown on Figure 5-7b and described in more detail below.

5.7.1.1 Kings River Riparian Corridor

The Kings River riparian corridor and associated surrounding natural lands (collectively referred to as the Kings River Linkage) are a connectivity choke-point linkage, which means that portions currently provide little or no connectivity and that the possibility of losing the function of this area is high. This linkage extends from the eastern Sierra Nevada foothills in Fresno County to Tulare Lake and the remaining alkali sink habitat in Kings County (Penrod et al. 2001). It provides an approximately 60-mile-long contiguous area of natural habitat between these eastern and western regions of the southern San Joaquin Valley. This linkage connects currently and historically occupied habitats of species that rely on riparian vegetation, such as migratory birds, as well as species that rely on the open natural habitat associated with river floodplains, such as the Fresno kangaroo rat. The dominant habitat type within the linkage is riparian forest. The Kings River Linkage overlaps with the BNSF Alternative.

5.7.1.2 St. John Alternate Cross Creek Riparian Corridor

The St. John's River–Cross Creek riparian corridor and associated surrounding natural lands (collectively referred to as the St. John's Cross Creek Linkage) were identified as a linkage but were not assigned a linkage type by the California Missing Linkages conference (Penrod et al. 2001). This linkage extends from the eastern Sierra Nevada foothills in Tulare County to natural habitat near the terminus of Cross Creek in the historical Tulare Lake Bed and in the vicinity of the Tulare Lakebed Mitigation Site (Penrod et al. 2001). It provides an approximately 36-mile long area of patchy natural habitat along the Cross Creek riparian corridor between the eastern Sierra Nevada foothills and the remaining natural lands in the historical Tulare Lake Bed. This linkage connects currently and historically occupied habitats for species that rely on the arid and open natural grassland and alkali sink habitat associated with the southern San Joaquin Valley, such as various kangaroo rat species and the San Joaquin kit fox, as well as species that rely on riparian vegetation, such as migratory birds. The dominant habitat types within the linkage are riparian forest, including valley oak and mixed riparian forest, as well arid grassland and alkali sink habitats. Conservation opportunities for this linkage are good because it spans lands owned by the CDFG and the Corcoran Irrigation District and conservation partnerships are already in place between the CDFG, Corcoran Irrigation District, and the Endangered Species Recovery Program (Penrod et al. 2001). The St. John's Cross Creek Linkage overlaps with the BNSF and Corcoran Bypass alternatives.

Figure 5-7b contains confidential information and has therefore not been included on the website.

5.7.1.3 State Route 43/State Route 155 Area

The SR 43/SR 155 area and associated natural lands (collectively referred to as the SR 43/SR 155 Linkage) are a missing linkage, which means that the area currently provides little to no connectivity but was identified as a priority because of its potential functionality (Penrod et al. 2001). It extends from the remaining natural lands associated with the historical Tulare Lake bed in the north with the remaining natural lands associated with the historical wetlands on the southern end of the Tulare Lake in the south. It provides an approximately 20-mile long patchy connection of natural lands between these two areas, which includes protected public lands like the Kern National Wildlife Refuge, the Pixley NWR, and other undisturbed tracts of land scattered throughout the San Joaquin Valley (Penrod et al. 2001). The SR 43/SR 155 linkage also connects the Pixley/Allensworth, Lost Hills, and Semitropic Ridge satellite areas, which are identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998).

This linkage connects current and historically occupied habitats of species that rely on arid open grassland and alkali sink habitat of the southern San Joaquin Valley, such as San Joaquin kit fox, blunt-nosed leopard lizard, and Tipton kangaroo rat. The major land cover types are agriculture and natural land. The dominant natural habitat types within the natural land are alkali sink scrub, valley grassland, and saltbush scrub. The most significant barriers to wildlife movement are natural habitat gaps up to several miles long, and therefore the need for restoration in this area is extensive; several thousand acres in this area need to be restored from agricultural land to natural habitat for this linkage to function optimally. Conservation opportunities for this linkage are moderate because it spans lands owned by the Department of the Interior and the State of California, but conservation opportunities are constrained by private landowners and the need for large-scale conversion to natural habitat (Penrod et al. 2001). The SR 43/SR 155 linkage intersects the BNSF, Corcoran Bypass, and Allensworth Bypass alternatives.

5.7.1.4 Allensworth Area (Deer Creek-Sand Ridge Linkage)

The Allensworth area and associated natural lands (collectively referred to as the Deer Creek-Sand Ridge Linkage) are a connectivity choke-point and missing linkage. This linkage extends from the eastern Sierra Nevada foothills to remaining natural lands on the western San Joaquin Valley floor. It provides an approximately 25-mile patchy connection of natural lands between these two areas, which includes protected public lands like the Sequoia Foothills core area and the Kreyenhagan and Kettleman Hills core area, which are identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998). The Allensworth area linkage also connects portions of the Pixley/Allensworth, Lost Hills, and Semitropic Ridge satellite areas identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998) and two essential connectivity areas identified by the *California Essential Habitat Connectivity* project that connect the Pixley/Allensworth reserves with the Carrizo Plain/Kettleman Hills natural landscape blocks as well as with various natural landscape blocks northeast of the Pixley/Allensworth reserves (Spencer et al. 2010).

This linkage connects current and historically occupied habitats of multiple special-status species of the southern San Joaquin Valley as well as marsh colonial birds and migratory birds. The dominant natural habitat types are riparian, grassland, vernal pool marshes, and dunes. The most significant barriers to wildlife movement are natural habitat gaps. Conservation opportunities for this linkage are good due to the limited number of landowners. This linkage consists of land owned by the USFWS and S. Wilbur Hacienda, and the potential for riparian restoration is high (Penrod et al. 2001). The Allensworth area linkage intersects the BNSF Alternative (near Allensworth) and the Allensworth Bypass Alternative.

5.7.1.5 Tule River Riparian Corridor

The Tule River riparian corridor and associated natural lands (collectively referred to as the Tule River Linkage) are a connectivity choke-point linkage. This linkage extends from the eastern Sierra Nevada foothills into the San Joaquin Valley floor along the Tule River riparian corridor. It provides an approximately 25-mile-long riparian corridor that connects 10 contiguous miles of valley foothill riparian habitat to natural lands within the SR 43/SR 155 linkage that were historically associated with Tulare Lake marshes (Penrod et al. 2001). Major habitat types in the linkage are valley foothill riparian, grassland, and vernal pool habitat. The Tule River linkage intersects the BNSF Alternative and the Corcoran Bypass Alternative.

5.7.1.6 Poso Creek Riparian Corridor

The Poso Creek riparian corridor and associated natural lands (collectively referred to as the Poso Creek Linkage) are a missing linkage. This linkage extends from natural habitat near the Kern National Wildlife Refuge to natural habitat in the eastern Sierra Nevada foothills. It provides an approximately 35-mile patchy connection of natural land that connects northeast Bakersfield to the Kreyenhagan and Kettleman Hills populations of the San Joaquin kit fox, which are identified in the *Recovery Plan for Upland Species of the San Joaquin Valley* (USFWS 1998; Penrod et al. 2001). The Poso Creek riparian corridor linkage also connects populations of San Joaquin kit fox between Bakersfield and the Pixley/Allensworth, Lost Hills, and Semitropic Ridge core and satellite areas (USFWS 1998). The major land cover type in and surrounding the linkage is agricultural. Major habitat types in the natural habitat of the linkage are riparian and upland habitat. Major barriers to wildlife include gaps in habitat cover from 1 to 5 miles in length. The features that currently facilitate wildlife movement include underpasses as well as bridges over major highways (SR 99). The Poso Creek riparian corridor linkage intersects the BNSF and Allensworth Bypass alternatives.

5.7.1.7 Kern River Riparian Corridor

The Kern River riparian corridor and associated natural lands (collectively referred to as the Kern River Linkage) are a connectivity-choke point linkage. This linkage extends from the eastern Sierra Nevada foothills to the western Coast Range foothills and connects the natural lands along the approximately 30-mile-long Kern River riparian corridor, including western satellite population areas of northeast Bakersfield identified in the *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998; Penrod et al. 2001). These areas are also identified as essential connectivity areas by the *California Essential Habitat Connectivity* (Spencer et al. 2010).

This linkage connects current and historically occupied habitats of multiple special-status species of the southern San Joaquin Valley, including the Buena Vista lake shrew (*Sorex ornatus relictus*), San Joaquin kit fox, and the Tipton kangaroo rat (Penrod et al. 2001). In addition, this linkage provides connectivity for native aquatic species such as the Kern brook lamprey, which may be present in the riverine channel of the Kern River. Dominant habitat types within the natural habitat of this linkage are riparian and upland. The most significant barriers to wildlife movement are gaps in riparian habitat and water impoundments, which potentially restrict the movement of terrestrial and aquatic species across areas that formerly had only intermittent water flow (Penrod et al. 2001). The Kern River riparian corridor linkage intersects the BNSF and Bakersfield South alternatives.

5.7.2 Survey Results

Field surveys identified and confirmed the presence of the seven major linkages, described above, that intersect the alternative alignments. Natural habitat associated with each linkage was mapped and investigated for wildlife usage. Wildlife usage was observed by sign and tracks

detected within riparian corridors along the Kings River, Cross Creek, Poso Creek, and Kern River. This usage suggests that the natural habitat within these linkages may actively serve as migration and movement corridors for common wildlife species (e.g., western toad, red-tailed hawk, great-horned owl, coyote, black-tailed jackrabbit, and cottontail), and could therefore act as migration and movement corridors for special-status wildlife species of similar size and habitat requirements. The conditions observed within the linkages are described below. For purposes of this discussion, the linkages are grouped by dominant natural habitat and existing condition of the linkage observed.

5.7.2.1 Riparian Linkages: Kings River, St. John's River-Cross Creek, Tule River, Poso Creek, and Kern River

In the Habitat Study Area, the Kings River, St. John's River–Cross Creek, Tule River, Poso Creek, and Kern River linkages appear to provide opportunities for wildlife movement across the San Joaquin Valley in an east-west direction. Field surveys of these riparian areas identified tracks and scat from a variety of small- and medium-sized mammal species such as skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), coyote (*Canis latrans*), black-tailed jackrabbit, and cottontail. At the intersections between these riparian corridor linkages and major roads and railways (i.e., SR 43 and the BNSF right-of-way), elevated bridges span the riparian channels. Within the limits of the Habitat Study Areas, it is reasonable to assume these elevated structures facilitate wildlife movement in riparian corridors (under the structures) across the San Joaquin Valley in an east-west direction. Other special-status and common wildlife species that could reasonably be expected to use these wildlife movement corridors for daily and migratory movements and dispersal include the American badger, San Joaquin kit fox, beaver (*Castor canadensis*), kangaroo rat (*Dipodomys* sp.), bobcat (*Felis rufus*), long-tailed weasel (*Mustela frenata*), and muskrat (*Ondatra zibethicus*). However, these elevated structures may also have temporary impacts on individuals from shading and traffic noise, although over time most species, especially common species like raccoons and skunks, likely become acclimated to these effects.

5.7.2.2 Patchy Natural Habitat Linkages: SR 43/SR 155 and Allensworth Area (Deer Creek-Sand Ridge)

In the Habitat Study Area, the SR 43/SR 155 linkage appears suboptimal because of its location along a roadway, but it may nevertheless provide marginal wildlife movement opportunities across the San Joaquin Valley in a north-south direction. Transect surveys in the vicinity of the SR 43/SR 155 linkage confirmed that it consists of extensive agricultural lands through a mosaic of fragmented natural lands, which largely follow existing roadways. It is possible that these roadways act as landscape features that wildlife such as the San Joaquin kit fox, coyote, and bobcat may follow between natural habitats in the Kern National Wildlife Refuge, Pixley NWR, and other surrounding natural lands.

Field surveys in the vicinity of the Allensworth area linkage showed evidence of fragmented, remnant alkali desert scrub and annual grassland habitats interspersed with predominantly developed agricultural habitats. Although the remnant natural parcels appear to provide opportunities for wildlife movement in the Habitat Study Area between the Allensworth ER and Allensworth State Park, they remain disconnected from neighboring natural parcels. Therefore, their ability to facilitate wildlife movement across the landscape of the San Joaquin Valley is limited.

5.7.2.3 Other Areas

Outside of the riparian corridor and patchy natural habitat linkages, few opportunities for wildlife movement exist. The remainder of the Habitat Study Area consists of developed urban and agricultural areas. Urban areas are dominated by hardscaped landscapes consisting of roadways

and buildings interspersed with ornamental vegetation such as nonnative trees, shrubs, and lawns. Agricultural areas are dominated by row crops, orchards, and vineyards. All of these features are disturbed on a daily to seasonal basis. These areas provide, at best, marginal habit for wildlife. On a metapopulation level, these urban and agricultural areas act as barriers to natural wildlife movement and provide little to no natural habitat value to most plant and wildlife species. Select species, however, have learned to adapt and acclimate to developed habitats. The San Joaquin kit fox, for example, still persists within the city limits of Bakersfield where it inhabits vacant lots and open areas in otherwise marginal habitat (CDFG 2012a).

5.7.3 Project Impacts

The construction and operation of the HST project may result in direct impacts and/or indirect impacts in habitat types where linkages and potential movement corridors have been identified. Direct impacts include the obstruction of wildlife movement because of project infrastructure, security fencing and construction fencing. Indirect impacts may occur as a result of noise, vibrations, visual or light pollution that could result in temporary shifts in use of corridors, foraging patterns or territories, nursery or rookery abandonment and increased predation. Furthermore, during construction, the installation of Environmentally Sensitive Area and wildlife exclusion fencing around sensitive resource areas could lead to as much as 7 miles of linear obstruction to wildlife movement and migration in natural habitat areas for between 2 to 5 consecutive years.

In the case where the rail would be constructed on elevated structures, the project would have negligible interferences to linkages because the elevated portions of the rail would span several miles and would allow unimpeded wildlife passage. In the case of at-grade portions of the rail, linkages would be at risk of losing their functionality, and construction and operations would further impair the tenuous habitat linkages between existing natural habitat blocks.

Although five of the seven major linkages identified are associated with riparian corridors, construction of the rail would not impede movement of aquatic species, such as the Kern brook lamprey, which may be present in the Friant–Kern Canal in the City of Bakersfield. The project would have negligible impacts on the migration and dispersal of this and other aquatic species since the rail would be constructed on elevated structures or bridges spanning the canal and all riparian corridors to allow wildlife passage.

5.7.4 Avoidance and Minimization Measures

5.7.4.1 Design Elements

Several engineering design features would facilitate wildlife crossing opportunities across the seven major linkages, the most extensive of which are dedicated wildlife crossing structures. These features would help minimize obstruction to wildlife movement within the linkages and help maintain the connectivity that the linkages provide between protected public lands. These are the most important design features for maintaining connectivity across the alignments because these are permanent features in the design of the rail and they can continue to provide connectivity across the alignments even as land use around the project changes. This allows for opportunities to restore natural land on either side of the rail where dedicated wildlife crossing structures would be provided.

Dedicated wildlife crossing structures would be provided from approximately Cross Creek (Kings County) south to Poso Creek (Kern County), which includes both the SR 43/SR 155 and Allensworth area linkages, in at-grade portions of the railroad embankment at approximately 0.3-mile intervals. The spacing of these structures was determined, in coordination with Endangered Species Recovery Program biologist Brian Cypher, Ph.D, using the San Joaquin kit fox as a focal

species that encompasses the movement requirements of most wildlife in the southern San Joaquin Valley (Cypher 2010). The 0.3-mile spacing was designed so that there is at least one crossing structure approximately 6 km^2 in size per average San Joaquin kit fox home range. At 0.3-mile spacing, this provides approximately six crossing opportunities per home range of the San Joaquin kit fox, which should also allow ample crossing opportunities for other species with larger home ranges, such as the coyote. Where bridges, aerial structures, and road crossings coincide with proposed dedicated wildlife crossing structures, such features would serve the function of and supersede the need for dedicated wildlife crossing structures. The location of these structures is shown on Figure 5-7c.

Design of these dedicated wildlife crossing structures was also completed in coordination with Dr. Cypher. The preliminary wildlife crossing structure design consists of modified culverts in the embankment that would support the HST tracks. The typical culvert from end-to-end would be 73 feet long (crossing structure distance), would span a width of approximately 10 feet (crossing structure width), and provide 3 feet of vertical clearance (crossing structure height), resulting in a calculated openness factor (Bremner-Harrison et al. 2007) of 0.41.[2] Additional wildlife crossing structure designs could include circular or elliptical pipe culverts, and larger (longer) culverts with crossing structure distances of up to 100 feet. However, any changes to wildlife crossing structure design must be constrained by a minimum of 3 feet of vertical clearance (crossing structure height), and must meet or exceed a minimum 0.41 openness factor. Wildlife crossing structures may be submerged below-ground; however, no more than half of the structure would be submerged to maintain the viability of a structure's openness factor (3-feet-high structure = 1.5 feet above ground level, 1.5 feet below ground level). Where wildlife crossing structures are submerged, the box culverts and the slopes approaching the culverts would be engineered to prevent water from ponding at either ends or within the culvert for any considerable amount of time (i.e., no more than 2 to 3 days). Options for drainage include sloped culvert floors that direct water to the margins or that direct water outward toward the ends of each structure.

Other engineering design features that would facilitate wildlife crossing opportunities include elevated portions of the alignments, bridges over riparian corridors, road overcrossings and undercrossings, and drainage facilities (i.e., large-diameter [60–120 inches] culverts and paired 30-inch culverts). There are elevated structures proposed over the five riparian linkages: the Kings River, St. John's River–Cross Creek, Tule Creek, Poso Creek, and Kern River linkages. In addition, dedicated wildlife crossing structures would be placed between 100 and 500 feet to the north and south of the elevated structures along these riparian linkages. These features would minimize disturbance to natural habitat and therefore minimize disturbance to wildlife usage of these linkages. Placement of these elevated structures and associated dedicated wildlife crossings are based on the reports described in Section 5.6, which identified landscape-level linkages and corridors using GIS modeling, as well as the focused field surveys described in Sections 3.4 and 5.6 that confirmed presences of wildlife species in the seven major linkages.

[2] (Height x Width) / Distance = Openness Factor; (3 ft x 10 ft) / 73 ft = 0.41

Figure 5-7c contains confidential information and has therefore not been included on the website.

5.7.4.2 Construction Avoidance and Minimization Measures

To minimize the effects of construction on wildlife movement corridors, the following avoidance and minimization measures will be implemented:

- During ground-disturbing activities, wildlife corridor undercrossing(s) will be installed at designated locations, shown on the construction drawings.
- Ground-disturbing activities within the wildlife linkages (e.g., SR 43/SR 155 and Allensworth area linkages) will be minimized during nighttime hours to the extent practicable.

To further mitigate the effects of project operations on wildlife movement corridors, the following avoidance and minimization measures will be implemented:

- The design plans will be further refined to identify optimal wildlife-friendly crossing locations within linkages in the Allensworth area (i.e., the SR 43/SR 155 and Deer Creek–Sand Ridge linkages) to maintain or enhance crossing, dispersal, and migration opportunities for wildlife across the HST alternatives.
- To prevent predation by larger predators (i.e., coyotes, bobcats, red foxes, and dogs) at wildlife undercrossings, artificial dens will be installed at each dedicated wildlife crossing structure (Figures 5-7a through 5-7c) to provide escape cover for wildlife (e.g., San Joaquin kit foxes).
- During final design, a Wildlife Corridor Monitoring Program will be prepared that will document wildlife usage of the undercrossing(s) during operation of the project. Wildlife usage of the designated undercrossing will be monitored and reported, consistent with the methods identified in the Wildlife Corridor Monitoring Program.
- Prior to operation of the HST, permanent mammal-proof directional fencing will be installed along portions of the project that are adjacent to wildlife movement corridors. The design of the mammal-proof fencing and the exact locations where mammal-proof fencing will be installed will be determined in consultation with the USFWS and CDFG.

5.7.5 Compensatory Mitigation

Compensatory mitigation for impacts on wildlife movement corridors and linkages will occur through compensatory mitigation for jurisdictional waters and special-status wildlife species, as determined through agency coordination and permitting. To the extent feasible, compensatory mitigation lands that provide connectivity among natural lands will be targeted for acquisition. No additional compensatory mitigation is anticipated or proposed at this time.

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Chapter 6.0

Results: Permits and Technical Studies for Special Laws or Conditions

6.0 Permits and Technical Studies for Special Laws or Conditions

This chapter summarizes the federal, state, regional, and local regulatory requirements, described in Chapter 3, that apply to the proposed project, and the actions needed to comply with the various requirements based on the impacts identified in Chapter 5.

6.1 Endangered Species Act Consultation Summary

Section 7 of the federal ESA provides a means for authorizing "take" of threatened or endangered species by federal agencies, and applies to actions that are conducted, permitted, or funded by a federal agency. The statute requires federal agencies to consult with the USFWS or NMFS, as appropriate, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species or result in destruction or adverse modification of critical habitat for these species. If a proposed project "may affect" a listed species or destroy or modify critical habitat, the lead agency is required to prepare a biological assessment evaluating the nature and severity of the potential impact.

6.1.1 U.S. Fish and Wildlife Service

Because the proposed project will result in direct and indirect impacts on federally listed plant and wildlife species and designated critical habitat, Section 7 consultation will be required with the USFWS. The FRA will initiate formal and informal consultation with the USFWS through the submittal of a Biological Assessment (BA). The BA will identify the various project impacts on federally listed species, and make a determination of no effect, not likely to adversely affect, or likely to adversely affect, based on the nature and magnitude of the impacts. The BA will also describe the project's proposed conservation measures to avoid, minimize, and compensate for adverse effects. As part of the formal consultation, the USFWS is required to issue a Biological Opinion within 135 days of receipt of a complete BA.

6.1.2 National Marine Fisheries Service

Because the proposed project will not directly or indirectly impacts on federally listed fish species regulated by the NMFS, Section 7 consultation will not be required with NMFS.

6.2 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. Section 1801 et seq.) requires all federal agencies to consult with the NMFS on all actions or proposed actions (permitted, funded, or undertaken by the agency) that may adversely affect fish habitats. It also requires cooperation among the NMFS, the councils, fishing participants, and federal and state agencies to protect, conserve, and enhance essential fish habitat, which is defined as those waters and substrates needed by fish for spawning, breeding, feeding, and growth to maturity.

Because the proposed project will not adversely affect fish habitat, the FRA will not be required to consult with the NMFS under the Magnuson-Stevens Fishery Conservation and Management Act.

6.3 California Endangered Species Act Consultation Summary

The California ESA (Sections 2050 to 2085) establishes the policy of the state to conserve, protect, restore, and enhance threatened or endangered species and their habitats by protecting "all native species of fishes, amphibians, reptiles, birds, mammals, invertebrates, and plants, and their habitats, threatened with extinction and those experiencing a significant decline which, if not halted, would lead to a threatened or endangered designation."

For projects that would affect a species that is federally and state listed, compliance with the federal ESA satisfies the California ESA if CDFG determines that the federal incidental take authorization is consistent with the California ESA under Section 2080.1. For projects that would result in take of a species that is state listed only, the project sponsor must apply for a take permit, in accordance with Section 2081(b).

The project may only adversely affect four federal and state listed species, and ten species that are state listed only. An Incidental Take Permit Application under Section 2081(b) will be prepared for all 14 state listed species, including the state only listed species and the state and federally listed species with state listed status. The Incidental Take Permit Application will disclose the range of the project impacts on California ESA listed-protected species and describe how these impacts would be fully mitigated. As part of the Incidental Take Permit process, additionally proposed compensatory mitigation locations and requirements would be identified. The Authority will consult with the CDFG to ensure that proposed avoidance and minimization measures are sufficient to avoid take of California fully protected species. Therefore, because federally listed species and state listed species will be consulted on separately, a consistency determination under Section 2080.1 is not necessary.

6.4 Wetlands and Other Waters Coordination Summary

During the surveys of jurisdictional waters conducted in the spring and summer of 2010, special aquatic features, including seasonal wetlands, vernal pools, vernal pool and swale complexes, irrigation channels, ditches, retention and detention basins, seasonal riverine areas, reservoirs, and culverts, were identified within the Wetland Study Area. Construction of the project, as currently designed, is anticipated to have permanent and temporary impacts on jurisdictional waters. To comply with federal and state regulations protecting jurisdictional waters, permits will be required from the USACE, the CDFG and the State Water Resources Control Board. The following describes the various requirements in more detail.

6.4.1 Section 404 of the Clean Water Act

A Section 404 permit is required when a project will result in discharge of dredged or fill materials into wetlands and other waters under USACE and EPA jurisdiction. The proposed project will result in fill being placed in waters of the U.S. as well as alterations of the bed and bank of seasonal riverine features in the project footprint. These activities will permanently and temporarily impact wetlands and other waters of the U.S. that are of a magnitude greater than the minimum acreage allowed under a nationwide permit application. Therefore, the project will need to apply for an individual permit, which is a lengthier process than the standard nationwide permit. Processing such permits involves evaluation of individual, project-specific applications in what can be considered three steps: pre-application consultation (for larger projects), formal permit application review, and decision making (USACE 2010).

The initial step will be the submittal of the Wetland Delineation Technical Report, which seeks a preliminary jurisdictional determination of waters of the U.S. under USACE jurisdiction. In

compliance with the Section 404 (b)(1) Guidelines issued by the EPA, Section 404 permits may only be issued for a least environmentally damaging practicable alternative (33 U.S.C. Sections 1251 to 1376). Compliance with Section 404 of the Clean Water Act requires compliance with several other environmental laws and regulations. The USACE cannot issue an individual permit until the requirements of NEPA, the federal ESA, and the National Historic Preservation Act have been met. Additionally, no permit can be issued or verified until a water quality certification or waiver of certification has been issued pursuant to CWA Section 401 (Water Quality Certification).

6.4.2 Section 401 of the Clean Water Act

A Section 401 Water Quality Certification is necessary when a project will impact federal and state waters, and/or when a project requires a 404 permit. A Section 401 Water Quality Certification is issued by the RWQCB for a region, except in cases where a project crosses through multiple regional board jurisdictions, in which case the State Water Resources Control Board takes authority. Since the proposed project will require a 404 permit and crosses through multiple regional board service areas, a Section 401 Water Quality Certification will need to be requested from the State Water Resources Control Board.

6.4.3 Executive Order 11990

Executive Order 11990 was designed to protect wetlands and to minimize adverse impacts associated with the destruction of wetlands. It requires all projects with a federal nexus to avoid construction in wetlands unless there is no alternative or the construction is designed in such a way that it includes all practicable measures to minimize impacts on wetlands. Compliance with this Executive Order will be attained through coordination with the USACE and the SWRCB. The Fresno to Bakersfield project has and will continue to coordinate with the USACE and SWRCB. Moreover, in addition to future correspondence, this technical report will satisfy coordination requirements under this executive order by providing a record of past coordination between the project and the regulatory agencies.

6.4.4 California Fish and Game Code Sections 1600-1616

Section 1600-1616 of the State Fish and Game Code requires notification of CDFG before any project activity that would do any of the following:

- Substantially divert or obstruct the natural flow of any river, stream, or lake.
- Substantially change or use any material from the bed, channel, or bank of any river, stream, or lake.
- Deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

The notification requirement applies to any work undertaken in or near a river, stream, or lake that flows at least intermittently through a bed or channel. This includes ephemeral streams, desert washes, and watercourses with a subsurface flow. It may also apply to work undertaken within the floodplain of a body of water. Preliminary notification and project review generally occur during the environmental process. The project will result in permanent alterations to the bed and banks of the Kern River as well as temporary alterations to other smaller creeks that cross through the project footprint. In addition, all work within canals, irrigation channels and drainage ditches will fall under CDFG jurisdiction. As a result, a lake and streambed alteration agreement will be required from the CDFG for this project.

6.5 Invasive Plant Species

This section describes regulations pertaining to invasive plant species and their potential impacts on special-status plant species, and identifies the appropriate pathways to comply with the regulations.

6.5.1 Executive Order 13112

The intent of Executive Order 13112, Invasive Species, is "to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause." Per the executive order, determinations of the likelihood of introducing or spreading invasive species and a description of measures being taken to minimize their potential harm should be part of any NEPA process.

A public draft of the EIR/EIS (part of the NEPA process) should be available in January 2011. The EIR/EIS identifies and describes impacts on biological resources and proposed mitigation efforts to lessen the potential harm. No additional consultation would be required outside of the NEPA process. The avoidance and minimization measure listed under Section 5.2 and Section 5.4 would reduce the likelihood of invasive species introduction.

6.5.2 Native Plant Protection Act

California's Native Plant Protection Act (NPPA) requires all state agencies to conserve endangered and rare native plants (Fish and Game Code Sections 1900-1913). Provisions of the NPPA prohibit the taking of listed plants from the wild and require notification of the CDFG at least 10 days before any change of land use. Botanical surveys have identified one federally listed plant species and two rare plant species that occur within the project footprint. Moreover, there are 22 additional special-status plant species that have the potential to occur within the Special-Status Plant Study Area. To comply with the provisions of this act, the Authority will consult with the CDFG through the Incidental Take Permit Application process, and will continue to consult with these agencies informally as required to comply with the provisions of this act.

6.6 Other Regulatory and Environmental Compliance Needs

This section describes additional regulatory and environmental compliance needs for special-status wildlife species and aquatic resources. These regulations do not require direct consultation with agencies, but instead advise consideration and implementation of avoidance and minimization measures.

6.6.1 Migratory Bird Treaty Act

The MBTA (U.S.C. Sections 703 to 712) makes it unlawful, unless expressly authorized by permit pursuant to federal regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export at any time, or in any manner, any migratory bird, or any part, nest, or egg of any such bird."

Most bird species occurring in California fall under the protection of the MBTA except those species that belong to the families not listed in any of the four treaties, such as wrentit (*Chamaea fasciata*), European starling (*Sturnus vulgaris*), California quail (*Callipepla californica*), ring-necked pheasant *(Phasianus colchicus*), and chukar (*Alectoris chukar*), among others less

common in California. The MBTA is administered by the USFWS Division of Migratory Bird Management.

Because the proposed project has the potential to take nests, eggs, young, or individuals of these protected species, the Authority will take measures to avoid the take of any migratory birds, nests, or eggs by implementing the proposed avoidance and minimization. This technical report identifies and proposes avoidance, minimization, and mitigation efforts to avoid the direct loss. As such, no direct take of migratory birds, or any part, nest, or egg of any such birds, is anticipated.

6.6.2 Protection of Migratory Bird Populations

Executive Order 13186 directs each federal agency taking actions that have or may have adverse impacts on migratory bird populations to work with the USFWS to develop a memorandum of understanding that will promote the conservation of migratory bird populations. This includes avoiding and minimizing adverse impacts on migratory birds when conducting agency actions; restoring and enhancing migratory bird habitats; and preventing or abating the pollution or detrimental alteration of the environment for the benefit of migratory birds.

Because the proposed project may have direct impacts on migratory bird populations, the FRA will take measures to avoid and minimize adverse impacts on migratory bird resources by implementing the proposed avoidance, minimization, and compensatory mitigation efforts identified in this document and determined through consultation with the USFWS.

6.6.3 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S.C. Sections 668 to 668d, 54 Statute 250) prohibits the destruction of bald and golden eagles and their occupied and unoccupied nests.

Although the proposed project may result in direct and indirect impacts on bald and golden eagle foraging habitat, these species are not expected to nest within the Habitat Study Area. Therefore, destruction of bald and golden eagles and their occupied and unoccupied nests is not expected. Regardless, the FRA will take measures to avoid and minimize destruction of bald and golden eagles and their occupied and unoccupied nests by implementing the proposed avoidance, minimization, and mitigation efforts identified in this document and determined through consultation with the USFWS.

6.6.4 California Fish and Game Code—Wildlife

This subsection describes the various California Fish and Game Code (CFGC) regulations and the appropriate pathways the Authority will take to comply with these requirements.

6.6.4.1 Bird Nesting Protections

Bird nesting protections (Sections 3503, 3503.5, 3511, and 3513) in the CFGC include the following:

- Section 3503 prohibits the take, possession, or needless destruction of the nest or eggs of any bird.
- Section 3503.5 prohibits the take, possession, or needless destruction of any nests, eggs, or birds in the orders Falconiformes (new world vultures, hawks, eagles, ospreys, and falcons, among others), or Strigiformes (owls).
- Section 3511 prohibits the take or possession of fully protected birds.

- Section 3513 prohibits the take or possession of any migratory nongame bird or part thereof, as designated in the MBTA. To avoid violation of the take provisions, it is generally required that project-related disturbance at active nesting locations be reduced or eliminated during the nesting cycle.

Executive Order 13186 directs each federal agency taking actions that have or may have adverse impacts on migratory bird populations to work with the CDFG to develop a memorandum of understanding that will promote the conservation of migratory bird populations. This includes avoiding and minimizing adverse impacts on migratory bird resources when conducting agency actions; restoring and enhancing migratory bird habitats; and preventing or abating the pollution or detrimental alteration of the environment for the benefit of migratory birds.

Because the proposed project has the potential to take nests, eggs, young, or individuals of these protected species, the FRA will take measures to avoid the take of any migratory birds, nests, or eggs by implementing the proposed avoidance, minimization, and mitigation efforts identified in this technical report to avoid the direct loss. As such, no direct take of migratory birds, or any part, nest, or egg of any such birds, is anticipated.

6.6.5 Fully Protected Species

Four sections of the CFGC list 37 fully protected species (CFGC Sections 3511, 4700, 5050, and 5515). These sections prohibit take or possession "at any time" of the species listed, with few exceptions, and state that "no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to 'take' the species," and that no previously issued permits or licenses for take of the species "shall have any force or effect" for authorizing take or possession.

Because the proposed project could lead to take or possession of fully protected species, the Authority will consult with the CDFG to ensure that proposed avoidance and minimization measures are sufficient to avoid impacts on California fully protected species. Additional avoidance and minimization measures would be identified through informal consultation with the CDFG.

Chapter 7.0
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7.0 References

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Chapter 8.0
Preparer Qualifications

8.0 Preparer Qualifications

This chapter lists the URS/HMM/Arup Joint Venture employees, and provides a summary of their qualifications, roles, and responsibilities in the field surveys and preparation of this report.

8.1 Field Surveys

Field surveys were conducted by URS/HMM/Arup Joint Venture employees. The qualification of the personnel involved with the various field surveys are described below.

8.1.1 Reconnaissance Field Surveys Personnel and Experience

The reconnaissance field surveys were conducted by Justin Whitfield, Biology Task Lead; Jan Novak, Senior Wetland Scientist; Todd Lemein, Botanist; Matthew Bettelheim, Senior Wildlife Biologist; and Melissa Newman, Senior Wildlife Biologist.

8.1.2 Delineation of Jurisdictional Waters Survey Personnel and Experience

Sundeep Amin Wetland Scientist	B.S., Ecology, Behavior, and Evolution, University of California–San Diego. 5 years of experience.
Joe Bandel Wetland Scientist	B.S., Wildlife, Fish, and Conservation Biology, University of California–Davis. 8 years of experience.
Jessica Brinbaum Wetland Scientist	M.S., Natural Resources: Planning and Interpretation, Humboldt State University; B.S., Biology, Trinity College. 4 years of experience.
Brian Carver Wetland Scientist	B.S., Aquatic Biology, University of California–Santa Barbara. 12 years of experience.
John Davis IV Team Leader	M.S., Biology, Cal Poly State University, San Luis Obispo; B.S., Ecology, San Diego State University. 13 years of experience.
Fletcher Halliday Wetland Scientist	B.S., Molecular Environmental Biology, University of California–Berkeley. 4 years of experience.
Paul Hamidi Team Leader	M.S., Forestry, University of Montana; B.S., Forestry, University of Montana. 14 years of experience.
Greg Hoisington Wetland Scientist	M.S., Biology, California State University–Long Beach; B.S., Ecology and Environmental Biology, California State University–Long Beach. 5 years of experience.
Jeffrey Jarvis Wetland Scientist	M.S., Biology, California State University–Fullerton; B.S., Biological Science, California State University–Fullerton. 3 years of experience.
Chris Julian Team Leader	B.S., Biology, University of California–Santa Barbara. 8 years of experience.
Marina Kasa Wetland Scientist	M.S., Environmental Science and Management, University of California–Santa Barbara; B.S., Animal Biology–Wildlife Conservation, University of California– Davis. 2 years of experience.

Bill Kidder Wetland Scientist	Certificate of Wetland Science and Management, University of Washington; B.S., Wildlife Ecology, University of Maine; B.S., Forestry, University of Maine. 11 years of experience.
Julie Love Wetland Scientist	M.S., Environmental Science and Management, University of California–Santa Barbara; B.S., Marine Biology, University of California–Los Angeles. 8 years of experience
Mary McClanahan Team Leader	M.S., Plant Science, California State University-Fresno; B.S., Range Science, University of Idaho-Moscow. 25 years of experience.
Jan Novak Wetland Resource Survey Task Leader	B.S., Soil Science, California Polytechnic State University, San Luis Obispo. 10 years of experience.
Kristiaan Stuart Team Leader	M.S., Biology, Plant Ecology, California State University–Chico; B.S., Biology, Ecology, California State University–Chico. 18 years of experience.
Jennifer Teschler Wetland Scientist	B.S., Environmental Systems: Ecology, Behavior, and Evolution, University of California–San Diego. 2 years of experience.

8.1.3 Botanical Surveys Personnel and Experience

		Early Spring Survey (March 15–April 2)	Late Spring Survey (April 19–April 23)	Early Summer Survey (May 17–May 28)	Late Season Survey (July 5–July 9)
Alyssa Berry Botanist	B.A., Earth and Environmental Science, Wesleyan University. 4 years of experience.	X	—	—	—
Karen Brimacombe Botanist	M.S., Botany, University of Hawaii; B.S., Psychology, Miami University. 16 years of experience.	—	X	—	—
Chris Hargreaves Botanist	B.S., Environmental Studies, University of Utah. 6 years of experience.	X	X	X	—
Dr. Bob Holland Botanist	Ph.D., Ecology, University of California–Davis. 1978 M.S., Ecology, University of California– Davis. 1974 B.A., Environmental Studies, Antioch College, Yellow Springs, OH. 1972. 32 years of experience.	—	X	X	—

		Early Spring Survey (March 15–April 2)	Late Spring Survey (April 19–April 23)	Early Summer Survey (May 17–May 28)	Late Season Survey (July 5–July 9)
David Kisner Botany Team Leader	M.S., Ecology, San Diego State University; B.A., Biology, Evolution, and Ecology, University of California–Santa Barbara. 17 years of experience.	X	—	—	—
Danni Kline Botanist	B.S., Botany, University of Washington. 11 years of experience.	X	X	X	—
Todd Lemein Botany Task Manager	B.S., Ecology and Evolution, University of California-Santa Barbara. 5 years of experience.	X	X	—	—
Robin Murray Botanist	B.S., Botany and Environmental Biology, Humboldt State University. 3 years of experience.	X	—	—	—
Ivan Parr Botanist	B.S., Environmental Science, Saint Mary's College of California. 5 years of experience.	X	X	X	X
Galen Peracca Botany Team Leader	Master of Forestry, Forestry, University of California–Berkeley; B.S., Resource Management, University of California–Berkeley. 8 years of experience.	—	X	—	—
Casey Stewman Botany Team Leader	M.A., Biological Sciences, Humboldt State University; B.S., Biological Sciences, Humboldt State University. 11 years of experience.	X	X	X	X
George Strnad Botany Team Leader	M.S., Regional Planning and Landscape Architecture, Czech Technical University, Praha; B.A., Architecture, Czech Technical University, Praha. 25 years of experience.	X	—	X	—
Kristiaan Stuart Botany Team Leader	M.S., Biology, Plant Ecology, California State University–Chico; B.S., Biology, Ecology, California State University–Chico. 18 years of experience.	—	—	X	—

		Early Spring Survey (March 15–April 2)	Late Spring Survey (April 19–April 23)	Early Summer Survey (May 17–May 28)	Late Season Survey (July 5–July 9)
Jeff Walker Botany Team Leader	B.S., Botany and Environmental Studies, University of Washington; Wetland Science Management Certification, University of Washington. 15 years of experience.	X	X	X	—

8.1.4 Wildlife Habitat Assessment Surveys Personnel and Experience

Rachel Avila Wildlife Biologist	B.A., Anthropology, University of California–Santa Cruz. 3 years of experience.
Matthew Bettelheim Wildlife Habitat Assessment Task Leader	B.S., Ecology, Behavior, and Evolution, University of California–San Diego. 12 years of experience.
Dave Compton Wildlife Biologist	M.A., U.S. History, Marquette University; B.A., History, Christian Brothers College. 11 years of experience.
Ronald Cummings Habitat Assessment Team Leader	B.S., General Biology, Oregon State University. 21 years of experience.
Heidi Dunbar Wildlife Biologist	B.S., Biology, California State University–Fresno. 2 years of experience.
Kate Eldredge Wildlife Biologist	B.S., Biology, California State University–Bakersfield; B.A., Anthropology, California State University–Bakersfield. 21 years of experience.
Jim Hornback Wildlife Biologist	B.S., Natural Resources, California State University–Humboldt. 18 years of experience.
Brian Latta Habitat Assessment Team Leader	B.S., Natural Resource Management, University of Maryland. 21 years of experience.
Melissa Newman Habitat Assessment Team Leader	M.S., Biology, University of California–San Diego; B.S., General Biology, University of California–San Diego. 7 years of experience.
David Pecora Wildlife/Fisheries Biologist	B.S., Marine Science, Kutztown University of Pennsylvania. 6 years of experience.
Crissy Slaughter Wildlife Biologist	B.A., Aquatic Biology, University of California–Santa Barbara. 13 years of experience.
Rebecca Verity Habitat Assessment Team Leader	Ph.D. Candidate and M.S., Microbiology, Cornell University; M.S., Oceanography, Scripps Institution of Oceanography; B.S., Marine Biology, Humboldt State University. 10 years of experience.

8.1.5 BNSF Surveys Personnel and Experience

Kate Eldredge Wildlife Biologist	B.S., Biology, California State University–Bakersfield; B.A., Anthropology, California State University–Bakersfield. 21 years of experience.
Chris Hargreaves Botanist	B.S., Environmental Studies, University of Utah. 6 years of experience.
Jeffrey Jarvis Wetland Scientist	M.S., Biology, California State University–Fullerton; B.S., Biological Science, California State University–Fullerton. 3 years of experience
Brian Latta Wildlife Biologist	B.S., Natural Resource Management, University of Maryland. 21 years of experience.
Ivan Parr Botanist	B.S., Environmental Science, Saint Mary's College of California. 5 years of experience.
Galen Peracca Wetland Scientist/BNSF Team Leader	Master of Forestry, Forestry, University of California–Berkeley; B.S., Resource Management, University of California–Berkeley. 8 years of experience.
Kristiaan Stuart Wetland Scientist/BNSF Team Leader	M.S., Biology, Plant Ecology, California State University–Chico; B.S., Biology, Ecology, California State University–Chico. 18 years of experience.

8.1.6 Engineering Design Considerations Surveys Personnel and Experience

Jessica Birnbaum Wetland Scientist	M.S., Natural Resources: Planning and Interpretation, Humboldt State University; B.S., Biology, Trinity College. 4 years of experience.
Ronald Cummings Wildlife Biologist/Team Leader	B.S., General Biology, Oregon State University. 21 years of experience.
Connor Dibble Wetland Scientist	B.S., Environmental Sciences, University of California–Berkeley, B.A., Integrative Biology, University of California–Berkeley. 4 years of experience.
Chris Hargreaves Botanist	B.S., Environmental Studies, University of Utah. 6 years of experience.
Greg Hoisington Wetland Scientist	M.S., Biology, California State University-Long Beach; B.S., Ecology and Environmental Biology, California State University-Long Beach. 5 years of experience.
Jeffrey Jarvis Wildlife Biologist	M.S., Biology, California State University-Fullerton; B.S., Biological Science, California State University-Fullerton. 3 years of experience.
Brian Latta Wildlife Biologist	B.S., Natural Resource Management, University of Maryland. 21 years of experience.
Ivan Parr Botanist	B.S., Environmental Science, Saint Mary's College of California. 5 years of experience.
Kristiaan Stuart Wetland Scientist/ Team Leader	M.S., Biology, Plant Ecology, California State University–Chico; B.S., Biology, Ecology, California State University–Chico. 18 years of experience.

8.1.7 Cost Containment Engineering Surveys Personnel and Experience

Karen Brimacombe Botanist	M.S., Botany, University of Hawaii; B.S., Psychology, Miami University. 16 years of experience.
Erin Maroni Wildlife Biologist	B.S., Environmental Science, University of New Hampshire. 2 years of experience.
David Pecora Wildlife/Fisheries Biologist	B.S., Marine Science, Kutztown University of Pennsylvania. 6 years of experience.

8.1.8 Supplemental Surveys for Hanford West Bypass 1 and Hanford West Bypass 2 Alternatives and Engineering Design Considerations Personnel and Experience

Amy Langston Wetland Scientist	M.S., Ecology and Systematic Biology, San Francisco State University; B.S., Ecology, California Polytechnic State University; 10 years of experience.
Emily Magnaghi Botanist	M.S., Ecology and Systematic Biology, San Francisco State University; B.A., Botany, University of Michigan. 13 years of experience.
David Pecora Wildlife/Fisheries Biologist	B.S., Marine Science, Kutztown University of Pennsylvania. 6 years of experience.
Mark Wilson Biologist	B.S., Environmental Science, St. Mary's College of California. 4 years of experience

8.2 Report Preparation

Alexandra Fraser, Ph.D. Deputy Environmental Project Manager/Group Leader	Ph.D., Ecology, University of Kansas; M.A., Ecology, University of Kansas; B.S., Biology, Baylor University. 16 years of experience in wetland science, restoration ecology, botany, and environmental impact assessments. • Deputy Project Manager and project management review of this technical report.
Justin Whitfield Project Ecologist/Group Leader	B.S., Biological Sciences, Florida State University. 11 years of experience in biological assessments and preparation of environmental documents. • Biological Resources and Wetland Task Manager. • Organized and planned report preparation. • Prepared, reviewed, and edited sections in this report.
Jonathan Stead Project Ecologist	M.S., Ecology, University of California-Davis; B.S., Ecology, Behavior, and Evolution, University of California-San Diego. 13 years of experience in ecology, habitat assessments and impact analysis, and restoration and mitigation planning. • Internal Technical Review.

Biological Resources	
Jan Novak Senior Soil Scientist	B.S., Soil Science, California Polytechnic State University, San Luis Obispo. 10 years of experience conducting wetland delineations and preparation of wetland delineation reports, environmental documents and permit applications. • Wetland Subtask Manager. • Field Surveys Wetland Delineation Manager. • Prepared and reviewed wetland data and text. • Coordinated production of wetland related sections. • Coordinated preparation of wetland GIS figures.
Todd Lemein Senior Vegetation Ecologist	B.S., Ecology and Evolution, University of California-Santa Barbara. 5 years of experience in wetland restoration and delineations, rare plant surveys, environmental permitting and preparation of environmental documents. • Botanical Task Manager. • Field Survey Botanical Manager. • Prepared and reviewed botanical data and text. • Coordinated production of botanical related sections. • Coordinated preparation of botanical related GIS figures.
Matthew Bettelheim Senior Wildlife Biologist	B.S., Ecology, Behavior, and Evolution, University of California-San Diego. 12 years of experience in environmental impact assessments, special-status species surveys, construction monitoring, and herpetology. • Wildlife Subtask Manager. • Field Survey Wildlife Habitat Assessment Manager. • Prepared and reviewed wildlife data and text. • Coordinated production of wildlife-related sections. • Coordinated preparation of wildlife-related GIS figures.
Melissa Newman Senior Wildlife Biologist	M.S., Biology, University of California-San Diego; B.S., General Biology, University of California-San Diego. 7 years of experience in biological research studies, 4 of which in environmental consulting, including environmental impact analysis, preparation of environmental documents, and special-status species surveys. • Author of wildlife-related sections.
Ode Bernstein Wildlife Biologist	B.S., Biological Sciences, Humboldt State University. 8 years of experience in tidal wetland ecology and restoration, avian ecology, and invasive species mapping. • Prepared environmental setting: climate and topography. • GIS support and wetland data analysis.
Karen Brimacombe Botanist	M.S., Botany, University of Hawaii; B.S., Psychology, Miami University. 16 years of experience in preparation of environmental documents; rare plant surveys; design, monitoring, and maintenance of restoration sites; and wetland delineations. • Prepared special-status plant species section.
Andrea Coleman Biologist	B.S., Biology, University of California-Los Angeles. 3 years of experience in environmental document preparation, Section 7 consultations, and plant and wildlife surveys. • Assisted in table production, reference collection, and technical assistance.

Jessie Golding Wildlife Biologist	B.A., Integrative Biology, University of California-Berkeley; B.A., Environmental Earth Science, University of California-Berkeley. 5 years of experience in environmental impact analysis, federal ESA consultation, and habitat assessments. • Prepared special-status wildlife species accounts. • Prepared wildlife movement corridors text.
Amy Langston Wetland Scientist	M.S., Ecology and Systematic Biology, San Francisco State University; B.S., Ecology, California Polytechnic State University. 10 years of experience in wetland delineations, botanical surveys, biological monitoring, biological impact analysis, environmental permitting, environmental document preparation. • Prepared wetland sections.
Emily Magnaghi Botanist	M.S., Ecology and Systematic Biology, San Francisco State University; B.A., Botany, University of Michigan. 13 years of experience in botanical surveys, vegetation monitoring, and habitat assessment. • Prepared special-status plant species and communities section.
Erin Maroni Wetland Scientist	B.S., Environmental Science, University of New Hampshire. 2 years of experience. • Prepared wetland sections.
Ivan Parr Botanist	B.S., Environmental Science, Saint Mary's College of California. 5 years of experience. • Author of wildlife habitat descriptions. • Prepared plant species accounts.
David Pecora Biologist	B.S., Marine Science, Kutztown University of Pennsylvania. 6 years of experience in environmental document preparation, biological monitoring, aquatic biology, and environmental permitting. • Author of wildlife habitat descriptions. • Prepared wildlife species accounts.
Galen Peracca Biologist	Master of Forestry, Forestry, University of California-Berkeley; B.S., Resource Management, University of California-Berkeley. 8 years of experience in wetland delineations, botanical surveys, biological impact analysis, and development of CEQA and NEPA compliance documents for hazard mitigation and infrastructure projects. • Author of local and regional regulatory setting, protected trees, and special-status plant communities sections.
Mark Wilson Biologist	B.A., Environmental Studies, Saint Mary's College of California. 4 years of experience in habitat assessments, biological monitoring, and conservation biology. • Prepared wetland sections.
GIS	
Rose Abbors Senior GIS Analyst	B.S., Geography, Arizona State University. 6 years of experience in ESRI-based GIS, cartographic design, and land use analysis.
Chris Bente, GISP Senior GIS Analyst	B.A., Geography, San Francisco State University. 8 years of experience in environmental and geotechnical mapping programs; GIS data transformation, management, and analysis; and methodologies of land surveys. • Technical GIS lead and map production lead. • Reviewed and assisted with maps and data production. • GIS support for project-level map, and permission to enter

Appendix A

USFWS Species List / CNDDB Results

U.S. Fish & Wildlife Service

Sacramento Fish & Wildlife Office

Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 120116071828

Database Last Updated: September 18, 2011

Quad Lists

Listed Species

Invertebrates

- Branchinecta conservatio
  - Conservancy fairy shrimp (E)

- Branchinecta lynchi
  - Critical habitat, vernal pool fairy shrimp (X)
  - vernal pool fairy shrimp (T)

- Desmocerus californicus dimorphus
  - valley elderberry longhorn beetle (T)

- Lepidurus packardi
  - Critical habitat, vernal pool tadpole shrimp (X)
  - vernal pool tadpole shrimp (E)

Fish

- Hypomesus transpacificus
  - delta smelt (T)

- Oncorhynchus mykiss
  - Central Valley steelhead (T) (NMFS)

Amphibians

- Ambystoma californiense
  - California tiger salamander, central population (T)

    - Critical habitat, CA tiger salamander, central population (X)

- Rana draytonii
    - California red-legged frog (T)

Reptiles

- Gambelia (=Crotaphytus) sila
    - blunt-nosed leopard lizard (E)

- Thamnophis gigas
    - giant garter snake (T)

Birds

- Charadrius alexandrinus nivosus
    - western snowy plover (T)

- Empidonax traillii extimus
    - southwestern willow flycatcher (E)

- Gymnogyps californianus
    - California condor (E)

Mammals

- Dipodomys ingens
    - giant kangaroo rat (E)

- Dipodomys nitratoides exilis
    - Fresno kangaroo rat (E)

- Dipodomys nitratoides nitratoides
    - Tipton kangaroo rat (E)

- Sorex ornatus relictus
    - Buena Vista Lake shrew (E)

- Vulpes macrotis mutica
    - San Joaquin kit fox (E)

Plants

- Castilleja campestris ssp. succulenta
    - Critical habitat, succulent (=fleshy) owl's-clover (X)
    - succulent (=fleshy) owl's-clover (T)

- Caulanthus californicus
  - California jewelflower (E)

- Chamaesyce hooveri
  - Critical habitat, Hoover's spurge (X)

- Eremalche kernensis
  - Kern mallow (E)

- Monolopia congdonii (=Lembertia congdonii)
  - San Joaquin woolly-threads (E)

- Opuntia treleasei
  - Bakersfield cactus (E)

- Orcuttia inaequalis
  - Critical habitat, San Joaquin Valley Orcutt grass (X)
  - San Joaquin Valley Orcutt grass (T)

- Orcuttia pilosa
  - hairy Orcutt grass (E)

- Pseudobahia peirsonii
  - San Joaquin adobe sunburst (T)

- Tuctoria greenei
  - Greene's tuctoria (=Orcutt grass) (E)

Quads Containing Listed, Proposed or Candidate Species:

ARVIN (214A)

WEED PATCH (214B)

CONNER (215A)

MILLUX (215B)

RIO BRAVO RANCH (239A)

OIL CENTER (239B)

LAMONT (239C)

EDISON (239D)

OILDALE (240A)

ROSEDALE (240B)

STEVENS (240C)

GOSFORD (240D)

RIO BRAVO (241A)

BUTTONWILLOW (241B)

TUPMAN (241D)

KNOB HILL (262C)

DEEPWELL RANCH (263A)

MCFARLAND (263B)

FAMOSO (263C)

NORTH OF OILDALE (263D)

POND (264A)

WASCO NW (264B)

WASCO SW (264C)

WASCO (264D)

LOST HILLS NE (265A)

SEMITROPIC (265D)

SAUSALITO SCHOOL (287B)

DELANO EAST (287C)

PIXLEY (288A)

ALPAUGH (288B)

ALLENSWORTH (288C)

DELANO WEST (288D)

HACIENDA RANCH NE (289A)

HACIENDA RANCH NW (289B)

HACIENDA RANCH (289D)

TULARE (311A)

PAIGE (311B)

TAYLOR WEIR (311C)

TIPTON (311D)

WAUKENA (312A)

GUERNSEY (312B)

EL RICO RANCH (312C)

CORCORAN (312D)

STRATFORD (313A)

STRATFORD SE (313D)

TRAVER (334B)

GOSHEN (334C)

BURRIS PARK (335A)

LATON (335B)

HANFORD (335C)

REMNOY (335D)

RIVERDALE (336A)

BURREL (336B)

LEMOORE (336D)

REEDLEY (356C)

SANGER (357A)

MALAGA (357B)

CONEJO (357C)

SELMA (357D)

FRESNO SOUTH (358A)

KEARNEY PARK (358B)

RAISIN (358C)

CARUTHERS (358D)

CLOVIS (378C)

ROUND MOUNTAIN (378D)

HERNDON (379C)

FRESNO NORTH (379D)

County Lists

No county species lists requested.

Key:

- (E) Endangered - Listed as being in danger of extinction.
- (T) Threatened - Listed as likely to become endangered within the foreseeable future.
- (P) Proposed - Officially proposed in the Federal Register for listing as endangered or threatened.
- (NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.
- Critical Habitat - Area essential to the conservation of a species.
- (PX) Proposed Critical Habitat - The species is already listed. Critical habitat is being proposed for it.
- (C) Candidate - Candidate to become a proposed species.
- (V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.
- (X) Critical Habitat designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, or may be affected by projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list.
See our Protocol and Recovery Permits pages.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal consultation with the Service.
- During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.
- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.
- Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our Map Room page.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. More info

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6520.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be April 15, 2012.

Selected Elements by Scientific Name

California Department of Fish and Game

California Natural Diversity Database

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFG SSC or FP
Agelaius tricolor tricolored blackbird	ABPBXB0020	None	None	G2G3	S2	SSC
Ambystoma californiense California tiger salamander	AAAAA01180	Threatened	Threatened	G2G3	S2S3	SSC
Ammospermophilus nelsoni Nelson's antelope squirrel	AMAFB04040	None	Threatened	G2	S2	
Andrena macswaini An andrenid bee	IIHYM35040	None	None	G1G3	S1S3	
Anniella pulchra pulchra silvery legless lizard	ARACC01012	None	None	G3G4T3T4Q	S3	SSC
Antrozous pallidus pallid bat	AMACC10010	None	None	G5	S3	SSC
Aquila chrysaetos golden eagle	ABNKC22010	None	None	G5	S3	FP
Ardea alba great egret	ABNGA04040	None	None	G5	S4	
Athene cunicularia burrowing owl	ABNSB10010	None	None	G4	S2	SSC
Branchinecta lynchi vernal pool fairy shrimp	ICBRA03030	Threatened	None	G3	S2S3	
Buteo swainsoni Swainson's hawk	ABNKC19070	None	Threatened	G5	S2	
Chaetodipus californicus femoralis Dulzura pocket mouse	AMAFD05021	None	None	G5T3	S2?	SSC
Charadrius alexandrinus nivosus western snowy plover	ABNNB03031	Threatened	None	G4T3	S2	SSC
Charadrius montanus mountain plover	ABNNB03100	Proposed Threatened	None	G2	S2?	SSC
Cicindela tranquebarica ssp. San Joaquin tiger beetle	IICOL0220E	None	None	G5T1	S1	
Coccyzus americanus occidentalis western yellow-billed cuckoo	ABNRB02022	Candidate	Endangered	G5T3Q	S1	
Danaus plexippus monarch butterfly	IILEPP2010	None	None	G5	S3	
Dendrocygna bicolor fulvous whistling-duck	ABNJB01010	None	None	G5	S1	SSC
Desmocerus californicus dimorphus valley elderberry longhorn beetle	IICOL48011	Threatened	None	G3T2	S2	
Dipodomys ingens giant kangaroo rat	AMAFD03080	Endangered	Endangered	G2	S2	
Dipodomys nitratoides brevinasus short-nosed kangaroo rat	AMAFD03153	None	None	G3T1T2	S1S2	SSC

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFG SSC or FP
Dipodomys nitratoides exilis Fresno kangaroo rat	AMAFD03151	Endangered	Endangered	G3T1	S1	
Dipodomys nitratoides nitratoides Tipton kangaroo rat	AMAFD03152	Endangered	Endangered	G3T1	S1	
Efferia antiochi Antioch efferian robberfly	IIDIP07010	None	None	G1G3	S1S3	
Egretta thula snowy egret	ABNGA06030	None	None	G5	S4	
Elanus leucurus white-tailed kite	ABNKC06010	None	None	G5	S3	FP
Emys marmorata western pond turtle	ARAAD02030	None	None	G3G4	S3	SSC
Entosphenus hubbsi Kern brook lamprey	AFBAA02040	None	None	G1G2	S1S2	SSC
Eremophila alpestris actia California horned lark	ABPAT02011	None	None	G5T3Q	S3	WL
Eumops perotis californicus western mastiff bat	AMACD02011	None	None	G5T4	S3?	SSC
Gambelia sila blunt-nosed leopard lizard	ARACF07010	Endangered	Endangered	G1	S1	FP
Helminthoglypta callistoderma Kern shoulderband	IMGASC2080	None	None	G1	S1	
Lasiurus cinereus hoary bat	AMACC05030	None	None	G5	S4?	
Lepidurus packardi vernal pool tadpole shrimp	ICBRA10010	Endangered	None	G3	S2S3	
Linderiella occidentalis California linderiella	ICBRA06010	None	None	G3	S2S3	
Lithobates pipiens northern leopard frog	AAABH01170	None	None	G5	S2	SSC
Lytta hoppingi Hopping's blister beetle	IICOL4C010	None	None	G1G2	S1S2	
Lytta moesta moestan blister beetle	IICOL4C020	None	None	G2	S2	
Lytta molesta molestan blister beetle	IICOL4C030	None	None	G2	S2	
Lytta morrisoni Morrison's blister beetle	IICOL4C040	None	None	G1G2	S1S2	
Masticophis flagellum ruddocki San Joaquin whipsnake	ARADB21021	None	None	G5T2T3	S2?	SSC
Metapogon hurdi Hurd's metapogon robberfly	IIDIP08010	None	None	G1G3	S1S3	

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFG SSC or FP
Nycticorax nycticorax black-crowned night heron	ABNGA11010	None	None	G5	S3	
Onychomys torridus tularensis Tulare grasshopper mouse	AMAFF06021	None	None	G5T1T2	S1S2	SSC
Perognathus inornatus inornatus San Joaquin pocket mouse	AMAFD01061	None	None	G4T2T3	S2S3	
Phrynosoma blainvillii coast horned lizard	ARACF12100	None	None	G4G5	S3S4	SSC
Plegadis chihi white-faced ibis	ABNGE02020	None	None	G5	S1	WL
Sorex ornatus relictus Buena Vista Lake shrew	AMABA01102	Endangered	None	G5T1	S1	SSC
Spea hammondii western spadefoot	AAABF02020	None	None	G3	S3	SSC
Taxidea taxus American badger	AMAJF04010	None	None	G5	S4	SSC
Thamnophis gigas giant garter snake	ARADB36150	Threatened	Threatened	G2G3	S2S3	
Toxostoma lecontei Le Conte's thrasher	ABPBK06100	None	None	G3	S3	SSC
Vulpes macrotis mutica San Joaquin kit fox	AMAJA03041	Endangered	Threatened	G4T2T3	S2S3	
Xanthocephalus xanthocephalus yellow-headed blackbird	ABPBXB3010	None	None	G5	S3S4	SSC

Record Count: 54

Selected Elements by Scientific Name

California Department of Fish and Game

California Natural Diversity Database

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFG SSC or FP
Astragalus hornii var. hornii Horn's milk-vetch	PDFAB0F421	None	None	G4G5T2T3	S1	1B.1
Atriplex cordulata heartscale	PDCHE040B0	None	None	G2?	S2.2?	1B.2
Atriplex coronata var. vallicola Lost Hills crownscale	PDCHE04250	None	None	G4T2	S2	1B.2
Atriplex depressa brittlescale	PDCHE042L0	None	None	G2Q	S2.2	1B.2
Atriplex erecticaulis Earlimart orache	PDCHE042V0	None	None	G2	S2.2	1B.2
Atriplex minuscula lesser saltscale	PDCHE042M0	None	None	G1	S1.1	1B.1
Atriplex persistens vernal pool smallscale	PDCHE042P0	None	None	G2	S2.2	1B.2
Atriplex subtilis subtle orache	PDCHE042T0	None	None	G2	S2.2	1B.2
Atriplex tularensis Bakersfield smallscale	PDCHE04240	None	Endangered	GX	SX	1A
California macrophylla round-leaved filaree	PDGER01070	None	None	G2	S2	1B.1
Calochortus striatus alkali mariposa-lily	PMLIL0D190	None	None	G2	S2	1B.2
Castilleja campestris ssp. succulenta succulent owl's-clover	PDSCR0D3Z1	Threatened	Endangered	G4?T2	S2.2	1B.2
Caulanthus californicus California jewel-flower	PDBRA31010	Endangered	Endangered	G1	S1	1B.1
Chloropyron molle ssp. hispidum hispid bird's-beak	PDSCR0J0D1	None	None	G2T2	S2.1	1B.1
Cirsium crassicaule slough thistle	PDAST2E0U0	None	None	G2	S2.2	1B.1
Clarkia tembloriensis ssp. calientensis Vasek's clarkia	PDONA05141	None	None	G3T1	S1.1	1B.1
Delphinium purpusii rose-flowered larkspur	PDRAN0B1G0	None	None	G2	S2	1B.3
Delphinium recurvatum recurved larkspur	PDRAN0B1J0	None	None	G3	S3	1B.2
Eremalche kernensis Kern mallow	PDMAL0C031	Endangered	None	G3?T1Q	S1	1B.1
Eriastrum hooveri Hoover's eriastrum	PDPLM03070	Delisted	None	G3	S3.2	4.2
Eryngium spinosepalum spiny-sepaled button-celery	PDAPI0Z0Y0	None	None	G2	S2.2	1B.2

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFG SSC or FP
Eschscholzia lemmonii ssp. kernensis Tejon poppy	PDPAP0A071	None	None	G5T1	S1.1	1B.1
Fritillaria striata striped adobe-lily	PMLIL0V0K0	None	Threatened	G2	S2.1	1B.1
Heterotheca shevockii Shevock's golden-aster	PDAST4V0T0	None	None	G1	S1.3	1B.3
Imperata brevifolia California satintail	PMPOA3D020	None	None	G2	S2.1	2.1
Lasthenia glabrata ssp. coulteri Coulter's goldfields	PDAST5L0A1	None	None	G4T3	S2.1	1B.1
Layia heterotricha pale-yellow layia	PDAST5N070	None	None	G2	S2	1B.1
Layia leucopappa Comanche Point layia	PDAST5N0A0	None	None	G1	S1.1	1B.1
Layia munzii Munz's tidy-tips	PDAST5N0B0	None	None	G1	S1.1	1B.2
Lepidium jaredii ssp. album Panoche pepper-grass	PDBRA1M0G2	None	None	G1T1	S1.2	1B.2
Leptosiphon serrulatus Madera leptosiphon	PDPLM09130	None	None	G1?	S1?	1B.2
Mimulus pictus calico monkeyflower	PDSCR1B240	None	None	G2	S2.2	1B.2
Monolopia congdonii San Joaquin woollythreads	PDASTA8010	Endangered	None	G3	S3	1B.2
Nama stenocarpum mud nama	PDHYD0A0H0	None	None	G4G5	S1S2	2.2
Navarretia setiloba Piute Mountains navarretia	PDPLM0C0S0	None	None	G1	S1.1	1B.1
Opuntia basilaris var. treleasei Bakersfield cactus	PDCAC0D055	Endangered	Endangered	G5T1	S1	1B.1
Orcuttia inaequalis San Joaquin Valley Orcutt grass	PMPOA4G060	Threatened	Endangered	G1	S1	1B.1
Orcuttia pilosa hairy Orcutt grass	PMPOA4G040	Endangered	Endangered	G2	S2.1	1B.1
Pseudobahia peirsonii San Joaquin adobe sunburst	PDAST7P030	Threatened	Endangered	G2	S2.1	1B.1
Pterygoneurum californicum California chalk moss	NBMUS65020	None	None	GH	SH	1B.1
Sagittaria sanfordii Sanford's arrowhead	PMALI040Q0	None	None	G3	S3	1B.2
Stylocline citroleum oil neststraw	PDAST8Y070	None	None	G2	S2	1B.1

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFG SSC or FP
Stylocline masonii	PDAST8Y080	None	None	G1	S1.1	1B.1
Mason's neststraw						
Tortula californica	NBMUS7L090	None	None	G2?	S2	1B.2
California screw moss						
Tropidocarpum californicum	PDBRA33010	None	None	G1	S1.1	1B.1
Kings gold						
Tropidocarpum capparideum	PDBRA2R010	None	None	G1	S1.1	1B.1
caper-fruited tropidocarpum						
Tuctoria greenei	PMPOA6N010	Endangered	Rare	G1	S1	1B.1
Greene's tuctoria						

Record Count: 47

Selected Elements by Scientific Name

California Department of Fish and Game

California Natural Diversity Database

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFG SSC or FP
Alkali Seep	CTT45320CA	None	None	G3	S2.1	
Alkali Seep						
Coastal and Valley Freshwater Marsh	CTT52410CA	None	None	G3	S2.1	
Coastal and Valley Freshwater Marsh						
Great Valley Cottonwood Riparian Forest	CTT61410CA	None	None	G2	S2.1	
Great Valley Cottonwood Riparian Forest						
Great Valley Mesquite Scrub	CTT63420CA	None	None	G1	S1.1	
Great Valley Mesquite Scrub						
Northern Claypan Vernal Pool	CTT44120CA	None	None	G1	S1.1	
Northern Claypan Vernal Pool						
Northern Hardpan Vernal Pool	CTT44110CA	None	None	G3	S3.1	
Northern Hardpan Vernal Pool						
Stabilized Interior Dunes	CTT23100CA	None	None	G1	S1.1	
Stabilized Interior Dunes						
Valley Sacaton Grassland	CTT42120CA	None	None	G1	S1.1	
Valley Sacaton Grassland						
Valley Saltbush Scrub	CTT36220CA	None	None	G2	S2.1	
Valley Saltbush Scrub						
Valley Sink Scrub	CTT36210CA	None	None	G1	S1.1	
Valley Sink Scrub						

Record Count: 10

CNPS INVENTORY OF RARE AND ENDANGERED PLANTS, 16 JANUARY 2012

Scientific Name	Common Name	Family	Rare Plant Rank
Astragalus hornii var. hornii	Horn's milk-vetch	Fabaceae	1B.1
Atriplex cordulata	heartscale	Chenopodiaceae	1B.2
Atriplex coronata var. coronata	crownscale	Chenopodiaceae	4.2
Atriplex coronata var. vallicola	Lost Hills crownscale	Chenopodiaceae	1B.2
Atriplex depressa	brittlescale	Chenopodiaceae	1B.2
Atriplex erecticaulis	Earlimart orache	Chenopodiaceae	1B.2
Atriplex minuscula	lesser saltscale	Chenopodiaceae	1B.1
Atriplex persistens	vernal pool smallscale	Chenopodiaceae	1B.2
Atriplex subtilis	subtle orache	Chenopodiaceae	1B.2
Atriplex tularensis	Bakersfield smallscale	Chenopodiaceae	1A
Azolla microphylla	Mexican mosquito fern	Azollaceae	4.2
California macrophylla	round-leaved filaree	Geraniaceae	1B.1
Calochortus striatus	alkali mariposa lily	Liliaceae	1B.2
Castilleja campestris ssp. succulenta	succulent owl's-clover	Orobanchaceae	1B.2
Caulanthus californicus	California jewel-flower	Brassicaceae	1B.1
Chloropyron molle ssp. hispidum	hispid bird's-beak	Orobanchaceae	1B.1
Cirsium crassicaule	slough thistle	Asteraceae	1B.1
Clarkia tembloriensis ssp. calientensis	Vasek's clarkia	Onagraceae	1B.1
Delphinium purpusii	rose-flowered larkspur	Ranunculaceae	1B.3
Delphinium recurvatum	recurved larkspur	Ranunculaceae	1B.2
Eremalche kernensis	Kern mallow	Malvaceae	1B.1
Eriastrum hooveri	Hoover's eriastrum	Polemoniaceae	4.2
Eriogonum nortonii	Pinnacles buckwheat	Polygonaceae	1B.3
Eryngium spinosepalum	spiny-sepaled button-celery	Apiaceae	1B.2
Eschscholzia lemmonii ssp. kernensis	Tejon poppy	Papaveraceae	1B.1
Fritillaria striata	striped adobe-lily	Liliaceae	1B.1
Goodmania luteola	golden goodmania	Polygonaceae	4.2
Heterotheca shevockii	Shevock's golden-aster	Asteraceae	1B.3
Imperata brevifolia	California satintail	Poaceae	2.1
Lasthenia glabrata ssp. coulteri	Coulter's goldfields	Asteraceae	1B.1
Layia heterotricha	pale-yellow layia	Asteraceae	1B.1
Layia leucopappa	Comanche Point layia	Asteraceae	1B.1
Layia munzii	Munz's tidy-tips	Asteraceae	1B.2
Lepidium jaredii ssp. album	Panoche pepper-grass	Brassicaceae	1B.2
Leptosiphon serrulatus	Madera leptosiphon	Polemoniaceae	1B.2
Mimulus pictus	calico monkeyflower	Phrymaceae	1B.2
Monardella linoides ssp. oblonga	Tehachapi monardella	Lamiaceae	1B.3
Monolopia congdonii	San Joaquin woollythreads	Asteraceae	1B.2

Scientific Name	Common Name	Family	Rare Plant Rank
Myosurus minimus ssp. apus	little mousetail	Ranunculaceae	3.1
Nama stenocarpum	mud nama	Hydrophyllaceae	2.2
Navarretia setiloba	Piute Mountains navarretia	Polemoniaceae	1B.1
Opuntia basilaris var. treleasei	Bakersfield cactus	Cactaceae	1B.1
Orcuttia inaequalis	San Joaquin Valley Orcutt grass	Poaceae	1B.1
Orcuttia pilosa	hairy Orcutt grass	Poaceae	1B.1
Pseudobahia peirsonii	San Joaquin adobe sunburst	Asteraceae	1B.1
Pterygoneurum californicum	California chalk moss	Pottiaceae	1B.1
Sagittaria sanfordii	Sanford's arrowhead	Alismataceae	1B.2
Schizymenium shevockii	Shevock's copper moss	Bryaceae	1B.2
Stylocline citroleum	oil neststraw	Asteraceae	1B.1
Stylocline masonii	Mason's neststraw	Asteraceae	1B.1
Tortula californica	California screw-moss	Pottiaceae	1B.2
Tropidocarpum californicum	Kings gold	Brassicaceae	1B.1
Tropidocarpum capparideum	caper-fruited tropidocarpum	Brassicaceae	1B.1
Tuctoria greenei	Greene's tuctoria	Poaceae	1B.1

Appendix B
Soil Map Unit Descriptions

B. Soil Map Unit Descriptions

B.1 Map Unit: 746 – San Joaquin -Madera-Cometa

Moderately deep to a duripan, moderately well drained soils developed in granitic alluvium, on fan terraces.

Location in the survey area: Fresno County, mostly urban areas in the City of Fresno.

B.1.1 Component: San Joaquin (ABRUPTIC DURIXERALFS, FINE)

The San Joaquin component makes up 47 percent of the map unit. Slopes are 0 to 3 percent. This component is on fan remnants on valleys. The parent material consists of granitic alluvium. Depth to a root restrictive layer, duripan, is 24 to 48 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R017XE113CA Terrace 12-14" ecological site. Nonirrigated land capability classification is 4s. Irrigated land capability classification is 3s. This soil does not meet hydric criteria.

B.1.2 Component: Madera (ABRUPTIC DURIXERALFS, FINE)

The Madera component makes up 10 percent of the map unit. Slopes are 0 to 2 percent. This component is on erosion remnants on terraces on valleys. The parent material consists of granitic alluvium. Depth to a root restrictive layer, duripan, is 20 to 40 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is low. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the Terrace 12-14" ecological site. Nonirrigated land capability classification is 4s. Irrigated land capability classification is 3s. This soil does not meet hydric criteria.

B.1.3 Component: Cometa

This series is not mapped in the study area.

B.2 Map Unit: 745 – Hanford-Delhi

Very deep, somewhat excessively drained and well drained sand to fine sandy loam soils developed in granitic alluvium and eolian deposits, on alluvial fans and dunes.

Location in the survey area: Fresno County, between Conejo and southern Fresno.

B.2.1 Component: Hanford (TYPIC XERORTHENTS, COARSE-LOAMY)

The Hanford component makes up 62 percent of the map unit. Slopes are 0 to 2 percent. This component is on alluvial fans on valleys. The parent material consists of granitic alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 4c. Irrigated land capability classification is 1. This soil does not meet hydric criteria.

B.2.2 Component: Delhi (TYPIC XEROPSAMMENTS)

The Delhi component makes up 22 percent of the map unit. Slopes are 0 to 3 percent. This component is on dunes on fan remnants on valleys. The parent material consists of eolian deposits derived from granitic alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 4e. Irrigated land capability classification is 3s. This soil does not meet hydric criteria.

B.3 Map Unit: 743 – Waukena-Temple-Pond

This map unit covers an area at the northern end of the Hanford West Bypass Alternative Alignments. However, it does not correspond to the actual soil series mapped in this area. See **Map Unit 745 – Hanford-Delhi** for a description of the soils in this area.

B.4 Map Unit: El Peco-Pachappa-Hesperia

The El Peco-Pachappa-Hesperia general map unit was created for this report, since the mapped unit [**742 – Lewis-Fresno-Dinuba**] does not correspond to the actual soil series mapped in this area.

Moderately deep to a duripan, and deep, somewhat poorly drained and well drained soils developed in sandy granitic alluvium, on alluvial fans.

Location in the survey area: Fresno County, north of Laton.

B.4.1 Component: El Peco (ENTIC DURIXEREPTS, COARSE-LOAMY)

The El Peco component makes up approximately 50 percent of the map unit. Slopes are 0 to 2 percent. This component is on fan skirts on valleys. The parent material consists of granitic alluvium. Depth to a root restrictive layer, duripan, is 20 to 40 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 4e. Irrigated land capability classification is 4s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent. The soil has a moderately saline horizon within 30 inches of the soil surface. The soil has a slightly sodic horizon within 30 inches of the soil surface.

B.4.2 Component: Pachappa (MOLLIC HAPLOXERALFS, COARSE-LOAMY)

The Pachappa component makes up approximately 30 percent of the map unit. Slopes are 0 to 2 percent. This component is on alluvial fans on valleys. The parent material consists of granitic alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 4c. Irrigated

land capability classification is 1. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

B.4.3 Component: Hesperia (XERIC TORRIORTHENS, COARSE-LOAMY)

The Hesperia component makes up approximately 15 percent of the map unit. Slopes are 0 to 2 percent. This component is on fan skirts on valleys, alluvial fans on valleys. The parent material consists of granitic alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 6s. Irrigated land capability classification is 3s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent. The soil has a slightly saline horizon within 30 inches of the soil surface. The soil has a slightly sodic horizon within 30 inches of the soil surface.

B.5 Map Unit: 744 – Nord-Grangeville-Chino

Very deep, nearly level, well drained and somewhat poorly drained soils that formed in sandy alluvium derived from igneous and sedimentary rock, on alluvial fans and flood plains.

Location in the study area: Kings County, extreme southern Fresno County, between Hanford and Laton.

B.5.1 Component: Nord (CUMULIC HAPLOXEROLLS, COARSE-LOAMY)

The Nord component makes up 36 percent of the map unit. Slopes are 0 to 1 percent. This component is on valleys, flood plains. The parent material consists of alluvium derived from igneous rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4c. Irrigated land capability classification is 1 This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

B.5.2 Component: Grangeville (FLUVAQUENTIC HAPLOXEROLLS, COARSE-LOAMY)

The Grangeville component makes up 25 percent of the map unit. Slopes are 0 to 1 percent. This component is on valleys, alluvial fans, flood plains. The parent material consists of alluvium derived from primarily granitic rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, December. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 6w. Irrigated land capability classification is 2w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

B.5.3 Component: Chino

This series is not mapped in the study area.

B.6 Map Unit: 810 – Lakeside -Kimberlina-Garces-

Very Deep, nearly level, well drained and somewhat poorly drained, saline-alkali soils that formed in alluvium derived derived dominantly from igneous and sedimentary rock, on alluvial fans and basin rims.

Location in the study area: Kings County, between Corcoran and Hanford.

B.6.1 Component: Kimberlina (TYPIC TORRIORTHENTS, COARSE-LOAMY)

The Kimberlina component makes up 46 percent of the map unit. Slopes are 0 to 2 percent. This component is on alluvial fans. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 2s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent. The soil has a slightly saline horizon within 30 inches of the soil surface. The soil has a moderately sodic horizon within 30 inches of the soil surface.

B.6.2 Component: Garces (TYPIC NATRARGIDS, FINE-LOAMY)

The Garces component makes up 12 percent of the map unit. Slopes are 0 to 2 percent. This component is on alluvial fans. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 2s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent. The soil has a moderately saline horizon within 30 inches of the soil surface. The soil has a moderately sodic horizon within 30 inches of the soil surface.

B.6.3 Component: Lakeside (FLUVAQUENTIC HAPLOXEROLLS, FINE-LOAMY)

The Lakeside component makes up 10 percent of the map unit. Slopes are 0 to 1 percent. This component is on rims on basin floors, valleys. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6w. Irrigated land capability classification is 2w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically,

does not exceed 3 percent. The soil has a moderately saline horizon within 30 inches of the soil surface. The soil has a moderately sodic horizon within 30 inches of the soil surface.

B.7 Map Unit: 807 – Westcamp-Houser -Gepford- Armona

Very deep, nearly level, somewhat poorly drained, and poorly drained soils that formed in fine textured alluvium from igneous and sedimentary rock, in basins and on flood plains and basin rims.

Location in the study area: Tulare and Kings Counties, between Allensworth and north of Corcoran.

B.7.1 Component: Gepford (TYPIC NATRAQUERTS, FINE)

The Gepford component makes up 26 percent of the map unit. Slopes are 0 to 1 percent. This component is on rims, flood plains, basins, valleys. The parent material consists of alluvium derived from mixed. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is high. This soil is rarely flooded. It is not ponded. A seasonal zone of water saturation is at 39 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6w. Irrigated land capability classification is 3w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 10 percent. The soil has a moderately saline horizon within 30 inches of the soil surface. The soil has a strongly sodic horizon within 30 inches of the soil surface.

B.7.2 Component: Westcamp (AERIC FLUVAQUENTS, FINE-SILTY)

The Westcamp component makes up 14 percent of the map unit. Slopes are 0 to 2 percent. This component is on flood plains, rims, basins, valleys. The parent material consists of alluvium derived from mixed. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is moderate. This soil is rarely flooded. It is not ponded. A seasonal zone of water saturation is at 60 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7w. Irrigated land capability classification is 3w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent. The soil has a moderately saline horizon within 30 inches of the soil surface. The soil has a strongly sodic horizon within 30 inches of the soil surface.

B.7.3 Component: Armona (FLUVAQUENTIC HAPLAQUOLLS, FINE-LOAMY)

The Armona component makes up 13 percent of the map unit. Slopes are 0 to 1 percent. This component is on rims, basins, flood plains, valleys. The parent material consists of alluvium derived from mixed. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is low. Shrink-swell potential is moderate. This soil is rarely flooded. It is not ponded. A seasonal zone of water saturation is at 48 inches during January, February, March, April, May, June, July, August, September, October, November, and December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7w. Irrigated land capability classification is 3w. This soil meets hydric

criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent. The soil has a moderately saline horizon within 30 inches of the soil surface. The soil has a strongly sodic horizon within 30 inches of the soil surface.

B.7.4 Component: Houser (VERTIC FLUVAQUENTS, FINE)

The Houser component makes up 11 percent of the map unit. Slopes are 0 to 1 percent. This component is on rims, basins, valleys. The parent material consists of alluvium derived from mixed. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is low. Shrink-swell potential is high. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7w. Irrigated land capability classification is 3w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent. The soil has a strongly saline horizon within 30 inches of the soil surface. The soil has a strongly sodic horizon within 30 inches of the soil surface.

B.8 Map Unit: 778 – Twisselman- Nahrub-Lethent

Very deep, nearly level, well drained and somewhat poorly drained soils that formed in clayey alluvium derived from igneous and sedimentary rock; on lower alluvial fans and basin rims.

Location in the study area: Tulare County, north and south of Allensworth.

B.8.1 Component: Lethent (TYPIC NATRARGIDS, FINE)

The Lethent component makes up 44 percent of the map unit. Slopes are 0 to 1 percent. This component is on fan remnants, valleys. The parent material consists of alluvium derived from mixed. Depth to a root restrictive layer, natric, is 5 to 10 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is low. Shrink-swell potential is high. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 3s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent. The soil has a moderately saline horizon within 30 inches of the soil surface. The soil has a strongly sodic horizon within 30 inches of the soil surface.

B.8.2 Component: Nahrub (VERTIC TORRIORTHENTS, FINE)

The Nahrub component makes up 22 percent of the map unit. Slopes are 0 to 1 percent. This component is on valleys, basins, rims. The parent material consists of alluvium derived from mixed. Depth to a root restrictive layer, strongly contrasting textural stratification, is 5 to 16 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is high. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 0 percent. Nonirrigated land capability classification is 6s. Irrigated land capability classification is 3s. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 7 percent. The soil has a strongly saline horizon within 30 inches of the soil surface. The soil has a strongly sodic horizon within 30 inches of the soil surface.

B.8.3 Component: Twisselman

This series is not mapped in the study area.

B.9 Map Unit: 779 – Panoche -Garces

Very deep, nearly level, saline-alkali, well drained silt loam and clay loam soils developed in alluvium derived from igneous and sedimentary rock, on alluvial fans and basin rims.

Location in the study area: Kern and Tulare Counties, between Kernell and Allensworth.

B.9.1 Component: Garces (TYPIC NATRARGIDS, FINE-LOAMY)

The Garces component makes up 62 percent of the map unit. Slopes are 0 to 2 percent. This component is on rims on basin floors, basins. The parent material consists of alluvium derived from granite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is moderate. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 0 percent. This component is in the Loamy Saline Alkali ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 3s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent. The soil has a moderately saline horizon within 30 inches of the soil surface. The soil has a strongly sodic horizon within 30 inches of the soil surface.

B.9.2 Component: Panoche (TYPIC TORRIORTHENTS, FINE-LOAMY)

The Panoche component makes up 21 percent of the map unit. Slopes are 0 to 2 percent. This component is on alluvial fans. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 0 percent. This component is in the Loamy Saline Alkali ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 2s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

B.10 Map Unit: 775 – Wasco -Kimberlina

Deep, nearly level, well drained fine sandy loam and sandy loam soils developed in sandy alluvium derived from igneous and sedimentary rock, on alluvial fans.

Location in the study area: Kern County, between Bakersfield and Wasco.

B.10.1 Component: Kimberlina (TYPIC TORRIORTHENTS, COARSE-LOAMY)

The Kimberlina component makes up 52 percent of the map unit. Slopes are 0 to 2 percent. This component is on alluvial fans. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is rarely

flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7c. Irrigated land capability classification is 1. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent.

B.10.2 Component: Wasco (TYPIC TORRIORTHENTS, COARSE-LOAMY)

The Wasco component makes up 37 percent of the map unit. Slopes are 0 to 2 percent. This component is on alluvial fans. The parent material consists of alluvium derived from granite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 0 percent. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 2s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

B.11 Map Unit: 780 – McFarland

Very deep, nearly level, well drained loam soils developed from alluvium derived from granite, on alluvial fans.

Location in the study area: Kern County, between Wasco and Pond.

B.11.1 Component: McFarland (TYPIC TORRIORTHENTS, FINE-LOAMY)

The McFarland component makes up 84 percent of the map unit. Slopes are 0 to 2 percent. This component is on alluvial fans. The parent material consists of alluvium derived from granite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7c. Irrigated land capability classification is 1. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

B.12 Map Unit: 783 – Zerker-Premier-Delano-Chanac

This map unit covers a small area near Shafter and a small area at the extreme southern end of the Wetland RSA. However, it does not correspond to the actual soil series mapped in these areas. See **Map Unit 775 – Wasco-Kimberlina** for a description of the soils in these areas.

B.13 Map Unit: 781 – Milham

Very deep, nearly level, well drained sandy loam soils developed in alluvium derived from igneous and sedimentary rock, on alluvial fans.

Location in study area: Kern County, south of Shafter.

B.13.1 Component: Milham (TYPIC HAPLARGIDS, FINE-LOAMY)

The Milham component makes up 94 percent of the map unit. Slopes are 0 to 2 percent. This component is on alluvial fans. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage

class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is moderate. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the Loamy 6-8" P.z. ecological site. Nonirrigated land capability classification is 7c. Irrigated land capability classification is 1. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent.

B.14 Map Unit: 782 –Westhaven-Lerdo -Excelsior-Cajon

Deep, nearly level and gently sloping, well drained, somewhat excessively drained, and somewhat poorly drained soils that formed in dominantly sandy alluvium from igneous and sedimentary rock, on flood plains, alluvial fans and basin rims.

Location in the study area: Kern County, near Greenacres, west of Bakersfield.

B.14.1 Component: Cajon (TYPIC TORRIPSAMMENTS)

The Cajon component makes up 45 percent of the map unit. Slopes are 0 to 2 percent. The parent material consists of alluvium derived from granite. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 0 percent. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 3s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 2 percent.

B.14.2 Component: Westhaven

This series is not mapped in the study area.

B.14.3 Component: Excelsior (TYPIC TORRIFLUVENTS, COARSE-LOAMY)

The Excelsior component makes up 14 percent of the map unit. Slopes are 0 to 2 percent. This component is on alluvial fans. The parent material consists of alluvium. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 6s. Irrigated land capability classification is 2s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 2 percent. The soil has a very slightly saline horizon within 30 inches of the soil surface.

B.14.4 Component: Lerdo (TYPIC TORRIFLUVENTS, FINE-LOAMY)

The Lerdo component makes up 13 percent of the map unit. Slopes are 0 to 2 percent. This component is on rims on basin floors, valleys. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is moderate. Shrink-swell potential is moderate. This soil is rarely flooded. It is not ponded. There is no zone of water

saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. This component is in the Clayey Saline-Alkali ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 3s. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent. The soil has a moderately saline horizon within 30 inches of the soil surface. The soil has a moderately sodic horizon within 30 inches of the soil surface.

B.15 Map Unit: 774 - Panoche-Milham-Kimberlina

Deep, nearly level, gently sloping, and well drained soils that formed in alluvium from igneous and sedimentary rock, on alluvial fans.

Location in the study area: Kern County, near Bakersfield.

B.15.1 Component: Panoche (TYPIC TORRIORTHENTS, FINE-LOAMY)

The Panoche component makes up 44 percent of the map unit. Slopes are 0 to 2 percent. This component is on alluvial fans. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 0 percent. This component is in the Loamy Saline Alkali ecological site. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 2s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent.

B.15.2 Component: Milham (TYPIC HAPLARGIDS, FINE-LOAMY)

The Milham component makes up 24 percent of the map unit. Slopes are 0 to 2 percent. This component is on alluvial fans. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is moderate. This soil is rarely flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the Loamy 6-8" P.z. ecological site. Nonirrigated land capability classification is 7c. Irrigated land capability classification is 1. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent.

B.15.3 Component: Kimberlina (TYPIC TORRIORTHENTS, COARSE-LOAMY)

The Kimberlina component makes up 16 percent of the map unit. Slopes are 0 to 2 percent. This component is on alluvial fans. The parent material consists of alluvium derived from igneous and sedimentary rock. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. Nonirrigated land capability classification is 7s. Irrigated land capability classification is 2s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 3 percent. The soil has a slightly saline horizon within 30 inches of the soil surface. The soil has a moderately sodic horizon within 30 inches of the soil surface.

Appendix C

Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Federal and State Listed Species							
Atriplex tularensis (Bakersfield smallscale)	--	SE/1B.1	Chenopod scrub, alkali meadow. (FAC)	Valley sink scrub or with saltgrass (*Distichlis*), *Frankenia*, and *Atriplex bracteosa*. (300-315ft)	Jun. – Oct.	**Potential to occur**. There are several CNNDB and CNPS occurrences in central Kern County, just west of the Special-Status Plant Study Area.	Recovery Plan for the Upland Species of the San Joaquin Valley, California
Castilleja campestris ssp. *succulenta* (succulent owl's-clover)	FT	SE/1B.2	Northern Claypan and Northern Hardpan vernal pools within annual grasslands. (OBL)	Small and large vernal pools and swales. (80-2475ft)	Apr. – May	**No potential to occur**. There are several CNDDB and CNPS occurrences in north central Fresno County, northeast of the Special-Status Plant Study Area. The soils where this species was observed are coarser and more acidic than those in the Special-Status Plant Study Area.	Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon
Castilleja campestris ssp. *succulenta* (succulent owl's-clover) *CRITICAL HABITAT*	D	--				**No potential to occur**. Critical habitat has not been designated for this species within the Special-Status Plant Study Area.	Originally designated in the Federal Register, section 68:46683; August 6, 2003. Designation revised, section 70:46923; August 11, 2005. Species by unit designations were published in 71:7117 (PDF) February 10, 2006.

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Caulanthus californicus (California jewel-flower)	FE	SE/1B.1	Chenopod scrub, valley and foothill grassland, pinyon-juniper woodland. (NL)	Historically from central valley and Carrizo plain. Occurs with *Vulpia microstachys*, *Trifolium* spp., *Calandrinia ciliata,* and *Lasthenia californica*. Usually on subalkaline sandy loams. (240-2,950ft)	Feb. – May	**Potential to occur**. There are numerous CNDDB and CNPS occurrences in central and west Kern County, southwest Tulare County, and one occurrence in central Fresno County. The Special-Status Plant Study Area habitats and elevations are similar to those where this species was previously observed.	Recovery Plan for the Upland Species of the San Joaquin Valley, California
Chamaesyce hooveri (Hoover's spurge)	FT	1B.2	Valley and foothill grassland, Northern Hardpan or Claypan vernal pools. (OBL)	Vernal pools on volcanic mudflow, sandy loam or clay substrate on alluvial fans or terraces. (80-130ft)	Jul. – Sept. [Oct.]	**Potential to occur**. There are several CNDDB and CNPS occurrences in northwest Tulare County, just east of the Special-Status Plant Study Area. Even though the soils where this species was observed may be coarser than in the Special-Status Plant Study Area, the elevation and vernal pool habitat are suitable for the species.	Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Chamaesyce hooveri (Hoover's spurge) *CRITICAL HABITAT*	D	--				**No potential to occur**. Critical habitat has not been designated for this species within the Special-Status Plant Study Area.	Originally designated in the Federal Register, section 68:46683; August 6, 2003. Designation revised, section 70:46923; August 11, 2005. Species by unit designations were published in 71:7117 (PDF) February 10, 2006.
Eremalche kernensis (Kern mallow)	FE	1B.1	Chenopod scrub, valley and foothill grassland. (NL)	Dry, open sandy to clay soils, usually within valley saltbush scrub, edge of balds. (300-900ft)	Mar. – May	**Not likely to occur**. The populations of conservation concern are in the Lokern area, which is approximately 35 miles west of the Special-Status Plant Study Area. Although two populations of Kern mallow, as described in the Jepson Manual, were identified in the Special-Status Plant Study Area, these populations are believed to be *Eremalche parryi* ssp. *kernensis*. The populations identified in the Special-Status Plant Study Area contain light to medium purple flowers, whereas the populations of conservation concern typically contain all white flowers (Cypher 2002).	Recovery Plan for the Upland Species of the San Joaquin Valley, California

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Fritillaria striata (striped adobe-lily)	--	ST/1B.1	Cismontane woodland, valley and foothill grassland. (NL)	Heavy clay adobe soils in oak grassland. (440-4,770ft)	Feb. – Apr.	**Not likely to occur**. There are several CNDDB and CNPS occurrences in central Tulare County and central Kern County, primarily east of the Special-Status Plant Study Area. However, only marginally suitable habitat for the species exists in the Special-Status Plant Study Area.	
Monolopia congdonii (San Joaquin woollythreads)	FE	1B.2	Chenopod scrub, valley and foothill grassland. (NL)	Alkaline or loamy plains, sandy soils, with grasses and within chenopod scrub. (200-2,600ft)	Feb. – May	**Potential to occur**. There are numerous CNDDB and CNPS occurrences in Fresno, Kings, Tulare, and Kern counties in the vicinity of the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats and elevations may be suitable for the species.	Recovery Plan for the Upland Species of the San Joaquin Valley, California
Opuntia basilaris var. *treleasei* (Bakersfield cactus)	FE	SE/1B.1	Chenopod scrub, valley and foothill grassland, cismontane woodland. (NL)	Coarse or cobbly well-drained granitic sand on bluffs, low hills, and flats within grassland. (460-1,800ft)	Apr. – May	**Not likely to occur**. There are numerous CNDDB and CNPS occurrences in central Kern County, in the vicinity of the Special-Status Plant Study Area; however, most are extirpated due to development. Suitable habitats in the Special-Status Plant Study Area are highly fragmented and degraded.	Recovery Plan for the Upland Species of the San Joaquin Valley, California

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Orcuttia inaequalis (San Joaquin Valley Orcutt grass)	FT	SE/1B.1	Vernal pool. (OBL)	Vernal pools averaging 1.5 acres. Acidic soils with clay to sandy loam texture. (100- 2,475ft)	Apr. – Sept.	**Not likely to occur**. There are several CNDDB and CNPS occurrences in central Fresno County and northwest Tulare County, east of the Special-Status Plant Study Area, however, this species is believed to be restricted to the Southern Sierran Foothills Vernal Pool region that does not fall within the Special-Status Plant Study Area.	Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon
Orcuttia inaequalis (San Joaquin Valley Orcutt grass) *CRITICAL HABITAT*	D	--				**No potential to occur**. Critical habitat has not been designated for this species within the Special-Status Plant Study Area.	Originally designated in the Federal Register, section 68:46683; August 6, 2003. Designation revised, section 70:46923; August 11, 2005. Species by unit designations were published in 71:7117 February 10, 2006.

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Orcuttia pilosa (hairy Orcutt grass)	FE	SE/1B.1	Vernal pool. (OBL)	With *Eryngium vaseyi*, *Trichostema lanceolatum*, *Downingia* sp., surrounded by annual grassland. Average vernal pool size is 4.2 acres. (80-415ft)	May – Sept.	**No potential to occur**. The nearest CNDDB and CNPS occurrences are in south-central Madera County about 50 miles north of the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats and elevations are similar to those where this species was previously observed; however, the Special-Status Plant Study Area soils are finer and more alkaline.	Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon
Orcuttia pilosa (hairy Orcutt grass) *CRITICAL HABITAT*	D	--				**No potential to occur**. Critical habitat has not been designated for this species within the Special-Status Plant Study Area.	Originally designated in the Federal Register, section 68:46683; August 6, 2003. Designation revised, section 70:46923; August 11, 2005. Species by unit designations were published in 71:7117 (PDF) February 10, 2006.

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Pseudobahia peirsonii (San Joaquin adobe sunburst)	FT	SE/1B.1	Cismontane woodland, valley and foothill grassland. (NL)	Grassy valley floors and rolling foothills in heavy clay soil. (275-2,625ft)	Mar. – Apr.	**Not likely to occur**. There are several CNDDB and CNPS occurrences in central Fresno County, west-central Tulare County, and north-central Kern County in the vicinity of the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats and elevations are similar to those where this species was previously observed; however, these habitats are degraded.	Recovery plan under development (Southern Sierran Foothills plants)
Tuctoria greenei (Green's tuctoria)	FE	SR/1B.1	Vernal pools, valley and foothill grassland. (OBL)	Dry bottoms of vernal pools in open grasslands. Vernal pools averaging 1.5 acres. (110- 3,500ft)	May – Jul. [Sept.]	**Not likely to occur**. There are several historical CNDDB and CNPS occurrences in central Fresno and Tulare Counties, east of the Special-Status Plant Study Area; however, this species is believed to be extirpated from Tulare County. Some of the Special-Status Plant Study Area habitats and elevations are similar to those where this species was previously observed; however, these habitats are degraded.	Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Tuctoria greenei (Green's tuctoria) *CRITICAL HABITAT*	D	--				**No potential to occur**. Critical habitat has not been designated for this species within the Special-Status Plant Study Area.	Originally designated in the Federal Register, Section 68:46683 (August 6, 2003). Designation revised, Section 70:46923 (August 11, 2005). Species by unit designations were published in Section 71:7117 (PDF) (February 10, 2006).
Other Special Status Plant Species							
Astragalus hornii var. *hornii* (Horn's milk-vetch)	--	1B.1	Alkali playa, meadows, seeps. (FAC) [D]	Lake margins, alkaline sites. (200-2,790ft)	May – Oct.	**Potential to occur**. There are several CNDDB and CNPS occurrences in southwest Kern County, west of the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats and elevations are similar to those where this species was previously observed.	
Atriplex cordulata (heartscale)	--	1B.2	Chenopod scrub, valley and foothill grassland, meadows. (FAC)	Alkaline flats and scalds in central valley; sandy soils. (0-1,000ft)	Apr. – Oct.	**Present**. Several plants were observed in the Special-Status Plant Study Area south of Allensworth, CA.	

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Atriplex coronata var. *vallicola* (Lost Hills crownscale)	--	1B.2	Chenopod scrub, valley and foothill grassland, vernal pools. (FACW)	Powdery, alkaline soils that are vernally moist. Commonly with *Frankenia* sp., other *Atriplex* spp., and *Distichlis* sp. (0-1,000ft)	Apr. – Aug.	**Potential to occur**. Observed within the vicinity of the Special-Status Plant Study Area south of Allensworth, CA. There are several CNDDB and CNPS occurrences in west Fresno County, south Kings County, and west Kern County, west of the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats, elevations, and highly conductive soils are similar to those where this species was previously observed.	Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon
Atriplex depressa (brittlescale)	--	1B.2	Alkali playa, chenopod scrub, meadows, playas, valley and foothill grassland, vernal pools. (FAC) [D]	Alkali scalds or alkali clay in meadows or annual grassland, rarely associated with riparian, marshes or vernal pools. (0-1,050ft)	Apr. – Oct.	**Potential to occur**. Observed within the vicinity of the Special-Status Plant Study Area south of Allensworth, CA. There are several CNDDB and CNPS occurrences in west Fresno, northeast Kings, southwest Tulare and west-central Kern counties, primarily west of the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats, elevations, and highly conductive clay soils are similar to those where this species was previously observed.	

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Atriplex erecticaulis (Earlimart orache)	--	1B.2	Valley and foothill grassland. (NL)	(131-328ft)	Aug. – Sept.	**Potential to occur**. There are several CNDDB and CNPS occurrences in west Tulare, northeast Kings, and northwest Kern counties, both east and west of the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats, elevations, and soils are similar to those where this species was previously observed.	
Atriplex minuscula (lesser saltscale)	--	1B.1	Alkali playa, chenopod scrub, playas, valley and foothill grassland. (FACU)[D]	Alkali sink and grassland in sandy, alkaline soils. (50-660ft)	May – Oct.	**Potential to occur**. Observed within the vicinity of the Special-Status Plant Study Area south of Allensworth, CA. There are several CNDDB and CNPS occurrences in west-central Fresno, west Tulare, and northwest Kern counties, both east and west of the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats, elevations, and sandy alkaline soils are similar to those where this species was previously observed.	Recovery Plan for the Upland Species of the San Joaquin Valley, California

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Atriplex persistens (vernal pool smallscale)	--	1B.2	Vernal pool. (NL)	Alkaline vernal pools. (30-380ft)	Jun. – Oct.	**Potential to occur**. There are several CNDDB and CNPS occurrences in west Tulare County, both east and west of the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats, elevations, and soils are similar to those where this species was previously observed.	Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon
Atriplex subtilis (subtle orache)	--	1B.2	Valley and foothill grassland. (NL)	Saline depressions often within later growing vernal pools. (130-330ft)	Jun. – Aug. [Oct.]	**Potential to occur**. Observed within the vicinity of the Special-Status Plant Study Area south of Allensworth, CA. There are several CNDDB and CNPS occurrences in west Fresno, northeast Kings, southwest Tulare, and west-central Kern counties, both east and west of the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats and elevations are similar to those where this species was previously observed.	

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
California macrophylla (round-leaved filaree)	--	1B.1	Cismontane woodland, valley and foothill grassland. (NL)	Clay soils, often in disturbed places. (49-3,937ft)	Mar. – May	**Potential to occur**. There are numerous CNDDB and CNPS occurrences in Fresno, Kings, and Kern counties, near the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats, elevations, and highly conductive soils are similar to those where this species was previously observed.	
Calochortus striatus (alkali mariposa-lily)	--	1B.2	Chaparral, chenopod scrub, mojavean desert scrub, meadows. (FACW)	Alkaline meadows and ephermeral washes, with *Atriplex* spp., *Suaeda moquinii*, and *Prosopis glandulos*. (300-5,230ft)	Apr. – Jun.	**Potential to occur**. There are several CNDDB and CNPS occurrences in Tulare and Kern counties, some near the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats, elevations, and soils are similar to those where this species was previously observed.	
Chloropyron molle ssp. *hispidum* (hispid bird's-beak)		1B.1	Meadows, playas, valley and foothill grassland	In damp alkaline soils, especially in alkaline meadows and alkali sinks with Distichlis. (10-155 m)	Jun. – Sept.	**Not likely to occur.** There are two CNDDB occurrences in Kern county, one within with Special-Status Plant Study Area and one 5 miles southeast of it. However, suitable habitat does not remain within the Special-Status Plant Study Area in urban Bakersfield.	

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Cirsium crassicaule (slough thistle)	--	1B.1	Chenopod scrub, marshes and swamps, riparian scrub. (OBL)	Sloughs, riverbanks, and marshy areas. (10-328ft)	May – Aug.	**Potential to occur**. There are several CNDDB and CNPS occurrences in Kings and Kern counties, west of the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats, elevations, and soils are similar to those where this species was previously observed.	
Clarkia tembloriensis ssp. *calientensis* (Vasek's clarkia)	--	1B.1	Valley and foothill grassland. (NL)	North-facing slopes, rocky, with *Isomeris* sp., other *Clarkia* spp. (890-1,00ft)	Apr.	**No potential to occur**. There are two CNDDB and CNPS occurrences in central Kern County south of the Special-Status Plant Study Area. The Special-Status Plant Study Area elevations are lower than those typically preferred by the species.	Recovery Plan for the Upland Species of the San Joaquin Valley, California
Delphinium purpusii (rose-flowered larkspur)	--	1B.3	Chaparral, cismontane woodland, pinyon-juniper woodland. (NL)	Shady, rocky slopes, often on carbonates. (990-4,290ft)	[Mar.] Apr. – May	**No potential to occur**. There are several CNDDB and CNPS occurrences in the chaparral and on carbonate soils of the pinyon and juniper woodland of the low Sierra Foothills of the eastern part of Tulare and northeast Kern counties. The Special-Status Plant Study Area elevations and habitats are different than those typically observed for the species.	

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Delphinium recurvatum (recurved larkspur)	--	1B.2	Chenopod scrub, valley and foothill grassland, cismontane woodland. (NL)	Alkaline soils, valley saltbush or valley chenopod scrub. (0-4,400ft)	Mar. – Jun.	**Potential to occur.** Several plants were observed west of the Special-Status Plant Study Area south of Allensworth, CA. Some of the Special-Status Plant Study Area habitats and elevations are similar to those where this species was previously observed.	
Downingia pusilla (dwarf downingia)	--	2.2	Valley and foothill grassland (mesic sites), vernal pools. (OBL)	Vernal lake and pool margins in variety of vernal pool types. (1-1,600ft)	Mar. – May	**No potential to occur**. In addition to other occurrences further to the north, there is only one CNDDB and CNPS occurrence in north-central Fresno County, about 25 miles north of the Special-Status Plant Study Area. The Special-Status Plant Study Area elevations and habitats are similar to those where this species was previously observed; however, the soils are different.	
Eriastrum hooveri (Hoover's woolly-star)	FD	4.2	Chenopod scrub, valley and foothill grassland, pinyon and juniper woodland. (NL)	On sparsely vegetated alkaline alluvial fans, also in the temblor range on sandy soils. (165-3,00ft)	Mar. – Jul.	**Potential to occur**. The species is known from Fresno, Kings, and Kern counties. Some of the Special-Status Plant Study Area habitats and elevations are similar to those where this species was previously observed.	Recovery Plan for the Upland Species of the San Joaquin Valley, California. Delisted in 2003.

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Eriogonum nortonii (Pinnacles buckwheat)	--	1B.3	Chaparral, valley grassland. (NL)	Sandy soils, often on recent burns. (990-3,220ft)	May – Aug. [Sept.]	**No potential to occur**. Besides occurrences farther to the north, there is only one CNDDB and CNPS occurrence in north-central Fresno County, about 25 miles north of the Special-Status Plant Study Area. The elevation range in the Special-Status Plant Study Area is different than that typically observed for this species.	
Eryngium spinosepalum (spiny-sepaled button-celery)	--	1B.2	Vernal pools, valley and foothill grassland. (FACW)	Clay soils of granitic origin, vernal pools within grasslands. (260-1,300ft)	Apr. – May	**Potential to occur**. There are several CNDDB and CNPS occurrences in central Fresno and north-central Tulare counties east of the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats and elevations are similar to those where this species was previously observed.	
Eschscholzia lemmonii ssp. *kernensis* (Tejon poppy)	--	1B.1	Valley and foothill grassland. (NL)	(825-2475ft)	Mar. – May	**No potential to occur**. The Special-Status Plant Study Area elevations are different than those typically observed for the species.	Recovery Plan for the Upland Species of the San Joaquin Valley, California

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Fritillaria brandegeei (Greenhorn fritillary)	--	1B.3	Lower montane coniferous forest. (NL)	Loamy, granitic soils, often mixed in conifer-black oak community. ([445]3,960-4,00[6,270]ft)	Apr. – Jun.	**No potential to occur**. There are numerous CNDDB and CNPS occurrences in the lower montane coniferous forest of the Sierra Nevada Foothills of the east part of Tulare County and east-central Kern County; however, the Special-Status Plant Study Area elevations and habitats are different than those typically observed for the species.	
Heterotheca shevockii (Shevock's golden-aster)	--	1B.3	Chaparral, cismontane woodland, riparian woodland. (NL)	Ditches, crevices, shallow sand, disturbed, with *Artemisia douglasiana, Baccharis salicifolia, Cephalanthus occidentalis, Quercus wislizenii, Rorippa palustris, Salix* spp., *Verbascum thapsus*. (760-2,970ft)	Aug. – Nov.	**No potential to occur**. There are several CNDDB and CNPS occurrences in the chaparral and woodland of the Sierra Nevada Foothills of east-central Kern County. However, the Special-Status Plant Study Area elevations and habitats are different than those typically observed for the species.	

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Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Imperata brevifolia (California satintail)	--	2.1	Chaparral, coastal scrub, riparian scrub, mojavean scrub, meadows and seeps (alkali). (FAC)[D]	Mesic sites, alkali seeps, riparian areas. (0-1,500ft)	Sept. – May	**Potential to Occur**. There are several CNDDB and CNPS occurrences throughout California and in central Fresno, northeast Tulare, and west-central Kern counties, in the vicinity of the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats are similar to those where this species was previously observed.	
Lasthenia glabrata ssp. *coulteri* (Coulter's goldfields)	--	1B.1	Alkali playa, coastal salt marshes, playas, valley and foothill grassland, vernal pools. (FACW)	Alkaline soils in playas, sinks, and grasslands. (0-4,600ft)	[Feb.] Apr. – May [Jun.]	**Potential to occur**. There are CNDDB and CNPS occurrences recorded from Tulare and Kern counties. Some of the Special-Status Plant Study Area habitats are similar to those where this species was previously observed.	
Layia heterotricha (pale-yellow layia)	--	1B.1	Cismontane woodland, pinyon-juniper woodland, valley and foothill grassland. (FAC)	Alkaline or clay soils, open areas. (890-4,500[8,830]ft)	Mar. – Jun.	**No potential to occur**. There are CNDDB and CNPS occurrences recorded from Fresno, Kings, and Kern counties; however, the Special-Status Plant Study Area elevations are lower than those typically observed for the species.	

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Layia leucopappa (Comanche Point layia)	--	1B.1	Chenopod scrub, valley and foothill grassland. (NL)	Dry hills in white-grey clay soils, with weedy grasses. (300-1,200ft)	Mar. – Apr.	**Not likely to occur.** There are numerous CNDDB and CNPS occurrences recorded from south-central Kern County; however, suitable microhabitat characteristics are not present within the Special-Status Plant Study Area. Also, the Special-Status Plant Study Area falls outside the known range of the species.	Recovery Plan for the Upland Species of the San Joaquin Valley, California
Layia munzii (Munz's tidy-tips)	--	1B.2	Chenopod scrub, valley and foothill grassland. (FACW)	Hillsides, white-grey alkaline clay soils, with grasses and chenopod scrub associates, wetlands. (150-2,500ft)	Mar. – Apr.	**Potential to occur**. There are numerous CNDDB and CNPS occurrences in west Fresno, northwest Kern, and east San Luis Obispo counties, all west of the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats, elevations, and highly conductive soils are similar to those where this species was previously observed.	Recovery Plan for the Upland Species of the San Joaquin Valley, California

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Lepidium jaredii ssp. *album* (Panoche pepper-grass)	--	1B.2	Valley and foothill grassland. (NL)	Alkali bottoms, slopes, washes, alluvial fans, clay and gypsum-rich soils. (600-900ft)	Feb. – Jun	**Not likely to occur**. There are several CNDDB and CNPS occurrences in west Fresno, southeast Benito, and northeast San Luis Obispo counties, all west of the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats are similar to those where this species was previously observed. However, the Special-Status Plant Study Area lies below the known elevation range of this species.	Recovery Plan for the Upland Species of the San Joaquin Valley, California
Leptosiphon serrulatus (Madera leptosiphon)	--	1B.2	Cismontane woodland, lower montane coniferous forest. (NL)	Dry slopes, often on decomposed granite in woodland. ([260]990-4290[5,200]ft)	Apr. – May	**No potential to occur**. There are CNDDB and CNPS occurrences recorded from Fresno, Tulare, and Kern counties; however, the Special-Status Plant Study Area habitats are different than those typically observed for the species.	

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Mimulus acutidens (Kings River monkeyflower)	--	3	Cismontane woodland, Lower montane coniferous forest. (NL)	(1,000-4,030ft)	Apr. – Jul.	**No potential to occur**. There are several CNDDB and CNPS occurrences in the woodland and coniferous forest of the Sierra Nevada Foothills of east Madera and Fresno counties. However, the Special-Status Plant Study Area elevations and habitats are different than those typically observed for the species.	
Mimulus pictus (calico monkeyflower)	--	1B.2	Broadleaved upland forest, cismontane woodland. (NL)	Bare ground around gooseberry bushes, granite rock outcrops. (330-4,290ft)	Mar. – May	**No potential to occur**. There are CNDDB and CNPS occurrences recorded from central Tulare and Kern counties; however, the Special-Status Plant Study Area habitats are different than those typically observed for the species.	
Monardella linoides ssp. *oblonga* (flaxleaf monardella)	--	1B.3	Lower montane coniferous forest, pinyon and juniper woodland, upper montane coniferous forest. (NL)	(2,970-8,150ft)	Jun. – Aug.	**No potential to occur**. There are several CNDDB and CNPS occurrences in east Tulare and central Kern counties. However, the Special-Status Plant Study Area elevations and habitats are different than those typically observed for the species.	

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Myosurus minimus ssp. *apus* (little mouse tail)	--	3.1	Valley and foothill grassland, vernal pools. (OBL)	Alkaline vernal pools. (65-3,000ft)	Mar. – Jun.	**Present**. Numerous populations of this plant were observed on multiple (typically undisturbed) properties near Allensworth, CA.	Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon
Nama stenocarpum (mud nama)	--	2.2	Marshes and swamps. (FACW)	Lake shores, river banks, intermittently wet areas. (16-1,650ft)	Jan. – Jul.	**Potential to occur.** There are two CNDDB and CNPS occurrences in Kings County. The majority of occurrences of this species are from Southern California. Habitat for this species is limited and highly disturbed in the Special-Status Plant Study Area.	
Navarretia setiloba (Piute Mountains navarretia)	--	1B.1	Cismontane woodland, pinyon-juniper woodland, valley and foothill grassland (NL)	Red clay soils, gravelly loam. (990-6,930ft)	Apr. – Jul.	**No potential to occur**. There are several CNDDB and CNPS occurrences in Tulare and Kern counties. However, the Special-Status Plant Study Area elevations and habitats are different than those typically observed for the species.	

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Pterygoneurum californicum (California chalk moss)	--	1B.1	Alpine boulder and rock field, chenopod scrub, alkali playas, valley and foothill grassland. (NL)	Grows on alkali soil. (30-330ft)	NA	**Not likely to occur.** Known only from the type locality, which has not been seen since 1952. Habitat in the southern San Joaquin Valley has been greatly altered by urbanization and agriculture. See Madroño 19(3):92 (1967) for original description.	Moss species
Sagittaria sanfordii (Sanford's arrowhead)	--	1B.2	Marsh and swamp, wetland. (OBL)	Standing or slow-moving freshwater ponds, marshes, and ditches. (0-2,145ft)	May – Oct.	**Not likely to occur.** There are numerous CNDDB and CNPS occurrences recorded from more northern areas of the Valley as well as north-central Fresno County; the nearest observation is approx. 3.7 miles north of the Special-Status Plant Study Area.	
Schizymenium shevockii (Shevock's copper moss)	--	1B.2	Cismontane woodland. (NL)	Metamorphic rock, mesic areas. (2,475-4,620ft)	NA	**No potential to occur.** There are several CNDDB and CNPS occurrences in east and central Fresno County and southeast Tulare County. However, the range of habitats, elevations, and substrate/parent material in the Special-Status Plant Study Area is different that that where the species was typically observed.	Moss species

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Stylocline citroleum (oil neststraw)	--	1B.1	Chenopod scrub, coastal scrub. Valley and foothill grassland (NL)	Flats, clay soils in oil-producing areas. (165-1,320ft)	Mar. – Apr.	**Not likely to occur**. There are several CNDDB and CNPS occurrences in central and west Kern County, both east and west of the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats, elevations, and soils are similar to those where this species was previously observed. However, the species is rare, of restricted distribution, and extirpated from previous known populations and the lands near them have been converted to active agriculture and oil fields.	Recovery Plan for the Upland Species of the San Joaquin Valley, California
Stylocline masonii (Mason's neststraw)	--	1B.1	Chenopod scrub, pinyon-juniper woodland. (NL)	Sandy washes. (330-1,320[3,960]ft)	Mar. – May	**Not likely to occur**. There are several CNDDB and CNPS occurrences in north and west Kern County, both east and west of the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats, elevations, and soils are similar to those where this species was previously observed; however, the soils are different.	

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Tortula californica (California screw moss)	--	1B.2	Chenopod scrub, valley and foothill grassland. (NL)	Grows on sandy soil. (30-4,800ft)	NA	**Not likely to occur**. There is one CNDDB and CNPS occurrence in central Kern County, east of the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats, elevations, and soils are similar to those where this species was previously observed; however, the soils are different.	Moss species
Tropidocarpum californicum (king's gold)	--	1B.1	Chenopod scrub. (NL)	(215ft)	Mar.	**Potential to occur.** There is one CNDDB and CNPS occurrence in northwestern Kern County, west of the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats and elevations are similar to those where this species was previously observed.	
Tropidocarpum capparideum (caper-fruited tropidocarpum)	--	1B.1	Valley and foothill grassland. (NL)	Alkaline clay hills. (0-1500ft)	Mar. – Apr.	**No potential to occur**. There is one CNDDB and CNPS occurrence in north-central Fresno County, 25 miles north of the Special-Status Plant Study Area. Some of the Special-Status Plant Study Area habitats, elevations, and soils are similar to those where this species was previously observed; however, the topography and the soil drainage are different.	

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Viola pinetorum ssp. *grisea* (goosefoot yellow violet)	--	1B.3	Meadows and seeps, subalpine coniferous forest, upper montane coniferous forest, lodgepole forest. (NL)	(1,500-3,400ft)	Apr. – Jul.	**No potential to occur**. There are several CNDDB and CNPS occurrences in high-elevation Fresno, Tulare, and Kern counties. However, the Special-Status Plant Study Area elevations and habitats are different than those typically observed for the species.	
Special-Status Plant Communities							
Alkali Seep	NA	2.1	Permanently moist or wet alkaline seeps.	Vegetation is variable with few species	NA	**No potential to occur.** There are no alkali seep communities within the Special-Status Plant Study Area.	
Valley Freshwater Marsh	NA	2.1	Fresh water wetlands with deep soils.	Typha and/or Scirpus dominant	NA	**No potential to occur.** There are no alkali seep communities within the Special-Status Plant Study Area.	
Great Valley Cottonwood Riparian Forest	NA	2.1	Vegetated riparian systems in the Central Valley	Cottonwoods, willows, oaks, sycamore	NA	**Present.** A small stand was identified along the Kern River.	

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Great Valley Mesquite Scrub	NA	1.1	Open woodland or savanna of the southern San Joaquin Valley	Vegetation is variable	NA	**No potential to occur.** This community historically occurred in the vicinity of the Special-Status Plant Study Area, but has been extremely reduced by flood control and agricultural development.	
Northern Claypan Vernal Pool	NA	1.1	Vernal pools with claypan layer	Vegetation is variable	NA	**Potential to occur.** Stands dominated by goldfields are present in the vicinity of Allensworth.	
Northern Hardpan Vernal Pool	NA	3.1	Vernal pools with hardpan layer	Vegetation is variable	NA	**Potential to occur.** Stands dominated by goldfields are present in the vicinity of Allensworth.	
Stabilized Interior Dunes	NA	1.1	Mouth of the Sacramento-San Joaquin Delta	Herbaceous community with low shrubs or oaks.	NA	**No potential to occur.** There are no dune complexes within the Special-Status Plant Study Area.	
Valley Sacaton Grassland	NA	1.1	Tussock-forming grassland	Dominated by mid-height grasses	NA	**No potential to occur.** There are no natural grasslands within the Special-Status Plant Study Area.	
Valley Saltbush Scrub	NA	2.1	Alluvial fans with low relief	Shrub (Atriplex) dominated vegetation	NA	**Present.** Stands dominated by *Atriplex spinifera* are present in the vicinity of Allensworth.	

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**
Valley Sink Scrub	NA	1.1	Heavy saline/alkaline clays of lakebeds or playas	Shrub dominated vegetation	NA	**Present**. Stands dominated by *Allenrolfea occidentalis* and *Suaeda moquinii* are present in the vicinity of Allensworth.	

A

-- = No status designation·

Federal

FD = Delisted. Status to be monitored for 5 years.
FE = Listed as endangered under the federal Endangered Species Act.
FT = Listed as threatened under the federal Endangered Species Act.
D = Designated Critical Habitat

State

SE = Listed as endangered under the California Endangered Species Act.
ST = Listed as threatened under the California Endangered Species Act.
SR = Listed as rare under the California Endangered Species Act.
SSC = Species of special concern in California.

CNPS

LIST 1A = Presumed extinct in California
LIST 1B = Rare, threatened, or endangered in California and elsewhere
0.1: Seriously endangered in California
0.2: Fairly endangered in California
0.3 Not very endangered in California
LIST 2 = Rare, threatened, or endangered in California, but more common elsewhere
0.1: Seriously endangered in California
0.2: Fairly endangered in California
0.3 Not very endangered in California
LIST 3 = More information about this plant (Review List).
0.1: Seriously endangered in California
0.2: Fairly endangered in California
0.3 Not very endangered in California

B

General and micro habitat information primarily drawn from CNDDB database:

California Department of Fish and Game (CDFG). California Natural Diversity Database (CNDDB). Version 3.1.0 (2009)

Table C-1
Special-Status Plant Species and Special-Status Plant Communities with Potential to Occur

Scientific Name **(Common Name)**	**Federal Status[A]**	**State / CNPS Status[A]**	**General Habitat[B] (Wetland Indicator Status)[C,D]**	**Micro Habitat[B] (Elevation)[E]**	**Bloom Period[F]**	**Potential to Occur**	**Notes**

C
Wetland indicator status, Region 0:

Reed, P.B., Jr. 1988. National List of Plant Species That Occur in Wetlands: California (Region O). *U.S. Fish and Wildlife Service Biological Report* 88(26.10).

D
The 1988 list is incomplete in some cases where names have changed within a taxon. When a species was not listed in the 1988 list but the known ecology of the species indicated a wetland association the 1996 Wetland indicator status revision, Region 0 list was referenced:

Reed, P.B., Jr. (compiler). 1997. Revision of the National List of Plant Species that Occur in Wetlands. In Cooperation with the National and Regional Interagency Review Panels: U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, and Natural Resources Conservation Service. Department of Interior, U.S. Fish and Wildlife Service. Washington, DC, USA.

E
Elevation information often conflicting between CNDDB, CNPS, The Jepson Manual, and specific recovery plans. Average elevation range is presented, and outlier data is presented in brackets:

California Department of Fish and Game (CDFG). 2009a. California Natural Diversity Database (CNDDB). Version 3.1.0

California Native Plant Society (CNPS). 2009. Inventory of Rare and Endangered Plants (online edition, v7-09c). California Native Plant Society. Sacramento, CA. Accessed on Mon, Sep. 28, 2009 from http://www.cnps.org/inventory.

Hickman, James C. (ed.). 1993. The Jepson Manual. Berkeley, CA: University of California Press.

U.S. Fish and Wildlife Service. 2005. Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. Portland, Oregon. xxvi + 606 pages.
U.S. Fish and Wildlife Service. 1998. Recovery plan for upland species of the San Joaquin Valley, California. Region 1, Portland, OR. 319 pp.

F
Bloom period data from CNPS and The Jepson Manual. Uncommon months are shown in brackets:

Hickman, James C. (ed.). 1993. The Jepson Manual. Berkeley, CA: University of California Press.
California Native Plant Society (CNPS). 2009. Inventory of Rare and Endangered Plants (online edition, v7-09c). California Native Plant Society. Sacramento, CA. Accessed on Mon, Sep. 28, 2009, from http://www.cnps.org/inventory

Appendix D
List of Vascular Plant Species Identified in the Special-Status Plant Study Area

Table D-1
List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Aceraceae	Acer campestre	hedge maple	NA	NL	nonnative
Aceraceae	Acer macrophyllum	bigleaf maple	NA	FAC	native
Asteraceae	Acroptilon repens	Russian knapweed	CDFA List B, Cal-IPC moderate	NL	nonnative
Poaceae	Aegilops triuncialis	barbed goatgrass	CDFA List B, Cal-IPC high	NL	nonnative
Asteraceae	Agoseris heterophylla	annual mountain dandelion	NA	NL	native
Poaceae	Agropyron cristatum	crested wheatgrass	NA	NL	nonnative
Poaceae	Agrostis avenacea	Pacific bentgrass	Cal-IPC limited	FACW*	nonnative
Poaceae	Agrostis capillaris	colonial bentgrass	NA	NL	nonnative
Poaceae	Agrostis exarata	spike bentgrass	NA	FACW	native
Poaceae	Agrostis gigantea	giant bentgrass	NA	NI	nonnative
Simaroubaceae	Ailanthus altissima	tree-of-heaven	Cal-IPC moderate	FACU	nonnative
Chenopodiaceae	Allenrolfea occidentalis	iodine bush	NA	FACW+	native
Liliaceae	Allium neopolitanum	white garlic	NA	NL	nonnative
Betulaceae	Alnus rhombifolia	white alder	NA	FACW	native
Brassicaceae	Alyssum alyssoides	small alyssum	NA	NL	nonnative
Amaranthaceae	Amaranthus albus	tumbleweed	NA	FACU	nonnative
Amaranthaceae	Amaranthus blitoides	pigweed	NA	FACW	native
Amaranthaceae	Amaranthus californicus	California pigweed	NA	FACW	native

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List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Amaranthaceae	Amaranthus palmeri	carelessweed	NA	FACU	native
Asteraceae	Ambrosia psilostachya	western ragweed	NA	FAC	native
Lythraceae	Ammannia robusta	grand redstem	NA	OBL	native
Boraginaceae	Amsinckia eastwoodiae	Eastwood's fiddleneck	NA	NL	native
Boraginaceae	Amsinckia menziesii	Menzies' fiddleneck	NA	NL	native
Primulaceae	Anagallis arvensis	scarlet pimpernel	NA	FAC	nonnative
Asteraceae	Anthemis cotula	stinking dog fennel	NA	FACU	nonnative
Apiaceae	Anthriscus caucalis	bur chervil	NA	NL	nonnative
Apocynaceae	Apocynum cannabinum	dogbane	NA	FAC	native
Asteraceae	Artemisia biennis	biennial sagewort	NA	FAC	nonnative
Asteraceae	Artemisia douglasiana	Douglas's mugwort	NA	FACW	native
Asteraceae	Artemisia dracunculus	wormwood tarragon	NA	NL	nonnative
Asteraceae	Artemisia tridentata	Great Basin sagebrush	NA	NL	native
Poaceae	Arundo donax	giant reed	Cal-IPC high	FACW	nonnative
Asclepiadaceae	Asclepias californica	California milkweed	NA	NL	native
Asclepiadaceae	Asclepias fascicularis	narrow-leaf milkweed	NA	FAC	native
Asclepiadaceae	Asclepias speciosa	showy milkweed	NA	FAC	native
Fabaceae	Astragalus asymmetricus	San Joaquin milkvetch	NA	NL	native
Fabaceae	Astragalus didymocarpus var. didymocarpus	two-seeded milkvetch	NA	NL	native

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List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Fabaceae	Astragalus douglasii var. douglasii	Jacumba milk vetch	NA	NL	native
Fabaceae	Astragalus gambelianus	Gambel's dwarf milkvetch	NA	NL	native
Chenopodiaceae	Atriplex canescens	Fourwing saltbush	NA	FACU	native
Chenopodiaceae	Atriplex cordulata	heartscale	CNPS List 1B.2	FAC	native
Chenopodiaceae	Atriplex coronata var. coronata	crownscale	CNPS List 4.2	FACW	native
Chenopodiaceae	Atriplex depressa ₮	brittlescale	CNPS 1B.2	NL	native
Chenopodiaceae	Atriplex fruticulosa	ball scale	NA	FACW	native
Chenopodiaceae	Atriplex lentiformis	Big saltbush	NA	FAC	native
Chenopodiaceae	Atriplex minuscula ₮	lesser scale	CNPS List 1B.2	NL	native
Chenopodiaceae	Atriplex phyllostegia	leafclover saltweed	NA	FACW	native
Chenopodiaceae	Atriplex polycarpa	allscale saltbush	NA	FACU	native
Chenopodiaceae	Atriplex spinifera	spinescale saltbush	NA	FAC	native
Chenopodiaceae	Atriplex subtilis ₮	subtle orache	CNPS List 1B.2	NL	native
Chenopodiaceae	Atriplex vallicola ₮	Lost Hills crownscale	CNPS List 1B.2	FACW	native
Poaceae	Avena barbata	slender wild oats	Cal-IPC moderate	NL	nonnative
Poaceae	Avena fatua	common wild oats	Cal-IPC moderate	NL	nonnative
Poaceae	Avena sativa	cultivated oats	NA	NL	nonnative
Azollaceae	Azolla filiculoides	Pacific mosquito fern	NA	OBL	native
Asteraceae	Baccharis salicifolia	mulefat	NA	NL	native

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List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Chenopodiaceae	Bassia hyssopifolia	fivehook bassia	Cal-IPC limited	FAC	nonnative
Brassicaceae	Brassica nigra	black mustard	Cal-IPC moderate	NL	nonnative
Brassicaceae	Brassica rapa	rape mustard	Cal-IPC limited	NL	nonnative
Poaceae	Briza minor	little rattlesnake grass	NA	FACW-	nonnative
Poaceae	Bromus carinatus	California brome	NA	NL	native
Poaceae	Bromus catharticus	rescuegrass	NA	NL	nonnative
Poaceae	Bromus diandrus	ripgut brome	Cal-IPC moderate	NL	nonnative
Poaceae	Bromus hordeaceous	soft chess	Cal-IPC limited	FACU-	nonnative
Poaceae	Bromus madritensis ssp. madritensis	foxtail chess	NA	NL	nonnative
Poaceae	Bromus madritensis ssp. rubens	red brome	Cal-IPC high	NL	nonnative
Poaceae	Bromus secalinus	rye brome	NA	NL	nonnative
Poaceae	Bromus tectorum	cheatgrass	Cal-IPC high	NL	nonnative
Buddlejaceae	Buddleja davidii	summer butterflybush	NA	NL	nonnative
Portulacaceae	Calandrinia ciliata	common red maids	NA	FACU*	native
Onagraceae	Camissonia boothii	Booth's suncup	NA	NL	native
Onagraceae	Camissonia campestris	field suncup	NA	NL	native
Onagraceae	Camissonia contorta	plains evening primrose	NA	NL	native
Bignoniaceae	Campsis radicans	red trumpet	NA	NL	nonnative
Brassicaceae	Capsella bursa-pastoris	shepherd's purse	NA	FAC-	nonnative

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List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Brassicaceae	Cardamine oligosperma	bittercress	NA	FACW	native
Asteraceae	Carduus pycnocephalus	Italian thistle	CDFA List C, Cal-IPC moderate	NL	nonnative
Cyperaceae	Carex barbarae	Santa Barbara sedge	NA	FACW	native
Scrophulariaceae	Castilleja attenuata	valley tassels	NA	NL	native
Scrophulariaceae	Castilleja exserta	purple owl's clover	NA	NL	native
Ulmaceae	Celtis sp.	hackberry	NA	NL	nonnative
Poaceae	Cenchrus echinatus	southern sandbur	CDFA List C	NL	nonnative
Poaceae	Cenchrus longispinus	mat sandbur	CDFA List C	NL	nonnative
Asteraceae	Centaurea cyanus	Bachelor’s button	NA	NL	nonnative
Asteraceae	Centaurea maculosa	spotted knapweed	CDFA List A, Cal-IPC high	NL	nonnative
Asteraceae	Centaurea melitensis	Napa star thistle	Cal-IPC moderate	NL	nonnative
Asteraceae	Centaurea solstitialis	yellow-star thistle	CDFA List C, Cal-IPC high	NL	nonnative
Gentianaceae	Centaurium venustum	canchalagua	NA	NL	native
Rubiaceae	Cephalanthus occidentalis	California buttonwillow	NA	OBL	native
Caryophyllaceae	Cerastium glomeratum	mouse-ear chickweed	NA	FACU	nonnative
Euphorbiaceae	Chamaesyce maculata	spotted spurge	NA	FACU*	nonnative
Euphorbiaceae	Chamaesyce serpens	common spurge	NA	FAC*	nonnative
Asteraceae	Chamomilla occidentalis	valley mayweed	NA	NL	native

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List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Asteraceae	Chamomilla suaveolens	pineappleweed	NA	NL	nonnative
Chenopodiaceae	Chenopodium album	white goosefoot	NA	FAC	nonnative
Chenopodiaceae	Chenopodium berlandieri	Berlandier's goosefoot	NA	NL	native
Chenopodiaceae	Chenopodium dessicatum	aridland goosefoot	NA	NL	native
Chenopodiaceae	Chenopodium murale	nettleleaf goosefoot	NA	NL	nonnative
Chenopodiaceae	Chenopodium vulvaria	stinking goosefoot	NA	NL	nonnative
Polygonaceae	Chorizanthe sp.	spineflower	NA	NL	native
Asteraceae	Chrysothamnus nauseosus	rubber rabbitbrush	NA	NL	native
Portulacaceae	Claytonia perfoliata	miner's lettuce	NA	FAC	native
Apiaceae	Conium maculatum	poison hemlock	Cal-IPC moderate	FACW	nonnative
Convolvulaceae	Convolvulus arvensis	field bindweed	CDFA List C	NL	nonnative
Asteraceae	Conyza bonariensis	asthmaweed	NA	NL	nonnative
Asteraceae	Conyza canadensis	Canada horseweed	NA	FAC	native
Asteraceae	Conyza floribunda	many-flowered horseweed	NA	NL	nonnative
Brassicaceae	Coronopus didymus	lesser swine wart cress	NA	NL	nonnative
Rosaceae	Cotoneaster lacteus	milk cotoneaster	Cal-IPC moderate	NL	nonnative
Asteraceae	Cotula australis	Australian waterbuttons	NA	NL	nonnative
Crassulaceae	Crassula aquatica	aquatic pygmy weed	NA	OBL	native
Crassulaceae	Crassula connata	sand pygmy weed	NA	FAC	native

Table D-1
List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Crassulaceae	Crassula tillaea	Mediterranean pygmy weed	NA	NI*	nonnative
Asteraceae	Crepis setosa	bristly hawksbeard	NA	NL	nonnative
Convolvulaceae	Cressa truxillensis	alkali weed	NA	FACW	native
Euphorbiaceae	Croton setigerus	dove weed	NA	NL	native
Poaceae	Crypsis schoenoides	swamp pricklegrass	NA	OBL	nonnative
Cucurbitaceae	Cucurbita foetidissima	calabazilla	NA	NL	native
Cupressaceae	Cupressus sempervirens	Italian cypress	NA	NL	nonnative
Cuscutaceae	Cuscuta salina	saltmarsh dodder	NA	NL	native
Poaceae	Cynodon dactylon	Bermuda grass	CDFA List C, Cal-IPC moderate	FAC	nonnative
Cyperaceae	Cyperus eragrostis	tall flatsedge	NA	FACW	native
Cyperaceae	Cyperus erythrorhizos	red-root flatsedge	NA	OBL	native
Cyperaceae	Cyperus sp.	flatsedge	?	NL	?
Solanaceae	Datura stramonium	jimsonweed	NA	NL	nonnative
Solanaceae	Datura wrightii	western jimsonweed	NA	NL	native
Apiaceae	Daucus carota	wild carrot	NA	NL	nonnative
Ranunculaceae	Delphinium recurvatum [Ŧ]	recurved larkspur	CNPS 1B.2	NL	native
Poaceae	Deschampsia danthonioides	annual hairgrass	NA	FACW	native
Brassicaceae	Descurainia incana	soft mountain tansy mustard	NA	NL	native
Brassicaceae	Descurainia sophia	herb sophia	Cal-IPC limited	NL	nonnative

Table D-1
List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Liliaceae	Dichelostemma capitata	blue dicks	NA	NL	native
Poaceae	Distichlis spicata	inland saltgrass	NA	FACW	native
Poaceae	Echinochloa colona	jungle rice	NA	FACW	nonnative
Poaceae	Echinochloa crus-galli	barnyard grass	NA	FACW	nonnative
Alismataceae	Echinodorus berteroi	upright burhead	NA	OBL	native
Cyperaceae	Eleocharis atropurpurea	purple spikerush	NA	FACW+	native
Cyperaceae	Eleocharis macrostachya	common spikerush	NA	OBL	native
Poaceae	Elymus glaucus	blue wildrye	NA	FACU	native
Poaceae	Elymus sp.	ryegrass species	NA	NL	native
Poaceae	Elymus triticoides	creeping wildrye	NA	FAC+	native
Onagraceae	Epilobium brachycarpum	panicled willowherb	NA	UPL	native
Onagraceae	Epilobium ciliatum	fringed willowherb	NA	FACW	native
Equisetaceae	Equisetum laevigatum	smooth scouring rush	NA	FACW	native
Poaceae	Eragrostis barrelieri	Mediterranean lovegrass	NA	NL	nonnative
Poaceae	Eragrostis cilianensis	stinkgrass	NA	FACU	nonnative
Poaceae	Eragrostis curvula var. curvula	weeping lovegrass	NA	NL	nonnative
Malvaceae	Eremalche parryi ssp. kernensis [Ŧ]	Kern mallow	FE, CNPS List 1B.1	NL	native
Polygonaceae	Eriogonum gracillimum	rose and white buckwheat	NA	NL	native
Polygonaceae	Eriogonum sp.	buckwheat	NA	?	native

Table D-1
List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Geraniaceae	Erodium botrys	broad-leaf filaree	NA	NL	nonnative
Geraniaceae	Erodium cicutarium	red-stem filaree	Cal-IPC limited	NL	nonnative
Geraniaceae	Erodium moschatum	white-stem filaree	NA	NL	nonnative
Apiaceae	Eryngium vaseyi	coyote thistle	NA	FACW	native
Papaveraceae	Eschscholzia californica	California golden poppy	NA	NL	native
Myrtaceae	Eucalyptus globulus	Tasmanian blue gum	Cal-IPC moderate	NL	nonnative
Asteraceae	Euthamia occidentalis	western goldenrod	NA	OBL	native
Moraceae	Ficus carica	edible fig	Cal-IPC moderate	NL	nonnative
Asteraceae	Filago californica	California herb impia	NA	NL	native
Asteraceae	Filago gallica	Mediterranean herb impia	NA	NL	nonnative
Frankeniaceae	Frankenia salina	alkali heath	NA	FACW+	native
Oleaceae	Fraxinus sp.	ash	NA	NL	nonnative
Rubiaceae	Galium aparine	goose grass	NA	FACU	native
Poaceae	Gastridium ventricosum	nit grass	NA	FACU	nonnative
Geraniaceae	Geranium carolinianum	Carolina geranium	NA	NL	native
Geraniaceae	Geranium columbinum	longstalk cranesbill	NA	NL	nonnative
Geraniaceae	Geranium dissectum	cut-leaf geranium	Cal-IPC moderate	NL	nonnative
Geraniaceae	Geranium molle	dovefoot geranium	NA	NL	nonnative
Geraniaceae	Geranium pusillum	miniature geranium	NA	NL	nonnative

Table D-1
List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Polemoniaceae	Gilia leptalea	Bridge's gilia	NA	NL	native
Polemoniaceae	Gilia tricolor	bird's eye gilia	NA	NL	native
Asteraceae	Gnaphalium californicum	California cudweed	NA	NL	native
Asteraceae	Gnaphalium canescens	Wright's cudweed	NA	NL	native
Asteraceae	Gnaphalium luteo-album	everlasting cudweed	NA	NL	nonnative
Asteraceae	Gnaphalium palustre	lowland cudweed	NA	FACW	native
Malvaceae	Gossypium hirsutum	cotton	NA	NL	nonnative
Asteraceae	Grindelia camporum	Great Valley gumweed	NA	FACU	native
Brassicaceae	Guillenia lasiophylla	California mustard	NA	NL	native
Araliaceae	Hedera helix	English ivy	Cal-IPC high	NL	nonnative
Asteraceae	Helianthus annuus	common sunflower	NA	FAC-	native
Boraginaceae	Heliotropium curassavicum	seaside heliotrope	NA	OBL	native
Asteraceae	Hemizonia fitchii	Fitch's tarweed	NA	NL	native
Asteraceae	Hemizonia kelloggii	Kellogg's tarplant	NA	NL	native
Asteraceae	Hemizonia pungens	common tarweed	NA	FAC	native
Caryophyllaceae	Herniaria hirsuta	hairy rupturewort	NA	NL	nonnative
Asteraceae	Hesperevax sparsiflora var. sparsiflora	few-flowered evax	NA	FACU	native
Urticaceae	Hesperocnide tenella	western nettle	NA	NL	native
Asteraceae	Heterotheca grandiflora	telegraph weed	NA	NL	native

Table D-1
List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Asteraceae	Heterotheca subaxillaris	camphorweed	NA	UPL	native
Brassicaceae	Hirschfeldia incana	Mediterranean hoary mustard	Cal-IPC moderate	NL	nonnative
Poaceae	Hordeum brachyantherum ssp. brachyantherum	meadow barley	NA	FACW	native
Poaceae	Hordeum depressum	alkali barley	NA	NI	native
Poaceae	Hordeum marinum ssp. gussoneanum	Mediterranean barley	Cal-IPC moderate	NL	nonnative
Poaceae	Hordeum murinum ssp. leporinum	hare barley	Cal-IPC moderate	NI	nonnative
Poaceae	Hordeum murinum ssp. murinum	foxtail barley	Cal-IPC moderate	NL	nonnative
Poaceae	Hordeum vulgare	great barley	NA	NL	nonnative
Brassicaceae	Hutchinsia procumbens	prostrate hutchinsia	NA	NL	native
Asteraceae	Hypochaeris glabra	smooth cat's ear	Cal-IPC limited	NL	nonnative
Asteraceae	Isocoma acradenia	alkali goldenbush	NA	NL	native
Capparaceae	Isomeris arborea	bladder pod	NA	NL	native
Asteraceae	Iva axillaris var. axillaris	poverty weed	NA	FAC	native
Asteraceae	Iva axillaris var. robustior	poverty weed	NA	FAC	native
Juglandaceae	Juglans californica	California walnut	NA	FAC	planted
Juglandaceae	Juglans x regia	English walnut	NA	NL	nonnative
Juncaceae	Juncus ambiguus	saline toad rush	NA	NL	native
Juncaceae	Juncus balticus	Baltic rush	NA	OBL	native
Juncaceae	Juncus bryoides	moss rush	NA	FACW*	native

Table D-1
List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Juncaceae	Juncus bufonius	common toad rush	NA	FACW+	native
Juncaceae	Juncus effusus	common bog rush	NA	OBL	native
Juncaceae	Juncus mexicanus	Mexican rush	NA	FACW	native
Juncaceae	Juncus phaeocephalus var. paniculatus	brown-headed rush	NA	FACW	native
Cupressaceae	Juniperus chinensis	Chinese juniper	NA	NL	nonnative
Chenopodiaceae	Kochia californica	red molly	NA	FACW	native
Asteraceae	Lactuca serriola	prickly lettuce	NA	FAC	nonnative
Lamiaceae	Lamium amplexicaule	giraffe's head henbit	NA	NL	nonnative
Asteraceae	Lasthenia californica	California goldflields	NA	NL	native
Asteraceae	Lasthenia chrysantha	alkali sink goldfields	NA	FAC*	native
Asteraceae	Lasthenia glabrata ssp. glabrata	yellow-rayed goldfields	NA	FACW	native
Asteraceae	Lasthenia minor	smooth goldfields	NA	FACW	native
Asteraceae	Lasthenia platycarpha	alkali goldfields	NA	FACW	native
Fabaceae	Lathyrus jepsonii var. californicus	Jepson's pea	NA	NL	native
Asteraceae	Layia glandulosa	white layia	NA	NL	native
Asteraceae	Layia platyglossa	common tidy-tips	NA	NL	native
Lemnaceae	Lemna minor	common duckweed	NA	OBL	native
Brassicaceae	Lepidium campestre	English cow cress	NA	NL	nonnative
Brassicaceae	Lepidium dictyotum var. dictyotum	alkali peppergrass	NA	OBL	native

Table D-1
List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Brassicaceae	Lepidium latifolium	broad-leafed pepper	CDFA List B, Cal-IPC high	FACW	nonnative
Brassicaceae	Lepidium latipes var. latipes	dwarf pepperweed	NA	OBL	native
Brassicaceae	Lepidium nitidum ssp. nitidum	common shining peppergrass	NA	NL	native
Brassicaceae	Lepidium nitidum ssp. oreganum	Oregon shining peppergrass	NA	NL	native
Brassicaceae	Lepidium oxycarpum	forked pepperweed	NA	OBL	native
Poaceae	Leptochloa uninervia	one-nerved sprangletop	NA	FACW	native
Poaceae	Leymus sp.	ryegrass	NA	NL	native
Poaceae	Leymus triticoides	creeping ryegrass	NA	NL	native
Oleaceae	Ligustrum ovalifolium	privet	NA	NL	nonnative
Polemoniaceae	Linanthus androsaceus	Linanthus	NA	NL	native
Scrophulariaceae	Linaria canadensis	blue toadflax	NA	NL	native
Caryophyllaceae	Loeflingia squarrosa	spreading pygmyleaf	NA	NL	native
Poaceae	Lolium multiflorum	Italian rye grass	Cal-IPC moderate	NL	nonnative
Caprifoliaceae	Lonicera japonica	Japanese honeysuckle	NA	NI	nonnative
Fabaceae	Lotus purshianus	Spanish lotus	NA	NL	native
Fabaceae	Lotus strigosus	strigose lotus	NA	NL	native
Onagraceae	Ludwigia palustris	marsh seedbox	NA	OBL	native
Onagraceae	Ludwigia peploides	floating primrose	NA	OBL	native
Fabaceae	Lupinus bicolor	dove lupine	NA	NL	native

Table D-1
List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Fabaceae	Lupinus concinnus	elegant lupine	NA	NL	native
Fabaceae	Lupinus nanus	sky lupine	NA	NL	native
Solanaceae	Lycium andersonii	Anderson's box-thorn	NA	NL	native
Lythraceae	Lythrum hyssopifolium	hyssop loosestrife	Cal-IPC moderate	FACW	nonnative
Asteraceae	Machaeranthera gracilis	slender goldenweed	NA	NL	native
Asteraceae	Malacothrix coulteri	snake's head	NA	NL	native
Asteraceae	Malacothrix glabrata	desert dandelion	NA	NL	native
Malvaceae	Malva neglecta	dwarf mallow	NA	NL	nonnative
Malvaceae	Malva nicaeensis	bull mallow	NA	NL	nonnative
Malvaceae	Malva parviflora	cheeseweed mallow	NA	NL	nonnative
Malvaceae	Malva sylvestris	hollyhock	NA	NL	nonnative
Malvaceae	Malvella leprosa	alkali mallow	CDFA List C	FAC*	native
Lamiaceae	Marrubium vulgare	horehound	Cal-IPC limited	FAC	nonnative
Marsileaceae	Marsilea vestita ssp. vestita	hairy waterclover	NA	OBL	native
Fabaceae	Medicago lupulina	black medic	NA	FAC	nonnative
Fabaceae	Medicago polymorpha	bur clover	Cal-IPC limited	NL	nonnative
Fabaceae	Medicago sativa	alfalfa	NA	NL	nonnative
Fabaceae	Melilotus indicus	annual sweetclover	NA	FAC	nonnative
Lamiaceae	Mentha spicata	spearmint	NA	OBL	nonnative

Table D-1
List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Loasaceae	Mentzelia dispersa	Nada stickleaf	NA	NL	native
Aizoaceae	Mesembryanthemum nodiflorum	slender-leaved iceplant	NA	FACU	nonnative
Asteraceae	Microseris douglasii	Douglas's silverpuffs	NA	NL	native
Scrophulariaceae	Mimulus guttatus	seep monkeyflower	NA	OBL	native
Moraceae	Morus alba	white mulberry	NA	NI	nonnative
Poaceae	Muhlenbergia filiformis	slender muhly	NA	FACW	native
Liliaceae	Muilla maritima	sea muilla	NA	NL	native
Ranunculaceae	Myosurus minimus ssp. apus	little mousetail	CNPS 3.1	OBL	native
Poaceae	Nassella pulchra	purple-needlegrass	NA	NL	native
Oleaceae	Nerium oleander	oleander	NA	NL	nonnative
Solanaceae	Nicotiana attenuata	coyote tobacco	NA	FAC	native
Solanaceae	Nicotiana glauca	tree tobacco	Cal-IPC moderate	FAC	nonnative
Onagraceae	Oenothera elata ssp. hookeri	Hooker's evening primrose	NA	FACW	native
Onagraceae	Oenothera laciniata	cutleaf evening primrose	NA	NI*	nonnative
Oleaceae	Olea europaea	European olive	Cal-IPC limited	NL	nonnative
Oxalidaceae	Oxalis corniculata	creeping wood sorrel	NA	FACU	nonnative
Oxalidaceae	Oxalis pes-caprae	Bermuda buttercup	Cal-IPC moderate	NL	nonnative
Boraginaceae	Pectocarya linearis ssp. ferocula	sagebrush combseed	NA	NL	native
Vitaceae	Parthenocissus quinquefolia	Virginia creeper	NA	NL	nonnative

Table D-1
List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Boraginaceae	Pectocarya penicillata	sleeping combseed	NA	NL	native
Polygonaceae	Persicaria hydropiperoides	swamp smartweed	NA	OBL	native
Polygonaceae	Persicaria sp.	knotweed	?	NL	?
Hydrophyllaceae	Phacelia ciliata	Great Valley phacelia	NA	NL	native
Hydrophyllaceae	Phacelia distans	distant phacelia	NA	NL	native
Hydrophyllaceae	Phacelia fremontii	Fremont's phacelia	NA	NL	native
Hydrophyllaceae	Phacelia ramosissima var. latifolia	branching phacelia	NA	NL	native
Poaceae	Phalaris aquatica	Harding grass	Cal-IPC moderate	FAC+	nonnative
Poaceae	Phalaris arundinacea	reed canarygrass	NA	OBL	native
Poaceae	Phalaris canariensis	canarygrass	NA	FACU	nonnative
Poaceae	Phalaris paradoxa	paradox canary grass	NA	NL	nonnative
Poaceae	Phleum pratense	cultivated timothy	NA	FACU	nonnative
Hydrophyllaceae	Pholistoma membranaceum	white fiesta flower	NA	NL	native
Viscaceae	Phoradendron macrophyllum	bigleaf mistletoe	NA	NL	native
Rosaceae	Photinia x fraseri	Fraser's photinia	NA	NL	nonnative
Verbenaceae	Phyla nodiflora	turkey tanglefruit	NA	FACW	native
Solanaceae	Physalis philadelphica	tomatillo	NA	FAC	nonnative
Pinaceae	Pinus pinea	Italian stone pine	NA	NL	nonnative
Boraginaceae	Plagiobothrys leptocladus	alkali popcornflower	NA	OBL	native

Table D-1
List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Boraginaceae	Plagiobothrys nothofulvus	rusty popcornflower	NA	FAC	native
Plantaginaceae	Plantago elongata	prairie plantain	NA	FACW*	native
Plantaginaceae	Plantago erecta	California plantain	NA	NL	native
Plantaginaceae	Plantago lanceolata	lanceleaf plantain	Cal-IPC limited	FAC-	nonnative
Plantaginaceae	Plantago major	common plantain	NA	FACW-	nonnative
Platanaceae	Platanus racemosa	western sycamore	NA	FACW	native
Asteraceae	Pluchea odorata	marsh fleabane	NA	NL	native
Poaceae	Poa annua	annual bluegrass	NA	FACW-	nonnative
Poaceae	Poa pratensis	Kentucky bluegrass	Cal-IPC limited	FACU	nonnative
Polygonaceae	Polygonum arenastrum	dooryard knotweed	NA	NL	nonnative
Polygonaceae	Polygonum douglasii ssp. douglasii	Douglas's knotweed	NA	FACU	native
Polygonaceae	Polygonum lapathifolium	willow smartweed	NA	OBL	native
Poaceae	Polypogon maritimus	Mediterranean rabbitsfoot	NA	OBL	nonnative
Poaceae	Polypogon monspeliensis	rabbitfootgrass	Cal-IPC limited	FACW+	nonnative
Salicaceae	Populus alba	white poplar	NA	NL	nonnative
Salicaceae	Populus fremontii	Fremont cottonwood	NA	FACW	native
Portulacaceae	Portulaca oleracea	common purslane	NA	FAC	nonnative
Ranunculaceae	Potentilla indica	false strawberry	NA	UPL	nonnative
Ranunculaceae	Potentilla rivalis	brook cinquefoil	NA	FACW+	native

Table D-1
List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Fabaceae	Prosopis velutina	velvet mesquite	NA	NL	nonnative
Rosaceae	Prunus caroliniana	Carolina laurelcherry	NA	NL	nonnative
Rosaceae	Prunus cerasifera	cherry plum	Cal-IPC limited	NL	nonnative
Rosaceae	Prunus dulcis	almond	NA	NL	nonnative
Rosaceae	Prunus emarginata	bitter-leaf cherry	NA	NL	native
Poaceae	Puccinellia simplex	California alkali grass	NA	FACW*	native
Fagaceae	Quercus lobata	valley oak	NA	FAC*	native
Fagaceae	Quercus suber	cork oak	NA	NL	nonnative
Ranunculaceae	Ranunculus aquatilis	aquatic buttercup	NA	OBL	native
Brassicaceae	Raphanus sativus	wild radish	Cal-IPC limited	NL	nonnative
Fabaceae	Robinia pseudoacacia	black locust	Cal-IPC limited	FAC*	nonnative
Brassicaceae	Rorippa curvisiliqua	western yellow cress	NA	OBL	native
Brassicaceae	Rorippa nasturtium-aquaticum	watercress	NA	OBL	native
Rosaceae	Rubus discolor	Himalayan blackberry	Cal-IPC high	FACW*	nonnative
Rosaceae	Rubus pensilvanicus	Pennsylvania blackberry	NA	NL	nonnative
Rosaceae	Rubus ursinus	California blackberry	NA	NL	native
Polygonaceae	Rumex acetosella	sheep sorrel	Cal-IPC moderate	FAC-	nonnative
Polygonaceae	Rumex crispus	curly dock	Cal-IPC limited	FACW-	nonnative
Polygonaceae	Rumex hymenosepalus	wild rhubarb	NA	NL	native

Table D-1
List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Polygonaceae	Rumex pulcher	fiddle dock	NA	FAC+	nonnative
Caryophyllaceae	Sagina apetala	annual pearlwort	NA	FAC	native
Salicaceae	Salix exigua	narrowleaf willow	NA	OBL	native
Salicaceae	Salix exigua x melanopsis	hybrid willow	NA	NL	native
Salicaceae	Salix gooddingii	Goodding's black willow	NA	OBL	native
Salicaceae	Salix laevigata	red willow	NA	NL	native
Salicaceae	Salix lucida ssp. lasiandra	shining willow	NA	OBL	native
Chenopodiaceae	Salsola kali	Russian thistle	CDFA List C, Cal-IPC limited	FACU+	nonnative
Chenopodiaceae	Salsola tragus	Russian thistle	CDFA List C, Cal-IPC limited	FACU	nonnative
Lamiaceae	Salvia columbariae	chia	NA	NL	native
Caprifoliaceae	Sambucus mexicana	blue elderberry	NA	FAC	native
Caryophyllaceae	Saponaria officinalis	bouncing bet	Cal-IPC limited	FACU	nonnative
Poaceae	Schismus barbatus	Mediterranean schismus	Cal-IPC limited	NL	nonnative
Cyperaceae	Scirpus acutus	tule	NA	OBL	native
Cyperaceae	Scirpus maritimus	hardstem bulrush	NA	OBL	native
Asteraceae	Senecio vulgaris	common groundsel	NA	NI*	nonnative
Aizoaceae	Sesuvium verrucosum	western sea purslane	NA	FACW	native
Poaceae	Setaria gracilis	bristly foxtail	NA	NL	native

Table D-1
List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Malvaceae	Sida rhombifolia	Cuban jute	NA	FACU*	nonnative
Asteraceae	Silybum marianum	blessed milkthistle	Cal-IPC limited	NL	nonnative
Brassicaceae	Sisymbrium irio	London rocket	Cal-IPC moderate	NL	nonnative
Brassicaceae	Sisymbrium officinale	hedge mustard	NA	NL	nonnative
Brassicaceae	Sisymbrium orientale	oriental hedge mustard	NA	NL	nonnative
Solanaceae	Solanum douglasii	Douglas's nightshade	NA	FAC	native
Solanaceae	Solanum elaeagnifolium	silver-leaved horsenettle	CDFA List B	NL	nonnative
Solanaceae	Solanum lanceolatum	orangeberry nightshade	CDFA List B	NL	nonnative
Asteraceae	Solidago californica	California goldenrod	NA	NL	native
Asteraceae	Solidago occidentalis	western goldenrod	NA	NL	native
Asteraceae	Soliva sessilis	field burweed	NA	FAC+	nonnative
Asteraceae	Sonchus asper	spiny sowthistle	NA	FAC	nonnative
Asteraceae	Sonchus oleraceus	common sowthistle	NA	NI*	nonnative
Rosaceae	Sorbus acuparia	European mountain rowan	NA	NL	nonnative
Poaceae	Sorghum bicolor	sorghum	NA	FAC*	nonnative
Poaceae	Sorghum halepense	Johnson grass	CDFA List C	FACU	nonnative
Fabaceae	Spartium junceum	Spanish broom	Cal-IPC high	NL	nonnative
Caryophyllaceae	Spergula arvensis ssp. arvensis	corn spurry	NA	NL	nonnative
Caryophyllaceae	Spergularia atrosperma	blackseed sandspurry	NA	NL	native

Table D-1
List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Caryophyllaceae	Spergularia bocconei	Boccone's sand spurry	NA	NL	nonnative
Caryophyllaceae	Spergularia macrotheca var. leucantha	large-flowered sand spurry	NA	FAC+	native
Poaceae	Sporobolus indicus	smut grass	NA	NI	nonnative
Lamiaceae	Stachys albens	white hedge-nettle	NA	OBL	native
Caryophyllaceae	Stellaria media	common chickweed	NA	FACU	nonnative
Caryophyllaceae	Stellaria nitens	shiny chickweed	NA	NL	native
Asteraceae	Stephanomeria virgata ssp. virgata	rod wire lettuce	NA	NL	native
Chenopodiaceae	Suaeda moquinii	bush seepweed	NA	NL	native
Tamaricaceae	Tamarix aphylla	Athel tree	Cal-IPC limited	FACW-	nonnative
Tamaricaceae	Tamarix parviflora	small-flower tamarisk	Cal-IPC high	FAC	nonnative
Tamaricaceae	Tamarix pentandra	saltcedar	Cal-IPC high	NL	nonnative
Asteraceae	Taraxacum officinale	common dandelion	NA	FACU	nonnative
Brassicaceae	Thlaspi arvense	fan pepperweed	NA	NI	nonnative
Apiaceae	Torilis arvensis	hedge parsley	Cal-IPC moderate	NL	nonnative
Zygophyllaceae	Tribulus terrestris	puncture vine	CDFA List C	NL	nonnative
Fabaceae	Trifolium aureum	hop clover	NA	NL	nonnative
Fabaceae	Trifolium depauperatum var. amplectens	pale bladder clover	NA	FAC-	native
Fabaceae	Trifolium depauperatum var. depauperatum	cowbag clover	NA	FAC-	native
Fabaceae	Trifolium depauperatum var. truncatum	dwarf sack clover	NA	FAC-	native

Table D-1
List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Fabaceae	Trifolium dubium	shamrock clover	NA	FACU*	nonnative
Fabaceae	Trifolium fucatum	sour clover	NA	FAC	native
Fabaceae	Trifolium gracilentum	pinpoint clover	NA	NL	native
Fabaceae	Trifolium variegatum	white-tipped clover	NA	FACW-	native
Fabaceae	Trifolium willdenovii	tomcat clover	NA	NL	native
Campanulaceae	Triodanis biflora	Venus looking glass	NA	NL	native
Scrophulariaceae	Triphysaria eriantha	butter n' eggs	NA	NL	native
Liliaceae	Triteleia hyacinthina	wild hyacinth	NA	FACW*	native
Poaceae	Triticum aestivum	common wheat	NA	NL	nonnative
Typhaceae	Typha angustifolia	narrowleaf cattail	NA	OBL	native
Typhaceae	Typha latifolia	broadleaf cattail	NA	OBL	native
Ulmaceae	Ulmus minor	English elm	NA	NL	nonnative
Ulmaceae	Ulmus pumila	Siberian elm	NA	NL	nonnative
Urticaceae	Urtica dioica ssp. holosericea	stinging nettle	NA	FACW	native
Urticaceae	Urtica urens	dwarf nettle	NA	NL	nonnative
Scrophulariaceae	Verbascum thapsus	woolly mullein	Cal-IPC limited	NL	nonnative
Scrophulariaceae	Veronica chamaedrys	germander speedwell	NA	NL	nonnative
Scrophulariaceae	Veronica peregrina	wandering neckweed	NA	OBL	native
Scrophulariaceae	Veronica persica	bird's eye speedwell	NA	NL	nonnative

Table D-1
List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity
Fabaceae	Vicia cracca	bird vetch	NA	NL	nonnative
Fabaceae	Vicia sativa	spring vetch	NA	FACU	nonnative
Fabaceae	Vicia villosa	hairy vetch	NA	NL	nonnative
Poaceae	Vulpia bromoides	six-weeks fescue	NA	FACW	nonnative
Poaceae	Vulpia microstachys	small fescue	NA	NL	native
Poaceae	Vulpia myuros	rattail fescue	Cal-IPC moderate	FACU*	nonnative
Arecaceae	Washingtonia robusta	Washington fan palm	Cal-IPC moderate-alert	NL	nonnative
Capparaceae	Wislizenia refracta ssp. californica	jackass clover	NA	NI	native
Asteraceae	Xanthium spinosum	spiny cocklebur	NA	FAC+	native
Asteraceae	Xanthium strumarium	rough cocklebur	NA	FAC+	native
Araceae	Zantedeschia aethiopica	calla lily	Cal-IPC limited	OBL	nonnative

Table D-1
List of Vascular Plant Species Identified in the Special-Status Plant Study Area[1]

Family	Species Name	Common Name	Status	Indicator Status	Nativity

Notes:

[1] Species included in this table were identified within the Special-Status Plant Study Area; however, due to changes to the boundaries of the Special-Status Plant Study Area, some species listed may no longer occur within the current Special-Status Plant Study Area.

[2] Status

FE – Federally Endangered

Cal-IPC – California Invasive Plant Council

CNPS – California Native Plant Society

CDFA – California Department of Food and Agriculture

NA – Not Applicable

[3] Indicator Status

OBL – Obligate Wetland

FACW – Facultative Wetland

FAC – Facultative

FACU – Facultative Upland

UPL – Obligate Upland

NI – No Indicator

+/- – For the facultative categories, indicates frequency towards the high/low end of the category.

* – Identifies tentative assignments based on limited information from which to determine indicator status.

[†] These special-status speices were idenitified within the vicinity but no longer occur within the Special-Status Plant Study Area. They have potential to occur in natural areas where permission to enter has not been granted.

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Appendix E

Special-Status Wildlife Species with Potential to Occur

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Federal and State Listed Species				
Invertebrates				
Branchinecta conservatio CONSERVANCY FAIRY SHRIMP	FE	--	Found in large, turbid pools in the northern 2/3 of the Central Valley; inhabit astatic pools located in swales formed by old, braided alluvium, filled by winter/spring rains, which last until June.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Branchinecta lynchi VERNAL POOL FAIRY SHRIMP	FT	--	Found in vernal pools, particularly small, clear-water sandstone depression pools and grassy swale, earth slump, or basalt-flow depression pools.	**Potential to occur:** *Branchinecta* sp. fairy shrimp confirmed in vernal pool complexes in the Habitat Study Area but outside of the project footprint in the vicinity of the town of Allensworth.
Branchinecta lynchi VERNAL POOL FAIRY SHRIMP *CRITICAL HABITAT*	D	--	Primary constituent elements include: complexes of swales and pools with intermittently or continuously flowing surface water; depressional features that become inundated by winter rains and continuously hold water for a minimum of 18 days; and sources of food and habitat structure within pools.	**Present:** In the vicinity of the town of Allensworth, the BNSF Alternative is within 250 feet of Critical Habitat Unit 27B and Critical Habitat Unit 27C. However, the Fresno to Bakersfield HST project is separated physically and hydraulically from Critical Habitat Unit 27C by the presence of the existing SR 43 and BNSF right-of-way, and is primarily separated from Critical Habitat Unit 27B by this existing infrastructure.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Desmocerus californicus dimorphus VALLEY ELDERBERRY LONGHORN BEETLE	FT	--	Elderberry shrubs with stem diameters of 2-8 inches. Species always found close to host plant. Larvae may remain in stems for up to 2 years.	**Potential to occur:** No valley elderberry longhorn beetles were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range, the beetle's elderberry host plant was observed within the Special-Status Plant Study Area along the banks of the Kern River, Dutch John Slough, and Cole Slough, and CNDDB records have been reported within a 10-mile radius.
Lepidurus packardi VERNAL POOL TADPOLE SHRIMP	FE	--	Found in vernal pools in unplowed grassland with old alluvial soils underlain by hardpan or in sandstone depressions; water in the vernal pools has very low alkalinity and conductivity.	**Potential to occur:** No vernal pool tadpole shrimp were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range, high-quality vernal pool complexes were identified, and CNDDB records have been reported within a 10-mile radius.
Lepidurus packardi VERNAL POOL TADPOLE SHRIMP *CRITICAL HABITAT*	D	--	Primary constituent elements include: complexes of swales and pools with intermittently or continuously flowing surface water; depressional features that become inundated by winter rains and continuously hold water for a minimum of 41 days; and sources of food and habitat structure within pools.	**No potential to occur:** The Habitat Study Area lies outside of federally designated critical habitat for this species.
Fish				

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Hypomesus transpacificus DELTA SMELT	FT	ST	Occur in the low-mid reaches of San Joaquin-Sacramento Delta. Found in brackish water with very low salinity. Shortly before spawning, adults migrate upstream from the brackish-water habitat and disperse widely into river channels and tidally-influenced backwater sloughs and channel edgewaters. Spawn in these shallow, fresh or slightly brackish waters upstream of the mixing zone.	**No potential to occur:** The Habitat Study Area is outside of the historic and current known geographic range of the species, and suitable habitat is not present onsite due to extensive water diversions and instream obstructions to migratory movement.
Oncorhynchus mykiss CENTRAL VALLEY STEELHEAD	FT	--	Anadromous. Found in Pacific Ocean and spawns in coastal streams and rivers. Requires mostly gravel-sized material for spawning, but will also use mixtures of sand-gravel and gravel-cobble.	**No potential to occur:** The Habitat Study Area is outside of the historic and current known geographic range of the species, and suitable habitat is not present onsite due to extensive water diversions and instream obstructions to migratory movement.
Amphibians				
Ambystoma californiense CALIFORNIA TIGER SALAMANDER	FT	ST / CSC	Annual grasslands and grassy understory of valley-foothill hardwood habitats (i.e., oak-savannah). Require vernal pools or other seasonal water sources for breeding. Require mammal burrows or other underground refuges.	**Potential to occur:** No California tiger salamanders were observed during 2010 field surveys; however, portions of the Habitat Study Area between the city of Fresno and the city of Corcoran lie within the species' known range, though poor to marginal breeding habitat was identified and CNDDB records have been reported within a 10-mile radius.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Ambystoma californiense CALIFORNIA TIGER SALAMANDER *CRITICAL HABITAT*	D	--	Primary constituent elements include: standing bodies of fresh water which become inundated during winter rains and typically remain inundated for a minimum of 12 weeks; upland habitats that contain small mammal burrows or other underground refugia; upland dispersal habitat that allows for movement between occupied habitats.	**No potential to occur:** The Habitat Study Area lies outside of federally designated critical habitat for this species.
Batrachoseps simatus KERN CANYON SLENDER SALAMANDER	--	ST	Restricted in range to the Kern River drainage in southern Sierra at elevations ranging between 980 to 6,300 feet; isolated colonies along streams, ridges and canyons on moist, shaded, north-facing rocky slopes and shaded tributary canyons in oak and mixed pine-oak woodland; found beneath rocks and rotting logs.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Batrachoseps stebbinsi TEHACHAPI SLENDER SALAMANDER	C(T/E)	ST	Restricted in range between the southern Sierra Nevada mountain range and Fort Tejon at elevations ranging between 2,000 to 4,600 feet; habitat specialist limited to moist, seasonally shaded, north-facing rocky or talus slopes (e.g., limestone or granite) and oak and mixed pine-oak woodland along canyons and ravines; found beneath heavy leaf litter and rock, talus, and woody debris refugia.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Lithobates (=Rana) pipiens NORTHERN LEOPARD FROG *LIMITED TO* NATIVE POPULATIONS ONLY	C(T)	CSC	In California, native populations are limited in range to Modoc and Lassen counties; introduced populations are otherwise scattered throughout California, though their ability to naturalize is questionable. Habitat requirements include aquatic winter habitat with emergent vegetation for egg deposition, uplands dominated by grasses or forbs for foraging, and availability of moist substrate. Only native populations of this species receive consideration as California species of special concern under California Fish and Game Code.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range of native populations; population in California represents introduced individuals that receive no protection as California species of special concern.
Rana draytonii (*Rana aurora draytonii*) CALIFORNIA RED-LEGGED FROG	FT	CSC	Pools in marshes, streams, ponds, with emergent vegetation, and typically without predatory fish, require adequate hibernacula, such as small mammal burrows or moist leaf litter.	**No potential to occur:** The Habitat Study Area lies within the historical range of the California red-legged frog; however, records within the San Joaquin Valley have since been determined to list as extirpated and the current distribution of the species is primarily restricted to the Coast Range. The Habitat Study Area lies outside of the species' currently accepted range; no CNDDB records have been reported within a 10-mile radius.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Reptiles				
Gambelia (=*Crotaphytus*) *sila* BLUNT-NOSED LEOPARD LIZARD	FE	SE / FP	Resident of sparsely vegetated alkali and desert scrub habitats, in areas of low topographic relief. Seek cover in mammal burrows, under shrubs or structures such as fence posts; they do not excavate their own burrows.	**Present:** Blunt-nosed leopard lizard confirmed within the Allensworth Ecological Reserve on parcels adjacent and contiguous to those within the Habitat Study Area; suitable habitat in the way of sparsely vegetated alkali and desert scrub habitats present onsite for the species; additional CNDDB records confirm blunt-nosed leopard lizard in alkali scrub areas in the region.
Thamnophis gigas GIANT GARTER SNAKE	FT	ST	Found in freshwater marshes and low-gradient streams. Prefers habitat with dense emergent vegetation, deep and shallow pools of water (which persist throughout the seasonal cycle of activity), open areas along water margins, and upland habitat with access to structures suitable for hibernation and escape from flooding. Has adapted to drainage canals and irrigation ditches.	**No potential to occur:** The Habitat Study Area lies within the historical range of the giant garter snake; however, records within the San Joaquin Valley are limited to rice production zones in Sacramento, Sutter, Butte, Colusa, and Glenn counties and the Grasslands and Mendota Wildlife areas of Fresno County; in the southern San Joaquin Valley, the species has otherwise been determined to be extirpated, particularly in the vicinity of the historic Kern, Tulare, and Buena Vista lakebeds; the Habitat Study Area lies outside of the species' currently accepted range; no CNDDB records have been reported within a 10-mile radius.
Birds				
Aquila chrysaetos GOLDEN EAGLE	--	FP	Permanent resident and migrant throughout California range. Found in mountains and foothills. Nests on cliff edges or large trees in open areas. Needs open terrain for hunting: grasslands, deserts, savannahs, and early successional stages of forest and shrub habitats.	**Present:** Golden eagles were observed during 2010 field surveys; the Habitat Study Area lies within the species' known range and suitable foraging habitat was identified; a single CNDDB record has been reported within a 10-mile radius.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Buteo swainsoni SWAINSON'S HAWK	--	ST	Breeds in California, no wintering. Found in open country such as grassland, shrubland, and agricultural areas. Nests in riparian areas and oak woodlands as well as isolated and roadside trees close to grassland or agricultural foraging habitat.	**Present:** Swainson's hawk confirmed in flight, exhibiting courtship behavior, and nesting within the Habitat Study Area; suitable nesting/foraging habitat in the way of mature trees and grassland/agricultural areas present onsite for the species; additional CNDDB records confirm Swainson's hawk nesting in the region.
Charadrius alexandrinus nivosus WESTERN SNOWY PLOVER	FT	CSC	Occurs year round in California range. Inhabits beaches, dry mud or salt flats, sandy shores of rivers, lakes, and ponds. Nests primarily on coastal beaches, but known to nest in the Central Valley. Breeds in loose colonies. *Federal listing applies only to the Pacific coastal population. CDFG "Species of Special Concern" designation refers to both the coastal & interior populations.*	**Potential to occur:** No western snowy plovers were observed during 2010 field surveys; however, suitable habitat is present in the Habitat Study Area for the species; CNDDB records have been reported within a 10-mile radius.
Coccyzus americanus occidentalis WESTERN YELLOW-BILLED CUCKOO	C	SE	Breeds in large blocks of riparian habitats (particularly woodlands with willow and cottonwood) along the broad lower flood bottoms of larger river systems. Dense understory foliage important.	**No potential to occur:** The Habitat Study Area lies within the historical range of the western yellow-billed cuckoo; however, the current distribution of the species in the Central Valley is primarily restricted to isolated breeding populations along the Sacramento River and in the upper Kern River watershed; the Habitat Study Area lies outside of the species' currently accepted range; no western yellow-billed cuckoos were observed during 2010 field surveys; suboptimal nesting and/or foraging habitat was identified along the Kern River; a single CNDDB record has been reported within a 10-mile radius.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Elanus leucurus WHITE-TAILED KITE	--	FP	Found year-round within California range in grasslands, agricultural fields, oak woodlands, savannah, and riparian habitats in rural and urban areas. Often found along tree-lined river valleys with adjacent open areas. Nest in trees.	**Present:** White-tailed kite confirmed within the Habitat Study Area; suitable habitat (open grasslands, riparian habitats, oak woodlands, and irrigated crop field) present onsite for the species; one CNDDB record has been reported within a 10-mile radius.
Empidonax trallii extimus SOUTHWESTERN WILLOW FLYCATCHER	FE	SE	Breeds in relatively dense riparian tree and shrub communities (e.g., willow, cottonwood, tamarisk thickets and woodland) associated with rivers, swamps, and other wetlands, including lakes and reservoirs. Most of these habitats are classified as forested wetlands or scrub-shrub wetlands. Habitat requirements for wintering are not well known, but habitats used include brushy savanna edges, second growth, shrubby clearings and pastures, and woodlands near water.	**No potential to occur:** The Habitat Study Area lies in close proximity to the historical range of the southwestern willow flycatcher; however, the current distribution of the species in the Central Valley is primarily restricted to upstream portions of the Kern River watershed; the Habitat Study Area lies outside of the species' currently accepted range; no southwestern willow flycatchers were observed during 2010 field surveys; suboptimal nesting and/or foraging habitat was identified along the Kern River; no CNDDB records have been reported within a 10-mile radius.
Falco peregrinus anatum AMERICAN PEREGRINE FALCON	Delisted	SE / FP	Found year round within California range in a variety of habitats, most with cliffs for nesting and open areas for foraging. Uses large cities and nests on buildings.	**Present:** American peregrine falcon confirmed within the Habitat Study Area; suitable foraging habitat (open grasslands, meadows, pastures, fallow fields, and irrigated crop field) present onsite for the species; no CNDDB records have been reported within a 10-mile radius.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Grus canadensis tabida GREATER SANDHILL CRANE	--	ST / FP	Within California range winters in the Central Valley and nests in northeastern California. In summer, occurs in and near wet meadow, shallow lacustrine, and fresh emergent wetland habitats. In winter, frequents annual and perennial grassland habitats, moist croplands with rice or corn stubble, and open, emergent wetlands. It prefers relatively treeless plains.	**Potential to occur:** Greater sandhill cranes were observed during 2010 field surveys within the Pixley National Wildlife Refuge; the Habitat Study Area lies within the species' known range and suitable habitat (grasslands, pastures, meadows, and crop and grain fields) were identified; no CNDDB records have been reported within a 10-mile radius.
Gymnogyps californianus CALIFORNIA CONDOR	FE	SE / FP	Permanent resident of the semi-arid, rugged mountain ranges surrounding southern San Joaquin Valley. Nests in caves, crevices, behind rock slabs, or on large ledges on high sandstone cliffs.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Haliaeetus leucocephalus BALD EAGLE	Delisted	SE / FP	Mainly found in mountainous habitats near reservoirs, lakes and rivers and builds nests in the upper canopy of large coniferous trees. Most nest within 1 mile of water.	**Potential to occur:** No bald eagles were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range and suitable foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.
Passerculus sandwichensis beldingi BELDING'S SAVANNAH SPARROW	--	SE	Wetland-dependant avian species that breeds in coastal wetlands between Santa Barbara and the Mexican border.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Synthliboramphus hypoleucus XANTUS'S MURRELET	C / BCC	ST	Breeds on offshore islands of Baja California and southern California; occasionally wanders north to Vancouver Island. An ocean-going species; nests in colonies on rocky sea islands, laying its eggs among boulders or in crevices off of island beaches.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Vireo bellii pusillus LEAST BELL'S VIREO	FE	SE	Summers within California range. Typically inhabits structurally diverse dense riparian woodlands/shrubs along water courses or near open water. Nests in shrub or low tree, usually 1m above ground, in horizontal or down sloping twig fork, typically near edge of thicket. Obligate riparian species during breeding season. Brown-headed cowbird severe threat.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Mammals				
Ammospermophilus nelsoni NELSON'S (SAN JOAQUIN) ANTELOPE SQUIRREL	--	ST	Occurs in the San Joaquin Valley, from southern Merced County south to King, Tulare and Kern counties, at elevations ranging from 200-1,200 feet; species typically found on dry sparsely vegetated loam soils and needs widely scattered shrubs, forbs, and grasses in broken terrain with gullies and washes.	**Potential to occur:** No Nelson's antelope squirrels were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range and suitable grassland and scrubland habitat was identified; CNDDB records have been reported within a 10-mile radius.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Bassariscus astutus RINGTAIL	--	FP	Occurs throughout California; inhabits areas with a mixture of forest and shrubland in close association with rocky areas or riparian habitats; typically forages in riparian areas; uses hollow trees, logs, abandoned burrows, talus piles, and other features for refuge.	**Potential to occur:** Portions of the Habitat Study Area lie within the range of this species. This species is not tracked by the CNDDB. In 2011, ringtail tracks were observed along the Kern River in the vicinity of the Habitat Study Area. Suitable habitat for this species is present along the Kern River, including VRI, VOW, and AGS.
Dipodomys ingens GIANT KANGAROO RAT	FE	SE	Occurs in the western San Joaquin Valley; prefers annual grassland on gentle slopes (10 degrees) with friable, sandy-loam soils. Optimal cover consists of areas with almost no shrub cover.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range and no CNDDB records have been reported within a 10-mile radius.
Dipodomys nitratoides exilis FRESNO KANGAROO RAT	FE	SE	Restricted to native grasslands in Fresno County within the San Joaquin Valley; nearly level, light, friable soils in chenopod scrub and grassland communities.	**Potential to occur:** Although kangaroo rat signs (tail drags, burrows, tracks) were observed during 2010 field surveys, no Fresno kangaroo rats were confirmed to the sub-species; however, the Habitat Study Area lies within the species' known range and suitable grassland and scrubland habitat was identified; two CNDDB records have been reported within a 10-mile radius.
Dipodomys nitratoides nitratoides TIPTON KANGAROO RAT	FE	SE	Occurs in the Tulare Lake basin of the southern San Joaquin Valley; inhabits saltbrush scrub and sink scrub communities. This species needs soft friable soils which escape seasonal flooding. Digs burrows in elevated soil mounds at bases of shrubs.	**Potential to occur:** Although kangaroo rat signs (tail drags, burrows, tracks) were observed during 2010 field surveys, no Tipton kangaroo rats were confirmed to the sub-species; however, the Habitat Study Area lies within the species' known range and suitable scrubland habitat was identified; numerous CNDDB records have been reported within a 10-mile radius.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Sorex ornatus relictus *BUENA VISTA LAKE SHREW*	FE	CSC	Occurs in the Tulare Basin in marshlands and riparian areas; prefers moist soil and uses stumps, logs, and litter for cover.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range and no CNDDB records have been reported within a 10-mile radius.
Vulpes macrotis mutica SAN JOAQUIN KIT FOX	FE	ST	Occurs in the San Joaquin Valley in annual grassland or grassy open stages with scattered shrubby vegetation; requires loose-textured sandy soils for burrowing; requires suitable prey base of small rodents, including kangaroo rats or California ground squirrels.	**Present:** No San Joaquin kit foxes were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range and suitable grassland and scrubland habitat was identified; numerous CNDDB records have been reported within a 10-mile radius.
Other Special-Status Wildlife Species				
Fish				
Archoplites interruptus SACRAMENTO PERCH	--	CSC	Inhabits sloughs, slow-moving rivers, and lakes. Associated with beds of submerged and emergent vegetation, species can tolerate a wide variety of water quality, alkalinity, and turbidity. Usually, this species is extirpated in areas where non-native Centrarchid fish, especially crappie and bluegill, have been introduced. Currently extirpated from the San Joaquin River drainage.	**No potential to occur:** The Habitat Study Area is outside of the historic and current known geographic range of the species, and suitable habitat is not present onsite due to extensive water diversions and instream obstructions to migratory movement.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Entosphenus hubbsi KERN BROOK LAMPREY	--	CSC	Endemic to the east side of the San Joaquin Valley in silty backwaters of rivers emerging from the Sierra foothills.	**Potential to occur:** No Kern brook lamprey were observed during 2010 field surveys; however, the Habitat Study Area lies within the known range of the species and, despite, extensive water diversions and instream obstructions to migratory movement, suitable habitat is present within the Friant-Kern Canal; a single CNDDB record has been reported within a 10-mile radius.
Lampetra ayresi RIVER LAMPREY	--	CSC	Occur in the Sacramento, San Joaquin, and Napa Rivers and tributaries of San Francisco Bay. Adults live in the ocean and migrate into fresh water to spawn	**No potential to occur:** The Habitat Study Area is outside of the historic and current known geographic range of the species, and suitable habitat is not present onsite due to extensive water diversions and instream obstructions to migratory movement.
Lavinia symmetricus symmetricus SAN JOAQUIN ROACH	--	CSC	Small, intermittent to perennial drainages of the San Joaquin River and its tributaries. The introduction of predatory fishes, such as largemouth bass and sunfish, typically eliminates this species. This species is absent from the Kern River drainage.	**No potential to occur:** The Habitat Study Area is outside of the historic and current known geographic range of the species, and suitable habitat is not present onsite due to extensive water diversions and instream obstructions to migratory movement.
Mylopharodon conocephalus HARDHEAD	--	CSC	Distributed in low- to mid-elevation streams in the main Sacramento-San Joaquin drainage. Found in clear, high-quality streams with deep pool and sand-gravel-boulder substrates and slow velocities. Associated with Sacramento pikeminnow and usually with Sacramento sucker. Tend to be absent in streams with high densities of introduced fishes, particularly centrarchids.	**No potential to occur:** The Habitat Study Area is outside of the historic and current known geographic range of the species, and suitable habitat is not present onsite due to extensive water diversions and instream obstructions to migratory movement.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Amphibians				
Ensatina eschscholtzii croceator YELLOW-BLOTCHED SALAMANDER	--	CSC	One of several differentiated forms of *Ensatina*; limited in range to predominantly Kern County in vicinity of Tehachapi Mountains, Mount Pinos, Fort Tejon, and Frazier-Alamo Mountain area; inhabits canyons in oak and pine dominated woodlands and forests beneath leaf litter.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Rana boylii FOOTHILL YELLOW-LEGGED FROG	--	CSC	Frog restricted to partly shaded, shallow streams and riffles with a rocky substrate in a variety of habitats. Cobble-sized substrate required for egg-laying.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Spea (=*Scaphiopus*) *hammondii* WESTERN SPADEFOOT	--	CSC	Grassland and valley-foothill hardwood woodlands, vernal pools or seasonal wetlands are essential for egg laying.	**Present:** Western spadefoot toad confirmed in vernal pool complexes and seasonal wetlands throughout the Habitat Study Area, and in the Allensworth Ecological Reserve, which lies adjacent and contiguous to lands within the HST project corridor; suitable habitat (vernal pools and seasonal wetlands) present onsite for the species; additional CNDDB records confirm western spadefoot toad occurrences throughout the San Joaquin Valley.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Reptiles				
Actinemys (= *Clemmys / Emys) marmorata* WESTERN POND TURTLE	--	CSC	Ponds, marshes, rivers, streams, irrigation ditches, vernal pools. Needs basking sites such as partially submerged logs or rocks, and suitable upland habit (sandy banks or grassy open fields) for egg laying. Fresh, brackish or saltwater conditions.	**Potential to occur:** No western pond turtles were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range and suitable ponds, irrigation ditches, streams, and river habitat was identified; CNDDB records have been reported within a 10-mile radius.
Anniella pulchra pulchra SILVERY LEGLESS LIZARD	--	CSC	Semi-stabilized sand dunes, areas with sandy soil, and high moisture content, vegetated with oak or pine-oak woodland, chaparral; also wooded stream edges, and occasionally desert-scrub. Bush lupine often is an indicator of suitable conditions. Often found in leaf litter, under rocks, logs, and driftwood.	**Potential to occur:** No silvery legless lizards were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range and suitable soils and riparian habitat were identified; CNDDB records have been reported within a 10-mile radius.
Masticophis flagellum ruddocki SAN JOAQUIN WHIPSNAKE	--	CSC	Open, dry, treeless areas, including grassland and saltbush scrub. Takes refuge in rodent burrows, under shaded vegetation, and under surface objects. Primarily restricted to the foothills and higher elevations surrounding the southern San Joaquin Valley in the Coast Range, Sierra Nevada Range, and Tehachapi Mountains.	**Potential to occur:** The Habitat Study Area lies within the historical range of the San Joaquin whipsnake; however, records within the greater San Joaquin Valley have since shown the species as extirpated, and the current distribution of the species is primarily restricted to the foothills and higher elevations surrounding the southern San Joaquin Valley within the Coast Range, Sierra Nevada Range, and Tehachapi Mountains; no San Joaquin whipsnakes were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' historical range and suitable grassland and scrubland habitat was identified; CNDDB records have been reported within a 10-mile radius.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Phrynosoma blainvillii COAST (CALIFORNIA) HORNED LIZARD	--	CSC	Sandy loam areas and on alkali flats. Dietary specialists dependent on ants, as well as beetles and other seasonally abundant insects. Forage on the ground in open areas, usually between shrubs and often near an ant nest. Utilize small mammal burrows or burrow under surface objects during periods of extended inactivity or hibernation.	**Present:** Coast horned lizard confirmed in alkali scrub areas throughout the Habitat Study Area, as well as in the Allensworth Ecological Reserve, which lies adjacent and contiguous to lands within the Habitat Study Area; suitable habitat (alkali flats and arid scrub/shrub communities) present onsite for the species; additional CNDDB records confirm coast horned lizard occurrences throughout the San Joaquin Valley.
Salvadora hexalepis virgultea COAST (WESTERN) PATCH-NOSED SNAKE	--	CSC	Restricted in range to the Pacific coast between San Luis Obispo County and Baja California, Mexico; preferred prey of whiptail lizard (*Aspidoscelis* spp.); inhabit coastal sage, chaparral, and other brushy, shrubby vegetation habitats that provide a low shrub structure; utilize small mammal burrows (i.e., gophers) or woodrat (*Neotoma* spp.) sticknests to overwinter.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Birds				

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Agelaius tricolor TRICOLORED BLACKBIRD	--	CSC	Almost endemic to California; permanent resident and migrant. Highly colonial species, most numerous in Central Valley and vicinity. Nests next to open water typically in freshwater marsh habitat where there is extensive emergent or riparian vegetation. Increasing percentage of breeding colonies has been reported in grain fields. Forages in grasslands, wetland habitats, and some agricultural areas.	**Present:** Tricolored blackbirds were observed during 2010 field surveys; the Habitat Study Area lies within the species' known range, suitable habitat (open water and emergent/riparian vegetation) was identified, and CNDDB records have been reported within a 10-mile radius.
Ammodramus savannarum GRASSHOPPER SPARROW	--	CSC	Occurs in California primarily as a summer (breeding) resident. At least partly migratory. Ecological requirements vary substantially from region to region within its wide range. In general, prefer short to middle-height, moderately open grasslands with scattered shrubs. Ground nester.	**Potential to occur:** No grasshopper sparrows were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range, and suitable nesting and/or foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.
Aphelocoma insularis ISLAND SCRUB-JAY	BCC	--	Found only on Santa Cruz Island in the Channel Islands. Found in open oak woods and brushy patches. Builds stick nest in dense trees or shrubs.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Asio flammeus SHORT-EARED OWL	--	CSC	Year round resident in certain areas (few) within California; more numerous as winter migrants. Found in open county including grasslands, freshwater marshes, old pastures, irrigated alfalfa or grain fields, prairie, and meadows, with concentrations of small mammals. Ground nester.	**Potential to occur:** No short-eared owls were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range, and suitable nesting and/or foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Asio otus LONG-EARED OWL	--	CSC	Occurs in California range year round. Nests in conifer, oak, riparian, pinyon-juniper, and desert woodlands that are either open or are adjacent to grasslands, meadows, or shrublands. Uses stick nests by other birds, and in rare cases, nests in cavities. Forage primarily at night in grasslands, meadows, active or fallow agricultural lands, sagebrush scrub, and desert scrub.	**Potential to occur:** No long-eared owls were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range, and suitable nesting and/or foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.
Athene cunicularia WESTERN BURROWING OWL	--	CSC	Year round resident throughout much of California range. Migrants from other parts of western North America may augment resident populations in winter. Found in open, dry, annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Uses small burrows for nesting and roosting.	**Present:** Western burrowing owl confirmed wintering throughout the Habitat Study Area as well as nesting/wintering in the Allensworth Ecological Reserve, which lies adjacent and contiguous to lands within the Habitat Study Area; suitable habitat (open grasslands, fallow fields, and scrublands with fossorial activity) present onsite for the species; additional CNDDB records confirm western burrowing owl occurrences throughout the San Joaquin Valley.
Aythya americana REDHEAD	--	CSC	Permanent resident and winter migrant in California range. Usually nest in freshwater wetlands with tall emergent vegetation interspersed with areas of deep, open water. In winter and migration forage and rest on large, deep bodies of water and may form rafts far from shore.	**Potential to occur:** No redheads were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range and suitable nesting and/or foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Baeolophus inornatus OAK TITMOUSE	BCC	--	Resident from southern Oregon south to Baja California. Prefers live oaks and deciduous growth of all kinds. Nests in tree cavities, fence-post holes, or crevices of old buildings; the nest is composed of grasses, fur, and some feathers.	**Potential to occur:** No oak titmice were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range and suitable nesting and/or foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.
Calidris canutus RED KNOT (ROSELAARI SSP.)	BCC	--	Breeds in Siberia and northwestern Alaska and winters in Florida, Panama, and Venezuela. Nests on wet, low tundra to dry slopes and ridges. Common locally along sandy beaches. Nest is a depression on a grass hummock, lined with leaves and lichen.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Calypte costae COSTA'S HUMMINGBIRD	BCC	--	Breeds from central California, southern Nevada, and southwestern Utah southward and winters in southern California and Mexico. Found in low deserts; in California, chaparral. Nest is a delicately woven cup, with leaves or lichens fastened to the outside, built low on a protected branch of a bush or small tree.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Campylorhynchus brunneicapillus CACTUS WREN	BCC	--	Resident from southern California, southern Nevada, Utah, and western Texas southward. Prefers desert thickets and cacti. Nest is a mass of fine grass and straw with a side entrance, lined with feathers and hair and placed in the top of a thorny desert shrub or spiny cactus.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Carduelis lawrencei LAWRENCE'S GOLDFINCH	BCC	--	Breeds in central and southern California, west of Sierra Nevada and south into Baja California; winters south and east to extreme western Texas. Prefers dry grassy slopes with weed patches, chaparral, and open woodlands. Nest is a tightly woven cup in a low tree or bush.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Charadrius montanus MOUNTAIN PLOVER	--	CSC	Winter visitor to California range. Roost and forage in short grasslands, freshly plowed fields, and bare ground with flat topography. Prefers fallow, grazed, or burned areas and alkali flats with burrowing rodents.	**Potential to occur:** No mountain plovers were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range and suitable nesting and/or foraging habitat was identified; CNDDB records have been reported within a 10-mile radius.
Chlidonias niger BLACK TERN	--	CSC	Occurs primarily as a migrant and summer resident in California range. In general, nest semi-colonially in favorable, protected areas of marshes. In Central Valley typically breed in rice fields, flooded agricultural fields, and emergent wetlands.	**Potential to occur:** No black terns were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range, and suitable nesting and/or foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.
Circus cyaneus NORTHERN HARRIER	--	CSC	Occurs year round within breeding range in California and may potentially winter in areas statewide. Breeds and forages in variety of open (treeless) habitats such as marshes, meadows, pastures, prairies, weedy borders of lakes, rivers, and streams, grasslands, some croplands, sagebrush flats, and desert sinks. Constructs nests on ground in open field or meadow in shrubby vegetation, usually near wet areas.	**Present:** Northern harrier confirmed within the Habitat Study Area; suitable habitat (open grasslands, meadows, pastures, marshes, fallow fields, and irrigated crop field) present onsite for the species; no CNDDB records have been reported within a 10-mile radius.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Coturnicops noveboracensis YELLOW RAIL	BCC	CSC	Breeds from northern Canada south to North Dakota, Maine and Michigan. Winters in Florida and along Gulf Coast, rarely to southern California. Utilizes grassy marshes and wet meadows, building well-concealed firm grass cup nests. Especially secretive and seldom seen.	**Potential to occur:** No yellow rails were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range, and suitable nesting and/or foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.
Cypseloides niger BLACK SWIFT	--	CSC	Occurs in California range as a summer resident and migrant. Restricted to limited potential nesting locations: behind or beside permanent or semi-permanent waterfalls, on perpendicular cliffs near water, and in sea caves. Forage for flying ants far from nesting locales over a variety of habitat types.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Dendragapus fuliginosus howardi MOUNT PINOS SOOTY GROUSE	--	CSC	Occurs year round in California range. Nests in high-elevation coniferous forest (i.e., mature *Abies*/*Pinus* forest) and raises brood in nearby meadows. Typically winters in conifers.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Dendrocygna bicolor FULVOUS WHISTLING-DUCK	--	CSC	Occurs mainly as summer resident and migrant in California range. Found in freshwater and coastal marshes, rice fields, and flooded tall-grass areas with adjacent uplands. Feeds nocturnally on seeds of emergent vegetation. Ground nester. Nests built on dense floating or flooded emergent vegetation.	**Potential to occur:** No fulvous whistling ducks were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range and suitable nesting and/or foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Dendroica petechia brewsteri YELLOW WARBLER	--	CSC	Occurs primarily as a migrant and summer resident in California range. Generally occupy riparian vegetation close to streams and in wet meadows. Nests placed in upright fork of shrub or tree.	**Potential to occur:** No yellow warblers were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range, and suitable nesting and/or foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.
Geothlypis trichas COMMON YELLOWTHROAT (SINUOSA SSP.)	BCC	--	The range of this subspecies is bounded by Tomales Bay on the north, Carquinez Strait on the east, and Santa Cruz County on the south. Inhabits moist thickets and tall grassy marshes. Nest is a loose cup mass of grass, sedge, and bark, concealed on or near the ground in a dense clump of weeds or grass.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Grus canadensis canadensis LESSER SANDHILL CRANE	--	CSC	Winters only within California range. Foraging habitat includes grasslands, pastures, meadows, crop and grain fields (i.e., corn, barley, wheat fields and to a minor extent rice), and shallow wetlands. Roost sites are in a variety of wetland habitats with shallow water (e.g., pooled agricultural fields, freshwater lakes and ponds, alkaline lakes, and channels of shallow rivers).	**Potential to occur:** Lesser sandhill cranes were observed during 2010 field surveys within the Pixley National Wildlife Refuge; the Habitat Study Area lies within the species' known range, and suitable habitat (grasslands, pastures, meadows, and crop and grain fields) were identified; no CNDDB records have been reported within a 10-mile radius.
Haematopus bachmani BLACK OYSTERCATCHER	BCC	--	Breeds in Baja California and is a casual visitor to California. Builds nests on rocky seacoasts creating a shallow depression among pebbles or, more rarely, on sand beaches.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Icteria virens YELLOW-BREASTED CHAT	--	CSC	Occurs as migrant and summer resident in California range. Occupy riparian habitats with a well-developed dense shrub layer and an open canopy. Nesting habitat is usually restricted to the narrow border of streams, creeks, sloughs, and rivers. Nests placed in dense shrubs.	**Potential to occur:** No yellow-breasted chats were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range and suitable nesting and/or foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.
Ixobrychus exilis LEAST BITTERN	--	CSC	Primarily a summer resident in California range, with some remaining during winter in a few locations. Breeding habitats include freshwater and brackish marshes with tall, dense emergent vegetation and clumps of woody plants over deep water. May require fairly large marshes for breeding.	**Potential to occur:** No least bitterns were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range, and suitable nesting and/or foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.
Lanius ludovicianus LOGGERHEAD SHRIKE	--	CSC	Year round throughout most of California range; some breeding populations may be migratory. Wintering individuals augment resident populations and occupy areas where none breed. Breeds and forages in open habitats interspersed with shrubs and small trees, including disturbed habitats. Nests placed in trees.	**Present:** Loggerhead shrike were observed during 2010 field surveys; the Habitat Study Area lies within the species' known range, and suitable nesting and/or foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Laterallus jamaicensis BLACK RAIL	BCC	CSC	Breeds along Pacific coast through San Francisco Bay and also over-winters in area. Uses matted dead marsh grasses and thick plant stands for cover and concealment. Builds cup nest of loose grasses on ground. Secretive and very rarely seen.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Limnodromus griseus SHORT-BILLED DOWITCHER	BCC	--	Breeds in southern Alaska and parts of Canada and winters along coast from California and Virginia southward. Nests on moist tundra or beside forest pools; visits mudflats, creeks, salt marshes, and tidal estuaries during migration and in winter. Nest is a depression on the ground lined with grass and moss.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Limosa fedoa MARBLED GODWIT	BCC	--	Breeds on the central plains from Saskatchewan to Minnesota and winters on coasts from California and Virginia southward and along Gulf Coast. Nests on grassy plains; visits salt marshes, tidal creeks, mudflats, and sea beaches on migration. Creates a nest in a slight depression lined with grass on the ground and nests in loose colonies.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Melanerpes lewis LEWIS'S WOODPECKER	BCC	--	Breeds from southern Canada south to central California, northern Arizona, and northern New Mexico. Winters from southern British Columbia and Oregon to Colorado and south to northern Mexico; wanders east to the Great Plains. Prefers open pine-oak woodlands, oak or cottonwood groves in grasslands, ponderosa pine country. Forms loose colonies nesting in cavities of dead stumps or tree limbs, often at a considerable height.	**Potential to occur:** No Lewis's woodpeckers were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range, and suitable nesting and/or foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.
Melospiza melodia SONG SPARROW (GRAMINEA SSP.)	BCC	CSC	Resident of Santa Barbara Island of the Channel Islands. Inhabits wooded edges, clearings, and thickets with open grassy feeding areas; uses low dense scrub for nesting; tall vantage points for singing. Nest is neat, well-hidden grassy cup nest often lined with hair, placed in a bush or on the ground.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Melospiza melodia SONG SPARROW (MAXILLARIS SSP.)	BCC	CSC	Resident of the marshes of Suisun Bay. Inhabits thickets and marshes with open grassy feeding areas; uses low dense scrub for nesting; tall vantage points for singing. Nest is neat, well-hidden grassy cup nest often lined with hair, placed in a bush or on the ground.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Melospiza melodia SONG SPARROW (PUSILLULA SSP.)	BCC	CSC	Resident of the eastern San Francisco Bay salt marshes. Inhabits clearings, thickets, and marshes with open grassy feeding areas; low dense scrub for nesting; tall vantage points for singing. Nest is a neat, well-hidden grassy cup nest often lined with hair, placed in a bush or on the ground.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Melospiza melodia SONG SPARROW (SAMUELIS SSP.)	BCC	CSC	Resident of the northern portion of San Francisco Bay and San Pablo Bay. Inhabits clearings, thickets, and marshes with open grassy feeding areas; undergrowth in urban areas; uses low dense scrub for nesting and tall vantage points for singing. Nest is a neat, well-hidden grassy cup nest often lined with hair, placed in a bush or on the ground.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Numenius americanus LONG-BILLED CURLEW	BCC	--	Breeds from southern Canada to northern California, Utah, northern New Mexico, and Texas. Winters from California, Texas, Louisiana, South Carolina, and Florida southward. Nests on plains and prairies; during migration frequents lake and river shores, mudflats, salt marshes, and sandy beaches. Uses a grass-lined nest in a hollow on the ground.	**Present:** Long-billed curlews were observed during 2010 field surveys; the Habitat Study Area lies within the species' known range, and suitable nesting and/or foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Numenius phaeopus WHIMBREL	BCC	--	Breeds on Arctic tundra in Alaska and Canada, especially near coast; uses coastal salt meadows, mudflats, and grassy shoreline slopes during migration. Winters on the Gulf and Atlantic coasts and southern California. Nests in clumps of moss or grassy depressions on the ground.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Oceanodroma homochroa ASHY STORM-PETREL	BCC	CSC	Pelagic marine species of the open ocean. Breeds on rocky islands from northern California to northern Baja California where it uses burrows or rock crevices and nests in large colonies.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Otus flammeolus FLAMMULATED OWL	BCC	--	Breeds in southern British Columbia south to southern California, Arizona, New Mexico, and western Texas. Winters south of United States. Inhabits coniferous woodlands and forest edges in the Northwest; dry ponderosa pine woods in the Southwest. Nests in a tree hollow or deserted woodpecker hole.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Pelecanus erythrorhynchos AMERICAN WHITE PELICAN	--	CSC	Year round in California range, winters along coast and breeds only inland. Breed in multi-species assemblages of colonial nesters along lakes. Nest on ground on earthen, sandy, and rocky islands or (rarely) peninsulas and (locally) on floating tule-mat islands. Forage in shallow inland waters, such as open areas in marshes and along lake or river edges; wintering and non-breeding feed in shallow coastal marine habitats.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Phoebastria nigripes BLACK-FOOTED ALBATROSS	BCC	--	Pelagic marine species of the open ocean that is rarely seen from shore. Uncommon non-breeding visitor to the Pacific coast of North America. Breeds on mid-Pacific islands, where it nests on the ground in shallow depressions.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Pica nuttalli YELLOW-BILLED MAGPIE	BCC	--	Resident in California's Central Valley and adjacent foothills. Common in oak savannas, oak woods, riverside growth, ranches, and suburbs. Nests in colonies in tall trees with dense foliage and builds nests of twigs and sticks.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Picoides albolarvatus WHITE-HEADED WOODPECKER	BCC	--	Resident from extreme south-central British Columbia, northeastern Washington, and Idaho, south to southern California and western Nevada. Prefers ponderosa pine belts of the mountains; also in subalpine belts of firs. Nest cavities are in a pine stub or snag, often close to the ground.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Picoides nuttallii NUTTALL'S WOODPECKER	BCC	--	Resident from northern California to Baja California. Prefers canyon scrub oaks, oak woodlands, and streamside growth. Nests in holes excavated in a thin dead branch of an oak or cottonwood, or even a large, thick-stemmed elderberry bush.	**Potential to occur:** No Nuttall's woodpecker were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range, and suitable nesting and/or foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.
Pipilo maculatus SPOTTED TOWHEE (CLEMENTAE SSP.)	BCC	CSC	Resident of Santa Rosa, Santa Catalina, and (formerly) San Clemente islands in the Channel Islands. Inhabits dense chaparral and woodlands. Nest is a loose cup built in a dense bush, close to or on the ground if sheltered by tall planting.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Pooecetes gramineus affinis OREGON VESPER SPARROW	--	CSC	Winters in California. Grassland wintering habitat characterized as mainly open ground with little vegetation, or short grass and low annuals, including stubble fields, meadows, and road edges.	**Potential to occur:** No Oregon vesper sparrows were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range, and suitable nesting and/or foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Progne subis PURPLE MARTIN	--	CSC	Occurs as summer resident and migrant in California range. Use wide variety of nesting substrates (e.g., tree cavities, bridges, utility poles, lava tubes, buildings); however, sites must have low canopy cover at nest height. Most tree nest sites located in upper slopes of hilly and mountainous terrain. Abundant near large wetlands and other water bodies. Starlings must be present in low densities or absent.	**Potential to occur:** No purple martins were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range, and suitable nesting and/or foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.
Ptychoramphus aleuticus CASSIN'S AUKLET	BCC	CSC	Breeds from the Aleutians to central Baja California. Winters in waters off southern part of breeding range. An open ocean species, it nests on sea cliffs and isolated headlands in colonies. Its nest is usually placed in a burrow but may also be found in a cavity among rocks.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Puffinus creatopus PINK-FOOTED SHEARWATER	BCC	--	Pelagic marine species of the open ocean that is seldom seem from shore. Common non-breeding visitor in the summer to the coasts of Oregon and California. Breeds on islands off of the coast of Chile, where is makes use of burrows and nests in colonies.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Puffinus opisthomelas BLACK-VENTED SHEARWATER	BCC	--	Pelagic marine species of the open ocean that is often seen from shore. A year-round visitor to the waters of southern California. Breeds on islands off Baja California where it makes use of burrows and nests in colonies.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Rynchops niger BLACK SKIMMER	BCC	CSC	Breeds along Atlantic and Gulf coasts from Massachusetts and Long Island to Florida and Texas. Winters north to southern California and Virginia. Nests chiefly on sandbars and beaches; feeds in shallow bays, inlets, and estuaries. Lays eggs on bare sand, usually among shell fragments and scattered grass clumps.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Selasphorus sasin ALLEN'S HUMMINGBIRD	BCC	--	Breeds along coast from southern Oregon to southern California and is a resident of southern California. Also winters in Mexico. Prefers coastal chaparral, brushland, and edges of redwood forests. Nest is a tightly woven cup placed on a sheltered branch.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Spizella atrogularis BLACK-CHINNED SPARROW	BCC	--	Breeds from central California, southern Nevada, southern Utah, Arizona, southern New Mexico, and western Texas southward and winters along Mexican border. Prefers low, dense chaparral, mountain slopes; and sagebrush. Nest is a grass-lined cup well concealed in a low bush.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Sterna nilotica GULL-BILLED TERN	BCC	CSC	Breeds primarily on the Atlantic and Gulf coasts and locally at the Salton Sea, California. Winters north to Gulf coast. Prefers coastal marshes and sandy beaches for nesting; at these locations, it forms shell-lined shallow depressions on a sandy island in a saltmarsh and nests in scattered colonies.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Strix occidentalis SPOTTED OWL (OCCIDENTALIS SSP.)	BCC	CSC	Occurs throughout its historic range in California, extending along the west side of the Sierra Nevada, some eastern Sierra portions, areas of the central Coast range, and in all major mountains of southern California. Inhabits old-growth coniferous forests and densely wooded canyons. Nests in a natural tree or canyon wall cavity or an abandoned hawk's nest.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Toxostoma lecontei LE CONTE'S THRASHER	--	CSC	Permanent resident within California range. Commonly found on very dry and lightly vegetated plains with desert scrub, particularly saltbush and creosote bush. Nests in thick, dense, and thorny desert shrubs or cholla cacti.	**Potential to occur:** No Le Conte's thrashers were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range, and suitable nesting and/or foraging habitat was identified; a single CNDDB record has been reported within a 10-mile radius.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Xanthocephalus xanthocephalus YELLOW-HEADED BLACKBIRD	--	CSC	Mainly summer resident and migrant in California range, small numbers winter. Breeds in loose colonies in freshwater wetlands (e.g., marshes) with tall dense emergent vegetation adjacent to deep water, and along borders of lakes or ponds. Places its nest over water, attached to cattails and reeds. Forages in the wetlands and in surrounding grasslands and croplands. In winter large flocks forage in agricultural areas.	**Present:** Yellow-headed blackbirds were observed during 2010 field surveys; the Habitat Study Area lies within the species' known range, and suitable nesting and/or foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.
Mammals				
Antrozous pallidus PALLID BAT	--	CSC	Occurs throughout California; species forages in open areas of grasslands, shrublands, woodlands, and forests from sea level up through 6,560 feet; roosts in caves, rock crevices, mines, hollow trees, buildings, and bridges.	**Potential to occur:** No pallid bats were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range, and suitable roosting and/or foraging habitat was identified; CNDDB records have been reported within a 10-mile radius.
Chaetodipus californicus femoralis DULZURA POCKET MOUSE	--	CSC	Primarily distributed around the U.S.-Mexico border, with scattered occurrences in the Central Valley; occurs in a variety of habitats including coastal scrub, chaparral and grasslands, particularly grass-chaparral edges.	**Potential to occur:** No Dulzura pocket mice were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range, suitable habitat (grasslands and scrub communities) is present onsite for the species, and a single CNDDB record have been reported within a 10-mile radius in the Allensworth Ecological Reserve on parcels adjacent and contiguous to those within the Habitat Study Area.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Corynorhinus townsendii TOWNSEND'S BIG-EARED BAT	--	CSC	Occurs throughout California; found in a variety of habitats, most commonly in mesic sites, including coniferous forests, mixed meso-phytic forests, deserts, native prairies, riparian communities, active agricultural areas, and coastal habitat types.	**Potential to occur:** No Townsend's big-eared bats were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range, and suitable roosting and/or foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.
Dipodomys nitratoides brevinasus SHORT-NOSED KANGAROO RAT	--	CSC	Occurs in scattered populations along the western edge of the Central Valley; occupies grassland and desert shrub associations on friable soils and open alkaline flats.	**Potential to occur:** Although kangaroo rat signs (tail drags, burrows, tracks) were observed during 2010 field surveys, no short-nosed kangaroo rats were confirmed to the sub-species; however, the Habitat Study Area lies within the species' known range, and suitable grassland and desert shrub habitat and alkaline soils were identified; no CNDDB records have been reported within a 10-mile radius.
Euderma maculatum SPOTTED BAT	--	CSC	Occurs throughout California at elevations ranging from below sea level to 8,860 feet in predominantly foothill, mountain, and desert regions in a wide variety of habitats including arid, low desert habitats to high elevation coniferous forests; roost in cracks, crevices and caves high in rock cliffs.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Eumops perotis californicus WESTERN MASTIFF BAT	--	CSC	Roosts in crevices in cliff faces, high buildings, and tunnels; forages in arid, semi arid habitat-coniferous and deciduous woodlands, coastal scrub, grasslands, and chaparral.	**Potential to occur:** No western mastiff bats were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range, and suitable roosting and/or foraging habitat was identified; CNDDB records have been reported within a 10-mile radius.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**
Lasiurus blossevillii *WESTERN RED BAT*	--	CSC	Occurs throughout California; roosts primarily in trees, typically adjacent to open fields or streams, which are protected above and open below for foraging; prefers habitat edges and mosaics with trees.	**Potential to occur:** No western red bats were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range, and suitable roosting and/or foraging habitat was identified; no CNDDB records have been reported within a 10-mile radius.
Onychomys torridus ramona *SOUTHERN GRASSHOPPER MOUSE*	--	CSC	Occurs in the Mojave Desert in arid desert habitats; prefers alkali desert scrub and desert scrub; also occurs in coastal scrub, mixed chaparral, sagebrush, low sage and bitterbrush scrub habitats; found in areas of low to moderate shrub cover.	**No potential to occur:** The Habitat Study Area lies outside of the species' known range.
Onychomys torridus tularensis *TULARE GRASSHOPPER MOUSE*	--	CSC	Occurs in the southern San Joaquin Valley; species historically occurred across the central and southern San Joaquin Valley but is currently only known from scattered populations; inhabits arid scrub communities, including saltbush scrub.	**Potential to occur:** No Tulare pocket mice were observed during 2010 field surveys; however, the Habitat Study Area lies within the species' known range, suitable habitat (arid scrub communities) is present onsite for the species, and CNDDB records have been reported within a 10-mile radius.
Taxidea taxus AMERICAN BADGER	--	CSC	Occurs throughout California in grasslands, savannas, and mountain meadows near timberline; require friable soils, and relatively open, uncultivated ground; requires suitable prey base of burrowing rodents such as gophers, ground squirrels, marmots, and kangaroo rats.	**Present:** American badger was confirmed in at least two locations, with fossorial activity typical of badgers observed elsewhere in the Habitat Study Area, as well as in the Allensworth Ecological Reserve, which lies adjacent and contiguous to lands within the Habitat Study Area; also, the Habitat Study Area lies within the species' known range, and CNDDB records have been reported within a 10-mile radius.

Table E-1
Special-Status Wildlife Species with Potential to Occur

Scientific Name **COMMON NAME**	**Federal Status[1]**	**State Status[2]**	**Preferred Habitat**	**Potential to Occur**

Notes:

[1] **Federal Status**

C(E) – Candidate for Endangered listing status

C(T) – Candidate for Threatened listing status

C(T/E) – Candidate for Threatened or Endangered listing status

FE – Endangered

FT – Threatened

D – Critical Habitat designated by the U.S. Fish and Wildlife Service.

P – Proposed Critical Habitat designated by the U.S Fish and Wildlife Service.

BCC – Birds of Conservation Concern designated by the U.S. Fish and Wildlife Service.

[2] **State Status**

C(E) – Candidate for Endangered listing status

C(T) – Candidate for Threatened listing status

SE – Endangered

ST – Threatened

CSC – California Species of Special Concern designated by the California Department of Fish and Game.

FP – Fully Protected species designated by the California Department of Fish and Game.

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Appendix F

List of Wildlife Species Observed in the Habitat Study Area

Table F-1
List of Wildlife Species Observed in the Habitat Study Area

Species Name	Common Name	Listing Status*	Notes
Invertebrates:			
family *Tenebrionidae*	darkling beetle	--	--
Branchinecta sp.	fairy shrimp	--	Observed outside of the project footprint in the vicinity of the town of Allensworth.
Linepithema humile	Argentine ant	--	--
Pogonomyrmex sp.	harvester ant	--	--
--	bee	--	Observed throughout project area due to presence of bee boxes.
--	centipede (unidentified)	--	--
--	crawdad (unidentified)	--	Dead crawdads and crawfish
--	dragonfly	--	--
--	freshwater clam shells	--	--
--	scorpion	--	--
--	tiger beetle	--	--
--	velvet ant	--	--
Amphibians:			
Bufo boreas	western toad	--	--
Pseudacris regilla	Pacific treefrog	--	--
Rana catesbeiana	bullfrog	--	non-native
Spea hammondii	western spadefoot toad	CSC	Tadpoles, 1 juvenile and multiple adults observed.
Reptiles:			
Aspidoscelis tigris	California whiptail	--	--
Crotalus oreganus oreganus	Northern Pacific rattlesnake	--	--
Eumeces skiltonianus	western skink	--	--
Phrynosoma coronatum	coast horned lizard	--/CSC/--	--
Sceloporous occidentalis	western fence lizard	--	--
Uta stansburiana	side-blotched lizard	--	--

Table F-1
List of Wildlife Species Observed in the Habitat Study Area

Species Name	Common Name	Listing Status*	Notes
Birds:			
Accipiter cooperii	Cooper's hawk	--	Species observed. Unknown stick nests observed, may be nesting.
Aechmophorus clarkii	Clark's grebe	--	--
Aechmophorus occidentalis	western grebe	--	--
Agelaius phoeniceus	red-winged blackbird	--	--
Agelaius tricolor	tricolored blackbird	CSC	--
Anas actua	Pintail duck	--	--
Anas carolinensis	green-winged teal	--	--
Anas clypeata	northern shoveler	--	--
Anas cyanoptera	cinnamon teal duck	--	--
Anas discors	Blue-winged teal	--	--
Anas platyrhynchos	mallard duck	--	--
Anas strepera	gadwall	--	--
Anthus rubescens	American pipit	--	--
Aphelocoma californica	western scrub jay	--	--
Aquila chrysaetos	golden eagle	CSC/FP/BCC	--
Ardea alba	great white egret	--	--
Ardea herodias	great blue heron	Other	--
Athene cunicularia	burrowing owl	CSC	Burrows and species observed.
Aythya affinis	lesser scaup	--	--
Aythya americana	redhead duck	--	--
Bombycilla cedrorum	cedar waxwing	--	--
Branta canadensis	Canada Goose	--	--
Bubo virginianus	great horned owl	--	Nest and species observed.
Bubulcus ibis	cattle Egret	--	--
Bucephala albeola	bufflehead	--	--
Bucephala clangula	goldeneye	--	--
Buteo jamaicensis	red-tailed hawk	--	Nests and species observed.

Table F-1
List of Wildlife Species Observed in the Habitat Study Area

Species Name	Common Name	Listing Status*	Notes
Buteo lineatus	red-shouldered hawk	--	--
Buteo swainsoni	Swainson's hawk	ST	Species observed nesting.
Calidris alpina	dunlin	--	--
Caladris mauri	western sandpiper	--	--
Calidris minutilla	least sandpiper	--	--
Callipepla californica	California quail	--	--
Carduelis psaltria	lesser goldfinch	--	--
Carduelis tristis	American goldfinch	--	--
Carpodacus mexicanus	house finch	--	--
Cathartes aura	turkey vulture	--	--
Charadrius vociferus	killdeer	--	--
Chondestes grammacus	lark sparrow	--	--
Circus cyaneus	northern harrier	CSC	
Cistothorus palustris	marsh wren	--	--
Colaptes auratus	northern flicker	--	--
Columba livia	rock dove (feral pigeon)	--	non-native
Corvus brachyrhynchos	American crow	--	--
Corvus corax	common raven	--	--
Dendroica coronata	yellow-rumped warbler	--	--
Egretta thula	snow egret	--	--
Elanus leucurus	white-tailed kite	FP	--
Eremophila alpestris	horned lark	--	--
Euphagus cyanocephalus	Brewer's blackbird	--	--
Falco columbarius	merlin	--	--
Falco peregrinus	peregrine falcon	Delisted/SE/FP	--
Falco sparverius	American kestrel	--	--
Fulica americana	American coot	--	--
Gallinula chloropus	common moorhen	--	--
Geothlypis trichas	common yellow-throat	BCC	--

Table F-1
List of Wildlife Species Observed in the Habitat Study Area

Species Name	Common Name	Listing Status*	Notes
Grus canadensis	sandhill crane	ST/FP=greater CSC=lesser	--
Hirundo rustica	barn swallow	--	--
Himantopus mexicanus	black-necked stilt	--	--
Icterus bullockii	Bullock's Oriole	--	--
Junco hyemalis	dark-eyed junco	--	--
Lanius ludovicianus	loggerhead shrike	CSC	--
Larus californicus	California gull	--	--
Larus delawarensis	ring-billed gull	--	--
Limnodromus griseus	Short-billed dowitcher	--	--
Limnodromus scolopaceus	long-billed dowitcher	--	--
Melospiza lincolnii	Lincoln's sparrow	--	--
Melospiza melodia	song sparrow	--	--
Mimus polyglottos	northern mockingbird	--	--
Molothrus ater	brown-headed cowbird	--	--
Numenius americanus	long-billed curlew	BCC	--
Nycticorax nycticorax	black crowned night heron	--	--
Oxyura jamaicensis	ruddy duck	--	--
Passer domesticus	English sparrow or House sparrow	--	--
Passerculus sandwichensis	savannah sparrow	--	--
Petrochelidon pyrrhonota	cliff swallow	--	--
Phalacrocorax auritus	double-crested cormorant	--	--
Phalaropus tricolor	Wilson's phalarope	--	--
Picoides pubescens	downy woodpecker	--	--
Pipilo crissalis	California towhee	--	--
Pipilo maculatus	spotted towhee	--	--
Plegadis chihi	white-faced ibis	--	--
Plegadis falcinellus	glossy ibis	--	--
Podilymbus podiceps	pied-billed grebe	--	--

Table F-1
List of Wildlife Species Observed in the Habitat Study Area

Species Name	Common Name	Listing Status*	Notes
Psaltriparus minimus	bushtit	--	--
Quiscalus mexicanus	Great tailed grackle	--	--
Recurvirostra americana	American avocet	--	--
Regulus calendula	ruby-crowned kinglet	--	--
Sayornis nigricans	black phoebe	--	--
Sayornis saya	Say's phoebe	--	--
Spizella passerine	chipping sparrow	--	--
Stelgidopteryx serripennis	northern rough-winged swallow	--	--
Streptopelia decaocto	Eurasian collared-dove	--	introduced
Sturnella neglecta	western meadowlark	--	--
Sturnus vulgaris	European starling	--	introduced
Tachycineta bicolor	tree swallow	--	--
Toxostoma rufum	brown thrasher	--	--
Tringa melanoleuca	greater yellowlegs	--	--
Tringa semipalmata	willet	--	--
Troglodytes aedon	house wren	--	--
Turdus migratorius	American robin	--	--
Tyrannus verticalis	western kingbird	--	--
Tyto alba	barn owl	--	Owl boxes; Diagnostic sign (feathers, pellets).
Xanthocephalus xanthocephalus	yellow-headed blackbird	CSC	--
Zenaida macroura	mourning dove	--	--
Zonotrichia leucophrys	white-crowned sparrow	--	--
Mammals:			
Canis latrans	coyote	--	--
Canis lupus familiaris	domestic dog	--	domestic
Castor canadensis	beaver	--	Diagnostic sign (gnaw-marks).

Table F-1
List of Wildlife Species Observed in the Habitat Study Area

Species Name	Common Name	Listing Status*	Notes
Dipodomys sp.	kangaroo rat (unidentified)	--	Burrows, scat, tail drags, observed; unable to identify to species.
Felis catus	domestic cat	--	domestic
Felis rufus	bobcat	--	Diagnostic sign (tracks).
Lepus californicus	black-tailed jackrabbit	--	--
Mustela frenata	long-tailed weasel	--	--
Ondatra zibethicus	muskrat	--	--
Procyon lotor	raccoon	--	--
Sorex sp.	shrew	--	--
Spermophilus beecheyi	Beechey (California) ground squirrel	--	--
Sylvilagus sp.	cottontail	--	--
Rattus norvegicus	Norway rat or brown rat	--	--
Taxidea taxus	American badger	CSC	Diagnostic sign (scat, diggings); observed outside of the project footprint in the vicinity of the town of Allensworth.
Thomomys bottae	Botta's pocket gopher	--	--
Vulpes macroitis mutica	San Joaquin kit fox	FE/ST	Diagnostic sign (track, scat, diggings); observed outside of the project footprint in the vicinity of the town of Allensworth.

Jessie Parteno Senior GIS Specialist	Advanced Diploma, Geographic Information Systems, Centre of Geographic Sciences; B.S., Biology and Geographic Information Systems, University of Guelph. 8 years of experience ESRI-based GIS and geodatabase design, development, and management.
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