

California High-Speed Rail Authority

Merced to Fresno Section: Central Valley Wye

Biological Resources and Wetlands Technical Report

December 2016

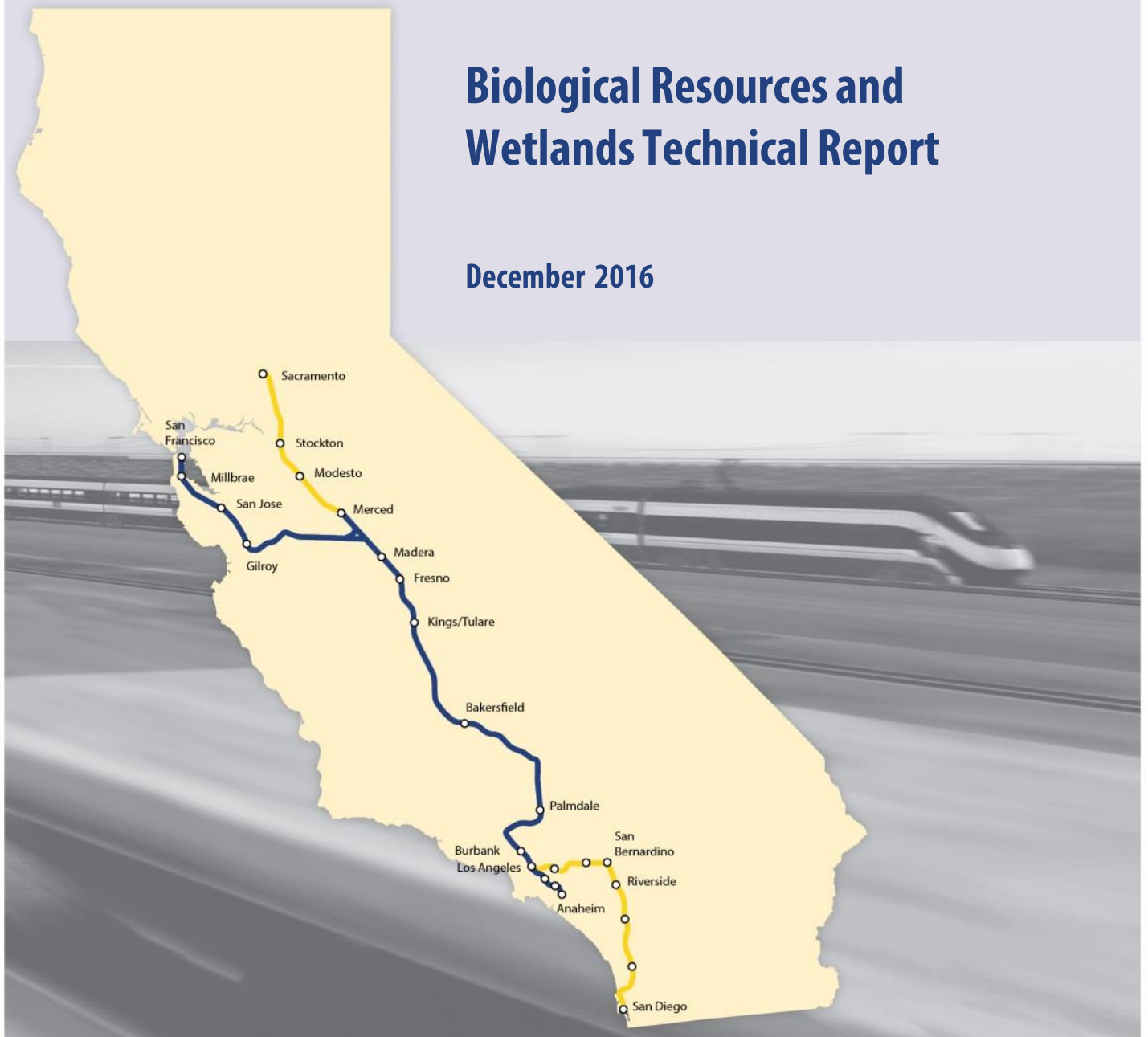


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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
AB	(California) Assembly Bill
Authority	California High-Speed Rail Authority
BA	biological assessment
BCC	birds of conservation concern
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practice
BNSF	BNSF Railway
BO	biological opinion
BRT	bus rapid transit
Central Valley RWQCB	Central Valley Regional Water Quality Control Board
Central Valley Wye Biological Resources Technical Report	<i>Merced to Fresno Section: Central Valley Wye Biological Resources Technical Report</i>
CESA	California Endangered Species Act
C.F.R.	Code of Federal Regulations
CNDDB	California Natural Diversity Database
COG	Council of Governments
CWA	Clean Water Act
CDFW	California Department of Fish and Wildlife
CWHR	California Wildlife Habitat Relationships
dBA	A-weighted decibel
Supplemental EIR/EIS	<i>Merced to Fresno Section: Central Valley Wye Supplemental Environmental Impact Report (EIR)/Supplemental Environmental Impact Statement (EIS)</i>
ECA	essential connectivity areas
EFH	essential fish habitat
EIR	environmental impact report
EIS	environmental impact statement
FAA	Federal Aviation Administration
Fed. Reg.	Federal Register
FESA	federal Endangered Species Act
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GIS	geographic information systems

HCM	Highway Capacity Manual
HCP	Habitat Conservation Plan
HDM	Highway Design Manual
HOV	high-occupancy vehicle
HSR	high-speed rail
HU	hydrologic unit
IAMF	impact avoidance and minimization feature
MBTA	Migratory Bird Treaty Act
Merced to Fresno Final EIR/EIS	<i>Merced to Fresno Section Final EIR/EIS</i>
NMFS	National Marine Fisheries Service
NPPA	Native Plant Protection Act
NWR	national wildlife refuge
PFO	palustrine forested wetland
PG&E	Pacific Gas and Electric Company
PMT	Program Management Team
quad	quadrangles
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SB	(California) Senate Bill, southbound (editor's note: use in tables or figures only)
SEL	sound exposure level
SJRRP	San Joaquin River Restoration Program
SR	State Route
Statewide Program EIR/EIS	<i>Final Program EIR/EIS for the Proposed California High-Speed Train System</i>
SWRCB	State Water Resources Control Board
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
U.S.C.	United States Code
USEO	U.S. Presidential Executive Order
USFWS	U.S. Fish and Wildlife Service

EXECUTIVE SUMMARY

The California High-Speed Rail Authority (Authority) has prepared this *Merced to Fresno Section: Central Valley Wye Biological Resources Technical Report* (Central Valley Wye Biological Resources Technical Report) to support the *Merced to Fresno Section: Central Valley Wye Supplemental Environmental Impact Report (EIR)/Supplemental Environmental Impact Statement (EIS)* (Supplemental EIR/EIS). The Supplemental EIR/EIS tiers from the original *Merced to Fresno Section Final EIR/EIS* (Merced to Fresno Final EIR/EIS) (Authority and FRA 2012a). When the Authority Board of Directors and the Federal Railroad Administration (FRA) approved the Merced to Fresno Section in 2012, they deferred a decision on the wye connection for a future environmental analysis. Since then, the Authority and FRA have identified four new alternatives for consideration.

This technical report characterizes existing conditions and analyzes biological resource and wetland effects of the four Central Valley Wye alternatives:

- SR 152 (North) to Road 13 Wye Alternative
- SR 152 (North) to Road 19 Wye Alternative
- Avenue 21 to Road 13 Wye Alternative
- SR 152 (North) to Road 11 Wye Alternative

Biological and wetland resources comprise plant communities and land cover types, native fauna, special status species (plants and wildlife), habitats of concern, and wildlife movement corridors. This technical report addresses effects resulting from the high-speed rail track alignment for the Central Valley Wye. The Central Valley Wye alternatives also include electrical interconnections and PG&E network upgrades, which are not evaluated in this technical report. This report identifies relevant federal, state, regional, and local regulations and requirements; methods used for the analysis of effects; the affected environment; potential effects on biological and wetland resources in the Central Valley Wye resource study area that could result from construction and operations of the Central Valley Wye alternatives; and affect avoidance and minimization features (IAMF) that would avoid, minimize, or reduce effects.

Summary of Effects

The effects of the Central Valley Wye alternatives on biological and wetland resources include:

Plant Communities and Land Cover Types

The Central Valley Wye would require the removal of vegetation and changes in hydrology, primarily in agricultural lands, which would result in changes to plant communities and land cover types. Construction could result in the placement of permanent infrastructure and temporary disturbance from construction vehicles and personnel. Construction would also include the potential for erosion, siltation, and increased runoff into natural and constructed waterbodies; soil and water contamination; reduced photosynthetic abilities of plants; altered hydrology and related changes to wetland and aquatic habitat functions; increased risk of fire; habitat fragmentation; and introduction of noxious plant species. The effects on plant communities and land cover types would be minimized through IAMFs. IAMFs are standard practices, actions, and design features that are incorporated into the design of the Central Valley Wye and which reduce the intensity of effects, such as minimizing long-term plant disturbance by returning excavated soils, minimizing the displacement of plant communities by reducing potential for spread of invasive species, and applying measures that control water and wind erosion of soils. With these features incorporated, the Central Valley Wye is still likely to result in adverse effects on plant communities and land cover types.

Native Fauna

The Central Valley Wye alternatives would result in direct effects on native wildlife species where suitable habitat is present. Construction activities would remove breeding, foraging, and movement habitat and could also injure or kill individual animals during ground disturbance or and/or vegetation removal. Operations and maintenance activities could also disturb or remove

habitat, or result in displacement of individuals. IAMFs would include measures for excluding native fauna from active work areas, educating construction and operations personnel about procedures to avoid harming native fauna, and conducting nesting season surveys to avoid adverse effects on native birds, among others. During project operations, the Central Valley Wye stormwater system would divert runoff and pollutants from roads and tracks to prevent contaminants from reaching waterbodies and harming native aquatic fauna as well as becoming ingested by terrestrial fauna. These features would minimize adverse effects but there are still expected to be adverse effects on native fauna.

Special-Status Species (Plants and Wildlife)

Construction of the Central Valley Wye alternatives would result in direct effects on special-status plants similar to those described for plant communities and land cover types. Operation and maintenance activities are unlikely to have any direct effects on special-status plant species; however any change in local hydrology and vernal pools could cause a change in habitat conditions for vernal pool plants and mortality of individual plants could occur from incidental trampling by human activity or crushing caused by maintenance equipment. Construction and operation and maintenance activities have the potential to directly affect special status wildlife species through mortality, injury, or harassment of individuals, and indirectly affect populations through habitat disturbance and fragmentation, temporary or permanent displacement, introducing invasive species, degrading available habitat, attracting opportunistic predators, and interrupting breeding. IAMFs would include measures to reduce the effects of habitat disturbance by returning excavated soils to disturbed areas. IAMFs would reduce the potential for construction activities to introduce invasive plant species, which would minimize direct effects on special status plant species and indirect effects on special status wildlife species by the alteration of suitable habitat. IAMFs would also emphasize on-site retention of stormwater runoff which would minimize effects on wetland-dependent special status plant and wildlife species. With these features, the Central Valley Wye alternatives adverse direct and indirect effects on special status plant and wildlife species would be reduced.

Habitats of Concern

Habitats of concern including special-status plant communities could be permanently affected during construction by their direct removal. Special-status plant communities would also be affected by direct removal of habitat during construction as well as trampling or crushing of vegetation during operations and maintenance activities. Jurisdictional waters, comprising canals/ditches, culverts, retention/detention basins, seasonal wetlands, vernal pool wetlands, riparian habitats, and riverine features, are present at various locations throughout the Central Valley Wye vicinity. The construction and operation of each of the Central Valley Wye alternatives may result in direct effects or indirect effects on jurisdictional waters. The construction of roads, rail track, and associated infrastructure would remove or alter jurisdictional waters through filling, hydrological interruption, or other manners that would disturb these resources. In the case of built features, these effects 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. Construction and operations also could affect jurisdictional waters through the introduction of sediments and other contaminants (e.g., fuels, oils, lubricants, pesticides) to surface waterbodies and affect water quality. The Central Valley Wye alternatives would result in direct effects on essential fish habitat from the placement of piers and the bridge over the San Joaquin River and indirectly from construction noise, dust, and vibration. Reduced water quality and erosion would contribute to indirect effects under operations and maintenance activities. Each of the Central Valley Wye alternatives would affect federally designated critical habitat for listed vernal pool species due to changes in hydrology or the introduction of invasive species. The potential for these effects on the various habitats of concern as a result of construction and operation activities would be minimized with the design of the Central Valley Wye, which includes IAMFs such as native plant reestablishment measures; reduction of invasive plant establishment; erosion and sedimentation controls; treatment of post-project runoff; hazardous material spill prevention; and reduction in the potential for work to disrupt water flows that would be detrimental

to essential fish habitat. Even with these IAMFs, construction and operation activities could still adversely affect habitats of concern.

Wildlife Movement Corridors

The construction and operations of the Central Valley Wye alternatives would result in direct or indirect effects on designated wildlife movement corridors. Construction of the Central Valley Wye would result in concentrated heavy vehicle and equipment use within existing wildlife movement corridors. Construction and operations activities may result in the indirect disruption of wildlife movement through lighting, noise, motion, and startle effects. The Central Valley Wye design includes an IAMF requiring the preparation of a wildlife corridor assessment and incorporates a number of wildlife crossings into the preliminary engineering design. While IAMFs and wildlife crossing features would facilitate wildlife movement and reduce effects on wildlife corridors, construction activities could still impede wildlife movement.

Summary

The construction and operations of each of the Central Valley Wye alternatives may result in direct effects or indirect effects on special-status plant and wildlife species, special-status plant communities, critical habitat, and essential fish habitat. Direct effects would result from permanent and temporary loss of habitat. Indirect effects may result from erosion, siltation, and runoff into natural and constructed watercourses; soil and water contamination from construction equipment leaks; construction dust affecting plants by reducing their photosynthetic capability (especially during flowering periods); altered hydrology that could change the wetland functions of aquatic habitats; increased risk of fire (e.g., use of construction equipment and smoking by construction workers) in adjacent open spaces; habitat degradation through fragmentation and changes in habitat heterogeneity; and the introduction of noxious plant species (nonnative, detrimental species) resulting from ground disturbance could adversely affect special-status plants and wildlife, special-status plant communities, critical habitat and essential fish habitat. The Central Valley Wye alternatives would incorporate design standards and affect avoidance and minimization features to avoid or minimize effects on biological resources. Several important wildlife corridors are present in the study area. While the majority of land in the study area is actively being used for agriculture, wildlife corridors are present and considered important in the context of the existing conditions of the study area and San Joaquin Valley. Direct construction effects on wildlife corridors would occur where corridors are present, would be removed as a result of construction, and where any effects cannot be avoided. Indirect construction effects would occur if they result in wildlife corridor modifications that would result in the impedance of wildlife movement. The construction and operation of each of the Central Valley Wye alternatives may result in direct effects or indirect effects on habitat types where linkages and movement corridors have been identified. The Central Valley Wye alternatives incorporate a number of engineering design features that would facilitate wildlife movement. At select locations, specific wildlife movement structures would be installed.

1 INTRODUCTION

1.1 Background of HSR Program

The Authority proposes to construct, operate, and maintain an electric-powered high-speed rail (HSR) system in California. When completed, the nearly 800-mile train system would provide new passenger rail service to more than 90 percent of the state's population. More than 200 weekday trains would serve the statewide intercity travel market. The HSR would be capable of operating speeds of up to 220 miles per hour, with state-of-the-art safety, signaling, and automatic 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.

The Authority commenced its environmental planning process with the 2005 *Final Program EIR/EIS for the Proposed California High-Speed Train System* (Authority and FRA 2005) (Statewide Program EIR/EIS), and then began preparing second-tier, project environmental evaluations for sections of the statewide HSR system. The 2012 *Merced to Fresno Section Final EIR/EIS* (Merced to Fresno Final EIR/EIS) (Authority and FRA 2012a) was the first project-level EIR/EIS that the Authority certified and the Federal Railroad Administration (FRA) approved. The Merced to Fresno Final EIR/EIS identified the Hybrid Alignment as the preferred alternative and examined two design options for an east-west connection to the San Jose to Merced Section, referred to as the "wye connection" (Authority and FRA 2012a: pages 2-3 and 2-21). When the Authority Board of Directors and the FRA approved the Merced to Fresno Section later in 2012, they deferred a decision on the wye connection for a future environmental analysis. The Authority and FRA have prepared the Supplemental EIR/EIS as the next step in the environmental review process to select a Central Valley Wye connection. Chapter 2 of the Supplemental EIR/EIS provides a detailed history of how the Authority developed the Central Valley Wye alternatives.

1.2 Organization of this Technical Report

This technical report includes the following sections:

- Section 2, Merced to Fresno Section: Central Valley Wye, provides a description of the proposed Central Valley Wye alternatives.
- Section 3, Laws, Regulations, Orders, identifies the various regulatory requirements and defines terms used throughout the document.
- Section 4, Methods for Evaluating Effects, describes the study methods employed.
- Section 5, Affected Environment, describes existing conditions.
- Section 6, Effects Analysis, describes direct and indirect effects, both adverse and beneficial.
- Section 7, Permits and Technical Studies for Special Laws or Conditions, describes coordination with agencies and compliance activities for other laws and regulations.
- Section 8, References, provides a list of documents cited in this technical report.
- Section 9, Preparer Qualifications, identifies the individuals involved in preparing this report and their credentials.

Additional details on biological and wetland resources are provided in:

- Appendix A, Impact Avoidance and Minimization Features for Biological Resources, lists the Statewide HSR IAMFs for biological resources that would be implemented before, during, and after construction of the Central Valley Wye.
- Appendix B, U.S. Fish and Wildlife Service Species List, presents the list of species considered in the region by the U.S. Fish and Wildlife Service Species (USFWS).
- Appendix C, California Natural Diversity Database Search Results, lists the special-status species reported as occurring in the region by California Department of Fish and Wildlife (CDFW).

- Appendix D, Special-Status Species with Potential to Occur in the Resource Study Area, is the list of all special-status plant and animal species evaluated as potentially occurring in the resource study area.

DRAFT

2 MERCED TO FRESNO SECTION: CENTRAL VALLEY WYE

The Central Valley Wye would create the east-west HSR connection between the San Jose to Merced Section to the west and the north-south Merced to Fresno Section to the east.¹ The four Central Valley Wye alternatives addressed in the Supplemental EIR/EIS (Figures 2-1 to 2-4) are:

- SR 152 (North) to Road 13 Wye Alternative
- SR 152 (North) to Road 19 Wye Alternative
- Avenue 21 to Road 13 Wye Alternative
- SR 152 (North) to Road 11 Wye Alternative

This section describes the common design features of the four alternatives, followed by descriptions of each alternative.

2.1 Common Features

The Central Valley Wye alternatives would cross rural areas in unincorporated Merced and Madera Counties, and would travel through the southern portion of Chowchilla and the rural-residential community of Fairmead. Volume 3 of the Supplemental EIR/EIS provides detailed design drawings that support the descriptions of the Central Valley Wye alternatives.

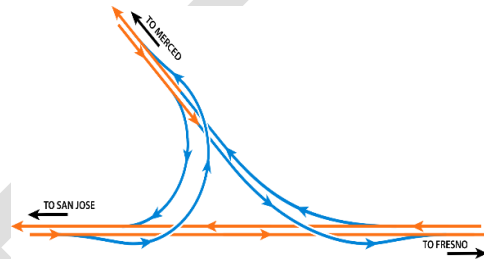
The HSR alignment would be entirely grade-separated, meaning that crossings of roads, railroads, and other transport facilities would use overpasses or underpasses so that the HSR would operate independently of other modes of transport. The HSR right-of-way would also be fenced to prevent public or vehicle access. The Central Valley Wye project footprint would primarily consist of the train right-of-way, which would accommodate two sets of tracks in an area with a minimum width of 100 feet. Additional right-of-way would be required to accommodate grade separations, embankments, traction power facilities, and transitional portions of the Central Valley Wye that allow for bidirectional interface between north-south and east-west trending alignments.

The Central Valley Wye alternatives would include at-grade, below-grade, and above-grade (elevated) track segments. The at-grade track would be laid on an earthen railbed raised 6–10 feet (embankment heights are in excess of 35 feet) off the ground level, set on ties with rock ballast; fill and ballast for the railbed would be obtained from permitted borrow sites and quarries. Below-grade track would be laid in open cut, trench, or cut-and-cover tunnel at a depth that would allow roadway and other grade-level uses above the track. Elevated track segments would span some waterways, roadways, railroad, and other HSR tracks, and would consist of precast, prestressed concrete box girders, cast-in-place concrete box girders, or steel box girders. The height of elevated track sections would depend on the height of existing structures below, or clearances to existing roads or other HSR facilities, and would range from 35 to 90 feet above grade. Columns would be spaced approximately 100–120 feet apart on average.

2.2 SR 152 (North) to Road 13 Wye Alternative

The SR 152 (North) to Road 13 Wye Alternative (Figure 2-1) follows the existing Henry Miller Road and SR 152 rights-of-way as closely as possible in the east-west direction, and the Road 13, SR 99, and BNSF Railway (BNSF) rights-of-way in the north-south direction. Deviations from these existing transportation routes or corridors are necessary to accommodate design requirements; specifically, wider curves are necessary to accommodate the speed of the HSR

Central Valley Wye Schematic



¹ The term *wye* refers to the Y-like formation created at the point where train tracks branch off the mainline to continue in different directions. The transition of mainline track to a wye requires splitting two tracks into four tracks that cross over one another before the wye “legs” (segments) can diverge in opposite directions to allow two-way travel. For the Merced to Fresno Section of the HSR system, the two tracks traveling east-west from the San Jose to Merced Section must become four tracks—a set of two tracks branching toward Merced to the north and a set of two tracks branching toward Fresno to the south.

compared to lower-speed roadway alignments. The SR 152 (North) to Road 13 Wye Alternative would not follow existing transportation rights-of-way where it transitions from following one transportation corridor to another.

2.2.1 Alignment and Ancillary Features

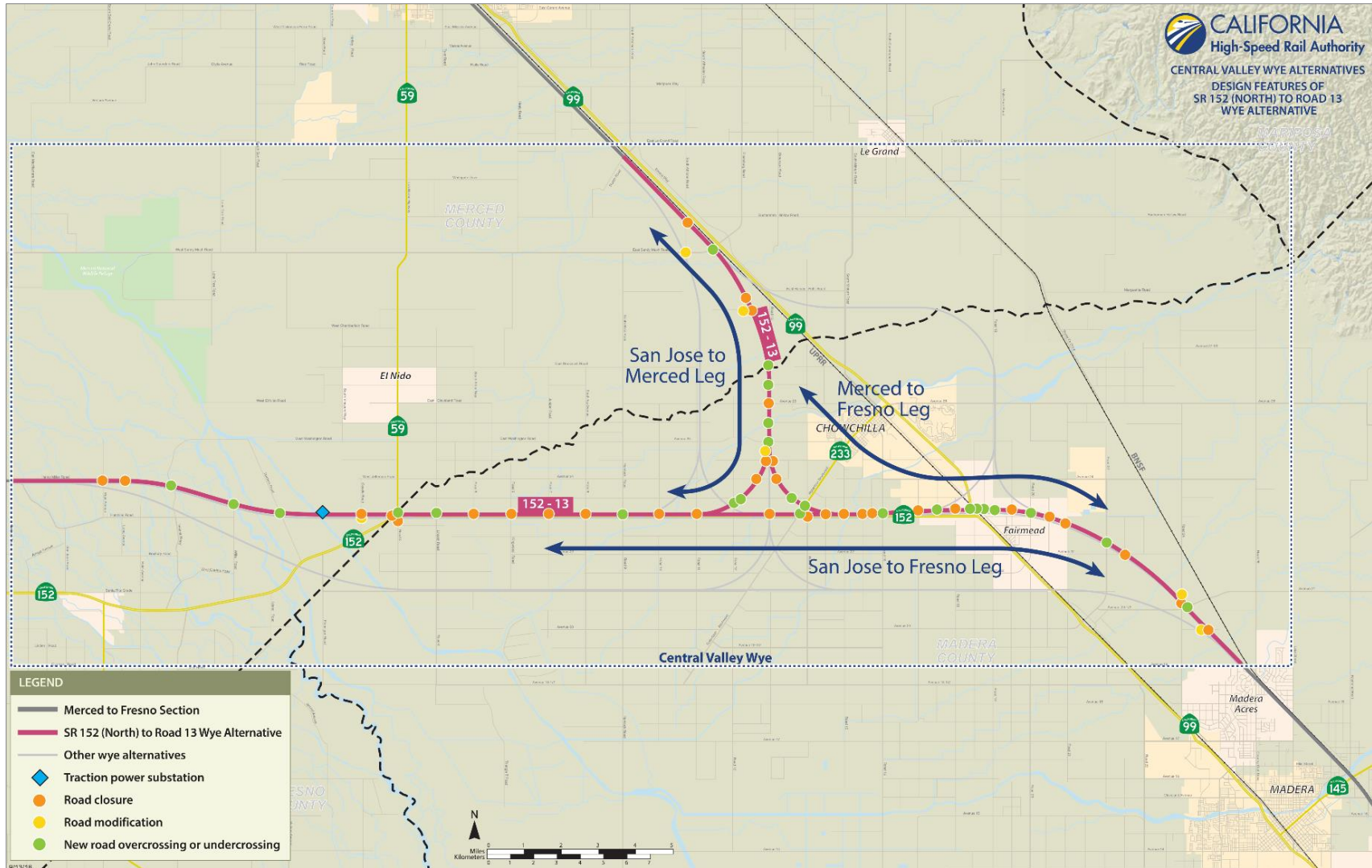
The SR 152 (North) to Road 13 Wye Alternative would extend approximately 52 miles, mostly at-grade on raised embankment, although it would also have aerial structures and a segment of retained cut (depressed alignment). The wye configuration of this alternative would be located southwest of the city of Chowchilla, with the east-west axis along the north side of SR 152 and the north-south axis on the east side of Road 13.

As shown on Figure 2-1, this alternative would begin in Merced County at the intersection of Henry Miller Road and Carlucci Road, and would continue at-grade on embankment due east toward Elgin Avenue, where it would curve southeast toward the San Joaquin River and Eastside Bypass. Approaching Willis Road, the alignment would cross the San Joaquin River on an aerial structure, then would return to embankment. It would then cross the Eastside Bypass on an aerial structure. After crossing the Eastside Bypass, the alignment would continue east and cross SR 59 at-grade just north of the existing SR 152/SR 59 interchange, entering Madera County. The SR 152/SR 59 interchange would be reconstructed a little to the south and SR 59 would be grade-separated to pass above the HSR on an aerial structure. The alignment would continue east at-grade along the north side of SR 152 toward Chowchilla, splitting into two legs (four tracks) near Road 11 to transition to the Merced to Fresno Section: Hybrid Alignment, and would cross Ash Slough on an aerial structure. All but the northbound track of the San Jose to Merced section of the alignment (leg) would then return to at-grade embankment. The northbound track would rise to cross over the tracks of the San Jose to Fresno leg on aerial structure as it curves north toward Merced. The SR 152 (North) to Road 13 Wye Alternative legs would be routed as described below and as shown on Figure 2-1:

- The southbound track of the San Jose to Merced leg² would be at-grade. This split (where tracks separate) would be west of Chowchilla, at approximately Road 11. The two San Jose to Merced tracks would continue north on the eastern side of Road 13, crossing Ash Slough and the Chowchilla River, and then would cross over Road 13 to its west side. As the tracks return to grade, they would curve northwest, crossing Dutchman Creek on an aerial structure, and follow the west side of the Union Pacific Railroad (UPRR)/SR 99 corridor. At Sandy Mush Road, the alignment would descend into a shallow cut (depressed) section for approximately 0.5 mile, with a retained cut-and-cover undercrossing³ at Caltrans' Sandy Mush Road overhead. The alignment would return to grade and continue along the west side of the UPRR/SR 99 corridor, connecting to the Merced to Fresno Section: Hybrid Alignment at Ranch Road.

² A track is included within a leg; e.g., southbound track of the San Jose to Merced leg.

³ An undercrossing is a road or track crossing under an existing road or track.



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Figure 2-1 SR 152 (North) to Road 13 Wye Alternative Alignment and Key Design Features

- The San Jose to Fresno leg of this alternative would continue east from the split near Road 11 and along the north side of SR 152 toward Chowchilla. It would be predominantly at-grade, crossing several roads and Berenda Slough on aerial structures. The alignment would pass south of Chowchilla at-grade then would rise to cross over the UPRR/SR 99 corridor and Fairmead Boulevard on an aerial structure. East of the UPRR/SR 99 corridor, the alternative would extend at-grade through Fairmead, north of Avenue 23. At approximately Road 20, the alignment would curve southeast toward the BNSF corridor and cross Dry Creek on a short aerial structure. The San Jose to Fresno leg would align parallel to the west side of the BNSF corridor as it meets the Merced to Fresno Section: Hybrid Alignment at Avenue 19.
- The Merced to Fresno leg of the alternative would split from the San Jose to Fresno leg near Road 14, where the southbound track of the Merced to Fresno leg would ascend on aerial structure, crossing over the tracks of the San Jose to Fresno leg. The northbound track would curve northwest, rise on a high embankment crossing over several roads, and continue on an at-grade embankment until joining the San Jose to Merced leg near Avenue 25.

Wildlife undercrossing structures would be installed in at-grade embankments along this alternative where the alignment intersects wildlife corridors.

2.2.2 State Highway or Local Roadway Modifications

The SR 152 (North) to Road 13 Wye Alternative would require the permanent closure of 38 public roadways at selected locations and the construction of 24 overcrossings⁴ or undercrossings in lieu of closure. Figure 2-1 shows the anticipated state highway and local roadway closures and modifications. Fourteen of these permanent road closures would be located at SR 152, where roads currently cross at-grade but need to be closed to convert SR 152 to a fully access-controlled corridor. The 14 proposed closures are Road 5, Road 6, Road 7, Road 8, Road 10, Road 11, Road 13, Road 14, Road 14 1/2, Road 15, Road 15 1/2, Road 15 3/4, Road 17, and Road 18. Planned new grade separations along SR 152 at the SR 59/SR 152 Interchange, Road 4/Lincoln Road, Road 12, and Road 17 1/2 would maintain access to, and across, SR 152. These roadways would be reconfigured to two 12-foot lanes with two 8-foot shoulders. Each of the new interchanges would require realigning SR 152. Three new interchanges are proposed between SR 59 and SR 99 to provide access to SR 152: at Road 9/Hemlock Road, SR 233/Robertson Boulevard, and Road 16.

The distance between over- or undercrossings would vary from less than 2 miles to approximately 5 miles where other roads are perpendicular to the proposed HSR. Between these over- or undercrossings, 24 additional roads would be closed, as shown on Figure 2-1. Local roads paralleling the proposed HSR alignment and used by small communities and farm operations may be shifted and reconstructed to maintain their function. Access easements would be provided to maintain access to properties severed by HSR.

2.2.3 Freight or Passenger Railroad Modifications

The SR 152 (North) to Road 13 Wye Alternative would cross over the UPRR right-of-way south of Chowchilla. This alternative would maintain required vertical (at least 23.3 feet) clearance over UPRR operational right-of-way to avoid or minimize effects on UPRR rights-of-way, spurs, and facilities (BNSF and UPRR 2007). In areas where the SR 152 (North) to Road 13 Wye Alternative parallels the UPRR right-of-way, the alternative maintains a minimum horizontal clearance of 102 feet from the centerline to the UPRR right-of-way.

⁴ An overcrossing is a road or track crossing over an existing road or track.

2.2.4 Summary

Table 2-1 summarizes the design features for the SR 152 (North) to Road 13 Wye Alternative.

Table 2-1 Design Features of the SR 152 (North) to Road 13 Wye Alternative

Feature	SR 152 (North) to Road 13 Wye
Total length (linear miles) ¹	52
At-grade profile (linear miles) ¹	48.5
Elevated profile (linear miles) ¹	3
Below-grade profile (linear miles) ¹	0.5
Number of straddle bents	32
Number of railroad crossings	1
Number of major water crossings	12
Number of road crossings	62
Approximate number of public roadway closures	38
Number of roadway overcrossings and undercrossings	24
Traction power substation sites	1
Switching and paralleling stations	1 switching station, 8 paralleling stations
Signaling and train-control elements	18
Communication towers	9
Wildlife crossing structures	39

Source: Authority, 2016

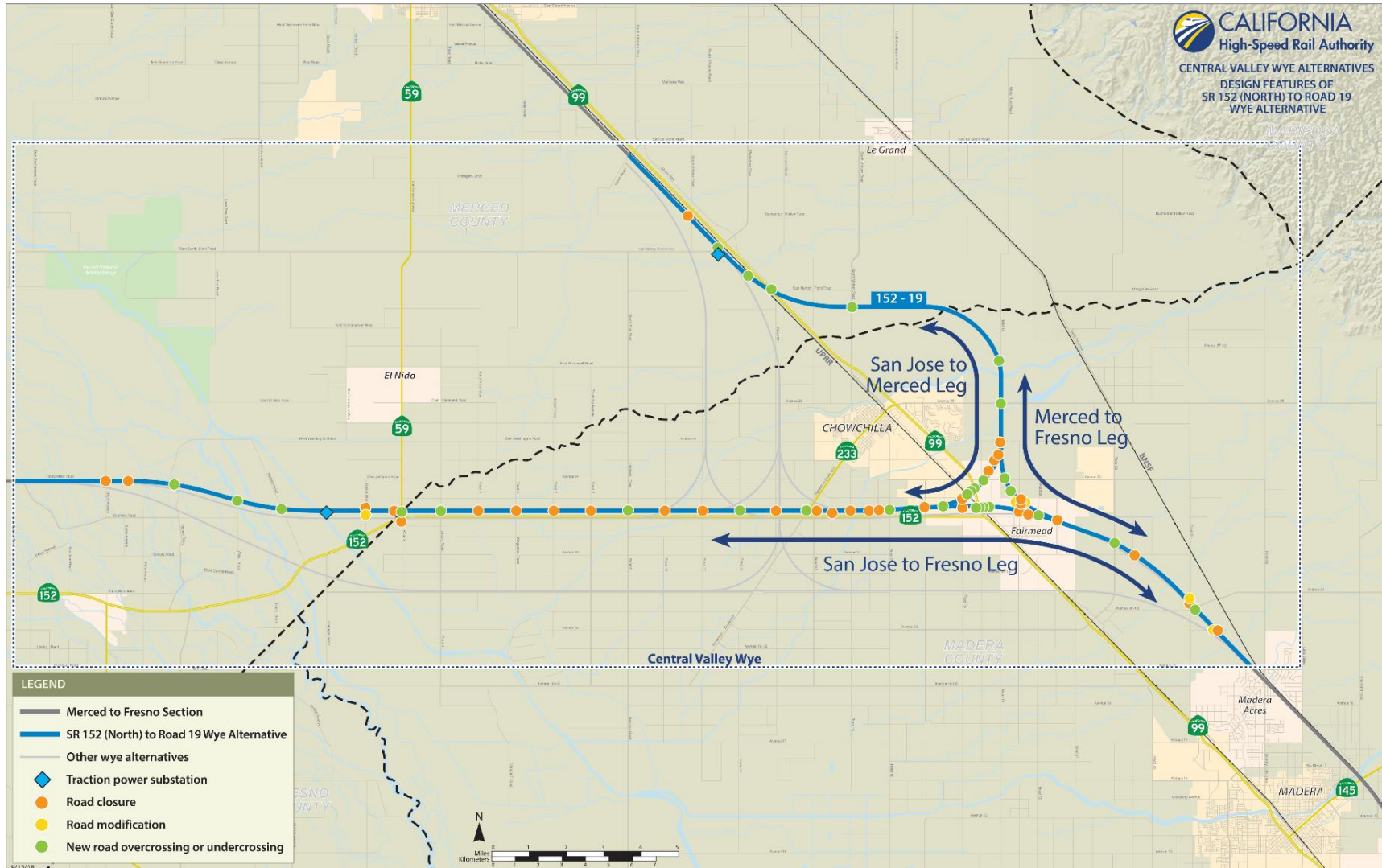
¹ Lengths shown are based on equivalent dual-track alignments and are one-way mileages. For example, the length of single-track elevated structure will be divided by a factor of 2 to convert to dual-track equivalents.

2.3 SR 152 (North) to Road 19 Wye Alternative

The SR 152 (North) to Road 19 Wye Alternative (Figure 2-2) is designed to follow the existing Henry Miller Road and SR 152 rights-of-way as closely as practicable in the east-west direction and Road 19, SR 99, and BNSF rights-of-way in the north-south direction. Deviations from these existing transportation corridors would be necessary to accommodate design requirements; specifically, larger curves would be necessary to accommodate the high speed of the HSR compared to lower-speed roadway alignments. The SR 152 (North) to Road 19 Wye Alternative would not follow existing transportation rights-of-way as it transitions from following one transportation corridor to another.

2.3.1 Alignment and Ancillary Features

The SR 152 (North) to Road 19 Wye Alternative would extend approximately 55 miles, mostly at-grade on embankment, although it would also have aerial structures, retained cut (depressed alignment), and depressed tunnel undercrossings of major railroad and highway corridors. The wye configuration of this alternative would be located southeast of the city of Chowchilla and north of Fairmead, with the east-west axis along the north side of SR 152 and the north-south axis on the east side of Road 19.



Source: Authority, 2016; ESRI, 2013; CAL FIRE, 2004; ESRI/National Geographic, 2015

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Figure 2-2 SR 152 (North) to Road 19 Wye Alternative Alignment and Key Design Features

Beginning at the intersection of Henry Miller Road and Carlucci Road (at the same point in Merced County as the SR 152 [North] to Road 13 Wye Alternative), this alternative would continue east toward Elgin Avenue, where it would curve southeast toward the San Joaquin River. It would cross the river on an aerial structure, returning to an at-grade embankment, then onto another aerial structure to cross the Eastside Bypass. After crossing the Eastside Bypass, the alignment would continue east and cross SR 59 at-grade just north of the existing SR 152/SR 59 interchange, where it would enter Madera County. It would continue east at-grade along the north side of SR 152 toward Chowchilla, crossing Ash Slough and Berenda Slough on aerial structures. As it crosses Road 16, the alignment would split into two legs (four tracks) to transition to the Merced to Fresno Section: Hybrid Alignment. East of Road 17, the San Jose to Merced leg would curve northeast, rising to cross the UPRR/SR 99 corridor on an aerial structure, and then would continue north along the east side of Road 19.

As the alignment approaches Avenue 25, the San Jose to Merced and Merced to Fresno legs would converge, requiring the northbound track of the San Jose to Merced leg to rise on an aerial structure and cross over the tracks of the Merced to Fresno leg.

- The San Jose to Merced leg would continue north to just south of Ash Slough, where it would curve west, cross Ash Slough and the Chowchilla River on aerial structures, and continue west approximately 0.5 mile south of Harvey Pettit Road. West of South Minturn Road, the leg would curve northwest and descend below-grade into a series of three tunnels crossing under the SR 99 and UPRR corridors and the Caltrans Sandy Mush Road overhead. The UPRR tracks would be reconstructed on the roof of the HSR cut-and-cover tunnels, while maintaining the same horizontal and vertical alignment. Construction of this type of below-grade crossing would require temporarily realigning the UPRR tracks. Approximately 0.6 mile north of Sandy Mush Road, the alternative would ascend to grade and continue along the UPRR/SR 99 corridor to connect with the Merced to Fresno Section: Hybrid Alignment at Ranch Road.
- The San Jose to Fresno leg would continue east from Road 16 and, east of Road 18, ascend on an aerial structure to cross SR 99 north of the SR 99/SR 152 interchange. East of the UPRR/SR 99 corridor, the leg would continue north of Avenue 23 through Fairmead, descending to grade east of Road 18 3/4. The alternative would then curve southeast toward the BNSF corridor, crossing Dry Creek on a short aerial structure, and continuing along the west side of the BNSF corridor to join the Merced to Fresno Section: Hybrid Alignment at Avenue 19.
- The Merced to Fresno leg would split from the San Jose to Fresno leg near Road 20 1/2. The southbound track of the Merced to Fresno leg would ascend on an aerial structure and cross over the tracks of the San Jose to Fresno leg. The Merced to Fresno leg would curve northwest, rise on aerial structures over several road crossings, and then continue at-grade to join the San Jose to Merced leg near Avenue 25.

Wildlife undercrossing structures would be provided in at-grade embankments where the alignment intersects wildlife corridors.

2.3.2 State Highway or Local Roadway Modifications

The SR 152 (North) to Road 19 Wye Alternative would require the permanent closure of 36 public roadways at selected locations and the construction of 29 overcrossings or undercrossings. Table 2-2 and Figure 2-2 show the anticipated state highway and local roadway closures and modifications. Fourteen of these permanent road closures would be located at SR 152 where roads currently cross at-grade but must be closed to convert SR 152 to a fully access-controlled corridor. The proposed 14 closures are Road 5, Road 6, Road 7, Road 8, Road 10, Road 11, Road 13, Road 14, Road 14 1/2, Road 15, Road 15 1/2, Road 15 3/4, Road 17, and Road 18. New grade separations are planned along SR 152 at the SR 59/SR 152 interchange, Road 4/Lincoln Road, Road 12, SR and Road 17 1/2. These roadways would be reconfigured to two 12-foot lanes with two 8-foot shoulders, and several of these interchanges would require

realigning SR 152. Interchanges between SR 59 and SR 99 that would provide access to SR 152 are Road 9/Hemlock Road, SR 233/Robertson Boulevard, and Road 16.

The distance between over- or undercrossings would vary from less than 2 miles to approximately 5 miles where roads would be perpendicular to the proposed HSR. Between these over- or undercrossings, 22 additional roads would be closed (Figure 2-2). Local roads paralleling the proposed HSR alignment and used by small communities and farm operations may be shifted and reconstructed to maintain their function. Access easements would be provided to maintain access to properties severed by HSR.

The SR 152 (North) to Road 19 Wye Alternative would cross over SR 99 at three locations. South of Chowchilla, both the San Jose to Merced and the San Jose to Fresno legs would rise on aerial structures to cross SR 99. Another crossing of SR 99 would be at the northern end of the alternative, where it descends below-grade into an undercrossing tunnel segment. SR 99 would be temporarily realigned during construction, and would be reconstructed on the roof of the undercrossing tunnel.

2.3.3 Freight or Passenger Railroad Modifications

The SR 152 (North) to Road 19 Wye Alternative would cross over the UPRR corridor at three separate locations. South of Chowchilla, both the San Jose to Merced and the San Jose to Fresno legs would rise on aerial structures to cross the UPRR operational right-of-way. In these instances, the alternative would maintain required vertical (at least 23.3 feet) clearance over UPRR operational right-of-way to avoid or minimize effects on UPRR rights-of-way, spurs, and facilities (BNSF and UPRR 2007). The third crossing of the UPRR corridor would be at the northern end of the alternative, where the alignment would descend into an undercrossing tunnel. The UPRR tracks would be reconstructed on the roof of the HSR tunnel, maintaining the same vertical alignment. Construction of this crossing would require the temporary detour (shoofly)⁵ of the UPRR tracks. In areas where the SR 152 (North) to Road 19 Wye Alternative parallels the UPRR right-of-way, the alternative maintains a minimum horizontal clearance of 102 feet from the centerline to the UPRR right-of-way.

2.3.4 Summary

Table 2-2 summarizes the design features for the SR 152 (North) to Road 19 Wye Alternative.

Table 2-2 Design Features of the SR 152 (North) to Road 19 Wye Alternative

Feature	SR 152 (North) to Road 19 Wye
Total length (linear miles) ¹	55
At-grade profile (linear miles) ¹	48.5
Elevated profile (linear miles) ¹	3.5
Below-grade profile (linear miles) ¹	3
Number of straddle bents	31
Number of railroad crossings	3
Number of major water crossings	13
Number of road crossings	65
Approximate number of public roadway closures	36
Number of roadway overcrossings and undercrossings	29
Traction power substation sites	2

⁵ A shoofly is a temporary track alignment that detours trains around a construction site.

Feature	SR 152 (North) to Road 19 Wye
Switching and paralleling stations	2 switching stations, 7 paralleling stations
Signaling and train-control elements	21
Communication towers	6
Wildlife crossing structures	41

Source: Authority, 2016

¹ Lengths shown are based on equivalent dual-track alignments and are one-way mileages. For example, the length of single-track elevated structure will be divided by a factor of 2 to convert to dual-track equivalents.

2.4 Avenue 21 to Road 13 Wye Alternative

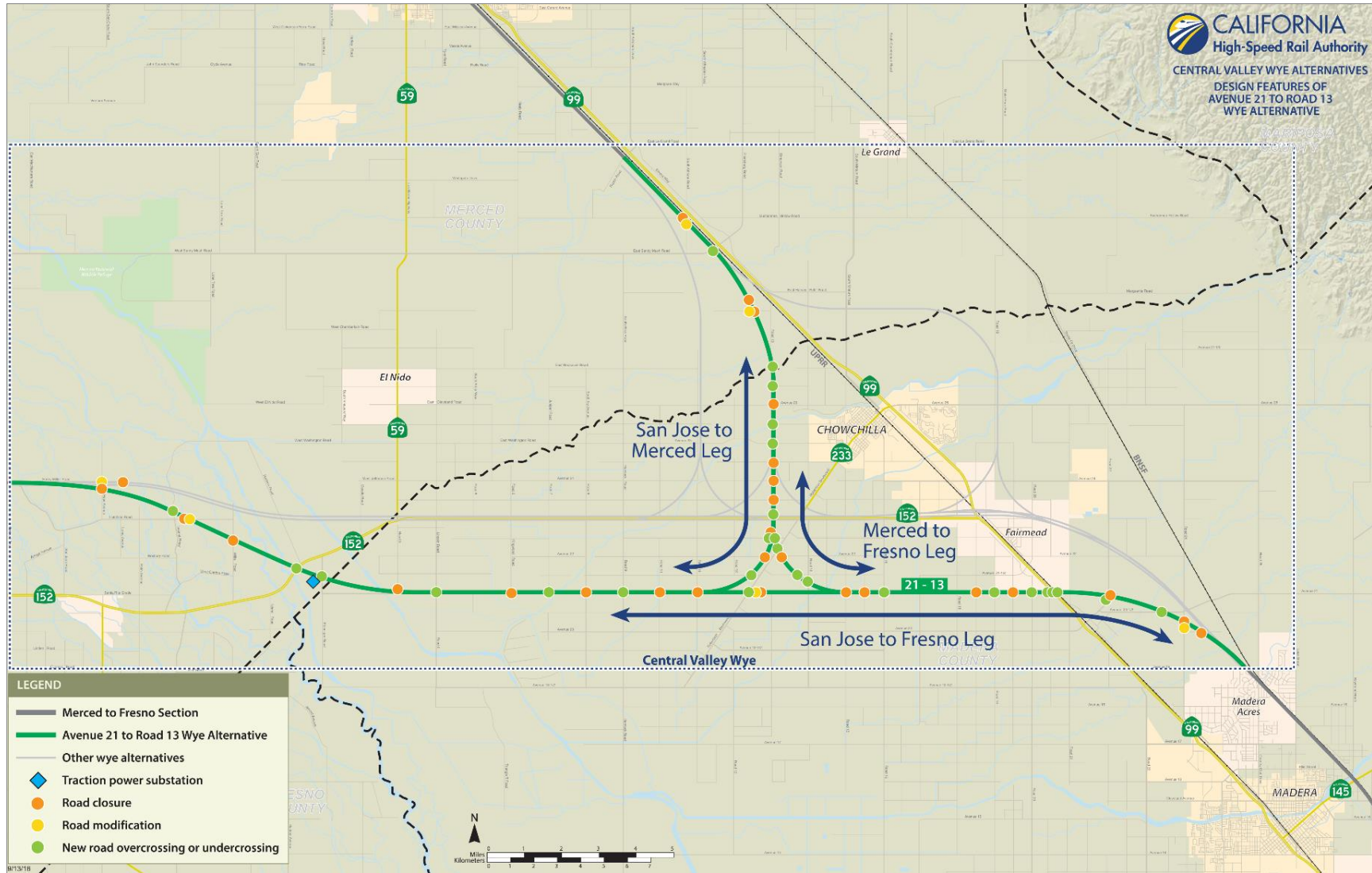
The Avenue 21 to Road 13 Wye Alternative (Figure 2-3) is designed to follow the existing Henry Miller Road and Avenue 21 rights-of-way as closely as practicable in the east-west direction and the Road 13, SR 99, and BNSF rights-of-way in the north-south direction. Deviations from these existing transportation corridors would be necessary to accommodate design requirements; specifically, larger curves would be necessary to accommodate the high speeds of the HSR compared to lower-speed roadway alignments. The Avenue 21 to Road 13 Wye Alternative would not follow existing transportation rights-of-way as it transitions from following one transportation corridor to another.

2.4.1 Alignment and Ancillary Features

The Avenue 21 to Road 13 Wye Alternative would extend approximately 53 miles, mostly at-grade on embankment, although it would also have aerial structures and a short segment of retained cut (depressed alignment). The wye configuration of this alternative would be located approximately 4 miles southwest of the city of Chowchilla, with the east-west axis along the north side of Avenue 21 and the north-south axis on the east side of Road 13.

Beginning at the intersection of Henry Miller Road and Carlucci Road (at the same point in Merced County as the SR 152 [North] to Road 13 Wye Alternative), west of Elgin Avenue this alternative would curve southeast toward the San Joaquin River and Eastside Bypass. East of Willis Road, the alignment would rise to an aerial structure to cross the river, SR 152, and the Eastside Bypass. The alignment would continue east along the north side of Avenue 21, crossing Ash Slough on an aerial structure. Southwest of Chowchilla, near Road 11, the alignment would split into two legs (four tracks) for transition to the Merced to Fresno Section: Hybrid Alignment. The San Jose to Merced leg would curve northeast, cross Road 13, and continue north along the east side of Road 13. At the beginning of the San Jose to Merced leg, the northbound track alternative would rise onto an aerial structure to cross over the tracks of the San Jose to Fresno leg. The Avenue 21 to Road 13 Wye Alternative legs would be routed as described below and shown on Figure 2-3:

- As the San Jose to Merced leg approaches SR 152, it would converge with the Merced to Fresno leg, requiring the northbound track of the San Jose to Merced leg to rise on an aerial structure and cross over the tracks of the Merced to Fresno leg. The San Jose to Merced leg would continue north on an elevated alignment crossing Ash Slough, the Chowchilla River, and Road 13 on aerial structures. As the leg returns to grade, it would curve northwest, cross Dutchman Creek on an aerial structure, and follow along the west side of the UPRR/SR 99 corridor. At Sandy Mush Road, the alternative would descend into a shallow cut (depressed) section for approximately 0.5 mile, with a retained cut-and-cover undercrossing tunnel segment at the Caltrans Sandy Mush Road Overhead. The alternative would return to grade and continue along the UPRR/SR 99 corridor, connecting to the Merced to Fresno Section: Hybrid Alignment at Ranch Road.



Source: Authority, 2016; ESRI, 2013; CAL FIRE, 2004; ESRI/National Geographic, 2015

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Figure 2-3 Avenue 21 to Road 13 Wye Alternative Alignment and Key Design Features

- The San Jose to Fresno leg would continue east from the split near Road 11 along the north side of Avenue 21 toward Chowchilla. It would be predominantly at-grade on embankment, ascending to cross Berenda Slough on an aerial structure. East of the wye configuration, the alignment would extend south of Chowchilla, ascend on an aerial structure east of Road 19 1/2, and cross the UPRR/SR 99 corridor. The alternative would extend south of Fairmead and curve southeast toward the BNSF corridor, cross Dry Creek on an aerial structure, and run adjacent to the west side of the BNSF corridor to its meeting with the Merced to Fresno Section: Hybrid Alignment at Avenue 19.
- The Merced to Fresno leg would split from the San Jose to Fresno leg near Road 15. The southbound track of the Merced to Fresno leg would ascend on an aerial structure and cross over the tracks of the San Jose to Fresno leg. The Merced to Fresno leg would curve northwest, rise on aerial structures over several road crossings, and then continue on an at-grade embankment to join the San Jose to Merced leg near SR 152.

Wildlife undercrossing structures would be provided along this alternative in at-grade embankment portions of the HSR corridor where the alignment intersects wildlife corridors.

2.4.2 State Highway or Local Roadway Modifications

The Avenue 21 to Road 13 Wye Alternative would require the permanent closure of 30 public roadways at selected locations and the construction of 28 overcrossings or undercrossings. Table 2-3 and Figure 2-3 show the anticipated state highway and local roadway closures. This alternative would require the fewest roadway and state highway modifications.

The Avenue 21 to Road 13 Wye Alternative would rise on aerial structures and cross over state highway facilities in three locations: SR 59 at Harmon Road, SR 152 at Road 13, and SR 99 at Avenue 21. Where other roads would be perpendicular to the proposed HSR, over- or undercrossings are planned at distances from less than 2 miles to 5 miles. Between these over- and undercrossings, some roads may be closed. Local roads paralleling the HSR alignment and used by small communities and farm operations may be shifted and reconstructed to maintain their function. Access easements would be provided to maintain access to properties severed by HSR.

2.4.3 Freight or Passenger Railroad Modifications

The Avenue 21 to Road 13 Wye Alternative would cross the UPRR operational right-of-way on an aerial structure south of Fairmead and maintain a vertical (at least 23.3 feet) clearance over UPRR operational right-of-way to avoid or minimize effects on other UPRR rights-of-way, spurs, and facilities. In areas where the Avenue 21 to Road 13 Wye Alternative parallels the UPRR right-of-way, the alternative maintains a minimum horizontal clearance of 102 feet from the centerline to the UPRR right-of-way.

2.4.4 Summary

Table 2-3 summarizes the design features for the Avenue 21 to Road 13 Wye Alternative.

Table 2-3 Design Features of the Avenue 21 to Road 13 Wye Alternative

Feature	Avenue 21 to Road 13 Wye
Total length (linear miles) ¹	53
At-grade profile (linear miles) ¹	48.5
Elevated profile (linear miles) ¹	4
Below-grade profile (linear miles) ¹	0.5
Number of straddle bents	32
Number of railroad crossings	1

Feature	Avenue 21 to Road 13 Wye
Number of major water crossings	11
Number of road crossings	58
Approximate number of public roadway closures	30
Number of roadway overcrossings and undercrossings	28
Traction power substation sites	1
Switching and paralleling stations	1 switching station, 7 paralleling stations
Signaling and train-control elements	15
Communication towers	6
Wildlife crossing structures	44

Source: Authority, 2016

¹ Lengths shown are based on equivalent dual-track alignments and are one-way mileages. For example, the length of single-track elevated structure will be divided by a factor of 2 to convert to dual-track equivalents.

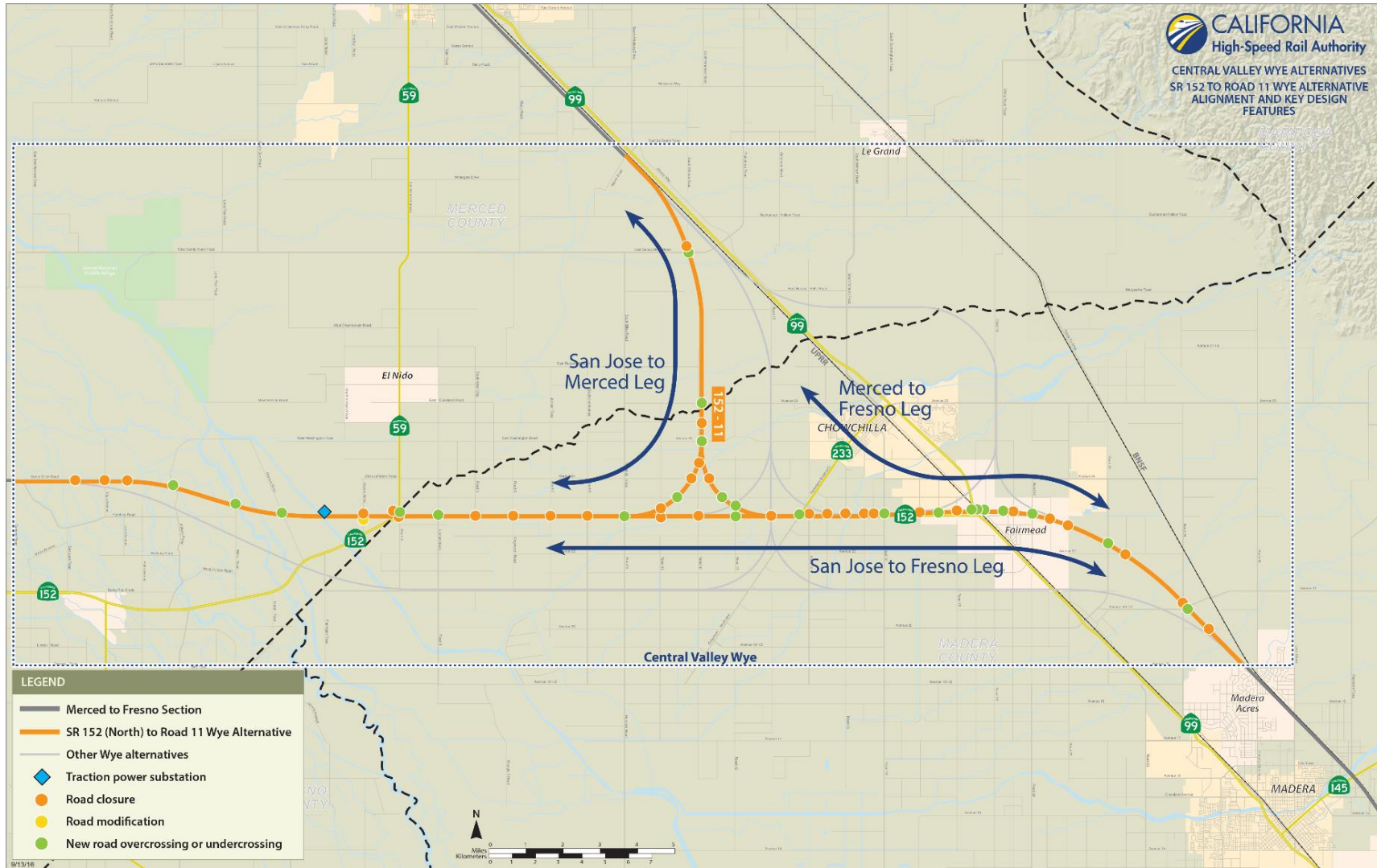
2.5 SR 152 (North) to Road 11 Wye Alternative

The SR 152 (North) to Road 11 Wye Alternative (Figure 2-4) follows the existing Henry Miller Road and SR 152 rights-of-way as closely as practicable in the east-west direction, and the Road 11, SR 99, and BNSF rights-of-way in the north-south direction. Deviations from these existing transportation corridors are necessary to accommodate design requirements; specifically, wider curves are necessary to accommodate the speed of the HSR compared to lower-speed roadway alignments. The SR 152 (North) to Road 11 Wye Alternative would not follow existing transportation rights-of-way where it transitions from following one transportation corridor to another.

2.5.1 Alignment and Ancillary Features

The SR 152 (North) to Road 11 Wye Alternative would extend approximately 51 miles, mostly at-grade on raised embankment, although it would also have aerial structures. The wye configuration of this alternative would be located west-southwest of the city of Chowchilla, with the east-west axis along the north side of SR 152 and the north-south axis on the east side of Road 11.

Like the other three alternatives, this alternative would begin in Merced County at the intersection of Henry Miller Road and Carlucci Road, and would continue at-grade on embankment east toward Elgin Avenue, where it would curve southeast toward the San Joaquin River and Eastside Bypass. Approaching Willis Road, the alignment would rise to cross the San Joaquin River on an aerial structure, return to embankment, then cross the Eastside Bypass on an aerial structure. After crossing the Eastside Bypass, this alternative would continue east, crossing SR 59 at-grade just north of the existing SR 152/SR 59 interchange, entering Madera County. To accommodate the SR 152 (North) to Road 11 Wye Alternative, the SR 152/SR 59 interchange would be reconstructed slightly to the south, and SR 59 would be grade-separated to pass above the HSR on an aerial structure. The alignment would continue east at-grade along the north side of SR 152 toward Chowchilla, splitting into two legs (four tracks) near Road 10 to transition to the Merced to Fresno Section: Hybrid Alignment, and would cross Ash Slough on an aerial structure. All but the northbound track of the San Jose to Merced leg of the alternative would then return to at-grade embankment; the northbound track would rise to cross over the tracks of the San Jose to Fresno leg on an aerial structure as it curves north toward Merced. The SR 152 (North) to Road 11 Wye Alternative legs would be routed as described below and shown on Figure 2-4:



Source: Authority, 2016; ESRI, 2013; CAL FIRE, 2004; ESRI/National Geographic, 2015

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Figure 2-4 SR 152 (North) to Road 11 Wye Alternative Alignment and Key Design Features

- The southbound track of the San Jose to Merced leg would turn north at-grade. This split would be west of Chowchilla, at approximately Road 10. The two San Jose to Merced tracks would continue north on the eastern side of Road 11, crossing the Chowchilla River, and then would cross over Road 11 to follow its west side. As the tracks return to grade, they would curve northwest, crossing Dutchman Creek on an aerial structure, following the west side of the UPRR/SR 99 corridor. The alignment would continue north, crossing over Sandy Mush Road on an aerial structure. The alignment would return to grade and continue along the west side of the UPRR/SR 99 corridor, connecting to the Merced to Fresno Section: Hybrid Alignment at Ranch Road.
- The San Jose to Fresno leg would continue east from the wye split near Road 10, along the north side of SR 152 toward Chowchilla. It would be predominantly at-grade, ascending on aerial structures at several road crossings and Berenda Slough. The leg would pass south of Chowchilla at-grade then rise to cross over the UPRR/SR 99 corridor and Fairmead Boulevard on an aerial structure. East of the UPRR/SR 99 corridor, the alignment would extend at-grade through Fairmead, north of Avenue 23. At approximately Road 20, the leg would curve southeast toward the BNSF corridor and cross Dry Creek on a short aerial structure. The SR 152 (North) to Road 11 Wye Alternative would align parallel to the west side of the BNSF corridor as it meets the Merced to Fresno Section: Hybrid Alignment at Avenue 19.
- The Merced to Fresno leg would split from the San Jose to Fresno leg near Road 13. The southbound track of the Merced to Fresno leg would ascend on an aerial structure and cross over the tracks of the San Jose to Fresno leg. The Merced to Fresno leg would curve northwest, rise on a high embankment crossing over several roads, and continue at-grade on embankment to join the San Jose to Merced leg near Avenue 25.

Wildlife undercrossing structures would be installed in at-grade embankments along this alternative where the alignment intersects wildlife corridors.

2.5.2 State Highway or Local Roadway Modifications

The SR 152 (North) to Road 11 Wye Alternative would require the permanent closure of 33 public roadways at selected locations and the construction of 24 overcrossings or undercrossings in lieu of closure. Table 2-4 and Figure 2-4 show the anticipated state highway and local roadway closures and modifications. Fourteen of these permanent road closures would be located at SR 152 where roads currently cross at-grade but need to be closed in order to convert SR 152 to a fully access-controlled corridor. The 14 proposed closures are Road 5, Road 6, Road 7, Road 8, Road 10, Road 11, Road 13, Road 14, Road 14 1/2, Road 15, Road 15 1/2, Road 15 3/4, Road 17, and Road 18. Planned new grade separations along SR 152 at the SR 59/SR 152 Interchange, Road 4/Lincoln Road, Road 12, and Road 17 1/2 would maintain access to SR 152. These roadways would be reconfigured to two 12-foot lanes with two 8-foot shoulders. Several of these new interchanges would require realigning SR 152. Three new interchanges are proposed between SR 59 and SR 99 to provide access to SR 152: at Road 9/Hemlock Road, SR 233/Robertson Boulevard, and Road 16.

The distance between over- or undercrossings would vary from less than 2 miles to approximately 5 miles where other roads are perpendicular to the proposed HSR. Between these over- or undercrossings, 19 additional roads would be closed. Local roads paralleling the proposed HSR alignment and used by small communities and farm operations may be shifted and reconstructed to maintain their function. Access easements would be provided to maintain access to properties severed by HSR.

2.5.3 Freight or Passenger Railroad Modifications

The SR 152 (North) to Road 11 Wye Alternative would cross over the UPRR right-of-way as it passes south of Chowchilla. This alternative would maintain required vertical (at least 23.3 feet) clearance over UPRR operational right-of-way to avoid or minimize effects on UPRR rights-of-way, spurs, and facilities. In areas where the SR 152 (North) to Road 11 Wye Alternative parallels

the UPRR right-of-way, the alternative maintains a minimum horizontal clearance of 102 feet from the centerline to the UPRR right-of-way.

2.5.4 Summary

Table 2-4 summarizes the design features for the SR 152 (North) to Road 11 Wye Alternative.

Table 2-4 Design Features of the SR 152 (North) to Road 11 Wye Alternative

Feature	SR 152 (North) to Road 11 Wye
Total length (linear miles) ¹	51
At-grade profile (linear miles) ¹	46.5
Elevated profile (linear miles) ¹	4.5
Below-grade profile (linear miles) ¹	0
Number of straddle bents	27
Number of railroad crossings	1
Number of major water crossings	13
Number of road crossings	57
Approximate number of public roadway closures	33
Number of roadway overcrossings and undercrossings	24
Traction power substation sites	1
Switching and paralleling stations	1 switching stations, 7 paralleling stations
Signaling and train-control elements	19
Communication towers	9
Wildlife crossing structures	37

Source: Authority, 2016

¹ Lengths shown are based on equivalent dual-track alignments and are one-way mileages. For example, the length of single-track elevated structure will be divided by a factor of 2 to convert to dual-track equivalents.

2.6 Central Valley Wye Impact Avoidance and Minimization Features

The Authority has developed IAMFs that would avoid or minimize potential effects and mitigation measures that would avoid or reduce significant effects that exist after the application of all appropriate IAMFs. IAMFs are standard practices, actions, and design features that are incorporated into the Central Valley Wye description. Mitigation measures consist of practices, actions, and design features that are applied to the Central Valley Wye after an effect is identified. Appendix A presents complete descriptions of all IAMFs related to hydrology and water resources. Volume 2 of the Supplemental EIR/EIS, Appendix 2-B, California High-Speed Rail: Impact Avoidance and Minimization Features, presents complete descriptions of all IAMFs for the Central Valley Wye.

3 LAWS, REGULATIONS, ORDERS

This section presents a summary of the various federal and state government regulatory requirements that provide protection of biological resources and wetlands and which are applicable to the Central Valley Wye. Also included is a summary of regional and local planning provisions that relate to the Central Valley Wye. Because this is a federal and state project, it is not subject to local agency regulation; however this information is provided so that any inconsistencies with local requirements can be identified as required by NEPA and CEQA. The regulatory requirements are unchanged from those described in the Merced to Fresno Final EIR/EIS, except for the Merced County general plan, which was updated in 2013.

3.1 Federal

3.1.1 Endangered Species Act of 1973 (16 U.S.C. § 1531 et seq.)

The federal Endangered Species Act (FESA) and subsequent amendments provide guidance for conserving federally listed species and the ecosystems upon which they depend. The applicable sections of the FESA are:

- Section 7 requires federal agencies to consult with the USFWS or NMFS, as appropriate, to make certain that the actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered fish, wildlife, or plant species or result in the destruction or adverse modification of designated critical habitat for any such species. As part of the consultation, USFWS and NMFS will issue a BO and an incidental take statement for wildlife species to exempt the Section 9 take prohibition.
- Section 9 and its implementing regulations prohibit the “take” of any fish or wildlife species listed under the FESA as endangered or threatened, 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. Take includes the modification of habitat of a listed species where the modification results in death or injury of individuals of the species. Section 9 prohibits a number of specified activities with respect to endangered plants.
- Section 10 provides a process by which nonfederal entities may obtain an incidental take permit from USFWS or NMFS for otherwise lawful activities that might incidentally result in take of endangered or threatened species, subject to specific conditions. The Central Valley Wye is a federal agency project and therefore will not utilize Section 10.

3.1.2 Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq.)

The amended Magnuson-Stevens Fishery Conservation and Management Act, also known as the Sustainable Fisheries Act (PL 104-297), requires that all federal agencies consult with NMFS on activities or proposed activities authorized, funded, or undertaken by that agency that may adversely affect essential fish habitat (EFH) of commercially managed marine and anadromous fish species.

3.1.3 Omnibus Public Land Management Act of 2009 (16 U.S.C. §§ 10001-10203) (New since the Merced to Fresno Final EIR/EIS)

The Omnibus Public Land Management Act (Public Law 111-11) was signed into law by President Obama on March 30, 2009, and includes the San Joaquin River Restoration Settlement Act (16 U.S.C. §§ 10001-10011), which authorizes implementation of the San Joaquin River Restoration Settlement (Natural Resources Defense Council, et al., v. Kirk Rodgers, et al. Settlement Agreement (Settlement)). The San Joaquin River Restoration Program (SJRRP) was initiated in accordance with the terms and conditions of the Settlement.

The SJRRP is a comprehensive long-term effort to restore flows to a 153-mile-long portion of the San Joaquin River from Friant Dam to the confluence of the Merced River. The SJRRP goals are to restore a self-sustaining Chinook salmon fishery while reducing or avoiding adverse water

supply effects from restoration flows. The implementing agencies of the SJRRP include the U.S. Bureau of Reclamation (USBR); USFWS; NMFS; California Department of Water Resources (DWR); and CDFW (USBR and DWR 2011).

3.1.4 Clean Water Act (33 U.S.C. § 1251 et seq.)

The federal Clean Water Act (CWA) serves as the primary federal law protecting the quality of the nation's surface waters, including wetlands. The applicable sections of the CWA are:

- Under Section 401, applicants for a federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the U.S. must obtain certification from the state in which the discharge would originate or from the interstate water pollution control agency with jurisdiction over affected waters. Project sponsors must obtain a 401 Water Quality Certification from SWRCB.
- Under Section 402, all point source discharges, including, but not limited to, construction-related stormwater discharges to surface waters, are regulated through the National Pollutant Discharge Elimination System program. Project sponsors must obtain a National Pollutant Discharge Elimination System permit from SWRCB.
- Under Section 404, USACE and the U.S. Environmental Protection Agency regulate the discharge of dredged and fill materials into the waters of the U.S. Project sponsors must obtain a permit from USACE for discharges of dredged or fill materials into proposed jurisdictional waters over which USACE determines that it will exert jurisdiction.

3.1.5 U.S. Fish and Wildlife Coordination Act (16 U.S.C. §§ 661–666c)

The U.S. Fish and Wildlife Coordination Act 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.

3.1.6 Migratory Bird Treaty Act (16 U.S.C. § 703–712)

The Migratory Bird Treaty Act (MBTA) of 1918 prohibits the take of the nest, eggs, birds, or any parts thereof (50 C.F.R. § 10.13 as modified by 75 Fed. Reg. § 9281).

3.1.7 Bald and Golden Eagle Protection Act (16 U.S.C. §§ 668–668(d), 50 C.F.R. § 22)

The Bald and Golden Eagle Protection Act (BGEPA) prohibits anyone from taking, possessing, or transporting bald eagle (*Haliaeetus leucocephalus*) or golden eagle (*Aquila chrysaetos*), or the parts, nests, or eggs of such birds without prior authorization. The BGEPA regulations authorize issuance of incidental take permits of bald and golden eagles under limited circumstances.

3.1.8 Protection of Wetlands (USEO 11990)

U.S. Presidential Executive Order (USEO) 11990 aims to avoid direct or indirect effects on wetlands from federal or federally approved projects when a practicable alternative is available. If wetland effects cannot be avoided, all practicable measures to minimize harm must be included.

3.1.9 Protection of Migratory Bird Populations (USEO 13186)

USEO 13186 directs each federal agency taking actions that have or may have adverse effect on migratory bird populations to work with the USFWS to develop a memorandum of understanding that will promote the conservation of migratory bird populations.

3.1.10 Invasive Species (USEO 13112)

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

3.2 State

3.2.1 California Fish and Game Code

3.2.1.1 *California Endangered Species Act (Cal. Fish and Game Code, §§ 2050–2085)*

The California Endangered Species Act (CESA) prohibits the take of any fish, wildlife, or plant species listed as endangered or threatened, or designated as candidates for listing, under CESA. Take refers to mortality or injury of the listed species itself and not the modification of a listed species habitat. Compared to the FESA process, CESA contains a procedure for the CDFW to issue a Section 2081 incidental take permit authorizing the take of listed and candidate species incidental to an otherwise lawful activity, subject to specified conditions, including that the effects of the take are fully mitigated.

3.2.1.2 *Fully Protected Species (Cal. Fish and Game Code, §§ 3511, 4700, 5050, and 5515)*

The California Fish and Game Code designates 37 fully protected species and prohibits the take or possession at any time of such species with certain limited exceptions.

3.2.1.3 *Bird Protections (Cal. Fish and Game Code, §§ 3503, 3503.5)*

California Fish and Game Code section 3503 states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by code or any regulation made pursuant thereto. 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).

3.2.1.4 *Lake and Streambed Alteration (Cal. Fish and Game Code, §1600 et seq.)*

California Fish and Game Code section 1600 et seq. requires notifying the CDFW prior to any project activity that might: (1) substantially divert or obstruct the natural flow of any river, stream or lake; (2) substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake; or (3) 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. If after this notification the CDFW determines that the activity may substantially adversely affect fish and wildlife resources, a Lake or Streambed Alteration Agreement will need to be obtained.

3.2.1.5 *Bird Protections (Cal. Fish and Game Code, § 3513) (New since the Merced to Fresno Final EIR/EIS)*

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.

3.2.2 California Native Plant Protection Act (Cal. Fish and Game Code, §§ 1900–1913)

The California Native Plant Protection Act (NPPA) requires all state agencies to use their authority to carry out programs to conserve endangered and rare native plants. The NPPA gives the CDFW the power to designate native plants as “endangered” or “rare” and prohibits the take of such plants, with certain exceptions.

3.2.3 Porter-Cologne Water Quality Control Act (Cal. Water Code, § 13260 et seq.)

The Porter-Cologne Water Quality Control Act provides for implementation of the federal CWA by SWRCB, including issuance of Section 401 Certifications and Section 402 National Pollutant

Discharge Elimination System Permits. Issuance of a Section 401 Certification requires documenting compliance with state water quality standards, including watershed plans, designated beneficial uses, and the total maximum daily load program.

The Act regulates discharges that could affect the quality of waters of the state and requires a waste discharge requirements form be obtained for discharges, including fill of wetlands that are not otherwise authorized by Section 404 or Section 402 of the federal CWA. Application for waste discharge requirements requires filing of a report of waste discharge.

3.3 Regional and Local

Table 3-1 summarizes local and regional laws and regulations that were identified and considered in preparation of this analysis.

Table 3-1 Local and Regional Laws and Regulations

Policy Title	Summary
Merced County	
<p><i>Merced County 2030 General Plan, Natural Resources Element (2013) (Updated since the Merced to Fresno Final EIR/EIS)</i></p>	<p>The Natural Resources Element addresses protection, preservation, and enhancement of biological resources in Merced County. The following policies relate to the proposed project:</p> <p>Policy NR-1.1: Habitat Protection: Identify areas that have significant long-term habitat and wetland values, including riparian corridors, wetlands, grasslands, rivers and waterways, oak woodlands, vernal pools, and wildlife movement and migration corridors, and provide information to landowners.</p> <p>Policy NR-1.2: Protected Natural Lands: Identify and support methods to increase the acreage of protected natural lands and special habitats, including but not limited to, wetlands, grasslands, vernal pools, and wildlife movement and migration corridors, potentially through the use of conservation easements.</p> <p>Policy NR-1.4 Important Vegetative Resource Protection: Minimize the removal of vegetative resources which stabilize slopes, reduce surface water runoff, erosion, and sedimentation.</p> <p>Policy NR-1.5 Wetland and Riparian Habitat Buffer: Identify wetlands and riparian habitat areas and designate a buffer zone around each area sufficient to protect them from degradation, encroachment, or loss.</p> <p>Policy NR-1.6: Terrestrial Wildlife Mobility: Encourage property owners within or adjacent or designated habitat connectivity corridors that have been mapped or otherwise identified by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service to manage their lands in accordance with such mapping programs.</p> <p>Policy NR-1.8: Use of Native Plant Species for Landscaping: Encourage the use of native plant species in landscaping, and, where the County has discretion, require the use of native plant species for landscaping.</p> <p>Policy NR-1.10: Aquatic and Waterfowl Habitat Protection: Cooperate with local, State, and Federal water agencies in their efforts to protect significant aquatic and waterfowl habitats against excessive water withdrawals or other activities that would endanger or interrupt normal migratory patterns or aquatic habitats.</p> <p>Policy NR-1.11: On-Going Habitat Protection and Monitoring: Cooperate with local, State, and Federal agencies to ensure that adequate on-going protection and monitoring occurs adjacent to rare and endangered species habitats or within identified significant wetlands.</p>

Policy Title	Summary
	<p>Policy NR-1.12: Wetland Avoidance: Avoid or minimize loss of existing wetland resources by careful placement and construction of any necessary new public utilities and facilities, including roads, railroads, high speed rail, sewage disposal ponds, gas lines, electrical lines, and water/wastewater systems.</p> <p>Policy NR-1.13: Wetland Setbacks: Require an appropriate setback, to be determined during the development process, for developed and agricultural uses from the delineated edges of wetlands.</p> <p>Policy NR-1.17: Agency Coordination: Consult with private, local, State, and Federal agencies to assist in the protection of biological resources and prevention of degradation, encroachment, or loss of resources managed by these agencies.</p> <p>Policy NR-1.20: Conservation Easements: Encourage property owners to work with land trusts and State and Federal agencies to pursue voluntary conservation easements.</p> <p>Policy NR-1.21: Special-Status Species Surveys and Mitigation: Incorporate the survey standards and mitigation requirements of state and federal resource management agencies for use in the County's review processes for both private and public projects.</p>
<p>Madera County</p>	
<p><i>Madera County General Plan, Open Space for the Preservation of Natural Resources (1995)</i></p>	<p>Goal 5.H preserves and enhances open space lands to maintain the natural resources of the county.</p> <p>Policy 5.H.1: The County shall support the preservation and enhancement of natural land forms, natural vegetation, and natural resources as open space. To the extent feasible, the county shall permanently protect as open space areas of natural resource value, including wetlands preserves, riparian corridors, woodlands and floodplains.</p> <p>Policy 5.H.2: The County shall require that new development be designed and constructed to preserve the following types of areas and features as open space to the maximum extent feasible:</p> <ul style="list-style-type: none"> ▪ High erosion hazard areas; ▪ Scenic and trail corridors; ▪ Streams and streamside vegetation; ▪ Wetlands; ▪ Other significant stands of vegetation; ▪ Wildlife corridors; and ▪ Any areas of special ecological significance. <p>Policy 5.H.3: The County shall support the maintenance of open space and natural areas that are interconnected and of sufficient size to protect biodiversity, accommodate wildlife movement, and sustain ecosystems.</p> <p>Policy 5.H.5: The County shall require that significant natural, open space, and cultural resources be identified in advance of development and incorporated into site-specific development project design.</p>
<p><i>Madera County General Plan, Wetlands and Riparian Areas (1995)</i></p>	<p>Goal 5.D protects wetland communities and related riparian areas throughout Madera County as valuable resources.</p> <p>Policy 5.D.1: The County shall comply with the wetlands policies of the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and the California Department of Fish and Wildlife. Coordination with these agencies at</p>

Policy Title	Summary
	<p>all levels of project review shall continue to ensure that appropriate mitigation measures and the concerns of these agencies are adequately addressed.</p> <p>Policy 5.D.2: The County shall require new development to mitigate wetland loss in both regulated and nonregulated wetlands through any combination of avoidance, minimization, or compensation. The County shall support mitigation banking programs that can provide the opportunity to mitigate impacts to rare, threatened, and endangered species and/or the habitat which supports these species in wetland and riparian areas.</p> <p>Policy 5.D.3: Development should be designed in such a manner that pollutants and siltation will not significantly adversely affect the value or function of wetlands.</p> <p>Policy 5.D.4: The County shall require riparian protection zones around natural watercourses. Riparian protection zones shall include the bed and bank of both low and high flow channels and associated riparian vegetation, the band of riparian vegetation outside the high flow channel, and buffers of 100 feet in width as measured from top of bank of unvegetated channels and 50 feet in width as measured from the outer edge for the canopy of riparian vegetation. Exceptions may be made in existing developed areas where existing development and lots are located within the setback areas.</p> <p>Policy 5.D.5: The County shall strive to identify and conserve remaining upland habitat areas adjacent to wetlands and riparian areas that are critical to the feeding or nesting of wildlife species associated with these wetland and riparian areas.</p> <p>Policy 5.D.6: The County shall require new private or public developments to preserve and enhance existing native riparian habitat unless public safety concerns require removal of habitat for flood control or other public purposes. In Cases where new private or public development results in modification or destruction of riparian habitat for purposes of flood control, the developers shall be responsible for creating new riparian habitats within or near the project area at a ratio of three acres of new habitat for every acre destroyed.</p> <p>Policy 5.D.7: The County shall support the management of wetland and riparian plant communities for passive recreation, groundwater recharge, nutrient catchment, and wildlife habitats. Such communities shall be restored, where possible.</p>
<p><i>Madera County General Plan, Fish and Wildlife Habitat (1995)</i></p>	<p>Goal 5.E protects, restores, and enhances habitats that support fish and wildlife species so as to maintain populations at viable levels.</p> <p>Policy 5.E.1: The County shall identify and protect critical nesting and foraging areas, important spawning grounds, migratory routes, waterfowl resign areas, oak woodlands, wildlife movement corridors, and other unique wildlife habitats critical to protecting and sustaining wildlife populations.</p> <p>Policy 5.E.2: The County shall require development in areas known to have particular value for wildlife to be carefully planned and, where possible, located so that the reasonable value of the habitat for wildlife is maintained.</p> <p>Policy 5.E.4: The County shall support preservation of the habitats of rare, threatened, endangered, and/or other special-status species.</p> <p>Policy 5.E.6: The County shall ensure the conservation of sufficiently large, continuous expanses of native vegetation to provide suitable habitat for maintaining abundant and diverse wildlife, if this preservation does not threaten the economic well-being of the county.</p> <p>Policy 5.E.7: The County shall support the preservation or reestablishment of fisheries in the rivers and streams within the county, whenever possible.</p>

Policy Title	Summary
	<p>Policy 5.E.8: The County shall ensure close monitoring of pesticide use in areas adjacent to habitats of special-status plants and animals.</p> <p>Policy 5.E.10: Prior to approval of discretionary development permits involving parcels within a significant ecological resource area, the County shall require, as part of the environmental review process, a biotic resources evaluation of the sites by a qualified biologist. The evaluation shall be based upon field reconnaissance performed at the appropriate time of year to determine the presence or absence of rare, threatened, or endangered species of plants or animals. Such evaluation will consider the potential for significant impact on these resources and will either identify feasible measures to mitigate such impacts or indicate why mitigation is not feasible.</p>
<p><i>Madera County General Plan, Vegetation (1995)</i></p>	<p>Goal 5.F preserves and protects the valuable vegetation resources of Madera County.</p> <p>Policy 5.F.1: The County shall encourage landowners and developers to preserve the integrity of existing terrain and natural vegetation in visually sensitive areas such as hillsides, ridges, and along important transportation corridors.</p> <p>Policy 5.F.2: The County shall require developers to use native and compatible nonnative species, especially drought-resistant species, to the extent possible in fulfilling landscaping requirements imposed as conditions of discretionary permit approval or for project mitigation.</p> <p>Policy 5.F.3: The County shall support the preservation of outstanding areas of natural vegetation, including, but not limited to, oak woodlands, riparian areas, and vernal pools.</p> <p>Policy 5.F.4: The County shall ensure that landmark trees are preserved and protected.</p> <p>Policy 5.F.5: The County shall establish procedures for identifying and preserving rare, threatened, and endangered plant species that may be adversely affected by public or private development projects.</p> <p>Policy 5.F.6: The County shall require that new development preserve natural woodlands to the maximum extent possible.</p> <p>Policy 5.F.7: The County shall require that development on hillsides be limited to maintain valuable natural vegetation, especially forests and open grasslands, and to control erosion.</p>
<p>City of Chowchilla</p>	
<p><i>City of Chowchilla 2040 General Plan, Open Space and Conservation Element, Biological Resources Section (2011)</i></p>	<p>Objective OS-13 encourages the provision of open space areas throughout the Planning Area through the preservation and enhancement of natural features or the joint use of other public facilities and/or rights-of-ways.</p> <p>Policy OS 13.1: To the extent feasible. Maintain sloughs and water courses within the Chowchilla Planning Area as components of a possible recreational trail system. Public access within sensitive habitat areas of the sloughs or waterways shall be considered individually to ensure protection of the habitat resource.</p> <p>Policy OS 13.3: Where appropriate and feasible, establish permanent mechanisms to protect wetlands and riparian corridors.</p> <p>Policy OS 13.6: The City of Chowchilla shall support the management of riparian scrub and aquatic environments of Ash Slough, Berenda Slough and of the Chowchilla River for passive recreation, groundwater recharge, and wildlife habitat. The riparian and aquatic environment of Ash and Berenda</p>

Policy Title	Summary
	<p>Sloughs, and the Chowchilla River shall be restored and expanded, where feasible and appropriate.</p> <p>Policy OS 13.7: New and redevelopment projects adjacent to Ash Slough or Berenda Slough are to be carefully planned and, where possible, designed to avoid existing riparian scrub vegetation and aquatic wildlife habitat.</p> <p>Policy OS 13.8: Lighting associated with new and redevelopment projects adjacent to Ash Slough or Berenda Slough shall be designed to prevent artificial lighting from illumination adjacent natural areas at a level greater than one candle foot above ambient conditions.</p> <p>Policy OS 13.10: On development sites with the potential to contain wetland resources, a wetlands delineation shall be prepared by a qualified biologist using the protocol defined by the U. S. Army Corps of Engineers. A report on the findings of the wetland delineation shall be submitted to the City of Chowchilla as part of the project application process.</p> <p>Policy OS 13.11: The City of Chowchilla shall maintain a no net loss of wetlands on a project-by-project basis. For the purpose of identifying wetlands, the City will accept a map delineating wetlands which has been accepted by the U.S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act of 1972. No net loss may include mitigation implementation through participation in an off-site mitigation bank or similar mitigation mechanism acceptable to the City and permitting agencies.</p>

Source: Merced County, 2013; Madera County, 1995; City of Chowchilla, 2011

4 METHODS FOR EVALUATING EFFECTS

4.1 Resource Definitions

4.1.1 Special-Status Species

Special-status species are plants or animals that are legally protected under FESA, CESA, California Native Plant Protection Act, or other regulations as defined in Section 3, Laws, Regulations, Orders. This includes species that meet the definitions of rare, threatened, or endangered under California Environmental Quality Act (CEQA) Guidelines Sections 15380 and 15125. Special-status species consist of the following:

- Species listed or proposed for listing as threatened or endangered under FESA (50 C.F.R. § 17.12 [listed plants], 50 C.F.R. § 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 FESA (80 Fed. Reg. 80584, December 24, 2015)
- Species listed or proposed for listing by the State of California as threatened or endangered under CESA (Cal. Code Regs., tit. 14, § 670.5)
- Plant species listed as rare under the NPPA (Cal. Fish and Game Code, § 1900 et seq.)
- Species that meet the definitions of “rare” or “endangered” under the CEQA (CEQA Guidelines §§ 15380 and 15125)
- Species on the CDFW *Special Vascular Plants, Bryophytes, and Lichens List* (CDFW 2016a)
- Animal species designated as California Species of Special Concern by the CDFW (CDFW 2016b)
- Bird species of conservation concern (BCC) as identified by the USFWS in *Birds of Conservation Concern* (USFWS 2008)
- Animals that are fully protected in California (Cal. Fish and Game Code, §§ 3511 [birds], 4700 [mammals], 5050 [amphibians and reptiles], and 5515 [fish])

4.1.2 Habitats of Concern

4.1.2.1 Special-Status Plant Communities

Special-status plant communities (also referred to as *sensitive natural communities*) are plant communities that are of limited distribution statewide or within a county or region, and that are often vulnerable to the environmental effects of projects (CDFG 2009). The CDFW maintains a list of natural communities in California (CDFG 2010) and assigns them global and state rarity ranks to identify which communities should be considered special status. Many of these communities are described in the *Manual of California Vegetation* (Sawyer et al. 2009), which follows the National Vegetation Classification system (Federal Geographic Data Committee 2008).

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 (Master et al. 2012):

- S1: Fewer than 6 viable occurrences or up to 1,280 acres statewide
- S2: 6 to 20 viable occurrences or more than 1,280 to 6,400 acres statewide
- S3: 21 to 100 viable occurrences 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 or if they provided potential habitat for special-status plant species.

4.1.2.2 Jurisdictional Waters

Wetlands and other waters regulated by the federal government (USACE) and the State of California (SWRCB and CDFW) are collectively termed *jurisdictional waters*. Wetlands and other waters as delineated during the jurisdictional delineation (see the *Merced to Fresno Section Wetlands Delineation Report, California High-Speed Train Project Final EIR/EIS* [Primary Wetlands Delineation Report] [Authority and FRA 2012c] and the *Merced to Fresno Section: Central Valley Wye Second Supplemental Wetlands Delineation Report* [Second Supplemental Wetlands Delineation Report] [Authority and FRA 2016]) are assumed to fall under the jurisdiction of the USACE, the SWRCB, and the CDFW for purposes of this discussion. Confirmation of these waters as jurisdictional by the USACE, the SWRCB, and the CDFW will be obtained through the regulatory permitting process. Definitions of the categories that are included in the jurisdictional waters sections are presented below.

Waters of the U.S.

The federal CWA (33 U.S.C. § 1251 et seq.) 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 C.F.R. § 328.3(a)). Wetlands are a sub-classification of waters of the U.S. The term *other waters of the U.S.* is used to describe waters of the U.S. exclusive of wetlands.

Wetlands

According to the *Corps of Engineers Wetland Delineation Manual* (USACE 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0) (USACE 2008a), three criteria must be satisfied to classify an area as a jurisdictional wetland. These criteria are: (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 State

Waters of the state are broadly defined by the Porter-Cologne Water Quality Control Act (Cal. Water Code, § 13050(e)) to mean any surface water or groundwater, including saline waters within the boundaries of the state. Under this definition, isolated wetlands that may not be subject to regulations under federal law are considered waters of the state and regulated accordingly.

Some regional water quality control boards have adopted a wetland definition in their basin plans. The Central Valley Regional Water Quality Control Board, which has jurisdiction over all drainage basins that could be affected by the Central Valley Wye, has not yet adopted a wetland definition within its basin plan. On June 17, 2016, the SWRCB released a preliminary draft of its proposed *Procedures for Regulation of Dredged or Fill Material to Waters of the State*, which includes a proposed wetland definition. Under this definition, an area is a wetland if, under normal circumstances: (1) the area has continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both; (2) the duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and (3) the area's vegetation is dominated by hydrophytes or the area lacks vegetation. Because this definition is still in draft form and has

not formally been adopted, the term *wetland* as used in this document refers to the USACE definition of wetlands.

State Lakes and Streambeds

The CDFW has not released an official definition of lake or streambed jurisdiction and therefore the extent of areas regulated under California Fish and Game Code section 1600 et seq. remains undefined. However, the CDFW jurisdiction generally includes the streambed and bank, together with the adjacent floodplain and riparian vegetation. This riparian area is classified as waters of the state in this document.

Riparian Areas

A *riparian area* consists of the transitional habitat between terrestrial and aquatic ecosystems. Specifically, riparian areas are the vegetated areas between a seasonal riverine feature and the outer drip line of the adjacent vegetation. Riparian vegetation supports a unique set of physical and biological processes, including temperature regulation and wildlife habitat, and provides valuable aquatic food web services (inputs for nutrient cycling and food availability) to adjacent aquatic ecosystems. Riparian areas can be wetlands (as defined by USACE) or nonwetland areas. Portions of riparian areas that meet the USACE wetland criteria are regulated by the USACE.

4.1.2.3 Conservation Easements

A *conservation easement* is a binding, legal agreement between a landowner and a land trust or government agency that limits uses of the land to protect its conservation values and achieve specific conservation objectives. A conservation easement allows landowners to continue to own and use their land. However, certain actions are prohibited, and the landowner agrees to conserve or restore habitat, open space, scenic, or other ecological resource values on the land covered by the easement.

4.1.2.4 Public Lands

Public lands are owned and typically maintained by the government, including cities, counties, states, and the federal government.

4.1.2.5 Mitigation/Conservation Banks

Mitigation/conservation banks are permanently protected lands that contain natural resource values. These lands are conserved and permanently managed for special-status species, jurisdictional waters, or other natural resources. Mitigation/conservation banks function to offset adverse effects on natural resources that occurred elsewhere; for this reason, these banks are sometimes referred to as *off-site mitigation*. In exchange for permanently protecting the land and managing it for natural resources, the natural resource regulatory agencies (e.g., USFWS, USACE, CDFW) approve a specified number of natural resource (habitat, species, or resource) credits that bank owners may sell.

4.1.2.6 Habitat Conservation Plans

Habitat Conservation Plans (HCP) are planning documents required as part of an application for an incidental take permit under Section 10 of the FESA. As defined in this document, HCPs also include Natural Community Conservation Planning under California Fish and Game Code section 2800–2835, which identifies 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. Each HCP describes the anticipated effects of the proposed taking, how those effects will be minimized or mitigated, and how the HCP is to be funded.

4.1.2.7 Protected Trees

Protected trees are trees or tree communities that have special significance and are afforded protection by, and specifically identified in, county and city ordinances, codes, or general plans.

Cities and counties traversed by the Central Valley Wye alternatives consist of Merced and Madera Counties and the cities of Chowchilla and Madera. The types of trees and specific physical characteristics required to meet the local definitions vary by city and county. No ordinances or codes specific to the protection of trees were identified in the habitat study area. Consequently, protected trees are not discussed further in this report.

4.1.2.8 Essential Fish Habitat

EFH is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” *Waters* include aquatic areas and their associated physical, chemical, and biological properties. *Substrate* includes sediment underlying the waters. *Necessary* means the habitat required to support a sustainable fishery and the managed species’ contribution to a healthy ecosystem. *Spawning, breeding, feeding, or growth to maturity* cover all habitat types used by a species throughout its life cycle. The Magnuson-Stevens Fisheries Conservation and Management Act requires all federal agencies to consult with the NMFS on all actions or proposed actions permitted, funded, or undertaken by the federal agency that may adversely affect EFH. *Adversely affect* means any effect that reduces the quality or quantity of EFH. Adverse effects may include direct (e.g., contamination, physical disruption), indirect (e.g., loss of prey), site-specific, or habitat-wide effects, including individual, cumulative, or synergistic consequences of actions (NMFS 2009).

4.1.2.9 Critical Habitat

Designated *critical habitats* are geographic areas that contain features essential for the conservation of a species listed as threatened or endangered under the FESA and that may require special management and protection. Under the FESA, conservation is defined as “any and all methods and procedures used to bring a species to recovery; the point at which the protections of the FESA are no longer needed” (16 U.S.C. § 1532(3)). Critical habitat may include areas that are not currently occupied by the species, but that will be needed for recovery.

4.1.3 Wildlife Movement Corridors

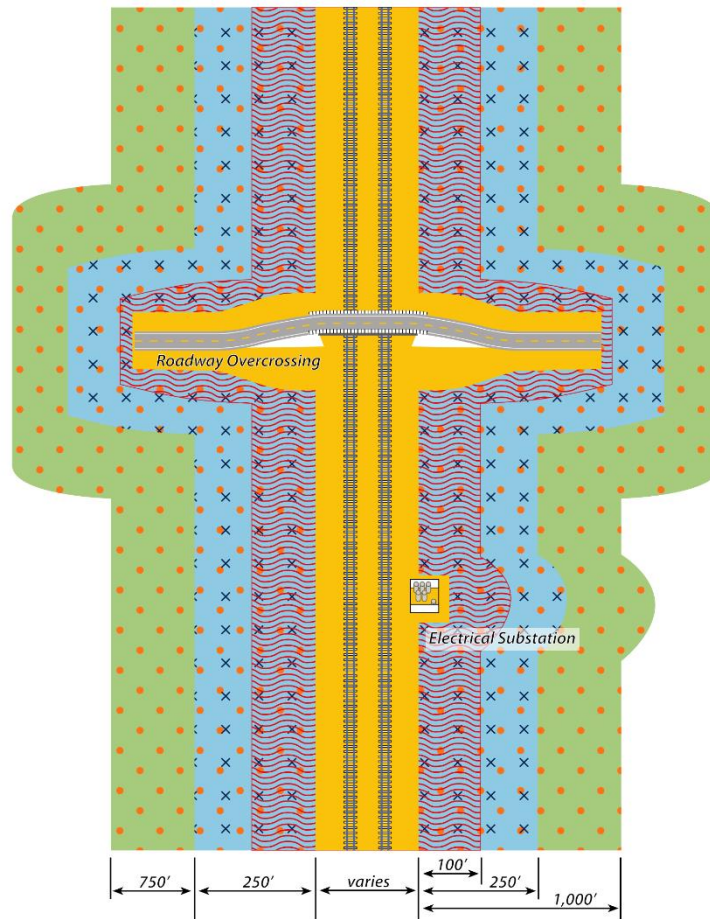
Wildlife movement corridors are areas that are used by wildlife for movement on varying scales (e.g., daily foraging, seasonal migration, dispersal) and include areas that have been modeled for specific species (i.e., San Joaquin kit fox) based on different physical and biological parameters published in statewide reports. For purposes of this document, the term habitat linkage is used synonymously with wildlife movement corridor. *Habitat linkages* are areas of land used for a variety of purposes that potentially serve as a corridor for movement or migration of wildlife. Habitat linkages aid in the dispersal and distribution of wildlife and are crucial for maintaining healthy populations of multiple species.

4.2 Definition of Resource Study Areas

To address regulatory requirements and assess potential effects on biological resources, the Authority and FRA developed the *Central Valley Biological Resources and Wetlands Survey Plan* (Authority and FRA 2010), which established various biological resource study areas (RSA). These RSAs are described in the following subsections, summarized in Table 4-1, and depicted on Figure 4-1. The Central Valley Wye alternatives project footprint encompasses the entire potential area of disturbance, including the proposed HSR 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 overheads, undercrossings and interchanges), and construction areas (including laydown, storage, and similar areas). The RSAs for biological resources and wetlands encompass the project footprint for each of the Central Valley Wye alternatives where plant and animal habitat and wetlands occur (direct effects). The RSAs also include habitat buffers where biological resources could be indirectly affected (indirect effects). The RSAs for indirect effects differ based on resource type and include several distances from the edge of the project footprint described. The buffer distances were based on agency standards and best available scientific methodologies.

- **Habitat study area**—Project footprint plus up to a 1,000-foot buffer around project elements to evaluate direct and indirect effects 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 to evaluate direct (permanent and temporary) effects plus a 250-foot buffer to evaluate indirect effects. It includes the proposed project footprint plus the entirety of vernal pool coverage to evaluate *indirect bisected* effects on vernal pool species, which applies in circumstances where a vernal pool falls partially within the project footprint and extends into adjacent areas, including areas beyond 250 feet, and includes effects on regulated waters as well as vernal pool wildlife and plant species. If a portion of a vernal pool or swale is within the project footprint and therefore directly affected, then the whole vernal pool or swale will be considered directly affected for purposes of identifying effects and mitigation measures.
 - The *auxiliary habitat study area*, from the edge of the core area laterally 250 to 750 feet, was surveyed through extrapolation of observations made in the core habitat study area from aerial photograph interpretation and windshield surveys.
 - The *supplemental habitat study area* extends up to 10 miles outward from the project footprint, depending on the target species.
- **Wetland study area**—Project footprint to evaluate direct effects plus a 250-foot buffer to evaluate indirect effects on wetlands and special-status wildlife and plants. It includes the proposed project footprint plus the entirety of vernal pool coverage to evaluate indirect bisected effects on vernal pool species.
- **Special-status plant study area**—Project footprint to evaluate direct effects plus a 100-foot buffer to evaluate indirect effects on upland special-status plant resources (including special-status plants and special-status plant communities). For vernal pool plant species, the wetland study area and auxiliary study area (if applicable) are used to evaluate effects.
- **Wildlife movement study area**—Project footprint plus a 20-mile buffer to evaluate direct and indirect effects. The area was based on the species likely to be present and determined based on agency regulations and guidance, literature, and best professional judgment, and in consultation with appropriate regulatory agencies.

CALIFORNIA
High-Speed Rail Authority
CENTRAL VALLEY WYE ALTERNATIVES
SCHEMATIC OF BIOLOGICAL RESOURCE
STUDY AREAS



LEGEND	
	Project footprint
	Special-status plant study area (100')
	Wetland study area (250')
	Habitat study area (1,000')
	Core habitat study area (250')
	Auxiliary habitat study area (250' - 1,000')

10/6/16

Not to scale

Source: Authority and FRA, 2014

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Figure 4-1 Schematic of Biological Resource Study Areas

Table 4-1 Resource Study Area Summary Definitions

Resource Study Area	Area of Impact	General Description
Habitat Study Area¹		
Core Habitat Study Area		
Direct Effects	Project footprint (includes permanent and temporary effects)	Evaluate direct and indirect effects on habitats and the special-status wildlife species that use them. This was the area that was physically surveyed, if access was available.
Indirect Effects	Project footprint plus 250 feet	
Indirect Bisected Effects ² (vernal pool species)	Project footprint plus the entirety of vernal pool coverage	
Auxiliary Habitat Study Area		
Indirect Effects	250–1,000-foot buffer outside core habitat study area	Surveyed through extrapolation of observations made in the core habitat study area from aerial photograph interpretation and windshield surveys.
Supplemental Habitat Study Area		
Indirect Effects	Extends up to 10 miles outward from the project footprint	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.
Wetland Study Area		
Direct Effects	Project footprint	Evaluate direct and indirect effects on wetlands and vernal pool species.
Indirect Effects	Project footprint plus 250-foot buffer outside project footprint	
Indirect Bisected Effects ²	Project footprint plus the entirety of vernal pool coverage	If a portion of the vernal pool or swale is within the project footprint and therefore directly affected, then the whole vernal pool or swale will be considered directly affected for purposes of impact and mitigation methodology.
Special-Status Plant Study Area³		
Direct Effects	Project footprint	Evaluate direct and indirect effects on upland sensitive plant resources (including special-status plants, special-status plant communities, protected trees, and elderberry shrubs). For vernal pool plant species, the wetland study area and auxiliary study area (if applicable) are used to evaluate effects.
Indirect Effects	Project footprint plus 100-foot buffer outside project footprint	

Resource Study Area	Area of Impact	General Description
Wildlife Movement Study Area		
Direct and Indirect Effects	20-mile buffer outside project footprint	Determined based on agency regulations and guidance, literature, and best professional judgment, and in consultation with appropriate regulatory agencies.

Source: Authority and FRA, 2018

¹ The RSA for the habitat study area generally includes the project footprint plus a 1,000-foot buffer to evaluate direct and indirect effects 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.

² Indirect bisected effects apply in circumstances where a vernal pool falls partially within the project footprint and extends into adjacent areas, including areas beyond 250 feet, and includes effects on regulated waters as well as vernal pool wildlife and plant species.

³ Effects on special-status plant species occurring in vernal pools are also considered in the context of the wetland study area and the auxiliary habitat study area (as applicable).

4.3 Field Survey and Study Methods

4.3.1 Literature Review

Before conducting field surveys, biologists reviewed existing background information to identify the locations of special-status plant and wildlife species, jurisdictional waters, 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 Central Valley Wye vicinity. This section summarizes the background information that was reviewed. Database queries included all reported occurrences within 10 miles of the Central Valley Wye alternatives in the California Natural Diversity Database (CNDDDB) or within the following U.S. Geological Survey 7.5-minute quadrangles (quads) (22-quad search area):

- Madera
- El Nido
- Plainsburg
- Le Grande
- Delta Ranch
- Santa Rita Bridge
- Bliss Ranch
- Chowchilla
- Berenda
- Charleston School
- Dos Palos
- Oxalis
- Poso Farm
- Firebaugh NE
- Bonita Ranch
- Merced
- Planada
- Owens Reservoir
- Turner Ranch
- Sandy Mush
- Raynor Creek
- Daulton
- Kismet

4.3.1.1 *Plant Communities*

Prior to field surveys, biologists created preliminary maps of plant communities and land cover types in the core habitat RSA by reviewing National Agriculture Imagery Program 2014 imagery using ArcGIS 10.3 software. A mapping scale of 1 inch = 200 feet (1:2,400) was used. A minimum mapping unit of 1.0 acre was used for wetland complexes, and a minimum mapping unit of 0.25 acre was used for stand-alone wetlands. A minimum mapping unit of 10 acres was used for all other land cover types, with smaller unit used when discrete boundary and types could be discerned. Natural and constructed watercourses were mapped as line features, attributed with their approximate average width. Features wider than 40 feet were mapped as polygons.

Terrestrial plant communities and land cover types were classified in accordance with the 2012 *Merced to Fresno Section Biological Resources and Wetlands Technical Report* (Authority and FRA 2012b) or identified using the CDFW *Hierarchical List of Natural Communities with Holland Types* (CDFG 2010) or California Wildlife Habitat Relationships Habitat Classification Scheme (CWHR System) (CDFG 1988). Aquatic plant communities and land cover types were classified in accordance with the USFWS *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979).

4.3.1.2 *Special-Status Species*

Special-Status Plants

Biologists consulted the following sources to identify special-status plant species known or potentially occurring in the special-status plant RSA.

- **USFWS Species List**—An official list of federal candidate, proposed, threatened, and endangered plant species for the habitat study area was obtained from USFWS Information for Planning and Conservation (IPaC) website. The list was first generated on March 29, 2016, and was updated on November 22, 2016 (USFWS 2016a); it is provided in Appendix B.
- **CNDDDB**—A list of special-status plant species was prepared through a twofold inquiry of the CNDDDB via a standard quad search using the RareFind program (CDFW 2014a) and a geographic information systems (GIS) mapping exercise of all occurrences in a 10-mile radius of the Central Valley Wye alternative centerlines (CDFW 2016c). This twofold inquiry was performed so that all special-status plant species with the potential to occur in the alignment were captured in the query. Volume 2, Appendix 3.7-B and Appendix 2-D, California Natural Diversity Database, provides the results of the initial RareFind quad search conducted in December 2014. To identify any additional species that have been recorded within 10 miles of the Central Valley Wye since the initial 2014 query, the 10-mile-radius GIS query is updated every 4–6 months; the most recent query was conducted on September 15, 2016 and confirmed that the 2014 species list is still accurate. Additionally, a GIS query of the CNDDDB for occurrences of special-status plant species within a 10-mile radius of the EINU components was conducted on August 5, 2016 (CDFW 2016d).
- **California Native Plant Society Online Inventory of Rare and Endangered Plants of California (CNPS Online Inventory)**— A list of California Native Plant Society (CNPS) special-status plant species was obtained by querying the CNPS Online Inventory for special-status plants within the 22 U.S. Geological Survey 7.5-minute quads identified in Literature Review (CNPS 2014; CNPS 2016). The CNPS Online Inventory is a credible and widely recognized resource used by conservationists, consultants, planners, researchers, and resource managers to obtain information about California’s rare plants.

Special-Status Wildlife

The following sources were reviewed to identify special-status wildlife species potentially occurring in the core habitat RSA.

- **USFWS Species List**—An official list of federal candidate, proposed, threatened, and endangered wildlife species for the habitat study area was obtained from the USFWS IPaC

website. The list was first generated on March 29, 2016, and was updated on November 22, 2016 (USFWS 2016a); it is provided in Appendix B.

- **CNDDB**—A list of special-status wildlife species was prepared through a twofold inquiry of the CNDDB via a standard 22-quad search area in RareFind (CDFW 2014a) and a GIS query of all occurrences within 10 miles of the Central Valley Wye alternative centerlines (CDFW 2016c). Appendix C provides the results of the initial RareFind quad search conducted in December 2014. To identify any additional species that have been recorded within 10 miles of the Central Valley Wye since the initial 2014 query, the 10-mile-radius GIS query is updated every 4–6 months; the most recent query was conducted on September 15, 2016 and confirmed that the 2014 species list is still accurate.
- **CWHR System**—GIS data of special-status wildlife species whose known geographic ranges occur within a 10-mile radius of the Central Valley Wye (CDFW 2014b) were obtained through the CWHR System. These species range data were used to augment data acquired from the CNDDB to identify additional special-status wildlife species with a known geographic range within the area but that have not been reported in the CNDDB.
- **USFWS Birds of Conservation Concern for Region 8 (California and Nevada)**—A list of Birds of Conservation Concern (BCC) species was obtained and considered for evaluation (USFWS 2008). The list of BCC is found in the USFWS list of BCC for the Bird Conservation Region that covers the habitat study area. BCC are migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the FESA.
- **Additional Sources for Special-Status Fish Species**—Moyle (2002), CalFish (2014), and University of California (2015) were consulted to identify special-status fish species in the habitat study area. These documents were used to identify known barriers to the upstream and downstream migrations of anadromous species and fish species that could occur in the habitat study area.

An analysis of available GIS data was conducted to identify regional watercourses that could potentially support special-status fish. To identify watercourses, a fisheries biologist reviewed the Central Valley Wye alternatives overlaid on aerial photography and the National Hydrology Database (1:24,000 scale; USGS 2009). In general, watercourses were identified as potentially supporting special-status fishes if they were named “river,” “creek,” or “slough” in the National Hydrology Database and available maps or they exhibited natural fluvial characteristics based on aerial photographs. These historically natural watercourses were targeted for further assessment and field characterization given their potential to provide habitat either currently or in the future based on foreseeable changes in water release programs (i.e., restoration activities associated with the San Joaquin River [Stillwater Sciences 2003, USBR 2010]).

Although the effects analysis within this report focuses on special-status wildlife species, it is anticipated that effects on other native fauna (i.e., those not considered to be special-status species) would also occur within the Central Valley Wye project footprint.

4.3.1.3 Habitats of Concern

Jurisdictional Waters

The wetland study area encompasses a total area specific to and surrounding the Central Valley Wye alternatives project footprint. The wetland study area includes the Central Valley Wye alternatives project footprint and, in general, a 250-foot buffer surrounding the project footprint on all sides. The project footprint include all Central Valley Wye alternative elements (i.e., alternative rights-of-way, construction staging, laydown areas, and borrow sites). All direct effects associated with the Central Valley Wye are anticipated to occur within the project footprint. Indirect effects are also anticipated to occur adjacent to the project footprint. The wetland study area for the Second Supplemental Wetlands Delineation Report (Authority and FRA 2016) also includes an update to the portion of the Central Valley Wye alternatives previously delineated in the Primary Wetlands Delineation Report (Authority and FRA 2012c).

Biologists reviewed the following resources prior to field investigations to obtain information on wetlands and other water features that may occur in the wetland study area:

- U.S. Geological Survey 7.5-minute topographic quadrangles that occur within the wetland study area (Delta Ranch, Santa Rita Bridge, Bliss Ranch, Chowchilla, Plainsburg, Le Grand, and Berenda are specific to the wetland study area)
- National Wetland Inventory maps (USFWS 2014)
- National Hydrography Dataset; BIOS Central Valley Vernal Pool Habitat dataset (CDFW 2014c)
- National Agriculture Imagery Program 2010 and 2012 aerial photograph
- Soil survey map units (NRCS 2012a and 2012b)
- Google Earth Pro aerial photographs from 1998, 2003 to 2006, and 2009 to 2014
- Climate and Precipitation Data (NRCS 2002)
- *Merced to Fresno Project Section: Central Valley Wye Hydrology and Hydraulics Engineering Report* (Authority 2016b).

Special-Status Plant Communities

Biologists generated a list of special-status plant communities known or potentially occurring in the special-status plant study area based on a review of the plant communities present using the following data sources:

- Project-specific vegetation mapping and characterization using aerial imagery
- The CDFW *Hierarchical List of Natural Communities with Holland Types* for California (CDFG 2010), which indicates whether natural communities are of special status, given the current state of the California classification
- CNDDDB query for special-status natural communities occurring within 10 miles of the Central Valley Wye alternative centerlines (CDFW 2016c).

Habitat Conservation Plans

HCPs overlapping with the Central Valley Wye vicinity were determined by accessing the USFWS Conservation Plans and Agreements Database (USFWS 2016b) and reviewing adopted HCPs within the USFWS's Region 8. To date, 157 HCPs have been approved in Region 8; however, only one, the Pacific Gas and Electric Company (PG&E) San Joaquin Valley Operations & Maintenance HCP, overlaps the Central Valley Wye alternatives. The Pacific Gas and Electric Company HCP is applicable to the operation and maintenance of the PG&E facilities proposed to be modified to support the Central Valley Wye alternatives. The HCP does not include preserve systems, and lands being used by PG&E for mitigation under the HCP would not be affected by the Central Valley Wye. As discussed above, there would be no change from baseline conditions in regards to operation and maintenance; therefore, the HCP is not discussed further in this section.

Protected Trees

To identify the requirements for protected trees, county and city ordinances and codes were reviewed, as well as available general plans and HCPs. No ordinances or codes specific to the protection of trees were identified. Consequently, protected trees are not discussed further in this report.

Essential Fish Habitat

EFH in the Central Valley Wye vicinity was determined by accessing the National Oceanic and Atmospheric Administration Habitat Conservation page at www.habitat.noaa.gov/protection/efh/

[efhmapper/index.html](#). The San Joaquin River in the proposed Central Valley Wye is within the Wetland RSA for all alternatives and is included as EFH for Pacific salmon.

Critical Habitat

Critical habitat designated for species listed under the FESA that could occur in the Central Valley Wye vicinity was determined by accessing the USFWS critical habitat portal page (<http://ecos.fws.gov/crithab/>).

4.3.1.4 Wildlife Movement Corridors

Biologists identified known wildlife movement corridors through a review of published technical reports, previous reports prepared for the Merced to Fresno Final EIR/EIS, and information available from regulatory agencies. To understand the location and species-specific requirements of the wildlife movement corridors that have been identified in the vicinity of the Central Valley Wye, biologists used the following data sources:

- The 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.
- *Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998), *San Joaquin Valley Endangered Species Recovery Program* (Constable et al. 2009, Cypher et al. 2007), and *San Joaquin Kit Fox (Vulpes macrotis mutica) 5-Year Review: Summary and Evaluation* (USFWS 2010a), which identified core, satellite, and linkage areas.
- Natural land blocks (Rustigian-Romsos 2010) and essential connectivity areas (ECAs) (Gogol-Prokurat 2014) as mapped by the California Essential Habitat Connectivity Project (Spencer et al. 2010).
- Modeled wildlife corridors in the San Joaquin Valley region, prepared by the Information Center for the Environment, University of California, Davis (Huber 2007).
- *Draft Landscape Permeability Plan for the Merced to Fresno Section* (Authority and FRA 2012a), which provided information on the proposed crossing structures for one alternative of the Merced to Fresno Section to facilitate wildlife movement.
- *Dedicated Wildlife Crossings for the Merced to Fresno Section of the California High-Speed Train System*, April 13, 2012 Memorandum (Authority and FRA 2012b), which describes dedicated wildlife crossings proposed for the Merced to Fresno Section.
- *Biological Opinion on the California High-Speed Train System: Merced to Fresno Section Project, Merced, Madera, and Fresno Counties* (USFWS 2012a), which provides design measures for proposed dedicated wildlife crossings for the Merced to Fresno Section.

4.3.2 Field Surveys and Assessments

This section describes the field surveys conducted in the habitat study area and summarizes the methods used to complete the field surveys. Biologists conducted field surveys to determine the presence or absence of biological resources, refine the preliminary plant community/land cover map created for the core habitat RSA (see Section 4.3.1.1, Literature Review: Plant Communities), delineate jurisdictional waters, and gather qualitative information on habitat quality for special-status plant and wildlife species. At the time of preparation of this document, permission to enter has been granted for some properties, but access to most properties has not been granted, and therefore most surveys have not yet been completed. Some limited surveys (e.g., special-status plants) are expected to be completed as permission to enter becomes available in the future. See Section 4.3.4, Limitations that May Influence Results, for more information.

4.3.2.1 Reconnaissance Field Survey

Biologists Kailash Mozumder, Will Kohn, Rob Preston, and Donna Maniscalco conducted a reconnaissance field survey on November 18 and 19, 2014. The purpose of the reconnaissance surveys was to ground-truth the preliminary plant community/land cover maps for the core habitat RSA (see Section 4.3.1.1) and collect qualitative information on land cover and habitat quality in the auxiliary habitat RSA. Additionally, parcels that supported moderate- to high-quality habitat for special-status plant and wildlife species were identified so that access could be requested to conduct presence/absence surveys for these species on those parcels in the future.

4.3.2.2 Botanical Surveys

On April 30, 2015, botanists Margaret Widdowson and Cristian Singer conducted a vernal pool habitat assessment and aquatic resource delineation on four parcels (i.e., Cementina property) in the northeastern portion of the Central Valley Wye special-status plant study area. On August 8, 2015, Ms. Widdowson and botanist John Holson conducted a follow-up assessment and late-season special-status plant surveys on the 4 Cementina parcels and 11 additional parcels with potential vernal pool habitat. The surveys were conducted by the botanists walking transects across each parcel while searching vernal pools for special-status plant species. Surveys were timed to coincide with the peak blooming period for target species, and conducted in accordance with the CDFW *Protocols for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Natural Communities* (CDFG 2009) and the USFWS *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants* (USFWS 1996).

4.3.2.3 Wildlife Surveys

Biologists Matt Ricketts, Eric Christensen, Will Kohn, Donna Maniscalco, Theresa Engle, Pablo Herrera, and John Holson conducted a preliminary survey for nesting Swainson's hawks within 0.5 mile of the centerlines for the SR 152 (North) to Road 13 Wye Alternative, SR 152 (North) to Road 19 Wye Alternative, and Avenue 21 to Road 13 Wye Alternative from April 13–15 (Ricketts, Christensen, Kohn, and Maniscalco) and June 29–30 (Ricketts, Herrera, Holson, and Engle), 2015 (the SR152 [North] to Road 11 Wye Alternative had not yet been identified). Each survey visit consisted of four biologists (two 2-person teams) systematically driving available public roads and searching potential nesting habitat (trees, utility and transmission towers) for nest structures and raptor activity. Observations were made from public roadsides with binoculars and spotting scopes.

Where property access was limited, active nests were identified through the observation of adult Swainson's hawks sitting on or flying to nest structures, carrying food into and out of dense trees, or nest-building. Although the biologists were able to scan all potential nesting habitat and observe Swainson's hawks perching or foraging throughout the habitat study area (i.e., within 1,000 feet of project footprint), time constraints precluded them from conducting long-term (i.e., 30 minutes or more) observations at some areas where reproductive status was uncertain (e.g., adults observed in suitable habitat but no nest structure seen). In addition, the survey focused on potential nesting habitat in and within 1,000 feet of the project footprint and was not considered a complete census of all Swainson's hawk nesting territories in the Central Valley Wye vicinity (i.e., within 0.5 mile of project limits as typically required by the CDFW). Biologists collected spatial data (latitude, longitude, nest substrate, nest height, etc.) and nonspatial data (date, time, number of adults, etc.) for each nest or nest structure using Collector for ArcGIS® and iFormBuilder mobile data collection platforms. Wildlife surveys for other wildlife species were not conducted during the analysis of the Central Valley Wye alternatives. Presence of special-status wildlife species was presumed if potentially suitable habitat was identified within the habitat study area, based on the vegetation map and land cover type.

4.3.2.4 Wildlife Habitat Assessment

Wildlife habitat assessments were conducted on November 18 and 19, 2014 according to the methods described in the *Central Valley Biological Resources and Wetlands Survey Plan*, which was prepared in part for the Fresno to Bakersfield Section (Authority and FRA 2010). 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 2014b). The wildlife habitat assessment was general in nature; it was not intended to be a substitute for protocol-level surveys.

In addition to the field mapping of wildlife habitat, biologists collected qualitative information on wildlife habitat in field notes and recorded all species observed. The wildlife habitat assessment was conducted by driving along existing public roads and updating existing habitat types and noting sensitive natural communities and the location of any special-status wildlife species observed. The team stopped at all drainage crossings and areas that were noted as having a moderate to high potential for special-status wildlife species and at the location of CNDDDB records that could be assessed from the road. Biologists conducting the preliminary Swainson's hawk nest survey in 2015 (see above) also collected qualitative information on wildlife habitat and species observed.

4.3.2.5 Delineation of Jurisdictional Waters

Wetland Delineation Methods

Wetland ecologists conducted wetland surveys June 17–21 and August 26–28, 2013; December 22–23, 2014; and April 28–30, 2015 to identify the locations, types, and characteristics of features that may be subject to state and federal regulation in the Central Valley Wye wetland study area. Wetlands in the wetland study area were delineated using the methods described in the *U.S. Corps of Engineers Wetlands Delineation Manual* (USACE 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008a). All wetlands are described by using the classification system adopted by the 2012 Primary Wetlands Delineation Report (Authority and FRA 2012c). 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 any groundwater hydrology and soil conditions at the 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. After evaluating the hydrology, soils, and vegetation, all of the data points were recorded on Wetland Determination Data Form-Arid West Region data sheets (USACE 2008a). All areas determined to be wetlands were recorded as line, point, or polygon features using a geographic positioning system unit or aerial photographs. The boundaries of wetlands were extrapolated by following topographic contours, wetland vegetation boundaries, and clear hydrologic boundaries.

Watercourse Delineation Methods

Nonwetland waters 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 2008b) and USACE Regulatory Guidance Letter No. 05-05 (USACE 2005), where appropriate. These manuals provide an approach for identifying the lateral limits of jurisdictional other waters using stream geomorphology and vegetation response to the dominant stream discharge (USACE 2008b). Indicators of ordinary high water mark that were evaluated in the field include, but are not limited to, 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.

Waters of the State and CDFW Lakes and Streambeds

Generally, wetlands under state jurisdiction are delineated in the same manner as federal waters (including *Corps of Engineers Wetlands Delineation Manual* [USACE 1987] and the *Regional*

Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region [USACE 2008a]) because no formal guidelines exist for the identification of waters under Central Valley Regional Water Quality Control Board (Central Valley RWQCB) or CDFW jurisdiction. 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 ordinary high water mark). For example, isolated waterbodies and stream channels up to the top of the streambank or to the riparian drip line qualify as waters of the state.

SWRCB, which oversees California's RWQCBs, 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. Both the SWRCB and the CDFW 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. As such, the extent of the area regulated as waters of the state and the CDFW varies.

Survey Methods

Aerial Photograph Interpretation

A detailed land cover and wetland delineation map was created based upon the National Agriculture Imagery Program 2014 imagery using ArcGIS 10 software. A mapping scale of 1 inch = 200 feet (1:2,400) was used. A minimum mapping unit of 1.0 acre was used for wetland complexes, and a minimum mapping unit of 0.25 acre was used for stand-alone wetlands. A minimum mapping unit of 10 acres was used for all other land cover types, with smaller unit used when discrete boundary and types could be discerned. Natural and constructed watercourses were mapped as line features, attributed with their approximate average width. Features wider than 40 feet were mapped as polygons. Jurisdictional area boundaries along water features were mapped to the landward drip line for mixed riparian, other riparian, and palustrine forested wetlands.

Field Surveys

Field surveys were conducted in June and August 2013, December 2014, and April 2015. The surveys consisted of a qualified biologist verifying the hard-copy map produced from the pre-field aerial imagery mapping exercise (see Section 4.3.2.1). In addition, where access was granted, biologists walked meandering transects to visually access the wetland study area for the presence of additional wetland features. In these areas, survey transects were spaced 20–100 feet apart. The extent of all observed waters of the U.S. and state (including wetlands) and the CDFW lakes and streambeds were identified and mapped using a handheld geographic positioning system unit with sub-meter accuracy. Representative photographs were taken of features to document physical characteristics. The landforms, vegetation, hydrology, and soil conditions were noted. Survey data and personnel were recorded on data sheets. When property within the wetland study area was not accessible, field crews used public roads or other suitable means to conduct a visual survey of the inaccessible areas and compared notes to aerial signatures identified on the land cover maps created for the area. Where no access was possible, the biologists used available resources, including current and historical aerial photography, to estimate the extent and location of wetlands and other waters.

4.3.2.6 Wildlife Movement Corridors

Wildlife movement corridors have been described or defined by state and federal agencies and other researchers. Consequently, field surveys to define the corridors in the wildlife movement study area were not necessary and were not conducted. A background review of wildlife movement, or migration, corridors was conducted by overlaying migration corridor datasets with the Central Valley Wye alternatives in Google Earth Pro and in GIS, and noting areas that provide suitable movement corridors. These corridors were verified in the wildlife movement RSA during the reconnaissance field survey to ascertain the utility of identified movement corridors on both a local- and meta-population level. This field evaluation of potential movement corridors addressed

the availability and suitability for the movement of wildlife 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 drainage crossings, and automobile and train bridges) in the habitat survey area. Potential movement barriers such as canals and roadways were also noted in the field.

The *Dedicated Wildlife Crossings for the Merced to Fresno Section of the California High-Speed Train System* memorandum was prepared in 2012 to address potential effects of the Merced to Fresno Section on federally listed wildlife species. Specifically, the memo describes the dedicated wildlife crossings proposed for the Merced to Fresno Section to minimize effects on San Joaquin kit fox. The memo presents design options for wildlife-dedicated crossing and proposes the spacing of the wildlife-dedicated crossing along the alignment based on the land cover type and whether the alignment crosses an ECA. The subsequent *Biological Opinion on the California High-Speed Train System: Merced to Fresno Section Project, Merced, Madera, and Fresno Counties*, issued by the USFWS in 2012, also provides design measures applicable to most of the same movement corridors that are within the Central Valley Wye vicinity. Based on review of the memorandum and biological opinion, and the design measures in those documents, biologists provided project engineers preliminary locations of potential dedicated wildlife crossings along each of the Central Valley Wye alternative alignments. Additional coordination between project biologists, resource agencies, project engineers, and the Authority will be necessary to determine the appropriate locations for dedicated wildlife crossings considering other local factors such as existing barriers to movement, and ongoing work on other projects in the region (i.e., improvements to SR 99).

4.3.3 San Joaquin River Restoration Program

The SJRRP (described in Section 3.1, Federal) divides the San Joaquin River into multiple segments, and segment 4A of the river restoration area crosses the project footprint of the Central Valley Wye alternatives in a general north-south direction south of the City of Merced (DWR 2008).

The U.S. Bureau of Reclamation initiated interim flows in 2009. Interim flows are experimental flows and assist in obtaining data concerning flows, temperatures, fish needs, seepage losses, recirculation, recapture, and reuse. Prior to interim flows, the reach between Friant Dam and the Mendota Pool rarely sustained flows conducive to the Chinook salmon life cycle (USBR and DWR 2011). Beginning in 2014, the SJRRP initiated full restoration flows and began releasing hatchery fish into the San Joaquin River just above its confluence with the Merced River to begin restoring a natural spring-run of Chinook salmon. These releases have continued on a regular basis and evaluation is ongoing on the progress made to date in reintroducing spring-run Chinook salmon and fall-run Chinook salmon to the San Joaquin River (NMFS 2015).

During the initial design of the Merced to Fresno section of the California High-Speed Rail, the Authority took part in a coordination meeting on June 6, 2011 with the U.S. Bureau of Reclamation and the Department of Water Resources. During this meeting, it was determined that the project design would not conflict with the SJRRP. As the design has progressed, the Authority has continued working with the implementing agencies of the SJRRP to avoid any project-related effects to the goals of the SJRRP.

This analysis builds on the analysis presented in the 2012 Merced to Fresno Final EIR/EIS and the Record of Decision, which included information relevant to the goals of the SJRRP. The 2012 Merced to Fresno Final EIR/EIS evaluates direct and indirect effects for special-status fish and essential fish habitat through the construction period. Direct effects evaluated for special-status fish include physical disturbance; Interruptions to fish passage, sedimentation, turbidity, altered water temperatures, oxygen depletion and contaminants. Specific information regarding implementation of SJRRP goals in relation to species or resource area for the analysis of the Central Valley Wye alternatives is provided, where applicable, in Section 5, Affected Environment.

4.3.4 Agency Coordination and Professional Contacts

4.3.4.1 Previous Agency Coordination

The Authority consulted with the USFWS under Section 7 of the FESA in 2012 regarding the Merced to Fresno Section. The USFWS issued a BO on September 14, 2012 addressing the effects of the entire Merced to Fresno Section, which included the Central Valley Wye alternatives, but issued an Incidental Take Statement for just one part of the Merced to Fresno Section (PP1), which does not overlap with the Central Valley Wye alternatives. The USFWS amended the BO on September 26, 2013, but determined that reinitiation of formal consultation was not necessary based on the nature of the amendments. The USFWS reinitiated formal consultation on March 13, 2014 and amended the BO again.

The Authority also consulted with the CDFW to obtain an incidental take permit under Section 2081 of the CESA for one part of the Merced to Fresno Section (PP1). The incidental take permit was issued on March 13, 2014. The CDFW issued one minor amendment to the incidental take permit since that time, on August 22, 2014. Together, these permitting efforts help inform the effects analysis and mitigation approach for the Central Valley Wye alternatives.

4.3.4.2 Current Agency Coordination

Wyes Tour: On July 17, 2014 a field tour of the Central Valley Wye was arranged to allow staff from the FRA, the Authority, U.S. Environmental Protection Agency, NMFS, USACE, U.S. Bureau of Reclamation (USBR), USFWS, the Program Management Team (PMT), and the regional consultants an opportunity to conduct an on-the-ground review of the key sections of the Central Valley Wye alternatives. Areas with representative engineering and environmental challenges were visited to help all parties gain a better understanding of the Central Valley Wye.

California Condor and MBTA Meeting: On Monday, August 26, 2013 a meeting was held to bring together the USFWS, the Authority, RDP, and the regional consultants to review how the issues related to migratory birds and California condor should be addressed in the environmental documents. The main objective was to share preliminary information of the HSR San Jose to Merced (which included species concerns that are relevant to the Central Valley Wye) and Bakersfield to Palmdale Sections and initiate an ongoing agency-to-agency discussion between the Authority and USFWS with respect to migratory birds and California condors.

April 2016 Regulatory Agency Monthly Coordination Meeting: On April 20, 2016, regional consultant biologists Brad Schafer and Matt Ricketts presented a summary of this report at the Authority's Central Valley monthly coordination meeting with the regulatory agencies in Sacramento. No substantial concerns were raised.

Informal NMFS Meeting: On June 16, 2016, Authority representative Serge Stanich informally met with NMFS biologists Monica Gutierrez and Katie Schmidt to orient Ms. Schmidt to the Central Valley Wye, while also communicating NMFS' current understanding of the Authority's progress with planning, construction, permitting, and Section 7 consultation (NMFS 2016).

4.3.5 Limitations that May Influence Results

The Authority has identified all parcels that may be crossed by the Central Valley Wye. The Authority sent letters to all property owners in 2014, 2015, and 2016 requesting permission to access the identified parcels by survey teams conducting biological, cultural resource, visual, and geotechnical surveys. The Authority saves all returned permission to enter forms and records which parcels have granted permission for access to the survey teams. Property owners who have granted access to their property are given a 48-hour notice before survey teams enter the parcel. As of the date of preparation of this report (September 2016) approximately 25 percent of all properties have granted access and approximately 5 percent of properties with habitat have access; in general the Authority has noted that there is a reluctance on the part of property owners to grant access due to concerns about disruption to their facilities or because they do not support the Central Valley Wye. Some property owners have indicated that they may permit entry to their property at a later date when the route of the Central Valley Wye is more definitive.

The habitat analysis was based on aerial photography, which is limited by the availability of the most recent aerial photographs. In agricultural lands, the crop patterns can change frequently, and areas mapped as fallow lands or annual grassland may have recently been planted to new crops after the latest available aerial photographs were taken. Even orchards and vineyards are subject to crop conversion, albeit on a longer duration. During the reconnaissance survey, an attempt was made to identify parcels with recent land use changes, but not all areas were accessible from roads.

Protocols for special-status plant surveys require that surveys be done when the plants would be evident and identifiable, which is usually during the blooming season. As a result of limited property access as of the date of preparation of this report (September 2016), special-status plant surveys have not been conducted with the exception of the vernal pool botanical surveys in April and August 2015; however, such surveys are anticipated to be completed prior to publishing the Supplemental EIR/EIS, to the extent that parcels are accessible.

Surveys for nesting Swainson's hawks were conducted in April and June 2015. These surveys were conducted from publicly accessible roads only. Although the biologists were able to survey most trees along the Central Valley Wye alternatives, there were sections that were not accessible, and trees in those areas could not be surveyed.

5 AFFECTED ENVIRONMENT

5.1 Existing Physical and Biological Conditions

5.1.1 Physical Conditions

This section describes the physical conditions of the resource study areas, including their topography, climate, hydrology, and soils. These characteristics are the context for the biological conditions and the biological resource descriptions that follow. Figure 5-1 provides an overview of the general soil types, watershed (based on the Natural Resources Conservation Service's hydrologic unit code 8), and elevation profile of the Central Valley Wye alternatives.

5.1.1.1 Topography

The proposed Central Valley Wye is within the Great Valley Geomorphic Province and Ecological Subregion. Portions of the Central Valley Wye within the Great Valley Ecological Subregion are located in three ecological subsections: Manteca-Merced Alluvium, Hardpan Terraces, and the Granitic Alluvial Fans and Terraces (Miles and Goudey 1998).

The Manteca-Merced Alluvium ecological subsection occurs on the alluvial fans of streams that travel from the Sierra Nevada to the San Joaquin River. The alluvium deposits are predominantly derived from the erosion of granitic rock from the southern Sierra Nevada region (Miles and Goudey 1998).

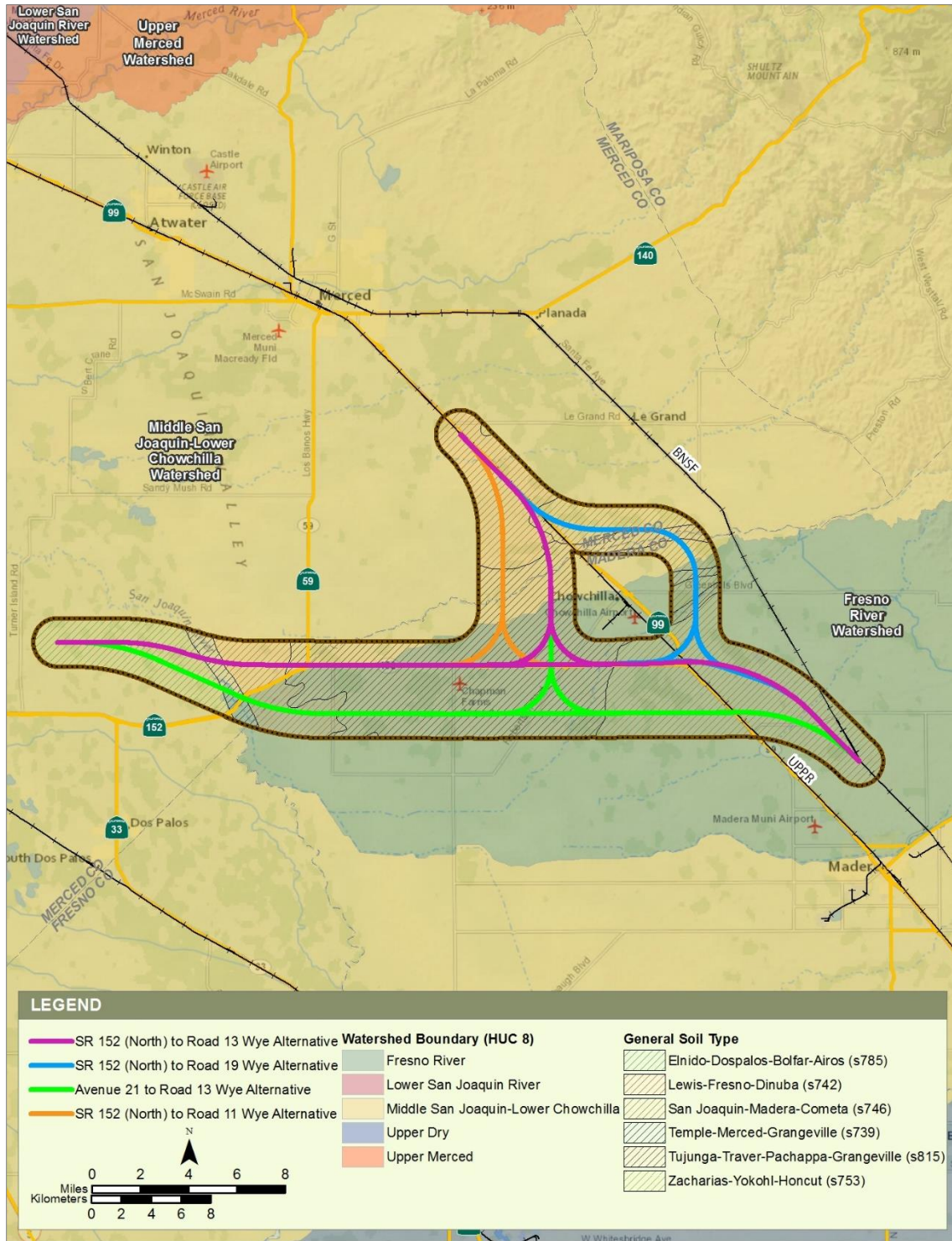
The Hardpan Terraces ecological subsection is characterized by very gently to gently sloping terraces that are interspersed with alluvial fans along streams that transport sediments from the Sierra Nevada region to the Sacramento and San Joaquin Rivers. This subsection contains mostly Pleistocene alluvium derived from volcanic, granitic, sedimentary, and metamorphic rock sources (Miles and Goudey 1998).

The Granitic Alluvial Fans and Terraces ecological subsection includes the alluvial fans and terraces on the eastern side of San Joaquin Valley. The fans and terraces in this area were derived predominantly from granitic alluvium originating in the southern Sierra Nevada (Miles and Goudey 1998).

5.1.1.2 Climate

The Mediterranean climate typical of the region consists of cool, wet winters and hot, dry summers. Mean annual temperatures range from a low of 36 degrees Fahrenheit (°F) in December to a high of 97°F in July (WRCC 2016). The National Resources Conservation Service (NRCS) Climate Analysis for Wetlands Tables (WETS Tables) show a growing season (defined as a 50 percent probability of temperatures at or above 28°F) of 333 days for Merced (NRCS 2002). Average annual precipitation in the region is approximately 12.27 inches (WRCC 2016). Eighty percent of the annual rainfall occurs from November to March.

Elevation above mean sea level in the habitat study area ranges from approximately 100 feet at the west end of the study area to 300 feet north of Madera. The topography throughout the habitat study area is generally flat with slopes ranging from 0 to 2 percent. Drainage generally flows to the west and southwest.



Source: Authority, 2016; NRCS 2012a; SCS, 1962a, 1962b, 1990

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Figure 5-1 Soil Types, Watersheds, and Elevation of the Resource Study Areas

5.1.1.3 Hydrology

The Central Valley Wye lies in the southern portion of the San Joaquin River Basin (Figure 5-1). The San Joaquin River Basin extends from the Sacramento-San Joaquin Delta in the north to the northerly boundary of the Tulare Lake Basin in the south, and from the crest of the Sierra Nevada range in the east to the crest of the Coast ranges in the west. The river basin encompasses about 13,500 square miles and includes large areas of high elevation along the western slope of the Sierra Nevada. As a result, the San Joaquin River experiences significant snowmelt runoff during the late spring and early summer. Unrestricted flood flows historically occurred between April and June following snow melt in the Sierra Nevada.

The Central Valley Wye is within two U.S. Geological Survey hydrologic unit code-8 watershed subbasins: the Middle San Joaquin–Lower Chowchilla and the Fresno River. Prominent water features in the area include the Santa Rita Slough, Wood Slough, San Joaquin River, Fresno River, Eastside Bypass, Ash Slough, Chowchilla River, Berenda Slough, and Berenda Creek. The natural hydrology of the region has been substantially altered by construction of dams, storage reservoirs, diversion dams, canals, and groundwater pumping associated primarily with agricultural irrigation.

5.1.1.4 Soils

Soil Conservation Service soil survey reports, State Soil Geographic data (NRCS 2012a, 2012b), and print versions of soil survey reports were used to gather generalized information about soil characteristics at the soil association level of mapping in the region. The soil survey reports used were Merced County, Western Part (SCS 1990), Madera area (SCS 1962a), and Merced area (SCS 1962b). Because of the large area of investigation, soil associations are presented to describe the general distribution of soil characteristics in the soils in the region (Table 5-1 and Figure 5-1).

Table 5-1 Soil Associations in the Region

Soil Association (map symbol)	County of Occurrence	Landform Group
Lewis-Fresno-Dinuba (s742) Elnido-Dospalos-Bolfar-Alros (s785)	Merced, Madera	Basins (including saline-alkali basin floors)
Temple-Merced-Grangeville (s739) Tujunga-Traver-Pachappa-Grangeville (s815)	Merced, Madera	Recent alluvial fans and floodplains
San Joaquin-Madera-Cometa (s746)	Merced, Madera	Older, low alluvial terraces

Source: NRCS, 2012a, 2012b; SCS, 1962a, 1962b, 1990

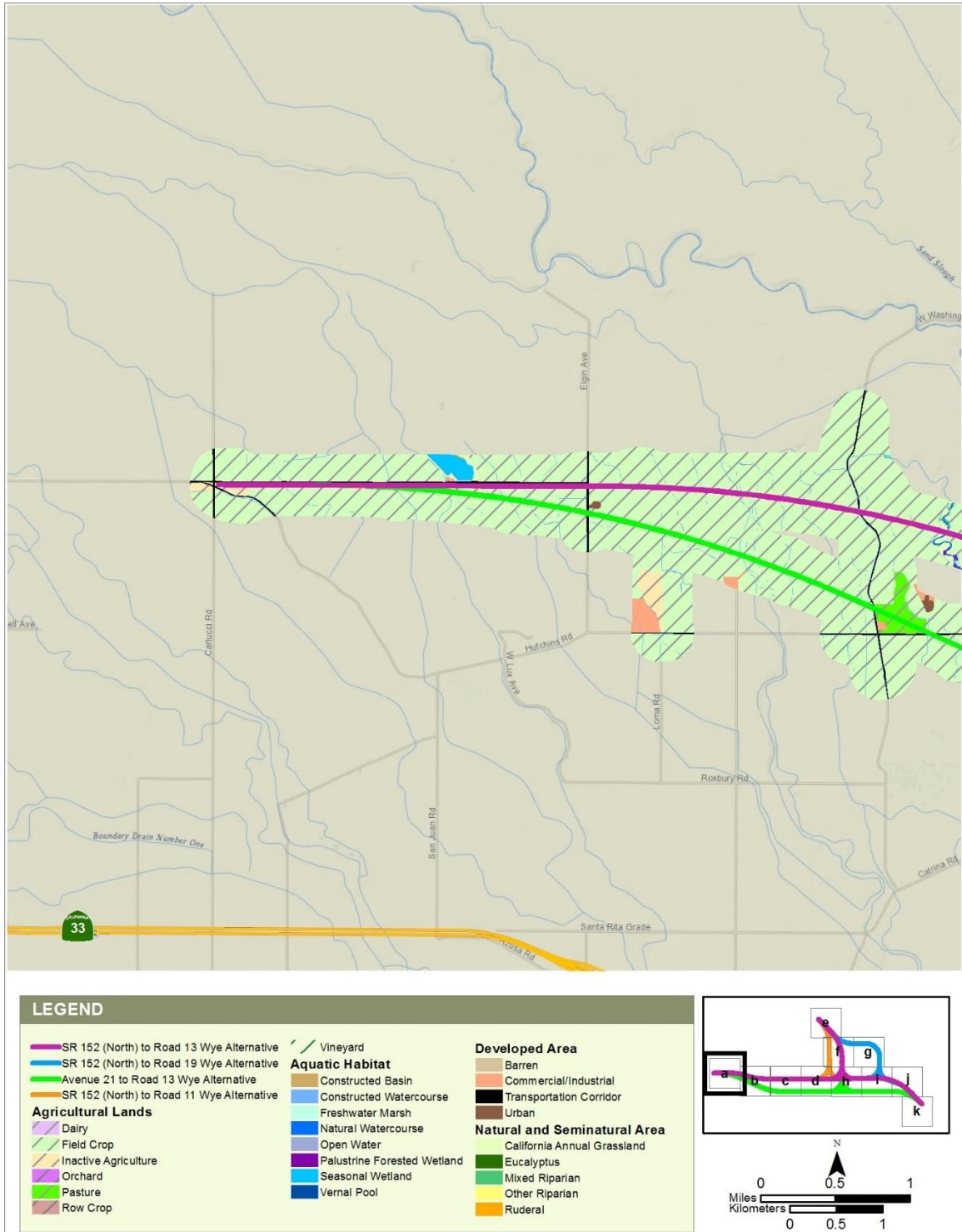
5.1.2 Plant Communities and Land Cover Types

The Central Valley Wye is in the San Joaquin Valley subregion of the California Floristic Province’s Great Central Valley region (Baldwin et.al. 2012). 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 habitat study area is actively being used for agriculture. Parcels whose agricultural use could not be determined to specific CWHR System wildlife habitat types (i.e., 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 Merced, Chowchilla, and Madera. 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 other nonnative or ornamental vegetation.

Due to the level of disturbance observed in all areas of the habitat study area, most terrestrial areas do not provide pristine high-quality habitat for special-status species; however, even lower

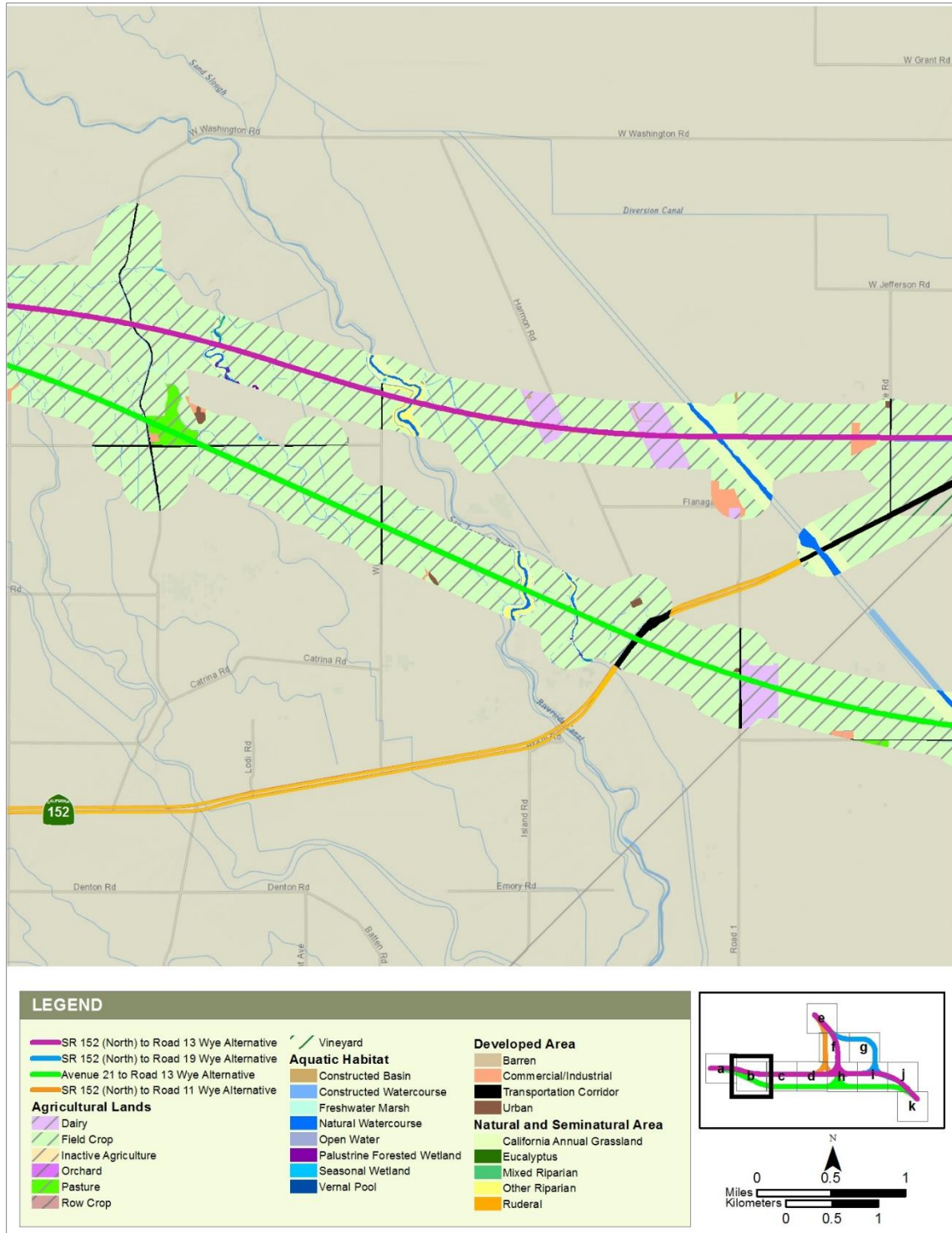
quality disturbed habitats may provide important habitat for some special-status species. Additionally, there are areas of potentially suitable habitat that are of a relatively higher and less disturbed quality, including riparian habitat, grasslands, and wetlands.

Plant communities and land cover types observed within the habitat study area are illustrated on Figure 5-2 for the Merced, Chowchilla, and Madera vicinities, as indicated in the upper right corner map inset on each sheet. Detailed vegetation mapping was conducted by using a combination of fieldwork, review of existing GIS wetland mapping data, and interpretation of aerial photographs. The classification of the land cover and vegetation communities were adapted from the Merced to Fresno Final EIR/EIS or identified using the CDFW's *Hierarchical List of Natural Communities with Holland Types* (CDFG 2010) or California Wildlife Habitat Relationships Habitat Classification Scheme (CWHR System) (CDFG 1988). Table 5-2 provides a list of the wildlife habitat types and Table 5-3 provides the acres of wildlife habitat types for each of the Central Valley Wye alternatives.



Source: Authority, 2016; Land cover generated using ESRI ArcGIS versions 10.1, 10.2, and 10.3 from data gathered during field surveys and aerial photo interpretation using NAIP aerial imagery dated 2010-2015
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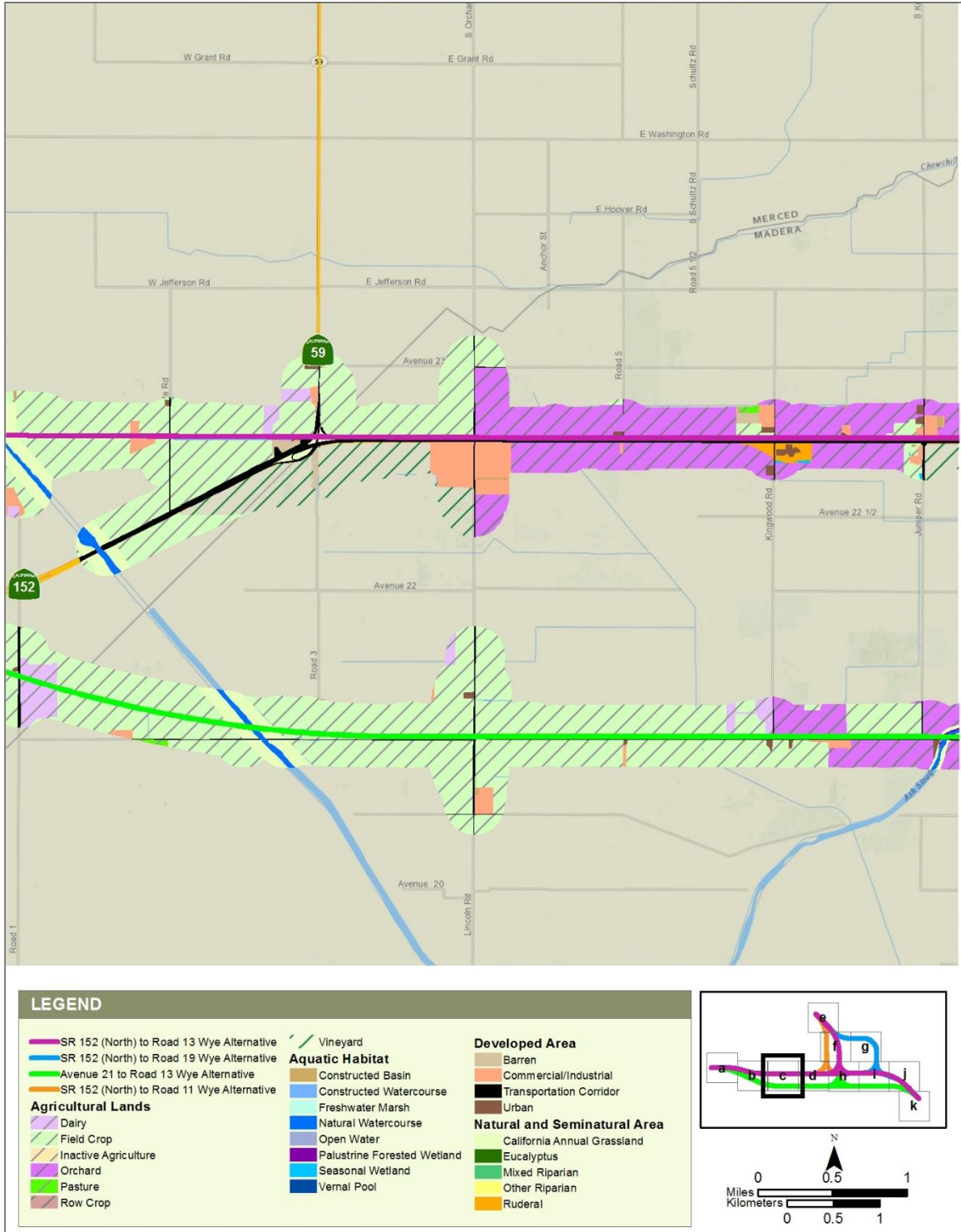
Figure 5-2a Plant Communities and Land Cover Types within the Habitat Study Area



Source: Authority, 2016; Land cover generated using ESRI ArcGIS versions 10.1, 10.2, and 10.3 from data gathered during field surveys and aerial photo interpretation using NAIP aerial imagery dated 2010–2015

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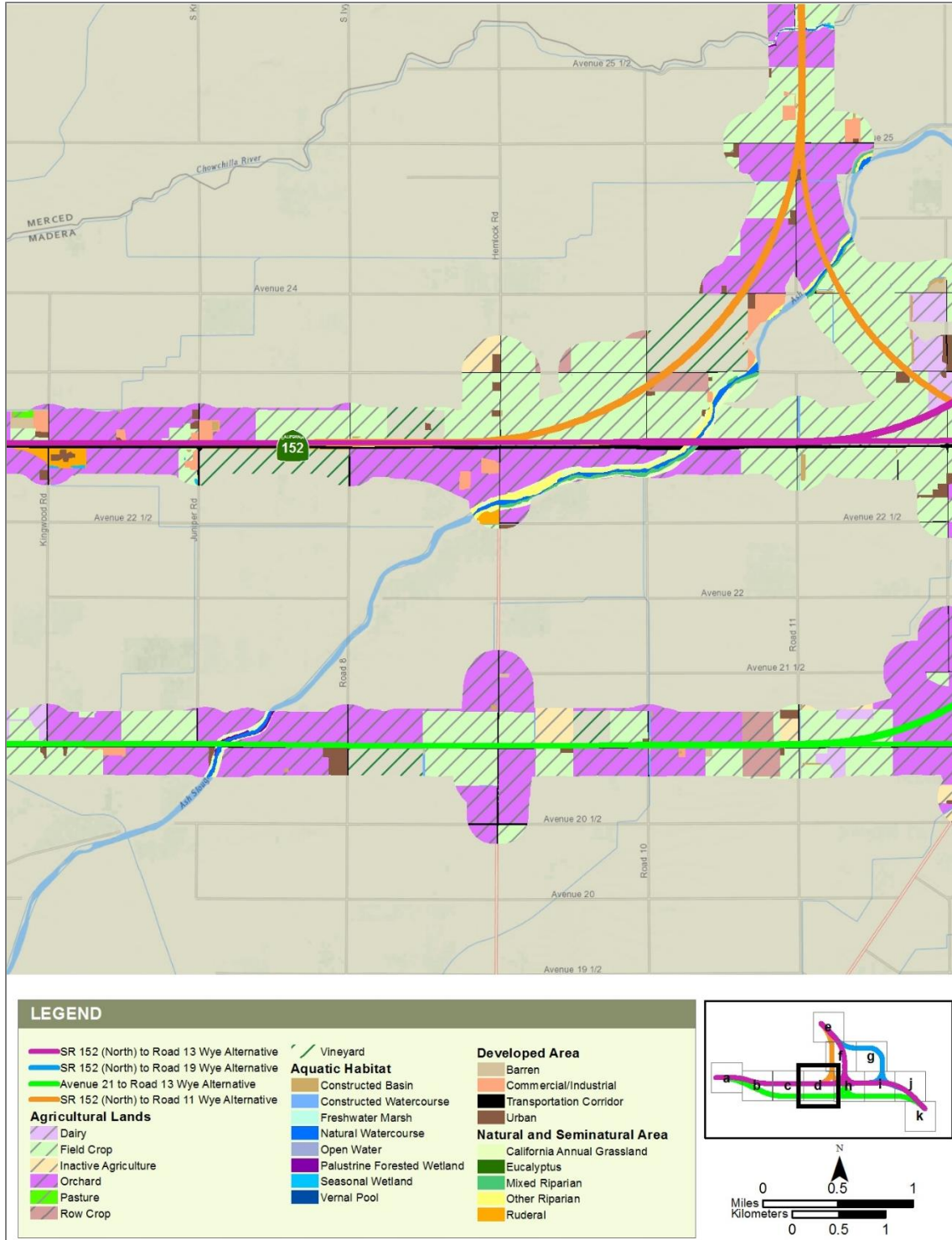
Figure 5-2b Plant Communities and Land Cover Types within the Habitat Study Area



Source: Authority, 2016; Land cover generated using ESRI ArcGIS versions 10.1, 10.2, and 10.3 from data gathered during field surveys and aerial photo interpretation using NAIP aerial imagery dated 2010–2015

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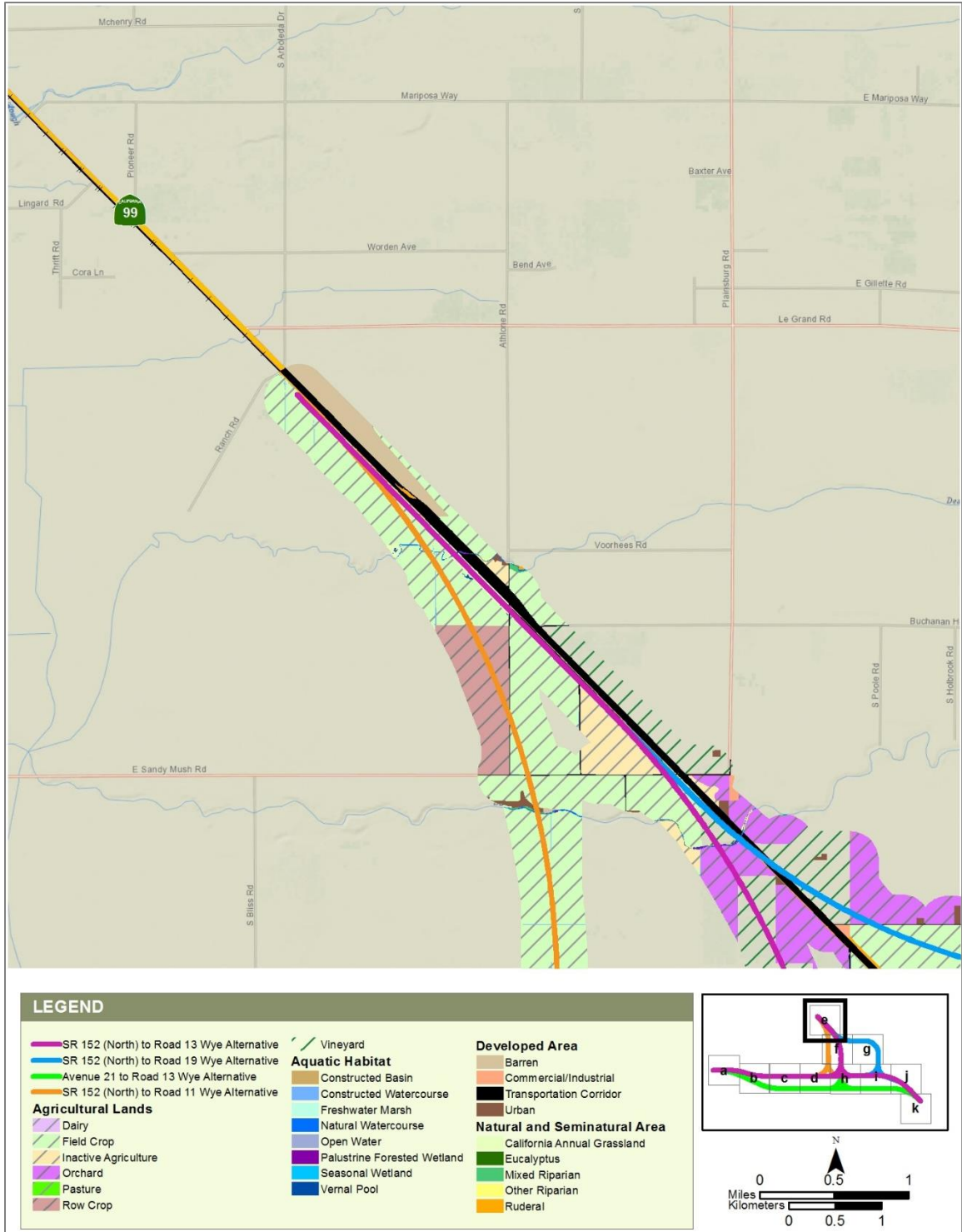
Figure 5-2c Plant Communities and Land Cover Types within the Habitat Study Area



Source: Authority, 2016; Land cover generated using ESRI ArcGIS versions 10.1, 10.2, and 10.3 from data gathered during field surveys and aerial photo interpretation using NAIP aerial imagery dated 2010–2015

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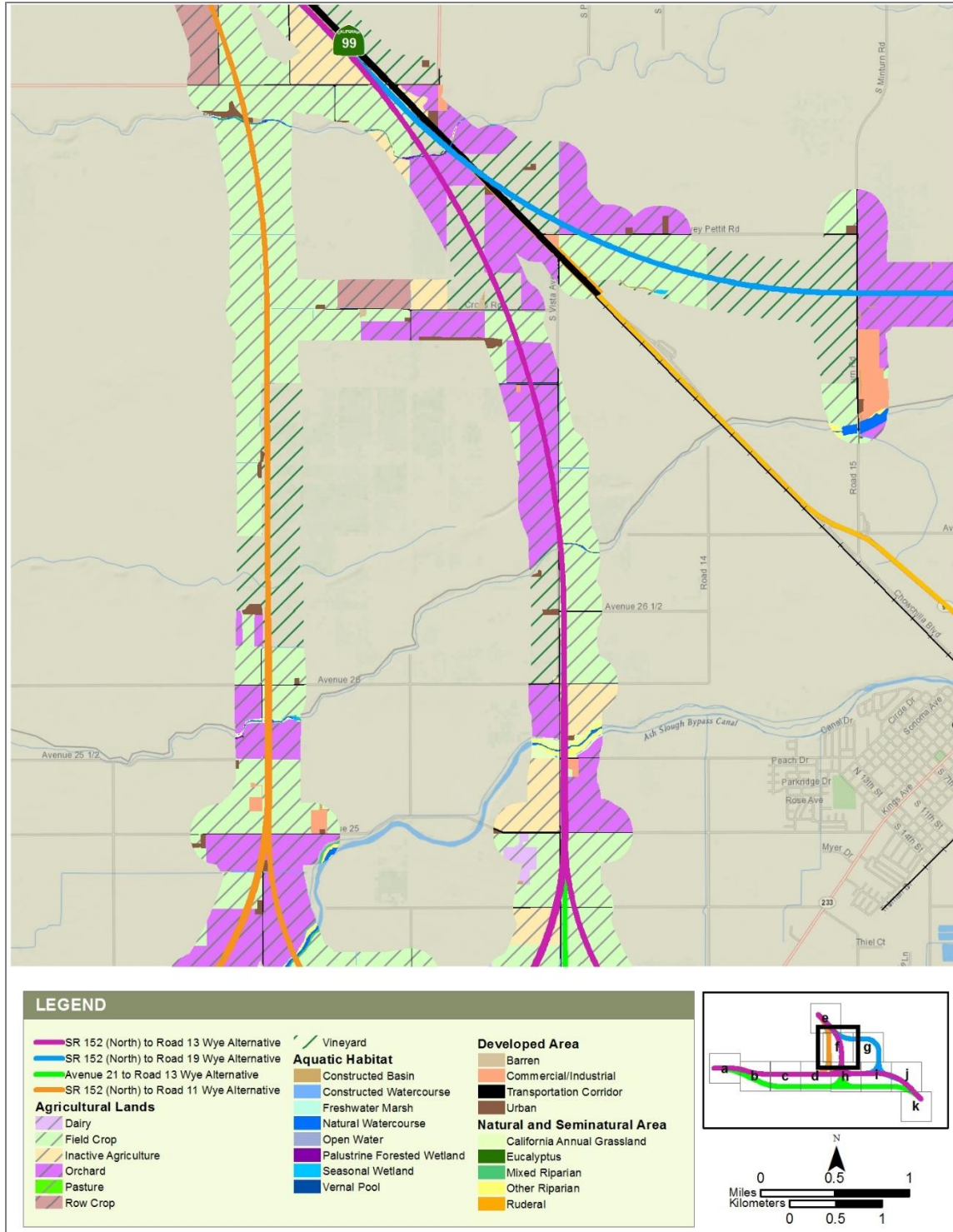
Figure 5-2d Plant Communities and Land Cover Types within the Habitat Study Area



Source: Authority, 2016; Land cover generated using ESRI ArcGIS versions 10.1, 10.2, and 10.3 from data gathered during field surveys and aerial photo interpretation using NAIP aerial imagery dated 2010–2015

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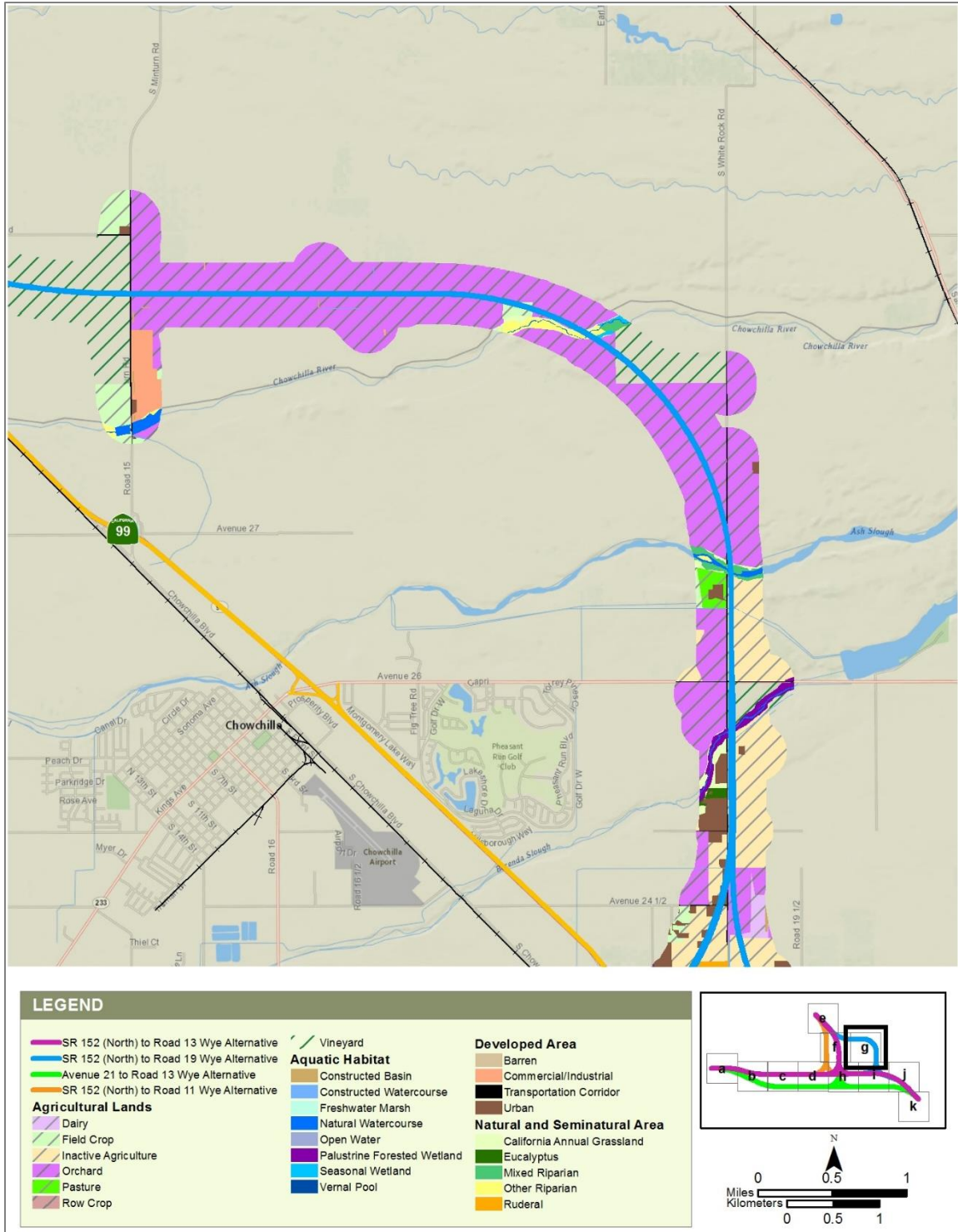
Figure 5-2e Plant Communities and Land Cover Types within the Habitat Study Area



Source: Authority, 2016; Land cover generated using ESRI ArcGIS versions 10.1, 10.2, and 10.3 from data gathered during field surveys and aerial photo interpretation using NAIP aerial imagery dated 2010–2015

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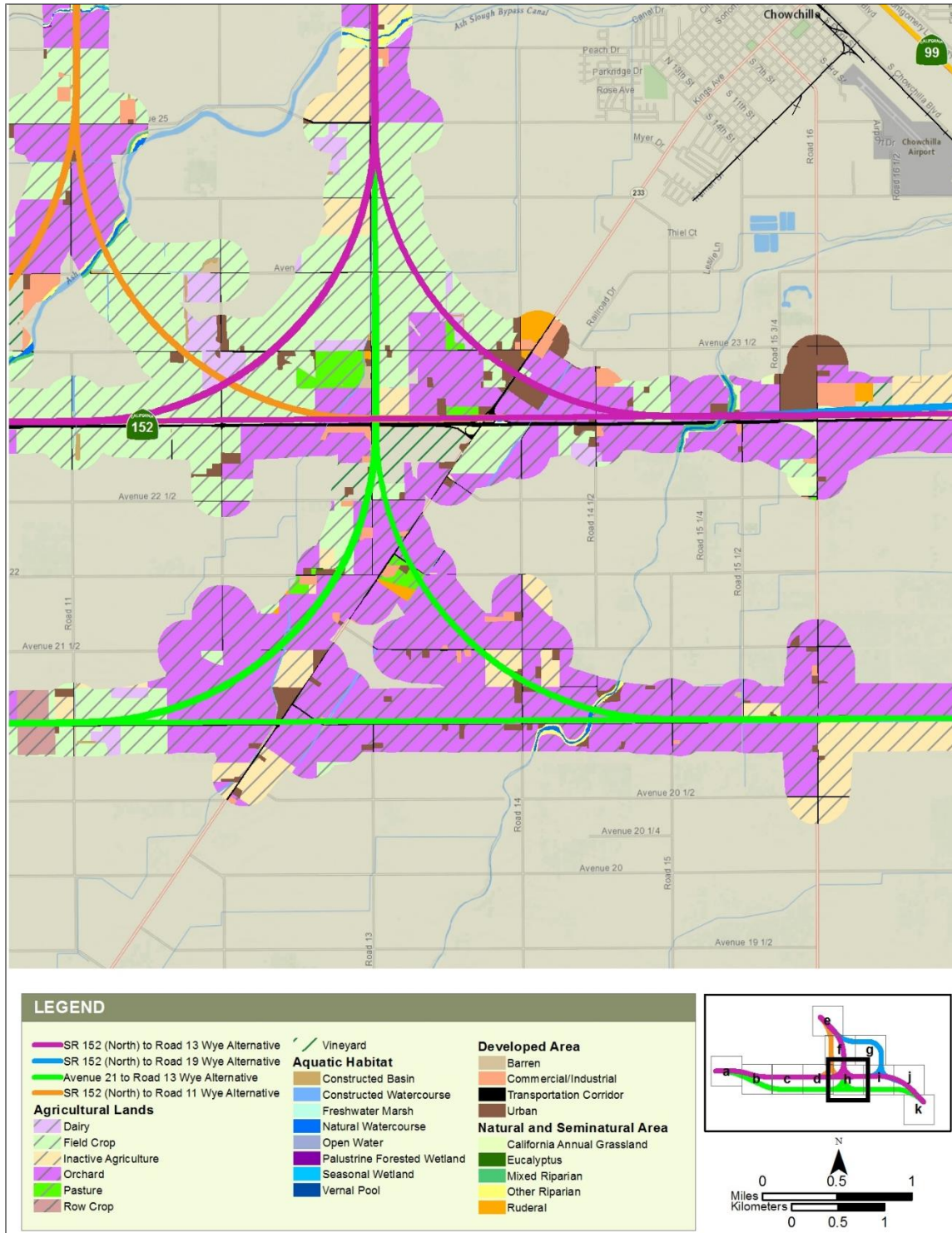
Figure 5-2f Plant Communities and Land Cover Types within the Habitat Study Area



Source: Authority, 2016; Land cover generated using ESRI ArcGIS versions 10.1, 10.2, and 10.3 from data gathered during field surveys and aerial photo interpretation using NAIP aerial imagery dated 2010–2015

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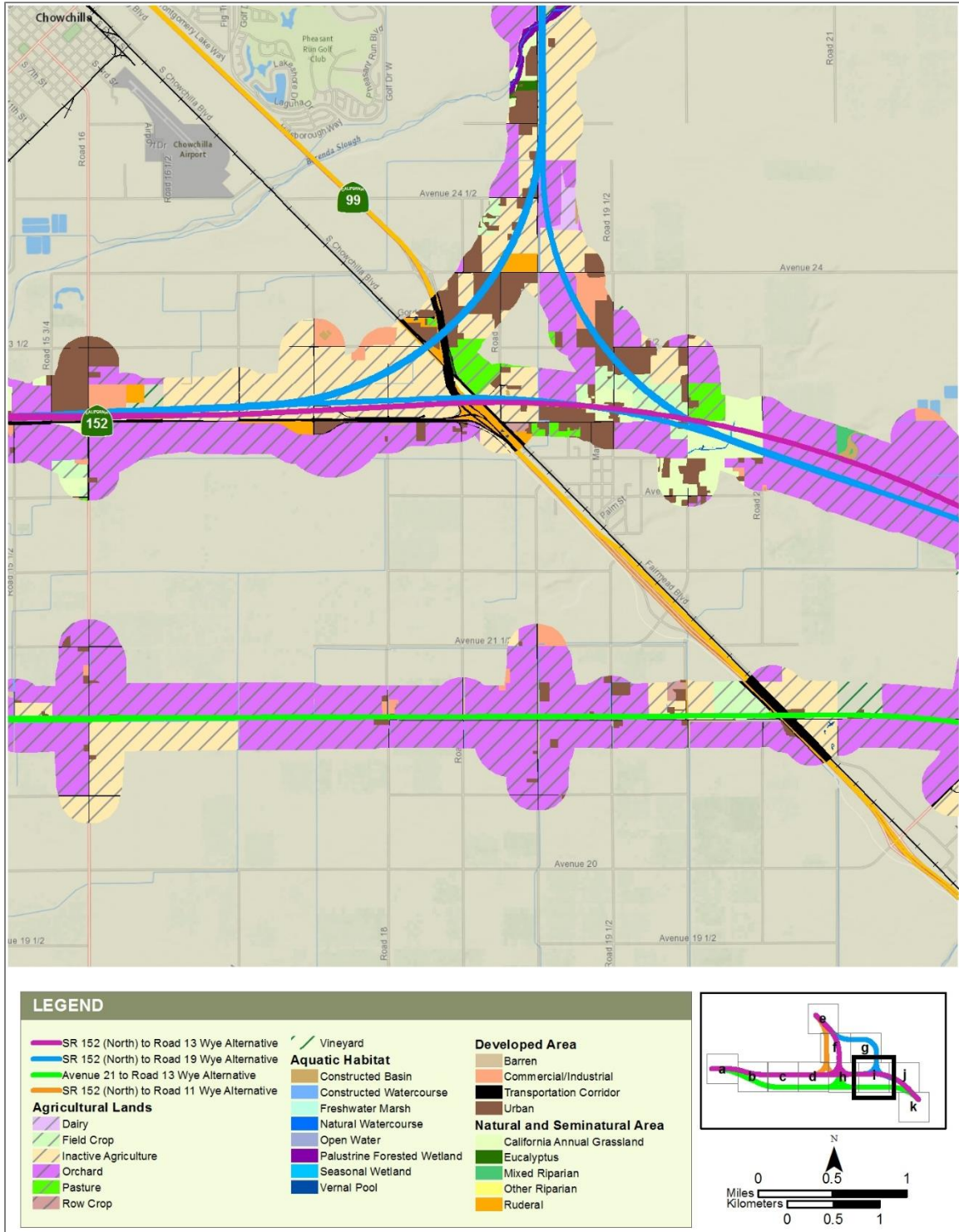
Figure 5-2g Plant Communities and Land Cover Types within the Habitat Study Area



Source: Authority, 2016; Land cover generated using ESRI ArcGIS versions 10.1, 10.2, and 10.3 from data gathered during field surveys and aerial photo interpretation using NAIP aerial imagery dated 2010–2015

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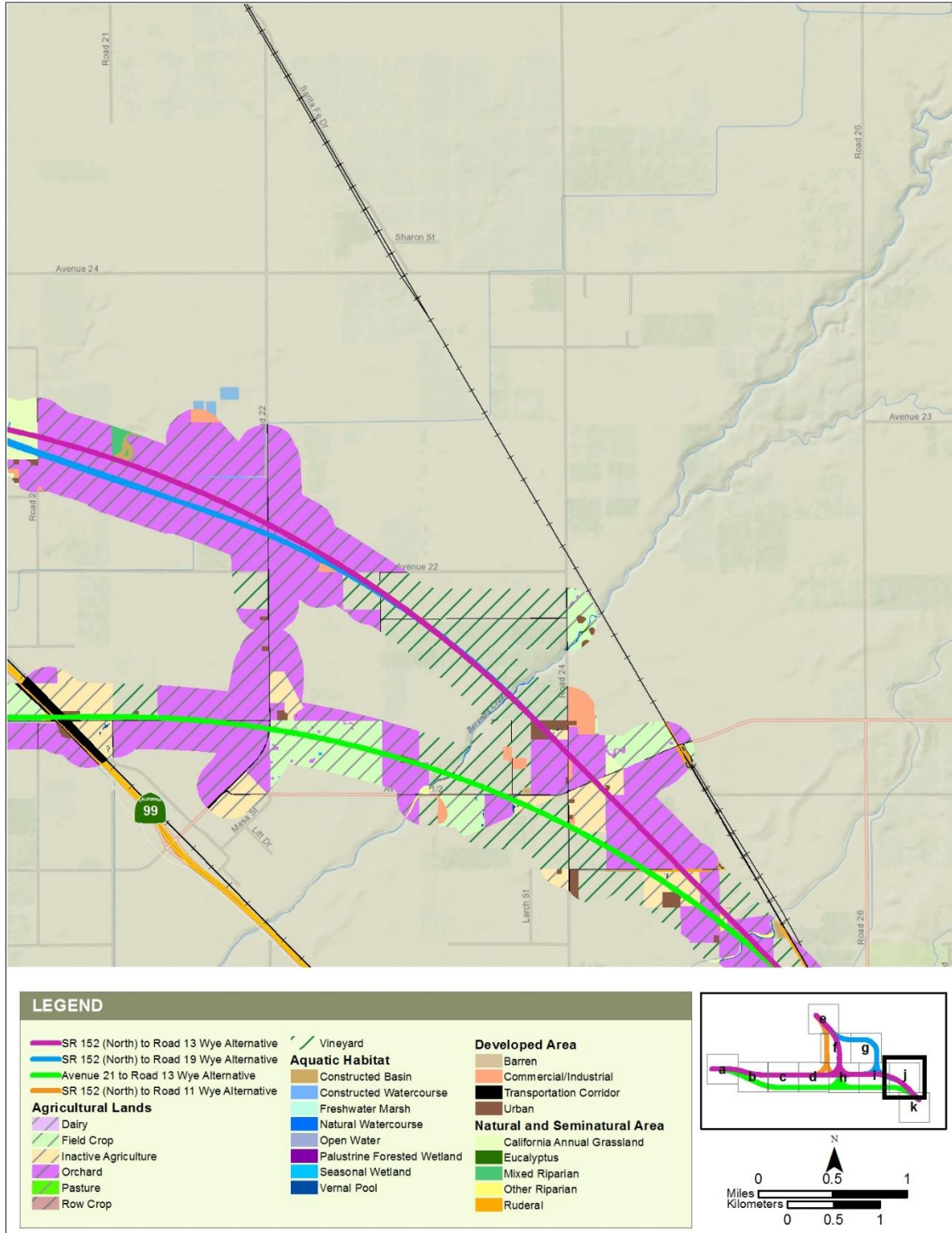
Figure 5-2h Plant Communities and Land Cover Types within the Habitat Study Area



Source: Authority, 2016; Land cover generated using ESRI ArcGIS versions 10.1, 10.2, and 10.3 from data gathered during field surveys and aerial photo interpretation using NAIP aerial imagery dated 2010–2015

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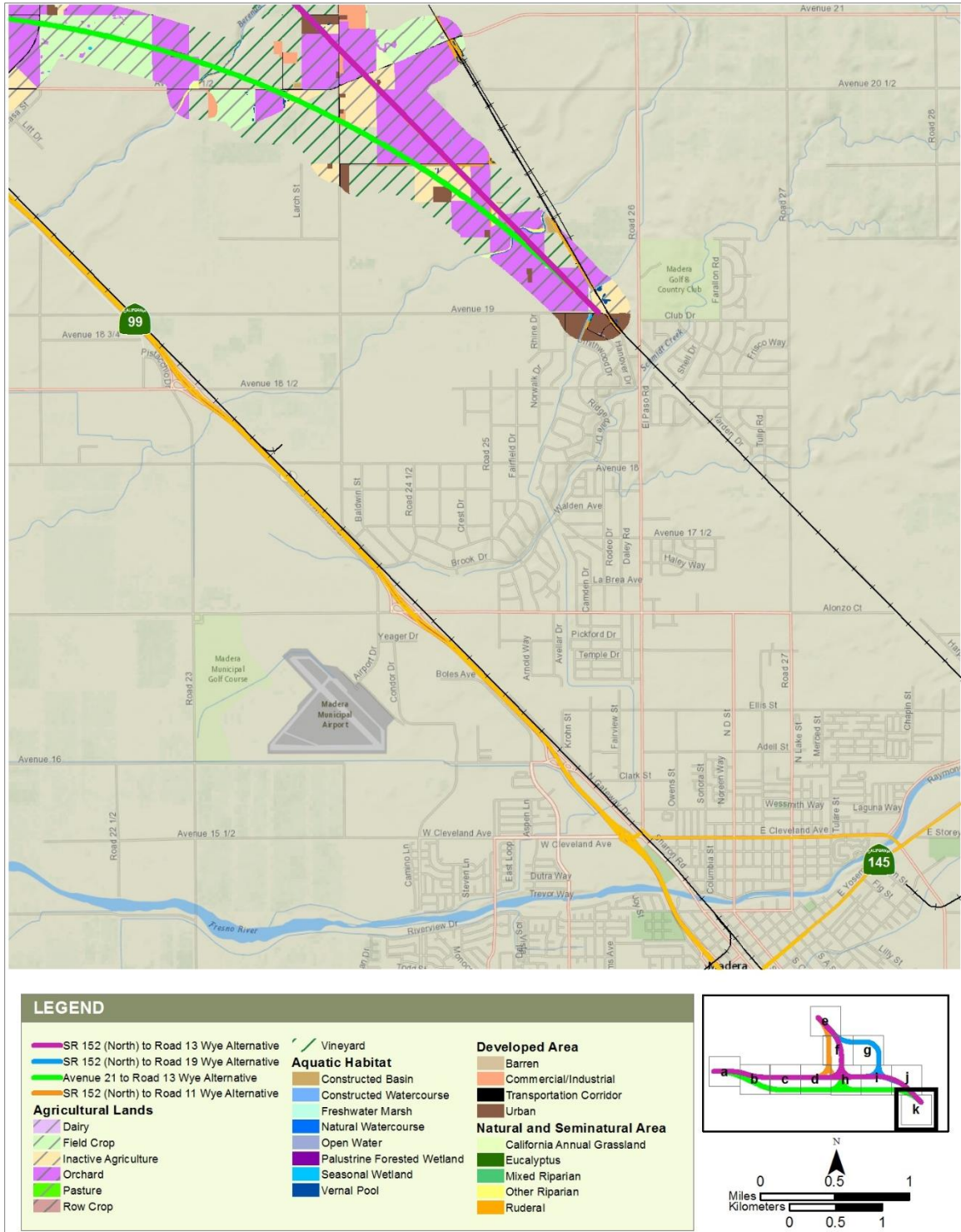
Figure 5-2i Plant Communities and Land Cover Types within the Habitat Study Area



Source: Authority, 2016; Land cover generated using ESRI ArcGIS versions 10.1, 10.2, and 10.3 from data gathered during field surveys and aerial photo interpretation using NAIP aerial imagery dated 2010–2015

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Figure 5-2j Plant Communities and Land Cover Types within the Habitat Study Area



Source: Authority, 2016; Land cover generated using ESRI ArcGIS versions 10.1, 10.2, and 10.3 from data gathered during field surveys and aerial photo interpretation using NAIP aerial imagery dated 2010–2015

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Figure 5-2k Plant Communities and Land Cover Types within the Habitat Study Area

Table 5-2 Wildlife Habitat Types, Land Uses, and Typical Vegetation

Wildlife Habitat Type/Land Use Type	Typical Vegetation
Tree-Dominated Habitats	
Mixed Riparian (MIR)	Fremont cottonwood, western sycamore, valley oak, white alder, California blackberry, elderberry, poison oak, button bush, willows, rushes, mugwort, poison hemlock, stinging nettle (i.e., large tree dominated)
Other Riparian (OTR)	Willows, rushes, mugwort (i.e., small tree or shrub dominated)
Palustrine Forested Wetland (PFW)	Fremont cottonwood, western sycamore, valley oak
Herbaceous-Dominated Habitats	
California Annual Grassland (AGS)	Wild oats, brome species, barley, annual fescues, California oatgrass, hairgrass, sweet vernal grass
Freshwater Marsh (FRM)	Cattail, bulrush
Pasture (PAS)	Grasses
Ruderal (RUD)	Brome species, barley, star thistle
Seasonal Wetland (SEW)	Curly dock, rushes, grasses
Vernal Pool (VP)	Annual and perennial vernal pool obligate species
Aquatic Habitats	
Natural Watercourse (NAW)	Unvegetated, willows, rushes, cattails
Open Water (OPW)	Unvegetated, willows, rushes
Developed Habitats	
Commercial/Industrial (COI)	Warehouses, industrial plants
Constructed Basin (COB)	Detention basins, ponds
Constructed Watercourse (COW)	Canals, drainage ditches
Transportation Corridor (TRC)	Roads, highways
Urban (URB)	Unvegetated pavement, grass lawns, hedges
Agricultural Habitats	
Dairy (DAI)	Dairy
Eucalyptus (EUC)	Eucalyptus trees
Field Crops (FIC)	Wheat, alfalfa
Inactive Agriculture (INA)	Agricultural land not cropped the current or previous crop season
Orchard (ORC)	Almonds, apricots, citrus
Row Crop (ROC)	Onions, tomatoes, corn
Vineyards (VIN)	Grapes
Nonvegetated Habitats	
Barren (BAR)	Unvegetated, rock, gravel, soil

Source: Authority and FRA, 2018

Table 5-3 Land Cover Types and Acreages in the Central Valley Wye Habitat Study Area

Land Cover Type	SR 152 (North) to Road 13 Wye Alternative			SR 152 (North) to Road 19 Wye Alternative			Avenue 21 to Road 13 Wye Alternative			SR 152 (North) to Road 11 Wye Alternative		
	Project Footprint	Core Habitat Study Area ¹	Auxiliary Habitat Study Area	Project Footprint	Core Habitat Study Area ¹	Auxiliary Habitat Study Area	Project Footprint	Core Habitat Study Area ¹	Auxiliary Habitat Study Area	Project Footprint	Core Habitat Study Area ¹	Auxiliary Habitat Study Area
Agricultural Lands												
Dairies	58.08	54.79	151.76	32.92	49.28	152.54	16.0	34.74	100.89	28.67	51.79	153.24
Field Crops	1,154.41	1,584.36	4,520.57	961.19	1,275.80	3,718.13	927.4	1,603.87	4,772.27	1,118.25	1,537.48	4,294.30
Inactive Agriculture	254.50	182.80	432.77	377.95	269.04	578.79	150.45	144.90	311.11	161.06	117.16	270.70
Orchards	685.32	1,065.69	3,074.69	900.96	1,356.98	4,086.22	1,041.85	1,510.85	4,206.56	721.39	1,009.10	2,905.16
Pastures	20.71	36.49	127.29	14.50	28.43	142.64	22.87	21.31	46.09	16.18	21.69	112.32
Row Crops	1.28	16.76	69.71	0.0	1.80	25.22	9.16	30.01	104.12	26.64	48.18	132.60
Vineyards	241.02	398.20	1,182.79	355.62	463.61	1,393.58	192.91	315.34	759.56	284.24	401.98	1,160.60
<i>Subtotal</i>	<i>2,415.32</i>	<i>3,339.09</i>	<i>9,559.58</i>	<i>2,643.14</i>	<i>3,444.94</i>	<i>10,097.12</i>	<i>2,360.64</i>	<i>3,661.02</i>	<i>10,300.6</i>	<i>2,356.43</i>	<i>3,187.38</i>	<i>9,028.92</i>
Developed Areas												
Barren	22.82	26.21	38.60	53.72	42.55	49.12	24.93	31.69	33.11	17.23	15.38	26.35
Commercial/Industrial	60.46	71.94	134.96	77.71	99.40	210.44	16.07	28.27	103.93	57.12	82.96	175.82
Transportation Corridor	280.67	212.53	392.48	327.24	254.12	401.77	125.41	194.56	411.78	233.91	141.14	222.95
Urban	104.28	121.14	284.23	148.15	183.50	431.60	56.66	66.58	148.88	81.26	115.04	297.26
<i>Subtotal</i>	<i>468.23</i>	<i>431.82</i>	<i>850.27</i>	<i>606.82</i>	<i>579.57</i>	<i>1,092.93</i>	<i>223.07</i>	<i>321.10</i>	<i>697.70</i>	<i>389.52</i>	<i>354.52</i>	<i>722.38</i>
Natural and Semi-Natural Areas												
California Annual Grassland	95.01	126.22	280.94	102.65	126.56	269.25	32.30	54.46	92.30	74.30	97.67	273.04

Land Cover Type	SR 152 (North) to Road 13 Wye Alternative			SR 152 (North) to Road 19 Wye Alternative			Avenue 21 to Road 13 Wye Alternative			SR 152 (North) to Road 11 Wye Alternative		
	Project Footprint	Core Habitat Study Area ¹	Auxiliary Habitat Study Area	Project Footprint	Core Habitat Study Area ¹	Auxiliary Habitat Study Area	Project Footprint	Core Habitat Study Area ¹	Auxiliary Habitat Study Area	Project Footprint	Core Habitat Study Area ¹	Auxiliary Habitat Study Area
Eucalyptus Woodlands	0.0	0.28	0.77	0.0	1.97	5.71	0.0	0.61	0.16	0.0	0.0	0.77
Mixed Riparian	3.22	9.44	33.36	4.26	10.96	44.61	0.12	0.13	3.78	3.41	10.80	39.78
Other Riparian	6.33	15.76	51.73	5.81	21.89	59.08	5.61	11.45	33.27	4.53	12.08	50.14
Ruderal	19.99	33.46	77.59	38.12	49.97	97.12	6.06	11.17	18.28	19.33	32.32	74.44
<i>Subtotal</i>	<i>124.55</i>	<i>185.16</i>	<i>444.39</i>	<i>150.84</i>	<i>211.35</i>	<i>475.77</i>	<i>44.09</i>	<i>77.82</i>	<i>147.79</i>	<i>101.57</i>	<i>152.87</i>	<i>438.17</i>
Aquatic Habitats												
Depressional/Palustrine Wetlands												
Coastal and Valley Freshwater Marsh	0	0	0	0	0	0.52	0	0	0	0	0	0
Palustrine Forested Wetland	0.44	1.35	4.48	2.87	4.95	26.26	1.02	3.03	4.09	0	0	2.96
Seasonal Wetland	0.40	2.69	20.93	0.72	3.55	23.69	0.12	0.10	15.71	0.39	2.71	21.64
Vernal Pool	1.47	0.37	1.67	1.48	0.21	2.11	2.34	0.53	0.87	0.21	0.39	2.77
<i>Subtotal</i>	<i>2.31</i>	<i>4.41</i>	<i>27.08</i>	<i>5.07</i>	<i>8.71</i>	<i>52.58</i>	<i>3.48</i>	<i>3.66</i>	<i>20.67</i>	<i>0.60</i>	<i>3.10</i>	<i>27.37</i>
Other Waters												
Constructed Watercourse	17.32	16.55	44.53	15.63	15.68	42.60	26.59	24.25	54.59	11.89	18.42	44.23
Natural Watercourse	6.29	18.72	62.61	6.41	19.94	83.25	6.60	16.06	39.65	5.31	16.34	58.97

Land Cover Type	SR 152 (North) to Road 13 Wye Alternative			SR 152 (North) to Road 19 Wye Alternative			Avenue 21 to Road 13 Wye Alternative			SR 152 (North) to Road 11 Wye Alternative		
	Project Footprint	Core Habitat Study Area ¹	Auxiliary Habitat Study Area	Project Footprint	Core Habitat Study Area ¹	Auxiliary Habitat Study Area	Project Footprint	Core Habitat Study Area ¹	Auxiliary Habitat Study Area	Project Footprint	Core Habitat Study Area ¹	Auxiliary Habitat Study Area
Open Water	0.0	0.0	0.12	0.0	0.0	0.32	0.0	0.0	0.0	0.0	0.0	0.01
Constructed Basin	7.26	12.75	30.14	3.48	11.76	32.29	4.59	1.19	5.48	6.45	12.85	34.23
<i>Subtotal</i>	<i>30.87</i>	<i>48.02</i>	<i>137.4</i>	<i>25.52</i>	<i>47.38</i>	<i>158.46</i>	<i>37.78</i>	<i>41.5</i>	<i>99.72</i>	<i>23.65</i>	<i>47.61</i>	<i>137.44</i>
Total	3,041.28	4,008.50	11,018.72	3,431.39	4,291.95	11,876.86	2,669.06	4,105.10	11,266.48	2,871.77	3,745.48	10,354.28

Source: Calculations generated using ESRI ArcGIS versions 10.1, 10.2, and 10.3 from data generated by field surveys and aerial photo interpretation during 2010–2015.

¹ Does not include the Central Valley Wye acreages within the project footprint. Acreage provided is from the project footprint out to 250 feet.

SR = State Route

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5.1.2.1 Agricultural Lands

Agricultural lands account for a majority of the land use within the habitat study area. These land uses include orchards, vineyards, row crops and field crops, and fallow fields, as well as dairies, pastures, and inactive agriculture. Constructed watercourses, such as canals, drains, and basins associated with agriculture, are discussed in Section 5.1.3. Agricultural lands provide limited plant and wildlife habitat value relative to natural and seminatural habitats as a result of lower species diversity and uniform vegetation structure. Additionally, wildlife species are often regarded as pests and many farmers will actively haze birds and poison small mammals to reduce crop damage and loss. Vegetation other than the managed crop generally comprises weedy species adapted to high levels of disturbance and is often actively managed with herbicides, mowing, and tilling. Sparse annual grasses and weedy forbs may be present within hay fields and along the crop edges; however, because these weeds decrease crop value, these undesirable plants are often eradicated. The following sections describe the agricultural types identified in the habitat study area.

Orchards

Almond trees (*Prunus dulcis*) are the most common orchard crop in the habitat study area. Other deciduous orchard crops include pistachios (*Pistacia vera*), walnut trees (*Juglans regia*), fig trees (*Ficus* spp.) and pomegranate trees (*Punica* spp.). Evergreen orchards such as oranges and lemons (*Citrus* spp.) are also present. Orchards consist of monocultures of evenly spaced, generally low bushy trees that are similar in canopy size and tree height. Canopy cover ranges from open to dense depending on the age of the trees, with saplings and young trees having relatively open canopies and older trees providing more closed canopy cover. Depending on management levels, the understory is either devoid of vegetation or composed of various weedy annual grasses and forbs. Where herbaceous vegetation is present, it is often mowed, sprayed, or tilled to facilitate harvest and conserve water. Most of the orchards in the habitat study area are flood-irrigated.

Vineyards

Vineyards include cultivated wine, table, and raisin grapes (*Vitis* spp.) grown in evenly spaced rows that are variable in canopy cover depending on the age and growth of the vines. The understory vegetation is variable depending on management practices. In some vineyards, herbaceous vegetation is nearly absent and in other areas weedy annual grasses and forbs are common. Where herbaceous vegetation is present, it is often managed with herbicides, mowing, and tilling. Flood and drip methods are most commonly used to irrigate the vineyards in the habitat study area.

Row Crops

Irrigated row crops in the San Joaquin Valley include sweet potatoes (*Ipomoea batatas*), cotton (*Gossypium herbaceum*), tomatoes (*Solanum lycopersicum*), lettuce (*Lactuca* spp.), beans (*Phaseolus vulgaris*), and garlic (*Allium sativum*). Most field and row crops in the habitat study area are flood-irrigated, although sprinkler irrigation is used in some areas.

Irrigated grain crops include corn (*Zea mays*), safflower (*Carthamus tinctorius*), and milo (*Sorghum* spp.) grown as silage for dairy cows. Nonnative annual grasses and herbaceous weeds are uncommon as a result of active cultivation, herbicide application, and shading from the mature corn stalks.

Field Crops

Field crops consist of monocultures that are intensely managed and frequently harvested and replanted, often on a seasonal rotational basis. Field crops include dry land grain crops and irrigated hay crops. Dry land grain crops include nonirrigated annual grass crops such as wheat (*Triticum* spp.), barley (*Hordeum* spp.), and rye (*Secale cereale*). Other annual grasses and herbaceous weeds are frequently interspersed along the margins of dry crop fields. Common irrigated hay crops include species such as timothy (*Phleum pratense*), oats (*Avena* spp.), orchard grass (*Dactylis glomerata*), millet (*Panicum miliaceum*), red clover (*Trifolium pratense*),

and alfalfa (*Medicago sativa*). Within the habitat study area, these crops are planted as monocultures in large, predominantly flood-irrigated fields. Irrigated hay crops are common throughout the habitat study area and are often associated with dairy farms because they are grown as silage.

Dairies

Dairy farms within the habitat study area are large industrial-scale farming operations that include barns and other farm buildings, feed lots, silage storage areas, and manure settling basins. These areas are generally devoid of herbaceous vegetation but may include trees.

Pastures

Pastures are generally enclosed by fences and composed of a mixture of annual and perennial grasses and forbs that provide forage for domestic livestock. Most of the pastureland in the habitat study area is associated with rural residential areas. While some pastures may be enhanced through the seeding of desirable forage plants such as tall fescue (*Schedonorus phoenix*), ryegrass (*Festuca perenne*), and various clovers (*Trifolium* spp.), they are less intensively managed than other types of agricultural lands and have a relatively low native diversity but often support some (usually minor) component of native California annual grassland species. Irrigation is variable, with some pasture areas flood- or sprinkler-irrigated while others are managed as dry-land pasture only. This habitat type is distinguished from extensive areas of California annual grassland that may be used as rangeland.

Inactive Agriculture

Inactive agriculture includes fields that have evidence of past cultivation (including surrounding landscape, evidence of tillage, leveled fields or irrigation checks and furrows) but are not currently used for crop production. These areas may have been recently disked but show no evidence of recent cultivation, resulting in dense growth of nonnative annual grasses such as riggut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), oats, Italian ryegrass (*Lolium* spp.), barley, and weedy forbs such as bur clover (*Medicago polymorpha*), prickly lettuce (*Lactuca serriola*), filaree (*Erodium* spp.), and yellow star-thistle (*Centaurea solstitialis*). While species composition is similar to that of California annual grassland and ruderal areas, inactive farmland areas generally support a very low diversity and abundance of native plant species and are distinguished by a high degree of disturbance as a result of past cultivation.

5.1.2.2 Developed Areas

Developed areas in the habitat study area include various types of urban and rural developed land use. Developed areas include urban areas, commercial and industrial buildings, transportation corridors, and barren areas where vegetation has been removed or is absent. In general, the types of developed areas are unchanged from the Merced to Fresno Final EIR/EIS, although there have been changes in the location and extent of transportation corridors as infrastructure updates, such as the RTPs, have been completed.

Barren

Barren areas are open plots of rock, gravel or soil that are either completely devoid of vegetation or contain only sparse (less than 2 percent), widely scattered, predominantly weedy herbaceous plants. Within the habitat study area, barren areas are associated with equipment yards adjacent to agricultural fields and various water storage or delivery features.

Urban

Urban habitat includes relatively high-density residential areas and parks that may include landscaped areas, yards, gardens, and various buildings. Many urban areas include large landscape and shade trees such as ash (*Fraxinus* spp.), cedar (*Cedrus* spp.), eucalyptus (*Eucalyptus* spp.), London plane (*Platanus* spp.), maple (*Acer* spp.), redwood (*Sequoia sempervirens*), and pine (*Pinus* spp.). Because of a significant agricultural component, rural

residential habitat is considered an agricultural habitat type. Parkland includes developed and maintained open, grassy areas, picnic facilities, and children's playgrounds.

Commercial and Industrial

Commercial and industrial areas include urban shops, businesses, warehouses, industrial plants, factories, junkyards, equipment storage yards, airports, and various municipal facilities as well as associated parking lots. Rural commercial areas include landfills, farm equipment yards, and agricultural processing and storage facilities; dairy farms are not considered to be a commercial and industrial habitat type but are instead described separately as an agricultural habitat type. Urban commercial and industrial areas often have associated landscaped vegetation.

Transportation Corridors

Transportation corridors in the habitat study area include roads and railways, including portions of SR 99, SR 152, and SR 233, numerous paved urban and county roads, and the BNSF corridor. For the purpose of habitat characterization, narrow strips of landscaped or ruderal vegetation associated with these corridors were not separately mapped and quantified; instead, these areas were mapped together with their associated corridor. Dirt farm roads associated with agricultural fields also were not distinguished separately from the adjacent agricultural land use.

5.1.2.3 Natural and Seminalural Areas

Natural and seminalural habitats are distinguished from the land uses and vegetation types described in the previous sections by the degree of current human influence on the vegetation composition and structure. While natural and seminalural vegetation types have been altered to some extent by past and present human activities, the composition and structure of these communities is generally not actively managed or controlled. A distinction is also made between those habitats that are largely characterized by native vegetation and those in which the dominant vegetation comprises introduced species. Natural and seminalural habitats associated with aquatic features such as vernal pools and seasonal wetlands are discussed in Section 5.1.3.

California Annual Grassland

California annual grassland habitat within the habitat study area is best classified as part of the *Amsinckia (menziesii, tessellata)* Alliance as defined by Sawyer et al. (2009) and the nonnative grassland type described by Holland (1986). This community is characterized by an open to dense cover of grasses and herbaceous species less than 3 feet high. Scattered trees and shrubs may be present, but provide minimal cover.

California annual grassland in the habitat study area is characterized by large expanses of open grassland composed of nonnative annual grasses such as ripgut brome, soft chess, foxtail barley, medusa-head (*Taeniatherum caput-medusae*), and wild oat. Common nonnative herbaceous species include yellow star-thistle, Italian thistle (*Carduus pycnocephalus*), prickly lettuce, mustards (*Brassica* spp.), and wild radish (*Raphanus sativa*). Many native annual and perennial herbaceous species may also be present within this grassland community; such species include Canadian horseweed (*Erioneuron canadensis*), telegraph weed (*Heterotheca grandiflora*), California poppy (*Eschscholzia californica*), and silver cudweed (*Gnaphalium canescens*). California annual grassland may be used for cattle or sheep grazing and is generally not seeded or irrigated when compared to similar areas classified as pasture. Areas of California annual grassland are on soils suitable for vernal pools and other seasonal wetlands.

Eucalyptus Woodlands

Eucalyptus woodlands are classified by Sawyer et al. (2009) as eucalyptus (*E. globulus*, *E. camaldulensis*) seminalural woodland stands or eucalyptus groves. There is no corresponding natural community type in Holland (1986). These areas are characterized by relatively dense stands of eucalyptus trees. Within the habitat study area, the understory vegetation typically comprises introduced annual grasses such as ripgut brome and Bermuda grass with goose grass (*Galium aparine*) and dovefoot geranium (*Geranium molle*). In some areas, giant reed is also a common associated understory species.

Mixed Riparian

Mixed riparian communities include sensitive riparian communities as identified on the CDFW *Hierarchical List of Natural Communities with Holland Types* (CDFG 2010). As discussed in Section 5.3.1, Special-Status Plant Communities, the biological community mixed riparian is equivalent to the valley foothill riparian community as defined by the CWHR.

The cottonwood-willow riparian community is part of the *Populus fremontii* Forest Alliance (Fremont cottonwood forest) as described by Sawyer et al. (2009) and most closely resembles the Great Valley cottonwood riparian forest described by Holland (1986). Mixed riparian most closely resembles the *Populus fremontii* Forest Alliance described by Sawyer et al. (2009), while Holland (1986) describes this community as mixed riparian forest.

Mixed riparian in the habitat study area is dominated by trees and large shrubs, primarily mature cottonwood (*Populus fremontii*). Mixed riparian occurs along the banks of major rivers and streams, and is generally characterized by a prevalence of hydrophytic vegetation but lacking the other criteria to be considered wetlands. Riparian areas form transition zones between terrestrial and aquatic ecosystems, providing essential habitat for a large variety of terrestrial as well as aquatic wildlife species.

Other Riparian

Other riparian communities include valley oak woodland, valley and foothill riparian, willow riparian forest and woodland, cottonwood willow riparian, and black walnut riparian. Several types of other riparian communities were identified within the habitat study area. Willow riparian forest in the habitat study area may be classified as part of the *Salix lasiolepis* Shrubland Alliance (arroyo willow thickets) as defined by Sawyer et al. (2009) and most closely resembles the central coast arroyo willow riparian forest described by Holland (1986). Himalayan blackberry brambles and giant reed (*Arundo donax*) (Sawyer et al. 2009) are also present in riparian communities.

Riparian communities are located on the banks of natural waterways including streams, sloughs, and rivers and, in some cases, constructed waterway features. Riparian areas occur along the banks of rivers and streams and are generally characterized by a prevalence of hydrophytic vegetation but do not meet other criteria for wetlands. Riparian communities may consist of overstory species that are facultative wetland; however, soils, hydrology, and understory vegetation are not representative of wetland communities.

Ruderal Vegetation

Ruderal vegetation types occur in areas where the natural vegetation has been removed or significantly degraded by past or current human activity. Ruderal vegetation is often associated with vacant lots, roadsides, and other highly disturbed areas. Vegetation in these areas is highly variable but often includes a mix of nonnative annual grasses such as ripgut brome, soft chess, wild oat, Italian ryegrass, foxtail barley, and weedy forbs such as bur clover, filaree (*Erodium botrys*), yellow star-thistle, Italian thistle, milk thistle (*Silybum maritimum*), Russian thistle (*Salsola tragus*), and many others. Due to the highly variable nature of ruderal habitats, this type was not classified according to Sawyer et al. (2009) or Holland (1986). Ruderal areas may be similar to California annual grassland but are characterized by a greater level of disturbance. Ruderal areas are also similar to inactive farmland but do not occur in areas with evidence of active farming in the recent past.

5.1.3 Aquatic Habitats

This section describes the wetland and other water features that were mapped in the habitat study area. Figure 5-2 depicts these areas for the Merced, Chowchilla, and Madera vicinities. Of the aquatic plant communities and land cover types identified in the habitat study area, the following fall under the jurisdiction of USACE, SWRCB, and CDFW:

- Vernal pools
- Seasonal wetlands
- Palustrine forested wetland

- Mixed riparian
- Other riparian
- Freshwater marsh
- Natural watercourses
- Constructed watercourses

Jurisdictional waters are further discussed and evaluated in detail in the Second Supplemental Wetlands Delineation Report (Authority and FRA 2016). Jurisdictional water types have been broadly classified following the Hydrogeomorphic Wetland Classification System (USACE 2008c) and the Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979).

5.1.3.1 **Depressional/Palustrine Wetlands**

Depressional wetlands are a hydrogeomorphic class of wetlands that occur in topographic depression where the dominant water sources are precipitation, groundwater discharge, and both inflow and overland flow from the adjacent uplands (USACE 2008c). The palustrine system is a broad class of nontidal wetlands that was developed to include vegetated wetlands traditionally called by names such as marsh, swamp, bog, fen, and prairie. The palustrine system also includes small, shallow permanent or intermittent waterbodies such as ponds. Palustrine wetlands may be situated shoreward of lakes, river channels, or estuaries; on river floodplains; in isolated catchments; or on slopes. They may also occur as islands in lakes or rivers (Cowardin et al. 1979). Palustrine wetlands identified within the habitat study area include vernal pools, coastal and valley freshwater marsh, Fremont cottonwood forested wetlands, retention basins, and agricultural tailwater ponds.

Freshwater Marsh

Freshwater marsh includes sensitive wetland communities as identified on the CDFW *Hierarchical List of Natural Communities with Holland Types*. This biological community is equivalent to the *Schoenoplectus californicus* Herbaceous Alliance (Sawyer et al. 2009) and freshwater emergent wetland (CDFG 1988).

Freshwater marsh habitats are semi-permanently flooded areas that typically support perennial emergent vegetation such as cattails (*Typha* spp.), sedges (*Carex* spp., *Schoenoplectus* spp.), and rushes (*Juncus* spp.). Freshwater marshes are found on floodplains, backwater areas, and within the channels of rivers and sloughs. Freshwater marshes are nontidal, flooded, depressional wetlands and designated as palustrine emergent semi-permanently flooded wetlands in Cowardin et al. (1979).

Palustrine Forested Wetland

Palustrine forested wetlands occur on soils intermittently or seasonally flooded or saturated by freshwater systems. Frequently, these community types are found along riparian corridors, floodplains subject to high-intensity flooding, or on low-gradient depositions along rivers and streams. These communities are described as typically containing an overstory dominated by Fremont cottonwood or mixed with other tree species including box elder (*Acer negundo*), Oregon ash (*Fraxinus latifolia*), California walnut (*Juglans californica*), or California sycamore (*Platanus racemosa*). The shrub layer within this community type is typically dominated by willow species (*Salix* spp.) and California wild grape (*Vitis californica*). The understory of Fremont cottonwood forested wetlands may support emergent perennial vegetation such as cattails, sedges, and rushes. Freshwater forested wetlands are nontidal, flooded, depressional wetlands; and are categorized as Cowardin class: palustrine forested wetland (PFO). The *Populus fremontii* Forest Alliance, Fremont cottonwood forested wetland, is described by Sawyer et al. (2009) and is similar to the Great Valley cottonwood riparian forest described by Holland (1986).

Vernal Pools

Vernal pools are a type of seasonal wetland characterized by a low amphibious, herbaceous community dominated by annual forbs and grasses. Vernal pools are isolated, unstable

ecosystems that respond markedly to seasonal precipitation patterns. These pools are associated with certain types of soils. Hardpan soil layers frequently form in the horizons of clay soils, leading to the formation of vernal pools with clay soils. California annual grasslands can occur on similar soils but are not exclusively associated with vernal pools. Once formed, vernal pools have specific flora and fauna associated with their seasonal water cycle. The standing water that forms in vernal pools is ideal breeding habitat for several special-status species such as vernal pool fairy shrimp (*Branchinecta lynchi*), Conservancy fairy shrimp (*Branchinecta conservatio*), vernal pool tadpole shrimp (*Lepidurus packardii*), California tiger salamander (*Ambystoma californiense*), and western spadefoot (*Spea hammondi*). This plant community type is a CDFW special-status plant community and is a subclass of depressionnal wetlands, which are considered palustrine emergent seasonally flooded wetlands (Cowardin et al. 1979).

Common plant species observed in vernal pools include woolly marbles (*Psilocarphus brevissimus*), popcorn flower (*Plagiobothrys* spp.), water pigmy-stonecrop (*Crassula aquatica*), annual hairgrass (*Deschampsia danthonioides*), purslane speedwell (*Veronica peregrina*), and toad rush (*Juncus bufonius*). Shallow vernal pools are often characterized by an abundance of nonnative grasses and forbs such as Mediterranean barley (*Hordeum marinum*) and hyssop-loosestrife (*Lythrum hyssopifolium*), but these areas also typically contain relatively high cover of native vernal pool plants such as coyote thistle (*Eryngium* spp.). Deeper parts of vernal pools are often characterized by creeping spikerush (*Eleocharis macrostachya*). The quality of vernal pools identified within the project footprint ranges from low quality where they occur in areas of inactive farmland to moderate quality where they occur in grazed California annual grassland. No high-quality undisturbed vernal pools were identified within the project footprint.

Seasonal Wetlands

Seasonal wetlands are a class of wetland characterized by seasonal inundation. Seasonal wetlands support a variety of both native and nonnative wetland plant species and may occur in a variety of landforms where there is seasonal saturation or inundation. Although sharing a similar hydrologic regime, seasonal wetlands are distinguished from vernal pool wetlands by their lack of distinctive floristic components (i.e., vernal pool indicator species) and by the absence of a distinctive claypan or hardpan soil.

In the wetland study area, seasonal wetlands may be considered somewhat degraded based on nonnative plant community assemblages and land management modifications (e.g., cultivation, grading) that may reduce flood storage potential. Example species include cattail (*Typha* spp.), horsetail (*Equisetum* spp.), barley (*Hordeum* spp.), saltgrass (*Distichlis spicata*), meadow barley (*Hordeum brachyantherum*), *Chenopodium* sp., summer Cyprus (*Kochia scoparia*), fivehook bassia (*Bassia hyssopifolia*), knotweed (*Polygonum* spp.), rush (*Juncus* spp.), sedge (*Carex* spp.), nutsedge (*Cyperus* spp.), bulrush (*Scirpus* spp. or *Schoenoplectus* spp.), and plantain (*Plantago* spp.). The stable water column in seasonal wetlands (although not as ephemeral as vernal pools) provides suitable conditions for California tiger salamanders, vernal pool branchiopods, and western spadefoot to complete their lifecycles.

In the most-manipulated areas, inundation is hydrologically controlled by pumps, weirs, and storm drain systems. In less-manipulated systems, natural inundation or saturation occurs during the winter and spring seasons, and the seasonal wetlands are dry during the summer and fall. For the Central Valley Wye, this wetland type is similar to the vernal marsh designation in Holland (1986). No high-quality undisturbed seasonal wetlands were identified within the project footprint.

5.1.3.2 Other Waters

Nonwetland waters investigated in the habitat study area include constructed basins, constructed watercourses, natural watercourses, and open water features. Other waters are located within the Merced, Chowchilla, Madera, and Fresno watersheds, as shown on Figure 5-2. All other waters are considered potentially jurisdictional under the Preliminary Jurisdictional Delineation format (USACE 2008c). Features of other waters are discussed in this section, with additional information located in the Second Supplemental Wetlands Delineation Report (Authority and FRA 2016).

Constructed Basins

Constructed basins in the habitat study area are highly disturbed and may be routinely managed through vegetation removal and dredging. Depending on substrate and management regimes, vegetation type and presence varies. Hydrology is variable based on precipitation events, irrigation inputs/removal, and other management objectives. Stormwater retention basins and agricultural tailwater ponds are the management features that make up the constructed basin wetland types.

Stormwater retention basins are generally excavated earthen basins that have been constructed to hold urban stormwater runoff. Most of the stormwater retention basins in the habitat study area are associated with urban communities as well as commercial and industrial areas. Most of these basins are devoid of vegetation or support ruderal species that become established when the water levels are low or the basins are dry. Constructed basins on average do not retain perennial water sources. They have the potential to support special-status species, such as vernal pool brachiopods and California tiger salamanders that rely on ephemeral inundation cycles.

Agricultural tailwater ponds are generally small, relatively shallow basins that are excavated in the low corners or along the side of an agricultural field or orchard for the purpose of capturing excess irrigation water. Excess water is then either allowed to gradually seep into the soil or is pumped into a nearby canal feature. Vegetation within these basins is often composed of ruderal wetland plant species such as Bermuda grass (*Cynodon dactylon*), tall flat sedge (*Cyperus eragrostis*), sprangletop (*Leptochloa* spp.), and fireweed (*Epilobium* spp.).

Constructed Watercourses

Constructed watercourses include irrigation canals and drainage ditches. The constructed watercourses have the potential to support emergent vegetation, as well as ruderal wetland species. A number of constructed watercourses convey water diverted from or discharged into natural watercourses. Constructed watercourses potentially support special-status species such as Sanford's arrowhead (*Sagittaria sanfordii*) and western pond turtle (*Actinemys marmorata*), but these watercourses usually do not provide native fishes with the aquatic habitat necessary to survive and grow, and are typically dominated by predatory or competitive nonnative fishes. Constructed watercourses are routinely maintained by removing vegetation (e.g., by clearing or spraying), which greatly limits their potential as aquatic habitat. Constructed basins on average do not retain perennial water sources. They have the potential to support special-status species that rely on ephemeral inundation cycles such as vernal pool brachiopods and California tiger salamanders.

Many new watercourses have been constructed as a result of agricultural supply and drainage. These constructed watercourses are new features that were not available to fish historically. These features generally have limited access for fish from natural watercourses due to a variety of structures to control flows, elevations, or drainage. In addition, many of the constructed watercourses have ephemeral or intermittent hydrology, flowing only during periods of agricultural demand or drainage. For these reasons, special-status fish were presumed to potentially occur only in historically natural watercourses, not in the constructed watercourses. Constructed waterways within the study area are considered potentially jurisdictional under the Preliminary Jurisdictional Delineation format (USACE 2008d).

Natural Watercourses

Historically, natural watercourses included riverine areas of the habitat study area, including the perennial San Joaquin River and several intermittent to ephemeral sloughs and creeks. The major natural watercourses within the habitat study area are as follows: San Joaquin River, Fresno River, Chowchilla River, Ash Slough, Berenda Slough, Berenda Creek, Eastside Bypass, Deadman Creek, Dutchman Creek, and Dry Creek. Most historically natural watercourses have ephemeral hydrology either because of their small watershed size or because they have been impounded or diverted upstream into other watercourses for agricultural purposes. All are low-gradient systems with emergent vegetation along margins of pool-run habitat units with bottom

substrates dominated by fine sediments (i.e., sand, silt, or clay). Riffle and other fast-water habitats are uncommon.

Natural watercourses have also been historically influenced by the anthropogenic stressors affecting streams elsewhere in the San Joaquin Valley, such as agricultural land conversions of floodplains and associated water diversions combined with more than a century of exotic fish and invertebrate introductions (McBain and Trush 2002). Watercourses within agricultural areas or developed areas could potentially support special-status species for short time periods, but these watercourses usually represent “false pathways”⁶ for native fishes and are typically dominated by nonnative fishes that prey on or outcompete natives. For these reasons, special-status fishes were presumed to potentially occur only in historical natural watercourses. While many watercourses are now inhabited by primarily nonnative species, many native fish species still persist in the basin (Moyle 2002). The main natural watercourses are described in this section and shown on Figure 5-2.

San Joaquin River

The San Joaquin River is the largest and most substantial water feature in the wetland study area. Sections of the river are characterized by a single large flow channel with an average width of 150 feet. In several locations, the river splits into multiple braided channels, including some larger backwater ponded areas. A detailed investigation of the adjacent riparian habitat was not conducted during the field survey because of property access limitations; however, observations of the area were made from Willis Road on the southeast side of the river. The riparian community within the wetland study area is an open mixed woodland composed of valley oak, California sycamore, and eucalyptus trees. The open understory consists of typical California annual grassland species with occasional patches of sandbar willow and elderberry. The San Joaquin River is normally dry within the habitat study area, at least during the summer/fall months.

Fresno River

The Fresno River near the wetland study area contains sections of low, broad, routinely maintained channel crossing SR 152. The sandy channel in this area is highly disturbed as a result of vegetation clearing and grading, presumably done for flood control maintenance and giant reed removal. Trash and debris are also common and widespread throughout the channel. Although there were patches of clearing, some portions of the channel were vegetated with sandbar willow, scattered patches of cattail, hardstem bulrush, sprangletop, tall flat sedge, Bermuda grass, and fireweed. The adjacent riparian area included some large cottonwood and red willow (*Salix laevigata*) trees. The Fresno River is normally dry within the habitat study area, at least during the summer/fall months.

Chowchilla River

Within the wetland study area, the Chowchilla River is a low, broad sandy channel that supports a mosaic of emergent vegetation, active flow channels, and riparian woodland. There was no flowing water present at the time of the surveys, but shallow pockets of ponding water (less than 6 inches deep) were present along the channel bottom. The active flow channel in this area appears to be variable, ranging from 30 to 60 feet wide with an estimated ordinary high-water depth of 3 feet. Vegetation within the channel includes patches of cattail as well as scattered tall flat sedge, cocklebur, dallisgrass, rabbitsfoot grass, and a number of other herbaceous species. Water primrose (*Ludwigia peploides*) was observed in a few areas where standing water was present within the channel. The open riparian woodland adjacent to the river includes a number of large cottonwood trees and several smaller arroyo willows.

⁶ As described by McBain and Trush (2002), *false pathways* lead fish away from the life history trajectory (pathway) that will otherwise allow it to survive, grow, and complete its life cycle. False pathways affect both upstream and downstream fish movement. During upstream movement, flow may attract fish into drains and bypasses that do not provide habitat because spawning substrate or cover, food availability, water temperatures, dissolved oxygen concentrations, salinity, and other environmental conditions are unsuitable.

Ash Slough

The section of Ash Slough in the wetland study area is a broad, open sandy-gravel channel that was dry at the time of the survey. The average active flow channel is 70 feet wide with an ordinary high-water depth of 3 feet. The channel is largely devoid of emergent vegetation with the exception of a few small patches of cattail and hardstem bulrush in scattered locations. Riparian vegetation along the edges of the channel includes a mixture of dense patches of giant reed intermixed with cottonwood and willow trees and open areas characterized by ruderal grassland habitat. Other riparian vegetation includes Himalayan blackberry, Mexican rush (*Juncus mexicanus*), and sandbar willow. In some areas along the slough, giant reed had been cut, treated, and burned with herbicides in an apparent effort to manage this highly invasive species.

Ash Slough was dry at the time of the survey and much of the channel was vegetated. Vegetation within the channel varies, with most areas characterized by dense giant reed. Other vegetation observed within the channel included scattered Himalayan blackberry, Johnson grass, verbena, Bermuda grass, tall flat sedge, and cocklebur. Occasional sandbar and black willows are also present in some locations within the channel. The adjacent riparian vegetation is predominantly dense giant reed with scattered large cottonwood trees. Other observation points indicated substantial disturbance from earth work, gravel mining, and vehicular traffic. As a result of the grading and excavation it was difficult to determine the extent and depth of the active flow channel.

Berenda Slough

Berenda Slough is an open sandy channel that was dry at the time of the surveys. The active flow channel has an average width of 40 feet with an ordinary high-water depth around 3 feet. The active flow channel is generally devoid of vegetation, with the exception of occasional small areas of Bermuda grass, cocklebur, trefoil, and giant reed. The broad, low terrace adjacent to the channel supports open riparian woodland characterized by cottonwood, black walnut, arroyo willow, and black locust trees, with an understory of mule fat, sandbar willow, creeping wild rye, riggut brome, and mustard. The outer banks support dense giant reed with scattered eucalyptus and cottonwood trees. Other areas of the slough are characterized by dense growth of cattail, with some hardstem bulrush likely the result of impounded water in this section of the slough.

Berenda Creek

Berenda Creek is a small, intermittent stream. The channel in this area has a sandy substrate with some cobbles and woody debris. At the time of the survey, water was not flowing in the creek, but shallow ponded water (less than 6 inches deep) was present in some areas along the channel bed. Within the wetland study area, the channel is characterized by patches of dense cattail and open unvegetated areas. Riparian vegetation along the edges of the channel consists of a patches of arroyo, sandbar, and red willow. Downstream, Berenda Creek has been channelized into a drainage ditch that flows to the west and then runs to the north along Avenue 18. The channel is characterized by steep vertical banks approximately 15 feet wide. The ordinary high-water depth was estimated to be between 2 and 3 feet. Scattered emergent vegetation, including cattails and hardstem bulrushes, occurs throughout much of the channel in this area. Vegetation along the upper banks is characterized by Himalayan blackberry, small black walnut trees, giant reed, and scattered cottonwood trees.

Eastside Bypass of the San Joaquin River

The section of Eastside Bypass in the wetland study area is a broad, open silty-clay channel that was dry at the time of the survey. Several active flow channels were evident, with the channels being devoid of vegetation. Vegetation along the low terrace of the bypass includes a mixture of nonnative grasses (*Bromus* spp., *Avena* spp.) characterized by grassland habitat. The portion crossing under SR 152 was reinforced with riprap bottom and sides. Trash and debris was evident within the channel.

Deadman Creek

Within the wetland study area, Deadman Creek has gravelly silty clay substrate that was dry at the time of the survey. The active flow channel ranges from 14 to 20 feet wide with an ordinary high-water depth ranging from 18 to 24 inches above the channel bottom. The narrow riparian community along most of the channel consists of cottonwoods, including numerous saplings as well as large mature trees. This section of the channel is devoid of emergent and aquatic vegetation, but does contain some woody debris. Immediately west of the wetland study area, Deadman Creek has been diverted from its natural channel into a constructed canal.

Dutchman Creek

The northeastern portion of Dutchman Creek within the wetland study area is highly disturbed with no riparian vegetation. The sandy substrate in this area has been disturbed by several unimproved roads, both parallel to the railroad tracks as well as crossing under the highway. To the southwest, the channel and adjacent riparian habitat are much less disturbed. In this area, the channel has a silty clay substrate with scattered patches of common rush, tall flat sedge, and curly dock scattered throughout. Small patches of cattail are also present in some sections of the channel, towards the southwestern end of the wetland study area. The channel was dry at the time of the survey with an active flow channel ranging from 20 to 30 feet wide. The depth of the ordinary high water appears to be between 2 and 3.5 feet. The narrow riparian community comprises large cottonwood and black walnut trees with scattered arroyo willow. Some trash and debris is present within the channel in this area.

Dry Creek

Dry Creek is characterized by an open water channel lined with dense growth of cattail and hardstem bulrush on both sides. The channel has a sandy substrate and an active flow channel between 35 and 38 feet wide with an ordinary high-water depth of 3 feet. The adjacent riparian community is characterized by scattered large arroyo willow and cottonwood trees, localized dense thickets of sandbar willow, and open areas with creeping wild rye, ripgut brome, saltgrass, mustard, and common rush. Further downstream, Dry Creek has been channelized and converted into a routinely maintained agricultural irrigation canal. The constructed earthen channel is 25 feet wide and approximately 5 feet deep with riprap along the edges. The channel supports small patches of cattail and hardstem bulrush with some tall flat sedge, sprangletop, common rush, and horseweed growing along the upper edges. Farm and canal maintenance roads are present along both sides of the channel and the area has no adjacent riparian vegetation.

Open Waters

This habitat type is characterized by shallow depressions such as incidental scrapes, tire ruts, and artificial hardpans that have an ephemeral hydroperiod. The features are typically bare or sparsely vegetated; adventive native and nonnative species are associated with both vernal and upland habitats. Inundation is not of a sufficient duration to produce hydric soils or defined wetland vegetation under normal hydrological cycles. Therefore, these features are not identified as wetlands. Inundation may nevertheless be of sufficient duration to provide marginal breeding habitat for special-status vernal pool species such as vernal pool branchiopods and western spadefoot.

5.1.4 Native Fauna Assemblage

Although the effects analysis in this report focuses on special-status wildlife species, it is anticipated that effects would also occur on other native fauna within the project footprint. Typical native fauna occurring in the habitat study area includes the western toad (*Anaxyrus boreas*), Sierran treefrog (*Pseudacris sierra*), western fence lizard (*Sceloporus occidentalis*), side-blotched lizard (*Uta stansburiana*), gopher snake (*Pituophis catenifer*), common garter snake (*Thamnophis sirtalis*), great egret (*Ardea alba*), red-winged blackbird (*Agelaius phoeniceus*), mourning dove (*Zenaida macroura*), American crow (*Corvus brachyrhynchos*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), American robin (*Turdus migratorius*),

western scrub jay (*Aphelocoma californica*), turkey vulture (*Cathartes aura*), Brewer's blackbird (*Euphagus cyanocephalus*), American coot (*Fulica americana*), California ground squirrel (*Otospermophilus beecheyi*), and Botta's pocket gopher (*Thomomys bottae*).

5.2 Special-Status Species

This section discusses special-status plant and wildlife species determined through prefield investigations and reconnaissance-level field surveys to have potential to occur within the habitat study area. Each discussion provides a summary of the species' regulatory status, physical and ecological description, observed or nearest reported occurrence, and potential to occur. Determinations on occurrence potential assume that a particular species could occur if suitable habitat is present. Figures 5-3 and 5-4 show the location of CNDDDB records for special-status species that have been reported within the region (the supplemental habitat study area is not depicted on Figures 5-3 and 5-4).

5.2.1 Special-Status Plants

Based on the background review (see Section 4.3.1, Background Review), 44 special-status plant species were initially evaluated for their potential to occur in the special-status plant study area. Appendix D-1 presents the list of 44 special-status plant species reported to occur in the region. Among these special-status plant species there were 9 federally and state-listed species and 35 other nonlisted species. With the exception of the vernal pool assessments conducted on April 30 and August 8, 2015, no surveys were done to determine if these species are present in the special-status plant study area. Instead, the evaluation was based on the species range, the presence of known occurrences in the Central Valley Wye vicinity, and the presence of potential habitat within the special-status plant study area.

No habitat is present in the special-status plant study area for nine of the species, and they are presumed to be absent and would not be affected by the Central Valley Wye. Seven species have low potential to occur; the special-status plant study area is within the range of these species, but they have never been documented in the Central Valley Wye vicinity. These seven species are also presumed to be absent and would not be affected by the Central Valley Wye. Nine species have moderate potential to occur. Habitat is present in the special-status plant study area for these species, but either the special-status plant study area is just outside of their range or only historic occurrences are present within 10 miles. Nineteen species have high potential to occur. The special-status plant study area is within the range of these species, there are known occurrences of the species within 10 miles, and habitat for the species is present. The 28 species with moderate to high potential to occur in the special-status plant study area are further discussed in the following subsections and are summarized in Table 5-4.

On April 30, 2015, botanists conducted a vernal pool habitat assessment and aquatic resource delineation on four parcels (i.e., Cementina property) in the northeastern portion of the Central Valley Wye special-status plant study area. While several vernal pools were observed on three of the parcels, no federally listed vernal pool plants were detected. On August 8, 2015, botanists conducted a follow-up assessment and late-season special-status plant surveys on the 4 Cementina parcels and 11 additional parcels with potential vernal pool habitat. Of the 15 parcels evaluated, only 4 (3 of the Cementina parcels and the Tesauro parcel) contained vernal pools. No federally listed plant species were observed during either survey. The results of these and future surveys will be summarized in future supplemental information submittals to the USFWS as the description of the Central Valley Wye alternatives is refined and if additional surveys are conducted. For the purposes of this analysis, special-status plant species are assumed present in all potentially suitable habitat (e.g., vernal pools) within the special-status plant study area.

Table 5-4 Special-Status Plant Species with Moderate to High Potential to Occur in the Special-Status Plant Study Area

Common Name	Scientific Name	Federal Status ^{1, 2}	State Status ³
Federally and State-Listed Special-Status Species			
Succulent owl's-clover	<i>Castilleja campestris</i> subsp. <i>Succulenta</i>	FT	SE
Palmate-bracted bird's-beak	<i>Chloropyron palmatum</i>	FE	SE
Delta button-celery	<i>Eryngium racemosum</i>	—	SE
Hoover's spurge	<i>Euphorbia hooveri</i>	FT	—
Other Special-Status Plant Species			
Alkali milk-vetch	<i>Astragalus tener</i> var. <i>tener</i>	—	—
Heartscale	<i>Atriplex cordulata</i>	—	—
Crownscale	<i>Atriplex coronata</i> var. <i>coronata</i>	—	—
Lesser saltscale	<i>Atriplex minuscula</i>	—	—
Vernal pool smallscale	<i>Atriplex persistens</i>	—	—
Subtle orache	<i>Atriplex subtilis</i>	—	—
Round-leaved filaree	<i>California macrophylla</i>	—	—
Succulent owl's-clover	<i>Castilleja campestris</i> subsp. <i>Succulenta</i>	FT	SE
Parry's rough tarplant	<i>Centromadia parryi</i> subsp. <i>rudis</i>	—	—
Hispid bird's-beak	<i>Chloropyron molle</i> subsp. <i>hispidum</i>	—	—
Hoover's cryptantha	<i>Cryptantha hooveri</i>	—	—
Ewan's larkspur	<i>Delphinium hansenii</i> subsp. <i>ewanianum</i>	—	—
Recurved larkspur	<i>Delphinium recurvatum</i>	—	—
Dwarf downingia	<i>Downingia pusilla</i>	—	—
Spiny-sepaled button-celery	<i>Eryngium spinosepalum</i>	—	—
Golden goodmania	<i>Goodmania luteola</i>	—	—
Hogwallow starfish	<i>Hesperevax caulescens</i>	—	—
Ferris' goldfields	<i>Lasthenia ferrisiae</i>	—	—
Little mousetail	<i>Myosurus minimus</i> subsp. <i>apus</i>	—	—
Shining navarretia	<i>Navarretia nigelliformis</i> subsp. <i>radians</i>	—	—
Fragile pentachaeta	<i>Pentachaeta fragilis</i>	—	—
Merced phacelia	<i>Phacelia ciliata</i> var. <i>opaca</i>	—	—
Sanford's arrowhead	<i>Sagittaria sanfordii</i>	—	—
Wright's trichocoronis	<i>Trichocoronis wrightii</i>	—	—

Source: CDFW, 2016c; 2016d; CNPS, 2014; USFWS, 2015

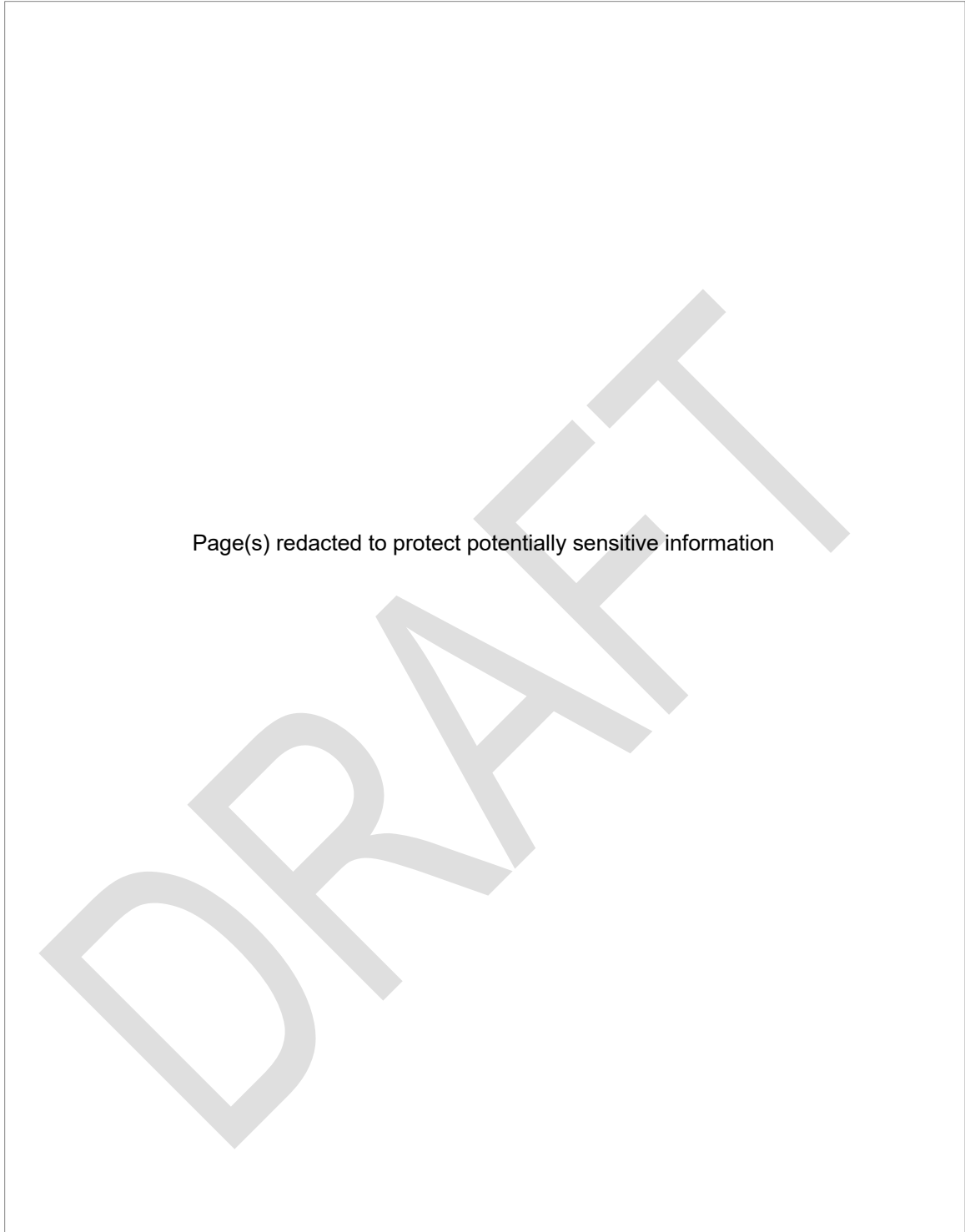
¹ Federal Status, FT = Threatened

² CH = Critical Habitat, designated by the U.S. Fish and Wildlife Service

³ State Status, SE = Endangered

5.2.1.1 *Alkali Milk-Vetch (Astragalus tener var. tener)*

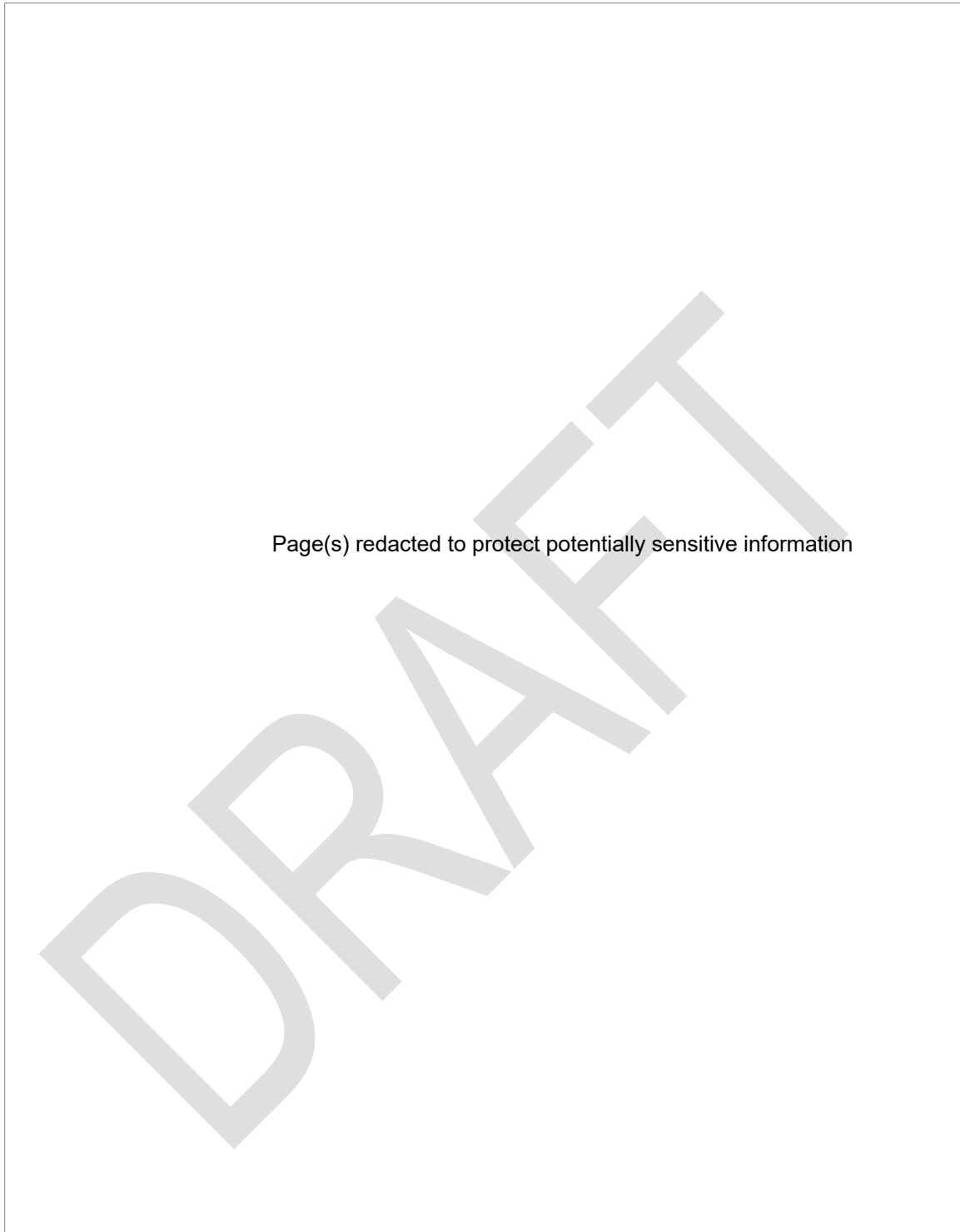
Alkali milk-vetch has no federal or state listing status but has a California Rare Plant Rank of 1B.2, indicating that it is rare in California and moderately threatened (CDFW 2016a). Alkali milk-vetch occurs at scattered locations in southern Sacramento Valley, northern San Joaquin Valley, and the eastern San Francisco Bay Area (Wojciechowski and Spellenberg 2012: page 750). The special-status plant study area is outside of the species' range, but the species occurs in the San Luis National Wildlife Refuge system and adjacent state wildlife areas, and one occurrence is within 10 miles. Habitat for alkali milk-vetch consists of grassy flats and vernal pool margins in areas with alkali soils (Wojciechowski and Spellenberg 2012: page 750; CNPS 2014). California annual grassland along the west side of the special-status plant study area, north of Sandy Mush Road and along the Eastside Bypass, may contain this habitat type.



Source: Authority, 2016; CDFW, 2016a

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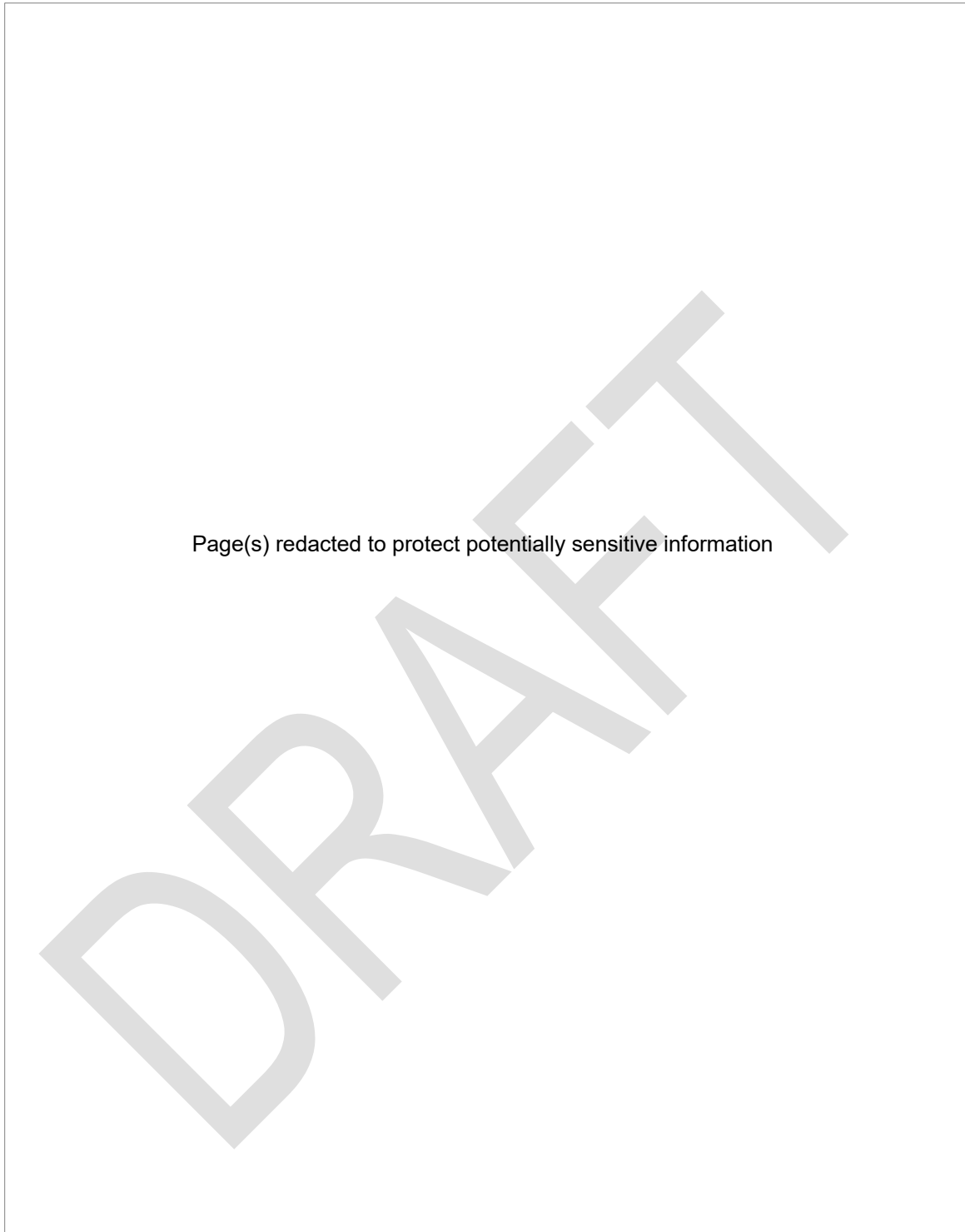
Figure 5-3a Special-Status Plants in the Special-Status Plant Study Area



Source: Authority, 2016; CDFW, 2016a

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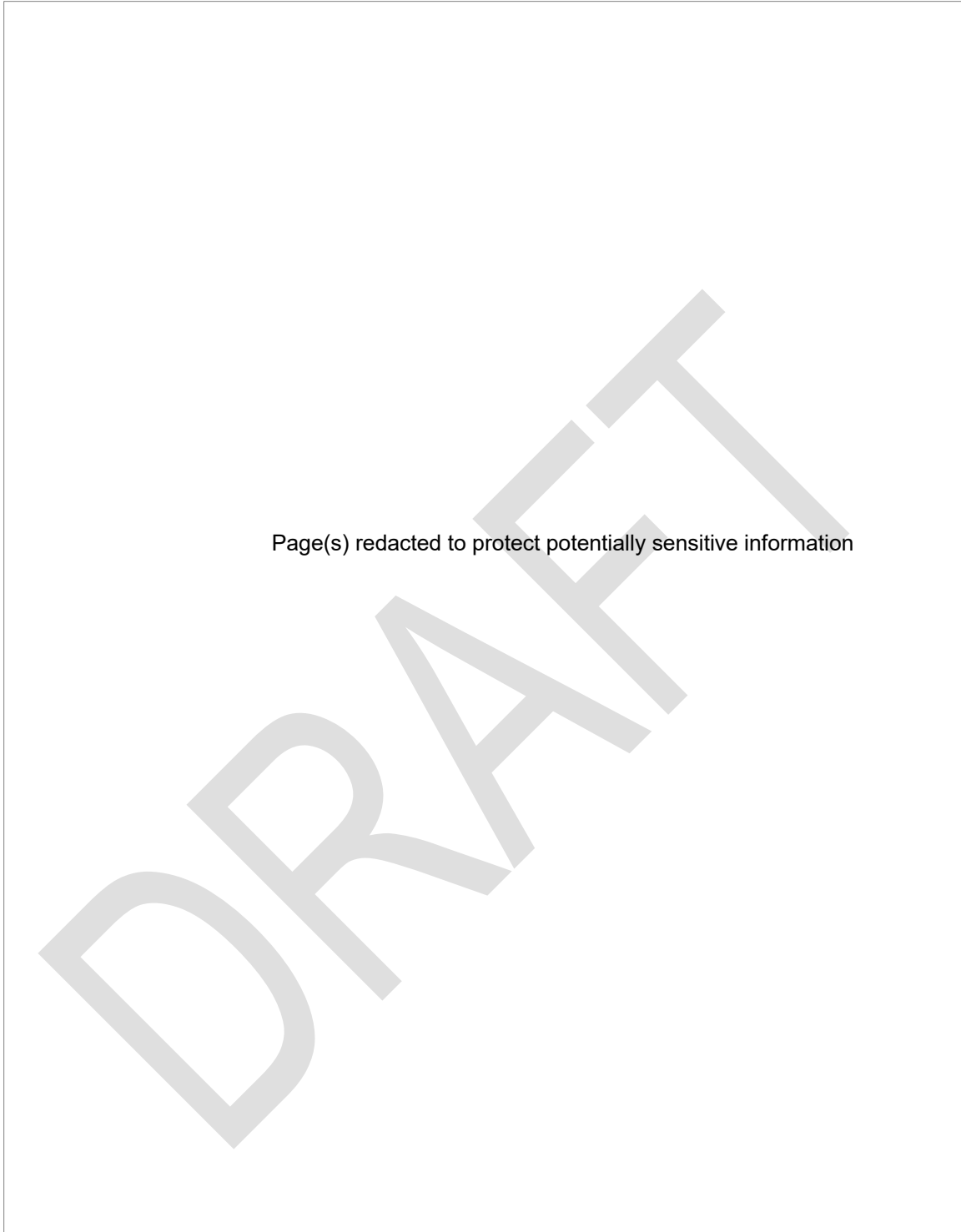
Figure 5-3b Special-Status Plants in the Special-Status Plant Study Area (cont.)



Source: Authority, 2016; CDFW, 2016a

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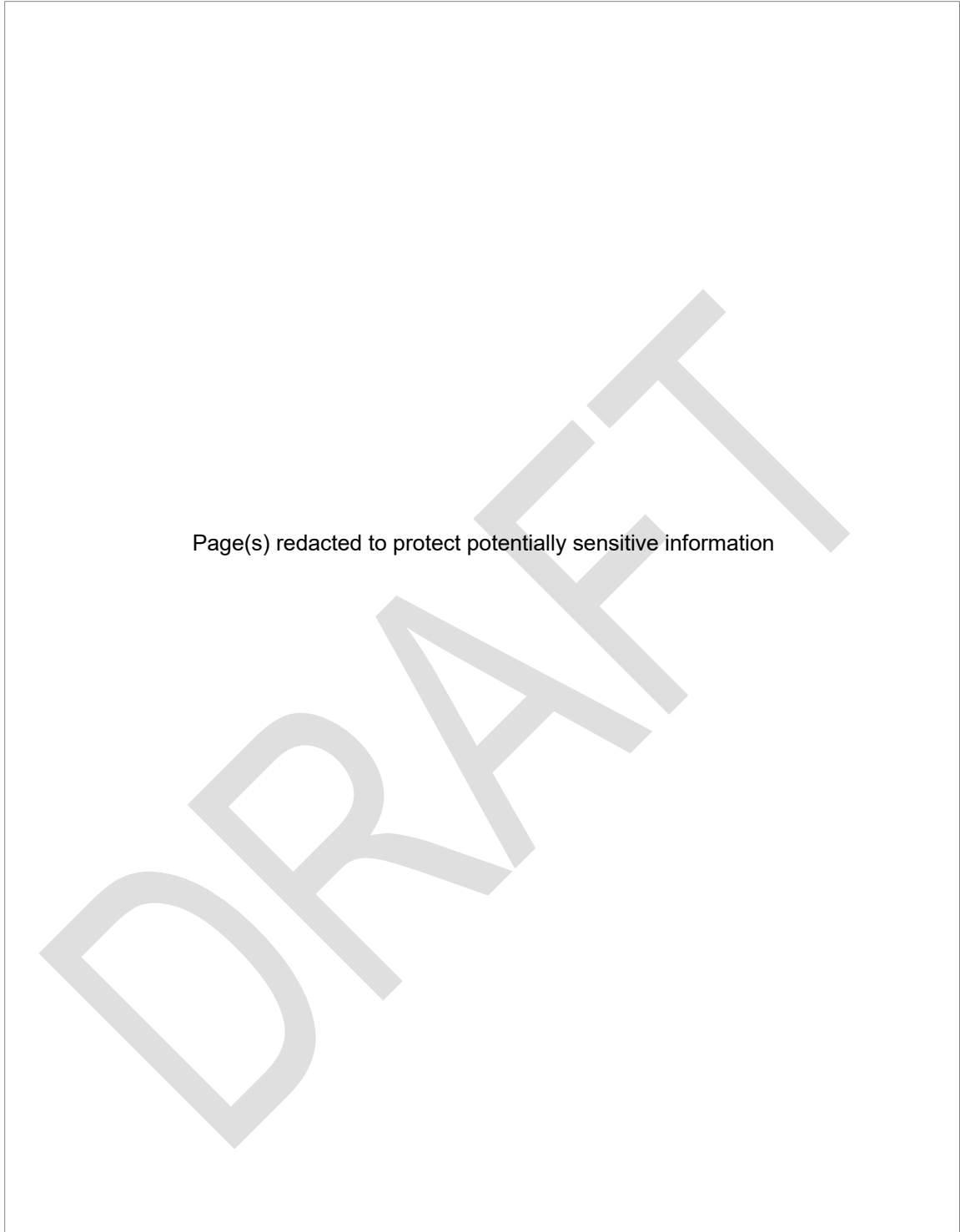
Figure 5-3c Special-Status Plants in the Special-Status Plant Study Area (cont.)



Source: Authority, 2016; CDFW, 2016a

FINAL – SEPTEMBER 27, 2016

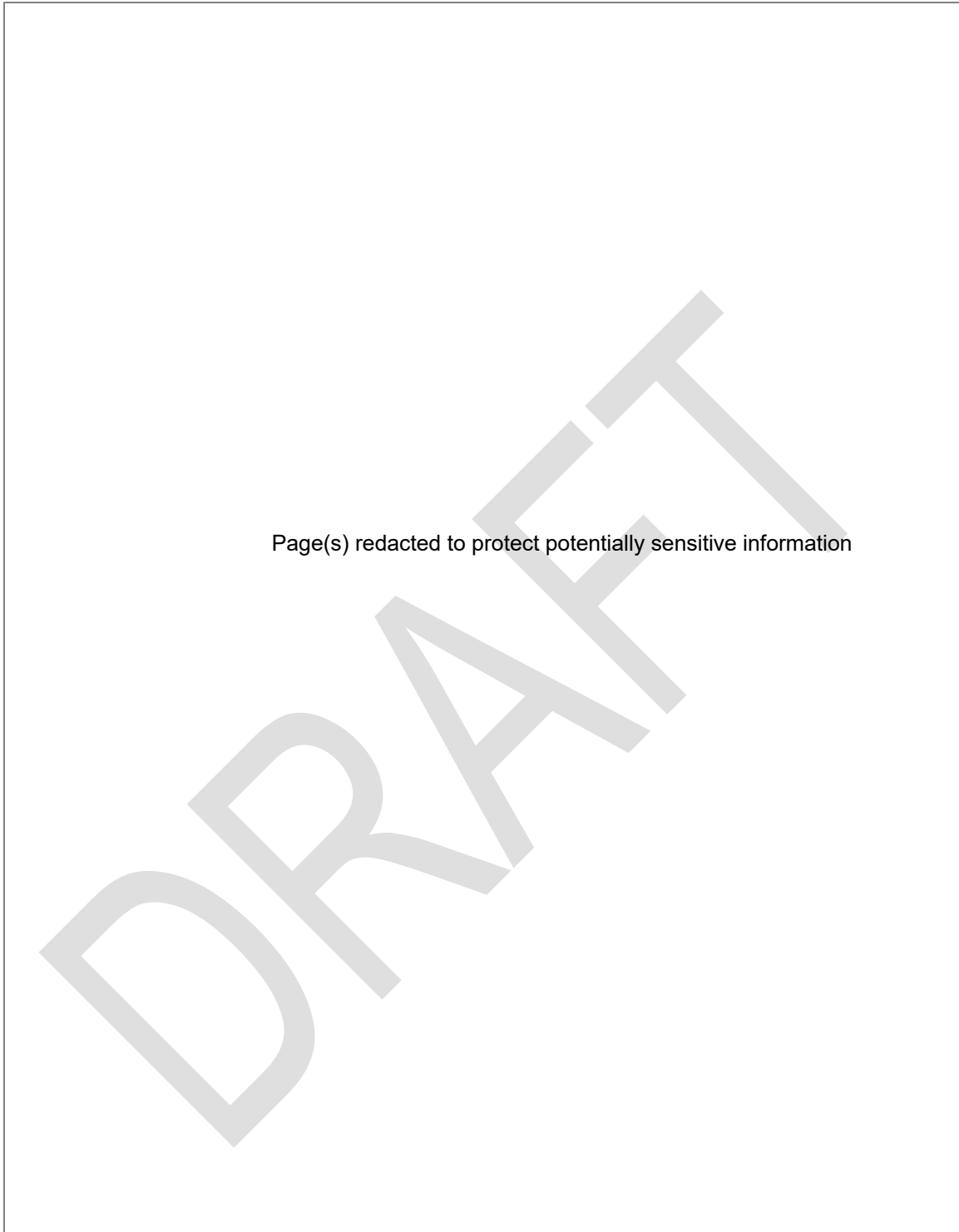
Figure 5-3d Special-Status Plants in the Special-Status Plant Study Area (cont.)



Source: Authority, 2016; CDFW, 2016a

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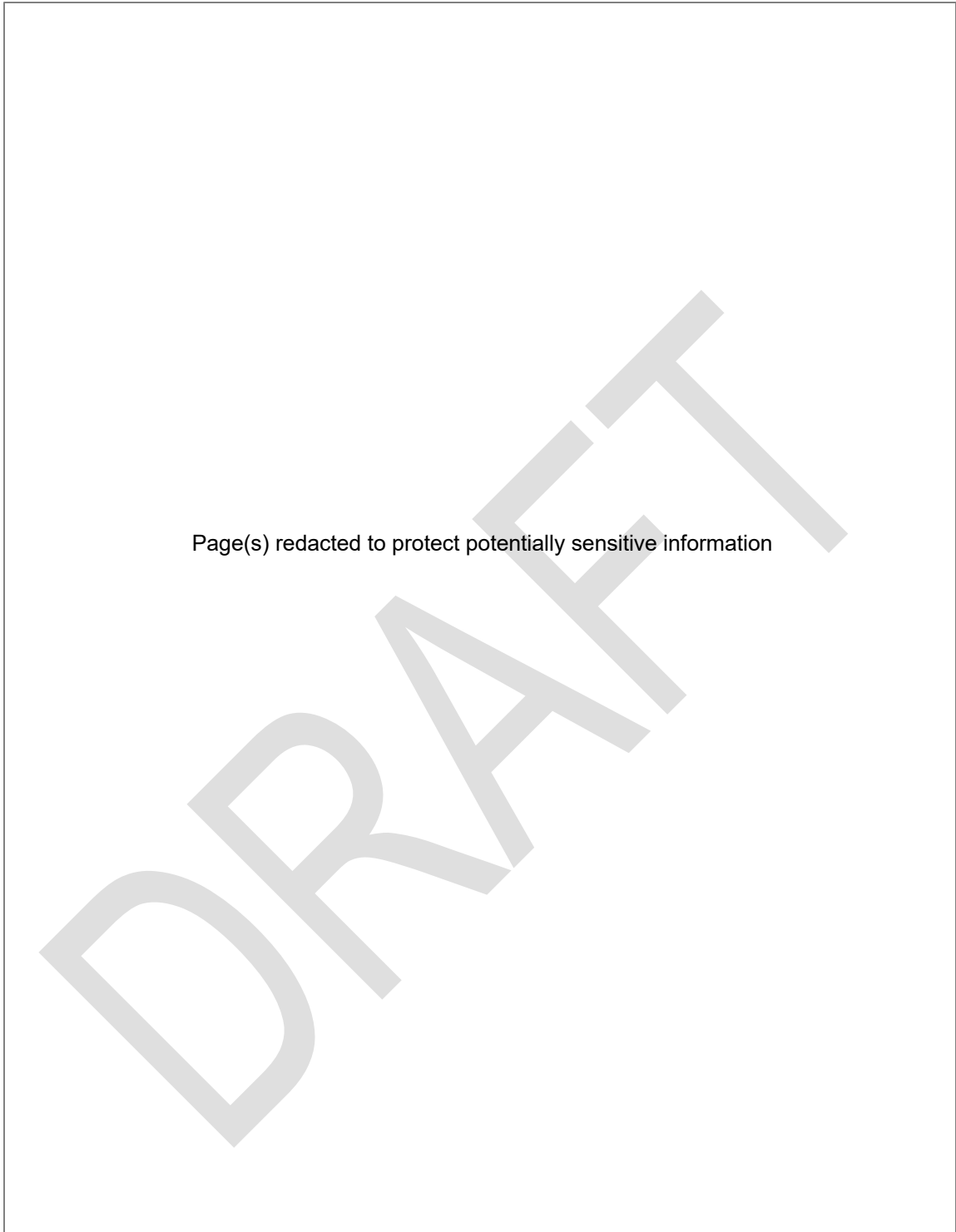
Figure 5-3e Special-Status Plants in the Special-Status Plant Study Area (cont.)



Source: Authority, 2016; CDFW, 2016b

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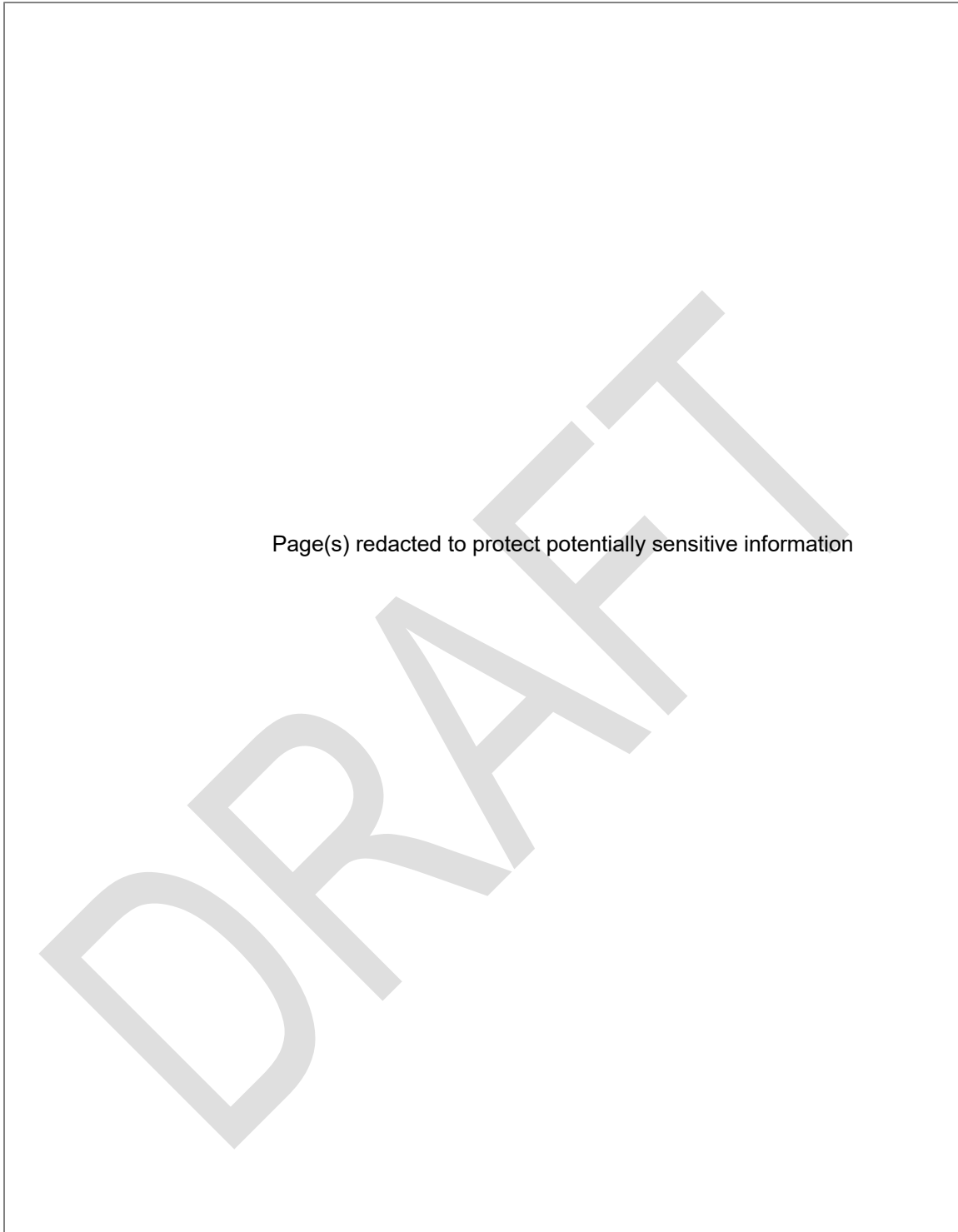
Figure 5-4a Special-Status Animals in the Habitat Study Area



Source: Authority, 2016; CDFW, 2016b

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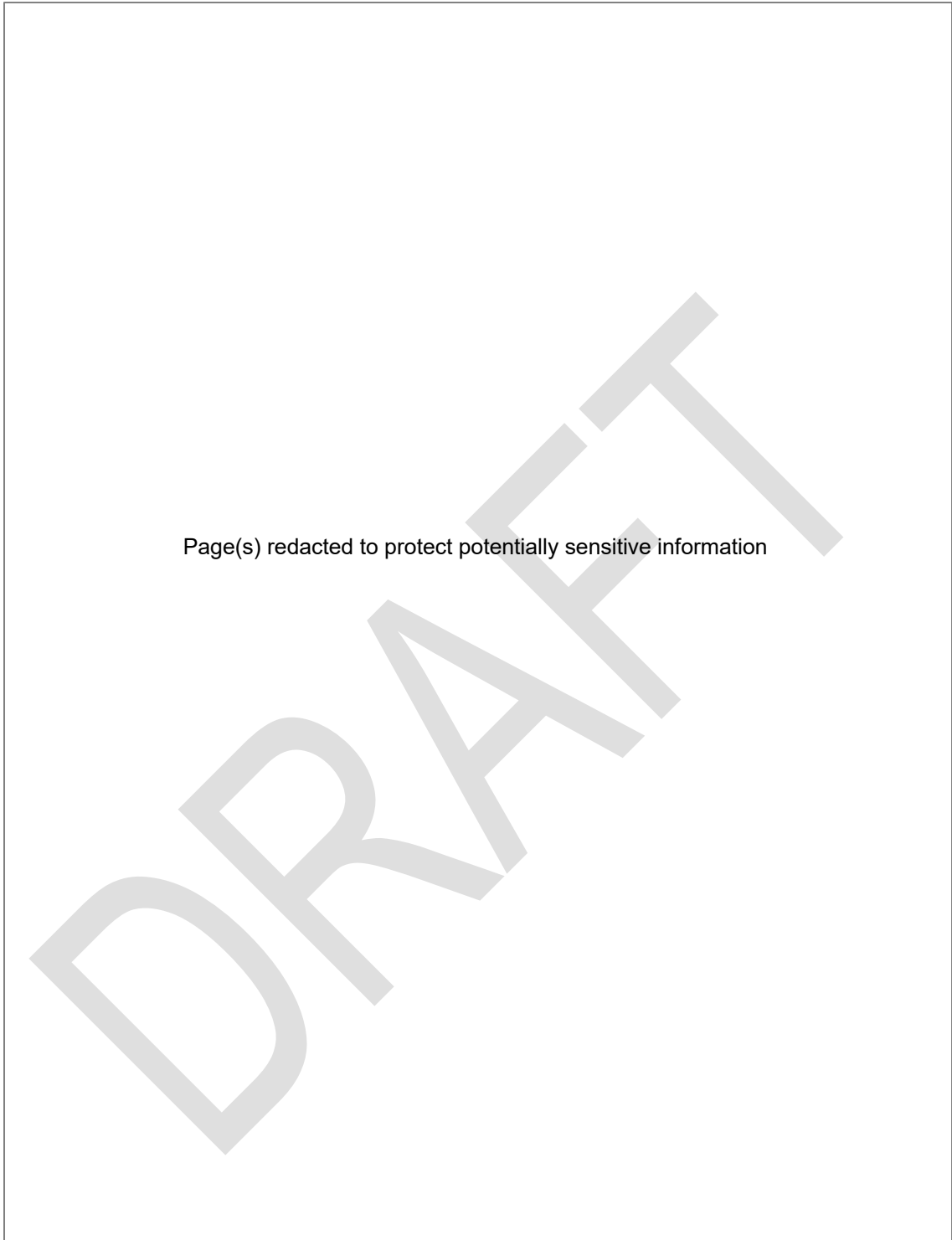
Figure 5-4b Special-Status Animals in the Habitat Study Area (cont.)



Source: Authority, 2016; CDFW, 2016b

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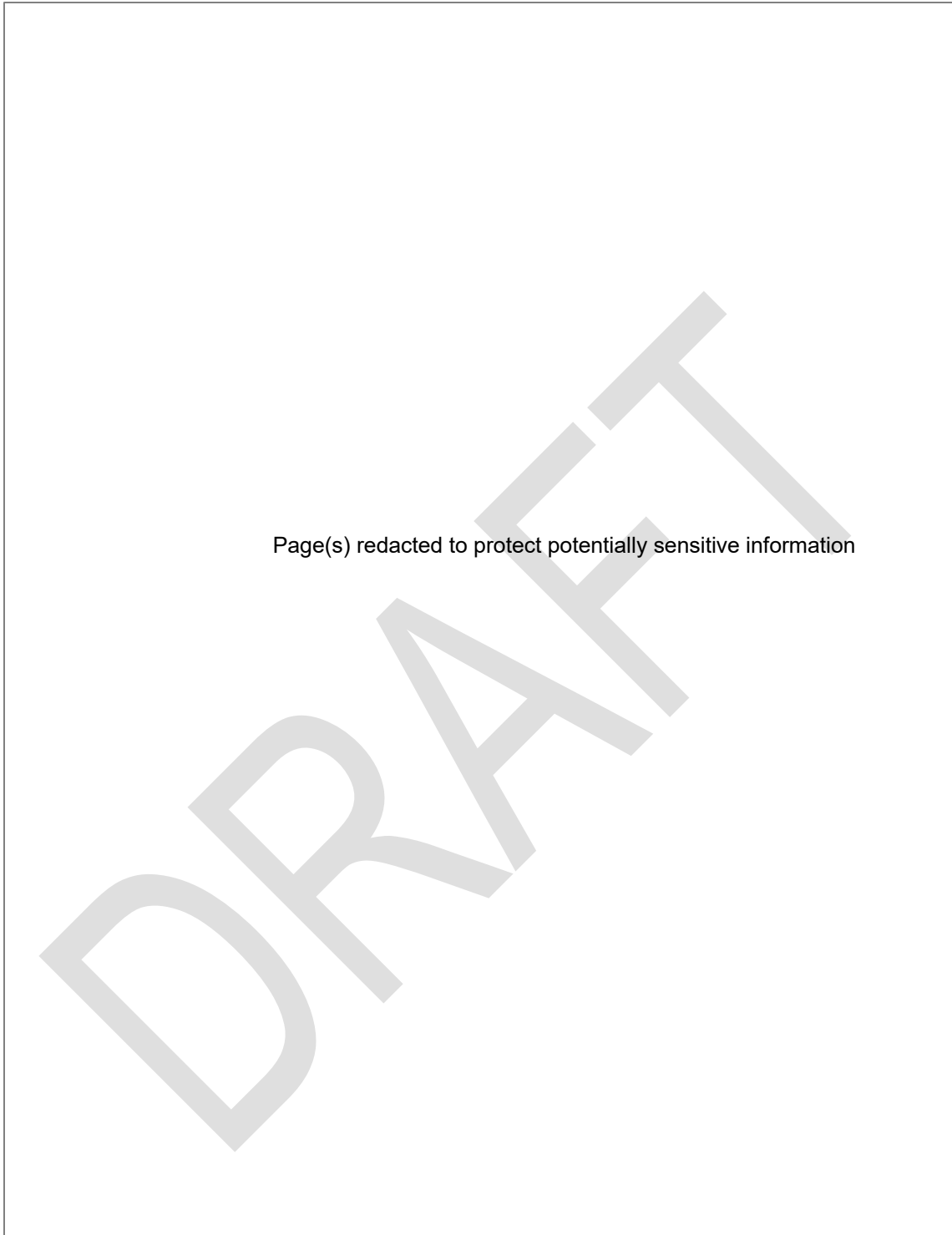
Figure 5-4c Special-Status Animals in the Habitat Study Area (cont.)



Source: Authority, 2016; CDFW, 2016b

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Figure 5-4d Special-Status Animals in the Habitat Study Area (cont.)



Source: Authority, 2016; CDFW, 2016b

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Figure 5-4e Special-Status Animals in the Habitat Study Area (cont.)

5.2.1.2 Heartscale (*Atriplex cordulata* var. *cordulata*)

Heartscale has no federal or state listing status but has a California Rare Plant Rank of 1B.2, indicating that it is rare in California and moderately threatened (CDFW 2016a). Heartscale occurs at scattered locations along western side of the Central Valley and the valleys of adjacent foothills (Zacharias 2012: page 633, CNPS 2014). The special-status plant study area is within the southern end of the species' range, and 15 occurrences are located in or within 10 miles. Heartscale grows in iodine bush scrub, alkali meadow, and alkali grasslands on the margins of vernal pools, swales, slickspots and scalds, on sandy soils (CDFW 2016a). California annual grassland along the west side of the special-status plant study area, north of Sandy Mush Road, contains this habitat type. One historic occurrence of heartscale is recorded from that location. California annual grassland along the Eastside Bypass may also contain this habitat type.

5.2.1.3 Crownscale (*Atriplex coronata* var. *coronata*)

Crownscale has no federal or state listing status but has a California Rare Plant Rank of 4.2, indicating that it has a limited distribution within California and is moderately threatened (CDFW 2016a). Crownscale is known from the southern Sacramento Valley, eastern San Joaquin Valley, eastern San Francisco Bay Area, and the inner South Coast ranges (Zacharias 2012: page 633). The special-status plant study area is within the species' range. Multiple occurrences are present in the San Luis National Wildlife Refuge system and adjacent state wildlife areas, within 10 miles (Consortium of California Herbaria 2014a). Crownscale occurs in habitats similar to that of heartscale, but on clay soils (CNPS 2014). California annual grassland along the west side of the special-status plant study area, north of Sandy Mush Road and along the Eastside Bypass, may contain this habitat type.

5.2.1.4 Lesser Saltscale (*Atriplex minuscula*)

Lesser saltscale has no federal or state listing status but has a California Rare Plant Rank of 1B.2, indicating that it is rare in California and moderately threatened (CDFW 2016a). Lesser saltscale occurs in the San Joaquin Valley from Merced County to Kern County, with a disjunct occurrence in Butte County (Zacharias 2012: page 634). The special-status plant study area is within the species' range, and eight occurrences are located in or within 10 miles (CDFW 2016c). Habitat for lesser saltscale is similar to that for heartscale, and the two species are often found growing together (CNPS 2014). California annual grassland along the west side of the special-status plant study area, north of Sandy Mush Road and along the Eastside Bypass, may contain this habitat type.

5.2.1.5 Vernal Pool Smallscale (*Atriplex persistens*)

Vernal pool smallscale has no federal or state listing status but has a California Rare Plant Rank of 1B.2, indicating that it is rare in California and moderately threatened (CDFW 2016a). Vernal pool smallscale occurs at scattered locations in the Central Valley from Glenn County to Tulare County (Zacharias 2012: page 636). The special-status plant study area is within the species' range, and six occurrences are located within 10 miles (CDFW 2016c). Habitat for vernal pool smallscale consists of vernal pools on alkali soils (Zacharias 2012). Vernal pools along the west side of the special-status plant study area, north of Sandy Mush Road, may provide habitat for this species. Other vernal pools in the special-status plant study area east of SR 99 occur on nonalkali soils, such as those of the San Joaquin series, and do not provide habitat for this species.

5.2.1.6 Subtle Orache (*Atriplex subtilis*)

Subtle orache has no federal or state listing status but has a California Rare Plant Rank of 1B.2, indicating that it is rare in California and moderately threatened (CDFW 2016a). Subtle orache occurs at scattered locations in the San Joaquin Valley from Stanislaus County to Kern County (Zacharias 2012: page 636). The special-status plant study area is within the species' range, and three occurrences are located in or within 10 miles (CDFW 2016c). Habitat for subtle orache is similar to that for heartscale, and the species frequently occurs with heartscale and lesser saltscale (CNPS 2014). California annual grassland along the west side of the special-status

plant study area, north of Sandy Mush Road and along the Eastside Bypass, may contain habitat for this species.

5.2.1.7 Round-Leaved Filaree (*California macrophylla*)

Round-leaved filaree has no federal or state listing status but has a California Rare Plant Rank of 1B.1, indicating that it is rare in California and seriously threatened (CDFW 2016a). Historically, round-leaved filaree occurred throughout much of California, including the Central Valley, southern North Coast ranges, San Francisco Bay Area, South Coast ranges, Channel Islands, Transverse ranges, and Peninsular ranges (Alarcón et al. 2012). Presently, it occurs at widely scattered locations within that range. The special-status plant study area is within the species' range, and one historic occurrence is located within 10 miles (CDFW 2016c). Habitat for round-leaved filaree consists of annual grassland and grassy areas in oak woodland, on heavy clay soils (CNPS 2014). California annual grasslands in the special-status plant study area may contain habitat for this species, although grassland areas with heavy clay soils are very uncommon in the special-status plant study area.

5.2.1.8 Succulent Owl's-Clover (*Castilleja campestris subsp. succulenta*)

Succulent owl's-clover is federally listed as threatened and state-listed as endangered. It has a California Rare Plant Rank of 1B.2, indicating that it is rare in California and moderately threatened (CDFW 2016a). Succulent owl's-clover occurs along the east side of the southern Sacramento Valley and the San Joaquin Valley, and in the southern Sierra Nevada foothills (Wetherwax et al. 2012: page 960). The special-status plant study area is on the margin of the species' range, and 20 occurrences are located within 10 miles (CDFW 2016c). Habitat for succulent owl's-clover consists of vernal pools (Wetherwax et al. 2012). Potential vernal pool habitat that supports succulent owl's-clover within the Central Valley Wye special-status plant RSA is present at two locations: 1) annual grassland southwest of the existing UPRR railroad between Deadman Creek and South Athlone Road, and 2) annual grassland to the northeast of the junction of Avenue 22 $\frac{3}{4}$ and Road 20 northeast of Fairmead (Cementina parcels).

5.2.1.9 Parry's Rough Tarplant (*Centromadia parryi subsp. rudis*)

Parry's rough tarplant has no federal or state listing status but has a California Rare Plant Rank of 4.2, indicating that it has limited distribution within California and is moderately threatened. Parry's rough tarplant occurs in scattered grassland remnants in the Sacramento Valley and northern San Joaquin Valley (Baldwin 2012: page 274). The special-status plant study area is at the margin of the species' range, and one occurrence near the Los Banos Wildlife Area is within 10 miles (Consortium of California Herbaria 2014b). Habitat for Parry's rough tarplant consists of grasslands and vernal pools on alkali soils, but it can also be found in disturbed habitats, such as roadsides (Baldwin 2012: page 274). California annual grassland along the west side of the special-status plant study area, north of Sandy Mush Road and along the Eastside Bypass, may contain habitat for this species.

5.2.1.10 Hoover's Spurge (*Euphorbia hooveri*, formerly *Chamaesyce hooveri*)

Hoover's spurge is federally listed as threatened but has no state listing status. It has a California Rare Plant Rank of 1B.2, indicating that it is rare in California and moderately threatened (CDFW 2016a). Hoover's spurge occurs at scattered locations in the Central Valley, ranging from Tehama County to Tulare County (Koutnik 2012: page 713). The special-status plant study area is within the species' range, and one occurrence is located within 10 miles (CDFW 2016c). Hoover's spurge grows below the high-water marks of large northern hardpan, volcanic mudflow, and alkali vernal pools (CNPS 2014). Vernal pools in the special-status plant study area may provide habitat for this species.

5.2.1.11 Hispid Bird's-Beak (*Chloropyron molle subsp. hispidum*)

Hispid bird's-beak has no federal or state listing status but has a California Rare Plant Rank of 1B.1, indicating that it is rare in California and seriously threatened (CDFW 2016a). It mostly is found in Merced County, although there are a few scattered occurrences in Placer, Alameda, and

Kern Counties, suggesting that it was historically more widespread (Consortium of California Herbaria 2014c). The special-status plant study area is within the species' range, and 19 occurrences are located within 10 miles (CDFW 2016c). Habitat for hispid bird's-beak consists of alkali grassland, alkali meadow, and alkali scrub, generally associated with saltgrass (CNPS 2014). California annual grassland along the west side of the special-status plant study area, north of Sandy Mush Road and along the Eastside Bypass, may contain habitat for this species.

5.2.1.12 Palmate-Bracted Bird's-Beak (*Chloropyron palmatum*)

Palmate-bracted bird's-beak is both federally and state-listed as endangered. It has a California Rare Plant Rank of 1B.1, indicating that it is rare in California and seriously threatened (CDFW 2016a). Palmate-bracted bird's-beak is known from the Livermore Valley and scattered locations in the Central Valley from Colusa County to Fresno County (Wetherwax and Tank 2012: page 966). The special-status plant study area is within the species' range, and four occurrences are located within 10 miles (CDFW 2016c). Palmate-bracted bird's-beak grows in alkali sink scrub, alkali meadow, and alkali grasslands (CNPS 2014). California annual grassland along the west side of the special-status plant study area, north of Sandy Mush Road and along the Eastside Bypass, may contain habitat for this species.

5.2.1.13 Hoover's Cryptantha (*Cryptantha hooveri*)

Hoover's cryptantha has no federal or state listing status. It has a California Rare Plant Rank of 1A, indicating that it is presumed to be extinct (CDFW 2016a). None of the only three known occurrences have been relocated in the last 75 years. The historic range of Hoover's cryptantha was the northern and central San Joaquin Valley (Kelley et al. 2012 p. 463). The special-status plant study area is within the species' range, and one recorded occurrence is present in the special-status plant study area (CDFW 2016c). Habitat for Hoover's cryptantha consisted of grasslands with coarse, sandy soils (Johnston 1937: page 24). Small patches of this habitat type may be present in the western half of the special-status plant study area, where California annual grasslands are present.

5.2.1.14 Ewan's Larkspur (*Delphinium hansenii* subsp. *ewanianum*)

Ewan's larkspur has no federal or state listing status but has a California Rare Plant Rank of 4.2, indicating that it has limited distribution within California and is moderately threatened (CDFW 2016a). Ewan's larkspur occurs along the eastern edge of the San Joaquin Valley and in the adjacent Sierra Nevada foothills (Koontz and Warnock 2012: page 1140). It ranges from Calaveras County to Kern County. The special-status plant study area is within the species' range, and one occurrence is located within 10 miles (Consortium of California Herbaria 2014d). Ewan's larkspur grows in grasslands and oak woodlands (Koontz and Warnock 2012). California annual grasslands in the special-status plant study area may contain habitat for this species.

5.2.1.15 Recurved larkspur (*Delphinium recurvatum*)

Recurved larkspur has no federal or state listing status but has a California Rare Plant Rank of 1B.2, indicating that it is rare in California and moderately threatened (CDFW 2016a). It is found primarily in the San Joaquin Valley and adjacent foothills and valleys, including the Carrizo Plain, but it is also found in the western Mojave Desert and formerly was found in the Sacramento Valley (Koontz and Warnock 2012: page 1411). The special-status plant study area is within the species' range, and four occurrences are located in or within 10 miles (CDFW 2016c). Recurved larkspur grows in valley sink scrub and grasslands on poorly drained, fine, alkaline soils (Koontz and Warnock 2012: page 1411). California annual grasslands along the west side of the special-status plant study area, north of Sandy Mush Road and along the Eastside Bypass, may contain habitat for this species.

5.2.1.16 Dwarf Downingia (*Downingia pusilla*)

Dwarf downingia has no federal or state listing status but has a California Rare Plant Rank of 2B.2, indicating that it is rare in California but also occurs outside of California, and it is moderately threatened (CDFW 2016a). In California, dwarf downingia is known from the inner

North Coast ranges, southern Sacramento Valley, and the northern and central portions of the San Joaquin Valley (Schultheis 2012: page 591). The special-status plant study area is located on the edge of the species' range, and two occurrences are located within 10 miles (CDFW 2016c). Habitat for dwarf downingia consists of vernal pools and seasonal wetlands (Schultheis 2012: page 591). Vernal pools at the north and east ends of the special-status plant study area may provide habitat for this species.

5.2.1.17 Delta Button-Celery (*Eryngium racemosum*)

Delta button-celery is state-listed as endangered but has no federal listing status. It has a California Rare Plant Rank of 1B.1, indicating that it is rare in California and seriously threatened (CDFW 2016a). It is found primarily in the historic floodplain of the San Joaquin River between San Joaquin County and Merced County (Preston et al. 2012: page 182). The special-status plant study area is located on the edge of the species' range, and seven occurrences are located within 10 miles (CDFW 2016c). Delta button-celery is associated with vernal mesic depressions that occur within the historic floodplain of the San Joaquin River, which can be characterized as vernal pool complex or, when stands of trees and shrubs occur in a mosaic with open areas of pools and swales, as valley/foothill riparian woodland (CNPS 2014). Other riparian habitat in the special-status plant study area along the San Joaquin River may contain habitat for this species.

5.2.1.18 Spiny-Sepaled Button-Celery (*Eryngium spinosepalum*)

Spiny-sepaled button-celery has no federal or state listing status but has a California Rare Plant Rank of 1B.2, indicating that it is rare in California and moderately threatened (CDFW 2016a). Spiny-sepaled button-celery occurs in the San Joaquin Valley from Contra Costa County to Kern County, Carrizo Plain and southern Sierra Nevada foothills (Preston et al. 2012: page 182). The special-status plant study area is located within the species' range, and 21 occurrences are located in or within 10 miles (CDFW 2016c). Habitat for spiny-sepaled button-celery consists of vernal pools and swales and other seasonal wetlands (Preston et al. 2012). Vernal pools at the north and east ends of the special-status plant study area may provide habitat for this species.

5.2.1.19 Golden Goodmania (*Goodmania luteola*)

Golden goodmania has no federal or state listing status but has a California Rare Plant Rank of 4.2, indicating that it has limited distribution within California and is moderately threatened (CDFW 2016a). It is found primarily in the western Mojave Desert, Owens Valley, and Long Valley, but its presence at several locations in the San Joaquin Valley indicates that it was historically more widespread there, as well (Consortium of California Herbaria 2014e). The special-status plant study area is located within the species' range, and two occurrences are located in or within 10 miles (Consortium of California Herbaria 2014e). Habitat for golden goodmania consists of meadows, grasslands, and scrub, with alkali clay soils (CNPS 2014). California annual grasslands along the west side of the special-status plant study area, north of Sandy Mush Road and along the Eastside Bypass, may contain habitat for this species.

5.2.1.20 Hogwallow Starfish (*Hesperovax caulescens*)

Hogwallow starfish has no federal or state listing status but has a California Rare Plant Rank of 4.2, indicating that it has limited distribution within California and is moderately threatened (CDFW 2016a). Hogwallow starfish is widely distributed throughout the Central Valley and adjacent foothills, generally below 1,000 feet (Morefield 2012: page 348). The special-status plant study area is located within the species' range, and at least one historic occurrence is within 10 miles (Consortium of California Herbaria 2014f). Habitat for hogwallow starfish consists of heavy clay soils in grasslands and vernal pools (Morefield 2012). California annual grasslands and vernal pools in the special-status plant study area may contain habitat for this species, although areas with heavy clay soils are very uncommon in the special-status plant study area.

5.2.1.21 Ferris' Goldfields (*Lasthenia ferrisiae*)

Ferris' goldfields has no federal or state listing status but has a California Rare Plant Rank of 4.2, indicating that it has a limited distribution within California and is moderately threatened (CDFW

2016a). It occurs primarily in the San Joaquin Valley, but a few scattered occurrences are present in the Sacramento Valley and the valleys of the adjacent foothills (Consortium of California Herbaria 2014g). The special-status plant study area is located within the species' range, and several occurrences are in or within 10 miles (Consortium of California Herbaria 2014g). Habitat for Ferris' goldfields consists of alkaline vernal pools and wet saline flats (Chan and Ornduff 2012: page 367). Vernal pools along the west side of the special-status plant study area, north of Sandy Mush Road, may contain habitat for this species.

5.2.1.22 Little Mousetail (*Myosurus minimus subsp. apus*)

Little mousetail has no federal or state listing status but has a California Rare Plant Rank of 3.1, indicating that it may be rare in California and seriously threatened, but more information is needed to make a final determination (CDFW 2016a). It occurs in the Sacramento and San Joaquin Valleys, the Carrizo Plains, and at other scattered locations at lower elevations in California (Consortium of California Herbaria 2014h). The special-status plant study area is located within the species' range, and two occurrences are in or within 10 miles (Consortium of California Herbaria 2014h). Habitat for little mousetail consists of alkaline vernal pools. Vernal pools along the west side of the special-status plant study area, north of Sandy Mush Road, may provide habitat for this species.

5.2.1.23 Shining Navarretia (*Navarretia nigelliformis subsp. radians*)

Shining navarretia has no federal or state listing status but has a California Rare Plant Rank of 1B.2, indicating that it is rare in California and moderately threatened (CDFW 2016a). The reported range includes valleys of the South Coast ranges, the San Joaquin Valley, and other scattered locations in the Sacramento Valley and southern Sierra Nevada foothills (CDFW 2016a). The special-status plant study area is located within the species' range, and 14 occurrences are within 10 miles (CDFW 2016c). Habitat for shining navarretia consists of heavy clay soils in grasslands and vernal pools (CNPS 2014). California annual grasslands and vernal pools in the special-status plant study area may contain habitat for this species, although areas with heavy clay soils are very uncommon in the region.

5.2.1.24 Fragile Pentachaeta (*Pentachaeta fragilis*)

Fragile pentachaeta has no federal or state listing status but has a California Rare Plant Rank of 4.3, indicating that it has a limited distribution within California but is not very threatened (CDFW 2016a). It occurs primarily in the southern Sierra Nevada, the southern South Coast ranges, and the western Transverse ranges, with a single historic occurrence reported from the San Joaquin Valley near Chowchilla, within the special-status plant study area (Consortium of California Herbaria 2014i). Habitat for fragile pentachaeta consists of grassy areas within chaparral, arid woodland, and lower montane conifer forest (Keil and Lane 2012: page 398). California annual grasslands in the special-status plant study area may support habitat for this species.

5.2.1.25 Merced Phacelia (*Phacelia ciliata var. opaca*)

Merced phacelia has no federal or state listing status but has a California Rare Plant Rank of 3.1, indicating that it may be rare in California and moderately threatened, but more information is needed to make a final determination (CDFW 2016a). It is known primarily from the San Joaquin Valley in Merced County, in the area between Le Grand and Planada (CNPS 2014). The special-status plant study area is on the margin of the range, and seven occurrences are within 10 miles (CDFW 2016c). Merced phacelia grows in heavy clay soils in grasslands (CNPS 2014). California annual grasslands in the eastern portion of the special-status plant study area may support habitat for this species.

5.2.1.26 Sanford's Arrowhead (*Sagittaria sanfordii*)

Sanford's arrowhead has no federal or state listing status but has a California Rare Plant Rank of 1B.2, indicating that it is rare in California and moderately threatened (CDFW 2016a). Sanford's arrowhead primarily occurs in the Sacramento and San Joaquin Valleys, although it has been reported at various other locations around California (CDFW 2016c). The special-status plant

study area is located within the species' range, and four occurrences are within 10 miles (CDFW 2016a). Habitat for Sanford's arrowhead consists of ponds, canals, and ditches with perennial, standing to slow-moving water (CNPS 2014). Freshwater marsh, natural watercourse, and open water habitats in the special-status plant study area may provide habitat for this species.

5.2.1.27 Wright's Trichocoronis (*Trichocoronis wrightii*)

Wright's trichocoronis has no federal or state listing status but has a California Rare Plant Rank of 2B.1, indicating that it is rare in California but also occurs outside of California, and it is seriously threatened in California (CDFW 2016a). Wright's trichocoronis is known from scattered locations in the Central Valley and South Coast (Keil and Powell 2012). The special-status plant study area is located within the species' range, and four occurrences are within 10 miles (CDFW 2016c). Habitat for Wright's trichocoronis includes alkaline meadow and floodplain wetlands (CNPS 2014). Other riparian habitat present in the special-status plant study area along the San Joaquin River may provide habitat for this species.

5.2.2 Special-Status Wildlife

Based on the background literature review (see Section 4.3.1), biologists identified 85 special-status wildlife species as having the potential to occur in the region. With the exception of California condor, which was added to the USFWS species list on its November 22, 2016 update, Appendix D-2 presents the evaluation of the potential for these species to occur in the habitat study area. Of the 85 special-status wildlife species initially evaluated, 31 species (including California condor) were ruled out based on the lack of suitable habitat, the extensive areas converted by human development, the extensive water diversions, and the 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 determined to have a moderate or high potential to occur in the habitat study area are listed in Table 5-5. The following subsections describe these special-status wildlife species, divided into special-status invertebrates, fish, amphibians, reptiles, birds, and mammals.

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

Common Name	Scientific Name	Federal Status ¹	State Status ²
Federally and State-Listed Species			
Invertebrates			
Conservancy fairy shrimp	<i>Branchinecta conservatio</i>	FE, CH	—
Vernal pool fairy shrimp	<i>Branchinecta lynchi</i>	FT, CH	—
Valley elderberry longhorn beetle	<i>Desmocerus californicus dimorphus</i>	FT	—
Vernal pool tadpole shrimp	<i>Lepidurus packardii</i>	FE	—
Fish			
Steelhead – Central Valley DPS	<i>Oncorhynchus mykiss irideus</i>	FT	—
Central Valley spring-run Chinook salmon	<i>Oncorhynchus tshawytscha</i>	FT	ST
Amphibians			
California tiger salamander	<i>Ambystoma californiense</i>	FT	ST
Reptiles			
Blunt-nosed leopard lizard	<i>Gambelia sila</i>	FE	SE/FP
Giant garter snake	<i>Thamnophis gigas</i>	FT	ST

Common Name	Scientific Name	Federal Status ¹	State Status ²
Birds			
Tricolored blackbird	<i>Agelaius tricolor</i>	BCC	C
Swainson's hawk	<i>Buteo swainsoni</i>	—	ST
Western snowy plover	<i>Charadrius alexandrinus nivosus</i>	FT	CSC
American peregrine falcon	<i>Falco peregrinus anatum</i>	Delisted	SE/FP
Greater sandhill crane	<i>Grus canadensis tabida</i>	—	ST/FP
Bald eagle	<i>Haliaeetus leucocephalus</i>	Delisted, BGEPA	SE/FP
Least Bell's vireo	<i>Vireo bellii pusillus</i>	FE	SE
Mammals			
San Joaquin kit fox	<i>Vulpes macrotis mutica</i>	FE	ST
Other Special-Status Wildlife Species			
Fish			
Hardhead	<i>Mylopharodon conocephalus</i>	--	CSC
Kern brook lamprey	<i>Lampetra hubbsi</i>	--	CSC
San Joaquin roach	<i>Lavinia symmetricus</i>	--	CSC
Chinook salmon—Central Valley fall/late-fall run evolutionarily significant unit	<i>Oncorhynchus tshawytscha</i>	FSC	CSC
Amphibians			
Western spadefoot	<i>Spea hammondi</i>	—	CSC
Reptiles			
Western pond turtle	<i>Actinemys marmorata</i>	—	CSC
Blainville's horned lizard	<i>Phrynosoma blainvillii</i>	—	CSC
Birds			
Grasshopper sparrow	<i>Ammodramus savannarum</i>	—	CSC
Golden eagle	<i>Aquila chrysaetos</i>	BGEPA	FP
Short-eared owl	<i>Asio flammeus</i>	—	CSC
Long-eared owl	<i>Asio otus</i>	—	CSC
Western burrowing owl	<i>Athene cucularia</i>	—	CSC
Redhead	<i>Aythya americana</i>	—	CSC
Red knot	<i>Calidris canutus roselaari</i>	BCC	—
Costa's hummingbird	<i>Calypte costae</i>	BCC	—
Lawrence's goldfinch	<i>Carduelis lawrencei</i>	BCC	—
Black tern	<i>Chlidonias niger</i>	—	CSC
Mountain plover	<i>Charadrius montanus</i>	—	CSC

Common Name	Scientific Name	Federal Status ¹	State Status ²
Northern harrier	<i>Circus cyaneus</i>	—	CSC
Fulvous whistling-duck	<i>Dendrocygna bicolor</i>	—	CSC
Yellow warbler	<i>Dendroica petechia brewsteri</i>	—	CSC
White-tailed kite	<i>Elanus leucurus</i>	—	FP
Lesser sandhill crane	<i>Grus canadensis</i>	—	CSC
Yellow-breasted chat	<i>Icteria virens</i>	—	CSC
Least bittern	<i>Ixobrychus exilis</i>	—	CSC
Loggerhead shrike	<i>Lanius ludovicianus</i>	—	CSC
Long-billed curlew	<i>Numenius americanus</i>	BCC	—
Whimbrel	<i>Numenius phaeopus</i>	BCC	—
American white pelican	<i>Pelecanus erythrorhynchos</i>	—	CSC
Yellow-billed magpie	<i>Pica nuttalli</i>	BCC	—
Nuttall's woodpecker	<i>Picoides nuttallii</i>	BCC	—
Oregon vesper sparrow	<i>Poocetes gramineus affinis</i>	—	CSC
Purple martin	<i>Progne subis</i>	—	CSC
Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	—	CSC
Mammals			
Pallid bat	<i>Antrozous pallidus</i>	—	CSC
Ringtail	<i>Bassariscus astutus</i>	—	FP
Western mastiff bat	<i>Eumops perotis californicus</i>	—	CSC
Western red bat	<i>Lasiurus blossevillii</i>	—	CSC
American badger	<i>Taxidea taxus</i>	—	CSC

Sources: USFWS, 2016a; CDFW, 2016c

Notes:

¹ Federal Status

FE – Endangered

FT – Threatened

CH – Critical Habitat designated by the U.S. Fish and Wildlife Service

BGEPA – Protected under the Bald Eagle/Golden Eagle Protection Act

BCC – Birds of Conservation Concern designated by the U.S. Fish and Wildlife Service

FSC – Federal Species of Concern

² State Status

SE – Endangered

ST – Threatened

C – Candidate for listing

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

5.2.2.1 *Invertebrates*

Four special-status invertebrates—Conservancy fairy shrimp, vernal pool fairy shrimp, vernal pool tadpole shrimp, and valley elderberry longhorn beetle—have potential to occur in the habitat study area. Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp have potential to occur in vernal pools and other seasonal wetlands, and valley elderberry longhorn beetles have potential to occur in elderberry shrubs located within the habitat study area.

Conservancy Fairy Shrimp (*Branchinecta conservatio*)

The Conservancy fairy shrimp is listed as endangered under the FESA. Federal critical habitat for this species was originally designated in August 6, 2003, and the critical habitat designation was revised on August 11, 2005. Conservancy fairy shrimp are known from six disjunct populations in California: Vina Plains, Tehama County; south of Chico, Butte County; Jepson Prairie, Solano County; Sacramento National Wildlife Refuge, Glenn County; near Haystack Mountain northeast of Merced, Merced County; and the Lockwood Valley, northern Ventura County (USFWS 2005, Johnson and Williams 2010).

Conservancy fairy shrimp completes its entire life cycle within the vernal pool and seasonal wetland habitat and therefore is dependent on suitable habitat and sufficient seasonal rains for survival. Fairy shrimp produce cysts (eggs) that lie dormant in the soil over summer and hatch during the winter rainy season, when favorable environmental conditions prevail: when pools are inundated, the water temperature is cool, and high oxygen concentration is present (Eriksen and Belk 1999). This species typically is associated with large (1 to 88 acres), clay-bottomed vernal pool playas with turbid water (USFWS 2005).

Six Conservancy fairy shrimp CNDDDB occurrences occur within 10 miles of the Central Valley Wye, though none have been recorded within 250 feet of the alignments. The nearest CNDDDB-reported occurrence is located approximately 3 miles west of the project footprint and is presumed extant (Occurrence 34; CDFW 2016c). No Conservancy fairy shrimp were observed during the 2014 reconnaissance field survey. Critical habitat for this species has been designated but no critical habitat occurs within 250 feet of the project footprint.

No protocol-level habitat assessment or focused presence/absence surveys have been conducted. The habitat study area is presumed to be within the current range of this species and potentially suitable, but moderate quality, vernal pool habitat is present within the habitat study area. Therefore, Conservancy fairy shrimp have a moderate potential to occur in this habitat type within the habitat study area.

Vernal Pool Fairy Shrimp (*Branchinecta lynchi*)

Vernal pool fairy shrimp is listed as threatened under the FESA. Federal critical habitat for this species was originally designated in August 6, 2003, and the critical habitat designation was revised on August 11, 2005. The vernal pool fairy shrimp is found at scattered locations throughout California's Central Valley, ranging from the Millville Plains and Stillwater Plains in Shasta County south through most of the length of the Central Valley, and to the eastern margins of the Coast ranges, from San Benito County south to Ventura County (USFWS 2005).

Vernal pool fairy shrimp inhabits clear to turbid water in earth sumps and grass- or mud-bottom vernal pools and swales in unplowed grasslands and basalt-flow vernal pools. The species also has been observed in rock outcrop pools, roadside ditches, road ruts, bulldozer scrapes, and backhoe pits. Fairy shrimp produce cysts (eggs) that lie dormant in the soil over summer and hatch during the winter rainy season, when favorable environmental conditions prevail: when pools are inundated, the water temperature is cool, and high oxygen concentration is present (Eriksen and Belk 1999).

There are numerous vernal pool fairy shrimp CNDDDB occurrences within 10 miles of the Central Valley Wye and one presumed extant occurrence is located within 250 feet of the SR 152 (North) to Road 13 Wye Alternative (Occurrence 310; CDFW 2016c). No vernal pool fairy shrimp were

observed during the 2014 reconnaissance field survey. Critical habitat has been designated for this species and does occur within the project footprint.

No protocol-level habitat assessment or focused presence/absence surveys have been conducted. The habitat study area is presumed to be within the current range of this species and potentially suitable, but moderate quality, vernal pool habitat is present within the habitat study area. Therefore, vernal pool fairy shrimp have a high potential to occur in vernal pool habitat within the project footprint.

Vernal Pool Tadpole Shrimp (*Lepidurus packardii*)

Vernal pool tadpole shrimp is listed as endangered under the FESA. Federal critical habitat for this species was originally designated in August 6, 2003, and the critical habitat designation was revised on August 11, 2005. The species is found in scattered locations throughout the Central Valley from Shasta County south to Merced County (USFWS 2005).

Vernal pool tadpole shrimp have been found in grassland pools with clear to highly turbid water, low conductivity, low alkalinity, and low total dissolved solids. It has also been observed in stock ponds, pools in old alluvial soil, grass bottom swales, and other seasonal wetlands. The life history of the vernal pool tadpole shrimp is similar to that of fairy shrimp, except the tadpole shrimp are longer-lived, usually persisting well into the early spring. These crustaceans hatch when the rains first inundate the habitat, maturing to adult in 20–30 days, mating, shedding their cysts (eggs), and dying. The resting cysts lie in the soil crust through the summer, hatching with the next season's rains. The cysts may lie dormant for decades before hatching (USFWS 2005).

There are several vernal pool tadpole shrimp CNDDDB occurrences within 10 miles of the Central Valley Wye, though none have been recorded within 250 feet of the alternatives. The nearest CNDDDB-reported occurrences are located approximately 1.25–1.5 miles northeast of the SR 152 (North) to Road 19 Wye Alternative (Occurrences 2 and 3; CDFW 2016c). No vernal pool tadpole shrimp were observed during the 2014 reconnaissance field survey. Critical habitat for this species has been designated and does occur within the project footprint.

No protocol-level habitat assessment or focused presence/absence surveys have been conducted. The habitat study area is presumed to be within the current range of this species and potentially suitable, but moderate quality, vernal pool habitat is present within the habitat study area. Therefore, vernal pool tadpole shrimp have a high potential to occur in vernal pools and other seasonal wetlands in the project footprint.

Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*)

Valley elderberry longhorn beetle is listed as threatened under the FESA. Federal critical habitat for this species was formally designated on August 8, 1980. Its range extends throughout the Central Valley and associated foothills, from the 3,000-foot contour in the Sierra Nevada foothills, across the valley floor, to the Central Valley watershed in the foothills of the Coast ranges (USFWS 2006a). Valley elderberry longhorn beetle's life cycle is entirely dependent on its host plants—elderberry shrubs (*Sambucus* spp.) (Collinge et al. 2001). Red and blue elderberry both occur commonly in riparian forest patches along the rivers, creeks, and other drainages in the Central Valley and surrounding foothills. Elderberry shrubs also can be found as isolated bushes or clumps of bushes in elderberry savannas adjacent to riparian vegetation (Collinge et al. 2001). Elderberry shrubs usually co-occur with other woody riparian plants, including Fremont cottonwood, California sycamore, various willows, wild grape, blackberry, and poison-oak (Collinge et al. 2001).

One valley elderberry longhorn beetle CNDDDB occurrences has been documented in riparian areas along the Chowchilla River approximately 0.75 mile east of the SR 152 (North) to Road 19 Wye Alternative (Occurrence 121; CDFW 2016c). No elderberry shrubs were observed during the 2014 reconnaissance field survey, although several elderberry shrubs were observed within the habitat study area during the 2015 Swainson's hawk surveys. These shrubs were on properties where access had not been granted, so the shrubs could not be directly observed. Although

critical habitat has been designated for this species, no critical habitat occurs in the Central Valley Wye vicinity; all critical habitat areas are located in Sacramento County.

The habitat study area is presumed to be within the current range of this species and potentially suitable, but moderate quality, riparian habitat is present within the habitat study area. Therefore, valley elderberry longhorn beetle has a moderate potential to occur in this habitat type within the habitat study area. Surveys to determine the presence of elderberry shrubs have not been conducted within the habitat study area.

5.2.2.2 Fish

As discussed in Section 5.1.3, the Central Valley Wye alternatives cross 11 watercourses. The Central Valley Wye alternatives would run parallel to and cross numerous agricultural drainages, including the San Joaquin River, Fresno River, Chowchilla River, Eastside Bypass, Ash Slough, Berenda Slough, Berenda Creek, Schmidt Creek, Deadman Creek, Dry Creek, and Dutchman Creek. These crossings were evaluated relative to their potential to provide suitable habitat for special-status aquatic species based on the criteria presented in Section 5.1.3. Through literature review, biologists determined that the San Joaquin River could potentially support one or more special-status fishes. Other than the San Joaquin River and Eastside Bypass, the alignments do not cross any watercourses identified by the San Joaquin River Restoration Program (SJRRP) Settlement (Natural Resources Defense Council 2006) for conveyance of interim and restoration flows. Bypasses for conveyance of interim and restoration flows, including the Chowchilla Bypass and Mariposa Bypass, are located west of the habitat study area.

Six special-status fish species have a moderate or greater potential to occur in the habitat study area—Kern brook lamprey (*Lampetra hubbsi*), Central Valley steelhead, Central Valley spring-run Chinook salmon, Central Valley fall/late fall-run Chinook salmon, hardhead (*Mylopharodon conocephalus*), and San Joaquin roach (*Lavinia symmetricus symmetricus*). Species descriptions and known and potential occurrences of these special-status fish species that could occur at the Central Valley Wye watercourse crossings are provided in this section.

Kern Brook Lamprey (*Lampetra hubbsi*)

Kern brook lamprey is designated as a California species of concern. The exact status of this species is uncertain because of the similarity with Western brook lamprey. Currently, very little information describing the abundance and distribution of Kern brook lamprey is available, perhaps because the species is often overlooked and seldom studied. Kern brook lamprey is endemic to the east side of the San Joaquin Valley. It is found in the lower Merced, Kaweah, Kings, and San Joaquin Rivers and in the Friant-Kern Canal (Moyle 2002).

Limited information is available regarding the life history of this species. Kern brook lamprey is a semelparous (i.e., individuals spawn once, then die) fish. Kern brook lamprey prefer silty backwaters of rivers emerging from the Sierra foothills. Ammocoetes favor substrates that are a mixture of sand and mud and are usually found in shallow pools and along edges of runs where flows are slight. Ammocoetes are abundant at times at the siphons of the Friant-Kern Canal. Riffles with gravels are used for spawning. This lamprey undergoes metamorphosis in the fall and spawns in the spring (Moyle 2002). Kern brook lamprey could occupy the San Joaquin River in the habitat study area.

Central Valley Steelhead (*Oncorhynchus mykiss*)

Central Valley steelhead are federally listed as threatened. *Oncorhynchus mykiss* either can be anadromous and called steelhead or can complete their life cycle within a given river reach. Freshwater residents typically are referred to as *rainbow trout*.

Depending on rain events, upstream migration of adult Central Valley steelhead can occur anywhere from November to February. Historical records for Central Valley steelhead indicate that adults enter the mainstem Sacramento River in July, peak in abundance in September and October, and continue migrating through February or March (McEwan and Jackson 1996, Hallock 1989). Most steelhead spawn from December through April, with peak spawning occurring from

January through March for all distinct population segments.⁷ Unlike Pacific salmon, some steelhead may survive to spawn more than one time, returning to the ocean between spawning migrations.

Newly emerged steelhead fry use shallow, protected areas along streambanks and move to faster, deeper areas of the river as they grow. Most juveniles occupy riffles in their first year of life, and some of the larger steelhead live in deep fast runs or in pools. Juvenile steelhead feed on a variety of aquatic and terrestrial insects and other small invertebrates. Juvenile steelhead migration to the ocean generally occurs from December through March; juvenile steelhead generally migrate as 1-year-olds (smolts) at a length of 6–8 inches (Barnhart 1986, Reynolds et al. 1993).

Central Valley steelhead occur in the San Joaquin River mainly from September to December (NMFS 2012). Some spawning occurs in the San Joaquin River eastside tributaries such as the Merced, Tuolumne, and Stanislaus Rivers. Steelhead have been captured in the San Joaquin River's eastside tributaries, but populations are small (McEwan 2001).

Central Valley Chinook salmon (*Oncorhynchus tshawytscha*) (Spring-Run and Fall/Late Fall-Run)

Spring-Run

The Central Valley spring-run Chinook salmon evolutionarily significant unit,⁸ which includes populations spawning in the Sacramento River and its tributaries, is listed as threatened under the FESA and CESA. Spring-run Chinook salmon historically occurred from the upper tributaries of the Sacramento River to the upper tributaries of the San Joaquin River. However, they have been extirpated from the San Joaquin River system. The only streams in the Central Valley with remaining wild spring-run Chinook salmon populations are the Sacramento River and its tributaries, including the Yuba River, Mill Creek, Deer Creek, and Butte Creek. Critical habitat is designated for spring-run Chinook salmon in the Sacramento River and upper tributaries.

Spring-run Chinook salmon enter the Sacramento River from late March through September (Reynolds et al. 1993), but peak abundance of immigrating adults in the Delta and lower Sacramento River occurs from April through June. Adult spring-run Chinook salmon remain in deep-water habitats downstream of spawning areas during summer until their eggs fully develop and become ready for spawning. Spring-run Chinook salmon spawn primarily upstream of the Red Bluff Diversion Dam in the mainstem Sacramento River and the aforementioned tributaries. Spawning occurs from mid-August through early October (Reynolds et al. 1993). A small portion of an annual year-class may emigrate as post-emergent fry (less than 1.8 inches long) and reside in the Delta undergoing smoltification. However, most are believed to rear in the upper Sacramento River and tributaries during winter and spring, emigrating as juveniles (more than 1.8 inches long). The timing of juvenile emigration from the spawning and rearing reaches can vary depending on tributary of origin and can occur from November through June. Spring-run Chinook salmon will be introduced into the San Joaquin River in 2016 through a hatchery program (Salmon Conservation and Research Facility) (USBR 2013a).

Fall/Late Fall-Run

Central Valley fall-run and late fall–run Chinook salmon are commercially and recreationally important. These evolutionarily significant units are federal species of concern. Because the fall-run Chinook salmon is currently the largest run of Chinook salmon in the Sacramento–San

⁷ A *distinct population segment* is a vertebrate population or group of populations that is discrete from other populations of the species and significant in relation to the entire species. The FESA provides for listing species, subspecies, or distinct population segments of vertebrate species.

⁸ An *evolutionarily significant unit* is a vertebrate population or group of populations that is substantially reproductively isolated from other conspecific populations and that represents an important component of the evolutionary legacy of the species.

Joaquin River system, it continues to support commercial and recreational fisheries of significant economic importance.

In general, adult fall-run Chinook salmon migrate into the Sacramento River, San Joaquin River, and their tributaries from July through December, peaking from mid-October through November. Due to questionable water quality conditions in the San Joaquin River during the summer and late fall months, San Joaquin Chinook salmon may not migrate upstream until after the first precipitation events in October to November. Fall-run Chinook salmon arrive at their spawning grounds in mature condition and spawn soon after. Fall-run Chinook salmon spawn during early October through late December in both the Sacramento and San Joaquin Rivers and incubation takes place during October through March. The peak of spawning is in October and November as water temperature drops. Juvenile Chinook salmon emerge from the gravel and migrate downstream to the ocean soon after emerging, rearing in the streams for only few months before emigrating to the ocean.

Literature was reviewed for the habitat study area and NMFS listed fall-run Chinook salmon as occurring in the study area. The study area may not be suitable for spawning or rearing, but would be a migratory corridor for both adult and juvenile fall-run Chinook salmon. Consequently, fall-run emigrants may be present in the San Joaquin River from January through June and remain in the Delta for variable lengths of time before ocean entry.

Hardhead (*Mylopharodon conocephalus*)

Hardhead are a California species of concern. Hardhead are found in undisturbed, low- to mid-elevation streams with summer water temperatures greater than 68°F. Optimal temperatures for hardhead range from 75 to 82°F. Hardhead typically are found in association with Sacramento pikeminnow and usually Sacramento sucker (Moyle 2002). Adults typically move upstream into tributaries to spawn primarily in April and May (Moyle 2002). Spawning behavior is not well documented, but it is thought that fertilized eggs are deposited on beds of gravel in riffles, runs, or the heads of pools. Although little is known about the early life history of hardhead, it is thought that young hardhead use shallow stream edges and backwater habitat with aquatic vegetation along perimeters of shallow pools as cover, and, once they grow larger, move into deeper habitats (Moyle 2002). In stream habitat, hardhead less than 6 inches use pools and slow runs for foraging during the day (Moyle 2002). Threats to hardhead include habitat loss and predation by introduced centrarchid fishes. Large to medium-sized streams with cool to warm water have been dammed and diverted, creating unsuitable temperature and flow regimes, and have isolated upstream areas. Hardhead occupy the San Joaquin River.

San Joaquin Roach (*Lavinia symmetricus symmetricus*)

San Joaquin roach are a subspecies of California roach and a California species of concern. They are generally found in small, warm streams and tolerate relatively high temperatures and low dissolved oxygen levels. However, they can also thrive in cold, clear, heavily modified habitats and in the main channels of rivers. Roach are most abundant in streams that lack nonnative predatory fish and with only one or two other species. They will occupy habitat that allows refuge from predatory fish, such as fast riffle habitat or pool habitat depending on other species that are present. Spawning occurs March through July, depending on when water temperatures reach 61°F (Moyle 2002). San Joaquin roach could occupy the San Joaquin River.

5.2.2.3 Amphibians

Two special-status amphibians have a moderate or greater potential to occur in vernal pools, other seasonal wetlands, and adjacent California annual grassland within the habitat study area—California tiger salamander and western spadefoot.

California Tiger Salamander (*Ambystoma californiense*)

The central population of California tiger salamander is federally listed as threatened under the FESA and the distinct population segments in Santa Barbara and Sonoma Counties are federally listed as endangered; the entire population is listed as a threatened species under the CESA. Federal critical habitat for this species was designated on August 23, 2005. The species is

endemic to the San Joaquin–Sacramento River Valleys, bordering foothills, and coastal valleys of central California. The species occurs in the Coast range from Sonoma County and the Colusa-Yolo County line south to Santa Barbara County, and from southern Sacramento County south to northern Kern County in the Central Valley (Jennings and Hayes 1994).

Adult California tiger salamanders move from subterranean burrow sites to breeding pools during November–February after warm winter and spring rains. Eggs are laid in January and February, at the height of the rainy season. Nine to twelve weeks are needed to complete development through metamorphosis. During winter, California tiger salamanders take refuge in damp places near the surface of the ground during the day and emerge at night to forage. During dry weather, these salamanders take refuge in ground squirrel burrows, crevices in the soil, or other burrows. California tiger salamanders are known to travel large distances from breeding ponds into upland habitats. One study found that 20–25 percent of individuals captured at one pond were recaptured at ponds approximately 1,900 and 2,200 feet away (Trenham 2001). In addition to traveling long distances during migration to or from ponds, tiger salamander may reside in burrows that are a long distance from ponds. Most California tiger salamander spend most of their lives (more than 95 percent) in terrestrial habitats surrounding suitable aquatic habitat (Searcy et al. 2013). Dry-season refuge sites within approximately 1 mile of suitable breeding habitat are likely a necessary requirement because this species is absent from sites with seemingly suitable breeding habitat where surrounding upland habitat is lacking in small mammal burrows (Jennings and Hayes 1994).

There are numerous California tiger salamander CNDDDB occurrences within 10 miles of the Central Valley Wye. The nearest occurrence is 200 feet east of the SR 152 (North) to Road 19 Wye Alternative (Occurrence 306; CDFW 2016c). Critical habitat for this species has been designated but no critical habitat occurs within or within 250 feet of the project footprint. No California tiger salamanders were observed during the 2014 reconnaissance field survey.

No protocol-level habitat assessment or focused presence/absence surveys have been conducted. Potentially suitable breeding habitat exists in vernal pools and seasonal retention basins that are surrounded by California annual grassland. Potentially suitable upland habitat for this species exists in California annual grassland if they are adjacent to potentially suitable breeding habitat. Because extant occurrences have been reported and potentially suitable aquatic and upland habitat for this species exists, the California tiger salamander has a high potential to occur within the project footprint.

Western Spadefoot (*Spea hammondi*)

The western spadefoot is a California species of special concern. The western spadefoot is distributed among the Sierra Nevada foothills, Central Valley, Coast ranges, and coastal counties in Southern California (Jennings and Hayes 1994).

Western spadefoot are primarily terrestrial and spend most of their lives feeding and aestivating in upland habitats. Upland habitats consist of washes, river floodplains, alluvial fans and alkali flats in valley and foothill grasslands, open chaparral, and pin-oak woodlands. Western spadefoot prefer areas with open vegetation and friable soils. Upland habitat needs to be in close proximity, typically within 1,207 feet of aquatic habitat, including vernal pools, temporary rain pools, pools in creeks and streams, and stock ponds (USFWS 2005). They require seasonal wetlands for reproduction and metamorphosis. Adult western spadefoots spend most of the year in self-excavated underground retreats and possibly in mammal burrows (Stebbins 2003). They emerge from underground retreats during heavy rains in fall and winter and migrate to aquatic habitats where they mate and spawn in aquatic habitats in late winter or early spring (Jennings and Hayes 1994).

There are numerous western spadefoot CNDDDB occurrences within 10 miles of the Central Valley Wye. The nearest occurrence is located approximately 1.75 miles east of the SR 152 (North) to Road 19 Wye Alternative (Occurrence 240; CDFW 2016c). No western spadefoot were observed during the 2014 reconnaissance field survey.

No focused presence/absence surveys have been conducted. Because there is a presumed extant occurrence and potentially suitable aquatic and upland habitat within the habitat study area, western spadefoot is considered to have a high potential to occur within the project footprint.

5.2.2.4 Reptiles

Four special-status reptile species have a moderate or greater potential to occur within the habitat study area—western pond turtle, blunt-nosed leopard lizard, Blainville’s horned lizard, and giant garter snake.

Western Pond Turtle (*Actinemys marmorata*)

The western pond turtle is a California species of special concern. It was found historically in most Pacific slope drainages between the Oregon and Mexico borders. It still is found in suitable habitats west of the Sierra-Cascade crest (Jennings and Hayes 1994).

Western pond turtles require some slow-water aquatic habitat and are uncommon in high-gradient streams (Jennings and Hayes 1994). The banks of inhabited waters usually have thick vegetation, but basking sites such as logs, rocks, or open banks must also be present. Depending on the latitude, elevation, and habitat type, the western pond turtle may become inactive over winter or remain active year-round. In addition to appropriate aquatic habitat, these turtles require an upland area for breeding in the vicinity of the aquatic habitat, often within 656 feet. Nest sites typically are found on slopes that are unshaded, with high clay or silt composition. Eggs are laid from March to August, depending on local conditions, and incubation lasts from 73 to 80 days (Jennings and Hayes 1994). While the turtles may be active all year along the coast, at interior locations such as the Central Valley, pond turtles are more likely to be active between April and October. Western pond turtles have been documented hibernating up to 1,110 feet from a watercourse (Jennings and Hayes 1994).

There are 14 western pond turtle CNDDDB occurrences within 10 miles of the Central Valley Wye. The nearest occurrence is located approximately 3.0 miles southwest of the Central Valley Wye near Dutchman Creek and El Nido Canal (Occurrence 55; CDFW 2016c). No western pond turtles were observed during the 2014 reconnaissance field survey.

No focused presence/absence surveys have been conducted. The habitat study area is presumed to be within the current range of this species and potentially suitable natural and constructed watercourse habitats and suitable upland habitat are present within the habitat study area. Therefore, the western pond turtle has a moderate potential to occur in these habitat types within the habitat study area.

Blunt-Nosed Leopard Lizard (*Gambelia sila*)

The blunt-nosed leopard lizard is federally listed as endangered under the FESA and is listed as endangered under the CESA. This species is also a fully protected species under the California Fish and Game Code. Federal critical habitat for this species has not been designated. Blunt-nosed leopard lizards are endemic to the San Joaquin Valley and the Carrizo Plain in California. Historically, this species was found from Stanislaus County in the north to the Tehachapi Mountains in Kern County in the south. The foothills of the Sierra Nevada and Coast ranges roughly define the eastern and western boundaries of its distribution, except for populations on the Carrizo Plain and in the Cuyama Valley west of the San Joaquin Valley. Blunt-nosed leopard lizard occurs at elevations below 2,600 feet (USFWS 2010b).

Blunt-nosed leopard lizards are found in sparsely vegetated plains, alkali flats, grasslands, low foothills, canyon floors, and large washes. They inhabit areas with sandy soils and scattered vegetation and are usually absent from thickly vegetated habitats. On the floor of the San Joaquin Valley, they are usually found in nonnative grassland, valley sink scrub habitats, valley needlegrass grassland, alkali playa, and valley saltbush scrub. Blunt-nosed leopard lizard use small rodent burrows for shelter, predator avoidance, and behavioral thermoregulation. These burrows may be abandoned ground squirrel tunnels, or occupied or abandoned kangaroo rat tunnels (USFWS 2010b).

There are 11 blunt-nosed leopard lizard CNDDDB occurrences within 10 miles of the Central Valley Wye. The nearest occurrence is located approximately 1.25 miles northwest of the Avenue 21 to Road 13 Wye Alternative permanent utility easement (Occurrence 116; CDFW 2016c). Another blunt-nosed leopard lizard occurrence is located approximately 4 miles south of the Avenue 21 to Road 13 Wye Alternative (Occurrence 403; CDFW 2016c). No critical habitat has been designated for this species. No blunt-nosed leopard lizards were observed during the 2014 reconnaissance field survey.

No protocol-level presence/absence surveys have been conducted. The habitat study area is presumed to be within the current range of this species and potentially suitable grassland habitats are present within the habitat study area. Therefore, the blunt-nosed leopard lizard has a moderate potential to occur in these habitat types within the habitat study area.

Blainville's Horned Lizard (*Phrynosoma blainvillii*)

The Blainville's horned lizard is a California species of special concern. This species occurs throughout the Central Valley and Coast ranges from Shasta County south to Los Angeles, Ventura, and Santa Barbara Counties (Stebbins 2003). Blainville's horned lizards occur in a variety of habitats, including clearings in riparian woodlands, chamise chaparral, and grasslands with loose, friable soils. During periods of inactivity, Blainville's horned lizards use small mammal burrows or burrow into loose soils under surface objects (Jennings and Hayes 1994).

There are no CNDDDB-reported Blainville's horned lizard occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no Blainville's horned lizards were observed during the 2014 reconnaissance field survey. No focused presence/absence surveys have been conducted. The habitat study area is presumed to be within the current range of this species and potentially suitable grassland habitats are present within the habitat study area. Therefore, the Blainville's horned lizard has a moderate potential to occur in these habitat types within the habitat study area.

Giant Garter Snake (*Thamnophis gigas*)

The giant garter snake is federally listed as threatened under the FESA and is listed as a threatened species under the CESA. Federal critical habitat for this species has not been designated. Giant garter snake occurs in the Central Valley of California from Fresno County in the south to Butte County in the north. Although giant garter snake historically ranged throughout the Central Valley, recent sightings of giant garter snake in the San Joaquin Valley are rare and the species likely has been extirpated from habitats south of Fresno County (USFWS 2012b).

Giant garter snakes inhabit marshes, ponds, sloughs, small lakes, low-gradient streams and other waterways, and agricultural wetlands, including irrigation and drainage canals, rice fields, and adjacent uplands. Their habitat requirements include: (1) adequate water during the snake's active season (early spring through mid-fall) to provide food and cover; (2) emergent herbaceous wetland vegetation for escape cover and foraging habitat during the active season; (3) basking habitat of grassy banks and openings in waterside vegetation; and (4) higher-elevation uplands for cover and refuge from floodwaters during the snake's dormant season (USFWS 2012b).

There are 19 giant garter snake CNDDDB occurrences within 10 miles of the Central Valley Wye. The nearest occurrence is located approximately 2.25 miles south of the western end of the Central Valley Wye (Occurrence 161; CDFW 2016c). No giant garter snakes were observed during the 2014 reconnaissance field survey.

No protocol-level habitat assessment or focused presence/absence have been conducted. The habitat study area is presumed to be within the current range of this species and potentially suitable aquatic and upland habitats are present within the habitat study area. Therefore, the giant garter snake has a moderate potential to occur in suitable habitat types within the habitat study area.

5.2.2.5 *Birds*

Thirty-three special-status bird species have a moderate or high potential to occur in the habitat study area. Swainson's hawk (*Buteo swainsoni*), a state-listed threatened species, was reported and observed in the habitat study area. Three additional species that are California species of special concern or USFWS BCC were observed in the habitat study area during field surveys—the northern harrier (*Circus cyaneus*), loggerhead shrike (*Lanius ludovicianus*), and yellow-billed magpie (*Pica nuttalli*). With few exceptions, any bird present in the habitat study area would also be protected under the MBTA.

Fulvous Whistling-Duck (*Dendrocygna bicolor*)

Fulvous whistling-duck is a California species of special concern. It is a large duck with long legs and a long neck. The duck's body is tawny with a dark back with white flank stripes (Sibley 2000). The fulvous whistling-duck was known to nest in the San Joaquin Valley and occurred rarely as far north as San Francisco Bay and the Delta. However, it has not been observed in these regions over the past two decades except as a very rare vagrant (Shuford and Gardali 2008). Its occurrence in California is now thought to be restricted to post-breeding wanderers in the Imperial Valley in dense wetlands of cattails along the south end of the Salton Sea (Shuford and Gardali 2008). It lives in fresh emergent wetlands and shallow lacustrine and quiet riverine waters. It also feeds in wet croplands and pastures. Elsewhere in California, it is rare and irregular (Shuford and Gardali 2008), with most records from the San Joaquin Valley.

There are no CNDDDB-reported fulvous whistling-duck occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no fulvous whistling-ducks were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable but moderate wetland, riverine, retention basin, and open water habitats exist within the habitat study area. Therefore, the fulvous whistling-duck has a moderate potential to occur in these habitat types within the habitat study area.

Redhead (*Aythya americana*)

Redhead is a California species of special concern. It is a medium-sized duck with a smoothly rounded head and relatively broad wings with grayish secondaries. Males have a bright rufous head during the breeding season (Sibley 2000). In the Central Valley and coastal lowlands, redheads are most common during the fall and winter, when numbers are bolstered by overwintering migrants from the north. This species formerly bred in large numbers throughout the valley, but numbers have steadily declined over the last century. They are now an uncommon and local breeder from the Butte Sink south to Kern County, Orange County, San Diego coast, and Imperial Valley (Shuford and Gardali 2008).

There are no CNDDDB-reported redhead occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no redheads were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable wetland, riverine, retention basin, and open water habitats are present within the habitat study area. Therefore, the redhead has a moderate potential to occur in these habitat types within the habitat study area.

American White Pelican (*Pelecanus erythrorhynchos*)

American white pelican is a California species of special concern. It is a large white bird with black primary and outer secondary feathers and pinkish or yellow-orange bill (Sibley 2000). In California, the American white pelican now nests only at large lakes in the Klamath Basin, especially Clear Lake National Wildlife Refuge (Shuford and Gardali 2008). It is common to abundant on nesting grounds from April to August (sometimes March to September). White pelicans formerly bred in large numbers in the Central Valley and Salton Sea (Shuford and Gardali 2008). From July to January, the species occurs in the Central Valley and along the coast from Bodega Bay south. It is locally uncommon to common on large lakes and estuaries in the Central Valley and is fairly common at Lake Tahoe and Salton Sea in late spring and summer. The American white pelican also occurs widely during migration (Shuford and Gardali 2008).

There are no CNDDDB-reported American white pelican occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no American white pelicans were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable open water and riverine habitat is present within the habitat study area. Therefore, American white pelican has a moderate potential to occur in this habitat type within the habitat study area.

Least Bittern (*Ixobrychus exilis*)

Least bittern is a California species of special concern. It is a small wading bird with a distinctive long neck and bright, buffy color (Sibley 2000). Least bitterns are mainly a summer breeder in California, where the breeding season extends from May through August. Suitable breeding habitats occur in freshwater and brackish marshes and wetlands with dense stands of emergent vegetation and woody vegetation hanging over deeper water. Least bitterns forage for invertebrates and small vertebrates from stands of emergent vegetation (Shuford and Gardali 2008). In the Central Valley, least bittern breeds from Glen and Colusa Counties south to Merced County where it occurs in national wildlife refuges (NWR) and private duck clubs (Shuford and Gardali 2008).

There are no CNDDDB-reported least bittern occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no least bittern were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable wetland, riverine, and riparian habitats are present within the habitat study area. Therefore, the least bittern has a moderate potential to occur in these habitat types within the habitat study area.

White-Tailed Kite (*Elanus leucurus*)

White-tailed kite is a fully protected species under the California Fish and Game Code. It is a medium-sized, mostly white raptor with pointed wings and black shoulders (Sibley 2000). White-tailed kite is a year-long resident in coastal and valley lowlands, and is frequently found in agricultural areas. The species is common in California's Central Valley lowlands. The breeding season generally extends from early February through early August. White-tailed kites usually nest in large native trees, although nonnative trees also are used occasionally. Nest trees are generally at the edge of wooded habitat next to open fields. Large trees in developed areas also may be used, although the trees need to be close to open fields for foraging (Dunk 1995). Prey primarily consist of small mammals (Dunk 1995).

There are no CNDDDB-reported white-tailed kite occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no white-tailed kites were observed during the 2014 reconnaissance field survey. Although not reported or observed within the habitat study area during field surveys, white-tailed kite is a common species that is likely to forage and nest in the habitat study area. This species has a high potential to occur in California annual grassland, pasture, field crops, row crops, and riparian habitat within the project footprint.

Bald Eagle (*Haliaeetus leucocephalus*)

The bald eagle has been delisted under the FESA but retains protections under the BGEPA, and is a USFWS BCC. It is listed as endangered under the CESA and is a fully protected species under the California Fish and Game Code. It is a large bird with broad, straight-edged wings. Adults have distinctive white heads (Sibley 2000).

The statewide bald eagle nesting population has increased steadily since the mid-1970s, when the population totaled fewer than 32 breeding pairs. The breeding range has expanded from 8 counties in 1981 to at least 32 of California's 58 counties by 2003. The wintering population has also increased dramatically during this time (CDFG 2005). However, the species remains an uncommon resident and winter visitor throughout the state. Bald eagle occurs throughout most of North America with isolated breeding populations in Baja California and northern Mexico. The species winters throughout most of California at lakes, reservoirs, river systems, and some rangelands and coastal wetlands. The breeding range is mainly in mountainous habitats near

reservoirs, lakes, and rivers, mainly in the northern two-thirds of the state, in the central Coast ranges, and on Santa Catalina Island (CDFG 2005).

Breeding birds in California are resident year-long in most areas where the climate is relatively mild, but migrants from northern areas supplement the winter population. Individuals breeding in California may move in search of food. Bald eagles nest on a variety of natural structures, including projections or ledges on cliffs, trees protruding from cliffs, deciduous trees lining river courses, and a number of conifer species found along or near major waterbodies (Buehler 2000). Nests usually are constructed in trees that provide an unobstructed view of a waterbody, are typically the dominant or codominant tree in the surrounding stand, and are free from extensive human development and disturbance. Snags and dead-topped live trees are important for perch and roost sites. Bald eagles winter along rivers, lakes, and reservoirs that support abundant fish or waterbird prey and that have large trees or snags for perch or roost sites (Buehler 2000). Bald eagles often roost communally during the winter, typically in mature trees or snags that are isolated from human disturbance. Home range sizes and distances to the nearest neighbor are highly variable because of large variations in the dispersion and availability of prey. Breeding home ranges for bald eagle are from 4.3 to 13.4 square miles, while winter home ranges are generally larger, up to 28,855 square miles (Buehler 2000).

One bald eagle CNDDDB occurrence has been documented in riparian areas along the Chowchilla River approximately 3.10 miles east of the SR 152 (North) to Road 19 Wye Alternative (Occurrence #263; CDFW 2016c). No bald eagles were observed during the 2014 reconnaissance field survey.

The habitat study area is presumed to be within the current range of this species and potentially suitable nesting and foraging habitats are present within the habitat study area. Therefore, the bald eagle has a moderate potential to occur in these habitat types within the habitat study area.

Northern Harrier (*Circus cyaneus*)

Northern harrier is a California species of special concern. It is a medium-sized, long-winged, long-tailed hawk with a white rump and a short, dark, hooked beak (Sibley 2000). The northern harrier is found mainly in upland grasslands and fresh- and saltwater marshes. In California, northern harriers are permanent year-round residents of the San Joaquin Valley (Shuford and Gardali 2008). Northern harrier frequents meadows, grasslands, desert sinks, open rangelands, and fresh- and saltwater emergent wetlands; this species is seldom found associated with wooded habitats. Harriers feed mostly on voles and other small mammals, as well as birds, frogs, small reptiles, crustaceans, and insects; they occasionally feed on fish. This species mostly nests in emergent wetland or along rivers or lakes but may also nest in grasslands and grain fields several miles from water. Its nest is built of a large mound of sticks on wet areas and a smaller cup of grasses on dry sites. The breeding season extends from March through August (Shuford and Gardali 2008).

Northern harriers were observed in the habitat study area during the 2014 reconnaissance field survey. There are three northern harrier CNDDDB occurrences within 10 miles of the Central Valley Wye, all approximately 7 miles west of the western end of Central Valley Wye (Occurrences 7, 8, and 43; CDFW 2016c). Because this species was observed during field surveys, it has a high potential to nest in riparian and wetland areas and forage in field crops, row crops, and California annual grassland habitats within the habitat study area.

Swainson's Hawk (*Buteo swainsoni*)

Swainson's hawk is listed as a threatened species under the CESA. It is a large hawk with relatively long tail and pointed wings with dark remiges (Sibley 2000). Swainson's hawks inhabit grasslands, sage-steppe plains, and agricultural regions of western North America during the breeding season, and winter in grassland and agricultural regions from central Mexico to southern South America (Bechard et al. 2010). In California, the nesting distribution includes the Sacramento and San Joaquin Valleys, the Great Basin sage-steppe communities and associated agricultural valleys in extreme northeastern California, isolated valleys in the Sierra Nevada in Mono and Inyo Counties, and limited areas of the Mojave Desert region (CDFG 2005).

In California, Swainson's hawk habitat generally consists of large, flat, open, undeveloped landscapes that include suitable grassland or agricultural foraging habitat and sparsely distributed trees for nesting (Bechard et al. 2010). Foraging habitat includes open fields and pastures. Preferred foraging habitats for Swainson's hawk include alfalfa fields, fallow fields, low-growing row or field crops, rice fields during the nonflooded period, and cereal grain crops (CDFG 2005). Prey species include ground squirrels, California voles, pocket gophers, deer mice, reptiles, and insects (CDFG 2005; Bechard et al. 2010). Swainson's hawks usually nest in large native trees such as valley oak (*Quercus lobata*), Fremont cottonwood, and willows, although nonnative trees such as eucalyptus (*Eucalyptus* spp.) occasionally are used. Nests occur in riparian woodlands, roadside trees, trees along field borders, isolated trees and small groves, trees in windbreaks, and edges of remnant oak woodlands. In some locales, urban nest sites have been recorded. The breeding season is typically March to August (Bechard et al. 2010).

The CNDDDB reports five presumed extant occurrences of this species within the project footprint (Occurrences 476, 820, 821, 2470, and 24847; CDFW 2016c) (Figure 5-4). Four additional presumed extant occurrences are located within the habitat study area (Occurrences 1000, 2468, 2469, and 2467; CDFW 2016c). No Swainson's hawks were observed during the 2014 reconnaissance field survey.

During the preliminary Swainson's hawk nest survey in 2015, biologists confirmed active Swainson's hawk nesting at five locations:

- Rural residence northeast of the intersection of Hutchins Road and Indiana Road (approximately 460 feet north of Avenue 21 to Road 13 Wye Alternative project footprint)
- Fremont cottonwood tree adjacent to and east of the Road 13 bridge over Ash Slough (within project footprint for SR 152 [North] to Road 13 Wye and Avenue 21 to Road 13 Wye alternatives); CNDDDB occurrence no. 2484 (CDFW 2016c)
- Willow in riparian vegetation along Dutchman Creek, adjacent to and west of SR 99 (within project footprint for Avenue 21 to Road 13 Wye Alternative, approximately 570 feet east of project footprint for SR 152 [North] to Road 13 Wye and SR 152 [North] to Road 19 Wye alternatives)
- Northwest edge of orchard at junction of Buchanan Hollow Road and Silveira Way (approximately 800 feet east of project footprint for all except SR 152 [North] to Road 11 Wye Alternatives)
- Utility pole adjacent to and west of SR 99 (approximately 2,100 from northern terminus of Central Valley Wye)

Territorial behavior (e.g., pairs near suitable nest trees) was observed at several additional locations but nesting could not be confirmed. Additionally, numerous Swainson's hawks were observed soaring over the habitat study area and several suitable but unoccupied nests were observed. In general, the three SR 152 (North) Wye alternatives provide higher quality habitat for Swainson's hawks than the Avenue 21 to Road 13 Wye Alternative, where the abundance of orchards creates suboptimal foraging habitat for the species, which favors agricultural fields with open and low-growing crops (e.g., alfalfa). In addition to the five active Swainson's hawk nests, the biologists observed 20 active red-tailed hawk nests (*Buteo jamaicensis*), one red-shouldered hawk (*Buteo lineatus*) nest, and one great horned owl (*Bubo virginianus*) nest in the survey area.

Golden Eagle (*Aquila chrysaetos*)

Golden eagle is a CDFW fully protected species and is protected under the BGEPA. It is a very large, broad-winged, and broad-tailed eagle with a relatively small head and golden nape (Sibley 2000). Golden eagles are found throughout western North America in remote, open habitats, including savanna woodlands, grasslands, aspen parklands, high and low deserts, and in the taiga zone. They mostly feed on lagomorphs and rodents, but also take other mammals, birds, reptiles, and some carrion in these open habitats. Because they nest almost exclusively on cliff ledges and steep canyon walls, golden eagles do not typically breed in the Central Valley, but

nonbreeding individuals may be seen in the region throughout the year. Their breeding season begins in late January, continues through August, and peaks from March through July. Numbers in the Central Valley peak between October and March (Kochert et al. 2002).

There are no CNDDDB-reported golden eagle occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no golden eagles were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable California annual grassland and pasture habitats are present within the habitat study area. Therefore, the golden eagle has a moderate potential to occur in these habitat types within the habitat study area.

American Peregrine Falcon (*Falco peregrinus anatum*)

American peregrine falcon is a USFWS BCC, is listed as an endangered species under the CESA, and is a fully protected species under the California Fish and Game Code. It is a large falcon with long, pointed wings, short tail, and dark mustache (Sibley 2000). American peregrine falcon is an uncommon breeding resident on the California coast from Orange County north, and in the Sierra and Cascade mountains. In winter, it is found inland throughout the Central Valley and occasionally on the Channel Islands. Migrants occur along the coast and in the western Sierra Nevada in spring and fall. It breeds mostly in woodland, forest, and coastal habitats. Riparian areas and coastal and inland wetlands are important habitats yearlong, especially during the nonbreeding seasons. The species also occasionally inhabits built structures.

Populations declined drastically during the 20th century; 39 breeding pairs were known in California in 1981 (Monk 1981). Domestic banning of the pesticide DDT along with aggressive rehabilitation programs have brought the species back from the brink of extirpation, culminating in its removal in 1999 from the FESA (64 Fed. Reg. 46541).

There are no CNDDDB-reported American peregrine falcon occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no American peregrine falcons were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable habitats are present within the habitat study area. Therefore, the peregrine falcon has a moderate potential to occur in these habitat types within the habitat study area.

Greater Sandhill Crane (*Grus canadensis tabida*)

The greater sandhill crane is listed as threatened under the CESA and is a CDFW fully protected species under the California Fish and Game Code. It is a large, long-legged and long-necked bird with a long, pointed bill and dark gray legs that are extended in flight. Its height is 46 inches (Sibley 2000).

In California, greater sandhill cranes nest in Siskiyou, Modoc, Lassen, Shasta, Plumas, and Sierra Counties. Breeding populations from northern California migrate south in September and October, where they overwinter in the Central Valley from near Chico, Butte County, south to Delano, Kern County. Northern migration occurs in March and April. Agricultural fields with an abundance of grain crops characterize winter foraging habitat. Rice and corn are the most important food sources for cranes wintering in the Central Valley (CDFG 2005).

Wintering greater sandhill cranes in the Central Valley depend on certain agricultural practices and cropping patterns that are compatible with their foraging and nonforaging needs. Wet meadows interspersed with marshes are important habitat features where greater sandhill cranes congregate in the winter months. Greater sandhill cranes often concentrate on private lands and therefore are vulnerable to land use changes that alter their foraging and roosting habitat (CDFG 2005).

Greater sandhill cranes were observed in the habitat study area during the 2014 reconnaissance field survey. There are no CNDDDB-reported greater sandhill crane occurrences within 10 miles of the Central Valley Wye (CDFW 2016c).

The habitat study area is presumed to be within the current range of this species and potentially suitable, but moderate quality, wetland, California annual grassland, pasture, and field crop habitats are present within the habitat study area. Therefore, the greater sandhill crane has a moderate potential to occur in these habitat types within the habitat study area.

Lesser Sandhill Crane (*Grus canadensis canadensis*)

Lesser sandhill crane is a California species of special concern. It is smaller and has blacker primary feathers than the greater sandhill crane. Its height is 41 inches (Sibley 2000). This migratory subspecies winters in habitats similar to those of the greater sandhill crane in the San Joaquin and Imperial valleys and to a lesser extent in the Sacramento Valley (Shuford and Gardali 2008). This subspecies forages on agricultural fields and wetland areas, where they feed on waste seed and other grains as well as invertebrates and small vertebrates (Shuford and Gardali 2008).

Lesser sandhill cranes were observed in the habitat study area during the 2014 reconnaissance field survey. There are no CNDDDB-reported lesser sandhill crane occurrences within 10 miles of the Central Valley Wye (CDFW 2016c).

Potentially suitable wetland, California annual grassland, pasture, and field crop habitats are present within the habitat study area. Therefore, the lesser sandhill crane has a moderate potential to occur in these habitat types within the habitat study area.

Western Snowy Plover (*Charadrius alexandrinus*) (Interior Population)

Although the Pacific coast population of the western snowy plover (those individuals that nest adjacent to tidal waters of the Pacific Ocean) is federally listed as threatened and federal critical habitat was designated on September 29, 2005, western snowy plover in the San Joaquin Valley constitute a population that nests at inland sites. Western snowy plovers that nest in the San Joaquin Valley are not considered part of the federally listed as threatened Pacific coast population; inland nesting populations are a California species of special concern. Snowy plovers are small, compact shorebirds with relatively long, grey legs and short wings. Western snowy plovers have underparts that are clean white with dark side patches (Sibley 2000).

In the San Joaquin Valley, western snowy plovers nest on barren or sparsely vegetated areas along alkali or saline lakes, wastewater ponds, salt evaporation ponds, and river channels. This species occurs more widely during migration (Shuford and Gardali 2008).

There are no CNDDDB-reported western snowy plover occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no western snowy plovers were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable vernal pools, California annual grassland, barren areas, and retention basins are present within the habitat study area. Therefore, the snowy plover has a moderate potential to occur in these habitat types within the habitat study area.

Mountain Plover (*Charadrius montanus*)

Mountain plover is proposed for listing as threatened under the FESA, is a USFWS BCC, and is a California species of special concern. It is a long-legged, long-winged upland plover with a distinctively plain plumage (Sibley 2000). This species breeds in the short-grassland prairies of the high plains east of the Rocky Mountains. Mountain plovers are a winter resident in California where they are associated with short-grass grasslands in the San Joaquin Valley (Shuford and Gardali 2008).

There are two mountain plover CNDDDB occurrences within 10 miles of the Central Valley Wye. The nearest occurrence is located approximately 8.65 miles south of the west end of the Central Valley Wye (Occurrence 20; CDFW 2016c). The other mountain plover occurrence is located approximately 9.75 miles north of the north end of Central Valley Wye (Occurrence 8; CDFW 2016c). No mountain plovers were observed during the 2014 reconnaissance field survey.

The habitat study area is presumed to be within the current range of this species and potentially suitable California annual grassland, field crops, pasture, and barren habitats are present within

the habitat study area. Therefore, mountain plover has a moderate potential to occur in these habitat types within the habitat study area.

Whimbrel (*Numenius phaeopus*)

Whimbrel is a USFWS BCC. Whimbrels have a sturdy, sleek body with pointed wings and a long decurved bill. American populations have an overall grayish-brown plumage (Sibley 2000). Whimbrel is fairly common to abundant as a spring migrant through the Central Valley from mid-March to late May. It is less common, but still numerous, in fall migration in July and August. In winter, it is very rare in the Central Valley, but fairly common along the California coast where small numbers of nonbreeders occur regularly through the summer. On the coast, it forages on rocky intertidal and sandy beach marine habitats, on the intertidal mudflats of estuarine habitats, and on wet meadow and pasture habitats adjacent to the immediate coast. It occasionally forages on lawns or golf courses. Inland, it prefers flooded fields, wet meadows, croplands, and the margins of riverine and lacustrine habitats (Skeel and Mallory 1996).

There are no CNDDDB-reported whimbrel occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no whimbrels were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable field crops, pasture, and California annual grassland habitats are present within the habitat study area. Therefore, the whimbrel has a moderate potential to forage but not to nest in these habitat types within the habitat study area.

Long-Billed Curlew (*Numenius americanus*)

Long-billed curlew is a USFWS BCC. The long-billed curlew is a broad-winged bird with an extremely long bill and a small head. It has a buffy body and cinnamon underwing (Sibley 2000). Long-billed curlew is an uncommon to fairly common breeder from April to September in wet meadow habitat in northeastern California in Siskiyou, Modoc, and Lassen Counties. It can be common as a winter visitor from early July to early April along most of the California coast, and in the Central and Imperial valleys, where the largest flocks occur. Preferred winter habitats include large coastal estuaries, upland herbaceous areas, and croplands. On estuaries, feeding occurs mostly on intertidal mudflats. Small numbers of nonbreeders remain on the coast in summer, and, during some years, larger numbers have remained in the Central Valley (Dugger and Dugger 2002).

There are no CNDDDB-reported long-billed curlew occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no long-billed curlews were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable California annual grassland, pasture, and field crop habitats are present within the habitat study area. Therefore, the long-billed curlew has a moderate potential to forage but not nest in these habitat types within the habitat study area.

Red Knot (*Calidris canutus*)

Red knot is a USFWS BCC. It is a fairly small shorebird with a thin and dark medium-length bill, dark legs, a gray wing stripe, and a gray rump and tail (Sibley 2000). Red knot is uncommon to fairly common during fall and spring migrations along coastal estuarine habitats (Swarth 1995). It prefers estuarine sand or mud flats and grows less often on sandy beaches on the outer coast. In winter, it is rare along the coast except at Humboldt, Bodega, San Francisco, Monterey, and San Diego Bays, where it may be fairly common at times (Swarth 1995). Small numbers occur in the Central Valley during migration. Red knot does not breed in California (Swarth 1995).

There are no CNDDDB-reported red knot occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no red knots were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable vernal pools and other seasonal wetlands are present within the habitat study area. Therefore, the red knot has a moderate potential to forage but not nest in this habitat type within the habitat study area.

Black Tern (*Chlidonias niger*)

Black tern is a California species of special concern. It is a small tern with a relatively short black bill, very short dark legs, a short notched tail, and a smoothly rounded head (Sibley 2000). Black terns occur in California during migration and breeding season from mid-April to mid-October. The breeding season is from mid-May to early August. In the San Joaquin Valley, black terns nest in marshes and overflow habitats, including flooded agricultural fields. Nests are built onto of dirt mounds above the waterline. Black terns feed mainly on insects and fish (Shuford and Gardali 2008).

There are no CNDDDB-reported black tern occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no black terns were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable vernal pool and row crops habitats are present within the habitat study area. Therefore, the black tern has a moderate potential to forage but not nest in these habitat types within the habitat study area.

Western Burrowing Owl (*Athene cunicularia*)

Western burrowing owl is a USFWS BCC and a California species of special concern. It is a ground-dwelling owl with long legs and a round head that lacks ear tufts (Sibley 2000). Western burrowing owls are year-round residents throughout much of California, especially in the Central Valley, San Francisco Bay region, Carrizo Plain, and Imperial Valley. Migrants from other parts of western North America can augment local populations in lowland areas in the winter (Shuford and Gardali 2008). The breeding season in California is February 1 to August 31 (CDFG 2012). Western burrowing owls prefer open, dry, short grassland habitats with few trees and often are associated with burrowing mammals such as California ground squirrels. They occupy burrows, typically abandoned by ground squirrels or other burrowing mammals, but also use artificial burrows such as abandoned pipes, culverts, and debris piles. Burrowing owls have adapted to landscapes that have been highly altered by human activity. Prey includes arthropods, amphibians, small reptiles, and small mammals (Shuford and Gardali 2008).

The CNDDDB reports one possibly extirpated occurrence approximately 3.2 miles southwest of the southern end of the Central Valley Wye (Occurrence #757; CDFW 2016c). The nearest presumed extant occurrence is located approximately 3.5 miles northeast of the SR 152 (North) to Road 19 Wye Alternative (Occurrence 434; CDFW 2016c).

The habitat study area is presumed to be within the current range of this species and potentially suitable field crops, pasture, California annual grassland, ruderal, and constructed watercourse habitats are present within the habitat study area. Therefore, the western burrowing owl has a moderate potential to forage and nest in these habitat types within the habitat study area.

Short-Eared Owl (*Asio flammeus*)

Short-eared owl is a California species of special concern. It is a medium-sized owl with dark eye patches and short ear tufts. The breast is tawny with darker streaks fading to a white belly with diffuse darker streaking (Sibley 2000). Breeding locations in the San Joaquin Valley appear to be cyclical and tend to increase after wet winters when small mammal populations increase greatly. The breeding season occurs from March through July. Most short-eared owls that occur in California migrate into California during the fall and winter months, causing the California short-eared population to increase tenfold. Short-eared owls require open habitats that support large concentrations of microtine rodents. Nesting habitat requires herbaceous cover sufficient to conceal ground nests from predators. These habitats would include fresh- and saltwater marshes, irrigated alfalfa and grain fields, and ungrazed grasslands (Shuford and Gardali 2008).

There are no CNDDDB-reported short-eared owl occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no short-eared owls were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable California annual grassland, field crops, row crops, and pasture habitats are

present within the habitat study area. Therefore, the short-eared owl has a moderate potential to forage but not nest in these habitat types within the habitat study area.

Long-Eared Owl (*Asio otus*)

Long-eared owl is a California species of special concern. It is a large bird with a rounded head, long ear tufts, yellow eyes, and tawny orange face with dark vertical stripes through the eye (Sibley 2000). Long-eared owls occur in wooded habitats that are either open or adjacent to grasslands, meadows, or shrublands. Dense cover for nesting and roosting, platforms on which nests are built, and open foraging areas are key habitat components for this species (Shuford and Gardali 2008). Long-eared owls are year-round residents of California outside of the Central Valley floor. The nesting season extends from February through July. Long-eared owls use mainly old corvid or hawk nests for nesting but also will use squirrel nests, mistletoe brooms, and natural platforms (Shuford and Gardali 2008).

There are no CNDDDB-reported long-eared owl occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no long-eared owls were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable California annual grassland, orchards, and riparian habitats are present within the habitat study area. Therefore, the long-eared owl has a moderate potential to occur in these habitat types within the habitat study area.

Nuttall's Woodpecker (*Picoides nuttallii*)

Nuttall's woodpecker is a USFWS BCC that is resident from northern California southward to northwestern Baja California, generally west of the southern deserts and Sierra Nevada divide. It primarily occurs in oak woodlands, but also uses riparian woodlands and rarely, coniferous forests. Nest cavities are excavated in soft wood, often in dead trunks or limbs of oaks, willows, cottonwoods, sycamores, or other riparian trees (Lowther 2000).

Potential habitat for Nuttall's woodpecker in the Central Valley Wye habitat study area occurs in riparian and residential areas that contain mature oaks or other trees suitable for nesting. The CNDDDB does not track this species and no Nuttall's woodpeckers were detected during field surveys, but it has a high potential to occur in riparian and developed cover types in the habitat study area.

Costa's Hummingbird (*Calypte costae*)

Costa's hummingbird is a USFWS BCC. It is a small hummingbird with a short, slightly curved bill; short tail; white underparts with greenish flanks; and breeding males have purple crown and throat (Sibley 2000). Costa's hummingbird is common in summer and uncommon in winter in California. It is most common and widespread in southern California, but also breeds locally along the western edge of the San Joaquin Valley and the eastern edge of the Sierra Nevada north through Inyo County. It has also nested irregularly in Monterey County since 1981. In winter, it is largely restricted to the southern coast, but also winters in southern deserts (Baltosser and Scott 1996). This species occurs in more arid habitats than other hummingbirds in California. Primary habitats are desert wash, edges of desert riparian and valley foothill riparian, coastal scrub, desert scrub, desert succulent shrub, lower-elevation chaparral, and palm oasis. It is an uncommon transient on the Channel Islands, and it is an uncommon and irregular visitor in the northern San Joaquin Valley region, mainly coming as a spring overshoot (Baltosser and Scott 1996).

There are no CNDDDB-reported Costa's hummingbird occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no Costa's hummingbirds were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable agricultural and urban habitats are present within the habitat study area. Therefore, Costa's hummingbird has a moderate potential to occur in these habitat types within the habitat study area.

Loggerhead Shrike (*Lanius ludovicianus*)

Loggerhead shrike is a USFWS BCC and a California species of special concern. It has a gray head with a broad black mask and a heavy, short bill, a gray back, white underparts, black wings with white wing patches, and a black tail with white outer tail feathers (Sibley 2000). Loggerhead shrikes are a common year-round resident throughout the lowlands and foothills of California. Loggerhead shrikes prefer open habitats with shrubs, fences, utility poles and lines, or other perches. Breeding occurs in shrublands and open woodlands. Nests usually are hidden in dense-foliaged shrubs or trees. The breeding season is from March through August. While populations in the Central Valley remain relatively high, populations have declined in the San Francisco Bay region, especially in the south bay where oak savanna habitat in the foothills has been lost (Shuford and Gardali 2008).

Individuals were observed in the habitat study area during the 2014 reconnaissance field survey. There are no CNDDDB-reported loggerhead shrike occurrences within 10 miles of the Central Valley Wye (CDFW 2016c). Because loggerhead shrike was observed during field surveys, this species has a high potential to occur in California annual grassland, field crops, row crops, and pasture habitats within the habitat study area.

Least Bell's Vireo (*Vireo bellii pusillus*)

Least Bell's vireo is federally listed as endangered under the FESA, state listed as endangered under the CESA, and is a USFWS BCC. Least Bell's vireos is a migrant species that winters in Mexico and are typically very small, 4.5 to 5 inches long, with short, rounded wings, relatively long tail, and short, straight bills. This species has a faint white eye ring and feathers that are mostly gray above and pale below (Sibley 2000).

More than 99 percent of least Bell's vireos in California occur in Southern California (from Santa Barbara County southward). In 2005, a pair of least Bell's vireo successfully bred in the San Joaquin Wildlife Refuge. This was the first recorded least Bell's vireo occurrence in the San Joaquin Valley since the species was listed (USFWS 2006b). There also have been incidental occurrences in Santa Clara, San Benito, and Kern Counties.

The least Bell's vireo is a summer resident that uses riparian woodlands for nesting and foraging. Preferred habitat is dense riparian woodlands that are dominated by willows and with a well-developed understory. Most nest sites are located near the edge of riparian thickets (CDFG 2005).

This species is now an uncommon local summer resident below about 2,000 feet in willows and other low, dense valley foothill riparian habitat and lower portions of canyons, as near to the Central Valley as San Benito and Monterey Counties; in coastal Southern California from Santa Barbara County south; and along the western edge of the deserts in desert riparian habitat.

Although this area is the only known habitat for least Bell's vireo in the Central Valley, there are no CNDDDB-reported least Bell's vireo occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no least Bell's vireos were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the potential historic range of this species and potentially suitable riparian habitat is present within the habitat study area. Therefore, the least Bell's vireo has a moderate potential to occur in this habitat type within the habitat study area.

Yellow-Billed Magpie (*Pica nuttall*)

Yellow-billed magpie is a USFWS BCC. It is fairly large bird with long tail, stout bill and broad wings. The yellow-billed magpie has a yellow bill and yellow skin beneath the eye (Sibley 2000). Yellow-billed magpie one of the few bird species that is truly endemic to California. It is a common, year-round resident of the Central Valley and surrounding foothills from Shasta County in the north to Kern County in the south. Breeding and nonbreeding range generally overlap. It was formerly more widespread in the south. Range contraction may be related to local eradication attempts. It inhabits valley foothill hardwood, valley foothill hardwood-conifer, valley

foothill riparian, orchard, vineyard, cropland, pasture, and urban greenscape habitats (Koenig and Reynolds 2009).

There are no CNDDDB-reported yellow-billed magpie occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no yellow-billed magpies were observed during the 2014 reconnaissance field survey. However, based on range and habitat, this species has a high potential to occur in California annual grassland, pasture, field crop, ruderal, orchard, vineyard, and urban habitats within the habitat study area.

Purple Martin (*Progne subis*)

Purple martin is a California species of special concern. It is the largest swallow, with relatively longer wings and large bill. Purple martin has uniformly blueish-black plumage (Sibley 2000). Purple martins occur in California during migration and breeding season from mid-March to late September. The breeding season is from May to mid-August. Purple martins nest on the east side of the Coast range in central California. Almost all tree nest sites are located in the upper slopes of hilly or mountainous terrain. Martins use a variety of substrates for nesting (tree cavities, bridges, utility poles, and lava tubes), although the abundance of nesting cavities is common to all nesting areas (Shuford and Gardali 2008).

There are no CNDDDB-reported purple martin occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no purple martins were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable California annual grassland, wetland, and riparian habitats are present within the habitat study area. Therefore, the purple martin has a moderate potential to occur in these habitat types within the habitat study area.

Yellow Warbler (*Dendroica petechia brewsteri*)

Yellow warbler is a USFWS BCC and a California species of special concern. It is a small insect-eating bird with a thin, pointed bill. Its plumage is mostly yellow with greenish-yellow upperparts, a plain yellow face with yellow eye ring and yellowish legs (Sibley 2000). Yellow warblers occur in California during migration and breeding season from late March to early October. The breeding season occurs from April to late July. Breeding yellow warblers largely have been extirpated from the San Joaquin Valley, although one nest and three territories were found in 2005 on the San Luis National Wildlife Refuge. Singing males occur along Pacheco Creek and San Benito and Pajaro Rivers. Yellow warblers inhabit riparian vegetation close to water along streams and wet meadows (Shuford and Gardali 2008).

There are no CNDDDB-reported yellow warbler occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no yellow warblers were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable riparian habitat is present within the habitat study area. Therefore, the yellow warbler has a moderate potential to occur in this habitat type within the habitat study area.

Yellow-Breasted Chat (*Icteria virens*)

Yellow-breasted chat is a California species of special concern. It is the largest of the wood warblers and has a thick bill and fairly long rounded tail. It has a yellow throat and breast, a whitish belly, olive upperparts, and dark legs (Sibley 2000). Yellow-breasted chats occur in California during migration and breeding season from late March to late September. The breeding season occurs from late April to early August. Breeding yellow-breasted chats occur in the southern Santa Clara Valley. Yellow-breasted chats breed in early succession riparian woodland with a well-developed shrub layer and an open canopy. Blackberry, wild grape, and willow that form dense tangles and thickets are frequently selected for nesting habitat (Shuford and Gardali 2008).

There are no CNDDDB-reported yellow-breasted chat occurrences within 10 miles of Central Valley Wye (CDFW 2016c) and no yellow-breasted chats were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable riparian habitat is present within the habitat study area.

Therefore, the yellow-breasted chat has a moderate potential to occur in this habitat type within the habitat study area.

Oregon Vesper Sparrow (*Pooecetes gramineus affinis*)

Oregon vesper sparrow is a California species of special concern. Vesper sparrows have a moderately long tail with distinctive white outer tail feathers, a prominent white eye ring, and a dark ear patch bordered in white. The Oregon subspecies is smaller and darker than other vesper sparrows (Sibley 2000). The Oregon vesper sparrow does not breed in the vast majority of California (although it was recently noted breeding regularly in coastal Del Norte County [Shuford and Gardali 2008]). It is uncommon in the Central Valley and bordering foothills and fairly common locally in southern deserts in winter. It occupies grasslands, croplands, and open brushlands in winter. It is most common in winter in central and southwestern California. It also occurs, uncommonly, on coastal slopes (Shuford and Gardali 2008).

There are no CNDDDB-reported Oregon vesper sparrow occurrences within 10 miles of Central Valley Wye (CDFW 2016c) and no Oregon vesper sparrows were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable California annual grassland and field crop habitats are present within the habitat study area. Therefore, the Oregon vesper sparrow has a moderate potential to forage but not nest in these habitat types within the habitat study area.

Grasshopper Sparrow (*Ammodramus savannarum*)

Grasshopper sparrow is a California species of special concern. It has a large, dark head with a narrow whitish crown stripe and a buffy face and breast (Sibley 2000). In California, grasshopper sparrows are summer residents from March to September. Grasshopper sparrows have been documented breeders at the Los Banos Wildlife Area and the species' nesting range includes the Coast range in eastern Santa Clara County and western Merced County (Shuford and Gardali 2008). Grasshopper sparrow occurs in dry grasslands, especially those with a variety of grasses and forbs, and this species prefers moderately open grasslands with patchy bare ground and shrubs. Grasshopper sparrows feed primarily on the ground, where a large proportion of its diet includes grasshoppers, although its diet also includes seeds. Nests are built of grasses and forbs in a slight depression in the ground and often are concealed with overhanging grasses (Shuford and Gardali 2008).

There are no CNDDDB-reported grasshopper sparrow occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no grasshopper sparrows were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable California annual grassland habitat is present within the habitat study area. Therefore, the grasshopper sparrow has a moderate potential to occur in this habitat type within the habitat study area.

Tricolored Blackbird (*Agelaius tricolor*)

Tricolored blackbird is a USFWS BCC and is a candidate for listing under the CESA. Adult males display a bright red patch on the shoulder similar to the more common red-winged blackbird (*Agelaius phoeniceus*), but bordered by white instead of yellow (Sibley 2000).

Largely endemic to California, more than 99 percent of the global population of tricolored blackbirds occur in the state. In any given year, most of the largest colonies can be found in the Central Valley. Tricolored blackbird colonies require open, accessible water; a suitable nesting substrate; and open-range foraging habitat of natural grassland, woodland, or agricultural cropland (Meese et al. 2014). Tricolored blackbirds often nest in dense cattails or tules and in willow thickets, blackberry, California wild rose, and tall herbs. Nests usually are located a few feet above the water. Generally, nesting habitat is large enough to support a minimum of about 50 breeding pairs (Shuford and Gardali 2008).

There are eight tricolored blackbird CNDDDB occurrences within 10 miles of the Central Valley Wye alternatives. The nearest occurrence is located at the Merced National Wildlife Refuge approximately 5.25 miles north of the west end of the Central Valley Wye (Occurrence 67; CDFW

2016c). Another is located just north of Henry Miller Road approximately 5.75 miles west of the west end of the Central Valley Wye (Occurrence 67; CDFW 2016c). A flock of tricolored blackbirds was observed near Road 12 and Avenue 24 during Swainson's hawk surveys that were conducted in April 2015 but no nesting colonies were observed.

The habitat study area is presumed to be within the current range of this species and potentially suitable wetland, pasture, California annual grassland, dairy, and field crop habitats are present within the habitat study area. Therefore, the tricolored blackbird has a high potential to occur in these habitat types in the habitat study area.

Yellow-Headed Blackbird (*Xanthocephalus xanthocephalus*)

Yellow-headed blackbird is a California species of special concern. Adult males display a bright yellow head and breast, a black body and tail, and black wings with a white patch (Sibley 2000). Yellow-headed blackbirds generally occur in California during the migration and summer months from April to early August. The breeding season occurs from mid-April to late July. Suitable breeding habitat occurs along rivers and sloughs in the San Joaquin Valley and in the wetland complex of the Grasslands Ecological Area near Los Banos, Merced County (Shuford and Gardali 2008). Yellow-headed blackbirds require marsh habitat with tall emergent vegetation at the edges of deeper aquatic habitats. Nests are built on lower marsh vegetation such as spikerush (*Eleocharis* spp.) (Shuford and Gardali 2008).

The CNDDDB reports one presumed extant occurrence located approximately 7.65 miles southwest of the west end of the Avenue 21 to Road 13 Wye Alternative (Occurrence 4; CDFW 2016c), but this occurrence was from 1919. No yellow-headed blackbirds were observed during the 2014 reconnaissance field survey. However, based on range and habitat, it has a high potential to occur in vernal pools, wetlands, California annual grassland, pasture, and field crop habitats within the habitat study area.

Lawrence's Goldfinch (*Carduelis lawrencei*)

Lawrence's goldfinch is a USFWS BCC. It is a small, seed-eating bird with a short, conical bill and a short, forked tail (Sibley 2000). Lawrence's goldfinch is highly erratic and localized in occurrence. It is rather common along the western edge of southern deserts, fairly common but with erratic numbers from year to year in Santa Clara County (Granholm 1995) and on the coastal slope from Monterey County south. It is uncommon in foothills surrounding the Central Valley. It is present mostly from April through September. It breeds in open oak or other arid woodland and chaparral, near water. It rarely breeds along the immediate coast. Typical habitats include valley foothill hardwood, valley foothill hardwood-conifer and, in Southern California, desert riparian, palm oasis, pinyon-juniper, and lower montane habitats. Nearby herbaceous habitats are often used for feeding. It winters erratically in southern coastal lowlands and the Colorado River Valley, and small numbers also winter in northern California (Granholm 1995). Lawrence's goldfinch prefers drier interior foothills and montane valleys, but breeding areas are not consistent from year to year; habitat for this species may be present in the Central Valley.

There are no CNDDDB-reported Lawrence's goldfinch occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no Lawrence's goldfinches were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable orchard, inactive farmland, rural residential, California annual grassland, eucalyptus woodland, riparian, and ruderal habitats are present within the habitat study area. Therefore, Lawrence's goldfinch has a moderate potential to occur in these habitat types within the habitat study area.

5.2.2.6 Mammals

Six special-status mammals have a moderate or greater potential to occur within the habitat study area—western red bat, pallid bat, western mastiff bat, ringtail, American badger, and San Joaquin kit fox.

Western Red Bat (*Lasiurus blossevillii*)

The western red bat is a California species of special concern. The species occurs throughout much of lowland California. It roosts primarily within the foliage of mature riparian and wooded habitats, as well as among nonnative trees in urban and rural residential areas. It forages in natural and seminatural habitats, as well as agricultural areas. They typically forage at higher elevations above tree canopies and adjacent to streams and rivers. Western red bats prefer mature, extensive riparian habitat to less extensive or degraded habitat, although mature orchards with dense canopies may provide alternate roosting and foraging habitat (Brown and Pierson 1996).

There are no CNDDDB-reported western red bat occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no bats were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species, and potentially suitable riparian, orchard, and urban woodland habitats are present within the habitat study area. Therefore, the western red bat has a moderate potential to roost and forage in these habitat types within the habitat study area.

Pallid Bat (*Antrozous pallidus*)

The pallid bat is a California species of special concern. The species ranges throughout California, primarily in the low and mid-level elevations (below 6,000 feet). Found in a variety of habitats, the pallid bat is known to roosts in buildings, bridges, caves, mines, and tree snags. At lower elevations it is strongly associated with oak savanna habitat and forages along riparian corridors, over grasslands, and possibly in agricultural areas. Pallid bats have also been captured while drinking at stock ponds (Brown and Pierson 1996).

There are no CNDDDB-reported pallid bat occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no bats were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable riparian, California annual grassland, and agricultural foraging habitats are present within the habitat study area. Therefore, the pallid bat has a moderate potential to forage but not roost in these habitat types within the habitat study area.

Western Mastiff Bat (*Eumops perotis californicus*)

The western mastiff bat is a California species of special concern. A free-tailed bat, it is the largest native bat in California. In California, it ranges in the north from the San Francisco Bay area east to the Sierra Nevada and southward through the rest of the state. It occupies arid and semiarid areas and roosts primarily in crevices in vertical cliffs and in broken terrain with exposed rock faces. It is also found in high buildings, trees, and tunnels. It has been known to travel more than 25 miles from roost sites to forage in a variety of habitats (Brown and Pierson 1996).

The CNDDDB reports one presumed extant occurrence approximately 8.35 miles northwest of the north end of the Central Valley Wye (Occurrence 71; CDFW 2016c). No bats were observed during the 2014 reconnaissance field survey. Because a presumed extant occurrence of western mastiff bat occurs within the habitat study area and potentially suitable ruderal, California annual grassland, and riparian foraging habitats are present within the habitat study area, the western mastiff bat has a high potential to occur in these habitat types within the habitat study area. Suitable roosting habitat is also present in structures throughout the habitat study area.

Ringtail (*Bassariscus astutus*)

The ringtail is a fully protected species under California Fish and Game Code section 4700. Ringtails are members of the raccoon family and are widely distributed throughout California at low to mid-level elevations. Ringtails prefer to live along watercourses and seldom are found more than 0.62 mile away from water. Ringtails are especially common in foothill canyons (Jameson and Peeters 2004). Suitable habitat for ringtails consists of a mixture of forest and shrubland in close association with riparian habitats or rocky areas (Jameson and Peeters 2004).

There are no CNDDDB-reported ringtail occurrences within 10 miles of the Central Valley Wye (CDFW 2016c) and no ringtails were observed during the 2014 reconnaissance field survey. The habitat study area is presumed to be within the current range of this species and potentially suitable riparian habitats are present within the habitat study area. Therefore, the ringtail has a moderate potential to forage but not roost in these habitat types within the habitat study area.

American Badger (*Taxidea taxus*)

The American badger is a California species of special concern. The species is found throughout the state except in the north coast region. Badgers are most abundant in drier areas with friable soils and sparse vegetation. Other fossorial (burrowing) animals often use burrows made by badgers. Badgers are carnivorous and prey on fossorial rodents, especially ground squirrels and pocket gophers, as well as reptiles, insects, earthworms, eggs, and carrion (Ahlborn 2008).

There are six American badger CNDDDB occurrences within 10 miles of the Central Valley Wye. The nearest occurrence is located approximately 2.85 miles north of the Avenue 21 to Road 13 Wye Alternative permanent utility easement (Occurrence 295; CDFW 2016c). Two other American badger occurrences are located approximately 4.75 miles south of the Avenue 21 to Road 13 Wye Alternative alignment (Occurrences 87 and 88; CDFW 2016c). No American badgers were observed during the 2014 reconnaissance field survey.

The habitat study area is presumed to be within the current range of this species, and potentially suitable California annual grassland habitat is present within the habitat study area. Therefore, American badger has a moderate potential to occur in this habitat type within the habitat study area.

San Joaquin Kit Fox (*Vulpes macrotis mutica*)

The San Joaquin kit fox is federally listed as endangered under the FESA and is state-listed as threatened. Federal critical habitat for this species has not been designated. The historical range of San Joaquin kit fox included most of the San Joaquin Valley as well as low-elevation basins and ranges along the eastern side of the central Coast ranges. By 1930, this range had been reduced by more than half, with the largest populations occurring in the southern and western portions of the San Joaquin Valley. Today, the San Joaquin kit fox occurs in the remaining native valley and foothill grasslands and chenopod scrub communities of the valley floor and surrounding foothills, from southern Kern County north to Los Banos, Merced County. The population consists of three main metapopulations (Carrizo Plain National Monument, LoKern Natural Area, Panoche Hills region) and a number of smaller "satellite" populations. Movement of foxes among these populations is critical for maintaining genetic and demographic exchange (Cypher et al. 2007). Linking the undeveloped area surrounding Sandy Mush Road with the population of kit foxes on natural lands east of Merced is listed in the *Draft Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998) as a recovery action. This undeveloped area around Sandy Mush Road was also listed as a wildlife movement corridor important to kit fox in the California Essential Habitat Connectivity Project (Spencer et al. 2010). Critical habitat has not been established for this species.

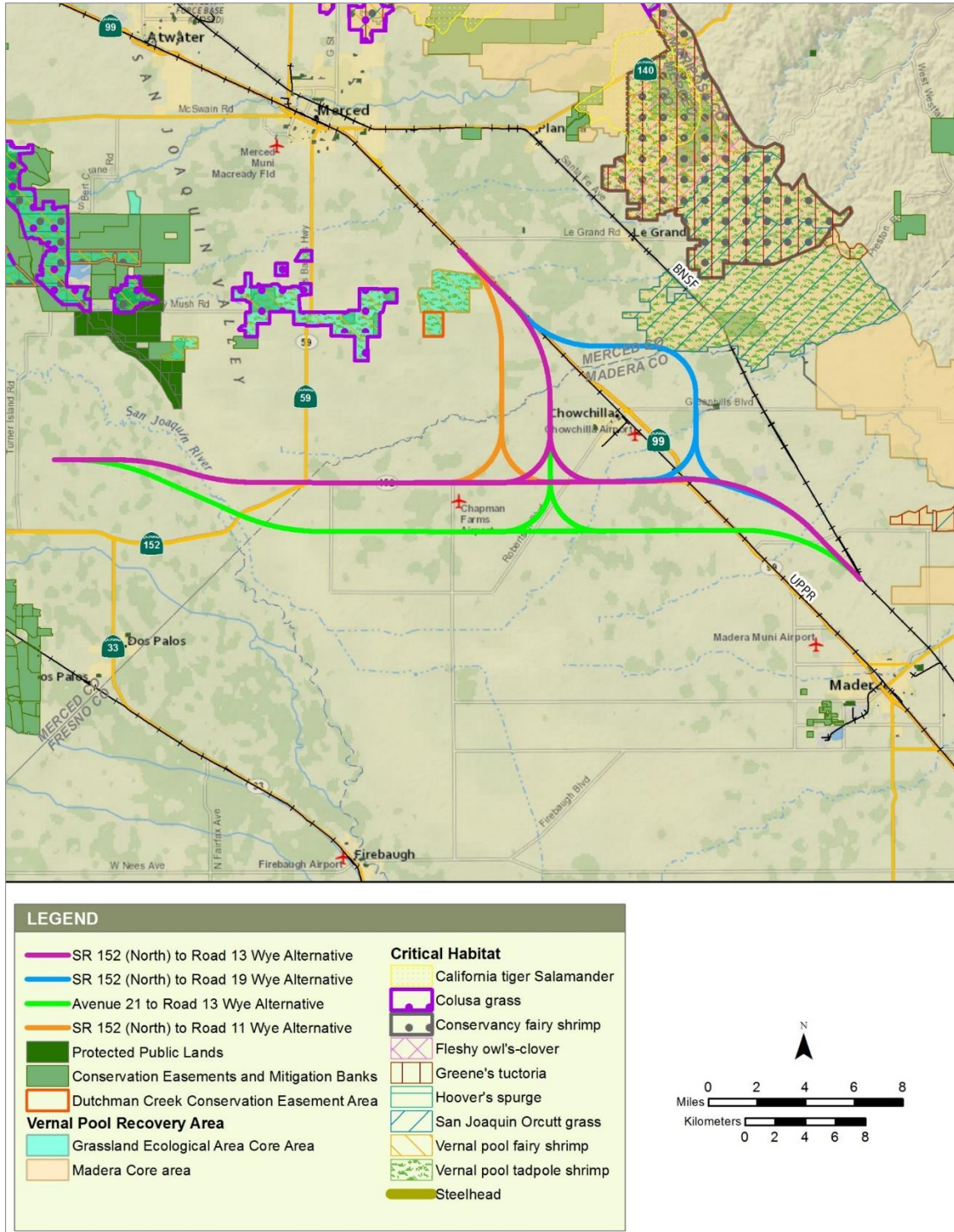
This species inhabits a variety of habitats, including grasslands; scrublands; vernal pool areas; alkali meadows and playas; and agricultural irrigated pastures, orchards, and vineyards. The San Joaquin kit fox prefers habitats with loose-textured soils and is found primarily in arid grasslands and open scrublands that are suitable for digging, but it occurs on virtually every soil type (USFWS 1998). Dens generally are located in open areas with just grass, or in open areas with both grass and scattered brush, and seldom occur in areas with thick brush. Preferred sites are relatively flat, well-drained terrain. They are seldom found in areas with shallow soils resulting from high water tables or impenetrable bedrock or hardpan layers. However, kit fox may occupy soils with high clay content where they can modify burrows dug by other animals, such as ground squirrels (USFWS 1998).

There are 14 San Joaquin kit fox CNDDDB occurrences within 10 miles of the Central Valley Wye. Three occurrences have been reported along the Eastside Bypass 3–5 miles north of the SR 152 (North) to Road 13 Wye Alternative and SR 152 (North) to Road 19 Wye Alternative alignments

(Occurrences 47, 195, and 602; CDFW 2016c). Another occurrence reports kit foxes foraging in an orchard approximately 3 miles northeast of the north end of the Central Valley Wye (Occurrence 25; CDFW 2016c). No San Joaquin kit foxes were observed during the 2014 reconnaissance field survey. Because San Joaquin kit fox has multiple presumed extant occurrences and suitable habitat in the habitat study area, this species has a high potential to occur in California annual grassland and agriculture habitats, primarily in areas associated with wildlife movement corridors such as the Eastman Lake–Bear Creek and Ash Slough–Merced National Wildlife Refuge ECAs.

5.3 Habitats of Concern

Habitats of concern evaluated in the regional area include special-status plant communities, jurisdictional waters, EFH, and designated critical habitat. Figure 5-5 depicts habitats of concern identified in the regional area. As described in Section 4.3.1.2, Habitats of Concern, one HCP (PG&E) overlaps with the Central Valley Wye alternatives, but is not applicable and therefore is not discussed further in this document.



Source: Authority, 2016; USFWS, 2005, 2015; WES, 2016

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Figure 5-5 Habitats of Concern in the Habitat Study Area

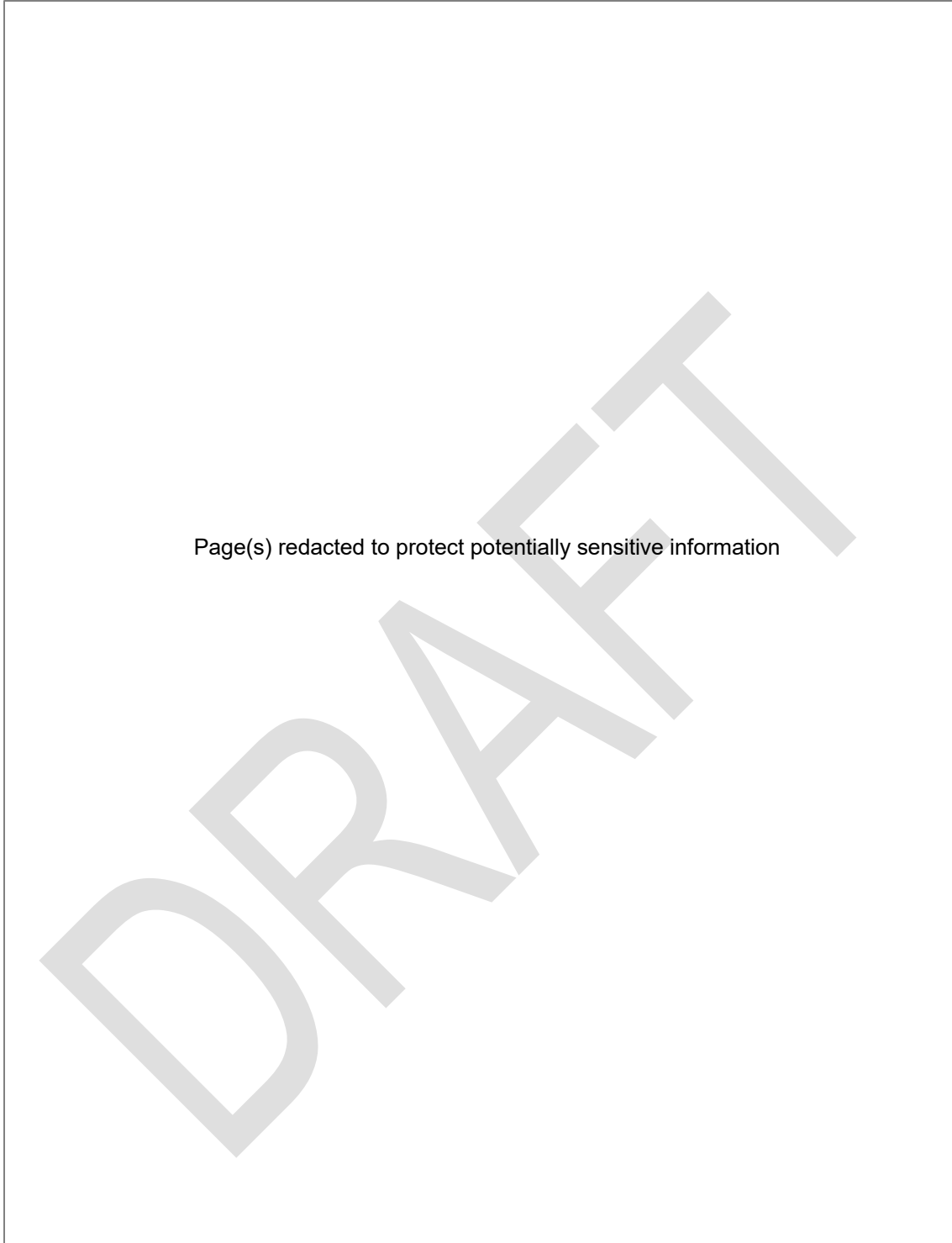
5.3.1 Special-Status Plant Communities

Special-status plant communities on the CDFW *Hierarchical List of Natural Communities with Holland Types* (CDFG 2010) and identified as potentially occurring in the regional area based on CNDDDB search results (CDFW 2016c) include mixed riparian, northern claypan vernal pool, valley sacaton grassland, and sycamore alluvial woodland. Figures 5-6a through 5-6e show the locations of known CNDDDB special-status plant communities for plants and animals. Riparian, wetland, and vernal pool communities are the only special-status plant communities that were observed during surveys of the special-status plant study area. For purposes of this discussion, the term “special-status” reflects terrestrial and aquatic plant communities that have been recognized as significant by the scientific community, represent a rare vegetation type, have limited distribution, or are recognized as rare by CDFW. Table 5-6 outlines the land cover types mapped in the special-status plant study area that would be considered special-status plant communities.

Table 5-6 Special-Status Plant Communities Occurring in the Special-Status Plant Study Area

Land Cover Type	Closest Corresponding Holland (1986) Type	Identified as High Inventory Priority by CDFW
Vernal Pool	Northern Claypan Vernal Pool	Yes
Mixed Riparian	Great Valley Mixed Riparian Forest	Yes
Other Riparian	Central Coast Arroyo Willow Riparian	Yes
Palustrine Forested Wetland	Great Valley Mixed Riparian Forest	Yes
Seasonal Wetland	Northern Claypan Vernal Pools	Yes

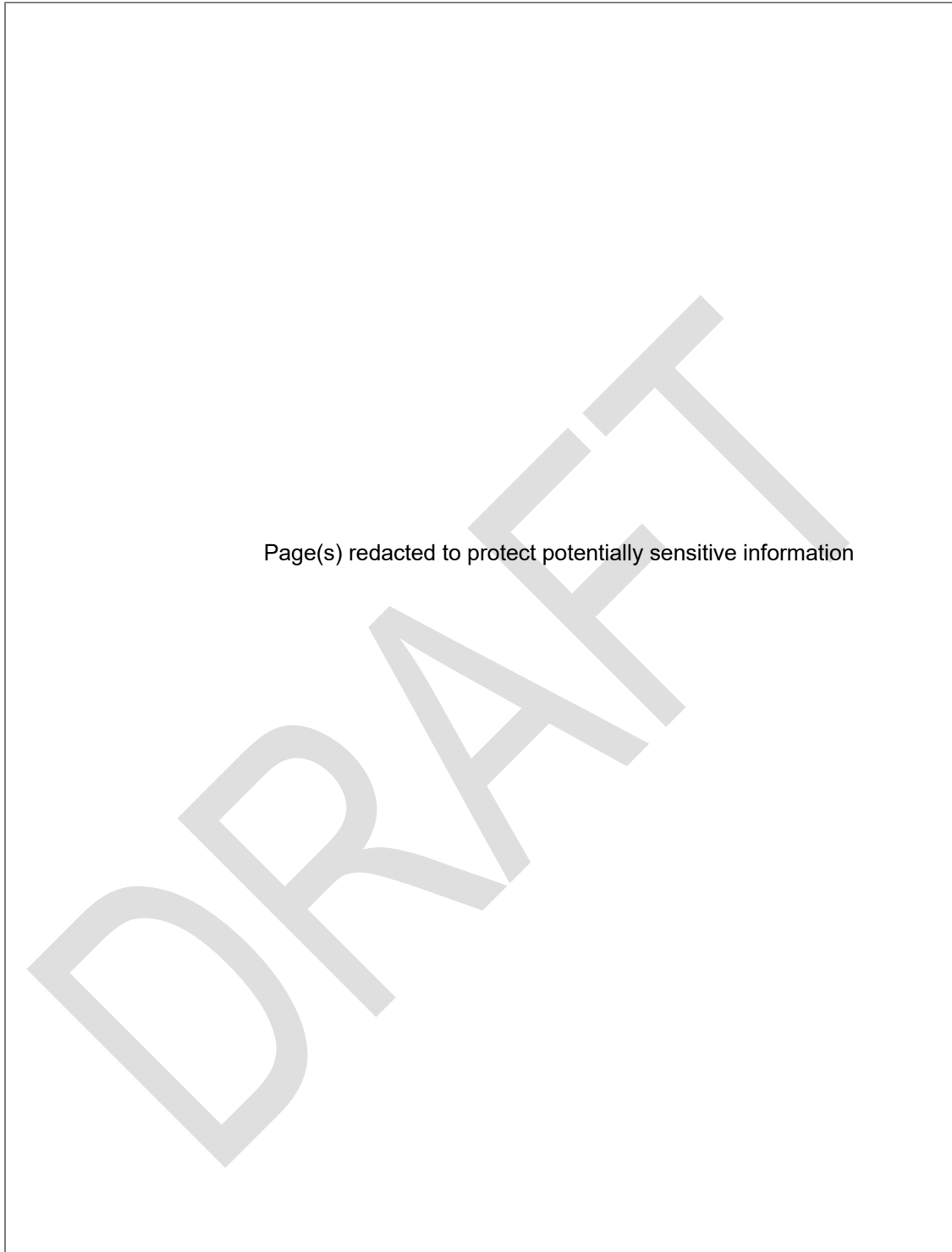
Source: Holland, 1986; CDFG, 2010; CDFW, 2016c



Source: Authority, 2016; CDFW, 2016a

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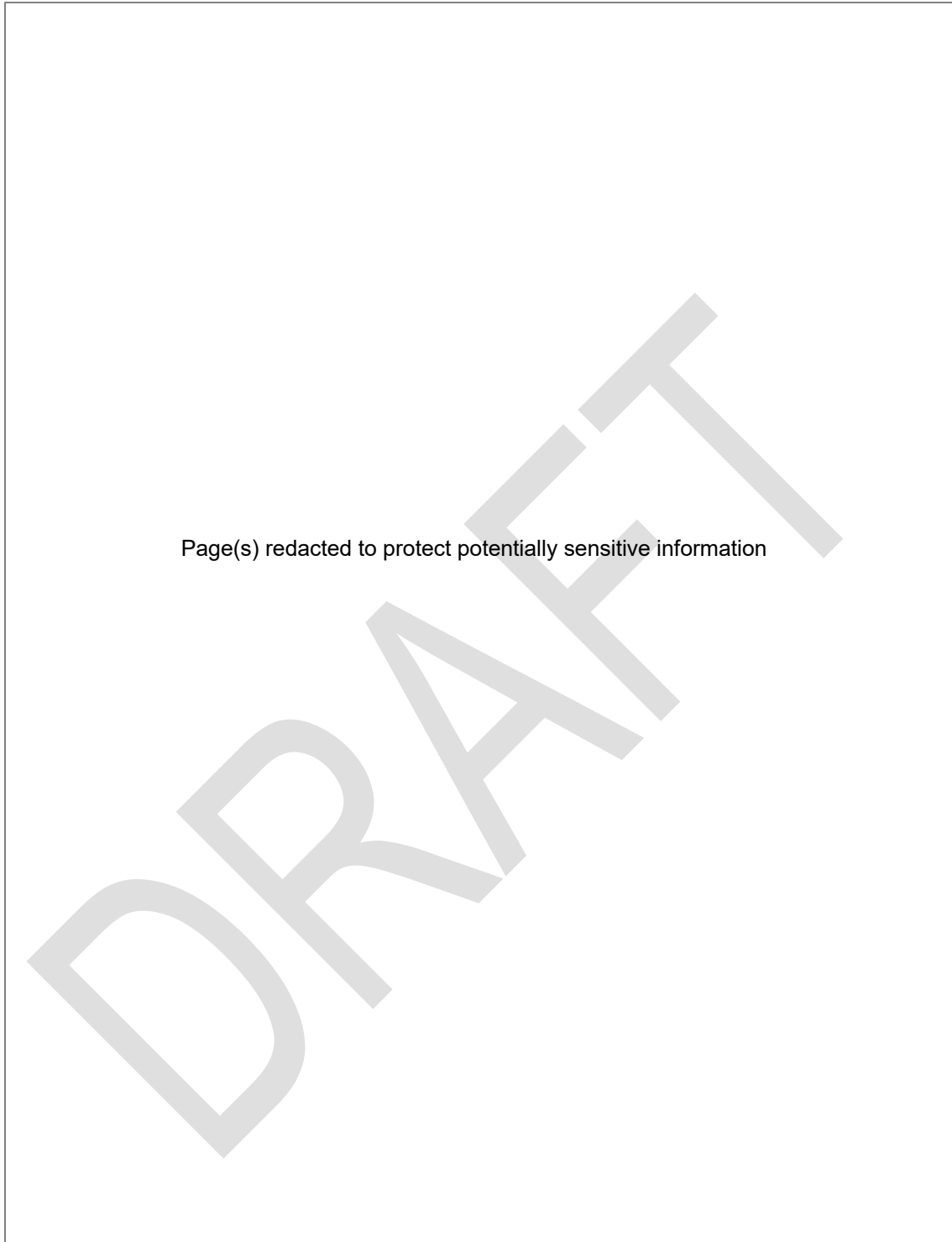
Figure 5-6a Special-Status Plant Communities in the Special-Status Plant Study Area



Source: Authority, 2016; CDFW, 2016a

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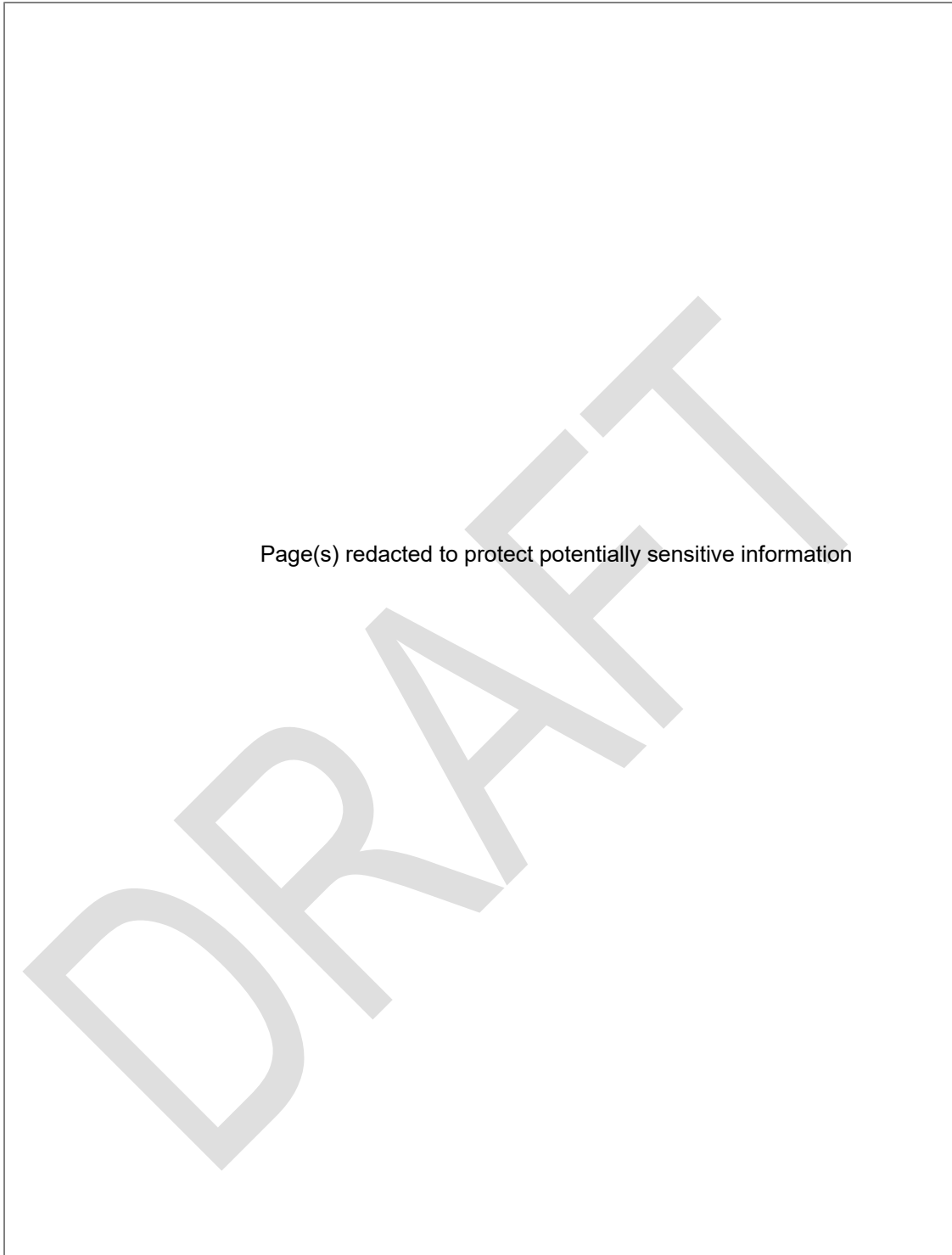
Figure 5-6b Special-Status Plant Communities in the Special-Status Plant Study Area (cont.)



Source: Authority, 2016; CDFW, 2016a

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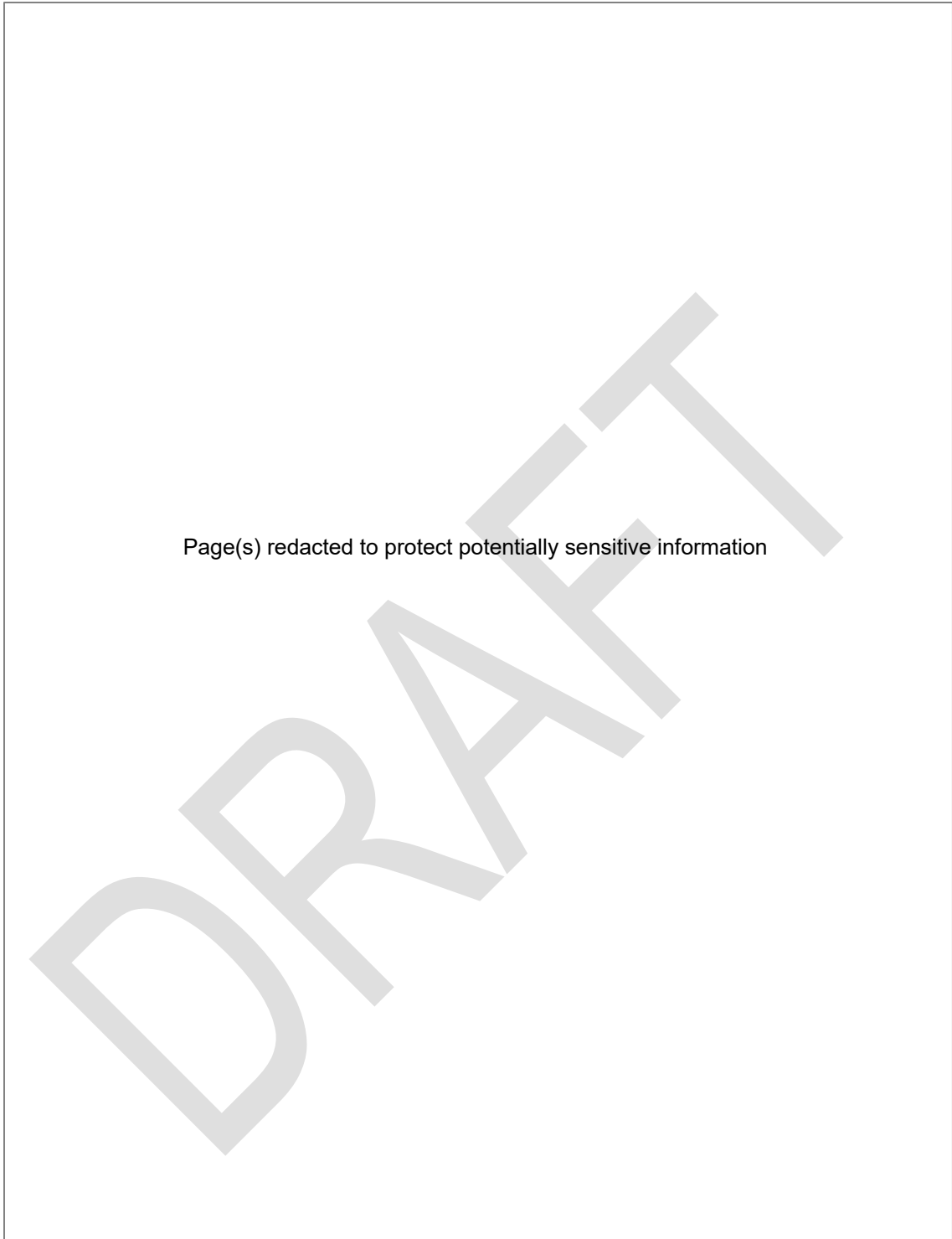
**Figure 5-6c Special-Status Plant Communities in the Special-Status Plant Study Area
(cont.)**



Source: Authority, 2016; CDFW, 2016a

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Figure 5-6d Special-Status Plant Communities in the Special-Status Plant Study Area (cont.)



Source: Authority, 2016; CDFW, 2016a

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**Figure 5-6e Special-Status Plant Communities in the Special-Status Plant Study Area
(cont.)**

5.3.2 Jurisdictional Waters and Habitat Types

5.3.2.1 Wetlands

Wetland types identified within the region include palustrine emergent wetlands such as freshwater marsh, mixed riparian, other riparian, and palustrine forested wetland. Vernal pools are also a type of palustrine emergent wetland; however, because of their importance as special-status species habitat, vernal pools and other seasonal wetlands are discussed and mapped separately in this report (see Section 5.3.1). Wetlands identified in the wetland study area are shown in the Primary Wetlands Delineation Report (Authority and FRA 2012c) and the Second Supplemental Wetlands Delineation Report (Authority and FRA 2016).

All wetlands identified within the wetland study area are considered jurisdictional based on the Preliminary Jurisdictional Delineation option as described in the Jurisdictional Determinations, Regulatory Guidance Letter (USACE 2008d). Wetlands are described under Section 5.1.3.

5.3.2.2 Other Waters

Nonwetland waters investigated in the wetland study area include constructed basin, constructed watercourse, natural watercourse, and open water. Nonwetland waters are described under Section 5.1.3. All natural and constructed waterways are considered potentially jurisdictional under the Preliminary Jurisdictional Delineation format (USACE 2008d).

5.3.2.3 CDFW and SWRCB Non-Wetland Riparian

Riparian communities identified in the wetland study area include palustrine forested wetlands, mixed riparian, and other riparian. Some of these riparian communities are considered jurisdictional under Section 404 and Section 401 of the CWA. However, according to guidance received from the USACE and CDFW during development of the Final Merced to Fresno Permitting Phase 1-Specific Permittee Responsible Mitigation Plan (Authority and FRA 2014), another subset of riparian communities (or portions of them) may only be subject to regulation under the California State Water Resources Control Board Porter-Cologne Act and California Fish and Game Code section 1602. These features are adjacent to federally regulated streams and are classified as non-wetland riparian. They have riparian vegetation, however lack either wetland hydrology or soil. Two types of non-wetland riparian occur in the wetland study area; mixed riparian and palustrine forested wetland.

5.3.3 Essential Fish Habitat

NMFS has designated most waterbodies that were historically accessible to Chinook salmon (*Oncorhynchus tshawytscha*) as EFH. This designation includes the Middle San Joaquin-Lower Chowchilla Watershed, hydrologic unit code (HUC) 18040001 (PFMC 1999). The Central Valley Wye occurs in this watershed. EFH has been designated for Chinook salmon within the San Joaquin River up to the boundary of watershed (HUC 18040001) at Friant Dam (Fed. Reg. 73:60987-60994).

Although EFH has been designated within the noted HU on the Middle San Joaquin River, surface water is only intermittently present in the Middle San Joaquin River since completion of the Central Valley Project in the late 1940s and early 1950s. The approximately 25-mile-long segment of the river between the Gravelly Ford gauging station and Mendota Pool is commonly without surface water due to diversions and infiltration losses, and conveys surface water only as a result of flood flow releases from Friant Dam. Since 1992, the CDFW has erected a diversion barrier at the Merced River confluence with the Middle San Joaquin River from mid-September to mid-December to stop salmonids from moving up the river above this location (CH2M HILL 2003, 2005). Fish habitat above the Merced River confluence, while potentially suitable for Chinook salmon and Central Valley steelhead, is currently adversely affected by habitat degradation, including altered flow regimes and this managed fish barrier.

As a result of the SJRRP Settlement (Natural Resources Defense Council 2006) and Public Law 111-11, the NMFS, USFWS, and USBR have implemented the SJRRP (USBR 2010) with implementation support from the California Department of Water Resources and CDFW. The

SJRRP is a comprehensive, long-term effort to restore flows to the San Joaquin River from Friant Dam to the confluence of the Merced River and restore a self-sustaining Chinook salmon fishery in the river while reducing or avoiding adverse water supply effects from restoration flows. Interim flow releases for water years 2010 through 2012 have been completed for the purpose of data collection (USBR 2010). USBR (2013b) analyzed the effects of flows for 2013 to 2017 in a draft Environmental Assessment. Spring-run Chinook salmon may be reintroduced to the San Joaquin River in 2016 after the salmon hatchery facility at the CDFW's trout hatchery in Friant (Salmon Conservation and Research Facility) becomes established (USBR 2013a). Because EFH in the habitat study area for all four Central Valley Wye alternatives is limited to the San Joaquin River, the only difference among the alternatives is that the Avenue 21 to Road 13 Wye Alternative is located south of the other three. EFH is currently of poor quality in the habitat study area due to the river being dry, sandy substrate, and dominance of nonnative vegetation along the banks. If flows were restored, this segment would provide a migratory corridor for salmonids.

5.3.4 Critical Habitat

Designated critical habitat for three species (San Joaquin Orcutt grass, vernal pool fairy shrimp, and vernal pool tadpole shrimp) occurs within the core habitat study area (Figure 5-5). Designated critical habitat for seven other species also occurs in the region, but does not overlap with the habitat study area. It is important to note that critical habitat must have the primary constituent elements to be considered habitat for these species. *Primary constituent elements* are those physical and biological features of a landscape that a species needs to survive and reproduce. In the case of the vernal pool species with designated critical habitat in the core habitat study area, the actual acreage of vernal pools (i.e., the primary constituent elements for these species) is less than the total mapped critical habitat because the acres include some portion of surrounding uplands.

5.4 Wildlife Movement Corridors

The following discussion presents the chronology of landscape linkage and wildlife movement planning efforts within the Central Valley Wye wildlife movement study area and vicinity. Specifically, this discussion includes the following designated and modeled corridor areas:

- Sandy Mush Road Area for San Joaquin Valley Species Conservation
- Designation of the Madera–Merced Linkage
- Designation of the Eastman Lake–Bear Creek and Ash Slough–Merced National Wildlife Refuge ECAs
- Modeled Wildlife Corridors

5.4.1 Sandy Mush Road Area for San Joaquin Valley Species Conservation

In 1998, the USFWS published the *Draft Recovery Plan for Upland Species of the San Joaquin Valley, California* (USFWS 1998). Among other goals, this plan promoted the Sandy Mush Road area for its high biological function and value. Sandy Mush Road originates at the intersection of Nickel Road (about 13 miles northwest of Los Banos) and extends approximately 20 miles eastward to Plainsburg Road, east of SR 99 (Figure 5-7). From a habitat perspective, Sandy Mush Road largely follows the Dutchman Creek corridor, which crosses the Central Valley Wye near where the Central Valley Wye alternatives parallel SR 99. With the exception of roadways and scattered urban centers, land use in the Sandy Mush Road area near the Central Valley Wye alternatives is almost entirely agricultural. Land use near the western origin of Sandy Mush Road is also agricultural, but is near the southern boundary of the Great Valley Grasslands State Park, which comprises expansive native grasslands and wetland complexes. The Great Valley Grasslands State Park is part of the larger Grasslands Ecological Area, an approximately 160,000-acre habitat preserve located within the historic floodplain of the San Joaquin River.

To meet the objective of delisting species and to ensure the long-term conservation of other species, the USFWS (1998) adopted an ecosystem-level strategy that proposed a network of

reserves and conservation areas, connected via linkages, which comprise many natural communities in San Joaquin upland ecosystems (USFWS 1998). This ecosystem-level strategy seeks to connect areas of suitable habitat through the establishment of habitat linkages. The USFWS notes conservation of lands and linkages near Sandy Mush Road as a Priority 2 action (1998). Priority 2 actions are those that must be taken to prevent a significant decline in a species' population or a decline in habitat quality or some other negative effect short of extinction.

Specific conservation goals the USFWS (1998) presented for the Sandy Mush Road area include:

- Protect natural land between the Alkali Sink Ecological Reserve and the San Joaquin River to the north (Sandy Mush Road/South Grasslands Area).
- Create a chain of habitat islands on the San Joaquin Valley floor that, together with establishing valley floor linkages through agricultural lands, link Merced County National Wildlife Refuges and state areas and other natural lands with the northwestern and northeastern portions of the San Joaquin Valley and with natural areas to the south.
- Maintain and enhance movement of San Joaquin kit fox between the Mendota area, Fresno County, natural lands in western Madera County, and natural lands along Sandy Mush Road and in the wildlife refuges and easement lands of Merced County. Specifically, maintain and enhance the Chowchilla or Eastside Bypass and natural lands along this corridor through acquisition, easement, or safe harbor initiatives.
- Link natural lands in the Sandy Mush Road area of Merced County with the population of San Joaquin kit fox on natural lands to the east by a safe harbor initiative on farmland.

Later work by conservation biologists recommended that San Joaquin kit fox be conserved aggressively in southwestern Merced County, which is currently understood to be the northernmost limit of self-sustaining populations of this species (Constable et al. 2009). The Sandy Mush Road area is shown on Figure 5-7.

5.4.2 Designation of the Madera-Merced Linkage

In late 2000, The Nature Conservancy of California and the California Wilderness Coalition formed the Missing Linkages Project and compiled habitat corridor information to promote and support a process to “maintain a network of interconnected public and private conservation areas throughout California.”

The proceedings of this effort were published in a document titled “Missing Linkages: Restoring Connectivity to the California Landscape” (Penrod et al. 2001). This planning process identified, mapped, and characterized landscape linkages, choke-points, and missing links within the California landscape that provided, or could provide, some level of function for wildlife movement and genetic dispersal.

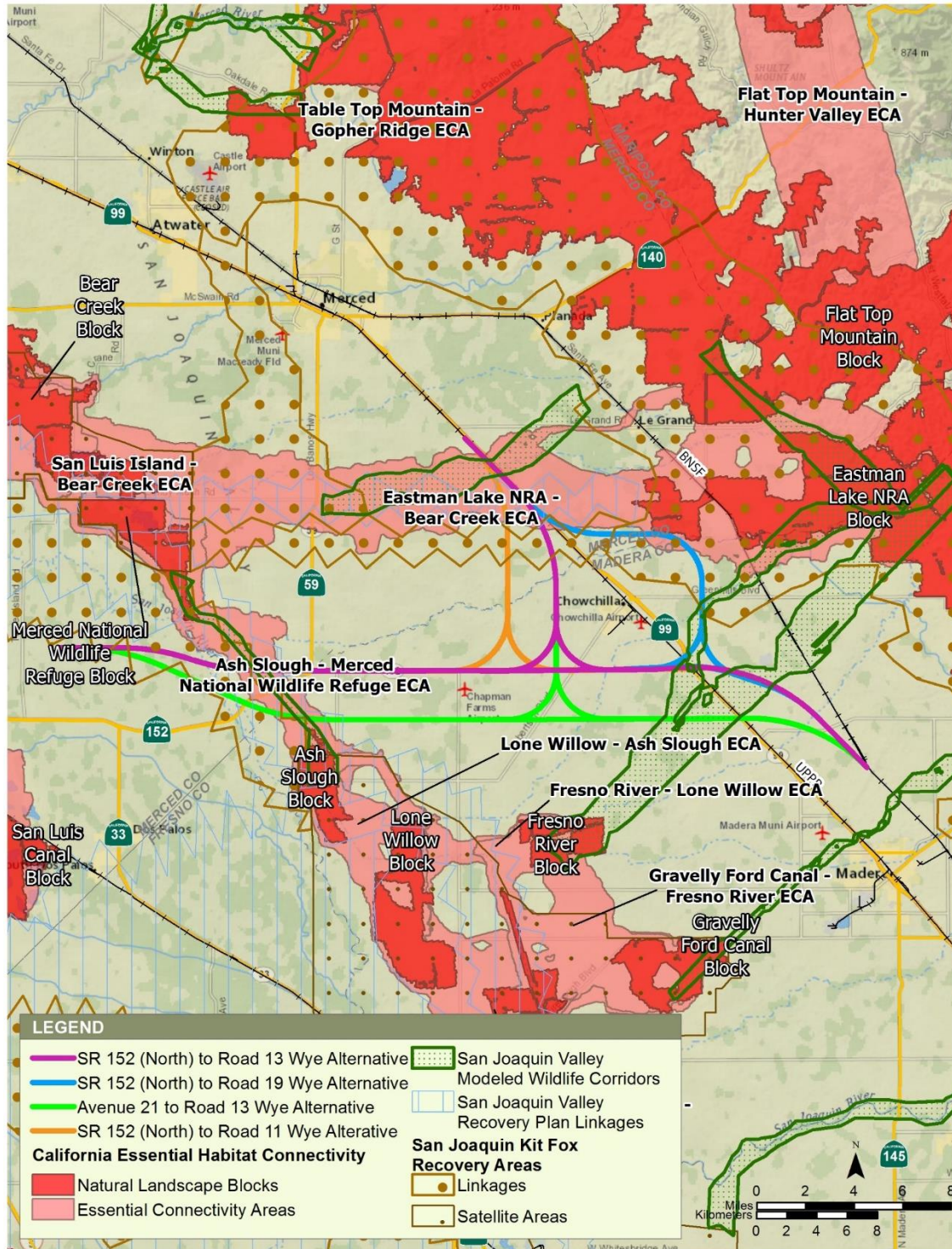
Penrod et al. (2001) defined these linkage terms as follows:

- **Landscape Linkages**—Large regional connections between habitat blocks (“core areas”) meant to facilitate animal movements and other essential flows between different sections of the landscape.
- **Choke-Point**—A narrow, impacted, or otherwise tenuous habitat linkage connecting two or more habitat blocks (core areas).
- **Missing Link**—A highly impacted area currently providing limited to no connectivity function (due to intervening development, roadways, etc.), but based on location, one that is critical to restore connectivity function.

In general, features identified that facilitated wildlife movement within linkages included riparian corridors or waterways, contiguous or semi-contiguous habitat patches, and culvert/bridge underpasses. Conversely, features that correlated with impeding wildlife movement included roads/highways, developed/urbanization, gaps in habitat patches, agriculture/ranching, dams/diversions, and logging.

Of the approximately 232 linkages evaluated during this initial process, 136 (59 percent) were ranked as severely threatened. Considering target species present, conservation opportunity, overall threat, and documentation availability, 54 linkages were identified as high-priority sites, 99 were ranked as medium-priority sites, and 79 were ranked as low-priority sites. *Priority* as used in this ranking process denoted preservation/planning urgency.

Twenty-seven of the 232 linkages were identified within the Central Valley of California. Of these, 8 were ranked as high priority and 9 were ranked as medium priority. Penrod et al. (2001) identified one of the linkages, the area near Deadman Creek and Dutchman Creek, near Sandy Mush Road and Le Grand, as the "Madera-Merced Linkage." This linkage is ranked as a high-priority choke-point and missing link. It is reportedly severely threatened, with only moderate conservation potential, reflecting existing functional impairments due to development. Figure 5-7 shows the Madera-Merced Linkage.



Source: Authority, 2016; Huber, 2007

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Figure 5-7 Wildlife Movement Corridors in the Wildlife Movement Study Area

5.4.3 Designation of the Eastman Lake-Bear Creek and the Ash Slough-Merced Wildlife Refuge Essential Connectivity Areas

In August 2008, California Assembly Bill (AB) 2785 amended the California Fish and Game Code and revised the existing Significant Natural Areas Program to direct the CDFW to, among other things:

...investigate, study, and identify those areas in the state that are most essential as wildlife corridors and habitat linkages and prioritize vegetative data development in those areas. The bill would require the department to develop and maintain high-quality spatial data on vegetation and land cover that is standardized statewide, and to develop and maintain a spatial data system that identifies those areas in the state that are most essential for maintaining habitat connectivity, including wildlife corridors and habitat linkages. The bill would require the department to make all of the described data sets and associated analytical products available to the public and other government entities. The bill would require the department to actively pursue grants and cost-sharing opportunities with local, state, or federal agencies, or private entities that use the data sets and benefit from their creation and maintenance. (AB 2785)

In 2010, the California Department of Transportation and the CDFW collaboratively published *The California Essential Habitat Connectivity Project: A Strategy for Conserving a Connected California* (Spencer et al. 2010). The Essential Habitat Connectivity Project was commissioned in response to the passage of AB 2785.

The Essential Habitat Connectivity Project produced maps, data, and mitigation guidelines for ECAs, which were defined as areas essential for ecological connectivity between natural landscape blocks. Using GIS modeling processes very similar to those used by the Missing Linkages Project, Spencer et al. (2010) identified 192 ECAs within California linking blocks of habitat thought to be beneficial to wildlife.

As noted by Spencer et al. (2010), land use within the California Central Valley ecoregion (Sacramento Valley, San Joaquin Valley, and Sacramento–San Joaquin Delta regions) has largely been converted to agriculture and urban land covers. As such, remaining habitat blocks are small in size and spatially fragmented relative to other ecoregions in the state. Within this ecoregion, 54 ECAs were identified, with 6 of those in the vicinity of the Central Valley Wye alternatives. These six proximal ECAs are:

- Eastman Lake–Bear Creek ECA
- Ash Slough–Merced National Wildlife Refuge ECA
- Lone Willow–Ash Slough ECA
- Fresno River–Lone Willow ECA
- Gravelly Ford Canal–Lone Willow ECA
- Gravelly Ford Canal–Fresno River ECA

Of these, the Central Valley Wye alternatives cross the Eastman Lake–Bear Creek ECA and the Ash Slough–Merced National Wildlife Refuge ECA. The Eastman Lake–Bear Creek ECA occurs in association with the corridors of Deadman Creek and Dutchman Creek, from their headwaters in the Sierra Nevada east of Planada and Le Grand, westward to their confluence points with the Eastside Bypass. The Eastman Lake–Bear Creek ECA also largely follows the spatial arrangement of the Madera-Merced Linkage reported by Penrod et al. (2001) and the Sandy Mush Road Wildlife Corridor along Sandy Mush Road. The Ash Slough–Merced National Wildlife Refuge ECA occurs in association with the corridors of the San Joaquin River, Ash Slough, and the Eastside Bypass north and south of SR 152. Figure 5-7 shows the Eastman Lake–Bear Creek ECA and the Ash Slough–Merced National Wildlife Refuge ECA.

5.4.4 Modeled Wildlife Corridors

Additional wildlife corridors that are potentially crossed by the Central Valley Wye alternatives occur near Berenda Slough and the Fresno River channels. The Information Center for the Environment, University of California, Davis, modeled these corridors for the CDFW in GIS

through evaluation of current land cover and management, road density, urban area density, natural area density, waterway density, and other elements (Huber 2007). Figure 5-7 shows modeled wildlife corridors.

5.4.5 Bird Migration Routes

The Pacific Flyway is a common bird migration route extending along the west coast of North and South Americas. The Pacific Flyway encompasses the western half of North America and South America from Alaska to Patagonia west to the pelagic areas of the Eastern Pacific to the Great Basin. This flyway spans the majority of California and encompasses the Central Valley, including the wildlife movement study area.

DRAFT

6 EFFECTS ANALYSIS

6.1 Introduction

This section provides a preliminary determination regarding the effects of the Central Valley Wye alternatives from construction and operations activities. Historically, the San Joaquin Valley was characterized by valley grasslands, saltbush scrub, palustrine wetlands, valley foothill hardwoods, and extensive riparian woodlands. Significant areas of these natural communities have been lost either to development (e.g. residential, commercial, petroleum, and transportation) or have been converted to agricultural production. The historical trend of losing or altering these natural communities has compromised the biological complexity of the region and has been a factor in the listing by federal and state agencies of special-status species. As such, any occurrences of special-status plant or wildlife species are considered sensitive resources under the existing, altered conditions of the RSAs and the surrounding San Joaquin Valley. Most of the land in the region consists of active agriculture, and the likelihood of occurrence for many special-status species is considered to be low in most areas; however, some natural areas could support special-status species. The potential for the Central Valley Wye alternatives to result in direct removal of species or direct or indirect habitat modifications determines the effect. Direct construction effects on biological resources or wetlands would generally result in the removal of the resource as a result of construction. Indirect construction effects would result in habitat modification that would result in the loss of viability of habitats.

Potential effects on biological resources and wetlands associated with the Central Valley Wye alternatives were analyzed for direct effects (i.e., effects which result in the immediate removal or disturbance of the resource), and for indirect effects (i.e., effects which are separated from the activity in space or time). 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 plant and wildlife species).

In determining the potential direct and indirect effects associated with construction and operations on biological resources and wetlands, a number of assumptions and limitations were applied:

- *Temporary direct effects* would occur in areas within the project footprint that can be fully restored to pre-disturbance conditions following construction (e.g., staging areas, construction laydown, relocation of underground utilities, and other work space that would not be occupied by Central Valley Wye facilities during HSR operations). Temporary direct effects on biological resources were calculated in GIS based on the acreage of a given resource (e.g., jurisdictional water feature or other land cover type that provides habitat for special-status species) within the boundaries of temporary construction easements as delineated in current engineering drawings provided by the Authority.
- *Permanent direct effects* would occur in the project footprint and would have lasting effects beyond the Central Valley Wye construction period. Permanent direct effects include habitat loss due to construction of rights-of-way for at-grade track segments, elevated structure track segments (everything under the aerial extent of the structure), road crossings, electrical substations, and facilities for maintenance of way. Permanent direct effects were calculated in GIS based on the acreage of a given resource that would be replaced by permanent Central Valley Wye facilities, utility easements, or access easements.
- *Indirect effects* would occur later in time (after construction or operations activities are conducted) or farther removed in distance (outside the project footprint), but are still reasonably foreseeable. Indirect effects on biological resources are described qualitatively under each resource topic.
- *Indirect bisected effects* apply in circumstances where a vernal pool falls partially within the project footprint and extends into adjacent areas, including areas beyond 250 feet, and includes effects on jurisdictional waters as well as special-status vernal pool plant and wildlife species. All effects on vernal pools are considered permanent and were calculated using GIS resource layers.

- Certain jurisdictional waters types (vernal pools) are especially sensitive to disturbance; therefore, effects 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.

Because habitat-level assessments were used in lieu of surveys in most cases, and the presence of special-status species is assumed in the absence of surveys, this analysis likely overestimates the magnitude and severity of most effects.

6.2 Effects on Plant Communities and Land Cover Types

The Central Valley Wye alternatives would have both direct and indirect effects on plant communities and land cover types through conversion to HSR facilities or infrastructure and degradation of adjacent areas due to increased cover of invasive plants and/or changes in hydrology. However, most effects would occur on agricultural lands, which are already highly disturbed from human activities and comprise the majority of land cover in the region. The SR 152 (North) to Road 19 Wye Alternative would have the highest potential for effects on plant communities and land cover types because it would directly and indirectly affect more acres than the other three Central Valley Wye alternatives (Table 5-3). The SR 152 (North) to Road 11 Wye Alternative would have the lowest potential for direct and indirect effects on plant communities and land cover types. The Avenue 21 to Road 13 Wye Alternative would have an intermediate potential for direct and indirect effects on plant communities and land cover types compared to the other alternatives.

Several IAMFs will help to minimize direct and indirect effects on plant communities and land cover types. The spread of noxious and invasive weeds into native plant communities would be minimized through the design of the Central Valley Wye, including BIO-IAMF#8, Prepare and Implement a Weed Control Plan, and BIO-IAMF#19, Cleaning of Construction Equipment. BIO-IAMF#8 would provide a mechanism through which the ecological integrity of plant communities within (i.e., temporarily disturbed as well as undisturbed areas) and adjacent to the project footprint would be maintained through the identification and removal of invasive plants that can outcompete native species. The Weed Control Plan also includes delineation of ERAs and would provide for identification of, contractor awareness of, and avoidance of sensitive biological resources adjacent to but outside the project footprint. BIO-IAMF#19 would minimize the spread of invasive plants outside the project footprint by making certain vehicles are cleaned of mud and plant materials prior to working in new areas, thus confirming that invasive plant seeds are not carried between construction work areas. Construction speed limits (BIO-IAMF#21 Vehicle Traffic and Construction Site Speed Limits) would minimize plant community exposure to dust, and construction site BMPs (BIO-IAMF#24) would include measures to reduce fire risk during construction (e.g., smoking prohibitions, not parking equipment over dry vegetation). During construction, the Authority will make certain that contractors will return excavated soils to their original locations to be used as backfill (BIO-IAMF#18) to reduce indirect effects on sensitive natural communities. Construction activities associated with the Central Valley Wye would require delineation of environmentally sensitive areas or ERAs on final construction plans and in the field (BIO-IAMF#13). BIO-IAMF#4 would avoid disturbance, including trampling or crushing to plants during maintenance activities by requiring maintenance personnel to attend a Worker Environmental Awareness Program (WEAP) training and acquire a certification that they understand regulatory agency requirements and procedures necessary to protect biological resources. Maintenance criteria will be included as part of the Biological Resources Management Plan (BIO-IAMF#6), which will include, but not be limited to, measures for the protection of special-status species and measures for erosion and siltation control. Although these IAMFs will help reduce indirect effects, their complete avoidance cannot be guaranteed because it is difficult to remove invasive plants from native plant communities once established without intensive and regular management (e.g., manual hand-pulling, herbicide application) and monitoring.

6.2.1 SR 152 (North) to Road 13 Wye Alternative

6.2.1.1 Construction Effects

Direct effects on plant communities and land cover types may result from the removal of vegetation for the placement of permanent infrastructure within the Central Valley Wye project footprint. Additional direct effects may result from construction crews removing vegetation within temporary affected areas and from construction vehicles and personnel disturbing vegetation (i.e., trampling, covering, and crushing individual plants or populations).

Indirect effects on plant communities and land cover types would potentially include:

- Erosion, siltation, and runoff into natural and constructed watercourses
- Soil and water contamination from construction equipment leaks
- Construction dust affecting plants by reducing their photosynthetic capability (especially during flowering periods)
- Altered hydrology that could change the wetland functions of aquatic habitats
- Increased risk of fire (e.g., construction equipment use and smoking by construction workers) in adjacent open spaces
- Habitat degradation through fragmentation and changes in habitat heterogeneity
- Introduction of noxious plant species (nonnative, detrimental species) resulting from ground disturbance

The effect acreages shown in Table 5-3 are the maximum amount of habitat that could be affected, and the actual habitat affected for each plant community and land cover type is expected to be much lower. Direct effects would occur where the project footprint overlaps with a particular plant community and land cover type, and indirect effects would occur where the plant community and land cover type is adjacent to the project footprint. The SR 152 (North) to Road 13 Wye Alternative would permanently remove plant communities and land cover types where they are present in the project footprint.

6.2.1.2 Operations Effects

Ongoing operations and maintenance activities (e.g., routine inspection and maintenance of the HSR right-of-way) are unlikely to have any direct effects on plant communities and land cover types because these activities would occur where the natural vegetation (i.e., areas with potential habitat for special-status plant species) has already been removed during Central Valley Wye construction. Direct effects, if they occur, would include incidental trampling or crushing of vegetation caused by increased human activity related to the maintenance of equipment and facilities associated with the HSR system and exposure to accidental spills, including contaminants or pollutants.

Any change in local hydrology and vernal pools could cause a change in habitat conditions for vernal pool–dependent plants. Indirect effects may result from grading and stockpiling soils upslope of the pools during operations, leading to sediment transfer into the water column. Depending on drainage BMPs, some changes to local hydrology could cause mobilization of otherwise standing water, scour, and changes to the period of inundation of vernal pools. Chemical spills from fuel, transmission fluid, lubricating oil, and motor oil leaks could contaminate the water column, resulting in degraded habitat.

Operational maintenance requires vegetation and pest control through a variety of methods, including the application of herbicides and pesticides. Pesticide and herbicide application would be applied by certified pesticide applicators in accordance with all requirements of the California Department of Pesticide Regulation and County Agricultural Commissioners. 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.

6.2.2 SR 152 (North) to Road 19 Wye Alternative

6.2.2.1 Construction Effects

The effect acreages shown in Table 5-3 are the maximum amount of habitat that could be affected, and the actual habitat affected for each plant community and land cover type is expected to be much lower. As shown in Table 5-3, both direct and indirect effects on plant communities and land cover types could occur if they are present. Direct effects would occur where the project footprint overlaps with a plant community and land cover type, and indirect effects would occur where the plant community and land cover type is adjacent to the project footprint. The SR 152 (North) to Road 19 Wye Alternative could permanently remove vegetation in unknown locations and in unknown quantities.

6.2.2.2 Operations Effects

The types of direct and indirect operations effects anticipated under the SR 152 (North) to Road 19 Wye Alternative would be identical to those described for the SR 152 (North) to Road 13 Wye Alternative.

6.2.3 Avenue 21 to Road 13 Wye Alternative

6.2.3.1 Construction Effects

The effect acreages shown in Table 5-3 are the maximum amount of habitat that could be affected, and the actual habitat affected for each plant community and land cover type is expected to be much lower. As shown in Table 5-3, both direct and indirect effects on plant communities and land cover types could occur if they are present. Direct effects would occur where the project footprint overlaps with a plant community and land cover type, and indirect effects would occur where the plant community and land cover type is adjacent to the project footprint. The Avenue 21 to Road 13 Wye Alternative could permanently remove vegetation in unknown locations and in unknown quantities.

6.2.3.2 Operations Effects

The types of direct and indirect operations effects anticipated under the Avenue 21 to Road 13 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative.

6.2.4 SR 152 (North) to Road 11 Wye Alternative

6.2.4.1 Construction Effects

The effect acreages shown in Table 5-3 are the maximum amount of habitat that could be affected, and the actual habitat affected for each plant community and land cover type is expected to be much lower. As shown in Table 5-3, both direct and indirect effects on plant communities and land cover types could occur if they are present. Direct effects would occur where the project footprint overlaps with a plant community and land cover type, and indirect effects would occur where the plant community and land cover type is adjacent to the project footprint. The SR 152 (North) to Road 11 Wye Alternative could permanently remove vegetation in unknown locations and in unknown quantities.

6.2.4.2 Operations Effects

The types of direct and indirect operations effects anticipated under the Avenue 21 to Road 13 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative.

6.3 Effects on Native Fauna

The Central Valley Wye alternatives would have effects on native fauna. Direct construction effects on wildlife would occur where suitable habitat is present, where species cannot move out of harm's way during construction, or where habitat is removed, reducing foraging and refugia opportunities. Similarly, operations and maintenance activities could disturb habitat, remove habitat, or result in effects on individuals if they cannot move out of harm's way.

Several IAMFs will help to reduce direct effects (i.e., mortality or injury) on native fauna. BIO-IAMF#4, will minimize the likelihood that individual species will be required to attend a WEAP training and certify that they understand the regulatory agency requirements and procedures necessary to protect biological resources. Such procedures, as well as provisions for biological monitoring during ground-disturbing and maintenance activities to confirm compliance with protective measures, will be clearly described in the biological resources management plan (BRMP) that will be prepared under BIO-IAMF#6, Prepare and Implement a Biological Resources Management Plan. BIO-IAMF#11, Conduct Biological Monitoring during Construction Activities, will also minimize the likelihood that animals will be injured or killed during construction because the contractor's agency-approved biologist would be on-site to survey for (and relocate, if necessary) animals in harm's way, as well as confirm that workers are in compliance with established protective measures. In addition, speed limits will be established in coordination with the Project Biologist for designated areas to prevent traffic accidents with fauna (BIO-IAMF#21). The installation and monitoring of wildlife exclusion fencing (WEF) under BIO-IAMF#13, Environmentally Sensitive Areas, Wildlife Exclusion Fencing and Non-Disturbance Zones, would prevent terrestrial animals from entering active work areas and thus minimize the likelihood of injury, harassment, and mortality. The prohibition of mono-filament netting or similar material in erosion control materials under BIO-IAMF#14, Monofilament Restrictions, will reduce the likelihood of native amphibians and reptiles (especially snakes) becoming trapped and dying in such materials. BIO-IAMF#15, Avoidance of Entrapment, would minimize the potential of native amphibians, reptiles, and mammals falling into holes or trenches or becoming trapped in pipes or culverts by establishing contractor requirements that all such features be properly covered, capped, and inspected during construction. The destruction or disturbance of active bird nests would be avoided through BIO-IAMF#26, General Nesting Season Restrictions, which requires the project biologist or agency-approved monitoring biologist to conduct a preconstruction nesting bird survey during the nesting season. Site-specific exclusion zones, work restrictions, and monitoring procedures established during such surveys would make certain that nests successfully fledge young or become inactive of natural causes (rather than human-caused disturbance) prior to work resuming in the nest vicinity.

6.3.1 SR 152 (North) to Road 13 Wye Alternative

6.3.1.1 Construction Effects

Suitable habitat for native fauna would be affected by construction of the SR 152 (North) to Road 13 Wye Alternative. Suitable habitat for native fauna includes both developed and natural lands, and aquatic and upland habitats. Effects on these habitats would result in a measurable but relatively minor loss to native fauna present in the region.

6.3.1.2 Operations Effects

Suitable habitat for native fauna, including aquatic habitats, such as riverine and lacustrine habitats, as well as natural upland areas, such as annual grassland, are present in the SR 152 (North) to Road 13 Wye Alternative habitat study area. Operations activities could adversely affect individuals of the native fauna and their habitat, however effects are expected to be minor and dispersed in time and area. The effects on native fauna from operations are expected to be dispersed over time, are expected to be minor, and would not substantially reduce the habitat for a fish or wildlife species.

6.3.2 SR 152 (North) to Road 19 Wye Alternative

6.3.2.1 Construction Effects

Suitable habitat for native fauna would be affected by construction of the SR 152 (North) to Road 19 Wye Alternative. Suitable habitat for native fauna includes both developed and natural lands, and aquatic and upland habitats. Effects on these habitats would result in a measurable but relatively minor loss to native fauna present in the region.

6.3.2.2 Operations Effects

Suitable habitat for native fauna, including aquatic habitats, such as riverine and lacustrine habitats, as well as natural upland areas, such as annual grassland, are present in the SR 152 (North) to Road 19 Wye Alternative habitat study area. Operations activities could adversely affect individuals of the native fauna and their habitat, however effects are expected to be minor and dispersed in time and area. The effects on native fauna from operations are expected to be dispersed over time, are expected to be minor, and would not substantially reduce the habitat for a fish or wildlife species.

6.3.3 Avenue 21 to Road 13 Wye Alternative

6.3.3.1 Construction Effects

The types of direct and indirect construction effects anticipated under the Avenue 21 to Road 13 Wye Alternative would be nearly identical to those for the SR 152 (North) to Road 13 Wye Alternative. Suitable habitat for native fauna would be temporarily affected by construction of the Avenue 21 to Road 13 Wye Alternative. Suitable habitat for native fauna includes both developed and natural lands, and aquatic and upland habitats. Effects on these habitats would result in adverse but minor effects on native fauna.

6.3.3.2 Operations Effects

Suitable habitat for native fauna, including aquatic habitats, such as riverine and lacustrine habitats, as well as natural upland areas, such as annual grassland, are present in the Avenue 21 to Road 13 Wye Alternative habitat study area. Operations activities could adversely affect individuals of the native fauna and their habitat. However, effects on native fauna from operations are expected to be dispersed over time, are expected to be minor, and would not substantially reduce the habitat for a fish or wildlife species.

6.3.4 SR 152 (North) to Road 11 Wye Alternative

6.3.4.1 Construction Effects

Suitable habitat for native fauna would be affected by construction of the SR 152 (North) to Road 11 Wye Alternative. Suitable habitat for native fauna includes both developed and natural lands, and aquatic and upland habitats. Effects on these habitats would result in a measurable but relatively minor loss to native fauna present in the region.

6.3.4.2 Operations Effects

Suitable habitat for native fauna, including aquatic habitats, such as riverine and lacustrine habitats, as well as natural upland areas, such as annual grassland, are present in the SR 152 (North) to Road 11 Wye Alternative habitat study area. Operations activities could adversely affect individuals of the native fauna and their habitat, however effects are expected to be minor and dispersed in time and area. The effects on native fauna from operations are expected to be dispersed over time, are expected to be minor, and would not substantially reduce the habitat for a fish or wildlife species.

6.4 Effects on Special-Status Species

6.4.1 Special-Status Plants

All of the Central Valley Wye alternatives are anticipated to have direct and indirect effects on special-status plants. The SR 152 (North) to Road 19 Wye Alternative would have the highest potential for effects on special-status plant species because it would directly affect more acres of suitable habitat for special-status plant species than the other three Central Valley Wye alternatives (Table 6-1). The Avenue 21 to Road 13 Wye Alternative would have the lowest potential for direct effects on special-status plant species compared to the other alternatives. The SR 152 (North) to Road 13 Wye Alternative would have an intermediate potential for direct effects on special-status plant species compared to the other alternatives. The SR 152 (North) to Road 11 Wye Alternative would directly affect less vernal pool, riparian, and aquatic special-status plant habitat than the other alternatives and would affect a moderate amount of annual grassland habitat.

To identify special-status plants (i.e., individual plants or colonies) to be avoided during The Authority will delineate environmentally sensitive areas or environmentally restricted areas (ERAs) on final construction plans and in the field (BIO-IAMF#13: Environmentally Sensitive Areas, Wildlife Exclusion Fencing and Non-Disturbance Zones). This IAMF will avoid some, but not all, direct effects on special-status plants because it will make certain that contractors are aware of and will avoid affecting special-status plant occurrences during construction. The implementation of the Central Valley Wye alternatives could still permanently remove special-status plants, resulting in direct construction effects where special-status plants are present and effects cannot be avoided through the design of the Central Valley Wye.

BIO-IAMF#8 includes the preparation and implementation of a Weed Control Plan by the project biologist to minimize and avoid the spread of weeds during construction activities. BIO-IAMF#13 would confirm the identification and contractor awareness and avoidance of sensitive biological resources adjacent to but outside the project footprint by delineating environmentally sensitive areas and ERAs. These IAMFs will help to minimize indirect effects on special-status plants and other native vegetation occurring outside of but adjacent to the project footprint. BIO-IAMF#19, will minimize the spread of invasive plants outside the project footprint by making certain vehicles are cleaned of mud and plant materials prior to working in new areas, thus confirming that invasive plant seeds are not carried between construction work areas. Although these IAMFs will help reduce direct effects, indirect effects may still occur because it is difficult to remove invasive plants from native plant communities once established without intensive and regular management (e.g., manual hand-pulling, herbicide application) and monitoring.

The Authority would require maintenance personnel to attend a WEAP training and certify that they understand the regulatory agency requirements and procedures necessary to protect biological resources (BIO-IAMF#4, Operation and Maintenance Period WEAP Training), including those which would avoid incidental trampling or crushing and spills. Maintenance criteria will be included as part of the Biological Resources Management Plan (BIO-IAMF#6), which will include, but not be limited to, measures for the protection of special-status species and the identification and avoidance of habitats through the delineation of ERAs. In addition, the Authority will prepare an Annual Vegetation Control Plan that would list “sensitive areas” in vegetation control areas (BIO-IAMF#7) to minimize adverse chemical and non-chemical (e.g., mowing or trimming) effects on vegetation. These IAMFs would minimize the direct effects on special-status plants that may result from the operations of the Central Valley Wye Alternatives.

Maintenance criteria will be included as part of the Biological Resources Management Plan (BIO-IAMF#6), which would include, but not be limited to, measures for the protection of special-status species, specifications on the purpose, type, frequency, and extent of chemical use for insect and disease control operations, and measures for erosion and siltation control. Pesticide and herbicide application would be applied by certified pesticide applicators in accordance with all requirements of the California Department of Pesticide Regulation and County Agricultural Commissioners. In addition, the Authority will prepare an Annual Vegetation Control Plan (BIO-IAMF#7) and Weed Control Plan (BIO-IAMF#8) that would consist of site-specific vegetation and weed control methods and areas (BIO-IAMF#7) to minimize adverse chemical effects on vegetation. The technology for the HSR system does not require large amounts of lubricants or hazardous materials for operations, compared to diesel locomotive fuel tanks. TPSSs, switching stations, and substations would require maintenance activities of oil and other materials for equipment storage. The Authority will implement an Environmental Management System to promote the use of nonhazardous materials to the extent possible (HMW-IAMF#3). Where hazardous materials cannot be avoided, the Authority will implement a spill prevention, control, and countermeasure plan to reduce potential effects from the use and storage of hazardous materials at Central Valley Wye facilities (PTSSs) (HMW-IAMF#4). In addition to requiring maintenance personnel to attend a WEAP training to gain knowledge of biological resources and associate regulatory requirements (BIO-IAMF#4), these IAMFs would minimize indirect effects during operations.

Table 6-1 Direct Effects on Special-Status Plant Species Habitat by Central Valley Wye Alternative (acres)

Species Potentially Affected	Associated Land Cover Type	Alternative							
		SR 152 (North) to Road 13 Wye		SR 152 (North) to Road 19 Wye		Avenue 21 to Road 13 Wye		SR 152 (North) to Road 11 Wye	
		Acres Affected	%	Acres Affected	%	Acres Affected	%	Acres Affected	%
Alkali milk-vetch, heartscale, crownscale, lesser saltscale, subtle orache, round-leaf filaree, Parry's rough tarplant, hispid bird's-beak, palmate-bracted bird's-beak, Hoover's cryptantha, Ewan's larkspur, recurved larkspur, golden goodmania, shining navarretia, fragile pentachaeta, Merced phacelia	California Annual Grassland	95.01	87	102.65	88	32.30	68	74.30	89
Vernal pool smallscale, succulent owl's-clover, Hoover's spurge, dwarf downingia, spiny-sepaed button-celery, hogwallow starfish, Ferris' goldfields, little mousetail, shining navarretia	Vernal Pool	1.52	1	1.52	1	2.82	6	0.24	0.3
Delta button-celery, Wright's trichocoronis	Other Riparian	6.33	6	5.81	5	5.61	12	4.53	5
Sanford's arrowhead	Freshwater Marsh, Natural Watercourse, Open Water	6.29	6	6.41	6	6.61	14	5.31	6
	Total Habitat	109.15	100	116.36	100	47.34	100	84.38	100

Source: Calculations generated using ESRI ArcGIS versions 10.1, 10.2, and 10.3 from data generated by field surveys and aerial photo interpretation during 2010–2015
 SR = State Route

6.4.1.1 SR 152 (North) to Road 13 Wye Alternative

Construction Effects

Direct effects on special-status plant species and native plant species may result from the removal of vegetation for the placement of permanent infrastructure within the Central Valley Wye project footprint. Additional direct effects may result from construction crews removing vegetation within temporary affected areas and from construction vehicles and personnel disturbing vegetation (i.e., trampling, covering, and crushing individual plants, populations, or suitable potential habitat for special-status plant species).

Indirect effects on special-status plant species and native plant species would potentially include:

- Habitat degradation through fragmentation and changes in habitat heterogeneity
- Introduction of noxious plant species (nonnative, detrimental species) resulting from ground disturbance

The effect acreages shown in Table 6-1 are the maximum amount of habitat that could be affected, and the actual amount of habitat affected for each species is expected to be much lower to none. As also shown in Table 6-1, direct effects on special-status plants could occur if those plants are present. Direct effects would occur where the project footprint overlaps with a special-status plant population. Indirect effects would occur where the population is adjacent to the project footprint. The SR 152 (North) to Road 13 Wye Alternative could permanently remove special-status plants in unknown locations and in unknown quantities, if they are present.

Operations Effects

Ongoing operations and maintenance activities (e.g., routine inspection and maintenance of the HSR right-of-way) are unlikely to have any direct effects on special-status plant species because these activities would occur where the natural vegetation (i.e., areas with potential habitat for special-status plant species) has already been removed during Central Valley Wye construction. Direct effects, if they occur, would include mortality from incidental trampling or crushing caused by increased human activity related to the maintenance of equipment and facilities associated with the HSR system and exposure to accidental spills, including contaminants or pollutants.

Any change in local hydrology and vernal pools could cause a change in habitat conditions for vernal pool dependent special-status plants. Indirect effects may result from grading and stockpiling soils upslope of the pools during operations, leading to sediment transfer into the water column. Depending on drainage BMPs, some changes to local hydrology could cause mobilization of otherwise standing water, scour, and changes to the period of inundation of vernal pools. Chemical spills from fuel, transmission fluid, lubricating oil, and motor oil leaks could contaminate the water column, resulting in degraded habitat of special-status plants.

Operational maintenance requires vegetation and pest control through a variety of methods, including the application of herbicides and pesticides. Pesticide and herbicide application would be applied by certified pesticide applicators in accordance with all requirements of the California Department of Pesticide Regulation and County Agricultural Commissioners. 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.

6.4.1.2 SR 152 (North) to Road 19 Wye Alternative

Construction Effects

The effect acreages shown in Table 6-1 are the maximum amount of habitat that could be affected, and the actual habitat affected for each species is expected to be much lower to none. As also shown in Table 6-1, direct effects on special-status plants could occur if they are present. Direct effects would occur where the project footprint overlaps with a special-status plant population. Indirect effects would occur where the population is adjacent to the project footprint. The SR 152 (North) to Road 19 Wye Alternative could permanently remove special-status plants in unknown locations and in unknown quantities, if they are present.

The types of direct and indirect construction effects anticipated under the SR 152 (North) to Road 19 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. The SR 152 (North) to Road 19 Wye Alternative special-status plant study area contains a relatively small amount of natural communities that could provide habitat for special-status plants, including California annual grassland, vernal pools, riparian habitats, freshwater marsh, natural watercourses, and open water (Table 5-3). Although these species have moderate to high potential to occur in the special-status plant study area, their likelihood of occurrence is very low because the habitat is fragmented and in most areas has been disturbed by disking, cattle grazing, or other activities.

Operations Effects

The types of direct and indirect operations effects anticipated under the SR 152 (North) to Road 19 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative.

6.4.1.3 Avenue 21 to Road 13 Wye Alternative

Construction Effects

The effect acreages shown in Table 6-1 are the maximum amount of habitat that could be affected by the Avenue 21 to Road 13 Wye Alternative. The types of direct and indirect construction effects anticipated under the Avenue 21 to Road 13 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative.

The Avenue 21 to Road 13 Wye Alternative special-status plant study area contains a relatively small amount of natural communities that could provide habitat for special-status plants, including California annual grassland, vernal pools, riparian forest and woodland, freshwater marsh, natural watercourses, and open water (Table 6-1). Although these species have moderate to high potential to occur in the special-status plant study area, their likelihood of occurrence is very low because the habitat is fragmented and in most areas has been disturbed by disking, cattle grazing, or other activities. Therefore, the effects acreages shown in Table 6-1 are the maximum amount of habitat that could be affected, and the actual habitat affected for each species is expected to be much lower to none.

Operations Effects

The types of direct and indirect operations effects anticipated under the Avenue 21 to Road 13 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative.

6.4.1.4 SR 152 (North) to Road 11 Wye Alternative

Construction Effects

The effect acreages shown in Table 6-1 are the maximum amount of habitat that could be affected, and the actual habitat affected for each species is expected to be much lower to none. As also shown in Table 6-1, direct effects on special-status plants could occur if they are present. Direct effects would occur where the project footprint overlaps with a special-status plant population. Indirect effects would occur where the population is adjacent to the project footprint. The SR 152 (North) to Road 11 Wye Alternative could permanently remove special-status plants in unknown locations and in unknown quantities, if they are present.

The types of direct and indirect construction effects anticipated under the SR 152 (North) to Road 11 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. The SR 152 (North) to Road 11 Wye Alternative special-status plant study area contains a relatively small amount of natural communities that could provide habitat for special-status plants, including California annual grassland, vernal pools, riparian habitats, freshwater marsh, natural watercourses, and open water (Table 5-3). Although these species have moderate to high potential to occur in the special-status plant study area, their likelihood of occurrence is very low because the habitat is fragmented and in most areas has been disturbed by disking, cattle grazing, or other activities.

Operations Effects

The types of direct and indirect operations effects anticipated under the SR 152 (North) to Road 11 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative.

6.4.2 Special-Status Wildlife

Table 6-2 presents potential direct (temporary and permanent) construction effects on special-status wildlife species by Central Valley Wye alternative based on the acreage of affected land cover types that provide habitat (i.e., the resources and conditions present in an area that produce occupancy by a given organism [Hall et al. 1997]) for a given species. It is important to recognize that although such land cover types are presumed occupied by the species for which habitat is present, the actual quality and extent of habitat within the landscape is highly variable and therefore large areas could be unoccupied.

The SR 152 (North) to Road 19 Wye and Avenue 21 to Road 13 Wye Alternatives would, in most cases, have the highest potential for effects on habitat for special-status wildlife species because they would directly affect more acres than the other three alternatives (Table 6-2). The SR 152 (North) to Road 13 Wye and SR 152 (North) to Road 11 Wye alternatives would have similar, though slightly less, effects on special-status wildlife species habitat.

Table 6-2 Direct Effects on Special-Status Wildlife Species Habitat by Central Valley Wye Alternative (acres)

Species Group and Species	Associated Land Cover Type	Effect Type ¹	Alternative			
			SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Invertebrates						
Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp	VP, SW	Direct Permanent	1.87	2.19	2.45	0.60
		Indirect Bisected	0.36	1.85	0.48	0.04
		Total	2.24	4.04	2.94	0.64
Valley elderberry longhorn beetle	MIR, OTR, PFW with elderberry shrubs	Direct Permanent	6.53	8.30	3.41	4.99
		Direct Temporary	3.47	4.64	3.34	2.95
		Total	10.00	12.94	6.75	7.94
Fish²						
Central Valley steelhead	NAW, OTR (San Joaquin River only)	Direct	2.64	2.64	2.04	2.64
		Total	2.64	2.64	2.04	2.64
Central Valley spring-run Chinook salmon	NAW, OTR (San Joaquin River only)	Direct	2.64	2.64	2.04	2.64
		Total	2.64	2.64	2.04	2.64
Hardhead	NAW, OTR (San Joaquin River only)	Direct	2.64	2.64	2.04	2.64
		Total	2.64	2.64	2.04	2.64
Kern brook lamprey	NAW, OTR (San Joaquin River only)	Direct	2.64	2.64	2.04	2.64
		Total	2.64	2.64	2.04	2.64
San Joaquin roach	NAW, OTR (San Joaquin River only)	Direct	2.64	2.64	2.04	2.64
		Total	2.64	2.64	2.04	2.64
Chinook salmon— Central Valley fall/late-fall run ESU	NAW, OTR (San Joaquin River only)	Direct	2.64	2.64	2.04	2.64
		Total	2.64	2.64	2.04	2.64

Species Group and Species	Associated Land Cover Type	Effect Type ¹	Alternative			
			SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Amphibians						
California tiger salamander	Aquatic: FWM, OPW, SEW, VP	Direct Permanent	1.85	2.07	1.99	0.59
		Direct Temporary	0.02	0.13	0.48	0.01
		<i>Subtotal</i>	<i>1.87</i>	<i>2.19</i>	<i>2.47</i>	<i>0.60</i>
	Upland: BAR, AGS, MIR, OTR, PFW, PAS, RUD	Direct Permanent	136.92	153.79	74.88	106.32
		Direct Temporary	26.57	65.38	15.29	23.10
		<i>Subtotal</i>	<i>163.19</i>	<i>219.18</i>	<i>90.17</i>	<i>129.42</i>
Total		165.36	221.37	92.64	130.02	
Western spadefoot	Aquatic: FWM, OPW, SEW, VP	Direct Permanent	1.85	2.07	1.99	0.59
		Direct Temporary	0.02	0.13	0.48	0.01
		<i>Subtotal</i>	<i>1.87</i>	<i>2.19</i>	<i>2.47</i>	<i>0.60</i>
	Upland: BAR, AGS, RUD surrounding suitable aquatic habitat	Direct Permanent	36.70	42.43	14.79	20.19
		Direct Temporary	1.83	5.23	2.16	3.37
		<i>Subtotal</i>	<i>38.53</i>	<i>47.66</i>	<i>16.95</i>	<i>23.57</i>
Total		40.41	49.85	19.42	24.17	
Reptiles						
Western pond turtle	Aquatic: FWM, NAW, OPW, PFW, SEW	Direct Permanent	5.22	7.42	4.21	4.07
		Direct Temporary	1.91	2.58	3.54	1.63
		<i>Subtotal</i>	<i>7.13</i>	<i>10.00</i>	<i>7.75</i>	<i>5.70</i>
	Upland: AGS, MIR, OTR, RUD within 1,300 feet of suitable aquatic habitat	Direct Permanent	58.78	63.28	25.78	39.15
		Direct Temporary	11.30	17.96	10.44	10.33
		<i>Subtotal</i>	<i>70.08</i>	<i>81.24</i>	<i>36.22</i>	<i>49.48</i>
Total		77.21	91.25	43.97	55.19	

Species Group and Species	Associated Land Cover Type	Effect Type ¹	Alternative			
			SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Blunt-nosed leopard lizard	BAR, AGS, RUD within range	Direct Permanent	26.75	23.31	9.03	23.40
		Direct Temporary	6.03	5.76	4.06	3.87
		Total	32.79	29.07	13.10	27.26
Blainville's horned lizard	BAR, AGS, RUD within range	Direct Permanent	113.66	133.10	52.92	89.00
		Direct Temporary	24.17	61.38	10.37	21.86
		Total	137.82	194.49	63.29	110.87
Giant garter snake	Aquatic: FWM, NAW, OPW, RFW within range	Direct Permanent	4.47	4.42	3.50	3.68
		Direct Temporary	1.82	1.99	3.11	1.63
		<i>Subtotal</i>	<i>6.29</i>	<i>6.41</i>	<i>6.61</i>	<i>5.31</i>
	Upland: AGS, PAS within 200 feet of suitable aquatic habitat	Direct Permanent	12.01	11.35	6.94	8.37
		Direct Temporary	3.89	3.69	4.36	3.35
		<i>Subtotal</i>	<i>15.90</i>	<i>15.04</i>	<i>11.30</i>	<i>11.72</i>
Total	22.19	21.45	17.91	17.03		
Birds						
American peregrine falcon	Foraging: BAR, AGS, COI, COB, COW, DAI, EUC, FIC, FWM, INA, MIR, NAW, OPW, ORC, OTR, PFW, PAS, RFW, ROC, RUD, RUR, SEW, SLO, TRC, URB, URW, VP, VIN	Direct Permanent	2,509.88	2,752.17	2,308.81	2,460.82
		Direct Temporary	531.61	674.22	360.51	410.95
		Total	3,041.49	3,426.39	2,669.31	2,871.77
Bald eagle	Nesting: EUC, MIR, OTR, PFW Foraging: BAR, AGS, FIC, FWM, INA, NAW, OPW, PAS, RFW, ROC, RUD, SEW, SLO, VP	Direct Permanent	1,288.35	1,170.00	1,032.22	1,212.88
		Direct Temporary	236.08	235.36	155.14	175.77
		Total	1,524.43	1,405.36	1,187.36	1,388.65
Golden eagle		Direct Permanent	1,281.39	1,162.76	1,028.63	1,206.70
		Direct Temporary	233.65	231.92	151.99	173.24

Species Group and Species	Associated Land Cover Type	Effect Type ¹	Alternative			
			SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
	Nesting: EUC, MIR, OTR, PFW Foraging: BAR, AGS, FIC, FWM, INA, PAS, RFW, ROC, RUD, SEW, SLO, VP	Total	1,514.93	1,394.68	1,180.62	1,379.94
Swainson's hawk	Nesting: EUC, MIR, ORC, OTR, TRC, Foraging: BAR, AGS, FIC, INA, PAS, ROC, RUD, SEW, TRC,	Direct Permanent	2,093.82	2,176.68	2,037.79	2,046.09
		Direct Temporary	449.61	567.43	307.87	350.53
		Total	2,543.43	2,744.11	2,345.67	2,396.62
Greater sandhill crane	Foraging: AGS, FIC, FWM, INA, PAS, RFW, ROC, RUD, SEW	Direct Permanent	1,256.18	1,123.51	1,000.79	1,188.54
		Direct Temporary	227.68	207.30	145.94	169.42
		Total	1,483.85	1,330.81	1,146.73	1,357.96
Western snowy plover (interior population)	Foraging: BAR, AGS, FIC, INA, PAS, RFW, ROC, RUD	Direct Permanent	1,275.71	1,155.21	1,023.32	1,203.62
		Direct Temporary	230.77	228.60	148.22	171.18
		Total	1,506.28	1,383.81	1,171.54	1,374.80
Least Bell's vireo	Nesting: MIR, OTR, PFW Foraging: FWM, MIR, NAW, OTR, PFW	Direct Permanent	11.00	12.72	6.90	8.67
		Direct Temporary	5.29	6.63	6.45	4.58
		Total	16.28	19.36	13.35	13.25
Tricolored blackbird	Nesting: COW, FIC, FEM, NAW, OPW, SEW Foraging: AGS, DAI, FIC, FEM, INA, MIR, OTR, PAS, SEW, VP	Direct Permanent	1,193.10	1,060.03	895.74	1,142.09
		Direct Temporary	226.30	190.79	137.68	160.78
		Total	1,419.41	1,250.82	1,033.43	1,302.87
Western burrowing owl	Nesting/Foraging: BAR, AGS, COI, COW, INA, ORC, RUD, RUR, TRC, URB	Direct Permanent	1,168.10	1,408.51	1,273.05	1,118.58
		Direct Temporary	308.72	471.15	205.27	245.27
		Total	1,476.83	1,879.66	1,478.32	1,363.84
Special-status ground nesting bird species	Nesting/Foraging: BAR, AGS, FIC, FWM, INA, PAS, RUD, SEW, TRC	Direct Permanent	1,354.07	1,254.64	981.13	1,295.86
		Direct Temporary	295.75	348.40	151.43	223.12

Species Group and Species	Associated Land Cover Type	Effect Type ¹	Alternative			
			SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
		Total	1,649.82	1,603.04	1,132.56	1,518.98
Special-status wading bird/shorebird/ duck species	Nesting: COB, COW, FWM, MIR, NAW, OPW, OTR, PFW, PAS, SEW Foraging: BAR, AGS, COB, COW, FIC, FWM, INA, MIR, NAW, OPW, OTR, PFW, PAS, RFW, ROC, RUD, SEW, VP	Direct Permanent	1,308.72	1,185.68	1,060.12	1,228.92
		Direct Temporary	240.29	238.78	158.41	178.07
		Total	1,549.01	1,424.46	1,218.53	1,407.00
Special-status tree-nesting bird species	Nesting: EUC, MIR, ORC, OTR, PFW, TRC Foraging: AGS, FIC, FWM, INA, MIR, ORC, OTR, PFW, PAS, ROC, RUD, SEW, TRC,	Direct Permanent	2,074.10	2,144.36	2,015.14	2,030.62
		Direct Temporary	446.51	546.03	305.60	348.77
		Total	2,520.61	2,690.40	2,320.74	2,379.39
Mammals						
Pallid bat	Roosting: MIR, OTR, PFW, Foraging: BAR, AGS, COI, COB, COW, DAI, EUC, FIC, FWM, INA, MIR, NAW, OPW, ORC, OTR, PFW, PAS, ROC, RUD, SEW, TRC, URB, VP, VIN	Direct Permanent	2,509.88	2,752.17	2,308.81	2,460.82
		Direct Temporary	531.61	674.22	360.51	410.95
		Total	3,041.49	3,426.39	2,669.31	2,871.77
Western red bat	Roosting: MIR, OTR, PFW, Foraging: BAR, AGS, COI, COB, COW, DAI, EUC, FIC, FWM, INA, MIR, NAW, OPW, ORC, OTR, PFW, PAS, ROC, RUD, SEW, TRC, URB, VP, VIN	Direct Permanent	2,509.88	2,752.17	2,308.81	2,460.82
		Direct Temporary	531.61	674.22	360.51	410.95
		Total	3,041.49	3,426.39	2,669.31	2,871.77
Western mastiff bat	Foraging: BAR, AGS, COI, COB, COW, DAI, EUC, FIC, FWM, INA, MIR, NAW, OPW, ORC, OTR, PFW, PAS, ROC, RUD, RUR, SEW, TRC, URB, VP, VIN	Direct Permanent	2,509.88	2,752.17	2,308.81	2,460.82
		Direct Temporary	531.61	674.22	360.51	410.95
		Total	3,041.49	3,426.39	2,669.31	2,871.77

Species Group and Species	Associated Land Cover Type	Effect Type ¹	Alternative			
			SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Ringtail	MIR, OTR, PFW	Direct Permanent	6.53	8.30	3.41	4.99
		Direct Temporary	3.47	4.64	3.34	2.95
		Total	10.00	12.94	6.75	7.94
American badger	BAR, AGS, INA, MIR, OTR, PAS, RUD	Direct Permanent	194.79	190.72	142.28	151.78
		Direct Temporary	47.42	83.09	27.75	35.9
		Total	242.21	273.80	170.02	187.47
San Joaquin kit fox	Denning: COW	Direct Permanent	13.97	12.79	24.70	10.31
		Direct Temporary	4.13	3.62	3.79	2.35
		<i>Subtotal</i>	<i>18.10</i>	<i>16.41</i>	<i>28.49</i>	<i>12.66</i>
	Denning and Movement: AGS, COW, PAS, RUD	Direct Permanent	106.35	102.09	44.59	82.23
		Direct Temporary	8.60	13.83	8.69	7.49
		<i>Subtotal</i>	<i>114.95</i>	<i>115.93</i>	<i>53.27</i>	<i>89.71</i>
	Movement: BAR, INA, ORC, ROC, RUD	Direct Permanent	814.90	995.65	1,146.87	809.04
		Direct Temporary	185.51	279.16	168.61	149.37
		<i>Subtotal</i>	<i>1,000.20</i>	<i>1,274.81</i>	<i>1,315.48</i>	<i>958.41</i>
	Total	1,133.25	1,407.15	1,397.24	1,060.78	

Source: CDFG, 1988; 2014b and Calculations generated using ESRI ArcGIS versions 10.1, 10.2, and 10.3 from data generated by field surveys and aerial photo interpretation during 2010–2015

¹ Direct effects on vernal pool invertebrates include both permanent and temporary effects because temporary effects on vernal pools are considered permanent. For all other species, direct permanent and direct temporary effect values reported separately. Indirect Bisected vernal pools occur both inside and outside of the project footprint. The portion outside the project footprint is referred to as *indirect bisected*, but is considered a permanent direct effect for purposes of calculating mitigation requirements.

² Direct effect numbers presented are amounts within the Central Valley Wye alternatives project footprint. Actual effects from placement of piers will be less depending on final designs.

- | | | | |
|-----------------------------------|---------------------------|-----------------------------------|-------------------------------|
| SR = State Route | EUC = Eucalyptus | ORC = Orchard | SLO = Slough |
| BAR = Barren | FIC = Field Crop | OTR = Other Riparian | TRC = Transportation Corridor |
| AGS = California Annual Grassland | FWM = Freshwater Marsh | INA = Inactive Agriculture | URB = Urban |
| COI = Commercial/Industrial | MIR = Mixed Riparian | PFW = Palustrine Forested Wetland | URW = Urban Woodland |
| COB = Constructed Basin | NAW = Natural Watercourse | PAS = Pasture | VP = Vernal Pool |
| COW = Constructed Watercourse | OPW = Open Water | RFW = Rice Field Wetland | VPC = Vernal Pool Complex |
| DAI = Dairy | ROC = Row Crop | RUD = Ruderal | VIN = Vineyard |
| | | SEW = Seasonal Wetland | |

6.4.2.1 SR 152 (North) to Road 13 Wye Alternative

Construction Effects

Construction activities could result in direct and indirect effects on special-status wildlife species and their habitat. This section discusses direct and indirect construction-related effects on special-status wildlife in the following subsections:

- Invertebrates
- Fish
- Amphibians
- Reptiles
- Birds
- Mammals

Invertebrates

Several IAMFs will help to reduce direct effects on special-status invertebrates (e.g., loss of vernal pools and elderberry shrubs occupied by vernal branchiopods and valley elderberry longhorn beetle, injury and mortality of individuals of these species during construction, permanent conversion of occupied habitat to Central Valley Wye infrastructure or changes to micro/local hydrology). Requirements would be implemented to identify special-status invertebrate habitat (i.e., vernal pools and elderberry shrubs) to be avoided during ground-disturbing activities, and document the field delineation and installation of all ESAs and WEFs to the Mitigation Manager and the Authority prior to construction (BIO-IAMF#13). The valley elderberry longhorn beetle would be directly affected through the damage or removal of elderberry host plants. Mitigation wetlands and riparian habitat may not fully replace the habitat value of affected habitat features if they cannot be demonstrated to support the affected species, however.

Several IAMFs will help to reduce indirect effects on special-status invertebrates (e.g., habitat degradation, altered vernal pool hydrology). The Central Valley Wye includes requirements to prepare and implement a Weed Control Plan (BIO-IAMF#8) to minimize and avoid the spread of weeds during construction activities. The Central Valley Wye design will also minimize the spread of invasive plants outside the project footprint by making certain that vehicles are cleaned of mud and plant materials prior to working in new areas, thus confirming that invasive plant seeds are not carried between construction work areas (BIO-IAMF#19). Delineation of ERAs (BIO-IAMF#13) will provide for the identification of, contractor awareness of, and avoidance of sensitive biological resources adjacent to but outside the project footprint. Therefore, the design of the Central Valley Wye would minimize the indirect effects of habitat degradation, alteration of vernal pool and seasonal wetland hydrology, reduced reproductive success and survival of invertebrate species in adjacent habitat, water contamination, and potential reduced health and vigor of elderberry host plants from construction-related dust accumulation and changes in local runoff. These IAMFs will avoid some, but not all indirect effects on special-status invertebrate species and habitat because it is difficult to remove invasive plants from native plant communities once established without intensive and regular management (e.g., manual hand-pulling, herbicide application) and monitoring, and construction of permanent features may still disrupt existing hydrological patterns that create vernal pool and seasonal wetland habitat. Indirect effects on vernal pool branchiopods may also include the shading of habitats by structures. For valley elderberry longhorn beetle, indirect effects during construction could include the accumulation of fugitive dust on elderberry host plants, potentially weakening their vigor, resulting in degradation of habitat for the valley elderberry longhorn beetle. Indirect construction effects on invertebrates are anticipated to be less than the direct effects of construction.

Amphibians

Several IAMFs will help to reduce direct effects (e.g., injury or mortality of individuals, permanent habitat loss) on special-status amphibians. BIO-IAMF#6 and BIO-IAMF#13 includes requirements to identify special-status amphibian habitat to be avoided during construction and to delineate

habitat features (e.g., seasonal wetlands and vernal pools) as environmentally sensitive areas or ERAs on final construction plans and in the field. WEF barriers would be installed around the perimeter of environmentally sensitive areas and ERAs to prevent special-status amphibians from entering the work area, reducing the likelihood of injury or mortality (BIO-IAMF#13). The Central Valley Wye design would prohibit the use of plastic monofilament netting or similar materials in erosion control materials a minimum of 30 days prior to any ground-disturbing activities, reducing the likelihood of special-status amphibians getting caught in plastic netting and dying from desiccation, predation, or starvation (BIO-IAMF#14). BIO-IAMF#15, requires contractors to cover all excavated, steep-sided holes or trenches deeper than 8 inches at the end of each work day, as well as all pipes, culverts, or other materials greater than 3 inches in diameter stored for one or more overnight periods. All such materials would also be inspected by the project biologist prior to their movement, capping, or burial. BIO-IAMF#21 includes speed limits of 15 miles per hour (mph) in construction zones, which will be implemented during construction, to reduce the likelihood of special-status amphibian mortality from vehicle strikes. Therefore the design of the Central Valley Wye would minimize, but may not entirely avoid, the direct effects of construction activities which could cause mortality, injury, or harassment of adults, eggs or egg masses, and larvae; permanent or temporary destruction, degradation, fill, or pollution of breeding, foraging, or movement habitat; and the temporary loss of burrows or other upland refugia. Mitigation wetlands and riparian habitat may not fully replace the habitat value of affected habitat features if they cannot be demonstrated to support the affected species, however. Direct effects may also include the permanent conversion of occupied aquatic and upland habitat to Central Valley Wye infrastructure and habitat fragmentation resulting from construction of the SR 152 (North) to Road 13 Wye Alternative, which would interfere with seasonal movement and dispersal of special-status amphibians, and changes to micro/local hydrology which could affect inundation periods of aquatic habitat.

Several IAMFs will help reduce indirect effects on special-status amphibians (e.g., habitat degradation, altered hydrology of aquatic habitat). The Central Valley Wye includes requirements to prepare and implement a Weed Control Plan (BIO-IAMF#8) to minimize and avoid the spread of weeds during ground-disturbing activities. Delineation of ESAs (BIO-IAMF#13) will provide for the identification of, contractor awareness of, and avoidance of sensitive biological resources adjacent to but outside the project footprint. The Central Valley Wye design will also minimize the spread of invasive plants outside the project footprint by making certain that vehicles are cleaned of mud and plant materials prior to working in new areas, thus confirming that invasive plant seeds are not carried between construction work areas (BIO-IAMF#19). Therefore, the design of the Central Valley Wye would minimize the indirect effects of habitat degradation, alteration of vernal pool and seasonal wetland hydrology, reduced reproductive success and survival of amphibian species in adjacent habitat, and water contamination. These IAMFs will avoid some, but not all indirect effects on special-status amphibian species and habitat because it is difficult to remove invasive plants from native plant communities once established without intensive and regular management (e.g., manual hand-pulling, herbicide application) and monitoring, and construction of permanent features may still disrupt existing hydrological patterns that create vernal pool and seasonal wetland habitat. Additional indirect effects could include abandonment of upland refugia (e.g., burrows) and temporary shifts in foraging patterns or territories. Central Valley Wye components such as security fencing, electrical infrastructure, and elevated structures could attract predators like raptors by providing artificial perch sites in the landscape. Indirect construction effects on amphibians are anticipated to be less than the direct effects of construction.

Reptiles

Several IAMFs will help to reduce direct effects on special-status reptiles (western pond turtle, blunt-nosed leopard lizard, Blainville's horned lizard, and giant garter snake). BIO-IAMF#6 includes requirements to identify special-status wildlife habitat to be avoided during construction and to delineate habitat features as environmentally sensitive areas or ERAs on final construction plans and in the field. WEF barriers would be installed around the perimeter of environmentally sensitive areas and ERAs to prevent special-status wildlife from entering the work area, reducing

the likelihood of injury or mortality (BIO-IAMF#13). The Central Valley Wye design would prohibit the use of plastic monofilament netting or similar materials in erosion control materials, reducing the likelihood of special-status reptiles getting caught in plastic netting and dying from desiccation, predation, or starvation (BIO-IAMF#14). BIO-IAMF#15 requires contractors to cover all excavated, steep-sided holes or trenches deeper than 8 inches at the end of each work day, as well as all pipes, culverts, or other materials greater than 3 inches in diameter stored for one or more overnight periods. All such materials would also be inspected by the project biologist prior to their movement, capping, or burial. BIO-IAMF#21 includes speed limits of 15 miles per hour (mph) in construction zones, which will be implemented during construction, to reduce the likelihood of special-status amphibian mortality from vehicle strikes. Therefore, the design of the Central Valley Wye would minimize, but may not entirely avoid, the direct effects of construction activities in suitable habitat that could cause mortality, injury, or harassment of adults, eggs, or juveniles. Mitigation wetlands and riparian habitat may not fully replace the habitat value of affected habitat features if they cannot be demonstrated to support the affected species, however. Direct effects also include the permanent conversion of occupied habitat to Central Valley Wye infrastructure and habitat fragmentation resulting from construction of the SR 152 (North) to Road 13 Wye Alternative, which would interfere with seasonal movement and dispersal of special-status reptiles. Due to its status as a California fully protected species, blunt-nosed leopard lizard may not be subjected to mortality, injury, or entrapment.

Several IAMFs will help to reduce indirect effects on special-status reptiles. The Central Valley Wye includes requirements to prepare and implement a Weed Control Plan (BIO-IAMF#8) to minimize and avoid the spread of weeds during construction activities that can reduce habitat suitability. Delineation of ERAs (BIO-IAMF#13) will provide for the identification of, contractor awareness of, and avoidance of sensitive biological resources adjacent to but outside the project footprint. The Central Valley Wye design will also minimize the spread of invasive plants outside the project footprint by making certain that vehicles are cleaned of mud and plant materials prior to working in new areas, thus confirming that invasive plant seeds are not carried between construction work areas (BIO-IAMF#19). These IAMFs will avoid some, but not all indirect effects on special-status reptiles because it is difficult to remove invasive plants from native plant communities once established without intensive and regular management (e.g., manual hand-pulling, herbicide application) and monitoring. In addition, soil compaction and the placement of fill in suitable habitat may indirectly affect special-status reptiles by prohibiting burrowing, or by changing the frequency of vegetative cover. Construction activities may attract opportunistic predators (e.g., ravens, feral cats, raccoons) that may feed on special-status reptiles. Construction activities could result in temporary shifts in foraging patterns or territories. Central Valley Wye components such as security fencing, electrical infrastructure, and elevated structures could attract predators like raptors by providing artificial perch sites in the landscape. Indirect construction effects on reptiles are anticipated to be less than the direct effects of construction.

Fish

Several IAMFs will help to reduce direct effects on special-status fish species (i.e., steelhead, Chinook salmon, hardhead, San Joaquin roach, and Kern brook lamprey). The contractor's project biologist will consult with the USFWS and CDFW to identify appropriate work windows for federally listed species, including federally listed fish in the San Joaquin River. If work cannot be conducted when the channel lacks flowing or standing water, additional measures would be required in consultation with the USFWS and CDFW. BIO-IAMF#20, Dewatering and Water Diversion requires the contractor to prepare a Dewatering Plan for review and approval by the resource agencies that includes appropriate measures to minimize turbidity and siltation. These measures would minimize, but may not entirely avoid, direct effects on special-status fish and their habitat from sedimentation, turbidity, altered water temperatures, oxygen depletion, contaminants, and stranding and mortality of special-status fish. Additional direct effects may include reduced habitat suitability due to increased shading from overhead elevated structures and interruptions to fish passage from new bridge footings, and disturbance and possible mortality if sound levels from pile-driving reach the lethal range.

Several IAMFs will help to reduce indirect effects on special-status fish. The Central Valley Wye includes requirements to prepare a construction site BMP field manual that identifies BMPs for temporary soil stabilization and temporary sediment control, among other general site cleanliness measures (BIO-IAMF#24). The contractor will prepare a Dewatering Plan under BIO-IAMF#20 for review and approval by the resource agencies that includes appropriate measures to minimize turbidity and siltation. These IAMFs would minimize, but may not entirely avoid, indirect effects including changes in water quality which could lead to temporary shifts in foraging patterns or territories; erosion and sedimentation into nearby creeks, rivers, and other waters; and contamination of downstream habitats from chemical spills from construction equipment (e.g., fuel, transmission fluid, lubricating oil, and motor oil). Central Valley Wye components such as security fencing, electrical infrastructure, and elevated structures could attract predators like raptors by providing artificial perch sites in the landscape, resulting in increased predation on fish. Indirect construction effects on fish are anticipated to be less than the direct effects of construction.

Birds

Several IAMFs will help to reduce direct effects on special-status bird species. BIO-IAMF#26 requires the project biologist or agency-approved monitoring biologist to conduct a preconstruction nesting bird survey during the nesting season. If active nests are detected, site-specific exclusion zones, work restrictions, and monitoring procedures established by the project biologist would make certain that nests successfully fledge young or become inactive of natural causes (rather than human-caused disturbance) prior to work resuming in the nest vicinity. This IAMF would minimize, but may not entirely avoid (e.g., if nests are not found during surveys of dense riparian vegetation), disturbance or destruction of active nests and associated mortality or reduced nesting success. In addition, burrowing owls potentially occurring in small mammal burrows within and adjacent to the project footprint could become trapped or crushed by increased vehicular traffic. Raptors may nest in riparian habitat, in roadside trees, in windbreaks, in oak woodlands, and on built towers. Several special-status species were identified as potentially occurring in the survey area, including Swainson's hawks. These measures would avoid some, but not all, direct effects on special-status birds because it will safeguard that construction does not result in the reproductive failure of any active nests within or adjacent to the project footprint.

Indirect effects during the construction period may include the permanent or temporary displacement of special-status bird species to avoid disturbance (e.g., noise, vibration, visual stimuli); such displacement could also result from the actual fragmentation of the landscape caused by the construction of the HSR components (e.g., security fences, elevated structures, railbeds, and associated facilities). These indirect effects could interfere with the daily movement, foraging, and dispersal of these bird species. Repeated exposure to disturbance can reduce reproductive success and increase mortality through the exposure of nests to predators and the elements. General nesting season restrictions (BIO-IAMF#26) would minimize the effects of permanent or temporary displacement of special-status bird species. This would avoid disturbance; fragmentation; displacement; interference with daily movement, foraging, and dispersal of these bird species; and reduced reproductive success and increased mortality through the exposure of nests to predators and the elements. Indirect construction effects on birds are anticipated to be less than the direct effects of construction.

Mammals

Several IAMFs will help to reduce direct effects on special-status mammals. BIO-IAMF#16, Artificial Dens Associated with Wildlife Exclusion Fencing and Non-Disturbance Zones, includes requirements to install artificial dens along WEF barriers to enable special-status mammal (i.e., San Joaquin kit fox, American badger, and ringtail) and other terrestrial wildlife movement through work areas during construction. This IAMF will minimize temporary disruption of movement corridors during construction by providing escape cover for special-status mammals during work periods. Mitigation habitat may not fully replace the habitat value of affected habitat if it cannot be demonstrated to support the affected species, however.

BIO-IAMF#25, Wildlife Crossings, will help to minimize indirect effects on special-status mammals from habitat fragmentation resulting from construction. This IAMF requires preparation of a wildlife corridor assessment identifying how facilitation of animal movement was considered during project design. While this IAMF would help reduce such habitat fragmentation effects, it would not eliminate them entirely because construction of the SR 152 (North) to Road 13 Wye Alternative would still introduce an impermeable feature (i.e., at-grade railroad embankment) in areas that currently allow uninhibited wildlife movement.

Construction activities may also result in the following direct and indirect effects on special-status bats, San Joaquin kit fox, American badger, and ringtail.

- **Special-Status Bat Species**—Increased lighting after sunset could disrupt foraging activities by special-status bat species, causing them to leave an area that has prolonged disturbance. Nocturnal insects are drawn by lighting, which in turn attracts foraging bats. Special-status bats that are attracted to lighted construction areas could have higher potential mortality through disorientation and effects with construction equipment. Direct effects on bats could include mortality of individuals during construction and temporary disturbances from noise, dust, and ultrasonic vibrations from construction equipment. Direct effects also include the permanent conversion of occupied roosting and foraging habitat to Central Valley Wye infrastructure and fragmentation of habitats and landscapes resulting from construction of the SR 152 (North) to Road 13 Wye Alternative, which would interfere with seasonal movement and dispersal of special-status bats. Ground-disturbing activities, such as excavation, vegetation removal, construction of the railbed, placement of temporary structures and staging areas, and equipment operation, would result in noise, dust, or vibration disturbance. These disturbances could indirectly disrupt breeding or roosting activity, or result in the temporary loss of foraging habitats. Indirect construction effects are anticipated to be less than the direct construction effects.
- **San Joaquin Kit Fox**—Effects on San Joaquin kit fox could occur because this species has the potential to actively use the project footprint and adjacent areas. Mortality and injury of San Joaquin kit foxes could occur from crushing burrows by construction equipment as well as from vehicle strikes in work areas. Ground disturbance could lead to the temporary loss of foraging and denning habitat, which in turn could result in increased vulnerability of San Joaquin kit fox to predation and a reduction in prey availability. Temporary effects on unhabituated San Joaquin kit fox could occur from noise, lighting, vibration, dust, and motion disturbance, which may disrupt normal feeding, breeding, or sheltering behavior of San Joaquin kit fox individuals. Direct effects also include the permanent conversion of occupied denning and dispersal habitat to Central Valley Wye infrastructure and fragmentation of habitats and landscapes resulting from construction of the SR 152 (North) to Road 13 Wye Alternative, which would interfere with seasonal movement and dispersal of San Joaquin kit foxes. Temporary habitat conversion could result in shifts in foraging patterns or territories, increased predation, and decreased reproductive success. Indirect effects could potentially include alteration of soils, such as compaction. Removal of burrowing prey species such as kangaroo rats may effect food availability for this species.
- **American Badger**—Mortality and injury of American badgers could occur from burrows being crushed by construction equipment as well as from vehicle strikes in construction work areas. Ground disturbance could lead to the temporary loss of foraging habitat. Temporary effects on American badgers may occur from noise, lighting, vibrations, dust, and motion disturbance. Direct effects also include the permanent conversion of occupied habitat to Central Valley Wye infrastructure and fragmentation of habitats and landscapes resulting from construction of the SR 152 (North) to Road 13 Wye Alternative, which would interfere with seasonal movement and dispersal of badgers. Indirect effects would be the same as those for the San Joaquin kit fox.
- **Ringtail**—Mortality and injury of ringtail could occur from being crushed by construction equipment working in riparian habitats. Ground disturbance could lead to the temporary loss of foraging habitat. Temporary effects on ringtails may occur from noise, lighting, vibration,

occupied habitat to Central Valley Wye infrastructure and fragmentation of habitats and landscapes resulting from construction of the SR 152 (North) to Road 13 Wye Alternative, which would interfere with seasonal movement and dispersal of ringtails. Indirect effects would be similar to those for other species occurring in riparian habitats.

Operations Effects

Several IAMFs would help to reduce direct and indirect effects on special-status wildlife species during operations and maintenance activities. BIO-IAMF#4, Operations Period WEAP Training, will minimize the likelihood that individual special-status animals will be injured or killed during operations activities because all workers would be required to attend a WEAP training and certify they understand the regulatory requirements and procedures necessary to protect biological resources. This IAMF will minimize, but may not entirely avoid, injury or mortality of special-status wildlife since it is difficult to predict whether all operations personnel will fully comply with or clearly understand the procedures described in WEAP training. Maintenance criteria will be included as part of the Biological Resources Management Plan (BIO-IAMF#6), which will include, but not be limited to, measures for the protection of special-status species and measures to control erosion and siltation that may be caused from alterations in the topography. In addition, speed limits will be established in coordination with the Project Biologist for designated areas, including areas with potential special-status species habitat (BIO-IAMF#21). BIO-IAMF#7, Prepare and Implement an Annual Vegetation Maintenance Plan, includes preparation of an Annual Vegetation Control Plan that would list “sensitive areas” in vegetation control areas. This IAMF would therefore minimize, but may not eliminate, adverse chemical and non-chemical (e.g., mowing or trimming) on vegetation that provides habitat for special-status wildlife. Direct effects may also result from management activities of mitigation lands that have been purchased to mitigate effects on special-status wildlife and their habitat. The technology for the HSR system does not require large amounts of lubricants or hazardous materials for operations, compared to diesel locomotive fuel tanks. TPSSs, switching stations, and substations would require maintenance activities of oil and other materials for equipment storage. The Authority will implement an Environmental Management System to promote the use of nonhazardous materials to the extent possible (HMW-IAMF#3). Where hazardous materials cannot be avoided, the authority will implement monitoring plans as a basis for a hazardous materials business plan and a spill prevention, control, and countermeasure plan to reduce potential effects of the use and storage of hazardous materials (HMW-IAMF#4). The following subsections describe the potential direct and indirect effects on the different taxonomic groups of wildlife species during operations.

Invertebrates

Ongoing operations and maintenance activities (e.g., routine inspection and maintenance of the Central Valley Wye right-of-way) are unlikely to have any direct effects on invertebrates because these activities would occur where the natural vegetation (i.e., areas with potential habitat for special-status invertebrate species) has already been removed during construction of the Central Valley Wye. Direct effects would include mortality from incidental trampling or crushing caused by increased human activity related to the maintenance of equipment and facilities associated with the HSR system and exposure to accidental spills, including contaminants or pollutants.

Removal of young elderberry shrubs that become established in the right-of-way over the duration of operations, could reduce the long-term habitat of the valley elderberry longhorn beetle by inhibiting recruitment of young elderberry shrubs into the canopy.

Operational maintenance requires vegetation and pest control through a variety of methods, including the application of herbicides and pesticides. Pesticide and herbicide application would be applied in accordance with all requirements of the California Department of Pesticide Regulation and County Agricultural Commissioners by certified applicators. 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 effects on special-status wildlife species are limited to the at-grade portion of the project footprint.

Amphibians

Direct effects on amphibians could be expected in drainages subject to or near to operational maintenance activities. Chemical spills from fuel, transmission fluid, lubricating oil, and motor oil leaks have the potential to contaminate the water column, resulting in mortality, habitat degradation, or reduced reproductive success. 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.

Reptiles

Train operations and maintenance activities would be limited to activities in the fenced right-of-way or to the raised structure. However, since security fencing would not likely prohibit or deter most reptile and amphibian species from accessing the right-of-way, the occasional individual of a special-status amphibian or reptile species could enter the right-of-way, which would increase the likelihood of a direct strike resulting from train operations or related maintenance activities. Such direct strikes could lead to injury or mortality of the species. Direct effects from the Central Valley Wye may also include some similar effects on invertebrates, such as incidental trampling or crushing and exposure to accidental spills including contaminants or pollutants.

Indirect effects on reptiles include changes in the local landscape from invasive species as well as aquatic and terrestrial spills of fuel, transmission fluid, lubricating oil, and motor oil leaks. 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.

Fish

Direct effects during operations could include exposure to contaminants or pollutants from accidental spills and increased sedimentation from erosion. Indirect effects on water quality would be similar to those discussed for the invertebrates. Depending on drainage BMPs, some changes to local hydrology, from operations-related maintenance and other activities, could cause scour and changes to local hydrologic profiles. Chemical spills from fuel, transmission fluid, lubricating oil, and motor oil leaks could also contaminate water, resulting in mortality, habitat degradation, or reduced reproductive success of special-status fish. Central Valley Wye 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 predation on special-status fish species.

Birds

Maintenance effects (e.g., mowing, weed control, and driving off-road) on birds during operations would result in the removal or disturbance of areas that provide potential nesting habitat for a diverse population of birds. Operations and maintenance activities conducted in areas of nesting habitat during the breeding season (generally between February 1 and September 1) could disturb nesting birds, which could cause nest abandonment and subsequent loss of eggs or developing young at active nests in or near the area of activity. Operations effects (e.g., operation of the Central Valley Wye at grade or on an elevated structure) could result in injury or mortality from bird strikes or bird interactions with fencing and the electrical systems, as well as by permanent disturbance or temporary displacement from noise, vibration, wind, or visual stimuli.

Indirect effects could occur from operations activities that disrupt nesting birds, potentially leading to nest failure or abandonment. Indirect effects may include avoidance behavior by some species in response to increased noise, lighting, and startle and motion disturbances during HSR operations and maintenance activities.

Mammals

Direct operations effects on mammals would be primarily related to ground disturbance during operations activities. Burrowing, denning, and foraging habitat may be directly affected. In addition, increased noise levels and human presence may accelerate local shifts in populations. Some free-ranging mammals may avoid the area and be funneled along the HSR corridor until

locating a wildlife crossing. Rodent control programs could directly poison predators such as San Joaquin kit fox through consumption of poisoned rodents or the reduction in the amount of available prey. Operations of the Central Valley Wye at grade or on elevated structure could result in injury or mortality from bat strikes or bat interactions with the electrical systems.

Operations of the Central Valley Wye could result in displacement of mammal species from noise, vibration, wind, and visual stimuli, and from the actual fragmentation of the landscape as a result of the construction of the Central Valley Wye infrastructure. These effects may result in shifts in foraging patterns or territories, or dispersal movements, increased predation, decreased reproductive success, and reduced population viability. Indirect effects may include any additional pressures on the landscape from the colonization of nonnative plant species. The change in plant species could further reduce adjacent habitat values. Local noise and motion disturbance effects resulting from Central Valley Wye operations may cause some avoidance behavior.

6.4.2.2 SR 152 (North) to Road 19 Wye Alternative

Construction Effects

The types of direct and indirect construction effects anticipated under the SR 152 (North) to Road 19 Wye Alternative, including applicable IAMFs for each taxonomic group that would help to reduce such effects, would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. The amounts of suitable habitat for special-status wildlife directly affected by construction of the SR 152 (North) to Road 19 Wye Alternative are listed in Table 6-2, and a discussion of effects on species groups is provided in this section.

Invertebrates

As noted in Table 6-2, the SR 152 (North) to Road 19 Wye Alternative wetland study area contains vernal pools and other seasonal wetlands that provide suitable habitat for Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal tadpole fairy shrimp. The amounts of suitable habitat for vernal pool branchiopods potentially affected by construction of the SR 152 (North) to Road 19 Wye Alternative are listed in Table 6-2. Permanent and indirect effects on special-status vernal pool invertebrates and the loss of suitable habitat could impair the survival of self-sustaining populations resulting in the elimination of vernal pool invertebrate populations.

The SR 152 (North) to Road 19 Wye Alternative habitat study area potentially contains populations of elderberry shrubs, specifically in riparian areas. All habitats with elderberry shrubs are assumed to be occupied by the valley elderberry longhorn beetle. The amounts of suitable habitat for valley elderberry longhorn beetles that would be potentially affected by construction of the SR 152 (North) to Road 19 Wye Alternative are listed in Table 6-2. The loss of elderberry shrubs could impair the survival of self-sustaining populations, resulting in the elimination of local valley elderberry longhorn beetle populations.

Amphibians

The SR 152 (North) to Road 19 Wye Alternative habitat study area contains suitable breeding and upland habitat for California tiger salamanders and western spadefoots. All suitable vernal pool and other seasonal wetland habitat with associated upland areas are assumed to be occupied by California tiger salamanders and western spadefoots. Populations of these special-status amphibians are regulated by both the USFWS and the CDFW; the loss of suitable breeding and upland habitat could impair the survival of self-sustaining populations, resulting in the elimination of California tiger salamander or western spadefoot populations. The amounts of suitable habitat for special-status amphibians potentially affected by construction of the SR 152 (North) to Road 19 Wye Alternative are listed in Table 6-2.

Reptiles

The SR 152 (North) to Road 19 Wye Alternative habitat study area contains suitable habitat for populations of western pond turtles, blunt-nosed leopard lizards, Blainville's horned lizards, and giant garter snakes. All suitable aquatic and upland habitats are assumed to be occupied by these species. Populations of these special-status reptiles are regulated by the USFWS and the

CDFW; the loss of suitable habitat could impair the survival of self-sustaining populations, resulting in the elimination of local special-status reptile populations. The amounts of suitable habitat for special-status reptiles potentially affected by construction of the SR 152 (North) to Road 19 Wye Alternative are listed in Table 6-2.

Fish

The SR 152 (North) to Road 19 Wye Alternative habitat study area contains aquatic habitats (primarily along the San Joaquin River) known to support Kern brook lamprey, fall-run Chinook salmon, Central Valley steelhead, hardhead, and San Joaquin roach. In addition, an experimental population of spring-run Chinook salmon is being reintroduced within the San Joaquin River from the Friant Dam to the Merced River confluence as part of the SJRRP. The amounts of suitable habitat for special-status fish potentially affected by construction of the SR 152 (North) to Road 19 Wye Alternative are listed in Table 6-2. At the present time, the San Joaquin River in the Central Valley Wye vicinity is intermittent and dry during the summer months. These hydrologic conditions could change under the SJRRP, which will extend flows from Friant Dam down to the Merced River. Construction of this Central Valley Wye alternative could modify special-status fish habitat by affecting water quality, cover, and hydraulics in the San Joaquin River.

Birds

The SR 152 (North) to Road 19 Wye Alternative habitat study area contains a wide range of habitats known to support a diversity of birds. All suitable habitats are assumed to be occupied by special-status bird species. Populations of special-status birds are regulated by both the CDFW and USFWS; the loss of suitable habitat could impair the survival of self-sustaining populations, resulting in the elimination of some local bird populations. The amounts of suitable habitat for special-status birds potentially affected by construction of the SR 152 (North) to Road 19 Wye Alternative are listed in Table 6-2.

Mammals

The SR 152 (North) to Road 19 Wye Alternative habitat study area contains California annual grassland and agricultural lands known to support American badger, San Joaquin kit fox, and special-status bats (also known to occur within trees), and riparian habitats that could support ringtail. All suitable habitats are assumed to be occupied by special-status mammals. Special-status mammals are regulated by both the CDFW and the USFWS; the loss of suitable habitat could impair the survival of self-sustaining populations, resulting in the elimination of local special-status mammal populations. The amounts of suitable habitat for special-status mammals potentially affected by construction of the SR 152 (North) to Road 19 Wye Alternative are listed in Table 6-2.

Operations Effects

The types of direct and indirect operations effects anticipated under the SR 152 (North) to Road 19 Wye Alternative, including applicable IAMFs that would help to reduce such effects, would be identical to those for the SR 152 (North) to Road 13 Wye Alternative.

Invertebrates

Suitable habitat for special-status invertebrates, including vernal pools, seasonal wetlands, and elderberry shrubs, occurs in the SR 152 (North) to Road 19 Wye Alternative habitat study area. Operations could adversely affect individuals and habitat for special-status invertebrates.

Fish

The SR 152 (North) to Road 19 Wye Alternative habitat study area contains aquatic habitats (primarily along the San Joaquin River) known to support Kern brook lamprey, Chinook salmon, Central Valley steelhead, hardhead, and San Joaquin roach. In addition, an experimental population of spring-run Chinook salmon is being reintroduced within the San Joaquin River from the Friant Dam to the Merced River confluence as part of the SJRRP. Effects of Central Valley Wye operations on runoff and water quality could hinder the re-establishment of special-status fish along the San Joaquin River.

Amphibians

Suitable habitat for California tiger salamander and western spadefoot consists of vernal pools and seasonal wetlands and adjacent upland habitat (e.g., annual grassland) that occur in the SR 152 (North) to Road 19 Wye Alternative habitat study area. Operations could adversely affect individuals and habitat for California tiger salamander and western spadefoot.

Reptiles

Suitable habitat for special-status reptiles, including aquatic habitats, such as riverine and lacustrine habitats, as well as natural upland areas, such as annual grassland, are present in the SR 152 (North) to Road 19 Wye Alternative habitat study area and may support special-status reptiles, including the western pond turtle, blunt-nosed leopard lizard, Blainville's horned lizard, and giant garter snake. Operations activities could adversely affect individuals and habitat for special-status reptiles.

Birds

A number of habitats, including aquatic and riparian habitats (e.g., riverine, lacustrine, valley foothill riparian), agricultural lands, and grasslands that provide suitable habitat for a variety of birds and raptors occur throughout the SR 152 (North) to Road 19 Wye Alternative habitat study area. Operations activities could adversely affect individuals and nesting and foraging habitat for special-status birds.

Mammals

Natural habitats occurring in the SR 152 (North) to Road 19 Wye Alternative habitat study area, such as annual grassland, may support American badger and San Joaquin kit fox and riparian habitats may support ringtail. Trees and rocky outcrops in natural habitats, such as valley foothill riparian, as well as trees and buildings in rural and urban areas, may support special-status bats. Operations activities could adversely affect individuals and habitat for special-status mammals and roosting and foraging habitat for special-status bats.

6.4.2.3 Avenue 21 to Road 13 Wye Alternative

Construction Effects

The types of direct and indirect construction effects anticipated under the Avenue 21 to Road 13 Wye Alternative, including applicable IAMFs for each taxonomic group that would help to reduce such effects, would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. Amounts of suitable habitat for special-status wildlife potentially affected by construction of the Avenue 21 to Road 13 Wye Alternative are listed in Table 6-2.

Invertebrates

As noted in Table 6-2, the Avenue 21 to Road 13 Wye Alternative wetland study area contains vernal pools and other seasonal wetlands that provide suitable habitat for Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp. The amounts of suitable habitat for vernal pool branchiopods potentially affected by construction of the Avenue 21 to Road 13 Wye Alternative are listed in Table 6-2. Direct and indirect effects on special-status vernal pool invertebrates and the loss of suitable habitat could impair the survival of self-sustaining populations resulting in the elimination of vernal pool invertebrate populations.

The Avenue 21 to Road 13 Wye Alternative habitat study area potentially contains populations of elderberry shrubs, specifically in riparian areas. All habitats with elderberry shrubs are assumed to be occupied by the valley elderberry longhorn beetle. The amounts of suitable habitat for valley elderberry longhorn beetles that would be potentially affected by construction of the Avenue 21 to Road 13 Wye Alternative are listed in Table 6-2. The loss of elderberry shrubs could impair the survival of self-sustaining populations, resulting in the elimination of local valley elderberry longhorn beetle populations.

Amphibians

The Avenue 21 to Road 13 Wye Alternative habitat study area contains suitable breeding and upland habitat for California tiger salamander and western spadefoot. All suitable vernal pool and other seasonal wetland habitat with associated upland areas are assumed to be occupied by California tiger salamanders and western spadefoots. Populations of these special-status amphibians are regulated by both the USFWS and the CDFW; the loss of suitable breeding and upland habitat could impair the survival of self-sustaining populations, resulting in the elimination of California tiger salamander or western spadefoot populations. The amounts of suitable habitat for special-status amphibians potentially affected by construction of the Avenue 21 to Road 13 Wye Alternative are listed in Table 6-2.

Reptiles

The Avenue 21 to Road 13 Wye Alternative habitat study area contains suitable habitat for populations of western pond turtles, blunt-nosed leopard lizards, Blainville's horned lizards, and giant garter snakes. All suitable aquatic and upland habitats are assumed to be occupied by these species. Populations of these special-status reptiles are regulated by the USFWS and the CDFW; the loss of suitable habitat could impair the survival of self-sustaining populations, resulting in the elimination of local special-status reptile populations. The amounts of suitable habitat for special-status reptiles potentially affected by construction of the Avenue 21 to Road 13 Wye Alternative are listed in Table 6-2.

Fish

The Avenue 21 to Road 13 Wye Alternative habitat study area contains aquatic habitats (primarily along the San Joaquin River) known to support Kern brook lamprey, fall-run Chinook salmon, Central Valley steelhead, hardhead, and San Joaquin roach. In addition, an experimental population of spring-run Chinook salmon is being reintroduced within the San Joaquin River from the Friant Dam to the Merced River confluence as part of the SJRRP. The amounts of suitable habitat for special-status fish potentially affected by construction of the Avenue 21 to Road 13 Wye Alternative are listed in Table 6-2. Construction of the Avenue 21 to Road 13 Wye Alternative could directly and indirectly modify special-status fish habitat by affecting water quality, cover, and hydraulics in the San Joaquin River. At the present time, the San Joaquin River in the Central Valley Wye vicinity is intermittent and dry during the summer months. These hydrologic conditions could change under the SJRRP, which will extend flows from Friant Dam down to the Merced River. Construction of the Avenue 21 to Road 13 Wye Alternative could modify special-status fish habitat by affecting water quality, cover, and hydraulics in the San Joaquin River.

Birds

The Avenue 21 to Road 13 Wye Alternative habitat study area contains a wide range of habitats known to support a diverse array of birds. All suitable habitats are assumed to be occupied by special-status bird species. Populations of special-status birds are regulated by both the CDFW and the USFWS; the loss of suitable habitat could impair the survival of self-sustaining populations, resulting in the elimination of some local bird populations. The amounts of suitable habitat for special-status birds potentially affected by construction of the Avenue 21 to Road 13 Wye Alternative are listed in Table 6-2.

Mammals

The Avenue 21 to Road 13 Wye Alternative habitat study area contains California annual grassland and agricultural lands known to support American badger, San Joaquin kit fox, and special-status bat species (also known to occur within trees), and riparian habitats that could support ringtail. All suitable habitats are assumed to be occupied by special-status mammals. Populations of mammals are regulated by both the CDFW and the USFWS; the loss of suitable habitat could impair the survival of self-sustaining populations, resulting in the elimination of local special-status mammal populations. The amounts of suitable habitat for special-status mammals

potentially affected by construction of the Avenue 21 to Road 13 Wye Alternative are listed in Table 6-2.

Operations Effects

The types of direct and indirect operations effects anticipated under the Avenue 21 to Road 13 Wye Alternative, including applicable IAMFs that would help to reduce such effects, would be identical to those for the SR 152 (North) to Road 13 Wye Alternative.

Invertebrates

Suitable habitat for special-status invertebrates, including vernal pools, seasonal wetlands, and elderberry shrubs, occurs in the Avenue 21 to Road 13 Wye Alternative habitat study area. Operations activities could adversely affect individuals and habitat for special-status invertebrates.

Amphibians

Suitable habitat for California tiger salamander and western spadefoot consists of vernal pools and seasonal wetlands and adjacent upland habitat (e.g., annual grassland) that occur in the Avenue 21 to Road 13 Wye Alternative habitat study area. Operations activities could adversely affect individuals and habitat for western spadefoot and California tiger salamander.

Reptiles

Suitable habitat for special-status reptiles, including aquatic habitats, such as riverine and lacustrine habitats, as well as natural upland areas, such as annual grassland, are present in the Avenue 21 to Road 13 Wye Alternative habitat study area and may support special-status reptiles, including the western pond turtle, blunt-nosed leopard lizard, Blainville's horned lizard, and giant garter snake. Operations activities could adversely affect individuals and habitat for special-status reptiles.

Fish

The Avenue 21 to Road 13 Wye Alternative habitat study area contains aquatic habitats (primarily along the San Joaquin River) known to support Kern brook lamprey, Chinook salmon, Central Valley steelhead, hardhead, and San Joaquin roach. In addition, an experimental population of spring-run Chinook salmon is being reintroduced within the San Joaquin River from the Friant Dam to the Merced River confluence as part of the SJRRP. Effects of Central Valley Wye operations on runoff and water quality could hinder the re-establishment of special-status fish along the San Joaquin River.

Birds

A number of habitats, including aquatic and riparian habitats (e.g., riverine, lacustrine, valley foothill riparian), agricultural lands, and grasslands that provide suitable habitat for a variety of birds and raptors occur throughout the Avenue 21 to Road 13 Wye Alternative habitat study area. Operations activities could adversely affect individuals and nesting and foraging habitat for special-status birds.

Mammals

Natural habitats occurring in the Avenue 21 to Road 13 Wye Alternative habitat study area, such as annual grassland, may support American badger and San Joaquin kit fox and riparian habitats may support ringtail. Trees and rocky outcrops in natural habitats, such as valley foothill riparian, as well as trees and buildings in rural and urban areas, may support special-status bats. Operations activities could adversely affect individuals and habitat for special-status mammals and roosting and foraging habitat for special-status bats.

6.4.2.4 SR 152 (North) to Road 11 Wye Alternative

Construction Effects

The types of direct and indirect construction effects anticipated under the SR 152 (North) to Road 11 Wye Alternative, including applicable IAMFs for each taxonomic group that would help to reduce such effects, would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. Amounts of suitable habitat for special-status wildlife potentially affected by construction of the SR 152 (North) to Road 11 Wye Alternative are listed in Table 6-2.

Invertebrates

As noted in Table 6-2, the SR 152 (North) to Road 11 Wye Alternative habitat study area contains vernal pools and other seasonal wetlands that provide suitable habitat for Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp. The amounts of suitable habitat for vernal pool branchiopods potentially affected by construction of the SR 152 (North) to Road 11 Wye Alternative are listed in Table 6-2. Direct and indirect effects on special-status vernal pool invertebrates and the loss of suitable habitat could impair the survival of self-sustaining populations resulting in the elimination of vernal pool invertebrate populations.

The SR 152 (North) to Road 11 Wye Alternative habitat study area potentially contains populations of elderberry shrubs, specifically in riparian areas. All habitats with elderberry shrubs are assumed to be occupied by the valley elderberry longhorn beetle. The amounts of suitable habitat for valley elderberry longhorn beetles that would be potentially affected by construction of the SR 152 (North) to Road 11 Wye Alternative are listed in Table 6-2. The loss of elderberry shrubs could result in the elimination of local valley elderberry longhorn beetle populations.

Amphibians

The SR 152 (North) to Road 11 Wye Alternative habitat study area contains suitable breeding and upland habitat for California tiger salamander and western spadefoot. All suitable vernal pool and other seasonal wetland habitat with associated upland areas are assumed to be occupied by California tiger salamanders and western spadefoots. Populations of these special-status amphibians are regulated by both the USFWS and the CDFW; the loss of suitable breeding and upland habitat could impair the survival of self-sustaining populations, resulting in the elimination of California tiger salamander or western spadefoot populations. The amounts of suitable habitat for special-status amphibians potentially affected by construction of the SR 152 (North) to Road 11 Wye Alternative are listed in Table 6-2.

Reptiles

The SR 152 (North) to Road 11 Wye Alternative habitat study area contains suitable habitat for populations of western pond turtles, blunt-nosed leopard lizards, Blainville's horned lizards, and giant garter snakes. All suitable aquatic and upland habitats are assumed to be occupied by these species. Populations of these special-status reptiles are regulated by the USFWS and the CDFW; the loss of suitable habitat could impair the survival of self-sustaining populations, resulting in the elimination of local special-status reptile populations. The amounts of suitable habitat for special-status reptiles potentially affected by construction of the SR 152 (North) to Road 11 Wye Alternative are listed in Table 6-2.

Fish

The SR 152 (North) to Road 11 Wye Alternative habitat study area contains aquatic habitats (primarily along the San Joaquin River) known to support Kern brook lamprey, fall-run Chinook salmon, Central Valley steelhead, hardhead, and San Joaquin roach. In addition, an experimental population of spring-run Chinook salmon is being reintroduced within the San Joaquin River from the Friant Dam to the Merced River confluence as part of the SJRRP. The amounts of suitable habitat for special-status fish potentially affected by construction of the SR 152 (North) to Road 11 Wye Alternative are listed in Table 6-2. Construction of the SR 152 (North) to Road 11 Wye Alternative could directly and indirectly modify special-status fish habitat by affecting water quality, cover, and hydraulics in the San Joaquin River. At the present time, the San Joaquin

River in the Central Valley Wye vicinity is intermittent and dry during the summer months. These hydrologic conditions could change under the SJRRP, which will extend flows from Friant Dam down to the Merced River.

Birds

The SR 152 (North) to Road 11 Wye Alternative habitat study area contains a wide range of habitats known to support a diverse array of birds. All suitable habitats are assumed to be occupied by special-status bird species. Populations of special-status birds are regulated by both the CDFW and the USFWS; the loss of suitable habitat could impair the survival of self-sustaining populations, resulting in the elimination of some local bird populations. The amounts of suitable habitat for special-status birds potentially affected by construction of the SR 152 (North) to Road 11 Wye Alternative are listed in Table 6-2.

Mammals

The SR 152 (North) to Road 11 Wye Alternative habitat study area contains California annual grassland and agricultural lands known to support American badger, San Joaquin kit fox, and special-status bat species (also known to occur within trees), and riparian habitats that could support ringtail. All suitable habitats are assumed to be occupied by special-status mammals. Populations of mammals are regulated by both the CDFW and the USFWS; the loss of suitable habitat could impair the survival of self-sustaining populations, resulting in the elimination of local special-status mammal populations. The amounts of suitable habitat for special-status mammals potentially affected by construction of the SR 152 (North) to Road 11 Wye Alternative are listed in Table 6-2.

Operations Effects

The types of direct and indirect operations effects anticipated under the SR 152 (North) to Road 11 Wye Alternative, including applicable IAMFs that would help to reduce such effects, would be identical to those for the SR 152 (North) to Road 13 Wye Alternative.

Invertebrates

Suitable habitat for special-status invertebrates, including vernal pools, seasonal wetlands, and elderberry shrubs, occurs in the SR 152 (North) to Road 11 Wye Alternative habitat study area. Operations activities could adversely affect individuals and habitat for special-status invertebrates.

Amphibians

Suitable habitat for California tiger salamander and western spadefoot consists of vernal pools and seasonal wetlands and adjacent upland habitat (e.g., annual grassland) that occur in the SR 152 (North) to Road 11 Wye Alternative habitat study area. Operations activities could adversely affect individuals and habitat for western spadefoot and California tiger salamander.

Reptiles

Suitable habitat for special-status reptiles, including aquatic habitats, such as riverine and lacustrine habitats, as well as natural upland areas, such as annual grassland, are present in the SR 152 (North) to Road 11 Wye Alternative habitat study area and may support special-status reptiles, including the western pond turtle, blunt-nosed leopard lizard, Blainville's horned lizard, and giant garter snake. Operations activities could adversely affect individuals and habitat for special-status reptiles.

Fish

The SR 152 (North) to Road 11 Wye Alternative habitat study area contains aquatic habitats (primarily along the San Joaquin River) known to support Kern brook lamprey, Chinook salmon, Central Valley steelhead, hardhead, and San Joaquin roach. In addition, an experimental population of spring-run Chinook salmon is being reintroduced within the San Joaquin River from the Friant Dam to the Merced River confluence as part of the SJRRP. Effects of Central Valley

Wye operations on runoff and water quality could hinder the re-establishment of special-status fish along the San Joaquin River.

Birds

A number of habitats, including aquatic and riparian habitats (e.g., riverine, lacustrine, valley foothill riparian), agricultural lands, and grasslands that provide suitable habitat for a variety of birds and raptors occur throughout the SR 152 (North) to Road 11 Wye Alternative habitat study area. Operations activities could adversely affect individuals and nesting and foraging habitat for special-status birds.

Mammals

Natural habitats occurring in the Avenue 21 to Road 13 Wye Alternative habitat study area, such as annual grassland, may support American badger and San Joaquin kit fox and riparian habitats may support ringtail. Trees and rocky outcrops in natural habitats, such as valley foothill riparian, as well as trees and buildings in rural and urban areas, may support special-status bats. Operations activities could adversely affect individuals and habitat for special-status mammals and roosting and foraging habitat for special-status bats.

6.5 Effects on Habitats of Concern

6.5.1 Special-Status Plant Communities

Several IAMFs will help to reduce direct effects on special-status plant communities. To identify special-status plant communities to be avoided during construction, the Authority will delineate environmentally sensitive areas or ERAs on final construction plans and in the field as part of BIO-IAMF#13. This IAMF will avoid some, but not all, direct effects on special-status plant communities because it will make certain that contractors are aware of and will avoid affecting special-status plant communities during construction. The implementation of the Central Valley Wye alternatives could still permanently remove special-status plant communities, resulting in direct construction effects where such communities are present and effects cannot be avoided through the IAMFs. Special-status plant communities that are assumed to be directly affected by the Central Valley Wye include vernal pools, other seasonal wetlands, mixed riparian, palustrine forested wetland, and other riparian communities and land cover types. The following discussion for direct effects during construction is focused on these native plant communities that occur within the project footprint:

- **Vernal Pools and Seasonal Wetlands**—During construction, these areas are anticipated to be directly disturbed after construction for maintenance and the introduction of other pavement, fencing and landscape features. The resource values that exist would be permanently removed during site preparation for the Central Valley Wye. Effects on vernal pools and seasonal wetlands are generally considered to be permanent once disturbance occurs because of the difficulty in restoring these habitats back to their original functions and values.
- **Mixed Riparian, Palustrine Forested Wetland, and Other Riparian Land Cover Types**—Direct effects on mixed riparian and other riparian communities would result from the permanent removal of vegetation from the project footprint. In addition, these habitats would be affected by increased pedestrian access/activity in the area, which would trample or crush native vegetation; exposure to accidental spills including contaminants or pollutants; and an increased risk of fire in adjacent open spaces due to increased human activity. Vehicle or foot traffic associated with ongoing operations and maintenance activities (e.g., routine inspection and maintenance of the HSR right-of-way) would also trample or crush native vegetation. Construction effects include the permanent removal of areas of mixed riparian and other riparian habitat during site preparation activities.

Several IAMFs will help to reduce indirect effects on special-status plant communities such as degradation of special-status plant communities outside the project footprint from increased cover of invasive plant species; construction dust resulting in a reduction in photosynthetic capability

(especially during flowering periods); and an increased risk of fire (e.g., construction equipment use and smoking by construction workers) in adjacent open spaces. The Authority will prepare and implement a Weed Control Plan (BIO-IAMF#8) to minimize and avoid the spread of weeds during construction activities. Construction speed limits (BIO-IAMF#21 Vehicle Traffic and Construction Site Speed Limits) would minimize special-status plant community exposure to dust, and construction site BMPs (BIO-IAMF#24) would include measures to reduce fire risk during construction (e.g., smoking prohibitions, not parking equipment over dry vegetation). During construction, the Authority will make certain that contractors will return excavated soils to their original locations to be used as backfill, as part of BIO-IAMF#18, to reduce indirect effects on sensitive natural communities. BIO-IAMF#19 requires contractors to clean moving equipment prior to construction and prior to being moved onto any site, which will reduce the potential for the introduction of nonnative plants to become established following construction. These measures will help to minimize effects on special-status plants and other native vegetation occurring outside but adjacent to the project footprint. Nevertheless, indirect effects may still occur because it is difficult to remove invasive nonnative plants from native plant communities once established without intensive and regular management (e.g., manual hand-pulling, herbicide application) and monitoring.

The Authority would require maintenance personnel to attend a WEAP training and certify that they understand the regulatory agency requirements and procedures necessary to protect biological resources (BIO-IAMF#4). Maintenance criteria will be included as part of the Biological Resources Management Plan (BIO-IAMF#6), which will include, but not be limited to, measures for the protection of special-status species and measures for erosion and siltation control. The Authority will prepare and implement a Weed Control Plan (BIO-IAMF#8) to minimize and avoid the spread of weeds during construction activities. Construction speed limits (BIO-IAMF#21 Vehicle Traffic and Construction Site Speed Limits) would minimize special-status plant community exposure to dust, and construction site BMPs (BIO-IAMF#24) would include measures to reduce fire risk during construction (e.g., smoking prohibitions, not parking equipment over dry vegetation). During construction, the Authority will make certain that contractors will return excavated soils to their original locations to be used as backfill (BIO-IAMF#18) to reduce indirect effects on sensitive natural communities. The contractor will also be required to clean moving equipment prior to construction and prior to being moved onto any site, which will reduce the potential for the introduction of nonnative plants to become established following construction (BIO-IAMF#19). These IAMFs would minimize direct and indirect effects on special-status plant communities during operations.

The IAMFs identified above would help to reduce direct and indirect effects on special-status plant communities for all four of the Central Valley Wye alternatives. The potential direct and indirect effects discussed in the following subsections are those that would or could occur with construction and operations of the Central Valley Wye.

Table 6-3 Direct Effects on Special-Status Plant Communities by Central Valley Wye Alternative (acres)

Special-Status Plant Community	Alternative				Total Range of Effect ¹
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye	
Vernal Pools	1.47	1.47	2.34	0.21	0.21–2.34
Indirect Bisected Vernal Pool ²	0.04	0.04	0.48	0.04	0.04–0.48
Mixed Riparian	3.22	4.26	0.12	3.41	0.12–4.26
Other Riparian	6.33	5.81	5.61	4.53	4.53–6.33
Seasonal Wetlands	0.40	0.72	0.12	0.39	0.12–0.72
Palustrine Forested Wetland	0.44	2.87	1.02	0.00	0.00–2.87
Total	11.90	15.17	9.69	8.58	8.58–15.17

Source: Calculations generated using ESRI ArcGIS versions 10.1, 10.2, and 10.3 from data generated by field surveys and aerial photo interpretation during 2010–2016

¹ Total range of effect identifies the least to most amount of habitat affected by the Central Valley Wye alternative.

² Indirect bisected vernal pools occur both inside and outside of the project footprint. The portion outside the project footprint is referred to as *indirect bisected*, but is considered a permanent direct effect for purposes of calculating mitigation requirements.

All decimal values are presented to the hundredths place. Totals from 0.005 to 0.009 are therefore rounded to 0.01. Totals less than or equal to 0.004 acre are therefore rounded to zero (0).

SR = State Route

6.5.1.1 SR 152 (North) to Road 13 Wye Alternative

Construction Effects

Table 6-3 lists the acreages of special-status plant communities potentially affected by construction of the SR 152 (North) to Road 13 Wye Alternative. The SR 152 (North) to Road 13 Wye Alternative could permanently remove special-status plant communities in unknown locations and in unknown quantities, if present. Construction activities within the project footprint would have direct effects on special-status plant communities. These effects would include removal or disruption (i.e., trampling and crushing) of special-status plant communities by construction vehicles and personnel. With respect to vegetation removal, it should be noted that vegetation within the HSR right-of-way would be permanently removed. However, adjacent vegetation requiring removal to accommodate construction work (i.e., access and laydown area) would be restored after construction activities are completed.

Indirect construction effects on special-status plant communities could 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 temporary features, especially linear features, such as access roads that bisect special-status plant communities. Construction activities could facilitate the spread of nonnative invasive plant species through the introduction of seeds by construction equipment, vehicles, and personnel.

In addition to the special-status communities that have been observed, a number of special-status plant communities could occur in unsurveyed habitats that have the potential to support special-status plant communities but where permission to enter was not available. Direct and indirect effects on these undocumented special-status plant communities would occur as described above in Section 6.2.

Operations Effects

Operations and maintenance effects on special-status plant communities would include the periodic removal of vegetation from within the HSR right-of-way, and the disturbance (i.e., trampling or crushing) of plants due to an increase of maintenance activity in the area. Ongoing operations and maintenance activities would also occur (e.g., routine inspection and maintenance of the HSR right-of-way) and would similarly involve disturbance from trampling or crushing of native vegetation by vehicle or foot traffic.

Operations-related indirect effects on special-status plant communities would be similar to those discussed above. These operational activities effects would include:

- Increased erosion, sedimentation, siltation, and runoff due to alterations in topography and hydrology from vegetation removal that could affect aquatic habitats in nearby water features
- Wind erosion effects (including from unvegetated rights-of-way and passing high-speed trains)
- Increased risk of fire in adjacent open spaces due to maintenance activity
- Introduction of noxious plant species from increased human activity

6.5.1.2 SR 152 (North) to Road 19 Wye Alternative

Construction Effects

The types of direct and indirect construction effects anticipated under the SR 152 (North) to Road 19 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. In addition to the special-status plant communities that have been observed, a number of special-status plant communities could occur in unsurveyed habitats that have the potential to support special-status plant communities where permission to enter was not available. Direct and indirect effects on these undocumented special-status plant communities would occur as described above.

Operations Effects

The types of direct and indirect operations effects anticipated under the SR 152 (North) to Road 19 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. Effects on special-status plant communities would include the removal of vegetation from within the right-of-way, and the disturbance (i.e., trampling or crushing) of plants due to an increase of maintenance activity in the area. Ongoing operations and maintenance activities would occur (e.g., routine inspection and maintenance of the HSR right-of-way) and would involve disturbance from trampling or crushing of native vegetation by vehicle or foot traffic.

Permanent indirect operations effects 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 that bisects special-status plant communities. Central Valley Wye operations 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 ground-disturbing activities occurred.

6.5.1.3 Avenue 21 to Road 13 Wye Alternative

Construction Effects

The types of direct and indirect construction effects anticipated under the Avenue 21 to Road 13 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. In addition to the special-status plant communities that have been observed, a number of special-status plant communities could occur in unsurveyed habitats that have the potential to support special-status plant communities where permission to enter was not available. Direct and indirect effects on these undocumented special-status plant communities would occur as described above.

Operations Effects

The types of direct and indirect operations effects anticipated under the Avenue 21 to Road 13 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. Effects on special-status plant communities would include the removal of vegetation from within the right-of-way, and the disturbance (i.e., trampling or crushing) of plants due to an increase of maintenance activity in the area. Ongoing operations and maintenance activities would occur (e.g., routine inspection and maintenance of the HSR right-of-way) and would involve disturbance from trampling or crushing of native vegetation by vehicle or foot traffic.

Permanent indirect operations effects 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 that bisects special-status plant communities. Central Valley Wye operations 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 ground-disturbing activities occurred.

6.5.1.4 SR 152 (North) to Road 11 Wye Alternative

Construction Effects

The types of direct and indirect construction effects anticipated under the SR 152 (North) to Road 11 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. In addition to the special-status plant communities that have been observed, a number of special-status plant communities could occur in unsurveyed habitats that have the potential to support special-status plant communities where permission to enter was not available. Direct and indirect effects on these undocumented special-status plant communities would occur as described above.

Operations Effects

The types of direct and indirect operations effects anticipated under the Avenue 21 to Road 13 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. Effects on special-status plant communities would include the removal of vegetation from within the right-of-way, and the disturbance (i.e., trampling or crushing) of plants due to an increase of maintenance activity in the area. Ongoing operations and maintenance activities would occur (e.g., routine inspection and maintenance of the HSR right-of-way) and would involve disturbance from trampling or crushing of native vegetation by vehicle or foot traffic.

Permanent indirect operations effects 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 that bisects special-status plant communities. Central Valley Wye operations 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 ground-disturbing activities occurred.

6.5.2 Jurisdictional Waters

The design characteristics of the Central Valley Wye include effective measures to minimize the removal or modification of local hydrology, the redirection of flow within jurisdictional waters, altering the long-term presence of the feature, or in the case of built features, removal or disruption of limited biological functions provided by such features. These measures would reduce but not avoid direct effects on jurisdictional wetlands. A construction site BMP field manual will be prepared that identifies BMPs for temporary soil stabilization and temporary sediment control, among other general site cleanliness measures (BIO-IAMF#24). A dewatering plan will also be prepared for review and approval by the resource agencies that includes appropriate measures to minimize turbidity and siltation (BIO-IAMF#20). These IAMFs would minimize potential indirect effects on jurisdictional waters, including degradation of wetlands or other waters outside the project footprint due to excess sediment or contaminants generated during construction entering these features.

Maintenance personnel would be required to attend a WEAP training and certify that they understand the regulatory agency requirements and procedures necessary to protect biological resources (BIO-IAMF#4). WEAP training minimizes the likelihood that jurisdictional waters would be contaminated during operations activities because all workers will be educated about which features they are likely to encounter while working and provided with clear procedures for how to avoid jurisdictional wetlands. Pesticide and herbicide application would be applied by certified pesticide applicators in accordance with all requirements of the California Department of Pesticide Regulation and County Agricultural Commissioners. In addition, the Authority will prepare an Annual Vegetation Control Plan (BIO-IAMF#7) and Weed Control Plan (BIO-IAMF#8) that would consist of site-specific vegetation and weed control methods and areas (BIO-IAMF#7) to minimize adverse chemical effects on vegetation. The technology for the HSR system does not require large amounts of lubricants or hazardous materials for operations, compared to diesel locomotive fuel tanks. TPSSs, switching stations, and substations would require maintenance activities of oil and other materials for equipment storage. The Authority will implement an Environmental Management System to promote the use of nonhazardous materials to the extent possible (HMW-IAMF#3). Where hazardous materials cannot be avoided, hazardous monitoring plans and a spill prevention, control, and countermeasure plan would be implemented to reduce potential effects from the use and storage of hazardous materials (HMW-IAMF#4). Maintenance criteria will be included as part of the Biological Resources Management Plan (BIO-IAMF#6), which will include, but not be limited to, measures for the protection of jurisdictional waters and measures for erosion and siltation control. These IAMFs would avoid direct and indirect effects on jurisdictional waters from operations.

The design of the Central Valley Wye would minimize, but not entirely avoid, direct effects on jurisdictional waters. The potential direct and indirect effects discussed in the following

subsections (6.5.2.1 through 6.5.2.4) are those that would or could occur with construction and operations of the Central Valley Wye. The construction of roads, rail track, and associated infrastructure would remove or alter jurisdictional waters through filling, hydrological interruption, or other manners that would disturb these resources. Effects on jurisdictional waters would result from implementation of any Central Valley Wye alternative. These direct and indirect effects would be common through all Central Valley Wye alternatives, although they would occur at varying amounts. In the case of built features, these effects 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 6-4 quantifies direct effects on jurisdictional waters under the Central Valley Wye alternatives.

Table 6-4 Direct Effects on Jurisdictional Waters by Central Valley Wye Alternative (acres)

Jurisdictional Water Type	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye	Total Range of Effect ¹
Wetlands					
Vernal Pools	1.47	1.48	2.34	0.21	0.21–2.34
Indirect Bisected ²	0.04	0.04	0.48	0.04	0.04–0.48
Seasonal Wetlands	0.40	0.71	0.12	0.39	0.12–0.79
Coastal and Valley Freshwater Marsh	0	0	0	0	N/A
Mixed Riparian ³	3.22	4.26	0.12	3.40	0.12–4.26
Other Riparian	6.33	5.81	5.61	4.53	4.53–6.33
Palustrine Forested Wetland ³	0.44	2.88	1.02	0.00	0.00–2.88
<i>Subtotal</i>	<i>11.90</i>	<i>15.18</i>	<i>9.69</i>	<i>8.57</i>	<i>8.57–15.18</i>
Other Waters					
Constructed Basin	7.26	3.48	4.95	6.46	3.48–7.26
Constructed Watercourse	17.55	15.63	26.82	12.12	12.12–26.82
Natural Watercourse	6.29	6.41	6.60	5.31	5.31–6.60
Open Water	0	0	0.01	0	0–0.01
<i>Subtotal</i>	<i>31.10</i>	<i>25.52</i>	<i>38.02</i>	<i>23.89</i>	<i>23.89–38.02</i>
Grand Total	43.00	40.70	47.70	32.46	32.46–47.70

Source: Calculations generated using ESRI ArcGIS versions 10.1, 10.2, and 10.3, based on Wetland Delineation Report dataset (9-Nov-16) and project footprints dated 14-Feb-16 (Avenue 21 to Road 13), 14-Sept-16 (SR 152 [North] to Road 13 and SR 152 [North] to Road 19), and 9-Nov-16 (SR 152 [North] to Road 11).

¹ Total range of effect identifies the least to most amount of habitat affected by the Central Valley Wye alternative.

² Indirect bisected vernal pools occur both inside and outside of the project footprint. The portion outside the project footprint is referred to as *indirect bisected*, but is considered a permanent direct effect for purposes of calculating mitigation requirements.

³ Mixed riparian and palustrine forested wetland acreages do not include non-wetland riparian areas that support riparian vegetation but are outside of Section 404 CWA jurisdiction.

All decimal values are presented to the hundredths place. Totals from 0.005 to 0.009 are therefore rounded to 0.01. Totals less than or equal to 0.004 acre are therefore rounded to zero (0).

SR = State Route

6.5.2.1 SR 152 (North) to Road 13 Wye Alternative

Construction Effects

Construction of the SR 152 (North) to Road 13 Wye Alternative would result in the temporary and permanent disturbance of jurisdictional waters as outlined in Table 6.4. Direct effects on jurisdictional waters would include filling or otherwise removing the feature during construction. Direct effects may also include the removal or modification of local hydrology and the redirection of flow within jurisdictional waters, altering the long-term presence of the feature. In the case of built features, these effects may 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. Potential indirect effects on jurisdictional waters include a number of temporary construction-related water-quality-related effects: erosion, siltation, and runoff into natural and constructed water features and fill downstream of the project footprint.

Operations Effects

Operations and maintenance activities along the SR 152 (North) to Road 13 Wye Alternative have the potential to result in the degradation of wetlands and other habitat types through incidental trampling or crushing caused by increase maintenance activity and vehicular traffic from maintenance activities. Accidental spills, including contaminants/pollutants could result in degradation of jurisdictional waters or habitat types.

Operations and maintenance activities could require the use of machinery to clean drains, control vegetation and to remove litter. The disturbance of other habitat types (i.e., riparian habitats) would result in the temporary loss of riparian habitats; and a potential increase in erosion and sediment transport into adjacent aquatic areas. Operations and maintenance activities could be expected to result in effects, including water quality related effects: erosion, siltation, and runoff into natural and constructed water features downstream of the Central Valley Wye from periodic maintenance of the right-of-way or culverts and other structures (i.e., drain cleaning and vegetation and litter removal).

6.5.2.2 SR 152 (North) to Road 19 Wye Alternative

Construction Effects

The types of direct and indirect construction effects anticipated under the SR 152 (North) to Road 19 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. Wetlands and other waters, including seasonal wetlands, vernal pools, freshwater marsh, riparian areas, constructed basins, constructed watercourse, and natural watercourse features are present throughout the SR 152 (North) to Road 19 Wye Alternative wetland study area (Table 6-4). Construction would result in the temporary disturbance of jurisdictional waters and habitat types. Because of the sensitivity of vernal pools and swales to direct effects, temporary effects on these jurisdictional waters are considered permanent.

Operations Effects

The types of direct and indirect operations effects anticipated under the SR 152 (North) to Road 19 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. Direct effects on jurisdictional waters (i.e., natural and built features) would also include the removal or modification of local hydrology and the redirection of flow within jurisdictional waters from vegetation removal. In the case of built features, these effects could 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. Potential indirect effects on jurisdictional waters include a number of temporary construction-related water-quality-related effects: erosion, siltation, and runoff into natural and constructed water features and fill downstream of the project footprint.

6.5.2.3 Avenue 21 to Road 13 Wye Alternative

Construction Effects

The types of direct and indirect construction effects anticipated under the Avenue 21 to Road 13 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. Wetlands and other waters, including seasonal wetlands, vernal pools, freshwater marsh, riparian areas, constructed basins, constructed watercourse, and natural watercourse features are present throughout the Avenue 21 to Road 13 Wye Alternative wetland study area (Table 6-4). Because of the sensitivity of vernal pools and swales to direct effects, temporary effects on these jurisdictional waters are considered permanent. Construction would result in direct and indirect effects on the adjacent seasonal riverine features.

Operations Effects

The types of direct and indirect operations effects anticipated under the Avenue 21 to Road 13 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. Direct effects on jurisdictional waters (i.e., natural and built features) would also include the removal or modification of local hydrology and the redirection of flow within jurisdictional waters from vegetation removal. In the case of built features, these effects 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. Potential indirect effects on jurisdictional waters include a number of temporary construction-related water-quality-related effects: erosion, siltation, and runoff into natural and constructed water features and fill downstream of the project footprint.

6.5.2.4 SR 152 (North) to Road 11 Wye Alternative

Construction Effects

The types of direct and indirect construction effects anticipated under the SR 152 (North) to Road 11 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. Wetlands and other waters, including seasonal wetlands, vernal pools, freshwater marsh, riparian areas, constructed basins, constructed watercourse, and natural watercourse features are present throughout the SR 152 (North) to Road 11 Wye Alternative wetland study area (Table 6-4). Because of the sensitivity of vernal pools and swales to direct effects, temporary effects on these jurisdictional waters are considered permanent.

Operations Effects

The types of direct and indirect operations effects anticipated under the SR 152 (North) to Road 11 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. Direct effects on jurisdictional waters (i.e., natural and built features) would also include the removal or modification of local hydrology and the redirection of flow within jurisdictional waters from vegetation removal. In the case of built features, these effects 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. Potential indirect effects on jurisdictional waters include a number of temporary construction-related water-quality-related effects: erosion, siltation, and runoff into natural and constructed water features and fill downstream of the project footprint.

6.5.3 Essential Fish Habitat

The anticipated effects on EFH, including applicable IAMFs that would help to reduce such effects, would be similar to those described in subsection 6.4.2.1 for special-status fish species. Overall, direct effects on EFH (San Joaquin River) would occur from the placement of piers and the bridge over the river. Temporary effects during construction would include noise, dust, and vibration. Overall, the four Central Valley Wye alternatives would have similar effects on EFH since they would involve construction and operations over the same reach of the San Joaquin

River. The Project Biologist would consult with the USFWS and CDFW to identify appropriate work windows for federally listed species, including federally listed fish in the San Joaquin River (BIO-IAMF#10). If work cannot be conducted when the channel lacks flowing or standing water, additional measures would be required in consultation with the USFWS and CDFW. The contractor will be required to prepare a dewatering plan for review and approval by the resource agencies that includes appropriate measures to minimize turbidity and siltation (BIO-IAMF#20). These measures would minimize the direct effects of placing piers in EFH, permanent loss of aquatic habitat, and permanent areas of channel shading. The contractor would prepare a construction site BMP field manual that identifies BMPs for temporary soil stabilization and temporary sediment control, among other general site cleanliness measures (BIO-IAMF#24). These IAMFs would avoid indirect effects from construction on essential fish habitat.

Few to no direct operations effects are anticipated because maintenance of the bridge over the San Joaquin River, once constructed, would be conducted from underneath the structure, without requiring activities in EFH. The Authority would require maintenance personnel to attend a WEAP training and certify that they understand the regulatory agency requirements and procedures necessary to protect biological resources (BIO-IAMF#4). Maintenance criteria will be included as part of the Biological Resources Management Plan (BIO-IAMF#6), which will include, but not be limited to, measures for the protection of essential fish habitat, specifications on the purpose, type, frequency, and extent of chemical use for insect and disease control operations, and measures for erosion and siltation control. These IAMFs would avoid indirect impacts on essential fish habitat from operations.

The potential direct and indirect effects discussed in the following subsections (6.5.3.1 to 6.5.3.4) are those that would or could occur with construction and operations of the Central Valley Wye.

6.5.3.1 SR 152 (North) to Road 13 Wye Alternative

Construction Effects

EFH in the San Joaquin River in the Central Valley Wye vicinity is of poor quality. Currently, the reach is dry, with sandy substrate, and nonnative vegetation lines the banks. This area would provide a migratory corridor for salmonids if flows were restored. Permanent construction effects would occur from the installation of piles in the San Joaquin River, which would result in a permanent loss of aquatic habitat. Additionally, aerial crossings would result in permanent areas of channel shading. Indirect effects would include contamination of EFH outside the project footprint from increased erosion, sedimentation, siltation, and runoff due to alterations in topography and hydrology.

Operations Effects

Operations effects on EFH in the San Joaquin River in the Central Valley Wye vicinity include possible release of contaminants. Chemical spills from fuel, transmission fluid, lubricating oil, and motor oil leaks could also contaminate water, resulting in mortality, habitat degradation, or reduced reproductive success of special-status fish. Central Valley Wye 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 predation on special-status fish species.

EFH in the San Joaquin River in the habitat study area is of poor quality. Currently, the reach is dry, with sandy substrate, and nonnative vegetation lines the banks. Few to no operations effects are anticipated because maintenance of the bridge over the San Joaquin River, once constructed, would be minor, and no activities within EFH are anticipated.

Indirect effects would include:

- Contamination of habitats of concern from increased erosion, sedimentation, siltation, and runoff due to alterations in hydrology during operations-related maintenance such as vegetation removal, drain cleaning, and litter removal

- Wind erosion effects (including from unvegetated rights-of-way and passing high-speed trains)
- Increased risk of fire in adjacent open spaces due to increased human activity
- Introduction of artificial perch sites (e.g., elevated structures, fences) for raptors which could lead to an increase in predation on special-status fish species
- Introduction of noxious plant species from increased human activity/disturbance

6.5.3.2 SR 152 (North) to Road 19 Wye Alternative

Construction Effects

The types of direct and indirect construction effects anticipated under the SR 152 (North) to Road 19 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. The SR 152 (North) to Road 19 Wye Alternative would be elevated where it crosses the San Joaquin River, which contains EFH for Chinook salmon within and adjacent to the project footprint. Final bridge design plans are not currently available but may require placing pilings in the San Joaquin River. However, for the SR 152 (North) to Road 19 Wye Alternative, there are no plans to modify the physical characteristics of the San Joaquin River channel. The HSR crossing would be designed with the planned increase in river flows and would not conflict with the goals of the restoration flows. A program-level environmental document on the SJRRP has been prepared (USBR and DWR 2011). During an initial coordination meeting with the USBR and the California Department of Water Resources on June 6, 2011, it was determined that Central Valley Wye design would not conflict with the SJRRP; however, this will be further evaluated as part of the permitting process, including FESA Section 7 consultation with the NMFS. The Authority would continue to coordinate with the SJRRP and comply with regulations regarding construction during the spawning and migration season.

Stream flows are being restored to the upper reach of the San Joaquin River from the Friant Dam to the Merced River confluence. Effects of construction on runoff and water quality could hinder the re-establishment of special-status fish along the San Joaquin River. Direct effects on EFH include direct loss of EFH due to pile placement. Additionally, hydraulics could change from piles in the wetted channel, causing an increase in velocities. An increase in velocity could impede migrating Chinook salmon.

Operations Effects

The types of direct and indirect operations effects anticipated under the SR 152 (North) to Road 19 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. Chemical spills from fuel, transmission fluid, lubricating oil, and motor oil leaks could also contaminate water, resulting in mortality, habitat degradation, or reduced reproductive success of special-status fish. Central Valley Wye 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 predation on special-status fish species.

6.5.3.3 Avenue 21 to Road 13 Wye Alternative

Construction Effects

The types of direct and indirect construction effects anticipated under the Avenue 21 to Road 13 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. The Avenue 21 to Road 13 Wye Alternative is elevated where it crosses the San Joaquin River, which contains EFH for Chinook salmon within and adjacent to the project footprint. Final bridge design plans are not currently available but require placing pilings in the San Joaquin River. There are no plans to modify the physical characteristics of the San Joaquin River channel. The HSR crossing would be designed with the planned increase in river flows and would not conflict with the goals of the restoration flows. A program-level environmental document on the SJRRP has been prepared (USBR and DWR 2011). During an initial coordination meeting with the USBR

and the California Department of Water Resources on June 6, 2011, it was determined that Central Valley Wye design would not conflict with the SJRRP; however, this will be further evaluated as part of the permitting process, including FESA Section 7 consultation with the NMFS. The Authority would continue to coordinate with the SJRRP and comply with regulations applicable to construction during the spawning and migration season.

Stream flows are being restored to the upper reach of the San Joaquin River from the Friant Dam to the Merced River confluence. The effects of Avenue 21 to Road 13 Wye Alternative construction on runoff and water quality could hinder the re-establishment of special-status fish along the San Joaquin River. Direct effects on EFH include the loss of EFH due to pile placement and the alteration of hydraulics from pile placement in the wetted channel, which would increase flow velocities. An increase in velocity could impede migrating Chinook salmon.

Operations Effects

The types of direct and indirect operations effects anticipated under the Avenue 21 to Road 13 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. Chemical spills from fuel, transmission fluid, lubricating oil, and motor oil leaks could also contaminate water, resulting in mortality, habitat degradation, or reduced reproductive success of special-status fish. Central Valley Wye 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 predation on special-status fish species.

6.5.3.4 SR 152 (North) to Road 11 Wye Alternative

Construction Effects

The types of direct and indirect construction effects anticipated under the SR 152 (North) to Road 11 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. The SR 152 (North) to Road 11 Wye Alternative is elevated where it crosses the San Joaquin River, which contains EFH for Chinook salmon within and adjacent to the project footprint. Final bridge design plans are not currently available but require placing pilings in the San Joaquin River. There are no plans to modify the physical characteristics of the San Joaquin River channel. The HSR crossing would be designed with the planned increase in river flows and would not conflict with the goals of the restoration flows. A program-level environmental document on the SJRRP has been prepared (USBR and DWR 2011). During an initial coordination meeting with the USBR and the California Department of Water Resources on June 6, 2011, it was determined that Central Valley Wye design would not conflict with the SJRRP; however, this will be further evaluated as part of the permitting process, including FESA Section 7 consultation with the NMFS. The Authority would continue to coordinate with the SJRRP and comply with regulations applicable to construction during the spawning and migration season.

Stream flows are being restored to the upper reach of the San Joaquin River from the Friant Dam to the Merced River confluence. The effects of SR 152 (North) to Road 11 Wye Alternative construction on runoff and water quality could hinder the re-establishment of special-status fish along the San Joaquin River. Direct effects on EFH include the loss of EFH due to pile placement and the alteration of hydraulics from pile placement in the wetted channel, which would increase flow velocities. An increase in velocity could impede migrating Chinook salmon.

6.5.4 Critical Habitat

Several IAMFs will help to reduce effects on critical habitat. The Authority will identify vernal pools to be avoided during construction (BIO-IAMF#6), which would help to avoid direct effects on federally designated critical habitat for vernal pools within the project footprint from construction. The implementation of the Central Valley Wye alternatives could still permanently remove critical habitat, resulting in direct construction effects where vernal pools are present and effects cannot be avoided through the IAMFs.

The Authority would require maintenance personnel to attend a WEAP training and certify that they understand the regulatory agency requirements and procedures necessary to protect

biological resources (BIO-IAMF#4). Maintenance criteria will be included as part of the Biological Resources Management Plan (BIO-IAMF#6), which will include, but not be limited to, measures for the protection of special-status species, specifications on the purpose, type, frequency, and extent of chemical use for insect and disease control operations, and measures for erosion and siltation control. Pesticide and herbicide application would be applied by certified pesticide applicators in accordance with all requirements of the California Department of Pesticide Regulation and County Agricultural Commissioners. In addition, the Authority will prepare an Annual Vegetation Control Plan (BIO-IAMF#7) and Weed Control Plan (BIO-IAMF#8) that would consist of site-specific vegetation and weed control methods and areas (BIO-IAMF#7) to minimize adverse chemical effects on vegetation. The technology for the HSR system does not require large amounts of lubricants or hazardous materials for operations, compared to diesel locomotive fuel tanks. TPSSs, switching stations, and substations would require maintenance activities of oil and other materials for equipment storage. The Authority will implement an Environmental Management System to promote the use of nonhazardous materials to the extent possible (HMW-IAMF#3). Where hazardous materials cannot be avoided, a hazardous materials business plan and a spill prevention, control, and countermeasure plan would be implemented to reduce potential effects from the use and storage of hazardous materials at Central Valley wye facilities (HMW-IAMF#4). These IAMFs would minimize direct and indirect effects on critical habitat during operations by training maintenance personnel to gain of knowledge of biological resources and associated regulatory requirements; applying pesticides and herbicides in accordance with state requirements and in accordance with prepared plans; and limiting the amount of hazardous substances used for HSR operations, which could contaminate the water column and result in degraded critical habitat.

The Authority would prepare and implement a Weed Control Plan under BIO-IAMF#8 to minimize and avoid the spread of weeds during construction activities. These IAMFs would help to minimize indirect effects on vernal pool critical habitat occurring outside but adjacent to the project footprint. BIO-IAMF#19 would also minimize the spread of invasive plants outside the project footprint by making certain that vehicles are cleaned of mud and plant materials prior to working in new areas, thus confirming that invasive plant seeds aren't carried between construction work areas. Nevertheless, indirect effects may still occur because it is difficult to remove invasive plants from native plant communities once established without intensive and regular management (e.g., manual hand-pulling, herbicide application) and monitoring.

Each of the Central Valley Wye alternatives would affect designated critical habitat for vernal pool species, including San Joaquin Orcutt grass, vernal pool fairy shrimp, and vernal pool tadpole shrimp. Table 6-5 provides a summary of direct effects by alternative on federally designated critical habitat for each species. Indirect effects, while not quantified, could occur from changes in hydrology or the introduction of invasive species. It is important to note that critical habitat must have the physical and biological features (formerly "primary constituent elements") to be considered habitat for these species. A key question in determining the significance of effects on critical habitat is whether or not the proposed activity would result in the adverse modification of the critical habitat. In order for the activity to be considered an adverse modification, physical and biological features must be adversely affected in a manner that appreciably reduces the value of the critical habitat for the conservation of the species. In the case of vernal pool species such as San Joaquin Orcutt grass, vernal pool fairy shrimp, and vernal pool tadpole shrimp, an analysis of the land cover mapping data conducted for this study indicates that there is no vernal pool or seasonal wetland habitat within the areas designated as critical habitat (Table 6-5). The potential direct and indirect effects discussed in the following subsections (6.5.4.1 through 6.5.4.4) are those that would or could occur with construction and operations of the Central Valley Wye.

Table 6-5 Critical Habitat Potentially Affected by Central Valley Wye Alternatives (acres; designated critical habitat/actual aquatic habitat in project footprint)

Species with Critical Habitat	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
San Joaquin Orcutt Grass	0/0	79.75/0	0/0	0/0
Vernal Pool Fairy Shrimp	0.69/0	0.69/0	1.01/0	13.53/0
Vernal Pool Tadpole Shrimp	0.69/0	80.44/0	1.01/0	13.53/0
Maximum Acreage Affected	0/0	80.44/0	0/0	13.53/0

Source: USFWS, 2015
SR = State Route

6.5.4.1 SR 152 (North) to Road 13 Wye Alternative

Construction Effects

Because critical habitat that would be affected by the Central Valley Wye is designated for vernal pool species, direct and indirect effects on critical habitat during construction would be similar to those described for special-status invertebrates in section 6.4.2.1. Construction of the SR 152 (North) to Road 13 Wye Alternative would result in the direct removal of a very small amount of designated critical habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp.

Operations Effects

Direct and indirect effects on critical habitat during operations would be similar to those described for special-status invertebrates in Section 6.4.2.1. The area of critical habitat that could be affected by operations activities associated with the SR 152 (North) to Road 13 Wye Alternative would be relatively small and would not result in the adverse modification of critical habitat.

6.5.4.2 SR 152 (North) to Road 19 Wye Alternative

Construction Effects

Because critical habitat that would be affected by the Central Valley Wye are designated for vernal pool species, direct and indirect effects on critical habitat during construction would be similar to those described for special-status invertebrates in section 6.4.2.1. The SR 152 (North) to Road 19 Wye Alternative wetland study area contains designated critical habitat for San Joaquin Orcutt grass, vernal pool fairy shrimp, and vernal pool tadpole shrimp; however, the primary constituent elements within such areas are absent (Table 6-5).

Operations Effects

Direct and indirect effects on critical habitat during operations would be similar to those described for special-status invertebrates in Section 6.4.2.1. The area of critical habitat that could be affected by operations activities associated with the SR 152 (North) to Road 19 Wye Alternative would be relatively small and would not result in the adverse modification of critical habitat.

6.5.4.3 Avenue 21 to Road 13 Wye Alternative

Construction Effects

Because critical habitat that would be affected by the Central Valley Wye is designated for vernal pool species, direct and indirect effects on critical habitat during construction would be similar to those described for special-status invertebrates in Section 6.4.2.1. The Avenue 21 to Road 13 Wye Alternative wetland study area contains designated critical habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp; however, the primary constituent elements within such areas are absent (Table 6-5).

Operations Effects

Direct and indirect effects on critical habitat during operations would be similar to those described for special-status invertebrates in Section 6.4.2.1. The area of critical habitat that could be affected by operations activities associated with the Avenue 21 to Road 13 Wye Alternative would be relatively small and would not result in a substantial effect or adverse modification of critical habitat.

6.5.4.4 SR 152 (North) to Road 11 Wye Alternative

Construction Effects

Because critical habitat that would be affected by the Central Valley Wye is designated for vernal pool species, direct and indirect effects on critical habitat during construction would be similar to those described for special-status invertebrates in Section 6.4.2.1. The SR 152 (North) to Road 11 Wye Alternative wetland study area contains designated critical habitat for vernal pool fairy shrimp and vernal pool tadpole shrimp; however, the primary constituent elements within such areas are limited (Table 6-5).

Operations Effects

Direct and indirect effects on critical habitat during operations would be similar to those described for special-status invertebrates in Section 6.4.2.1. The area of critical habitat that could be affected by operations activities associated with the SR 152 (North) to Road 11 Wye Alternative would be relatively small and would not result in a substantial effect or adverse modification of critical habitat.

6.6 Effects on Wildlife Movement Corridors

Wildlife-crossing features would be created as a requirement of the Central Valley Wye design to facilitate wildlife movement and reduce effects on wildlife corridors (BIO-IAMF#25). While this IAMF would help reduce adverse effects from habitat fragmentation, it would not eliminate them entirely because construction of the Central Valley Wye would still introduce an impermeable feature (i.e., at-grade railroad embankment) in areas that currently allow uninhibited wildlife movement. The construction and operations of each of the Central Valley Wye alternatives may result in direct or indirect effects on habitat types where linkages and movement corridors have been identified. Table 6-6 identifies the distance in miles of wildlife movement corridors crossed by each of the Central Valley Wye alternatives. The severity of effects is dependent on the permeability of the Central Valley Wye alternative (i.e., the presence of elevated structures, road crossings, or the availability of wildlife crossings), the amount of natural land within and adjacent the alternative, and the presence of identified linkages.

The SR 152 (North) to Road 19 Wye Alternative would have the highest potential effects on wildlife movement corridors because it would affect more overall acres of land than the other three alternatives, especially within the Eastman Lake–Bear Creek ECA (Table 6-6). The Avenue 21 to Road 13 Wye Alternative would have similar, but slightly greater, effects than the SR 152 (North) to Road 13 Wye Alternative. The SR 152 (North) to Road 11 Wye Alternative would affect the lowest amount of wildlife movement corridors overall, but would affect more of the Sandy Mush Road Area than the other alternatives (Table 6-6).

The potential direct and indirect effects on wildlife movement corridors discussed in the following subsections (6.6.1.1 through 6.6.1.4) are those that would or could occur with construction and operations of the Central Valley Wye. Effects are also considered within the context of existing linear facilities that impede wildlife movement, including SR 99, the existing BNSF and UPRR alignments, roadways and canals, and urban and certain agricultural land uses (e.g., vineyards). These features impair the ability of wildlife species to move freely across the Central Valley. Natural dispersal corridors such as waterways have also become increasingly constrained due to adjacent land use conversion and infrastructure.

Table 6-6 Wildlife Movement Corridors Crossed by Central Valley Wye Alternatives (miles)

	Alternative			
	SR 152 (North) to Road 13 Wye	SR 152 (North) to Road 19 Wye	Avenue 21 to Road 13 Wye	SR 152 (North) to Road 11 Wye
Eastman Lake-Bear Creek ECA	3.88	6.72	3.88	2.98
Ash Slough-Merced NWR ECA	1.86	1.86	2.30	1.87
Sandy Mush Road Area	1.43	1.40	1.43	1.81
Modeled Wildlife Corridors	3.84	7.49	4.23	3.77
Total	11.01	17.47	11.84	10.43

Source: Authority and FRA, 2018
 ECA = Essential Connectivity Area
 NWR = National Wildlife Refuge
 SR = State Route

6.6.1.1 SR 152 (North) to Road 13 Wye Alternative

Construction Effects

As described in Section 5.4, Wildlife Movement Corridors, and shown on Figure 5-7, the Eastman Lake–Bear Creek ECA, Ash Slough–Merced National Wildlife Refuge ECA, Sandy Mush Road Area, and modeled wildlife corridors are located within the project footprint.

Fenced, at-grade track of the SR 152 (North) to Road 13 Wye Alternative with wildlife-dedicated and other crossings (e.g., culverts, road crossings over the HSR track) would cross the ECAs, Sandy Mush Road Area, and modeled wildlife corridors. Modeled wildlife corridors occur within portions of the ECAs and occur at several locations outside the ECAs along the SR 152 (North) to Road 13 Wye Alternative. Direct effects include the placement of temporary and permanent linear barriers to wildlife movement with restricted crossing opportunities. This barrier placement could substantially degrade linkages, which may no longer provide food, cover, or ease of travel for many species. Corridor shifts could also result in increased competition for resources as well as the potential for isolation of populations. Construction of the SR 152 (North) to Road 13 Wye Alternative would result in concentrated heavy vehicle and equipment use within existing agricultural and urban development areas. Construction activities occurring at or in the vicinity of wildlife movement corridors (linkages) or natural lands may result in indirect disruption of wildlife movement through lighting, noise, motion, and startle effects.

Construction activities in the ECAs, Sandy Mush Road Area, and modeled wildlife corridors are not likely to impair the habitat linkages between existing habitat blocks. Effects associated with construction activities may temporarily impede wildlife movement within the Central Valley Wye area. Temporary and permanent effects from placement of barriers within natural lands and known linkages during construction activities may affect the ability of special-status species and other free-ranging animals to move freely within the ECAs, Sandy Mush Road Area, and modeled wildlife movement corridors.

Operations Effects

Operations activities associated with the SR 152 (North) to Road 13 Wye Alternative would be intermittent in nature. Operation of the SR 152 (North) to Road 13 Wye Alternative would expose wildlife to noise levels that could exceed 100 A-weighted decibel (dBA) sound exposure level (SEL) (i.e., noise exposure from an individual train passage) for at-grade crossings within the ECAs, Sandy Mush Road Area, and the modeled wildlife corridors. The 100-dBA SEL criterion would be exceeded, but for only a short distance (i.e., traversed) within immediate proximity to the crossings. Overall, SR 152 (North) to Road 13 Wye Alternative design would provide wildlife crossing features and maintain habitat connectivity and the temporary nature of the operations effects would not impede wildlife from using the wildlife crossings. However, structures that would

facilitate wildlife movement would likely incrementally affect some movement patterns and linkage connectivity in the region.

Design elements of the SR 152 (North) to Road 13 Wye Alternative would facilitate wildlife movement, including elevated tracks, road overcrossings and undercrossings, and specific structures designed for wildlife crossings, which could allow for unimpeded wildlife movement. The Central Valley Wye, once constructed, would affect wildlife movement. Direct effects during operations include the passage of temporary linear barriers (trains) that could temporarily restrict crossing opportunities and alter behavior of species. These barriers may cause habitat shifts (toward nonnative or disturbed type communities) over time, because they could substantially degrade linkages, which may no longer provide food, cover, or ease of travel for many species. Shifts in habitat use can result in increased competition for resources, as well as the potential for genetic isolation of populations.

The severity of this effect on wildlife movement is dependent on the permeability of the Central Valley Wye alternative (i.e., the presence of elevated structures, road crossings, or wildlife crossings), the amount of natural land within and adjacent to the SR 152 (North) to Road 13 Wye Alternative, and the presence of identified linkages. The SR 152 (North) to Road 13 Wye Alternative is on an elevated or viaduct structure located over a number of riparian and wildlife movement corridor (linkages) areas. These structures would facilitate wildlife movement, but would incrementally affect movement patterns and linkage connectivity in the region. Noise barriers installed for noise mitigation are not expected to affect wildlife movement because they would be located outside of known linkages and adjacent to urban areas, which are existing barriers to wildlife movement.

In addition to HSRs passing over tracks through wildlife movement corridors, implementation of the Central Valley Wye would require ongoing operations and maintenance activities (e.g., routine inspection and maintenance of the HSR right-of-way). These operations activities occurring at or in the vicinity of wildlife movement corridors or natural lands may result in indirect disruption of wildlife movement through lighting, noise, motion, and startle effects. Some indirect disturbance, such as noise, of the habitats associated with a wildlife corridor may cause wildlife to avoid use of a linkage. The FRA has established noise exposure limits for wildlife (mammals and birds). Noise exposure limits for each are an SEL of 100 dBA from passing trains. It is assumed that noise exposure that exceeds the 100-dBA SEL threshold could elicit a negative response, such as avoidance of a linkage.

In at-grade crossings the screening distance (i.e., distance from the trackway centerline within which an effect could result) for a single-train pass-by SEL of 100 dBA would be approximately 100 feet from the track centerline (for a total width of 200 feet). In all areas that are at-grade where the right-of-way is less than a width of 200 feet and that are adjacent to substantive wildlife habitat (e.g., identified habitat linkages), the HSR could expose wildlife to noise levels that exceed the 100-dBA SEL threshold, and which may elicit a startle, avoidance, or negative behavior by wildlife species.

6.6.1.2 SR 152 (North) to Road 19 Wye Alternative

Construction Effects

The types of direct and indirect construction effects anticipated under the SR 152 (North) to Road 19 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. The SR 152 (North) to Road 19 Wye Alternative crosses the greatest distance of identified wildlife movement corridors (Table 6-6). The SR 152 (North) to Road 19 Wye Alternative includes both elevated and at-grade crossings within the ECAs, Sandy Mush Road Area, and within modeled wildlife corridors. All crossings include both the mainline of the tracks as well as other permanent project features that cross the watercourse at other locations.

Many of the crossings intersected by the SR 152 (North) to Road 19 Wye Alternative include single-span or multispan bridges at natural watercourses. All bridge crossings for all design options have limited/scattered riparian habitat. However, some of the crossings, especially within the other modeled wildlife corridors, include cross culverts. All design options provide free-

ranging mammals with opportunities to disperse across the ECAs, Sandy Mush Road Area, and the modeled wildlife corridors. The SR 152 (North) to Road 19 Wye Alternative has integrated permeable features to convey wildlife dispersal and supplement the hydraulic crossings.

Although activities associated with the construction of the SR 152 (North) to Road 19 Wye Alternative has the potential to interfere with the movement of wildlife species within the Eastman Lake–Bear Creek ECA, Ash Slough–Merced National Wildlife Refuge ECA, Sandy Mush Road Area, and other modeled wildlife corridors, these activities are not long term and the construction phasing is anticipated to allow some dispersal over the construction period. Additionally, the SR 152 (North) to Road 19 Wye Alternative would provide permeable features within the design and coupled with hydraulic crossings, maintain a degree of permeability and connectivity.

Operations Effects

The types of direct and indirect operations effects anticipated under the SR 152 (North) to Road 19 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. Operations activities associated with the SR 152 (North) to Road 19 Wye Alternative would be temporary in nature. Operations of the SR 152 (North) to Road 19 Wye Alternative would expose wildlife to noise levels that could exceed 100 dBA SEL for at-grade crossings within the ECAs, Sandy Mush Road Area, and the modeled wildlife corridors. The 100-dBA SEL criterion would be exceeded, but for only a short distance (i.e., traversed) within immediate proximity to the at-grade crossings. Overall, SR 152 (North) to Road 19 Wye Alternative design would provide wildlife crossing features and maintain habitat connectivity and the temporary nature of the operations effects would not impede wildlife from using the wildlife crossings.

6.6.1.3 Avenue 21 to Road 13 Wye Alternative

Construction Effects

The types of direct and indirect construction effects anticipated under the Avenue 21 to Road 13 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. The Avenue 21 to Road 13 Wye Alternative would cross the same amount of the Eastman Lake–Bear Creek ECA and Sandy Mush Road Area as the SR 152 (North) to Road 13 Wye Alternative, but would cross slightly greater distances of the Ash Slough–Merced National Wildlife Refuge ECA and modeled wildlife corridors (Table 6-6). The Avenue 21 to Road 13 Wye Alternative includes both elevated and at-grade crossings within the ECAs, Sandy Mush Road Area, and within modeled wildlife corridors. All crossings include both the mainline of the tracks as well as other permanent Central Valley Wye features that cross the watercourse at other locations.

Many of the crossings intersected by the Avenue 21 to Road 13 Wye Alternative include single-span or multispan bridges at natural watercourses. All bridge crossings for all design options have limited/scattered riparian habitat. However, some of the crossings, especially within the other modeled wildlife corridors, include cross culverts. All design options provide free-ranging mammals with opportunities to disperse across the ECAs, Sandy Mush Road Area and the modeled wildlife corridors. The Avenue 21 to Road 13 Wye Alternative has integrated permeable features to convey wildlife dispersal and supplement the hydraulic crossings.

Although activities associated with the construction of the Avenue 21 to Road 13 Wye Alternative has the potential to interfere with the movement of wildlife species within the Eastman Lake–Bear Creek ECA, Ash Slough–Merced National Wildlife Refuge ECA, Sandy Mush Road Area, and other modeled wildlife corridors, these activities are not long term and the construction phasing is anticipated to allow some dispersal over the construction period. Additionally, the Avenue 21 to Road 13 Wye Alternative would provide permeable features within the design and coupled with hydraulic crossings, maintain a degree of permeability and connectivity.

Operations Effects

The types of direct and indirect operations effects anticipated under the Avenue 21 to Road 13 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. Operations activities associated with the Avenue 21 to Road 13 Wye Alternative would be temporary in nature. Operations of the Avenue 21 to Road 13 Wye Alternative would expose

wildlife to noise levels that could exceed 100 dBA SEL for at-grade crossings within the ECAs, Sandy Mush Road Area, and the modeled wildlife corridors. The 100-dBA SEL criterion would be exceeded, but would only traverse the short distance within immediate proximity to the at-grade crossings. Overall, Avenue 21 to Road 13 Wye Alternative design would provide wildlife crossing features and maintain habitat connectivity and the temporary nature of the operations effects would not impede wildlife from using the wildlife crossings.

6.6.1.4 SR 152 (North) to Road 11 Wye Alternative

Construction Effects

The types of direct and indirect construction effects anticipated under the SR 152 (North) to Road 11 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. The SR 152 (North) to Road 11 Wye Alternative crosses the least distance of identified wildlife movement corridors overall, but greatest distance of the Sandy Mush Road Area (Table 6-6). The SR 152 (North) to Road 11 Wye Alternative includes both elevated and at-grade crossings within the ECAs, Sandy Mush Road Area, and within modeled wildlife corridors. All crossings include both the mainline of the tracks as well as other permanent project features that cross the watercourse at other locations.

Many of the crossings intersected by the SR 152 (North) to Road 11 Wye Alternative include single-span or multispans bridges at natural watercourses. All bridge crossings for all design options have limited/scattered riparian habitat. However, some of the crossings, especially within the other modeled wildlife corridors, include cross culverts. All design options provide free-ranging mammals with opportunities to disperse across the ECAs, Sandy Mush Road Area, and the modeled wildlife corridors. The SR 152 (North) to Road 11 Wye Alternative has integrated permeable features to convey wildlife dispersal and supplement the hydraulic crossings.

Although activities associated with the construction of the SR 152 (North) to Road 11 Wye Alternative has the potential to interfere with the movement of wildlife species within the Eastman Lake–Bear Creek ECA, Ash Slough–Merced National Wildlife Refuge ECA, Sandy Mush Road Area, and other modeled wildlife corridors, these activities are not long term and the construction phasing is anticipated to allow some dispersal over the construction period. Additionally, the SR 152 (North) to Road 11 Wye Alternative would provide permeable features within the design and, coupled with hydraulic crossings, maintain a degree of permeability and connectivity.

Operations Effects

The types of direct and indirect operations effects anticipated under the SR 152 (North) to Road 11 Wye Alternative would be identical to those for the SR 152 (North) to Road 13 Wye Alternative. Operations activities associated with the SR 152 (North) to Road 11 Wye Alternative would be temporary in nature. Operations of the SR 152 (North) to Road 11 Wye Alternative would expose wildlife to noise levels that could exceed 100 dBA SEL for at-grade crossings within the ECAs, Sandy Mush Road Area, and the modeled wildlife corridors. The 100-dBA SEL criterion would be exceeded, but for only a short distance (i.e., traversed) within immediate proximity to the at-grade crossings. Overall, SR 152 (North) to Road 11 Wye Alternative design would provide wildlife crossing features and maintain habitat connectivity and the temporary nature of the operations effects would not impede wildlife from using the wildlife crossings.

7 PERMITS AND TECHNICAL STUDIES FOR SPECIAL LAWS OR CONDITIONS

Permits expected for the Central Valley Wye related to biological resources and the effects identified in Section 6, include two Section 7 BOs with incidental take permits from the USFWS and NMFS; a CWA Section 404 Permit from the USACE; a CWA Section 401 Water Quality Certification from the RWQCB; a California Fish and Game Code Section 2081 permit from the CDFW; and a Section 1602 Lake and Streambed Alteration Agreement from the CDFW. These and other permits and technical studies required by regulatory authority are discussed in this section.

7.1 Federal Endangered Species Act Consultation Summary

Section 7 of the FESA provides a means for authorizing take of threatened or endangered species by federal agencies and applicants, 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 make certain that the 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 federal agency proposing the action is required to consult with USFWS or NMFS.

7.1.1 U.S. Fish and Wildlife Service

Because the proposed Central Valley Wye would result in direct and indirect effects 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 BA. The BA will identify the various Central Valley Wye–related effects 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 effects. The BA will also describe the Central Valley Wye’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 BO within 135 days of receipt of a complete BA. As of the date of this report, a BA has not been submitted to the USFWS.

7.1.2 National Marine Fisheries Service

The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 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 EFH, which is defined as those waters and substrates needed by fish for spawning, breeding, feeding, and growth to maturity. Because the proposed Central Valley Wye will adversely affect EFH, the FRA will be required to consult with NMFS under the Magnuson-Stevens Fishery Conservation and Management Act.

7.2 California Endangered Species Act Summary

The CESA (§§ 2050–2085) 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 FESA satisfies CESA if the CDFW determines that the federal incidental take authorization is consistent with CESA 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 Central Valley Wye may only adversely affect six federal and state-listed species, and five species that are state listed only. An incidental take permit application under Section 2081(b) will

be prepared for all seven state-listed species, including the state only listed species and the state and federally listed species with state-listed status (four of the state-listed species are also fully protected species; therefore issuance of a take permit for these species is not permitted). The incidental take permit application will disclose the range of the Central Valley Wye effects on CESA-listed protected species and describe how these effects would be fully mitigated. The Authority will consult with the CDFW to make certain that design of the Central Valley Wye is sufficient to avoid take of California fully protected species. As part of the incidental take permit process, additional proposed compensatory mitigation locations and requirements would also be identified. Because federally listed species and state-listed species will be consulted on separately, a consistency determination under Section 2080.1 would not be sought.

7.3 Jurisdictional Waters Coordination Summary

Based on the results of the special aquatic resources surveys conducted for the Central Valley Wye, 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 habitat study area. Construction of the Central Valley Wye, as currently designed, is anticipated to have permanent and temporary effects on special aquatic resources. To comply with federal and state regulations protecting special aquatic resources, permits will be required from the USACE, the CDFW and the SWRCB. The following describes the requirements in more detail.

7.3.1 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 U.S. Environmental Protection Agency jurisdiction. The Central Valley Wye 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 effect wetlands and other waters of the U.S. that are of a magnitude greater than the maximum acreage allowed under a nationwide permit application. Therefore, the Central Valley Wye 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: (1) pre-application consultation (for larger projects), (2) formal permit application review, (3) public notice and comments, and (4) decisionmaking.

To comply with the Clean Water Act and to increase process efficiencies, the Authority, FRA, USACE, and U.S. Environmental Protection Agency developed the *Draft California High-Speed Train NEPA/404/408 Memorandum of Understanding* (404/408 MOU) (Authority and FRA 2015). The 404/408 MOU requires the agencies to work collaboratively to streamline the Section 404/Section 408 processes to the degree feasible, and to identify a Preliminary Least Environmentally Damaging Practicable Alternative (preliminary LEDPA), a requirement of the U.S. Environmental Protection Agency CWA 404(b)(1) Guidelines. Pursuant to the 404/408 MOU, in order to identify the preliminary LEDPA, the Authority and FRA must obtain concurrence from U.S. Environmental Protection Agency and USACE at three “checkpoints” during preparation of an EIR/EIS. The three checkpoint processes, Checkpoints A (defining the Purpose and Need), B (Identifying the Range of Alternatives to be Studied in the Project EIR/EIS), and C (Identifying a Preliminary LEDPA, Preparing a USACE Section 408 Preliminary Determination Report, and Preparing a Draft Compensatory Mitigation Plan), are integrated with the NEPA process.

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 the National Environmental Policy Act, FESA, 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). A Second Supplemental Wetlands Delineation Report is currently in preparation and will be submitted to the USACE in the near future.

7.3.2 Section 401 of the Clean Water Act

A Section 401 Water Quality Certification is necessary when a project will affect federal and state waters, or when a project requires a Section 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 SWRCB takes authority. The Central Valley Wye will require a Section 404 permit, is part of a larger project which crosses multiple jurisdictions, and therefore will be under the authority of the SWRCB.

7.3.3 U.S. Presidential Executive Order 11990

USEO 11990 was designed to protect wetlands and to minimize adverse effects 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 effects on wetlands. Compliance with this USEO will be attained through coordination with the USACE and the SWRCB. The Authority and FRA 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 USEO by providing a record of past coordination between the Authority and the regulatory agencies.

7.3.4 California Fish and Game Code Sections 1600–1616

Sections 1600–1616 of the California Fish and Game Code require notification of the CDFW prior to 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 Central Valley Wye would result in permanent alterations to the bed and banks of the San Joaquin River as well as temporary alterations to other smaller streams that cross the project footprint. In addition, all work within canals, irrigation channels and drainage ditches will fall under the CDFW jurisdiction. As a result, a lake and streambed alteration agreement will be required from the CDFW for the Central Valley Wye. Notification of lake and streambed alteration has not yet been filed with the CDFW as of the preparation of this report.

7.4 Invasive Plant Species

This section describes regulations pertaining to invasive plant species and identifies the appropriate pathways to comply with the regulations.

7.4.1 U.S. Presidential Executive Order 13112

The intent of USEO 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 effects that invasive species cause.” Per the USEO, 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 National Environmental Policy Act process.

A public draft of the Supplemental EIR/EIS (part of the National Environmental Policy Act process) is planned for release in mid-2017. The Supplemental EIR/EIS identifies and describes effects on biological resources and proposed mitigation efforts to lessen the potential harm. No additional consultation would be required outside of the National Environmental Policy Act process.

7.4.2 Native Plant Protection Act

California's NPPA requires all state agencies to conserve endangered and rare native plants (Cal. Fish and Game Code §§ 1900–1913). Provisions of the NPPA prohibit the taking of listed plants from the wild and require notification of the CDFW at least 10 days prior to any change of land use. There are 28 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 CDFW through the incidental take permit application process, and will continue to consult with these agencies informally as required to comply with the provisions of the NPPA.

7.5 Other Regulatory and Environmental Compliance Needs

This section describes several other additional regulatory and environmental compliance needs for special-status wildlife species and aquatic resources. These regulations do not require direct consultation with agencies, but are addressed concurrently and in consideration of other laws and regulations, and through the design of the Central Valley Wye.

7.5.1 Migratory Bird Treaty Act

The MBTA (16 U.S.C. §§ 703–712) 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 wren-tit (*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 Central Valley Wye has the potential to result in the take of nests, eggs, young, or individuals of these protected species, the Authority will implement measures to avoid the take of any migratory birds, nests, or eggs. As such, no direct take of migratory birds, or any part, nest, or egg of any such birds, is anticipated.

7.5.2 Protection of Migratory Bird Populations

USEO 13186 directs each federal agency taking actions that have or may have adverse effects 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 effects 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 Central Valley Wye may have direct effects on migratory bird populations, the Authority or FRA, as appropriate, will take measures to avoid and minimize adverse effects on migratory bird resources with measures and requirements under IAMFs and mitigation efforts as determined through consultation with the USFWS.

7.5.3 Bald and Golden Eagle Protection Act

The BGEPA (16 U.S.C. §§ 668–668d) prohibits the destruction of bald and golden eagles and their occupied and unoccupied nests. The proposed Central Valley Wye may result in direct and indirect effects on bald and golden eagle foraging habitat, although these species have not been recorded as nesting within the habitat study area. Measures to conduct nesting surveys and implement avoidance measures will be implemented by the Authority, therefore, destruction of bald and golden eagles and their nests is not expected. The Authority will implement proposed avoidance, minimization, and mitigation efforts and as determined through consultation with the USFWS.

7.5.4 California Fish and Game Code—Wildlife

7.5.4.1 *Bird Nesting Protections*

Bird nesting protections (Cal. Fish and Game Code §§ 3503, 3503.5, 3511, and 3513) in the California Fish and Game Code 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.

USEO 13186 directs each federal agency taking actions that have or may have adverse effects on migratory bird populations to work with the CDFW to develop a memorandum of understanding that will promote the conservation of migratory bird populations. This includes avoiding and minimizing adverse effects 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 Central Valley Wye has the potential to result in the take of 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. As such, no direct take of migratory birds, or any part, nest, or egg of any such birds, is anticipated.

7.5.4.2 *Fully Protected Species*

Four sections of the California Fish and Game Code list 37 fully protected species (Cal. Fish and Game Code §§ 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 Central Valley Wye could lead to take or possession of fully protected species, the Authority will consult with the CDFW to make certain that proposed measures are sufficient to avoid take of fully protected species. Additional measures would be identified through informal consultation with the CDFW.

8 REFERENCES

Authority	California High-Speed Rail Authority
BNSF	BNSF Railway
CAL FIRE	California Department of Forestry and Fire Protection
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CNPS	California Native Plant Society
DWR	California Department of Water Resources
FRA	Federal Railroad Administration
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
PFMC	Pacific Fishery Management Council
SCS	Soil Conservation Service
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WES	Western Regional Climate Center

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9 PREPARER QUALIFICATIONS

This section lists individuals responsible for the content of this report, and provides a summary of their qualifications, roles, and responsibilities in the field surveys and preparation of this report.

9.1 Field Surveys

Field surveys were conducted by the following biologists and botanists. Their qualifications are listed in this section.

9.1.1 Reconnaissance Field Surveys Personnel and Experience

John Holson Botanist	B.S., Ecology, University of California, Santa Barbara 10 years of experience
Will Kohn Biologist	B.S., Zoology, Humboldt State University, Humboldt 20 years of experience
Donna Maniscalco Fish Biologist	B.S., Wildlife, Fish, and Conservation Biology, University of California, Davis 15 years of experience
Kailash Mozumder Biologist	B.S., Ecology, Behavior & Evolution, University of California San Diego 14 years of experience
Robert Preston Botanist	Ph.D., Botany, University of California, Davis. 1990 M.A., Botany, California State University, Chico. 1983. B.A., Biological Sciences and Chemistry, California State University, Chico. 1981. 24 years of experience.
Brad Schafer Biologist	B.S., Biology, Western Illinois University, Macomb 18 years of experience

9.1.2 Delineation of Jurisdictional Waters Survey Personnel and Experience

Joel Butterworth Soil and Wetland Specialist	B.A., Geography, University of California, Santa Barbara M.S., Geography, minor in Soil Science, Oregon State University 26 years wetland delineation experience Senior Review, Co-author
Kate Carpenter Botanist/Wetland Ecologist	B.A., Plant Biology, minor in Soil Science, University of California, Davis 12 years wetland delineation experience Primary Author, Field Surveys
John Holson Botanist/Wetland Ecologist	B.S., Ecology, University of California, Santa Barbara 10 years wetland delineation experience Field Surveys
Zackry West Botanist/Wetland Ecologist	B.A., Environmental Studies, California State University, San Bernardino, California 11 years wetland delineation experience Field Surveys

Margaret Widdowson, PhD Botanist/Wetland Ecologist	PhD, Forest Ecology, University of Stirling, United Kingdom B.Sc., Botany, University of Aberdeen, United Kingdom 14 years wetland delineation experience Field Surveys
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9.1.3 Botanical Surveys Personnel and Experience

Margaret Widdowson, PhD Botanist/Wetland Ecologist	PhD, Forest Ecology, University of Stirling, United Kingdom B.Sc., Botany, University of Aberdeen, United Kingdom 14 years wetland delineation experience Field Surveys
John Holson Botanist/Wetland Ecologist	B.S., Ecology, University of California, Santa Barbara 10 years wetland delineation experience Field Surveys

9.1.4 Wildlife Habitat Assessment Personnel and Experience

Will Kohn Biologist	B.S., Zoology, Humboldt State University, Humboldt 20 years of experience
Kailash Mozumder Biologist	B.S., Wildlife, Fish, and Conservation Biology, University of California, Davis 15 years of experience
Donna Maniscalco Fish Biologist	B.S., Ecology, Behavior & Evolution, University of California San Diego 14 years of experience

9.1.5 Swainson's Hawk/Raptor Surveys Personnel and Experience

Will Kohn Biologist	B.S., Zoology, Humboldt State University, Humboldt 20 years of experience
Kailash Mozumder Biologist	B.S., Wildlife, Fish, and Conservation Biology, University of California, Davis 15 years of experience
Donna Maniscalco Fish Biologist	B.S., Ecology, Behavior & Evolution, University of California San Diego 14 years of experience
Matt Ricketts Biologist	M.S., Biology, Eastern Kentucky University, Richmond 15 years of experience

9.2 Report Preparation

Brittany Buscombe GIS Analyst	B.A., Environmental Analysis and Design, University of California Irvine 13 years of experience
John Holson Botanist	B.S., Ecology, University of California, Santa Barbara 10 years of experience
Will Kohn Biologist	B.S., Zoology, Humboldt State University, Humboldt 20 years of experience

Donna Maniscalco Fish Biologist	B.S., Wildlife, Fish, and Conservation Biology, University of California, Davis 15 years of experience
Kailash Mozumder Biologist	B.S., Ecology, Behavior & Evolution, University of California San Diego 14 years of experience
Bill Parker GIS Analyst	M.A., Geography, <i>in progress</i> B.A., Anthropology, University of California, Berkley GIS Certification of Completion, Diablo Valley College 5 years of experience
Robert Preston Botanist	Ph.D., Botany, University of California, Davis M.A., Botany, California State University, Chico. B.A., Biological Sciences and Chemistry, California State University, Chico 24 years of experience.
Matt Ricketts Biologist	M.S., Biology, Eastern Kentucky University, Richmond 15 years of experience
Brad Schafer Biologist	B.S., Biology, Western Illinois University, Macomb 18 years of experience
Daniel Schiff GIS Analyst	B.A., Sacramento State 10 years of experience
Sacha Selim GIS Analyst	B.A., Economics/Business Management, University of Santa Cruz 8 years of experience

