Appendix C
Biological Assessment Report

Biological Assessment / Biological Evaluation Report for the East Sand Slough Side Channel Project

Sacramento River Forum

May 16, 2019

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Summary

This report summarizes the habitats, wildlife and plants encountered during biological evaluations for the East Sand Slough Side Channel Project and provides recommendations for avoidance and mitigation measures to reduce project impacts to biological resources. Information in this report was supported by several field investigations. Botanical surveys were conducted April 28 through 30, 2018. Bird surveys were conducted in April of 2018. Field visits for a wetland delineation were conducted May 1 through 3, 2018. Elderberry shrubs were mapped between April 29 and May 30, 2018. General biological surveys were conducted throughout 2018.

Project Location and Description

The proposed Project is located in Tehama County, between River Mile 246 and 243, adjacent to the City of Red Bluff. The center of the project is at longitude -122.220236 and latitude 40.174084 in decimal degrees. Figures 1 and 2 show the project area and location. The project area is approximately 376 acres in size. The lead agency for the project is the Resource Conservation District of Tehama County (RCDTC).

The proposed Project is a salmonid rearing habitat restoration project. The proposed Project consists of reconnecting East Sand Slough to the Sacramento River during minimal flows by excavating the main channel and entrances. The main channel would be excavated to provide floodplain habitat. The main channel entrance would be excavated to allow flow into the channel when Sacramento River flows are 5,000 cubic feet per second (cfs). A high-flow entrance would be excavated to allow flow into the main channel when Sacramento River flows are 10,000 cfs and into a secondary channel when flows are 15,000 cfs. The proposed Project also consists of a recreation component that includes a combination of trail expansion, parking lot rehabilitation, tree planting, and/or grassland restoration.

Landscape Conditions and Site History

Prior to the construction of Shasta Dam, East Sand Slough (ESS) appears similar to its existing alignment as a large overflow channel of the Sacramento River (DWR 1938 photography, DWR 1942 photography). The near 90-degree bend of the Sacramento River against the Tehama formation just downstream of the East Sand Slough entrance slows the river velocity, leading to sediment deposition throughout the slough.

The Red Bluff Diversion Dam (RBDD) was completed in 1964 to provide irrigation flows for the Tehama-Colusa Canal and Corning Canal. The dam raised the upstream water elevation, creating 'Lake Red Bluff' which led to the increased growth of riparian forest within the slough due to a higher water table. In 2011, the dam was decommissioned and the dam gates were permanently raised, lowering the water surface elevation along East Sand Slough. This change stressed and killed some of the riparian vegetation along the slough. A wildfire in June 2013 within East Sand Slough burned many of the trees and riparian vegetation throughout the northern half of the slough (Resource Conservation District of Tehama County 2017). Figure 3 shows imagery of the northern slough both during Lake Red Bluff Conditions and following the 2013 fire. Following the 2013 fire, burned areas were quickly colonized by annual grasses and early-successional shrubs such as blue elderberry, box elder, and arroyo willow. Remnant patches of riparian forest and woodland remain on the uplands north of Antelope Boulevard.

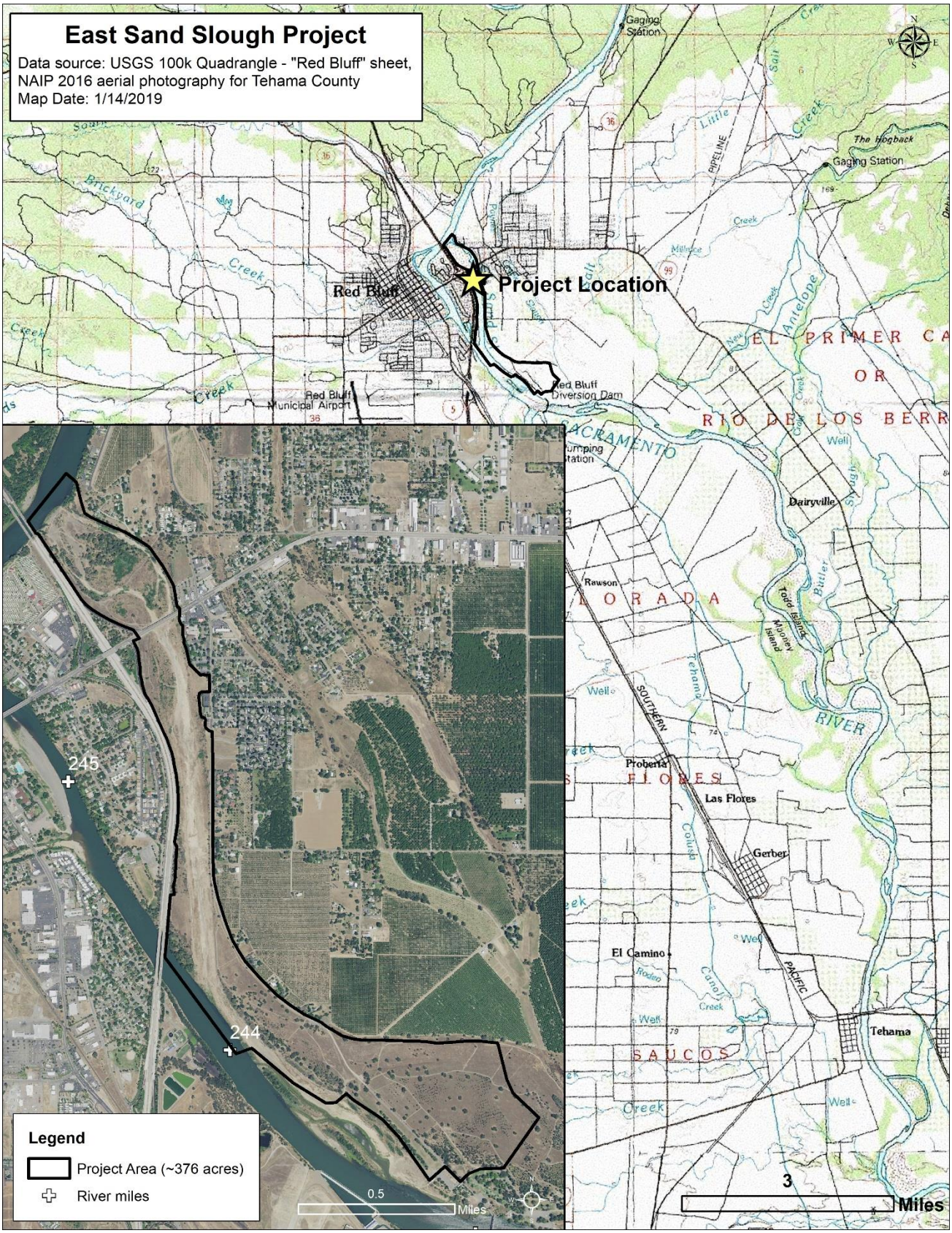


Figure 1. Location map

Figure 2. Aerial photography map

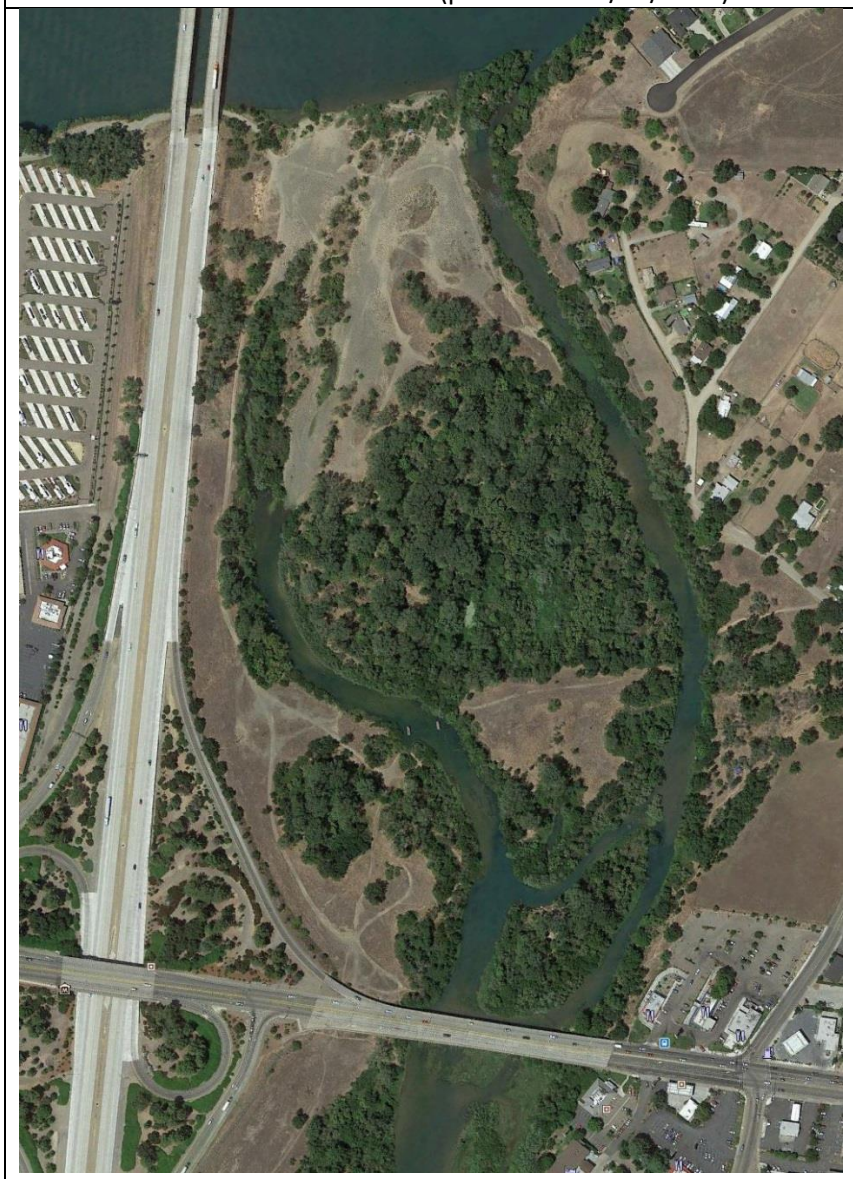
Lake Red Bluff conditions (photo date: 7/27/2011)	Post-2013 Fire (photo date: 8/27/2013)
	

Figure 3. Comparison of Vegetation Changes Following Loss of Lake Red Bluff and 2013 East Sand Slough Fire.

Wildlife Habitats and Vegetation Communities

The project area contains a diverse set of habitats and vegetation communities which support a high diversity of wildlife species. A query of the BISON database (USGS 2019) found 152 unique species of birds within the Project area and immediate vicinity. Appendix B lists 41 bird species found during 6 surveys between March and June in 2018. Table 1 lists all non-bird vertebrates found to date during biological surveys.

Table 1. Non-avian vertebrates observed

Common Name	**Species Name**	**Habitat Types observed in**
Red fox	*Vulpes vulpes*	Annual grassland
Coyote	*Canis latrans*	Annual grassland and all shrub and tree dominated habitats
Mule deer	*Odocoileus hemionus*	All shrub and tree dominated habitats
American beaver	*Castor canadensis*	Ponds in the slough channel
Raccoon	*Procyon lotor*	Riparian and developed areas
Black-tailed Jackrabbit	*Lepus californicus*	Annual grassland and all shrub and dominated habitats
California ground squirrel	*Otospermophilus beecheyi*	Annual grassland and Valley Oak Savanna
Domestic cat	*Felis catus*	Riparian habitats north of Antelope Blvd, Developed areas
Bats	Order *Chiroptera*	A colony found under the Antelope Blvd bridge. Species is uncertain
Gopher snake	*Pituophis catenifer*	Annual grassland, Valley Oak Savanna, Elderberry Savanna, Slough Channel
Red-eared sliders	*Trachemys scripta* ssp. *elegans*	Ponds in the Slough Channel
Western fence lizard	*Sceloporus occidentalis*	All open habitats
Western skink	*Plestiodon skiltonianus*	Annual grassland and Elderberry Savanna
American bullfrog	*Lithobates catesbeianus*	Ponds in the Slough Channel
Sierran chorus frog	*Pseudacris sierra*	Riparian habitats
Bluegill	*Lepomis macrochirus*	Ponds in the Slough Channel
Western Mosquitofish	*Gambusia affinis*	Ponds in the Slough Channel
Sacramento River sucker	*Catostomus occidentalis*	Temporary pools in the Slough Channel

The project area includes several habitat types that can be broadly divided into those found within the slough, its adjacent floodplain, and in the upland areas. Theses habitat types were mapped from 2018 aerial photography and assigned classifications to facilitate biological analysis. A Project area map of

these habitat types is presented in Figure 4 and several detailed maps of these habitat types are presented in Appendix E. Table 2 provides the total acreage of each habitat type along with its corresponding CWHR habitat classification scheme (CDFW 2019). The characteristics of each habitat type and the associated wildlife species are discussed below.

Table 2. Habitat Types within the Project Area

Habitat Type	**CWHR[1] Classification**	**Acres**
Annual Grassland	Annual Grassland	101
Valley Oak Savanna	Valley Oak Woodland	48
Slough Channel	Barren	42
Slough Floodplain	Annual Grassland	41
Elderberry Savanna	Annual Grassland	39
Riparian Scrub	Valley Foothill Riparian	18
Developed	Barren	18
Restoration Area	Valley Oak Woodland	16
Riverine	Riverine	15
Valley Oak Woodland	Valley Oak Woodland	13
Mixed Riparian Forest	Valley Foothill Riparian	11
Cottonwood Riparian Woodland	Valley Foothill Riparian	11
Himalayan Blackberry	Valley Foothill Riparian	3
Pond	Barren	0.43
Live Oak Woodland	Blue Oak-Foothill Pine	0.25

[1]California Wildlife Habitat Relationships (California Department of Fish and Wildlife 2019).

Annual Grassland Classification

The annual grassland (CWHR Class) is known to provide foraging habitat for many wildlife species, including the turkey vulture (*Cathartes aura*), northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), white-tailed kite (*Elanus leucurus*), and prairie falcon (*Falco mexicanus*). It also provides breeding habitat for the western fence lizard (*Sceloporus occidentalis*), common garter snake (*Thamnophis sirtalis*), western rattlesnake (*Crotalus oreganus*), burrowing owl (*Athene cunicularia*), short-eared owl (*Aseo flammeus*), horned lark (*Eremophila alpestris*), and western meadowlark (*Sturnella neglecta*). Mammals typically found in this habitat include the black-tailed jackrabbit (*Lepus californicus*), California ground squirrel (*Otospermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), western harvest mouse (*Reithrodontomys megalotis*), California vole (*Microtus californicus*), American badger (*Taxidea taxus*), and coyote (*Canis latrans*) (California Department of Fish and Wildlife 2019). The annual grassland classification was differentiated into three distinct habitat types based on the associated vegetation communities in the Project area: annual grassland, slough floodplain, and elderberry savanna. These habitat types are described below.

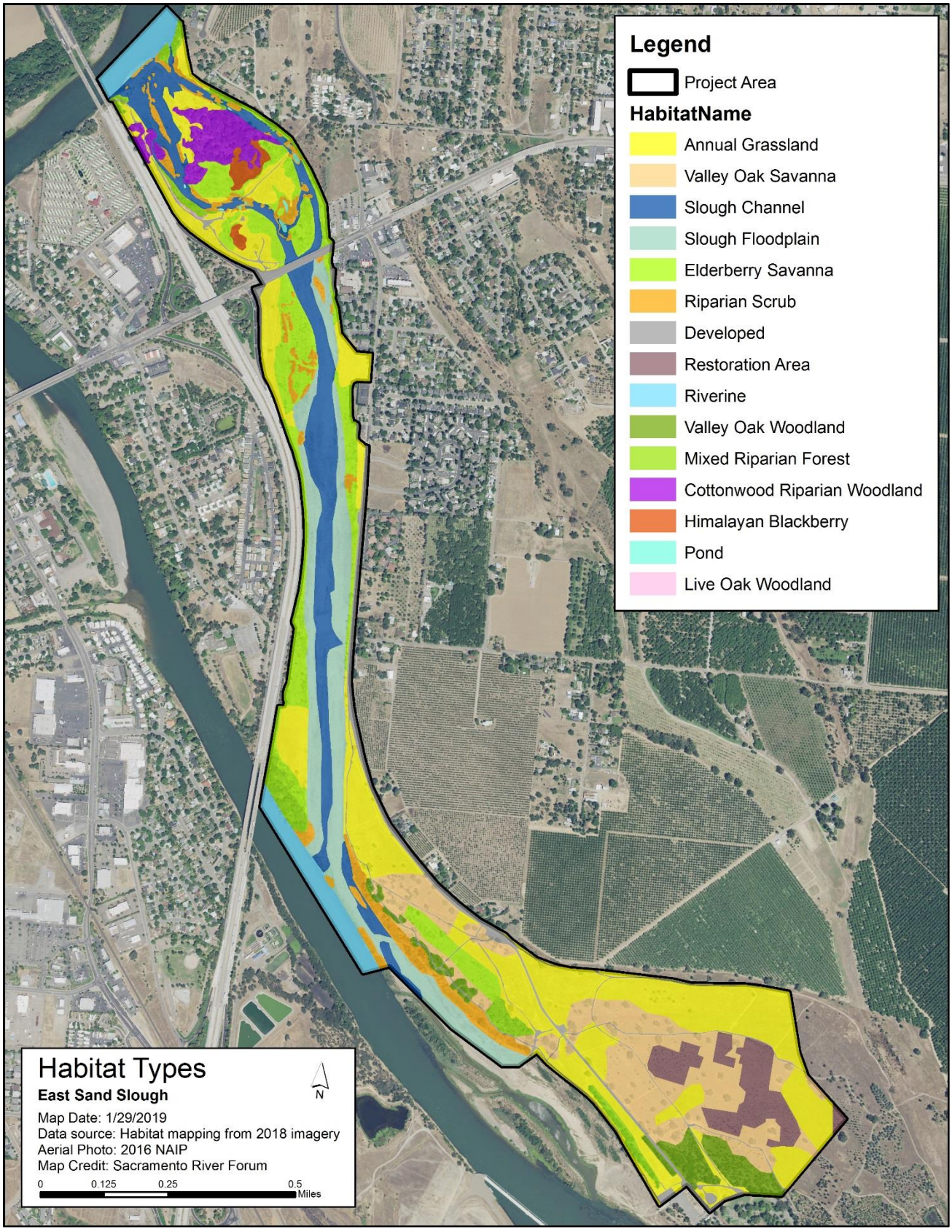


Figure 4. Distribution of Habitat Types within the Project Area

Annual Grassland

Approximately 101 acres of annual grassland is found within the project area. North of the Antelope Boulevard/Highway 36 Bridge, the understory of savannah and open forested areas is dominated by annual grassland. South of the Antelope Boulevard/Highway 36 Bridge, the grasslands dominate much of the upper floodplain of East Sand Slough and much of the southeast portion of the site. Dominant species are largely non-native and invasive grasses and forbs, including ripgut brome (*Bromus diandrus*), common soft-brome (*Bromus hordaceus*), wild oats (*Avena barbata*), black mustard (*Brassica nigra*), red brome (*Bromus madritensis* ssp. *rubens*), smooth cat's ear (*Hypochaeris glabra*), Italian rye grass (*Festuca perennis*), field mustard (*Brassica rapa*), and yellow starthistle (*Centaurea solstitialis*). Native herbs are less commonly found and include Oregon western rosinweed (*Calycadenia truncata*), naked buckwheat (*Eriogonum nudum*), rayless goldenaster (*Heterotheca oregona*), telegraphweed (*Heterotheca grandiflora*), rough-node bastard-sage (*Eriogonum wrightii* var *trachygonum*), wand buckwheat (*Eriogonum roseum*), sacred thorn-apple (*Datura wrightii*), winecup clarkia (*Clarkia purpurea*), Spanish clover (*Acmispon americanus*), and foothill deervetch (*Acmispon brachycarpus*).

Wildlife species observed during biological surveys within this habitat type include red fox (*Vulpes vulpes*), coyote, California ground squirrel, black-tailed jackrabbit (*Lepus californicus*), gopher snake (*Pituophis catenifer*), western fence lizard, and western skink (*Plestiodon skiltonianus*)

Slough Floodplain

Approximately 41 acres of slough floodplain habitat borders East Sand Slough's main channel. This area receives periodic flood deposits of silts and sandy soils and supports a dense assemblage of weedy annual grasses, primarily ripgut brome (*Bromus diandrus*). Field mustard (*Brassica rapa*) and black mustard (Brassica nigra) are dominant members of this vegetation. Patches of yellow starthistle (*Centaurea solstitialis*) are found in areas. Higher on the floodplain edges are scattered shrubs including blue elderberry (*Sambucus nigra* subsp. *caerulea*), arroyo willow (*Salix lasiolepis*), Himalayan blackberry (*Rubus armeniacus*) and giant reed (*Arundo donax*).

No wildlife species were observed within this habitat type during biological surveys, but raccoon (*Procyon lotor*) tracks are present.

Elderberry Savanna

Approximately 39 acres of elderberry savanna are found along the middle and upper terrace of the slough. This habitat type appears to be a successional regrowth in areas that had supported valley oak woodland and riparian woodlands but were burned in the 2013 fire. Blue elderberry (*Sambucus nigra* subsp. *caerulea*) is dominant in the shrub canopy, along with scattered young trees and shrubs such as box elder (*Acer negundo*), Oregon ash (*Fraxinus latifolia*), arroyo willow (*Salix lasiolepis*), red willow (*Salix laevigata*), black locust (*Robinia pseudoacacia*), interior live oak (*Quercus wislizeni*) and tree of heaven (*Ailanthus altissima*). The understory is typically composed of non-native annual grasses including ripgut brome (*Bromus diandrus*) with scattered forbs such as common hedge parsley (*Torillis arvensis*), Himalayan blackberry (*Rubus armeniacus*), California yerba santa (*Eriodictyon californicum*), mugwort (*Artemisia californica*), California rose (*Rosa californica*) and milk thistle (*Silybum marianum*).

Wildlife species observed during biological surveys within this habitat type include coyote, mule deer (*Odocoileus hemionus*), gopher snake, and western skink.

Valley Oak Woodland Classification

Valley Oak Woodland (CWHR Class) is known to provide food and cover for many wildlife species. Common bird species found in oak woodlands include European starling (Sturnus vulgaris), California quail (Callipepla californica), oak titmouse (Baeolophus inornatus), western scrub jay (Aphelocoma californica), rufous-sided towhee (Pipilo erythrophthalmus), Bewick's wren (Thryomanes bewickii), bushtit (Psaltriparis minimus), and acorn woodpecker (Melanerpes formicivorus). Common mammal species found in these habitats include foxes, western gray squirrels (Sciurus griseus), and mule deer (California Department of Fish and Wildlife 2019). The valley oak woodland classification was differentiated into three distinct habitat types based on the associated vegetation communities in the Project area: valley oak savanna, restoration area, and valley oak woodland. These habitat types are described below.

Valley Oak Savanna

Approximately 48 acres of valley oak savanna is found within the southeast portion of the site. The vegetation consists of widely scattered valley oaks (*Quercus lobata*) interspersed with annual grassland. The herbaceous cover is typically weedy annual grasses and forbs found in the surrounding grassland. Many of the valley oaks in the southern portion of the project area are older trees with large canopies providing partial shade for forbs such as amsinckia (*Amsinckia menziesii*), hairy vetch (*Vicia villosa*), sacred thorn-apple (*Datura wrightii*) and blue elderberry shrubs (*Sambucus nigra* subsp. *caerulea*).

Wildlife species observed during biological surveys within this habitat type include California ground squirrel and gopher snake.

Restoration Area

The US Forest Service has been actively restoring woodland habitat on approximately 16 acres of land in the Red Bluff Recreation Area. These restoration sites are in annual grassland and valley oak savanna areas. The species planted are typically native trees and shrubs including ponderosa pine (*Pinus ponderosa*), coffeeberry (*Frangula californica*), California buckeye (*Aesculus californica*), and western redbud (*Cercis occidentalis*), and blue elderberry (*Sambucus nigra* subsp. *caerulea*).

Wildlife species observed during biological surveys within this habitat type include mule deer and black-tailed jackrabbit.

Valley Oak Woodland

Approximately 13 acres of valley oak woodland is scattered on higher terraces adjacent to riparian scrub habitats near the Sacramento River in the southern end of the project area. The canopy is dominated by scattered valley oaks (*Quercus lobata*) with an understory of non-native annual grasses, mugwort (*Artemesia douglasiana*), milk-thistle (*Silybum marianum*), and other forbs.

Wildlife species observed during biological surveys within this habitat type include mule deer.

Barren Classification

Barren (CWHR Class) can provide habitat for birds and reptiles depending on the structure of the non-vegetated substrate (California Department of Fish and Wildlife 2019). The barren classification was

differentiated into three distinct habitat types based on the associated vegetation communities in the Project area: slough channel, developed, and pond. These habitat types are described below.

Slough Channel

Approximately 42 acres of slough channel habitat is found within the project area. East Sand Slough is designed to reduce flooding in Red Bluff by redirecting Sacramento River flood flows. The slough is activated at about 20,000 cfs at the Bend gage. These flood flows have created a high flow channel around 380 feet wide through much of its length south of the Antelope Boulevard/Highway 36 Bridge. Periodic flood flows scour vegetation and deposit cobbles, sand, and silts along its length. As flood flows recede, muddy areas and temporary pools remain. These temporary pools strand fish. The California Department of Fish and Wildlife (CDFW) periodically conducts fish rescues in these pools. In April 2018, the slough was activated for two days and within that timeframe, 3300 juvenile salmonids were rescued by CDFW from the pools in the Slough.

The vegetation along the slough is sparse in areas with bare cobbles and sand bars. Areas with deeper soils support a variety of native and non-native plants including sandbar willow (*Salix exigua*), German knotgrass (*Scleranthus annuus),* clammyweed (*Polanisia dodecandra* ssp. *trachysperma*), curvepod yellowcress (*Rorippa curvisiliqua*), flatsedges (*Cyperus* sp.), leontodon (*Leontodon saxatillis*), cocklebur (*Xanthium strumarium*), stalked popcornflower (*Plagiobothrys stipitatus* ssp. *micranthus*), field mustard (*Brassica rapa*), curled dock (*Rumex crispus*), ripgut brome (*Bromus diandrus*), slender wild oat (*Avena barbata*), perennial ryegrass (*Festuca perennis*), and wild oat (*Avena fatua*).

Near the north of the main channel, the bare cobbles and sandy areas support a sparse community of herbs and scattered willows. Flaccid cryptantha (*Cryptantha flaccida*), was found in these areas which indicates suitability for the Stoney Creek spurge (*Euphorbia ocellata* ssp. *rattanii*).

Developed

Approximately 18 acres of the Project area is classified as developed. Developed areas include paved and unpaved roads, parking areas, boat ramps, walking trails, facilities. The developed habitat type also includes disturbed lands such as compacted soils supporting sparse vegetation such as historic gravel operation areas. Much of this habitat type is in the Red Bluff Recreation Area. Vegetation in these areas typically consists of ruderal or weedy annual plants or horticultural plantings.

Wildlife species observed during biological surveys within this habitat type include nesting cliff swallows under the Antelope Boulevard/Highway 36 Bridge and the raccoon. Bat guano was also observed under the Antelope Boulevard/Highway 36 Bridge.

Ponds

Eight perennial ponds are scattered along the existing channel where scouring has formed low areas that may be contiguous with the groundwater as indicated by their low temperatures and perennial nature. These ponds are located north of Antelope Boulevard. A variety of perennial aquatic species were found in these ponds, including creeping water-primrose (*Ludwigia peploides*), Brazilian waterweed (*Egeria densa*), crisp-leaved pondweed (*Potamogeton crispus*), sedges, rushes, and algae.

Wildlife seen in the ponded areas included a variety of birds. American bullfrogs (*Lithobates catesbeianus*) and bluegill (*Lepomis macrochirus*) are abundant in the permanently ponded areas. Red-eared sliders (*Trachemys scripta* ssp. *elegans*) and American beaver (*Castor canadensis*) occur in two of the largest ponds.

Valley Foothill Riparian Classification

Valley Foothill Riparian (CWHR Class) is known to provide food, water, migration and dispersal corridors, cover, nesting, and thermal cover for many wildlife species (California Department of Fish and Wildlife 2019). A study on the Sacramento River within 0.3 mile of the Project area found 147 bird species as nesters or winter visitants (Laymon 1984). About 55 species of mammals are known to use California's Central Valley riparian communities (Trapp et al. 1984). The valley foothill riparian classification was differentiated into four distinct habitat types based on the associated vegetation communities in the Project area: riparian scrub, mixed riparian forest, cottonwood riparian forest, and Himalayan blackberry. These habitat types are described below.

Riparian Scrub

Approximately 18 acres of riparian scrub is found primarily along the inlet channels north of the Antelope Boulevard/Highway 36 Bridge and along the upper bank of the Sacramento River south of the channel outlet. Dominant shrub species include sandbar willow (*Salix exigua*) which forms scattered thickets in sandy and cobbly soils.

Wildlife species observed during biological surveys within this habitat type include coyote, mule deer, raccoon, and Sierran chorus frog (*Pseudacris sierra*).

Mixed Riparian Forest

Approximately 12 acres of mixed riparian forest found is found adjacent to the Sacramento River at the north end and south end of the slough. Dominant trees include Northern California black walnut (*Juglans californica* var. *hindsii*), box elder (*Acer negundo* var. *californicum*), red willow (*Salix laevigata*), western sycamore (*Platanus recemosa*), Oregon ash (*Fraxinus latifolia*) and Gooding's willow (*Salix gooddingii*). The herbaceous layer varies from weedy annual grasses and forbs to dense thickets of small trees with openings of Santa Barbara sedge (*Carex barbarae*), California mugwort (*Artemisia doublasiana*), California wild rose (*Rosa californica*) and Himalayan blackberry (*Rubus armeniacus*).

Wildlife species observed during biological surveys within this habitat type include mule deer, raccoon, and Sierran chorus frog.

Cottonwood Riparian Woodland

Approximately 11 acres of cottonwood riparian woodland is found in patches north of Antelope Boulevard that did not burn in the 2013 fire. This habitat type is dominated by Fremont cottonwood (*Populus fremontii*) with scattered western sycamore (*Platanus recemosa*) found in wetter soils. The understory is open with scattered shrubs and young trees including box elder (*Acer negundo*), Oregon ash (*Fraxinus latifolia*), northern California walnut (*Juglans hindsii*), arroyo willow (*Salix lasiolepis*), red willow (*Salix laevigata*), Gooding's willow (*Salix gooddingii*), blue elderberry (*Sambucus nigra* subsp. *caerulea*), and Himalayan blackberry (*Rubus armeniacus*). The shrub layer consists largely of annual grasses and non-native forbs such as poison hemlock (*Conium maculatum*). Some intact patches of Santa Barbara sedge (*Carex barbarae*) are found in areas.

Himalayan Blackberry

Two large patches of Himalayan blackberry (*Rubus armeniacus*) occupy nearly 3 acres of land north of Antelope Boulevard. These areas appear to be depressional wetlands. The high availability of moisture

and open canopy allows blackberry to cover contiguous patches and vigorously compete with nearby shrubs such as willows and blue elderberry.

Riverine Classification

Riverine (CWHR Class) provides resting and escape cover for many species of waterfowl, and foraging habitat for insectivorous and piscivorous bird species. Waterfowl and shorebirds also forage near the shore. Common mammals associated with riverine habitats include northern river otter (*Lontra canadensis*), American mink (*Mustela vison*), common muskrat (*Ondatra zibethicus*), and American beaver (California Department of Fish and Wildlife 2019). The riverine classification was not further differentiated

The Project area includes approximately 15 acres of riverine habitat (i.e. the Sacramento River) at the north and south end of the proposed channel alignment. The Sacramento River is designated as essential fish habitat (EFH) for chinook salmon.

Bird species detected during avian monitoring that are associated with riverine habitat include mallard (*Anys platyrhynchos*), great blue heron (*Ardea herodias*), green heron (*Butorides virescens*), and osprey (*Pandion haliaetus*).

Blue Oak-Foothill Pine

Blue-Oak Foothill Pine (CWHR Class) provides breeding habitat for numerous amphibian, reptile, bird, and mammal species. The blue-oak foothill pine classification was differentiated into a live oak woodland habitat type to better describe the vegetation community that exists within the Project area. This habitat type is described below.

Live Oak Woodland

A small live oak woodland is situated on the upper terrace adjacent to the secondary channel north of the Antelope bridge. The woodland is composed of several large oak trees which were initially identified as interior live oak (*Quercus wislizeni* var. *wislizeni*). But identification is difficult due to conflicting plant characteristics. Interior live oak populations in northern California show genetic evidence of considerable introgression with coast live oak *Quercus agrifolia* (Brophy and Parnell 1974). These trees may be hybrids or possibly they are *Quercus agrifolia* planted during the Interstate 5 construction.

No wildlife species were observed within this habitat type during biological surveys.

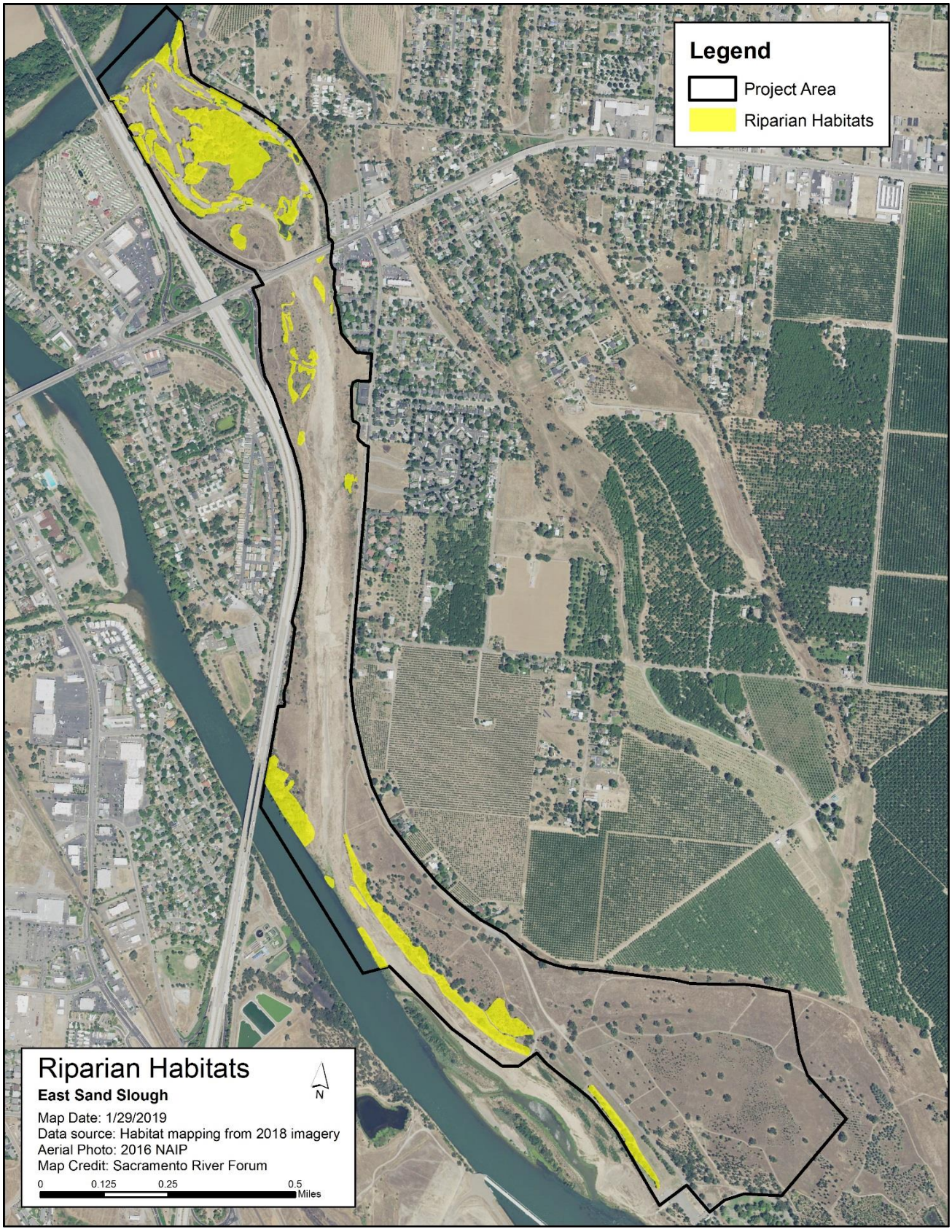


Figure 5. Distribution of Riparian Habitats within the Project Area

Invasive Plants

A variety of non-native and invasive plants have been documented within the East Sand Slough project area. Table 4 lists each non-native plant that has both a prevalence within the area and is either rated by the California Invasive Plant Council (CAL-IPC) or is of management concern. The Tehama Resource Conservation District (TRCD) prepared a weed management plan that coincides with the project area (TRCD 2016). Weed management efforts have been implemented in the last decade by various groups including the Tehama County RCD primarily in the northern half of the project area. The US Forest Service has also implemented weed abatement efforts in the Red Bluff Recreation Area. Field surveys in 2018 and 2019 found dead and partially killed patches of *Ailanthus altissima*, *Arundo donax*, *Cortaderia selloana*, and *Rubus armeniacus*. Abatement efforts appear to have been successful in eliminating almost all *Catalpa speciosa* within the project area.

Table 3. Invasive Plants Observed within the Project Area

Species	**Common Name**	**Location within the Project Area**	**Cal-IPC Invasive Species Rating**	**Prevalence in the Project Area**	**Control Options***
Ailanthus altissima	Tree of Heaven	uplands	Moderate	Moderate	Herbicide & Manual/mechanical removal
Arundo donax	Giant Reed	slough edges	High	Moderate	Herbicide & Manual/mechanical removal
Avena fatua	Wild Oat	grassland	Moderate	High	No Treatment Proposed
Brassica nigra	Black Mustard	throughout slough bench	Moderate	High	No Treatment Proposed
Brassica rapa	Field Mustard	throughout slough bench	Limited	Moderate	No Treatment Proposed
Bromus diandrus	Great Brome	grassland	Moderate	High	No Treatment Proposed
Bromus hordeaceus	Soft Chess	grassland	Limited	High	No Treatment Proposed
Bromus madritensis ssp. *rubens*	Red Brome	grassland	High		No Treatment Proposed
Carduus pycnocephalus	Italian Thistle	grassland, slough edges	Moderate	Low	No Treatment Proposed
Catalpa speciosa	Northern Catalpa	riparian forest, slough edges	Not rated	Low	Herbicide & Manual/mechanical removal
Centaurea solstitialis	Yellow Starthistle	slough edges, uplands	High	High	Herbicide Manual/mechanical removal & Biological control

Conium maculatum	Poison Hemlock	riparian forest	Moderate	High	No Treatment Proposed
Convolvulus arvensis	Field Bindweed	slough bottom and edges	Not rated	Low	No Treatment Proposed
Cortaderia selloana	Pampas Grass	slough edges	High		Herbicide & Manual/mechanical removal
Ficus carica	Common Fig	riparian forest, wetlands	Moderate	Low	No Treatment Proposed
Hirschfeldia incana	Shortpod Mustard	grassland	Moderate	Moderate	No Treatment Proposed
Hordeum murinum	Wall Barley	grassland	Moderate	High	No Treatment Proposed
Hypericum perforatum	Common St. John's-Wort	grasslands, riparian edges	Limited	Moderate	No Treatment Proposed
Hypochaeris glabra	Smooth Cat's Ear	grassland	Limited	High	No Treatment Proposed
Lepidium latifolium	Broadleaved Pepperweed	slough edges, wetlands	High	Scattered	No Treatment Proposed
Robinia pseudoacacia	Black Locust	uplands	Limited	Moderate	Herbicide & Manual/mechanical removal
Rubus armeniacus	Himalayan Blackberry	wetlands, riparian forest, slough edges	High	Moderate	Herbicide & Manual/mechanical removal & Animal control
Secale cereal	Rye	uplands	Not rated	Moderate	No Treatment Proposed
Sesbania punicea	Rattlebox, Scarlet Wisteria	slough edges, wetlands	High	Low	No Treatment Proposed
Stipa miliacea var. miliacea	Smilo-grass	savanna/grassland	Limited	High	No Treatment Proposed
Silybum marianum	Milk Thistle	savanna/grassland	Limited	Low	No Treatment Proposed
Torilis arvensis	Hedgeparsley	savanna/grassland	Moderate	High	No Treatment Proposed
Tribulus terrestris	Puncture Vine	uplands	Limited	Low	No Treatment Proposed
Verbena bonariensis	Tall Vervain	slough edges, wetlands	Watch	Low	No Treatment Proposed

*Control options proposed in the 2016 TRCD management plan. **Control options proposed in this document.

Special-Status Species Assessment

This section discusses 56 special-status species that were found to have some likelihood of occurring within the Project area. The likelihood of occurrence for each species was determined by examining the proximity to known occurrences and by the availability of suitable habitat within the project area. Minimization and avoidance and measures are proposed for those species with an occurrence likelihood of moderate or high.

The species list provided in Table 3 was generated in part by a query of the California Natural Diversity Database (CNDDB 2018) of all species within 9 USGS quadrangles around the project area (Appendix F) and by querying IPaC (Appendix G, USFWS 2018). Additional species known to be in the vicinity but not within the CNDDB query were also included.

The listing status of each species is given as follows: CESA refers to the California Endangered Species Act listing; ESA refers to the federal Endangered Species Act listing status; CNPS listing reflects the California Native Plant Society Rare Plant Program status; CDFW refers to California Department of Fish and Wildlife; SSC refers to Species of Special Concern; FPS refers to Fully Protected Species.

Table 4. Special-Status Species Known to Occur or Likely to Occur within the Project Area

Species	Common Name	Listing Status	Likelihood of Occurrence
Mammals			
Antrozous pallidus	Pallid Bat	CDFW: SSC	**Moderate**. Open habitats and surrounding woodland are suitable for this species.
Corynorhinus townsendii	Townsend's Big-Eared Bat	CDFW: SSC	**Moderate**. Riparian habitat may provide suitable foraging habitat.
Eumops perotis californicus	Western Mastiff Bat	CDFW: SSC	**Low**. Limited number of occurrences near the Project area and lack of suitable roosting habitat.
Lasiurus blossevillii	Western Red Bat	CDFW: SSC	**High**. Previous occurrence within Project area and suitable roost trees and foraging habitat are available throughout the Project area.
Birds			
Agelaius tricolor	Tricolored Blackbird	CESA: Candidate Endangered, CDFW: SSC	**Low**. Lack of suitable breeding habitat and not detected during surveys.
Athene cunicularia	Burrowing Owl	CDFW: SSC	**Moderate**. Project area is in close proximity to known populations and potentially suitable habitat is available.
Buteo swainsoni	Swainson's Hawk	CESA: Threatened	**High**. This species was observed during surveys and potentially suitable foraging and nesting habitat is available throughout the Project area.

Species	Common Name	Listing Status	Likelihood of Occurrence
Coccyzus americanus occidentalis	Western Yellow-Billed Cuckoo	ESA: Threatened, CESA: Endangered	**Low**. Lack of suitable riparian habitat patches.
Elanus leucurus	White-Tailed Kite	CDFW: FP	**High**. Availability of suitable habitat and the proximity to known occurrences.
Haliaeetus leucocephalus	Bald Eagle	ESA: Delisted, CESA: Endangered, CDFW: FP	**Moderate**. Not observed during surveys, but potentially suitable habitat in proximity to the Sacramento River exists.
Icteria virens	Yellow-Breasted Chat	CDFW: SSC	**High**. Project area is in close proximity to known occurrences and forested areas provide suitable habitat.
Pandion haliaetus	Osprey	CDFW: WL	**High**. Observed during surveys. Project area provides suitable foraging habitat.
Riparia riparia	Bank Swallow	CESA: Threatened	**High**. Numerous occurrences near the Project area and suitable breeding habitat exists throughout Project area.
Setophaga petechia	Yellow Warbler	CDFW: SSC	**Low**. Known distribution now restricted to Southern California.
Vireo bellii pusillus	Least Bell's Vireo	ESA: Endangered, CESA: Endangered	**High**. This species was observed during surveys and potentially suitable foraging and nesting habitat is available throughout the Project area.
Reptiles			
Actinemys marmorata	Western Pond Turtle	CDFW: SSC	**Moderate**. Presence of nearby populations and suitable habitat within Project area.
Thamnophis gigas	Giant Garter Snake	ESA: Threatened, CESA: Threatened	**Low**. Suitable habitat is not present in the Project area or surrounding area.
Amphibians			
Rana boylii	Foothill Yellow-Legged Frog	CESA: Candidate Threatened, CDFW: SSC	**Low**. Presence of predators in suitable habitat and distance to known populations.
Rana draytonii	California Red-Legged Frog	ESA: Threatened CDFW: SSC	**Low**. Presence of predators in suitable habitat, distance to known populations, and not observed during surveys.
Spea hammondii	Western Spadefoot	CDFW: SSC	**Moderate**. Known occurrences within two miles and potentially suitable habitat present.
Fish			

Species	Common Name	Listing Status	Likelihood of Occurrence
Acipenser medirostris	Green Sturgeon-Southern DPS	ESA: Threatened CDFW: SSC	**High**. The Project area is within a reach of the Sacramento River that is habitat for this species.
Lampetra ayresii	River Lamprey	CDFW: SSC	**High**. The Project area is within a reach of the Sacramento River that is habitat for this species.
Lampetra tridentata	Pacific Lamprey	CDFW: SSC	**High**. The Project area is within a reach of the Sacramento River that is habitat for this species.
Mylopharodon conocephalus	Hardhead	CDFW: SSC	**High**. The Project area is within a reach of the Sacramento River that is habitat for this species.
Oncorhynchus mykiss irideus	Steelhead - Central Valley Dps	ESA: Threatened	**High**. The Project area is within a reach of the Sacramento River that is habitat for this species.
Oncorhynchus tshawytscha	Chinook Salmon – Central Valley Fall/Late Fall-Run ESU	CDFW: SSC	**High.** The Project area is within a reach of the Sacramento River that is habitat for this species.
Oncorhynchus tshawytscha	Chinook Salmon - Sacramento River Winter-Run ESU	ESA: Endangered, CESA: Endangered	**High**. The Project area is within a reach of the Sacramento River that is habitat for this species.
Oncorhynchus tshawytscha	Chinook Salmon - Central Valley Spring-Run ESU	ESA: Threatened CESA: Threatened	**High**. The Project area is within a reach of the Sacramento River that is habitat for this species.
Pogonichthys macrolepidotus	Sacramento splittail	CDFW: SSC	**Low.** Suitable habitat is generally lacking in this reach of the Sacramento River.
Invertebrates			
Desmocerus californicus dimorphus	Valley Elderberry Longhorn Beetle	ESA: Threatened	**Low**. No suitable habitat within the Project area.
Branchinecta lynchi	Vernal Pool Fairy Shrimp	ESA: Threatened	**High**. Prior occurrence documented within Project area and suitable habitat available.
Lepidurus packardi	Vernal Pool Tadpole Shrimp	ESA: Endangered	**Low**. No suitable habitat within the Project area.
Plants			
Acmispon rubriflorus	Red-Flowered Bird's-Foot-Trefoil	CNPS: 1B.1	**Low**. Distance to known occurrences and not observed during surveys.
Agrostis hendersonii	Henderson's Bent Grass	CNPS: 3.2	**Moderate**. Not observed during surveys, but suitable habitat exists within the Project area.
Astragalus pauperculus	Depauperate Milk-Vetch	CNPS: 4.3	**Moderate**. Not observed during surveys, but suitable habitat exists within the Project area.

Species	Common Name	Listing Status	Likelihood of Occurrence
Cypripedium montanum	Mountain Lady's-Slipper	CNPS: 4.2	**Low**. Lack of suitable habitat and not observed during surveys.
Cryptantha crinita	Silky Cryptantha	CNPS: 1B.2	**High**. Proximity to known populations and availability of potentially suitable habitat.
Downingia pusilla	Dwarf Downingia	CNPS: 2B.2	**Low**. Not detected during surveys and lack of suitable habitat.
Erythranthe glaucescens	Shield-Bracted Monkeyflower	CNPS: 4.3	**High**. Availability of suitable habitat.
Eriogonum tripodum	Tripod Buckwheat	CNPS: 4.2	**Low**. Not detected during surveys and lack of suitable habitat.
Euphorbia ocellata ssp. *rattanii*	Stony Creek Spurge	CNPS: 1B.2	**High**. Presence of suitable habitat and proximity to known occurrences.
Fritillaria pluriflora	Adobe-Lily	CNPS: 1B.2	**Low**. Not detected during surveys and lack of suitable habitat.
Gratiola heterosepala	Boggs Lake Hedge-Hyssop	CESA: Endangered CNPS: 1B.2	**High**. Availability of suitable habitat.
Hemizonia congesta ssp. *calyculata*	Mendocino Tarplant	CNPS: 4.3	**Low**. Not detected during surveys and lack of suitable habitat.
Juncus leiospermus var. *ahartii*	Ahart's Dwarf Rush	CNPS: 1B.2	**Low**. Not detected during surveys and lack of suitable habitat.
Juncus leiospermus var. *leiospermus*	Red Bluff Dwarf Rush	CNPS: 1B.1	**High**. Availability of suitable habitat.
Legenere limosa	Legenere	CNPS: 1B.1	**High**. Availability of suitable habitat.
Limnanthes floccosa ssp. *floccosa*	Woolly Meadowfoam	CNPS: 4.2	**Moderate**. Availability of potentially suitable habitat.
Navarretia leucocephala ssp. *bakeri*	Baker's Navarretia	CNPS: 1B.1	**Low**. Not detected during surveys and lack of suitable habitat.
Navarretia heterandra	Tehama Navarretia	CNPS: 4.3	**Low**. Not detected during surveys and lack of suitable habitat.
Orcuttia tenuis	Slender Orcutt Grass	ESA: Threatened CESA: Endangered CNPS: 1B.1	**Low**. Not detected during surveys and lack of suitable habitat.

Species	Common Name	Listing Status	Likelihood of Occurrence
Paronychia ahartii	Ahart's Paronychia	CNPS: 1B.1	**Low**. Not detected during surveys and lack of suitable habitat.
Polygonum bidwelliae	Bidwell's Knotweed	CNPS: 4.3	**Low**. Not detected during surveys and lack of suitable habitat.
Sagittaria sanfordii	Sanford's Arrowhead	CNPS: 1B.2	**Moderate**. Availability of potentially suitable habitat.
Sidalcea celata	Redding Checkerbloom	CNPS: 3	**Moderate**. Availability of potentially suitable habitat.
Wolffia brasiliensis	Brazilian Watermeal	CNPS: 2B.3	**High**. Availability of suitable habitat.

Species Discussion

Acipenser medirostris **(Green Sturgeon)**

Listing Status - ESA: Threatened, CDFW Status: SSC

Green sturgeon typically enter the Sacramento River to spawn between February and March and are thought to select deeper holes with fast flowing water and coble sediment for spawning. Juveniles rear in fresh water for 1-2 years before migrating to the ocean where they mature into adults. The project is within a reach of the Sacramento River that is habitat for the North American Green Sturgeon Southern DPS of *Acipenser medirostris*. The Sacramento River provides spawning, adult holding, foraging, and juvenile rearing habitat for this species. A 1991 occurrence was documented within 800 feet of the project area, in the Sacramento River upstream of the Red Bluff Diversion Dam (USGS 2019). This species is considered to have a high likelihood of occurring within riverine habitats in the project area. The following measures are proposed to reduce project impacts to *Acipenser medirostris*:

- General Minimization and Avoidance Measures for Fish

Acmispon rubriflorus **(Red-Flowered Bird's-Foot-Trefoil)**

Listing Status - CNPS: 1B.1

Acmispon rubriflorus is an annual herb endemic to California known from four disjunct occurrences. The closest known occurrence to the project area is located 12.6 miles to the northeast on a volcanic plateau near Dale's Lake a grassland supporting vernal pools and swales. *Acmispon rubriflorus* was not detected during botanical surveys and was determined to have a low likelihood of occurring within the project area (Appendix A).

Actinemys marmorata **(Western Pond Turtle)**

Listing Status - CDFW: SSC

This western pond turtle inhabits a wide range of waterbodies. Nest sites are typically on gentle slopes in compact soil from 10 to 1,300 feet from aquatic habitats. Overwintering sites are typically in upland habitat beyond the riparian zone, however aquatic environments such as mud bottoms, beneath undercut banks or logs, or in areas of emergent vegetation may be used for overwintering sites. This species may be inactive in the winter or active throughout the year depending on environmental conditions. This species was not seen during pre-project surveys despite the presence of suitable

habitat in the northern portion of the project. Red-eared sliders (*Trachemys scripta elegans*) was observed in ponds within the site which would be suitable for western pond turtles. Due to the presence of nearby populations and suitable habitat, this species is considered to have a moderate likelihood of occurring onsite. The following measures are proposed to reduce project impacts to *Actinemys marmorata*:

- Specific Protection Measures for the Western Pond Turtle

Agelaius tricolor (Tricolored Blackbird)

Listing Status - CESA: Candidate Endangered, CDFW: SSC

The project site is within the species current range. Two colonies were found within 2 miles of the site on cattle grazed pasture supporting large thickets of blackberry and thistle (CNDDB 2018). Breeding colonies are generally found in the San Joaquin and southern Sacramento Valley in freshwater marshes with tall emergent vegetation. The habitats onsite are not typical of known breeding habitat. This species was not detected during site surveys and is considered to have a low likelihood of occurring within the project area.

Agrostis hendersonii (Henderson's Bent Grass)

Listing Status - CNPS: 3.2

Agrostis hendersonii is an annual grass native to California. It is found in mesic habitats in valley and foothill grassland and in vernal pools. The closest known occurrence to the project area is located 5.5 miles to the northeast. Several low areas and temporary pools within the main channel are subject to periodic inundation followed by gradual soil dry-down may be analogous to nearby vernal pool habitats, which may be suitable habitat for this species. *Agrostis hendersonii* was not detected during surveys but due to availability of suitable habitat, this species was determined to have a moderate likelihood of occurring within the project area (Appendix A).

Antrozous pallidus (Pallid Bat)

Listing Status - CDFW: SSC

The pallid bat can be locally common in low elevations throughout much of California. A wide variety of habitats are occupied including grasslands, shrublands, woodlands. The species is most common in open, dry habitats with adequate roost sites; caves, mines and occasionally hollow trees and buildings. Evidence of bat roosting was observed within and beneath the bents of the Antelope Boulevard / Highway 36 Bridge; these structures may provide suitable roosting habitat for the pallid bat. In addition, the open habitats and surrounding woodland are suitable habitat for this species. The availability of suitable habitat indicate that this species has a moderate likelihood of occurring within the project area. The following measures are proposed to reduce project impacts to *Antrozous pallidus*:

- Protective Measures During Removal of Trees that Provide Suitable Bat Roosting Habitat
- Establish Construction Avoidance Window during the Bat Maternity Season

Athene cunicularia (Burrowing Owl)

Listing Status – CESA: Threatened

Athene cunicularia is a small owl found throughout open landscapes in North and South America. This species was once common and locally abundant throughout much of California and Arizona. Breeding occurs in in open areas with mammal burrows in various open habitats including dry open rolling hills, grasslands, fallow fields, washes, arroyos, and human disturbed landscapes. In California, this species is a year-round resident, especially in the Central Valley. The breeding season in California is March to August but can begin as early as February and extent into December. In California, nests and roost burrows are most commonly dug by ground squirrels such as *Spermophilus beecheyi* (Shuford 2008). In

the southern portion of the project site, large areas of annual grassland show signs of burrowing mammal activity that could provide suitable habitat for Burrowing Owls. The proximity to known populations and the availability of potentially suitable habitat indicate that this species has a moderate likelihood of occurring within the project site. The following measures (CDFW 2012) are proposed to reduce project impacts to *Athene cunicularia*.

- Specific Protection Measures for Burrowing Owls

Astragalus pauperculus (Depauperate Milk-Vetch)

Listing Status - CNPS: 4.3

Astragalus pauperculus is an annual herb endemic to California. It occurs in vernally mesic and volcanic habitats in chaparral, cismontane woodland, and valley and foothill grassland. This species was not detected during surveys but was determined to have a moderate likelihood of occurring within the project area (Appendix A).

Branchinecta lynchi (Vernal Pool Fairy Shrimp)

Listing Status - ESA: Threatened

Branchinecta lynchi inhabit vernal pools and vernal pool-like habitats. No vernal pools, vernal swales or similar ephemeral aquatic habitats were found within the site. The pools along the channel were evaluated briefly for the presence of invertebrates. The perennial pools along the channel bottom do not appear suitable to support this species. Within temporary pools, invertebrate species were exceedingly rare, and it is likely that the rapid draining of these pools and abiotic conditions would prevent *Branchinecta lynchi* from establishing. This species is considered to have a low likelihood of occurring within the project area.

Buteo swainsoni (Swainson's Hawk)

Listing Status - CESA: Threatened

Swainson's Hawk utilize open habitats for foraging such as grasslands, agricultural fields and pastures. Scattered trees near foraging areas are utilized for nesting sites. This species was observed flying through the project area during avian surveys (Appendix B). Potentially suitable foraging and nesting habitat is available throughout the project area. This species is considered to have a high likelihood of occurring within the site. The following measures are proposed to reduce project impacts to *Buteo swainsoni*:

- Specific Protection Measures for Swainson's Hawk
- General Protection Measures for Birds
- Pre-Construction Surveys for Nesting Migratory Bird Treaty Act Species
- Pre-Construction Surveys for Nesting Raptors, including the White-Tailed Kite

Coccyzus americanus occidentalis (Western Yellow-Billed Cuckoo)

Listing Status - ESA: Threatened, CESA: Endangered

Several observations of this species are located along the Sacramento River approximately 2.5 miles of the project area (USGS 2019, CNDDB 2018). Critical habitat has been proposed for the Sacramento River Corridor (Federal Register: 79 FR 48547) and its northern extent is within 2.5 miles of the project area.

WYBC prefer dense riparian thickets with low-level foliage near slow-moving water sources. Nest are typically constructed in willows. Yellow-billed cuckoos typically forage by gleaning large insects. Foraging occurs extensively in cottonwood riparian habitat (Hughes 1999). Laymon and Halterman (1989) proposed that optimum habitat patches for the western yellow-billed cuckoo are greater than 200 acres in size and wider than 1,950 feet; sites 101 to 200 acres in size and wider than 650 feet were

suitable; sites 50 to 100 acres in size and 325 to 65 feet were marginal; while sites with smaller habitat patches were defined as unsuitable.

A total of approximately 43 acres of riparian vegetation occurs within the project area (see Figure 5). These riparian habitats include willow dominated riparian scrub, Fremont cottonwood forest, and valley oak mixed riparian woodland and forest. These habitats are highly fragmented with the largest patch of riparian forest being nearly 7 acres in size with a fairly open understory and a steady human presence. The area and quality of riparian habitats within the site indicate that western yellow-billed cuckoo has a low likelihood of occurring within the site. The following measures are proposed to reduce project impacts to *Coccyzus americanus occidentalis*:

- General Protection Measures for Birds
- Pre-Construction Surveys for Nesting Migratory Bird Treaty Act Species.

Corynorhinus townsendii (*Townsend's Big-Eared Bat*)

Listing Status - CDFW: SSC

Townsend's big-eared bat is found throughout California but are considered uncommon in the state. The bat is most abundant in mesic habitats where is feeds of insects by gleaning from foliage along habitat edges. Maternity roots are found in caves, tunnels, mines, and buildings in relatively warm sites. These bats are at hibernacula from October to April. There are three recent observations of this species approximately 10 to 13 miles to the southeast along foothill streams, though there are few occurrences found in the region (CNDDB 2018). The suitability and availability of roosting habitat is uncertain. Nearby buildings may serve as roosting habitat. The riparian habitat within the site may provide suitable foraging habitat. This species is considered to have a moderate likelihood of occurring within the project area. The following measures are proposed to reduce project impacts to *Corynorhinus townsendii*:

- Protective Measures During Removal of Trees that Provide Suitable Bat Roosting Habitat
- Establish Construction Avoidance Window during the Bat Maternity Season

***Cryptantha crinita* (Silky Cryptantha)**

Listing Status - CNPS: 1B.2

Cryptantha crinita is found in intermittent stream gravel bars and streambeds in nearby tributaries of the Sacramento River. *Cryptantha flaccida*, a relative and associate species of *Cyrptantha crinita*, was found growing in cobble and sandy soils within the channel near the north end of the slough. The proximity to known populations and availability of potentially habitat indicates that *Cryptantha crinita* may occur within the project site. This species was not detected during botanical surveys, although suitable habitat was found. This species was considered to have a high likelihood of occurring within the project area (Appendix A). The following measures are proposed to reduce project impacts to *Cryptantha crinita*:

- General Measures to Protect Special-Status Species

***Cypripedium montanum* (Mountain Lady's-Slipper)**

Listing Status - CNPS: 4.2

Cypripedium montanum is a perennial herb native to California. It is found in broadleafed upland forest, cismontane woodland, lower montane coniferous forest and North Coast coniferous forest. This species was not detected during surveys and was determined to have a low likelihood of occurring within the project area (Appendix A).

***Desmocerus californicus dimorphus* (Valley Elderberry Longhorn Beetle)**

Listing Status - ESA: Threatened

Potential habitat for the valley elderberry longhorn beetle (VELB) is present within the project area. A total of 1,246 blue elderberry shrubs (*Sambucus nigra* subsp. *cerulea*) were located within the project area and about 150 shrubs were found adjacent to the project area (see Figure 6). An occurrence from 1987 is recorded at the north end of the project area, and several other occurrences are within five miles of the project area (CNDDB 2018). Elderberry shrubs occur within many of the upland habitats within the site. All elderberry shrubs within the site are considered potential habitat for the valley elderberry longhorn beetle, with riparian areas having a higher likelihood of occupancy. Due to the availability of suitable habitat, this species is considered to have a high likelihood of occurring within the project area. To reduce project impacts to *Desmocerus californicus dimorphus,* the following measures (USFWS 2017, USBR 2016) are proposed:

- Specific Protection Measures for Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*).

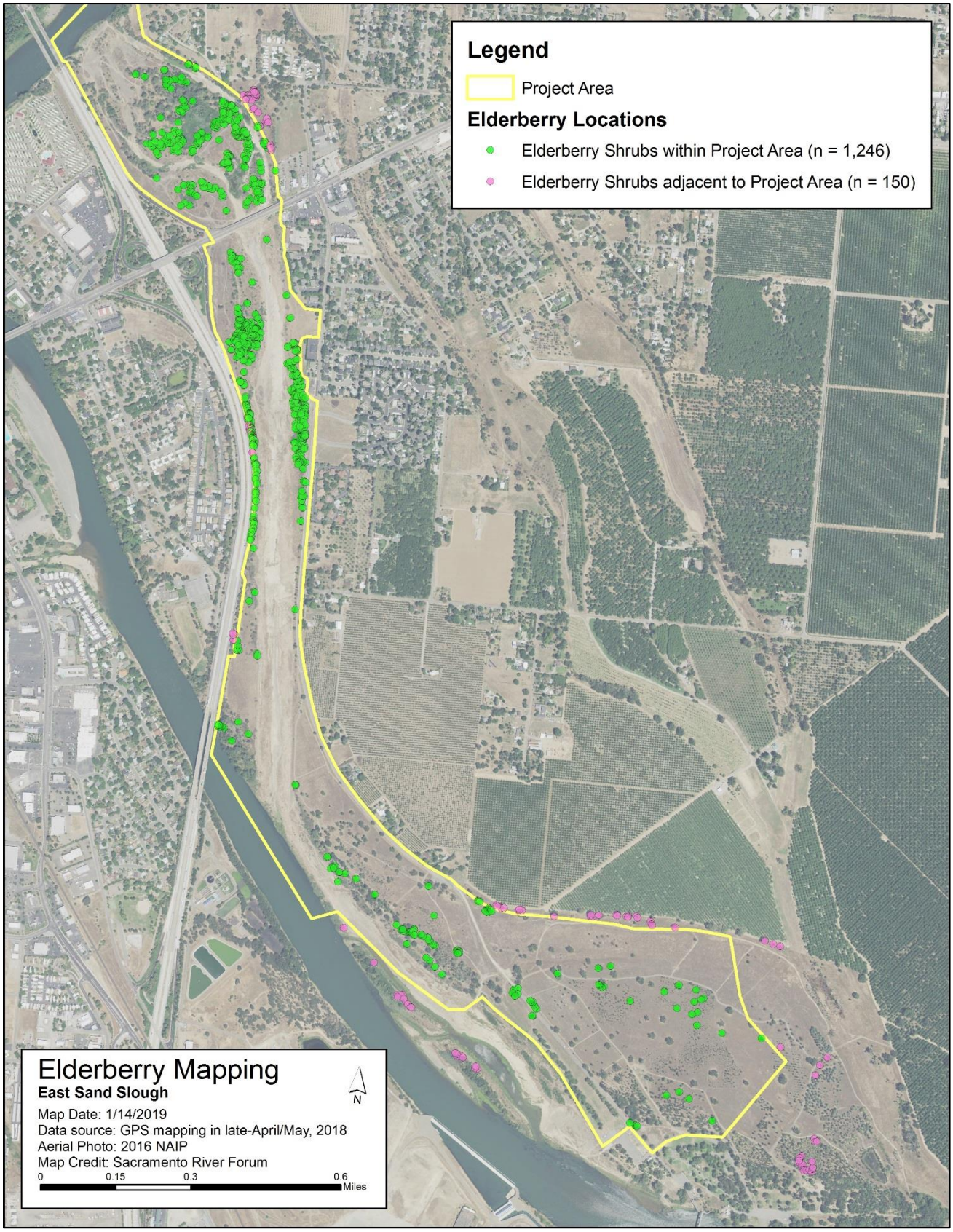


Figure 6. Elderberry Shrubs Mapped within and adjacent to the Project Area

Downingia pusilla (Dwarf Downingia)

Listing Status - CNPS: 2B.2

Downingia pusilla is an annual herb native to California that is found in vernal pools and roadside ditches in foothill woodland, valley grassland, freshwater wetlands, and wetland-riparian communities. Several occurrences are within 5 miles of the project in grassland supporting vernal pools and swales. Characteristic habitats for *Downingia pusilla* are not present within the project area, and the species was not detected during botanical surveys. Due to the lack of suitable habitat in the site, this species was determined to have a low likelihood of occurring within the project area (Appendix A).

Elanus leucurus (White-Tailed Kite)

Listing Status - CDFW: FP

The white-tailed kite is a small raptor found in western North America. It is found in the Central Valley. White-tailed kites feed primarily on rodents but will take other small prey. Nests are constructed in isolated trees. Occupied habitats include savannas, open woodlands, desert grasslands, partially cleared lands, and cultivated fields. Numerous observations of *E*. *leucurus* have been recorded immediately adjacent to the project area (eBird 2019). The availability of suitable habitat and the proximity to known sightings indicate that this species has a high likelihood of occurring within the project area. The following measures are proposed to reduce project impacts to *Elanus leucurus*:

- General Protection Measures for Birds
- Pre-Construction Surveys for Nesting Raptors, including the White-Tailed Kite

Eriogonum tripodum (Tripod Buckwheat)

Listing Status - CNPS: 4.2

Eriogonum tripodum is a shrub endemic to California. It occurs in chaparral and cismontane woodland, often in serpentinite soils. This species was not detected during surveys and was determined to have a low likelihood of occurring within the project area (Appendix A).

Erythranthe glaucescens (Shield-Bracted Monkeyflower)

Listing Status - CESA: Endangered, CNPS: 4.3

Erythranthe glaucescens is an annual herb endemic to California. This species is found along streambanks in valley and foothill grassland communities. It may also occur in intermittent stream gravel bars and streambeds in nearby tributaries to the Sacramento River. *Erythranthe glaucescens* was not detected during surveys but due to availability of suitable habitat, this species was determined to have a high likelihood of occurring within the project area (Appendix A). The following measures are proposed to reduce project impacts to *Erythranthe glaucescens*:

- General Measures to Protect Special-Status Species

Eumops perotis californicus (Western Mastiff Bat)

Listing Status - CDFW: SSC

The western mastiff bat is one of the largest bats in California. It is a colonial species that mates in the spring and gives birth to a single pup in the summer. They are thought to have extensive foraging ranges and feed on insects. This species is broadly distributed in southern California, although a handful of occurrences have been documented in Butte, Tehama, and Siskiyou counties. The closest known occurrence to the project area is located 2.4 miles to the southeast in the Butler Slough Ecological Reserve. Occupied habitats are varied. A limiting factor to its distribution is the availability of significant rock features suitable for roosting. Natural roosts are found under large slaps of granite, sandstone, basalt, and on cliff faces. These kind of slope and rock features are not present within the project area.

The limited number of occurrences and lack of suitable roosting habitat indicate that this species has a low likelihood of occurring within the project area.

Euphorbia ocellata ssp. *rattanii* (Stony Creek Spurge)

Listing Status - CNPS: 1B.2

Stony Creek spurge is an annual herb endemic to California. It is found primarily in Tehama, Glenn and Colusa counties. Habitats for this species include intermittent stream gravel bars and streambeds in nearby tributaries to the Sacramento River. This species was not detected during surveys, though suitable habitat conditions are present. Valley spurge (*Euphorbia ocellata* ssp. *ocellata*), a close relative of the rare Stony Creek spurge (*Euphorbia ocellata* ssp. *rattanii*) was found within the site. Due to the presence of suitable habitat and proximity to known occurrences this species was found to have a high likelihood of occurring within the project area (Appendix A). The following measures are proposed to reduce project impacts to *Euphorbia ocellata* ssp. *rattanii*:

- General Measures to Protect Special-Status Species

Fritillaria pluriflora (Adobe-Lily)

Listing Status - CNPS: 1B.2

This plant grows in adobe clay soils and is mainly limited to northern California. Adobe clay soils or similar clay outcrops do not occur within the project area. This species was not detected during surveys and was determined to have a low likelihood of occurring within the project area (Appendix A).

Gratiola heterosepala (Boggs Lake Hedge-Hyssop)

Listing Status - CESA: Endangered, CNPS: 1B.2

This species occurs along lake-margins, marshes, swamps and vernal pool edges on clay soils. Several low areas and temporary pools within the main channel are subject to periodic inundation followed by gradual soil dry-down may be analogous to nearby vernal pool habitats, which may be suitable habitat for this species. *Gratiola heterosepala* was not detected during surveys but due to availability of suitable habitat, this species was determined to have a high likelihood of occurring within the project area (Appendix A). The following measures are proposed to reduce project impacts to *Gratiola heterosepala*:

- General Measures to Protect Special-Status Species

Haliaeetus leucocephalus (Bald Eagle)

Listing Status - ESA: Delisted, CESA: Endangered, CDFW: Fully Protected Species

Nest sites have been documented within 2 miles of the project site (CNDDB 2018), and several sightings have been made within the project area (eBird 2019). However, no nests or individuals were seen during avian monitoring (Appendix B). The availability of large trees and snags within proximity of the Sacramento River indicate that this species is moderately likely to occur within the site. A qualified biologist shall conduct a pre-construction survey no less than 14 days prior to initiating ground disturbance activities. If an active bald eagle nest is found within 0.5 mile of the Project area, the following avoidance and mitigation measures are proposed for implementation:

- Specific Protection Measures for the Bald Eagle
- General Protection Measures for Birds

Hemizonia congesta ssp. *calyculata* (Mendocino Tarplant)

Listing Status - CNPS: 4.3

Hemizonia congesta ssp. *calyculata* is an annual herb endemic to California. It occurs in cismontane woodland and valley and foothill grassland. This species was not detected during surveys and was determined to have a low likelihood of occurring within the project area (Appendix A).

Icteria virens (Yellow-Breasted Chat)

Listing Status - CDFW: SSC

Icteria virens is a large songbird found in North America. Occupied habitats are thickets and other dense shrubby habitats. In California, breeding habitat requirements are dense riparian thickets of willows, vine tangles, and dense brush associated with streams, swampy ground and the edges of ponds (Small 1994). Foraging habitat is typically dense vegetation. Adults feed on insects and berries. Numerous occurrences of *Icteria virens* are located around the project area (eBird 2019), though avian monitoring has not located any individuals (Appendix B). Suitable habitat is available in the forested areas of the project site. This species is considered to have a high likelihood of occurring within the project site. To reduce impacts to *Icteria virens*, the following measures are proposed:

- General Protection Measures for Birds
- Pre-Construction Surveys for Nesting Migratory Bird Treaty Act Species

Juncus leiospermus var. *ahartii* (Ahart's Dwarf Rush)

Listing Status - CNPS: 1B.2

Juncus leiospermus var. *ahartii* is an annual herb endemic to California that is found in mesic microhabitats in valley and foothill grassland habitats. The only occurrence known in Tehama County is located one mile to the southwest in a grassland supporting vernal pools and vernal swales. This species was not detected during surveys and was determined to have a low likelihood of occurring within the project area (Appendix A).

Juncus leiospermus var. leiospermus (Red Bluff Dwarf Rush)

Listing Status - CNPS: 1B.1

Juncus leiospermus var. *leiospermus* is an annual herb endemic to California that is found in vernally mesic microhabitats in chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland, and vernal pool habitats. Several low areas and temporary pools within the main channel are subject to periodic inundation followed by gradual soil dry-down may be analogous to nearby vernal pool habitats, which may be suitable habitat for this species. Red Bluff dwarf rush was not detected during surveys but due to availability of potentially suitable habitat, this species was determined to have a high likelihood of occurring within the project area (Appendix A). The following measures are proposed to reduce project impacts to *Juncus leiospermus* var. *leiospermus*:

- General Measures to Protect Special-Status Species

Lampetra ayresii (River Lamprey)

Listing Status – CDFW: SSC

The Project area is within a reach of the Sacramento River that provides suitable migration habitat for upstream migrating adult and downstream migrating juvenile river lamprey but does not provide suitable spawning habitat. Riffle and side channel habitat are used for spawning and ammocoete (juvenile river lamprey) rearing. This species is considered to have a high likelihood of occurring within the Sacramento River adjacent to the Project area, and it is possible that during certain wet years the perennial ponds in East Sand Slough may provide suitable habitat for ammocoetes. The following measures are proposed to reduce project impacts to this species:

- Minimization and Avoidance Measures for Fish

Lampetra tridentata (Pacific Lamprey)

Listing Status – CDFW: SSC

The Project area is within a reach of the Sacramento River that provides suitable spawning habitat and a migration corridor for Pacific lamprey. This species is considered to have a high likelihood of occurring

within the Sacramento River adjacent to the Project area. The following measures are proposed to reduce project impacts to this species:

- Minimization and Avoidance Measures for Fish

Lasiurus blossevillii (Western Red Bat)

Listing Status - CDFW: SSC

Lasiurus blossevillii is locally common in some parts of California between Shasta County to the Mexican border and west of the Sierra Nevada / Cascade crets. Winter range includes western lowlands. Migration occurs between winter and summer ranges. Roosts are primarily in trees often in edge habitats adjacent to streams, fields, or urban areas. Preferred roost sites are protected above, open below, and located above dark groundcover. Foraging is typically along edges or habitat mosaics near roost trees and open areas. This species was observed within the southern end of the Project area in 1999 (CNDDB 2018). Suitable roost trees and foraging habitat is available throughout the project site. This species is considered to have a high probability of occurring within the site. The following measures are proposed to reduce project impacts to *Lasiurus blossevillii*:

- Protective Measures During Removal of Trees that Provide Suitable Bat Roosting Habitat
- Establish Construction Avoidance Window during the Bat Maternity Season

Legenere limosa (Legenere)

Listing Status - CNPS: 1B.1

Legenere limosa is an annual herb endemic to California that is found in vernal pools and similar habitats. Several low areas and temporary pools within the main channel are subject to periodic inundation followed by gradual soil dry-down may be analogous to nearby vernal pool habitats, that may be suitable habitat for this species. *Legenere limosa* was not detected during surveys but due to the availability of potentially suitable habitat it was determined to have a high likelihood of occurring within the project area (Appendix A). The following measures are proposed to reduce project impacts to *Legenere limosa*:

- General Measures to Protect Special-Status Species
- Minimization and Avoidance Measures for Plants

Lepidurus packardi (Vernal Pool Tadpole Shrimp)

Listing Status - ESA: Endangered

Lepidurus packardi inhabit vernal pools and vernal pool-like habitats. No vernal pools, vernal swales or similar ephemeral aquatic habitats were found within the site. The pools along the channel were evaluated briefly for invertebrates. The perennial pools along the channel bottom do not appear suitable to support this species. Within temporary pools, invertebrate species were exceedingly rare, and it is likely that the rapid draining of these pools would prevent *Lepidurus packardi* from establishing. This species is considered to have a low likelihood of occurring within the project area.

Limnanthes floccosa ssp. *floccosa* (Woolly Meadowfoam)

Listing Status - CNPS: 4.2

Wooly meadowfoam is an annual herb native to Oregon and California. Occupied microhabitats are vernally mesic and are typically in vernal pools, chaparral, cismontane woodland, valley and foothill grassland. The closest observations are three miles to the northeast toward the Tuscan Buttes. An isolated occurrence three miles to the southwest is in a grasslands vernal pool complex. The seasonally wet habitats in the bottom of East Sand Slough's channel north of Antelope Boulevard were found to be potentially suitable for wooly meadowfoam. This species was not detected during surveys but was

determined to have a moderate likelihood of occurring within the project area (Appendix A). The following measures are proposed to reduce project impacts to *Limnanthes floccosa* ssp. *floccosa*:

- General Measures to Protect Special-Status Species

Mylopharodon conocephalus (Hardhead)

Listing Status - CDFW: SSC

The Project area is within a reach of the Sacramento River that provides suitable habitat and a migration corridor to and from smaller tributary streams for hardhead. This species is considered to have a high likelihood of occurring within the Sacramento River adjacent to the Project area. The following measures are proposed to reduce project impacts to this species:

- Minimization and Avoidance Measures for Fish

Navarretia heterandra (Tehama Navarretia)

Listing Status - CNPS: 4.3

Navarretia heterandra is an annual herb native to California and Oregon. It occurs mesic habitats in valley and foothill grassland and in vernal pools. This species was not detected during surveys and was determined to have a low likelihood of occurring within the project area (Appendix A).

Navarretia leucocephala ssp. *bakeri* (Baker's Navarretia)

Listing Status - CNPS: 1B.1

Navarretia leucocephala ssp. *bakeri* is an annual herb endemic to California that is found in vernally mesic microhabitats in cismontane woodland, low coniferous forests, meadows and seeps, valley and foothill grassland, and vernal pool habitats. *Navarretia leucocephala* ssp. *bakeri* was not detected during surveys and was determined to have a low likelihood of occurring within the project area (Appendix A).

Oncorhynchus mykiss irideus (Steelhead - Central Valley DPS)

Listing Status - ESA: Threatened

The project is within a reach of the Sacramento River that is habitat for *Oncorhynchus mykiss irideus*. The Sacramento River provides spawning, adult holding, foraging, and juvenile rearing habitat for this species. This species is considered to have a high likelihood of occurring within the project area. The post-construction side channel is expected to provide a net benefit to the species and to the Central Valley DPS. The following measures are proposed to reduce project impacts to *Oncorhynchus mykiss irideus*:

- Minimization and Avoidance Measures for Fish
- Specific Protection Measures for Chinook Salmon

Oncorhynchus tshawytscha (Chinook Salmon - Sacramento River Winter-Run ESU)

Listing Status - ESA: Endangered, CESA: Endangered

The project is within a reach of the Sacramento River that is habitat for the Sacramento River Winter-Run ESU. The Sacramento River provides spawning, adult holding, foraging, and juvenile rearing habitat for *Oncorhynchus tshawytscha*. This species is considered to have a high likelihood of occurring within the project area. The following measures are proposed to reduce project impacts to *Oncorhynchus tshawytscha*:

- Minimization and Avoidance Measures for Fish
- Specific Protection Measures for Chinook Salmon

Oncorhynchus tshawytscha (Chinook Salmon - Central Valley Fall / Late Fall-Run ESU)

Listing Status - CDFW: SSC, USFWS: Sensitive
The project is within a reach of the Sacramento River that is habitat for the Central Valley fall / late fall-run ESU. The Sacramento River provides spawning, adult holding, foraging, and juvenile rearing habitat for *O. tshawytscha*. This species is considered to have a high likelihood of occurring within the Sacramento River adjacent to the Project area. The following measures are proposed to reduce project impacts to *Oncorhynchus tshawytscha*:

- Minimization and Avoidance Measures for Fish
- Specific Protection Measures for Chinook Salmon

***Oncorhynchus tshawytscha* (Chinook Salmon - Central Valley Spring-Run ESU)**
Listing Status - ESA: Threatened, CESA: Threatened
The project is within a reach of the Sacramento River that is habitat for the Central Valley spring-run ESU. The Sacramento River provides spawning, adult holding, foraging, and juvenile rearing habitat for this species. This species is considered to have a high likelihood of occurring within the Sacramento River adjacent to the Project area. The following measures are proposed to reduce project impacts to *Oncorhynchus tshawytscha*:

- Minimization and Avoidance Measures for Fish
- Specific Protection Measures for Chinook Salmon

***Orcuttia tenuis* (Slender Orcutt Grass)**
Listing Status - ESA: Threatened, CESA: Endangered, CNPS: 1B.1
Orcuttia tenuis is an annual grass endemic to California's Central Valley and Modoc Plateau regions. Occupied habitats are often gravelly vernal pools; however, it has been reported from other natural and artificial wetlands such as stock ponds and borrow pits. *Orcuttia tenuis* was not detected during surveys and was determined to have a low likelihood of occurring within the project area (Appendix A).

Pandion haliaetus (Osprey)
Listing Status - CDFW: WL
Pandion haliaetus have a worldwide distribution. They are migratory throughout most of their range, wintering in Central and South America. In California, Osprey arrive at nesting grounds in mid-March to early April. They feed primarily on fish but also take mammals, birds, reptiles, amphibians, and invertebrates. Large trees, snags, and dead-topped trees in open forest habitats are utilized for cover and nesting. *Pandion haliaetus* has been observed within the project area numerous times (Appendix B, eBird 2019). The numerous large trees and snags in proximity to the Sacramento River indicate that suitable habitat is present. This species is considered to have a high likelihood of occurring within the project area. The following measure is proposed to reduce project impacts to *Pandion haliaetus*:

- General Protection Measures for Birds
- Pre-Construction Surveys for Nesting Raptors, including the White-Tailed Kite

Paronychia ahartii (Ahart's Paronychia)
Listing Status - CNPS: 1B.1
Paronychia ahartii is an annual herb endemic to Northern California. It is found in Cismontane woodland, Valley and foothill grassland and Vernal pool habitats. Microhabitats are often vernally moist and on barren clay or thin rocky soils with low plant cover. *Paronychia ahartii* was not detected during surveys and was determined to have a low likelihood of occurring within the project area (Appendix A).

Pogonichthys macrolepidotus (Sacramento Splittail)
Listing Status - CDFW: SSC

Pogonichthys macrolepidotus occurs mostly in the San Francisco Bay Delta and lower Sacramento and San Joaquin rivers. Historically, this species was found throughout the Sacramento-San Joaquin River drainage. These fish feed on benthic invertebrates and detritus in areas with low to moderate currents. Rearing habitat is in brackish water in the San Francisco Estuary and on floodplain and river edge spawning habitats immediately above the estuary. This species is considered to have a low likelihood of occurring within the project area due to the current range of this species and lack of suitable habitat in the area.

Polygonum bidwelliae **(Bidwell's Knotweed)**

Listing Status - CNPS: 4.3

Polygonum bidwelliae is an annual herb endemic to California. It occurs in volcanic sites in chaparral, cismontane woodland, and valley and foothill grassland. This species was not detected during surveys and was determined to have a low likelihood of occurring within the project area (Appendix A).

Rana boylii **(Foothill Yellow-Legged Frog)**

Listing Status - CESA: Candidate Threatened, CDFW: SSC

Rana boylii is a small sized frog found in the foothills of the Sierra Nevada and the Cascade and Coast Ranges of Oregon and California. These frogs are found in or near rocky streams in a variety of habitats. Adults prey on aquatic and terrestrial invertebrates, while tadpoles are thought to graze on algae and diatoms along rocky stream bottoms. Within Northern California, *Rana boylii* is likely inactive or hibernating during the winter. Breeding and egg laying are usually following spring flooding, and usually commences from mid-March to May, depending on local water condition. Eggs clusters are attached to gravel or rocks in moving water near stream margins. This species was documented along the Sacramento River in this vicinity from between 1912 and 1928. Recent documented occurrences are located 20 miles to the east in the foothills of the Cascade Range (CNDDB 2018). Known predators include the American bullfrog (*Lithobates catesbeianus*) and sunfishes (Centrachidae). Bullfrog tadpoles and adults were found in all of the perennial ponds within the project area. Bluegills (*Lepomis macrochirus*), a type of sunfish, were found in three of the larger pools. The presence of these predators and distance to known populations indicate that *Rana boylii* has a low likelihood of occurring within the project area.

Rana draytonii **(California Red-Legged Frog)**

Listing Status - ESA: Threatened

The project is within the historic range of the California Red-Legged Frog (CRLF), although there are no known recent occurrences within the vicinity (CNDDB 2008). Dan Cordova, a USFWS approved biologist, conducted a habitat assessment for CRLF within the project area on October 2, 2018 (Appendix C). No adults or subadults were detected and the habitats onsite were found unsuitable for *Rana drytonii*. This species is considered to have a low likelihood of occurring within the project area.

Riparia riparia **(Bank Swallow)**

Listing Status - CESA: Threatened

Bank Swallows nest along the Sacramento River in recently eroded vertical cliffs or banks with friable soils. This species was detected within the site during avian surveys (Appendix B) though no evidence of breeding or nesting was observed. Foraging habitat is available over the Sacramento River and open habitats such as the savannah, riparian scrub, and the slough's grasslands. There are no vertical sandy banks in the project area that could be used by nesting colonies. This species is considered to have a high probability of occurring within the project area. The following measure is proposed to reduce project impacts to *Riparia riparia*:

- General Protection Measures for Birds
- Pre-Construction Surveys for Nesting Migratory Bird Treaty Act Species

Sagittaria sanfordii (Sanford's Arrowhead)

Listing Status - CNPS: 1B.2

Sagittaria sanfordii is a perennial herb native to California that is found in marshes, swamps, and assorted shallow freshwater habitats. Several low areas and temporary pools within the main channel are subject to periodic inundation followed by gradual soil dry-down may be analogous to nearby vernal pool habitats, which may be suitable habitat for this species. *Sagittaria sanfordii* was not detected during surveys but due to the availability of potentially suitable habitat it was determined to have a moderate likelihood of occurring within the project area (Appendix A). The following measures are proposed to reduce project impacts to *Sagittaria sanfordii*:

- General Measures to Protect Special-Status Species

Setophaga petechia (Yellow Warbler)

Listing Status - CDFW: SSC

Setophaga petechia is small songbird found throughout North America and northern South America. Adults breed in North America and overwinter in northern South America. Breeding season habitats include thickets and early successional habitats, particularly along streams and wetlands. Adults feed on insects by gleaning or hawking. Breeding habitat is typically riparian. Nests are built in shrubs or small trees, particularly in willows. Numerous occurrences of *Setophaga petechia* are located around the project area (eBird 2019), though avian monitoring has not located any individuals (Appendix B). Suitable breeding habitat is available throughout the project area. This species is considered to have a high likelihood of occurring within the project area. The following measures are proposed to reduce project impacts to *Setophaga petechia*:

- General Protection Measures for Birds
- Pre-Construction Surveys for Nesting Migratory Bird Treaty Act Species

Sidalcea celata (Redding Checkerbloom)

Listing Status - CNPS: 3

Sidalcea celata is an annual herb endemic to California. It occurs in cismontane woodland habitat in Shasta and Tehama Counties. This species was not detected during surveys but was determined to have a moderate likelihood of occurring within the project area (Appendix A). The following measures are proposed to reduce project impacts to *Sidalcea celata*:

- General Measures to Protect Special-Status Species

Spea hammondii (Western Spadefoot)

Listing Status - CDFW: SSC

Spea hammondii is a species of American spadefoot toad that is found throughout the Central Valley of California. Occupied habitats primarily include grasslands, but they are also found in scrub, chaparral, and oak woodlands. Grasslands with shallow temporary pools are optimal habitats for *Spea hammondii*. Adults are nocturnal and are active during the wet season or during summer rainstorms. Adults spend most of the year in underground burrows up to 36 inches deep. Breeding and egg laying occur in shallow, temporary pools formed by heavy winter rains. The closest occurrences to the project are located 2 miles to the southwest in a grassland supporting vernal pools and vernal swales. The project site is at the northern end of the frog's range. Though there is a lack of known occurrences nearby, there are likely temporary pools within the grasslands following rain events which could provide suitable

breeding habitat. This species is considered to have a moderate likelihood of occurring within the project area. To reduce potential impacts to this species, the following measures will be implemented:

- General Measures to Protect Special-Status Species

***Thamnophis gigas* (Giant Garter Snake)**
Listing Status – ESA: Threatened, CESA: Threatened
Suitable habitat for the giant garter snake includes stagnant or slow-moving waterbodies with abundant emergent vegetation. The closest known populations in the Sacramento Valley are associated with dense networks of canals and wetlands in areas dominated by rice agriculture. Suitable aquatic habitat is not present within the project area or surrounding area. This species is considered to have a low likelihood of occurring within the project area.

***Vireo bellii pusillus* (Least Bell's Vireo)**
Listing Status - ESA: Endangered, CESA: Endangered
This species was historically present along the Sacramento Valley as far north as Red Bluff. The current known distribution of Least Bell's Vireo is restricted to Southern California. This species is considered to have a low likelihood of occurring within the project area.

***Wolffia brasiliensis* (Brazilian Watermeal)**
Listing Status - CNPS: 2B.3
Wolffia brasiliensis is a perennial herb native to California. It is found in assorted shallow freshwater habitats including marshes, swamps and sloughs. *Wolffia brasiliensis* was not detected during surveys but due to the availability of potentially suitable habitat it was determined to have a high likelihood of occurring within the project area (Appendix A). The following measures are proposed to reduce project impacts to *Wolffia brasiliensis*:

- General Measures to Protect Special-Status Species

Proposed Mitigation Measures for Biological Resources

The following mitigation measures are proposed to avoid, minimize, and mitigate impacts to special-status species and other biological resources resulting from implementation of the proposed Project. Implementation of these mitigation measures would reduce the environmental impacts of the proposed Project to a less-than-significant level.

General Measures to Protect Special-Status Species

The following measures shall be implemented and enforced during all project construction activities to avoid or minimize adverse effects on candidate, sensitive, and special-status species.

- *General measures*: No pets of any kind shall be permitted on the construction sites. No firearms (except for federal, State, or local law enforcement officers and security personnel) would be permitted on the construction site.
- *Fencing*: All sensitive areas to be avoided during construction activities shall be fenced and/or flagged as close to construction limits as feasible.
- *Construction monitoring*: A qualified biologist shall monitor the construction area at project-appropriate intervals to assure Contractor implementation and adherence with all established resource impact avoidance/minimization measures. The amount and duration of monitoring

shall depend upon project specifics and shall be based upon consultation with CDFW, USFWS, and permitting entities.

- *Worker awareness training*: Before any construction begins, a qualified biologist and the RCDTC Project Manager shall conduct a mandatory training session for all construction crew personnel. The training shall include a discussion of the sensitive biological resources, including the valley elderberry longhorn beetle and its elderberry host plant, within the Project area and the potential presence of special-status species. Special-status species habitat protection measures (including Best Management Practices, Mitigation Measures, permit requirements, and other site-specific requirements established by the RCDTC Project Manager or agency personnel) shall also be discussed along with the extent of project boundaries to ensure such species are not impacted by project activities. The training and any supporting materials shall include a discussion of penalties for noncompliance. Upon completion of training, construction personnel shall sign a form stating that they have attended the training and understand all the conservation measures. Training shall be conducted in English and other languages, as appropriate. Proof of this instruction (signed forms) shall be kept on file with Contractor and the RCDTC, who shall provide a copy (as requested) to USFWS and permitting entities, along with a copy of the training materials.
- *Litter Control*: A litter control program shall be instituted. The contractor shall provide closed garbage containers for the disposal of all food-related trash items. All garbage shall be removed daily.
- *Delineation of Project boundary*: Project boundaries shall be clearly marked on final project design drawings with work confined within those boundaries. Prior to construction, the Project Contractor and RCDTC Project Manager shall meet on site to agree upon and flag boundaries of sensitive areas, particularly those within riparian areas.
- *Relocation of special-status species*: If a special-status species enters a work area, the Project Contractor shall contact the RCDTC Project Manager for further guidance. In such instances the RCDTC Project Managers shall contact appropriate State and/or federal regulatory agencies for guidance. If a federal or State- listed species or any other special- status species enters the work area, the species shall not be captured or handled without permission from the appropriate agency (State listed – CDFW; Federally listed – USFWS) as conveyed to the Project Contractor by the RCDTC. Construction activities shall cease until it is determined that the species shall not be harmed or that it has left the construction area on its own.

General Minimization and Avoidance Measures for Fish

To reduce the potential for impacts to fish species during project implementation, the following avoidance and mitigation measures will be employed.

- Work windows shall be restricted to October 1 to March 1 for any channel with flowing water. Work in areas separated from the main channel by gravel berms that are naturally present or artificially created may occur outside this window, as long as other environmental work is in compliance with related work widows.
- Heavy equipment operation practices that minimize the potential for injury or death of listed aquatic species' vulnerable life stages shall include alerting fish to equipment operation in the channel before gravel is placed in watered areas (e.g., slow, deliberate equipment operation and tapping water surface prior to entering in place or newly developed slough channels).
- Work within watered areas shall only occur for up to 12 hours per day to allow a 12-hour window of time for fish to migrate through without noise disturbance.

- In-river work with heavy equipment shall be completed during timing windows designed to have the lowest potential to adversely affect salmonids and sturgeon. Where feasible (i.e. in most side channel areas), the work area shall be separated from the river by gravel berms or other methods to prevent fish from entering the work area.
- Reasonable and prudent measures along with recommendations related to **Essential Fish Habitat for Pacific Coast Salmon** proposed by NMFS (NMFS 2015) shall be implemented by the RCD of Tehama County and the Contractor.
- Any work with the potential to affect listed salmonids shall require consultation with CDFW and/or NMFS. Such work shall also be implemented according to the requirements of all appropriate permits or other authorizations.

Specific Protection Measures for Chinook Salmon

Within one week prior to construction, the RCDTC Project Manager shall coordinate with CDFW to determine if salmon are spawning in the Sacramento River at that time. If so, the RCDTC shall obtain real-time aerial or boat redd survey data from CDFW, if available. A qualified biologist shall perform pre-construction surveys the day prior to construction; if redds from listed species are present within 200 feet downstream of the Project area the RCDTC shall contact NMFS with an impact minimization plan to be approved by NMFS personnel prior to final approval of project implementation.

Specific Protection Measures for the Western Pond Turtle

If a western pond turtle is observed in the Project area during construction activities, the Contractor shall temporarily halt construction until it is determined that the turtle will not be harmed or until the turtle has moved to a safe location outside of the construction limits. The Contractor shall inform the RCDTC Project Manager of such occurrences. If construction is to occur during the nesting season (late June - July), a pre-construction survey for turtles and nest sites shall be conducted by a qualified biologist. This survey shall be conducted within 660 feet of the Project area no more than 2 days prior to the start of construction or restoration activities in suitable habitat. If a pond turtle nest is found, the biologist shall flag the site and determine whether construction activities can avoid affecting the nest. If the nest cannot be avoided, in consultation with CDFW, a no-disturbance buffer zone may be established around the nest until the young have left the nest. If weather conditions prevent implementation of construction for more than 2 days after completion of turtle surveys, resurvey for this species shall be completed.

General Protection Measures for Birds

To reduce the potential for impacts to bird species resulting from project implementation, the following avoidance and mitigation measures are proposed:

- Nationwide Standard Conservation Measures shall be employed (USFWS 2018b)
- Vegetation removal shall not occur between March 1 and August 31.
- In order to protect potential nesting habitat, only the minimum number of trees required to satisfy the proposed Project design shall be removed or trimmed during project implementation. Removal or trimming shall not occur between March 1 and August 31. Trees larger than 10” in diameter shall not be removed unless retaining such trees shall prevent project implementation or are a safety hazard as determined by the RCDTC Project Manager. If such trees are identified by the Contractor, approval of such removal shall be obtained from the RCDTC Project Manager which shall be based upon guidance provided by appropriate State/federal regulatory agency personnel.

- If construction activity inadvertently results in take of individual birds or their nests, appropriate mitigation shall be determined by the RCDTC Project Manager in coordination with CDFW.
- Vehicle speed limits shall not exceed 15 MPH to avoid striking birds.

Pre-Construction Surveys for Nesting Migratory Bird Treaty Act Species

For migratory birds, a qualified biologist shall conduct a pre-construction survey no more than one week prior to commencement of construction or restoration activities scheduled between March 1 and August 31. The pre-construction survey shall be used to determine if active nests of these species are present in or within 250 feet of where construction activities take place. If an active nest is found, a qualified biologist in consultation with CDFW and/or USFWS shall determine the extent of a No-Treatment Buffer Zone to be established around the nest. If no active nests are identified, no further mitigation is necessary.

Pre-Construction Surveys for Nesting Raptors, including the White-Tailed Kite

A qualified biologist shall conduct a pre-construction surveys in all suitable upland and riparian habitat for common raptors. Surveys shall occur no more than 2 weeks prior to commencement of construction or restoration activities scheduled between February 15 and August 31. In addition to areas where project construction will occur, these surveys shall be conducted along proposed access roads and within the equipment staging area and spoil disposal sites. Surveys shall include examination of nests for raptor activity, visual searches for whitewash, listening for calls and any other evidence of nesting raptors within the Project area.

If an active nest is found, a qualified biologist, in consultation with CDFW, shall determine a No-Treatment Buffer to be established around the nest until the young have fledged. In consultation with CDFW, a plan shall be developed to monitor whether construction activity is disturbing the reproductive process and to determine when the young have fledged. If no active nests are identified, no further mitigation is necessary.

Modifications and possible reduction in "No Treatment Buffer" sizes for both Listed and Non-Listed Raptors may be made after consultation by the RCDTC Project Manager with the CDFW and/or USFWS personnel as appropriate.

Specific Protection Measures for Swainson's Hawk

A qualified biologist shall conduct a pre-construction survey of accessible areas within a 0.25-mile radius of the Project area between March 1 and September 15; the required survey radius may be reduced (on a case-by-case basis) if approved in advance by CDFW, but in no case will be less than 500 feet. At least one survey shall be conducted no more than one week prior to the initiation of construction activities. If no active nests are located, no further measures are necessary to avoid impacts to active Swainson's hawk nests. If active nests are identified, the following measures shall be implemented:

- A no-disturbance buffer zone shall be established around the nest site. The width of the buffer zone shall be determined by a qualified biologist in coordination with CDFW. Determination of the required width of the buffer zone shall consider the distance of the nest site from construction activities, the line of sight from the nest site to construction activities, the existing level of disturbance, and other factors established with CDFW on a case-by-case basis.
- A qualified biologist shall monitor active nests within 500 feet (or the width of the buffer zone) of construction activities. The first monitoring event shall coincide with the initial

implementation of construction activities and monitoring shall continue a minimum of once per week until the young have fledged. If the biologist determines that construction activities are disturbing the birds and nest failure is possible, CDFW shall be immediately notified. Measures to avoid nest failure shall be implemented in coordination with CDFW and may include halting some or all construction activities until the young have fledged. For monitored nest sites, a monitoring report shall be submitted to CDFG within 2 weeks after termination of monitoring activities.

Specific Protection Measures for Burrowing Owls

A qualified biologist shall conduct a pre-construction survey no less than 14 days prior to initiating ground disturbance activities. If positive owl presence is found, the following avoidance and mitigation measures (CDFW 2012) shall be implemented:

- Place visible markers near burrows to ensure that construction equipment or vehicles do not collapse burrows.
- Avoid disturbing occupied burrows during the nesting period, from February 1 through August 31.
- Avoid impacting burrows occupied during the non-breeding season by migratory or non-migratory resident burrowing owls.

Specific Protection Measures for the Bald Eagle

- Construction activities located within 0.5 mile of a known bald eagle nest shall occur between September 1 and December 31.
- If construction activities are to occur outside of this period, a 660-foot buffer around the nest would be maintained for a single construction activity visible from the nest and within one mile of the nest (USFWS 2007).
- If established, the construction buffer shall remain in place until after the nesting season, or until the biologist determines that the young have fledged during subsequent surveys.

Specific Protection Measures for Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*)

The following protection measures (United States Fish and Wildlife Service 2017; United States Bureau of Reclamation 2016) shall be implemented to protect valley elderberry longhorn beetles and their host plant, the elderberry shrub, if elderberry shrubs occur on or within 50 meters (165 feet) of the Project area:

- During Project implementation, no elderberry shrubs shall be removed.
- For activities that have the potential to damage or kill an elderberry shrub (e.g. trenching, paving, spoiling), an avoidance area shall be established at least 6 meters (20 feet) from the elderberry shrub's drip-line.
- As feasible, all Project-related activities that could occur within 50 meters (165 feet) of an elderberry shrub shall be conducted outside of the flight season of the valley elderberry longhorn beetle (March - July).
- To avoid and minimize adverse effects to valley elderberry longhorn beetle during trimming operations, all elderberry shrub trimming activities shall occur between November and February. Such trimming shall avoid the removal of any branches or stems that are ≥ 1 inch in diameter. Measures to address regular and/or large-scale maintenance (trimming) shall be established as required in consultation with USFWS.

- Herbicides shall not be used within the drip-line of the any elderberry shrub. Insecticides shall not be used within 30 meters (98 feet) of an elderberry shrub. All chemicals shall be applied using a backpack sprayer or similar direct application method.
- Temporary stockpiling of excavated material shall occur only in approved construction material staging areas created more than 20 feet from elderberry shrub drip-lines. Excess excavated soil shall be used on site or disposed of at a regional landfill or other appropriate area.
- Mechanical weed removal within the drip-line of the elderberry shrub shall be limited to the season when adult elderberry longhorn beetles are not active (August - February) and will avoid damaging the elderberry shrub.
- Construction personnel shall ensure that dust control measures (e.g., watering) are implemented in the vicinity of any elderberry shrub within 100 feet of construction activities. To avoid affecting the valley elderberry longhorn beetle, dirt roads shall be watered at least twice each day when being used by gravel trucks and other project-related vehicles during dry periods.

Protective Measures During Removal of Trees that Provide Suitable Bat Roosting Habitat

All removal of trees that provide suitable bat roosting (such as trees with deep bark crevices, snags, or holes) shall be conducted between August 15 and October 30, or earlier than October 30 if evening temperatures fall below 45 degrees Fahrenheit and/or more than a half inch of rainfall occurs within 24 hours. These dates correspond to the time period when bats would not be caring for non-volant young and have not yet entered torpor. A qualified biologist shall monitor removal/trimming of trees that provide suitable bat roosting habitat. Tree removal/trimming shall occur over two consecutive days. On the first day in the afternoon, limbs and branches shall be removed using chainsaws only. Limbs with cavities, crevices, or deep bark fissures shall be avoided, and only branches or limbs without those features shall be removed. On the second day, the entire tree shall be removed. Prior to tree removal/trimming, each tree shall be shaken gently and several minutes shall pass before felling trees or limbs to allow bats time to arouse and leave the tree. The biologist shall search downed vegetation for dead or injured bat species and report any dead or injured special-status bat species to CDFW.

Establish Construction Avoidance Window during the Bat Maternity Season

Construction activities associated with relocation of the sewer line, bridge protection, and excavation under the Antelope Boulevard/Highway 36 Bridge shall not occur from April 15 through August 31 to avoid impacts to roosting bats during the bat maternity season (non-volant period for young).

Prevent the Introduction of Invasive Plant Species

The Contractor shall implement the following best management practices, to the extent feasible, to prevent the introduction of invasive plant species:
Construction equipment with visible plant material or soil shall be washed prior to entering the Project area.

- If straw bales or other vegetative materials are used for erosion control, they shall be certified weed free.
- All re-vegetation materials (e.g., mulches, seed mixtures) shall be certified weed free and come from locally adapted native plant materials, to the extent practicable.

Minimization and Avoidance Measures for Plants

The botanical report prepared for this project (Appendix A) stated that the project is not anticipated to have a negative effect on botanical resources. No rare plants were observed, and no specific measures were proposed for rare plant protection. General measures to protect special-status species and measures to prevent the introduction of invasive plant species will help reduce impacts to existing plant communities.

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Appendix A

Botanical Reconnaissance Survey Report

BOTANICAL SURVEY RECORD: EAST SAND SLOUGH

Survey Dates: 03/28-03/30/18; 04/09/18; 04/19/18; 07/10-07/11/18. **Location:** East Sand Slough

Person(s) present: Barbara Castro, Evan MacKinnon, Rob Irwin

Record Prepared by: Evan MacKinnon & Barbara Castro

Purpose: The purpose of this survey was to search for rare plants near planned project activities at East Sand Slough, an intermittent side channel of the Sacramento River. The project aims to improve salmonid habitat by maintaining continuous flows through the side channel. Potential impacts to botanical resources include sediment excavation, a spoils area, haul routes and staging areas for heavy equipment, as well as permanent inundation of the channel (which now supports plants associated with a hydrologic pattern involving both inundated and dry periods).

Target Rare Plants: A list of potential rare plants was generated from a nine-quad search of the California Natural Diversity Database using the California Department of Fish and Wildlife's Biological Information and Observation System. Using information on rare species' habitat, microhabitat, soil type, and elevation range (Janeway 2013; Consortium of California Herbaria; Jepson eFlora), the potential rare plant list was divided into a high likelihood list (Table 1), a moderate likelihood list (Table 2), and a low likelihood list (Table 3). The high likelihood list contains "target rare plants," which were the focus of field surveys.

Site Characterization: Land use of the surrounding area is a mix of agricultural, residential, and commercial development. The southern, downstream end of the side channel leads to the Red Bluff Recreation Area, a semi-natural area managed by the Mendocino National Forest.

Vegetation structure and composition is variable throughout East Sand Slough. At the upstream end north of Antelope Blvd, the side channel has varying ground elevations with multiple meandering channels and ponds (Fig. 1). Patches of mixed riparian forest exist, as well as open annual grassland, and scattered riparian trees and shrubs. The overstory at the upstream end consists of scattered patches of large tree species including Fremont cottonwood (*Populus fremontii),* valley oak (*Quercus lobata*), Oregon ash (*Fraxinus latifolia*), and northern California walnut (*Juglans hindsii*). Understory vegetation consists of several willow species (*Salix spp*.), blue elderberry (*Sambucus nigra* ssp. *caerulea*), and Himalayan blackberry (*Rubus armeniacus*). South of Antelope Blvd, East Sand Slough becomes a narrow single channel with banks dominated by annual grasses with occasional valley oak, interior live oak (*Quercus wislizeni*), and tree of heaven (*Ailanthus altissima*). The southernmost portion of the project area, southeast of where East Sand Slough re-enters the Sacramento River, consists of valley oak savannah with an understory of annual grasses. Much of the vegetation at East Sand Slough is recovering from a wildfire that occurred in June 2013. Also, the recent decommissioning of the Red Bluff Diversion Dam and subsequent loss of Lake Red Bluff has most likely resulted in a hydrologic change that will continue to modify vegetation characteristics at East Sand Slough (Resource Conservation District of Tehama County 2017).

Target microenvironments: The current hydrologic pattern involves both inundated and dry periods, which could produce conditions associated with several rare plants. The periodic inundation followed by gradual soil dry-down may be analogous to nearby vernal pool habitats, which support rare plants like Red Bluff dwarf rush (*Juncus leiospermus* var. *leiospermus*), Boggs Lake hedge-hyssop (*Gratioloa heterosepala*), and legenere (*Legenere limosa*). This hydrology also creates several ponds, which can support rare plants like Sanford's arrowhead (*Sagittaria sanfordii*) and Brazilian watermeal (*Wolffia brasiliensis*). Intermittent stream gravel bars and streambeds in nearby tributaries to the Sacramento River support rare plants like Stony Creek spurge (*Euphorbia ocellata* ssp. *rattanii*), silky cryptantha (*Cryptantha crinita*), and shield-bracted monkeyflower (*Erythranthe glaucescens*) which are all more typical of higher elevations.

Activities: The first survey was performed 3/28-3/30 to target early-season target rare plants (Table 1). A follow-up early season survey on 4/09 focused on upland acreage that had been added to the project area for a possible spoils area (Fig. 1). A highly focused survey on 4/19 targeted silky cryptantha at the northernmost end of East Sand Slough, after the plant was confirmed to be present and identifiable at a nearby reference site. This north end of East Sand Slough is less than one mile from a known CNDDB occurrence of silky Cryptantha, and closely resembles the conditions of the reference site (gravely substrate and similar species composition). A late-season survey was performed on 7/10-7/11, which focused on gravel bars, ponds, and moist areas likely to support late-season target rare plants (Table 1).

Survey Results: In total, 194 species were observed within the East Sand Slough project area (Table 4; Fig. 1). Interesting findings that resulted in voucher specimens included Azure penstemon (*Penstemon azureus* var. *azureus*) and contorted sun cup (*Camissonia contorta*). No rare plants were found, although we did encounter Valley spurge (*Euphorbia ocellata* ssp. *ocellata*), a close relative of the rare Stony Creek spurge (*Euphorbia ocellata* ssp. *rattanii*), and weak-stemmed cryptantha (*Cryptantha flaccida*), a relative and associate species of the rare silky cryptantha (*Cryptantha crinita*). We also found *Mimulus guttatus* and *Mimulus pilosus*, two relatives of the rare shield-bracted monkeyflower (*Mimulus glaucescens*).

The hydrology of East Sand Slough creates areas that experience shallow inundation followed by gradual soil dry-down. We found these conditions favored plants often associated with vernal pools, such as toothed downingia (*Downingia cuspidata*), Orcutt's quillwort (*Isoetes orcuttii*), stalked popcornflower (*Plagiobothrys stipitatus* ssp. *micranthus*) and purslane speedwell (*Veronica peregrina* ssp. *xalapensis*). Similar hydrologic conditions have also been produced from willow removal by beaver, an activity that exposes moist soil to sunlight. Despite hydrologic conditions comparable to nearby vernal pool habitats, we did not encounter any rare vernal pool obligate plants.

Minimization Measures: Based on findings from field surveys, we do not anticipate the project to have a negative effect on botanical resources. Because no rare plants were observed, we propose no minimization measures for rare plant protection; however unique environments should be preserved to the extent possible. For example, riparian trees and shrubs serve an important ecological and hydrological role and should be preserved as much as possible during construction. Ideally, new riparian areas will be planted in the lower stretch of East Sand Slough, which currently supports very little woody riparian vegetation.

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Table 1. Potential Rare Plants with a High Likelihood of Occurring at East Sand Slough

Scientific Name	Common Name	CRPR	Blooming Period	Habitat	Micro Habitat	Elevation Low (ft)	Elevation High (ft)
Juncus leiospermus var. *leiospermus*	Red Bluff dwarf rush	1B.1	Mar-Jun	Chaparral, Cismontane woodland, Meadows and seeps, Valley and foothill grassland, Vernal pools	Vernally mesic	110	4100
Cryptantha crinita	silky cryptantha	1B.2	Apr-May	Cismontane woodland, Lower montane coniferous forest, Riparian forest, Riparian woodland, Valley and foothill grassland	Gravelly streambeds	200	3985
Gratiola heterosepala	Boggs Lake hedge-hyssop	1B.2	Apr-Aug	Marshes and swamps (lake margins), Vernal pools	Clay	30	7790
Legenere limosa	legenere	1B.1	Apr-Jun	Wet areas	Vernal pools and ponds	0	2885
Wolffia brasiliensis	Brazillian watermeal	2B.3	Jun-Aug	Ponds	Sloughs	0	300
Erythranthe glaucescens	shield-bracted monkeyflower	4.3	Feb-Aug(Sep)	Chaparral, Cismontane woodland, Lower montane coniferous forest, Valley and foothill grassland	Serpentinite seeps, sometimes streambanks	195	4070
Euphorbia ocellata ssp. *rattanii*	Stony Creek spurge	1B.2	May-Sep	sandy, gravel river bed		600	600

Table 2. Potential Rare Plants with a Moderate Likelihood of Occurring at East Sand Slough

Scientific Name	Common Name	CRPR	Blooming Period	Habitat	Micro Habitat	Elevation Low (ft)	Elevation High (ft)
Astragalus pauperculus	depauperate milk-vetch	4.3	Mar-Jun	Chaparral, Cismontane woodland, Valley and foothill grassland	Vernally mesic, volcanic	195	3985
Limnanthes floccosa ssp. *floccosa*	woolly meadowfoam	4.2	Mar-May(Jun)	Chaparral, Cismontane woodland, Valley and foothill grassland, Vernal pools	Vernally mesic	195	4380
Agrostis hendersonii	Henderson's bent grass	3.2	Apr-Jun	Valley and foothill grassland (mesic), Vernal pools	Vernally mesic tuscan mudflow	225	1000
Sagittaria sanfordii	Sanford's arrowhead	1B.2	May-Oct(Nov)	Marshes and swamps (assorted shallow freshwater)	Ponds	0	2135
Sidalcea celata	Redding checkerbloom	3	Apr-Aug	Cismontane woodland	Sometimes serpentinite	440	5005

Table 3. Potential Rare Plants with a Low Likelihood of Occurring at East Sand Slough

Scientific Name	Common Name	CRPR	Blooming Period	Habitat	Micro Habitat	Elevation Low (ft)	Elevation High (ft)
Downingia pusilla	dwarf downingia	2B.2	Mar-May	Valley and foothill grassland (mesic), Vernal pools	Vernal pools	0	1460
Juncus leiospermus var. ahartii	Ahart's dwarf rush	1B.2	Mar-May	Valley and foothill grassland (mesic)		95	750
Navarretia leucocephala ssp. bakeri	Baker's navarretia	1B.1	Apr-Jul	Cismontane woodland, Lower montane coniferous forest, Meadows and seeps, Valley and foothill grassland, Vernal pools	Mesic, Vernal pools	15	5710
Navarretia heterandra	Tehama navarretia	4.3	Apr-Jun	Valley and foothill grassland (mesic), Vernal pools	Vernal pools	95	3315
Polygonum bidwelliae	Bidwell's knotweed	4.3	Apr-Jul	Chaparral, Cismontane woodland, Valley and foothill grassland	Volcanic, thin vernally moist soils	195	3935
Orcuttia tenuis	slender Orcutt grass	1B.1	May-Sep(Oct)	Vernal pools	Often gravelly. Vernal pools	110	5775
Paronychia ahartii	Ahart's paronychia	1B.1	Feb-Jun	Cismontane woodland, Valley and foothill grassland, Vernal pools		95	1675
Fritillaria pluriflora	adobe-lily	1B.2	Feb-Apr	Chaparral, Cismontane woodland, Valley and foothill grassland	Often adobe	195	2315
Hemizonia congesta ssp. calyculata	Mendocino tarplant	4.3	Jul-Nov	Clay. Grassland		660	4600
Eriogonum tripodum	tripod buckwheat	4.2	May-Jun	Serpentine		900	2400
Cypripedium montanum	mountain lady's-slipper	4.2	Mar-Aug	Broadleafed upland forest, Cismontane woodland, Lower montane coniferous forest, North Coast coniferous forest	Conifer forest	605	7300
Acmispon rubriflorus	red-flowered bird's-foot trefoil	1B.1	Apr-Jun	Cismontane woodland, Valley and foothill grassland	Clay	655	1395

Table 4. East Sand Slough Species List

Family	Scientific Name	Common Name	Wetland Indicator Status (incomplete)	OBSERVED 03-28-18 to 03-30-18	OBSERVED 04-09-18	OBSERVED 07-10-18 to 07-11-18
Eudicots						
Adoxaceae	*Sambucus nigra* subsp. *caerulea*	Blue elderberry	FAC	X		X
Amaranthaceae	***Amaranthus albus***	**Pigweed amaranth**				X
Anacardiaceae	*Toxicodendron diversilobum*	Poison oak			X	X
Apiaceae	***Anthriscus caucalis***	**Bur chervil**			X	
	Conium maculatum	**Poison hemlock**				
	Daucus carota	**Queen Anne's lace**		X		X
	Torilis arvensis	**Field hedge parsley**			X	
Apocynaceae	***Vinca major***	**Periwinkle**			X	
Aristolochiaceae	*Aristolochia californica*	California pipevine		X		X
Asteraceae	*Ambrosia psilostachya*	Western ragweed		X		X
	Artemesia douglasiana	Mugwort	FAC	X		X
	Baccharis salicifolia	Mule-fat	FAC	X		X
	Blennosperma nanum	Yellow carpet		X		
	Brickellia californica	California brickelbush		X		X
	Calycadenia ciliosa	Klamath calycadenia				X
	Calycadenia fremontii (?, dry)	Fremont's calycadenia		X		
	Centaurea solstitialis	**Yellow starthistle**			X	X
	Centromadia fitchii	Fitch's spikeweed				X
	Chicory intybus	**Chicory**				X
	Erigeron annuus	Annual fleabane				X
	Erigeron canadensis	Horseweed	FAC	X		X
	Euthamia occidentalis	Western goldenrod				X
	Gnaphalium palustre	Lowland cudweed		X		X
	Grindelia camporum	Valley gumplant	UPL	X		X
	Helenium puberulum	Rosilla				X
	Heterotheca grandiflora	Telegraph weed	UPL	X		X
	Heterotheca oregona	Oregon false goldenaster	FACU	X		X
	Hypochaeris glabra	**Smooth cats-ear**				
	Lactuca serriola	**Prickly lettuce**	FAC	X		X
	Leontodon saxatilis* ssp. *longirostris	**Long-beaked hawkbit**	FACU	X		X
	Logfia gallica	**Narrowleaf**		X		
	Matricaria discoidea	Pineapple weed			X	
	Senecio vulgaris	**Old-man-of-spring**		X		
	Silybum marianum	**Milk-thistle**		X		
	Sonchus oleraceus	**Common sow-thistle**		X		
	Symphyotrichum subulatum var. *parviflorum*	Annual saltmarsh aster		X		
	Xanthium strumarium	Cocklebur	FAC	X		X
Bignoniaceae	***Catalpa speciosa***	**Northern catalpa**				X
Boraginaceae	*Amsinckia lycopsoides*	Bugloss fiddleneck		X		
	Cryptantha flaccida	Weak-stemmed cryptantha		X		
	Eriodictyon californicum	Yerba santa		X		X
	Heliotropium europaeum	**European heliotrope**				X
	Heliotropium curassavicum var. *oculatum*	Wild heliotrope				X (1 indiv.)
	Plagiobothrys canescens	Valley popcornflower		X		
	Plagiobothrys stipitatus ssp. *micranthus*	Small-flowered stalked	FACW	X		
Brassicaceae	***Arabidopsis thaliana***	**Thalecress**		X		
	Barbarea verna	**Early winter cress**		X		
	Brassica nigra	**Black mustard**	UPL	X		X
	Brassica rapa	**Field mustard**				
	Cardamine hirsuta	**Hairy bittercress**		X		
	Cardamine oligosperma	Western bittercress		X		
	Hirschfeldia incana	**Summer mustard**	UPL	X		
	Lepidium latifolium	**Perennial**				X
	Lepidium nitidum	Shining peppergrass		X		
	Nasturtium officinale	Watercress				
	Raphanus sp.	**Radish**		X		
	Rorippa curvisiliqua var. *occidentalis*	Curvepod yellow cress		X		

Table 4 (continued). East Sand Slough Species List

Family	Scientific Name	Common Name	Wetland Indicator Status (incomplete)	OBSERVED 03-28-18 to 03-30-18	OBSERVED 04-09-18	OBSERVED 07-10-18 to 07-11-18
Campanulaceae	*Downingia cuspidata*	Toothed downingia				X
Caryophyllaceae	***Herniaria hirsuta* var. *hirsuta***	**Hairy rupturewort**		X		
	Petrorhagia dubia	**Grass-pink**		X		
	Scleranthus annuus	**German knotgrass**		X		
	Spergula arvensis	**Corn spurry**				
	Spergularia bocconi	**Red sand-spurry**	FAC	X		
	Stellaria media	**Common chickweed**			X	
Chenopodiaceae	***Chenopodium album***	**Lamb's quarters**				X
	Dysphania botrys	**Jerusalem-oak**		X		X
Cleomaceae	*Polanisia dodecandra* ssp. *trachysperma*	Western clammyweed	FACU	X		X
Convolvulaceae	***Convolvulus arvensis***	**Field bindweed**				X
Crassulaceae	***Crassula tillaea***	**Mediterranean pygmy weed**		X		
Cucurbitaceae	*Marah fabacea*	California manroot		X		
Euphorbiaceae	*Croton setigerus*	Turkey mullein				X
	Euphorbia maculata	**Spotted spurge**				X
	Euphorbia ocellata ssp. *ocellata*	Valley spurge				X
	Euphorbia peplus	**Petty spurge**		X		
	Euphorbia serpyllifolia	Thyme-leaved spurge				X
Fabaceae	*Acmispon americanus* var. *americanus*	Spanish lotus				X
	Cercis occidentalis	Western redbud			X	
	Lotus corniculatus	**Bird's foot trefoil**				X
	Lupinus albifrons	Silver bush lupine			X	
	Lupinus bicolor	Bicolored lupine		X		
	Lupinus succulentus	Succulent lupine		X		
	Medicago polymorpha	**Burclover**	FACU	X		
	Melilotus albus	**White sweetclover**				X
	Melilotus indicus	**Yellow sweetclover**	FACU	X		
	Robinia pseudoacacia	**Black locust**			X	X
	Sesbania punicea	**Scarlet wisteria**				X
	Soartium junceum	**Spanish broom**				
	Trifolium hirtum	**Rose clover**		X		
	Vicia villosa* ssp. *varia	**Winter vetch**	UPL	X		
Fagaceae	*Quercus lobata*	Valley oak	FAC	X		X
	Quercus wislizeni	Interior live oak			X	X
Gentianaceae	*Zeltnera venusta*	Charming centaury				
Geraniaceae	***Erodium cicutarium***	**Red-stemmed filaree**	UPL	X		
	Geranium molle	**Crane's bill geranium**		X		
Hypericaceae	*Hypericum anagalloides*	Creeping St. John's-wort		X		
	Hypericum mutilum	**Small-flowered St. John's-wort**				X
	Hypericum perforatum	**Klamath-weed**	FACU	X		X
Juglandaceae	*Juglans hindsii*	Northern California black walnut	FAC	X		X
Lamiaceae	***Lamium amplexicaule***	**Giraffehead**		X		
	Lamium purpureum	**Purple dead nettle**				
	Lycopus americanus	Cut-leaved				X
	Marrubium vulgare	**Horehound**		X		X
	Mentha pulegium	**Pennyroyal**		X		X
	Trichostema lanceolatum	Vinegarweed				X
Lauraceae	*Umbellularia californica*	California bay			X	
Loasaceae	*Mentzelia laevicaulis*	Giant blazing star				X
Lythraceae	*Ammannia robusta*	Grand ammania				X
	Ficus carica	**Fig**				X
	Lythrum hyssopifolia	**Hyssop loosestrife**	FACW	X		

Table 4 (continued). East Sand Slough Species List

Family	Scientific Name	Common Name	Wetland Indicator Status (incomplete)	OBSERVED 03-28-18 to 03-30-18	OBSERVED 04-09-18	OBSERVED 07-10-18 to 07-11-18
Molluginaceae	***Mollugo verticillata***	**Green carpetweed**				X
Montiaceae	*Calandrinia menziesii*	Red maids		X		
	Claytonia perfoliata	Miner's lettuce			X	
Moraceae	***Maclura pomifera***	**Osage orange**				
	Morus alba	**Mulberry**		X		X
Myrtaceae	***Eucalyptus sp.***	**Eucalyptus**			X	
Oleaceae	*Fraxinus latifolia*	Oregon ash	FACW	X		X
Onagraceae	*Camissonia contorta*	Contorted sun cup			X	
	Epilobium brachycarpum	Tall annual	UPL	X		
	Epilobium ciliatum ssp. *ciliatum*	Fringed willowherb				X
	Ludwigia peploides	**Water primrose**	OBL	X		X
	Oenothera elata ssp. *hirsutissima*	Evening primrose				X
Orobanchaceae	*Castilleja attenuata*	Valley-tassels			X	
	Triphysaria eriantha	Johnny tuck		X		
Papaveraceae	*Eschscholzia caespitosa*	Foothill poppy				
	Platystemon californicus	Cream cups		X		
Phrymaceae	*Mimulus guttatus (Erythranthe guttata)*	Seep monkey-flower	OBL	X		
	Mimulus pilosus (Mimetanthe pilosa)	Downy mimetanthe				X
Pinaceae	***Pinus halepensis?***	**Aleppo pine?**			X	X
	Pinus sabiniana	Gray pine			X	X
Plantaginaceae	*Antirrhinum cornutum*	Spurred snapdragon				X
	Kickxia elatine	**Sharp-leaved fluellin**	NI	X		X
	Penstemon azureus var. *azureus*	Azure beardtongue		X		X
	Plantago erecta	California plantain			X	
	Plantago lanceolata	**English plantain**	FACW	X		X
	Veronica anagallis-aquatica	**Water speedwell**	OBL	X		X
	Veronica arvensis	**Speedwell**			X	
	Veronica peregrina ssp. *xalapensis*	Purslane speedwell	OBL	X		
Platanaceae	*Platanus racemosa*	Western sycamore	FACW	X		X
Polemoniaceae	*Leptosiphon sp.*			X		
	Linanthus (?)					
Polygonaceae	*Eriogonum nudum*	Naked buckwheat		X		X
	Eriogonum wrightii var. *trachygonum*	Wright's buckwheat		X		X
	Persicaria hydropiper	**Common smartweed**				X
	Polygonum aviculare	**Prostrate knotweed**				
	Rumex crispus	**Curly dock**	FACW	X		X
Potamogetonaceae	***Potamogeton crispus***	**Curly pondweed**				X
Rhamnaceae	*Frangula californica*	Coffeeberry			X	X
Rosaceae	*Heteromeles arbutifolia*	Toyon			X	
	Prunus cerasifera (green leaf)	**Cherry plum**				X
	Prunus cerasifera (purple leaf)	**Cherry plum**				X
	Prunus dulcis	**Almond**				X
Rosaceae	*Rosa californica*	California rose	FAC	X		X
	Rubus armeniacus	**Himalayan blackberry**	FACW	X		X
Rubiaceae	***Galium parisiense***	**Wall bedstraw**	UPL	X		
Salicaceae	*Populus fremontii*	Fremont cottonwood	FAC	X		X
	Salix exigua	Sandbar willow	OBL	X		X
	Salix goodingii	Black willow			X	X
	Salix laevigata	Red willow				X
	Salix lasiolepis	Arroyo willow	FACW	X		X

Table 4 (continued). East Sand Slough Species List

Family	Scientific Name	Common Name	Wetland Indicator Status (incomplete)	OBSERVED 03-28-18 to 03-30-18	OBSERVED 04-09-18	OBSERVED 07-10-18 to 07-11-18
Sapindaceae	*Acer negundo*	Box elder	FACW	X		X
Scrophulariaceae	***Verbascum blattaria***	**Moth mullein**	UPL	X		X
	Verbascum thapsus	**Wooly mullein**	FACU	X		X
Simaroubaceae	***Ailanthus altissima***	**Tree of heaven**			X	X
Solanaceae	*Datura wrightii*	Jimsonweed			X	X
	Solanum americanum	American black nightshade				X
Verbenaceae	*Phyla nodiflora* var. *nodiflora*	Creeping lippia (large leaf)				X
	Phyla nodiflora* var. *rosea	**Rosy lippia (small leaf-compact mat)**				X
	Verbena bonariensis	**Purple top vervain**	UPL			X
Vitaceae	*Vitis californica*	California wild grape	FACW	X		X
Zygophyllaceae	***Tribulus terrestris***	**Puncturevine**				X
Monocots						
Alismataceae	*Echinodorus bertoroi*	Burhead				**X (9/13/18)**
Cyperaceae	*Eleocharis macrostachya*	Creeping spike rush		X		
	Carex barbarae	Santa barbara sedge				X
	Cyperus sp.	Nutsedge				
	Schoenoplectus acutus var. *occidentalis*	Tule				X
Juncaceae	*Juncus balticus*	Baltic rush		X		
	Juncus bufonius var. *bufonius*	Toad rush	FACW	X		
	Juncusacuminatus					
Poaceae	***Aira caryophyllea (?)***	**Silver hairgrass**				
	Alopecurus carolinianus	Carolina foxtail		X		
	Arundo donax	**Giant reed**				
	Avena barbata or A. fatua	**Wild oats**	UPL	X		
	Brachypodium distachyon	**False brome**	UPL	X		
	Bromus diandrus	**Ripgut brome**	UPL	X		
	Bromus hordeaceus	**Soft chess**	FACU	X		
	***Bromus madritensis* ssp. rubens**	**Red brome**	UPL	X		
	Cynodon dactylon	**Bermudagrass**	FAC	X		X
	Echinochloa sp.			X		
	Elymus glaucus(?)	Blue wildrye				
	Festuca (=Vulpia) myuros	**Rattail sixweeks grass**		X		
	Festuca perennis	**Italian rye grass**		X		
	Hordeum marinum* ssp. *gussoneanum	**Mediterranean barley**	FAC	X		
	Hordeum murinum	**Wall barley**		X		
	Paspalum dilatatum	**Dallis grass**				X
	Phalaris arundinacea (?)	Reed canarygrass				X
	Secale cereale	**Cereal rye**			X	
	Sorghum halepense	**Johnsongrass**				X
	Stipa miliacea* ssp. *miliacea	**Smilo grass**		X		X
Themidaceae	*Dichelostemma capitatum*	Blue-dicks			X	
Typhaceae	*Typha sp.*	Cattail	OBL	X		X
Pteridophytes						
Equisetaceae	*Equisetum hyemale*	Scouringrush		X		X

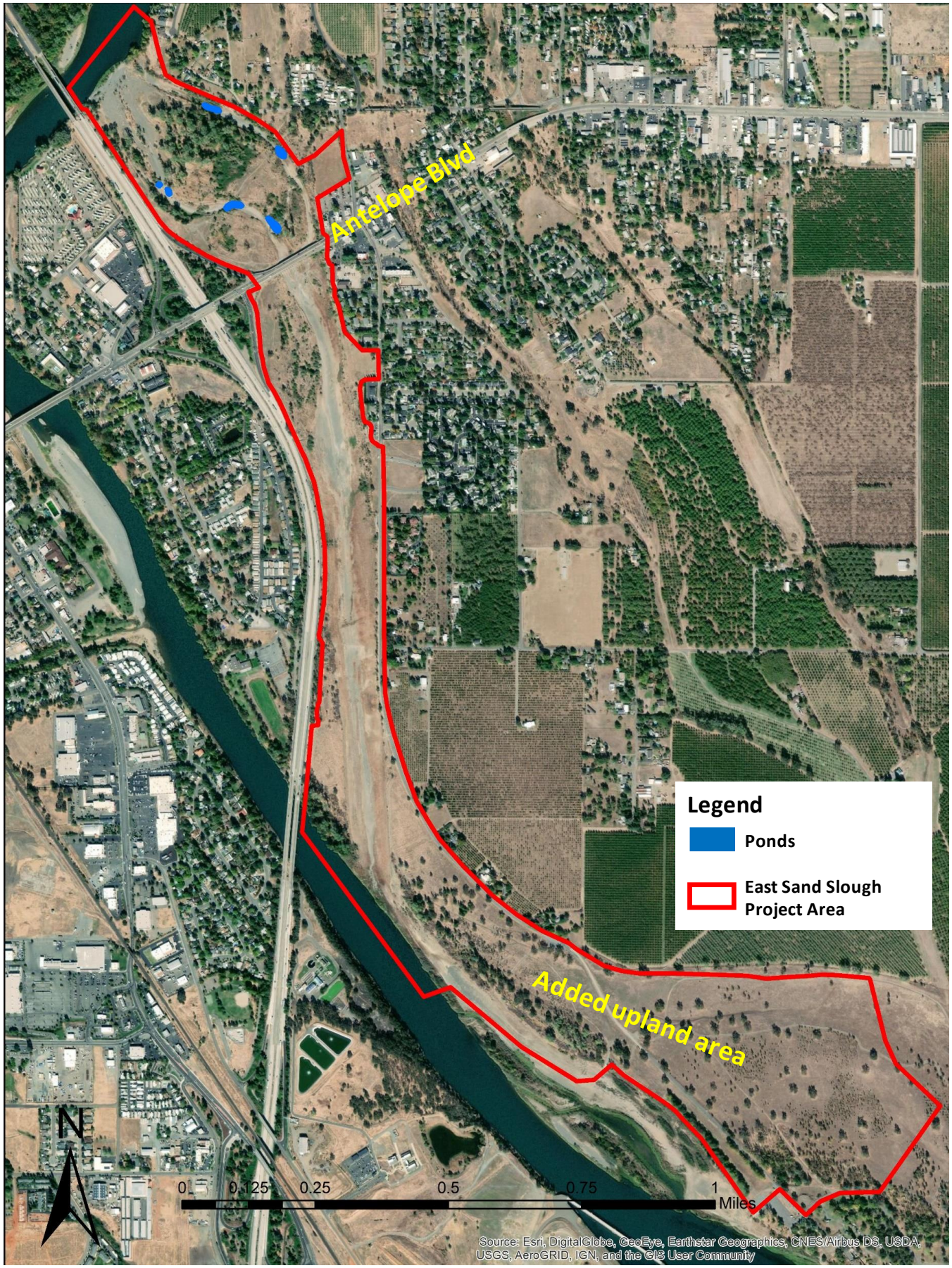

Figure 1. Areas surveyed for sensitive botanical resources -2018

Note: Minor boundary modifications were made in September 2018 that did not require a re-survey.

Appendix B

Avian Monitoring Report

Prepared By: Michael Rogner

Date: October 5, 2018

East Sand Slough Avian Monitoring Memo

In anticipation of construction on the East Sand Slough side channel, Swainson's Hawk surveys were conducted within the project area for the 2018 breeding season. Additionally, point count surveys were established to evaluate the breeding bird community at the site. All observations and conclusions were made by Michael Rogner, Senior Restoration Biologist for River Partners.

Swainson's Hawk Survey

The methodology for the survey was adopted from the Swainson's Hawk Technical Advisory Committee recommendations for nesting surveys in California's Central Valley. The only exception is that the surveys were not initiated until the first week of April.

Table 1. Surveys conducted by period

Survey Period	Period	# of Surveys
I	Jan - Mar 20	0
II	Mar 20 - Apr 5	1
III	Apr 5 - Apr 20	3
IV	Apr 21 - Jun 10	2
V	Jun 10 - Jul 30	0

Results

There was one Swainson's Hawk detection on April 17. The bird was soaring high over the project area and was not observed using any of the habitat. All other surveys resulted in zero detections.

A total of six surveys were conducted. No surveys were conducted in Period I (optional), nor were surveys conducted in Period V (nest monitoring) as there were no known breeding Swainson's Hawks to monitor.

Point Count Survey

We used a five-minute point count method (Ralph et al. 1993), surveying each of the point count stations twice during the peak breeding season for the Central Valley (once in May and once in June) in each year, for a total of 24 points surveyed. Surveys were conducted on mornings without strong wind or rain, and within the first 3-4 hours after local sunrise. Survey occasions were separated by at least ten days. The observer had expertise in bird identification and had conducted similar surveys for more than 15 years. We recorded the method of detection (song, visual, or call) and any observed breeding behavior (e.g., copulation, nest material, or food carry), and estimated the distance to all birds detected. Distances to detected birds were estimated in 10 m bands outward to 50 m, followed by three larger bands extending from 50 to 75 m, 75 m to 100 m and beyond 100 m.

Table 2. Dates of point count surveys conducted at East Sand Slough

Year	Visit	Date
2018	1	4-May
2018	2	11-Jun

Results

The surveys were conducted in anticipation of construction potentially occurring in 2018. The purpose of the surveys were to establish a baseline by which to evaluate the impacts of the East Sand Slough side channel restoration.

No Federally threatened or endangered species were detected during the surveys. One State threatened species (bank swallow) was detected on the May 4 survey, though no evidence of breeding was noted.

For this breeding season, a list of detected species is provided below. In future years, this baseline data could be used to evaluate changes in species richness, diversity, and abundance.

Table 3. Species detected within 50 meters of point count locations, East Sand Slough

Species	
Mallard	*Anas platyrhynchos*
California Quail	*Callipepla californica*
Great Blue Heron	*Ardea herodias*
Green Heron	*Butorides virescens*
Turkey Vulture	*Cathartes aura*
Osprey	*Pandion haliaetus*
Killdeer	*Charadrius vociferus*
Spotted Sandpiper	*Actitis macularius*
Eurasian Collared-Dove	*Streptopelia decaocto*
Mourning Dove	*Zenaida macroura*
Lesser Nighthawk	*Chordeiles acutipennis*
Anna's Hummingbird	*Calypte anna*
Nuttall's Woodpecker	*Picoides nuttallii*
Northern Flicker	*Colaptes auratus*
Western Wood-Pewee	*Contopus sordidulus*
Black Phoebe	*Sayornis nigricans*
Ash-throated Flycatcher	*Myiarchus cinerascens*
Western Kingbird	*Tyrannus verticalis*
California Scrub-Jay	*Aphelocoma californica*
Tree Swallow	*Tachycineta bicolor*
Bank Swallow	*Riparia riparia*
Cliff Swallow	*Petrochelidon pyrrhonota*
Oak Titmouse	*Baeolophus inornatus*

White-breasted Nuthatch	*Sitta carolinensis*
House Wren	*Troglodytes aedon*
Bewick's Wren	*Thryomanes bewickii*
American Robin	*Turdus migratorius*
Northern Mockingbird	*Mimus polyglottos*
European Starling	*Sturnus vulgaris*
Common Yellowthroat	*Geothlypis trichas*
California Towhee	*Melozone crissalis*
Spotted Towhee	*Pipilo maculatus*
Black-headed Grosbeak	*Pheucticus melanocephalus*
Lazuli Bunting	*Passerina amoena*
Brewer's Blackbird	*Euphagus cyanocephalus*
Brown-headed Cowbird	*Molothrus ater*
Bullock's Oriole	*Icterus bullockii*
House Finch	*Haemorhous mexicanus*
Lesser Goldfinch	*Spinus psaltria*
American Goldfinch	*Spinus tristis*
House Sparrow	*Passer domesticus*

Appendix C

California Red Legged Frog Survey Report

Habitat Assessment for California Red-legged Frog (CRLF) at the East Sand Slough Channel Project, Red Bluff, CA

Assessment Biologists: Dan Cordova, USBR; Rob Irwin, Sacramento River Forum; Luke Davis, USBR

Project Summary: Restoration of flows to a historic side channel of the Sacramento River. The side channel project will restore river flows to approximately two miles of side channel within the limits of Red Bluff. Project construction specifics are not available at this time. However, basic project components include excavation within the channel (or portions of) to facilitate more consistent flows to provide salmonid habitat. See attached site map. East Sand Slough begins approximately 0.5 miles north of the intersection of Interstate 5 and Antelope Boulevard in Red Bluff. The project would continue approximately 1.5 miles down the channel where it would connect to the Sacramento River.

Location: Red Bluff, Tehama County, CA;

40.183540 latitude and -122.224026 longitude

Assessment Date: October 2, 2018

Site Description: The project location is centralized on a historic side channel which occasionally conveys river flows during high volume releases from upstream dams. The substrate is generally river gravels and cobbles with thin to deeply deposited top-soil. Riparian canopy varied from open to overhanging throughout the project site, but the majority of the channel is open (especially south of Antelope Boulevard). Dominant vegetation included valley oak, cottonwood, and willow. Major understory components included blackberry, sedges, and grasses. The surrounding land is urbanized and composed of orchards, business, residential housing, and some open space. Staging and stockpile areas will occur on upland areas within the project footprint or on leased agricultural land (actively farmed) adjacent to the action area.

Survey Methodology: The site was walked by 3 biologists looking for both upland and aquatic features capable of supporting CRLF. Additionally, aquatic features were surveyed for the presence of amphibians and other wildlife. Surveys included one daytime and one night eye-shine survey.

General Aquatic Habitat Characterization: The proposed side channel site occasionally functions as a side channel during high volume Sacramento River flows. Aquatic habitat observed varied and included; dry channel, open-water pool, and shallow pool (less than 0.5m) all either with, or without emergent vegetation. Several areas within the channel were ponded during the site assessment. All ponds surveyed appeared to be populated with fish, even a shallow (less than 2 feet deep) 3m by 3m pond with no vegetation. Fish types included minnows and sunfish ranging in size, respectively, from less than 1-inch long to up to 7-inches long.

Based on pond water temperatures, the water level in some ponds appeared to be linked to sub-surface river flow.

Nearby Aquatic Habitat: There are several flood channels (to the Sacramento River) located within a 1 mile radius of the project site. In viewing aerial imagery, these flood channels appear to support some level of ponding in most years. There is one drainage to the east, which is evident on aerial imagery, that

appears to pond in most years. However, this drainage is separated from the project site by one-half mile of urban, agricultural, and residential development. An older side channel project in East Sand Slough is located immediately south of the proposed project (as the historic channel continues downstream) and appears to hold water throughout the year as a backwater to the Sacramento River.

Species Observed: Small and large minnows (3-5 inches), and sunfish (possibly bluegill) were present almost all ponds that were surveyed. Adult and sub-adult bullfrogs (*Lithobates catesbeianus*) were also observed (day and night) in most of the ponds (with emergent vegetation) that were surveyed. The backwater channel south of the action area was densely populated with sub-adult bullfrogs in the shallow areas with emergent vegetation.

Determination: The East Sand Slough side channel site appears to be unsuitable habitat for CRLF and they are not expected to be found on, or within dispersal distance of, the site for the following reasons:

1. The site is located adjacent to the Sacramento River, a potential barrier to CRLF dispersal into the site, a source of site scouring flows, and a source for large predatory fish.
2. The site has perennial water which supports a population of predatory fish and bullfrogs within the site.
3. The site occasionally conveys high Sacramento River flows.
4. The substrate of upland habitats within the site is dominated by gravel river deposits. The areas surveyed generally lacked evidence of burrowing rodents.
5. The site is at the northern extent of the historic range of the species and outside the current know range.
6. The site is approximately 20 miles northeast of, and at approximately 800’ lower elevation than the closest known CRLF occurrence.


East Sand Slough Sidechannel Project Boundary
Donna Ave
Roundup Ave
Mary Ln
Kae Ave
Wiltsey Rd
Breese Ave
Gurnsey Ave
Dale Ave
Bluff
Gamay Ct
Williams Ave
Gilmore Ranch Rd
Peach Tree Ln
Sale Ln
Google Earth
© 2018 Google
N
3000 ft

Appendix D

Site Photographs

Site Photographs

This selection of photographs is provided to give a sense of the habitats and landforms within the project area. All site photographs were taken by Rob Irwin (Sacramento River Forum) and are available to view on this webpage:
https://photos.google.com/share/AF1QipMeBZDAGOjafbIXIdra_bPhxC1CcANUeL4gYriElavpflWe7TP_8QGN9rOVt2EOgg?key=VUgwMTF0cU5rVTcwU2l4Y2xSdnRyY0tHOU1sMlZB

Table of Contents

Figure 1. The primary inlet into the slough from the Sacramento River. Photo date: March 28, 2018.

Figure 2. A view south along the main channel toward Antelope Blvd. Photo date: April 26, 2018.

Figure 3. A view north along the main channel. Photo date: April 26, 2018.

Figure 4. The bench along the main channel. Photo date: April 26, 2018.

Figure 5. A view of the secondary channel. Photo date: March 29, 2018.

Figure 6. A view of the seconary channel. Photo date: May 1, 2018.

Figure 7. Annual grassland with 'Elderberry savannah' in the background. Photo date: May 1, 2018.

Figure 8. A view of a wetland area dominated by Armenian Blackberry (Rubus armeniacus) and a mixed riparian forest dominated by Fremont cottonwood (Populus fremontii) in the background. Photo date: April 26, 2018.

Figure 9. A view of the remnant riparian forest with Fremont cottonwood (Populus fremontii) dominating the canopy. Photo date: April 27, 2018.

Figure 10. A view of the remnant riparian forest with Fremont cottonwood (Populus fremontii) dominating the canopy. Photo date: April 27, 2018.

Figure 11. A portion of the riparian forest is host to several homeless camps. Multiple trails cross through this area. Photo date: April 27, 2018.

Figure 12. The the cobbly soils on the island at the north end of the project area support a variety of herbacious species including Azure Penstemon (Penstemon azureus) and Rough-node Bastard-Sage (Eriogonom wrightii var. trachygonum). Photo date: April 30, 2018.

Figure 13. The main channel south of Antelope Blvd. Photo date: May 15, 2018.

Figure 14. Looking north along the slough. Photo date: March 29, 2016.

Figure 15. Near the southern confluence of the slough and the Sacramento River. Photo date: May 16, 2018.

Figure 16. A photo looking south from Antelope Blvd taken on January 11, 2017. Flows on along the Sacramento River were measured near 9,637 CFS at the Bend at the time this photo was taken. The peak flow was 13,172 CFS at 4am that morning.

Figure 17. A photo looking north from Antelope Blvd taken on January 11, 2017. Flows on along the Sacramento River were measured near 9,637 CFS at the Bend at the time this photo was taken. The peak flow was 13,172 CFS at 4am that morning.

Figure 18. Facing east across the slough, near the center of the project area (across from Sale Lane x Pinion Way). Photo date: March 29, 2018.

Figure 19. Looking south along I5 and the slough's western bank. Elderberry and Tree of Heaven are common along the bank. Photo date: March 29, 2018.

Figure 20. "Elderberry savannah" north of Antelope Blvd.

Figure 21. A pond ringed by sandbar willow (Salix exigua) along the channel. Photo date: March 29, 2018.

Appendix E

Habitat Maps


Legend
Project Area / ESL
Label, Habitat Type
1, Annual Grassland
2, Valley Oak Savanna
3, Slough Channel
4, Slough Floodplain
5, Elderberry Savanna
6, Riparian Scrub
7, Developed
8, Restoration Area
9, Riverine
10, Valley Oak Woodland
11, Mixed Riparian Forest
12, Cottonwood Riparian Woodland
13, Himalayan Blackberry
14, Pond
15, Live Oak Woodland
Map Extent
Antelope Blvd Bridge
Habitat Mapping
East Sand Slough
Map Date: 2/4/2019
Data source: Forum habitat mapping May 2017
Map Image: Google Earth 5-24-2017
Map Credit: Sacramento River Forum
0
145
290
580
Feet


Antelope Blvd Bridge
Legend
Project Area / ESL
Label, Habitat Type
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14, Pond
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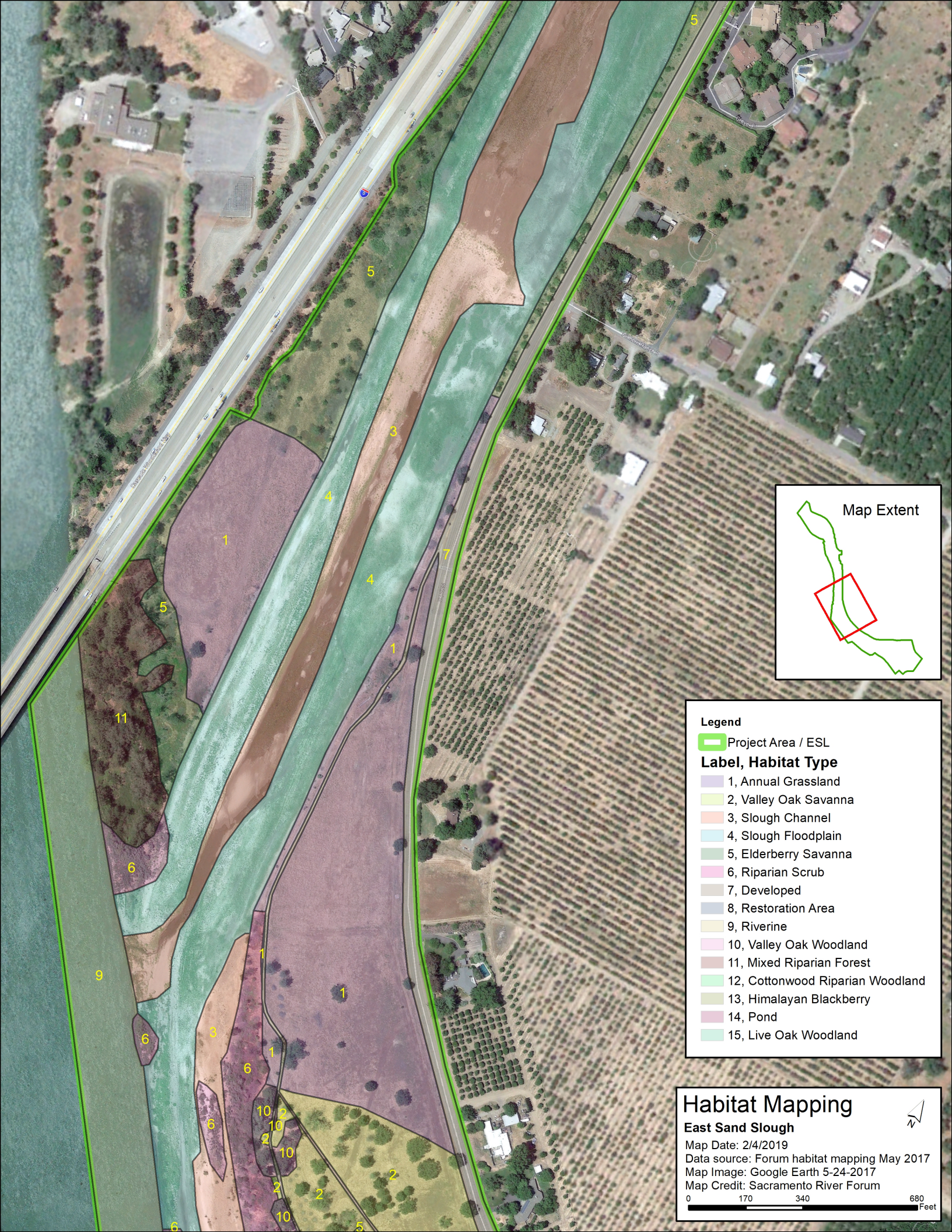
Map Extent
Habitat Mapping
East Sand Slough
Map Date: 2/4/2019
Data source: Forum habitat mapping May 2017
Map Image: Google Earth 5-24-2017
Map Credit: Sacramento River Forum
0
170
340
680
Feet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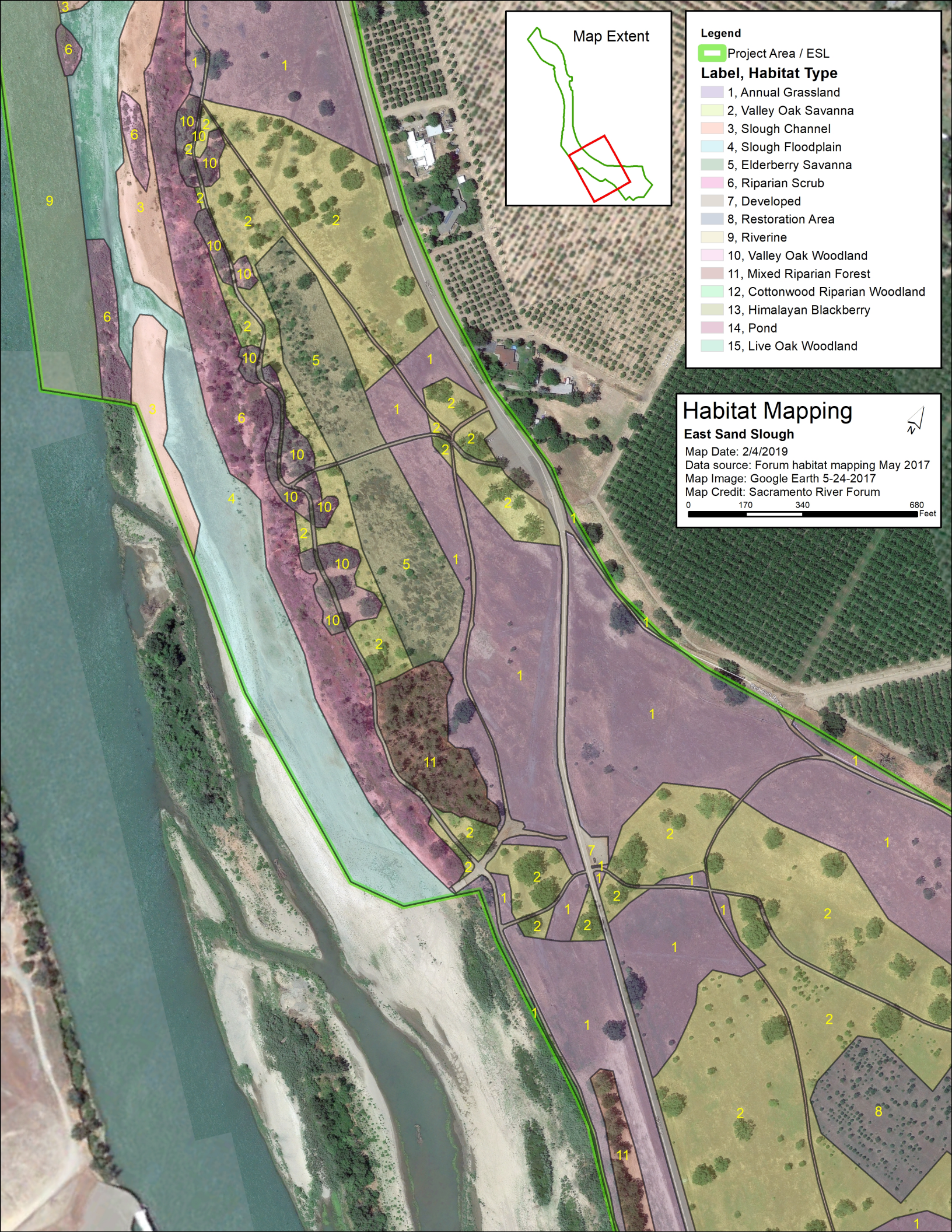
East Sand Slough
Map Date: 2/4/2019
Data source: Forum habitat mapping May 2017
Map Image: Google Earth 5-24-2017
Map Credit: Sacramento River Forum
0
170
340
680
Feet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East Sand Slough
Map Date: 2/4/2019
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Map Image: Google Earth 5-24-2017
Map Credit: Sacramento River Forum
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Habitat Mapping
East Sand Slough
Map Date: 2/4/2019
Data source: Forum habitat mapping May 2017
Map Image: Google Earth 5-24-2017
Map Credit: Sacramento River Forum
0
170
340
680
Feet

Appendix F

California Natural Diversity Database Species Table

SNAME	CNAME	Quad	SITEDATE	OWNERMGT	FEDLIST	CALLIST	GRANK	SRANK	RPLANTRANK	CDFWSTATUS
Oncorhynchus mykiss irideus pop. 11	steelhead - Central Valley DPS	Balls Ferry	2010XXXX	STATE, UNKNOWN	Threatened	None	G5T2Q	S2		
Oncorhynchus mykiss irideus pop. 11	steelhead - Central Valley DPS	Balls Ferry	20091209	UNKNOWN, PVT, USFS	Threatened	None	G5T2Q	S2		
Oncorhynchus mykiss irideus pop. 11	steelhead - Central Valley DPS	Los Molinos	200806XX	USFS-LASSEN NF, UNK	Threatened	None	G5T2Q	S2		
Oncorhynchus tshawytscha pop. 7	chinook salmon - Sacramento River win	Bend	199508XX	PVT, BLM, DPR	Endangered	Endangered	G5	S1		
Oncorhynchus mykiss irideus pop. 11	steelhead - Central Valley DPS	Red Bank	199811XX	UNKNOWN, BLM	Threatened	None	G5T2Q	S2		
Oncorhynchus mykiss irideus pop. 11	steelhead - Central Valley DPS	Panther Spring	20130422	USFS, DFG, UNKNOWN	Threatened	None	G5T2Q	S2		
Vireo bellii pusillus	least Bell's vireo	Los Molinos	19240514	UNKNOWN	Endangered	Endangered	G5T2	S2		
Oncorhynchus mykiss irideus pop. 11	steelhead - Central Valley DPS	Tuscan Buttes NE	2012XXXX	UNKNOWN	Threatened	None	G5T2Q	S2		
Linderiella occidentalis	California linderiella	West of Gerber	19960313	PVT	None	None	G2G3	S2S3		
Rana boylii	foothill yellow-legged frog	Los Molinos	19240514	USFWS, UNKNOWN	None	Candidate Threatened	G3	S3		SSC
Rana boylii	foothill yellow-legged frog	Bend	19260528	UNKNOWN	None	Candidate Threatened	G3	S3		SSC
Rana boylii	foothill yellow-legged frog	Bend	19280405	UNKNOWN	None	Candidate Threatened	G3	S3		SSC
Lepidurus packardi	vernal pool tadpole shrimp	Gerber	20011005	PVT	Endangered	None	G4	S3S4		
Bombus crotchii	Crotch bumble bee	Red Bluff East	19560520	UNKNOWN	None	None	G3G4	S1S2		
Corynorhinus townsendii	Townsend's big-eared bat	Bend	19260527	UNKNOWN	None	None	G3G4	S2		SSC
Northern Hardpan Vernal Pool	Northern Hardpan Vernal Pool	West of Gerber	19800518	UNKNOWN	None	None	G3	S3.1		
Cryptantha crinita	silky cryptantha	Bend	XXXXXXXX	PVT	None	None	G2	S2	1B.2	
Haliaeetus leucocephalus	bald eagle	Balls Ferry	198901XX	PVT-GOVER RANCH	Delisted	Endangered	G5	S3		FP
Icteria virens	yellow-breasted chat	Gerber	19770605	BLM, PVT	None	None	G5	S3		SSC
Coccyzus americanus occidentalis	western yellow-billed cuckoo	Gerber	1990XXXX	BLM, FWS, PVT	Threatened	Endangered	G5T2T3	S1		
Setophaga petechia	yellow warbler	Gerber	19770605	BLM, PVT	None	None	G5	S3S4		SSC
Emys marmorata	western pond turtle	Los Molinos	XXXXXXXX	UNKNOWN	None	None	G3G4	S3		SSC
Rana boylii	foothill yellow-legged frog	Dales	19240601	UNKNOWN	None	Candidate Threatened	G3	S3		SSC
Emys marmorata	western pond turtle	Dales	XXXXXXXX	UNKNOWN	None	None	G3G4	S3		SSC
Vireo bellii pusillus	least Bell's vireo	Dales	19240523	PVT	Endangered	Endangered	G5T2	S2		
Vireo bellii pusillus	least Bell's vireo	Los Molinos	19120611	UNKNOWN	Endangered	Endangered	G5T2	S2		
Rana boylii	foothill yellow-legged frog	Los Molinos	19120613	UNKNOWN	None	Candidate Threatened	G3	S3		SSC
Coccyzus americanus occidentalis	western yellow-billed cuckoo	Los Molinos	19870820	PVT	Threatened	Endangered	G5T2T3	S1		
Central Valley Drainage Hardhead/Squawfi	Central Valley Drainage Hardhead/Squa	Acorn Hollow	1987XXXX	USFS-LASSEN NF	None	None	GNR	SNR		
Great Valley Mixed Riparian Forest	Great Valley Mixed Riparian Forest	Gerber	1987XXXX	UNKNOWN	None	None	G2	S2.2		
Rana boylii	foothill yellow-legged frog	Inskip Hill	19260719	UNKNOWN	None	Candidate Threatened	G3	S3		SSC
Branchinecta lynchi	vernal pool fairy shrimp	West of Gerber	19950329	UNKNOWN	Threatened	None	G3	S3		
Paronychia ahartii	Ahart's paronychia	Bend	19420520	UNKNOWN	None	None	G3	S3	1B.1	
Vireo bellii pusillus	least Bell's vireo	Bend	19280423	UNKNOWN	Endangered	Endangered	G5T2	S2		
Vireo bellii pusillus	least Bell's vireo	Bend	19260525	PVT	Endangered	Endangered	G5T2	S2		
Great Valley Mixed Riparian Forest	Great Valley Mixed Riparian Forest	Vina	1987XXXX	PVT	None	None	G2	S2.2		
Great Valley Valley Oak Riparian Forest	Great Valley Valley Oak Riparian Forest	Red Bluff East	1988XXXX	USFS-MENDOCINO NF	None	None	G1	S1.1		
Central Valley Drainage Fall Run Chinook St	Central Valley Drainage Fall Run Chinoo	Los Molinos	1992XXXX	PVT	None	None	GNR	SNR		
Riparia riparia	bank swallow	Vina	20090611	UNKNOWN, PVT	None	Threatened	G5	S2		
Great Valley Mixed Riparian Forest	Great Valley Mixed Riparian Forest	Red Bluff East	1987XXXX	UNKNOWN	None	None	G2	S2.2		
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	Los Molinos	20031218	USFWS-SACRAMENTO	Threatened	None	G3T2	S2		
Lepidurus packardi	vernal pool tadpole shrimp	Dales	1992XXXX	UNKNOWN	Endangered	None	G4	S3S4		
Linderiella occidentalis	California linderiella	Dales	1992XXXX	UNKNOWN	None	None	G2G3	S2S3		
Agrostis hendersonii	Henderson's bent grass	West of Gerber	19980510	UNKNOWN	None	None	G2Q	S2	3.2	
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	Gerber	19850505	PVT	Threatened	None	G3T2	S2		
Agelaius tricolor	tricolored blackbird	Gerber	19890607	UNKNOWN	None	Candidate Endangered	G2G3	S1S2		SSC
Great Valley Mixed Riparian Forest	Great Valley Mixed Riparian Forest	Bend	1987XXXX	UNKNOWN	None	None	G2	S2.2		

Branchinecta lynchi	vernal pool fairy shrimp	Gerber	20140310	PVT	Threatened	None	G3	S3		
Central Valley Drainage Valley Floor River	Central Valley Drainage Valley Floor Riv	Los Molinos	1987XXXX	PVT	None	None	GNR	SNR		
Great Valley Mixed Riparian Forest	Great Valley Mixed Riparian Forest	Bend	1987XXXX	UNKNOWN	None	None	G2	S2.2		
Cryptantha crinita	silky cryptantha	Hooker	20000501	PVT	None	None	G2	S2	1B.2	
Navarretia leucocephala ssp. bakeri	Baker's navarretia	Bend	197904XX	UNKNOWN	None	None	G4T2	S2	1B.1	
Downingia pusilla	dwarf downingia	Corning	19960403	PVT, DFG-THOMES CR	None	None	GU	S2	2B.2	
Great Valley Mixed Riparian Forest	Great Valley Mixed Riparian Forest	Red Bluff East	1987XXXX	UNKNOWN	None	None	G2	S2.2		
Great Valley Mixed Riparian Forest	Great Valley Mixed Riparian Forest	Bend	1987XXXX	UNKNOWN	None	None	G2	S2.2		
Cryptantha crinita	silky cryptantha	Bend	XXXXXXXX	PVT	None	None	G2	S2	1B.2	
Riparia riparia	bank swallow	Gerber	20080610	PVT, USFWS	None	Threatened	G5	S2		
Great Valley Mixed Riparian Forest	Great Valley Mixed Riparian Forest	Bend	1987XXXX	UNKNOWN	None	None	G2	S2.2		
Orcuttia tenuis	slender Orcutt grass	Bend	19860720	PVT	Threatened	Endangered	G2	S2	1B.1	
Great Valley Valley Oak Riparian Forest	Great Valley Valley Oak Riparian Forest	Gerber	1987XXXX	UNKNOWN	None	None	G1	S1.1		
Haliaeetus leucocephalus	bald eagle	Cottonwood	20050615	PVT, BLM	Delisted	Endangered	G5	S3		FP
Limnanthes floccosa ssp. floccosa	woolly meadowfoam	Tuscan Springs	19940406	DFG-TEHAMA WA	None	None	G4T4	S3	4.2	
Athene cunicularia	burrowing owl	Gerber	19940629	PVT	None	None	G4	S3		SSC
Haliaeetus leucocephalus	bald eagle	Bend	1997XXXX	PVT	Delisted	Endangered	G5	S3		FP
Paronychia ahartii	Ahart's paronychia	Dales	19900405	UNKNOWN	None	None	G3	S3	1B.1	
Paronychia ahartii	Ahart's paronychia	Dales	19900405	UNKNOWN	None	None	G3	S3	1B.1	
Riparia riparia	bank swallow	Bend	20090611	UNKNOWN	None	Threatened	G5	S2		
Cryptantha crinita	silky cryptantha	Red Bluff West	19870610	UNKNOWN	None	None	G2	S2	1B.2	
Branchinecta lynchi	vernal pool fairy shrimp	Gerber	20010216	PVT	Threatened	None	G3	S3		
Spea hammondii	western spadefoot	West of Gerber	20110410	PVT	None	None	G3	S3		SSC
Branchinecta lynchi	vernal pool fairy shrimp	West of Gerber	20010216	PVT	Threatened	None	G3	S3		
Agelaius tricolor	tricolored blackbird	Gerber	19920620	PVT	None	Candidate Endangere	G2G3	S1S2		SSC
Cryptantha crinita	silky cryptantha	Hooker	20060504	UNKNOWN	None	None	G2	S2	1B.2	
Vireo bellii pusillus	least Bell's vireo	Red Bluff East	19240510	UNKNOWN	Endangered	Endangered	G5T2	S2		
Branchinecta lynchi	vernal pool fairy shrimp	West of Gerber	20010216	PVT	Threatened	None	G3	S3		
Northern Hardpan Vernal Pool	Northern Hardpan Vernal Pool	West of Gerber	19800518	UNKNOWN	None	None	G3	S3.1		
Agrostis hendersonii	Henderson's bent grass	West of Gerber	19960502	UNKNOWN	None	None	G2Q	S2	3.2	
Northern Hardpan Vernal Pool	Northern Hardpan Vernal Pool	Red Bluff West	19800518	UNKNOWN	None	None	G3	S3.1		
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	Red Bluff East	19870519	CALTRANS	Threatened	None	G3T2	S2		
Pandion haliaetus	osprey	Red Bluff East	19900608	PVT	None	None	G5	S4		WL
Buteo swainsoni	Swainson's hawk	Gerber	19900416	PVT	None	Threatened	G5	S3		
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	Bend	19890129	UNKNOWN	Threatened	None	G3T2	S2		
Limnanthes floccosa ssp. floccosa	woolly meadowfoam	Bend	19910403	BLM	None	None	G4T4	S3	4.2	
Pandion haliaetus	osprey	Bend	19900608	UNKNOWN	None	None	G5	S4		WL
Riparia riparia	bank swallow	Bend	19870516	PVT	None	Threatened	G5	S2		
Emys marmorata	western pond turtle	Bend	XXXXXXXX	UNKNOWN	None	None	G3G4	S3		SSC
Pandion haliaetus	osprey	Bend	19900608	UNKNOWN	None	None	G5	S4		WL
Riparia riparia	bank swallow	Bend	2008XXXX	PVT	None	Threatened	G5	S2		
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	Red Bluff East	198512XX	UNKNOWN	Threatened	None	G3T2	S2		
Great Valley Willow Scrub	Great Valley Willow Scrub	Gerber	19800511	UNKNOWN	None	None	G3	S3.2		
Riparia riparia	bank swallow	Los Molinos	198606XX	PVT	None	Threatened	G5	S2		
Pandion haliaetus	osprey	Los Molinos	19900608	UNKNOWN	None	None	G5	S4		WL
Pandion haliaetus	osprey	Los Molinos	19900608	UNKNOWN	None	None	G5	S4		WL
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	Bend	19890129	UNKNOWN	Threatened	None	G3T2	S2		
Ardea herodias	great blue heron	Los Molinos	19870606	UNKNOWN	None	None	G5	S4		
Ardea alba	great egret	Los Molinos	19870606	UNKNOWN	None	None	G5	S4		

Limnanthes floccosa ssp. floccosa	woolly meadowfoam	Dales	199505XX	DFG-DALES LAKE ER	None	None	G4T4	S3	4.2	
Cryptantha crinita	silky cryptantha	Hooker	19400501	UNKNOWN	None	None	G2	S2	1B.2	
Lepidurus packardi	vernal pool tadpole shrimp	Dales	20080412	DFG-DALES LAKE ER	Endangered	None	G4	S3S4		
Rana boylii	foothill yellow-legged frog	Los Molinos	19700401	TNC-GRAY DAVIS/DYE	None	Candidate Threatened	G3	S3		SSC
Great Valley Cottonwood Riparian Forest	Great Valley Cottonwood Riparian Fores	Gerber	1987XXXX	UNKNOWN	None	None	G2	S2.1		
Branchinecta lynchi	vernal pool fairy shrimp	Corning	19971221	DFG-THOMES CREEK E	Threatened	None	G3	S3		
Cryptantha crinita	silky cryptantha	Red Bluff West	19860504	UNKNOWN	None	None	G2	S2	1B.2	
Branchinecta lynchi	vernal pool fairy shrimp	Gerber	19971221	PVT	Threatened	None	G3	S3		
Anthicus antiochensis	Antioch Dunes anthicid beetle	Los Molinos	19890807	UNKNOWN	None	None	G1	S1		
Riparia riparia	bank swallow	Los Molinos	20090611	PVT, USFWS, UNKNOV	None	Threatened	G5	S2		
Great Valley Cottonwood Riparian Forest	Great Valley Cottonwood Riparian Fores	Red Bluff East	1987XXXX	UNKNOWN	None	None	G2	S2.1		
Cryptantha crinita	silky cryptantha	Bend	19970412	UNKNOWN	None	None	G2	S2	1B.2	
Great Valley Mixed Riparian Forest	Great Valley Mixed Riparian Forest	Bend	1987XXXX	UNKNOWN	None	None	G2	S2.2		
Riparia riparia	bank swallow	Los Molinos	20080610	USFWS-SACRAMENTO	None	Threatened	G5	S2		
Riparia riparia	bank swallow	Red Bluff East	20080610	UNKNOWN	None	Threatened	G5	S2		
Great Valley Mixed Riparian Forest	Great Valley Mixed Riparian Forest	Red Bluff East	1987XXXX	UNKNOWN	None	None	G2	S2.2		
Riparia riparia	bank swallow	Gerber	19990609	BLM, UNKNOWN	None	Threatened	G5	S2		
Lasiurus cinereus	hoary bat	Los Molinos	19990825	UNKNOWN	None	None	G5	S4		
Lasiurus blossevillii	western red bat	Los Molinos	19990825	UNKNOWN	None	None	G5	S3		SSC
Antrozous pallidus	pallid bat	Los Molinos	19990825	UNKNOWN	None	None	G5	S3		SSC
Corynorhinus townsendii	Townsend's big-eared bat	Los Molinos	19990825	UNKNOWN	None	None	G3G4	S2		SSC
Myotis yumanensis	Yuma myotis	Los Molinos	19990825	UNKNOWN	None	None	G5	S4		
Myotis evotis	long-eared myotis	Los Molinos	19990825	UNKNOWN	None	None	G5	S3		
Lasiurus cinereus	hoary bat	Dales	19390914	UNKNOWN	None	None	G5	S4		
Antrozous pallidus	pallid bat	Dales	19240604	UNKNOWN	None	None	G5	S3		SSC
Gratiola heterosepala	Boggs Lake hedge-hyssop	Dales	20110624	DFG-DALES LAKE ER	None	Endangered	G2	S2	1B.2	
Great Valley Mixed Riparian Forest	Great Valley Mixed Riparian Forest	Red Bluff East	1987XXXX	UNKNOWN	None	None	G2	S2.2		
Great Valley Mixed Riparian Forest	Great Valley Mixed Riparian Forest	Bend	1987XXXX	UNKNOWN	None	None	G2	S2.2		
Agrostis hendersonii	Henderson's bent grass	Dales	19950509	DFG-DALES LAKE ER	None	None	G2Q	S2	3.2	
Rana boylii	foothill yellow-legged frog	Los Molinos	19960911	TNC-GRAY DAVIS/DYE	None	Candidate Threatened	G3	S3		SSC
Orcuttia tenuis	slender Orcutt grass	Dales	20140528	BLM	Threatened	Endangered	G2	S2	1B.1	
Coccyzus americanus occidentalis	western yellow-billed cuckoo	Los Molinos	20130716	USFWS-SACRAMENTO	Threatened	Endangered	G5T2T3	S1		
Great Valley Cottonwood Riparian Forest	Great Valley Cottonwood Riparian Fores	Los Molinos	1987XXXX	UNKNOWN	None	None	G2	S2.1		
Paronychia ahartii	Ahart's paronychia	Dales	20000425	BLM, UNKNOWN	None	None	G3	S3	1B.1	
Great Valley Cottonwood Riparian Forest	Great Valley Cottonwood Riparian Fores	Red Bluff East	1987XXXX	UNKNOWN	None	None	G2	S2.1		
Anthicus sacramento	Sacramento anthicid beetle	Los Molinos	19890807	UNKNOWN	None	None	G1	S1		
Great Valley Mixed Riparian Forest	Great Valley Mixed Riparian Forest	Los Molinos	1987XXXX	UNKNOWN	None	None	G2	S2.2		
Orcuttia tenuis	slender Orcutt grass	Dales	20110812	DFG, PVT	Threatened	Endangered	G2	S2	1B.1	
Riparia riparia	bank swallow	Gerber	20090611	USFWS-SACRAMENTO	None	Threatened	G5	S2		
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	Red Bluff East	20010526	PVT	Threatened	None	G3T2	S2		
Lasiurus cinereus	hoary bat	Bend	19990920	UNKNOWN	None	None	G5	S4		
Myotis yumanensis	Yuma myotis	Bend	19990920	UNKNOWN	None	None	G5	S4		
Myotis evotis	long-eared myotis	Bend	19990920	UNKNOWN	None	None	G5	S3		
Antrozous pallidus	pallid bat	Bend	19990920	UNKNOWN	None	None	G5	S3		SSC
Lasiurus blossevillii	western red bat	Bend	19990920	UNKNOWN	None	None	G5	S3		SSC
Riparia riparia	bank swallow	Los Molinos	20090611	UNKNOWN	None	Threatened	G5	S2		
Riparia riparia	bank swallow	Gerber	20040609	UNKNOWN	None	Threatened	G5	S2		
Limnanthes floccosa ssp. floccosa	woolly meadowfoam	Tuscan Springs	19920411	PVT	None	None	G4T4	S3	4.2	
Riparia riparia	bank swallow	Los Molinos	20080610	USFWS-SACRAMENTO	None	Threatened	G5	S2		

Vireo bellii pusillus	least Bell's vireo	Red Bluff East	19240512	UNKNOWN	Endangered	Endangered	G5T2	S2		
Downingia pusilla	dwarf downingia	West of Gerber	19950510	PVT	None	None	GU	S2	2B.2	
Riparia riparia	bank swallow	Los Molinos	20090611	UNKNOWN	None	Threatened	G5	S2		
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	Gerber	20031218	USFWS-SACRAMENTO	Threatened	None	G3T2	S2		
Acmispon rubriflorus	red-flowered bird's-foot-trefoil	Dales	19930514	PVT, PVT-PGE	None	None	G2	S2	1B.1	
Limnanthes floccosa ssp. floccosa	woolly meadowfoam	Dales	19950413	BLM	None	None	G4T4	S3	4.2	
Limnanthes floccosa ssp. floccosa	woolly meadowfoam	Dales	1995XXXX	DFG-DALES LAKE ER	None	None	G4T4	S3	4.2	
Paronychia ahartii	Ahart's paronychia	Bend	20030501	BLM	None	None	G3	S3	1B.1	
Gratiola heterosepala	Boggs Lake hedge-hyssop	Dales	19960512	BLM	None	Endangered	G2	S2	1B.2	
Paronychia ahartii	Ahart's paronychia	West of Gerber	19880325	UNKNOWN	None	None	G3	S3	1B.1	
Linderiella occidentalis	California linderiella	Dales	20000225	DFG-DALES LAKE ER	None	None	G2G3	S2S3		
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	Cottonwood	20090616	CALTRANS	Threatened	None	G3T2	S2		
Legenere limosa	legenere	Dales	1996XXXX	BLM	None	None	G2	S2	1B.1	
Sagittaria sanfordii	Sanford's arrowhead	Dales	20010528	BLM	None	None	G3	S3	1B.2	
Agelaius tricolor	tricolored blackbird	Hooker	20100519	UNKNOWN, PVT	None	Candidate Endangere	G2G3	S1S2		SSC
Paronychia ahartii	Ahart's paronychia	Dales	19900404	UNKNOWN	None	None	G3	S3	1B.1	
Corynorhinus townsendii	Townsend's big-eared bat	Los Molinos	19990825	TEH COUNTY, BLM, TN	None	None	G3G4	S2		SSC
Lasiurus cinereus	hoary bat	Los Molinos	19990825	TEH COUNTY, BLM, TN	None	None	G5	S4		
Antrozous pallidus	pallid bat	Los Molinos	19990825	TEH COUNTY, BLM, TN	None	None	G5	S3		SSC
Lasiurus blossevillii	western red bat	Los Molinos	19990825	TEH COUNTY, BLM, TN	None	None	G5	S3		SSC
Myotis yumanensis	Yuma myotis	Los Molinos	19990825	TEH COUNTY, BLM, TN	None	None	G5	S4		
Myotis evotis	long-eared myotis	Los Molinos	19990825	TEH COUNTY, BLM, TN	None	None	G5	S3		
Lasionycteris noctivagans	silver-haired bat	Red Bluff East	19990919	UNKNOWN	None	None	G5	S3S4		
Myotis yumanensis	Yuma myotis	Red Bluff East	19990923	UNKNOWN	None	None	G5	S4		
Lasiurus cinereus	hoary bat	Red Bluff East	19990822	UNKNOWN	None	None	G5	S4		
Lasiurus blossevillii	western red bat	Red Bluff East	19990923	UNKNOWN	None	None	G5	S3		SSC
Antrozous pallidus	pallid bat	Red Bluff East	19990919	UNKNOWN	None	None	G5	S3		SSC
Eumops perotis californicus	western mastiff bat	Tuscan Springs	199409XX	DFG-BUTLER SLOUGH	None	None	G5T4	S3S4		SSC
Lasiurus blossevillii	western red bat	Red Bluff East	19990920	UNKNOWN	None	None	G5	S3		SSC
Lasiurus cinereus	hoary bat	Red Bluff East	19990824	UNKNOWN	None	None	G5	S4		
Myotis evotis	long-eared myotis	Red Bluff East	19990824	UNKNOWN	None	None	G5	S3		
Myotis yumanensis	Yuma myotis	Red Bluff East	19990824	UNKNOWN	None	None	G5	S4		
Antrozous pallidus	pallid bat	Red Bluff East	19990920	UNKNOWN	None	None	G5	S3		SSC
Branchinecta lynchi	vernal pool fairy shrimp	Gerber	20041214	CALTRANS	Threatened	None	G3	S3		
Paronychia ahartii	Ahart's paronychia	Dales	20010413	UNKNOWN	None	None	G3	S3	1B.1	
Lasiurus cinereus	hoary bat	Red Bluff East	19990823	UNKNOWN	None	None	G5	S4		
Lasiurus blossevillii	western red bat	Red Bluff East	19990823	UNKNOWN	None	None	G5	S3		SSC
Antrozous pallidus	pallid bat	Red Bluff East	19990823	UNKNOWN	None	None	G5	S3		SSC
Myotis evotis	long-eared myotis	Red Bluff East	19990823	UNKNOWN	None	None	G5	S3		
Myotis yumanensis	Yuma myotis	Red Bluff East	19990823	UNKNOWN	None	None	G5	S4		
Coccyzus americanus occidentalis	western yellow-billed cuckoo	Red Bluff East	20100630	USFWS-SACRAMENTO	Threatened	Endangered	G5T2T3	S1		
Riparia riparia	bank swallow	Bend	20090611	UNKNOWN	None	Threatened	G5	S2		
Coccyzus americanus occidentalis	western yellow-billed cuckoo	Red Bluff East	20130730	USFWS-SACRAMENTO	Threatened	Endangered	G5T2T3	S1		
Spea hammondii	western spadefoot	West of Gerber	20110410	PVT	None	None	G3	S3		SSC
Pandion haliaetus	osprey	Gerber	20040609	UNKNOWN	None	None	G5	S4		WL
Riparia riparia	bank swallow	Bend	20090611	UNKNOWN	None	Threatened	G5	S2		
Antrozous pallidus	pallid bat	Los Molinos	19990825	TNC-GRAY DAVIS/DYE	None	None	G5	S3		SSC
Lasiurus cinereus	hoary bat	Los Molinos	19990825	TNC-GRAY DAVIS/DYE	None	None	G5	S4		
Myotis evotis	long-eared myotis	Los Molinos	19990825	TNC-GRAY DAVIS/DYE	None	None	G5	S3		

Myotis yumanensis	Yuma myotis	Los Molinos	19990825	TNC-GRAY DAVIS/DYE	None	None	G5	S4		
Lasiurus blossevillii	western red bat	Los Molinos	19990825	TNC-GRAY DAVIS/DYE	None	None	G5	S3		SSC
Corynorhinus townsendii	Townsend's big-eared bat	Los Molinos	19990825	TNC-GRAY DAVIS/DYE	None	None	G3G4	S2		SSC
Juncus leiospermus var. leiospermus	Red Bluff dwarf rush	West of Gerber	199810XX	PVT	None	None	G2T2	S2	1B.1	
Athene cunicularia	burrowing owl	Gerber	19940713	PVT	None	None	G4	S3		SSC
Riparia riparia	bank swallow	Red Bluff East	20030611	UNKNOWN	None	Threatened	G5	S2		
Legenere limosa	legenere	Dales	20020426	DFG-DALES LAKE ER, P	None	None	G2	S2	1B.1	
Riparia riparia	bank swallow	Red Bluff East	20030611	UNKNOWN	None	Threatened	G5	S2		
Paronychia ahartii	Ahart's paronychia	Bend	19970718	BLM	None	None	G3	S3	1B.1	
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	Los Molinos	20031218	USFWS-SACRAMENTO	Threatened	None	G3T2	S2		
Branchinecta lynchi	vernal pool fairy shrimp	Red Bluff East	20110120	PVT	Threatened	None	G3	S3		
Paronychia ahartii	Ahart's paronychia	Tuscan Springs	19910429	PVT, BLM-REDDING RA	None	None	G3	S3	1B.1	
Riparia riparia	bank swallow	Los Molinos	19980617	UNKNOWN	None	Threatened	G5	S2		
Paronychia ahartii	Ahart's paronychia	West of Gerber	19950510	PVT-GREEN DIAMOND	None	None	G3	S3	1B.1	
Sagittaria sanfordii	Sanford's arrowhead	Dales	20110809	DFG-DALES LAKE ER	None	None	G3	S3	1B.2	
Andrena blennospermatis	Blennosperma vernal pool andrenid bee	Dales	19XXXXXX	DFG-DALES LAKE ER	None	None	G2	S2		
Buteo swainsoni	Swainson's hawk	Gerber	20130630	PVT	None	Threatened	G5	S3		
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	Hooker	2006XXXX	TEH-COUNTY	Threatened	None	G3T2	S2		
Paronychia ahartii	Ahart's paronychia	Bend	19960502	BLM	None	None	G3	S3	1B.1	
Limnanthes floccosa ssp. floccosa	woolly meadowfoam	Dales	19960318	BLM	None	None	G4T4	S3	4.2	
Branchinecta lynchi	vernal pool fairy shrimp	Red Bluff East	20031215	UNKNOWN	Threatened	None	G3	S3		
Orcuttia tenuis	slender Orcutt grass	Dales	19860723	PVT	Threatened	Endangered	G2	S2	1B.1	
Orcuttia tenuis	slender Orcutt grass	Dales	20110812	PVT	Threatened	Endangered	G2	S2	1B.1	
Sagittaria sanfordii	Sanford's arrowhead	Dales	19920721	PVT	None	None	G3	S3	1B.2	
Orcuttia tenuis	slender Orcutt grass	Dales	20110812	PVT	Threatened	Endangered	G2	S2	1B.1	
Gratiola heterosepala	Boggs Lake hedge-hyssop	Dales	20110624	PVT	None	Endangered	G2	S2	1B.2	
Orcuttia tenuis	slender Orcutt grass	Dales	20110809	DFG-DALES LAKE ER	Threatened	Endangered	G2	S2	1B.1	
Juncus leiospermus var. ahartii	Ahart's dwarf rush	Red Bluff East	20040324	PVT	None	None	G2T1	S1	1B.2	
Juncus leiospermus var. leiospermus	Red Bluff dwarf rush	Red Bluff East	20040324	PVT-HABITAT FOR HU	None	None	G2T2	S2	1B.1	
Paronychia ahartii	Ahart's paronychia	Bend	19960502	BLM	None	None	G3	S3	1B.1	
Juncus leiospermus var. leiospermus	Red Bluff dwarf rush	Red Bluff East	19980505	PVT	None	None	G2T2	S2	1B.1	
Orcuttia tenuis	slender Orcutt grass	Dales	20110812	PVT	Threatened	Endangered	G2	S2	1B.1	
Fritillaria pluriflora	adobe-lily	Tuscan Springs	20080310	TNC-GRAY DAVIS/DYE	None	None	G2G3	S2S3	1B.2	
Orcuttia tenuis	slender Orcutt grass	Dales	20110809	DFG-DALES LAKE ER	Threatened	Endangered	G2	S2	1B.1	
Paronychia ahartii	Ahart's paronychia	Dales	20050524	BLM-REDDING RA, PV	None	None	G3	S3	1B.1	
Orcuttia tenuis	slender Orcutt grass	Dales	20110812	BLM	Threatened	Endangered	G2	S2	1B.1	
Gratiola heterosepala	Boggs Lake hedge-hyssop	Dales	20110624	BLM-REDDING RA	None	Endangered	G2	S2	1B.2	
Paronychia ahartii	Ahart's paronychia	Dales	19950425	UNKNOWN	None	None	G3	S3	1B.1	
Emys marmorata	western pond turtle	Los Molinos	20160919	UNKNOWN	None	None	G3G4	S3		SSC
Emys marmorata	western pond turtle	Red Bluff East	20160504	PVT	None	None	G3G4	S3		SSC
Sagittaria sanfordii	Sanford's arrowhead	Bend	20110617	DFG	None	None	G3	S3	1B.2	
Cryptantha crinita	silky cryptantha	Dales	20060502	THE NATURE CONSERV	None	None	G2	S2	1B.2	
Limnanthes floccosa ssp. floccosa	woolly meadowfoam	Bend	19920413	UNKNOWN	None	None	G4T4	S3	4.2	
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	Red Bluff East	20010526	PVT	Threatened	None	G3T2	S2		
Paronychia ahartii	Ahart's paronychia	Bend	1996XXXX	BLM	None	None	G3	S3	1B.1	
Paronychia ahartii	Ahart's paronychia	Bend	19960506	BLM	None	None	G3	S3	1B.1	
Paronychia ahartii	Ahart's paronychia	Bend	1996XXXX	BLM	None	None	G3	S3	1B.1	
Limnanthes floccosa ssp. floccosa	woolly meadowfoam	Dales	19940401	PVT	None	None	G4T4	S3	4.2	
Limnanthes floccosa ssp. floccosa	woolly meadowfoam	Bend	19960318	BLM	None	None	G4T4	S3	4.2	

Limnanthes floccosa ssp. floccosa	woolly meadowfoam	Dales	19950425	PVT	None	None	G4T4	S3	4.2	
Limnanthes floccosa ssp. floccosa	woolly meadowfoam	Dales	19940401	PVT	None	None	G4T4	S3	4.2	
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	Red Bluff East	20010507	PVT-PGE	Threatened	None	G3T2	S2		
Andrena blennospermatis	Blennosperma vernal pool andrenid bee	Red Bluff East	19XXXXXX	UNKNOWN	None	None	G2	S2		
Euphorbia ocellata ssp. rattanii	Stony Creek spurge	Gerber	20070818	PVT-PGE	None	None	G4T3	S3	1B.2	
Fritillaria pluriflora	adobe-lily	Los Molinos	XXXXXXXX	TNC-GRAY DAVIS/DYE	None	None	G2G3	S2S3	1B.2	
Riparia riparia	bank swallow	Los Molinos	20120622	UNKNOWN	None	Threatened	G5	S2		
Riparia riparia	bank swallow	Bend	20050519	BLM	None	Threatened	G5	S2		
Buteo swainsoni	Swainson's hawk	Gerber	20130531	UNKNOWN	None	Threatened	G5	S3		
Buteo swainsoni	Swainson's hawk	Gerber	20130528	UNKNOWN	None	Threatened	G5	S3		
Agelaius tricolor	tricolored blackbird	Bend	20050519	BLM	None	Candidate Endangere	G2G3	S1S2		SSC
Spea hammondii	western spadefoot	Hooker	20060425	UNKNOWN	None	None	G3	S3		SSC
Athene cunicularia	burrowing owl	West of Gerber	20160207	UNKNOWN	None	None	G4	S3		SSC
Agelaius tricolor	tricolored blackbird	Bend	20050519	BLM	None	Candidate Endangere	G2G3	S1S2		SSC
Pandion haliaetus	osprey	Hooker	20060413	PVT	None	None	G5	S4		WL
Agrostis hendersonii	Henderson's bent grass	Bend	19960603	BLM	None	None	G2Q	S2	3.2	
Cryptantha crinita	silky cryptantha	Red Bluff West	20070508	UNKNOWN	None	None	G2	S2	1B.2	
Fritillaria pluriflora	adobe-lily	Red Bluff West	20070309	UNKNOWN	None	None	G2G3	S2S3	1B.2	
Athene cunicularia	burrowing owl	Gerber	1993XXXX	PVT	None	None	G4	S3		SSC
Athene cunicularia	burrowing owl	Gerber	1993XXXX	PVT	None	None	G4	S3		SSC
Elanus leucurus	white-tailed kite	Gerber	19930517	PVT	None	None	G5	S3S4		FP
Paronychia ahartii	Ahart's paronychia	Gerber	19960508	PVT	None	None	G3	S3	1B.1	
Paronychia ahartii	Ahart's paronychia	Gerber	19960508	PVT	None	None	G3	S3	1B.1	
Elanus leucurus	white-tailed kite	Gerber	19930519	PVT	None	None	G5	S3S4		FP
Orcuttia tenuis	slender Orcutt grass	Bend	20110810	BLM	Threatened	Endangered	G2	S2	1B.1	
Buteo swainsoni	Swainson's hawk	Red Bluff East	199308XX	PVT	None	Threatened	G5	S3		
Athene cunicularia	burrowing owl	Red Bluff East	1992XXXX	PVT	None	None	G4	S3		SSC
Downingia pusilla	dwarf downingia	Red Bluff East	19920406	PVT	None	None	GU	S2	2B.2	
Orcuttia tenuis	slender Orcutt grass	Bend	19870818	PVT	Threatened	Endangered	G2	S2	1B.1	
Paronychia ahartii	Ahart's paronychia	Tuscan Springs	19910528	BLM-REDDING RA	None	None	G3	S3	1B.1	
Gratiola heterosepala	Boggs Lake hedge-hyssop	Dales	19930511	PVT	None	Endangered	G2	S2	1B.2	
Orcuttia tenuis	slender Orcutt grass	Dales	19860723	PVT	Threatened	Endangered	G2	S2	1B.1	
Rana boylii	foothill yellow-legged frog	Dales	19930401	PVT	None	Candidate Threatened	G3	S3		SSC
Athene cunicularia	burrowing owl	Dales	19930209	PVT	None	None	G4	S3		SSC
Gratiola heterosepala	Boggs Lake hedge-hyssop	Dales	19920408	PVT	None	Endangered	G2	S2	1B.2	
Lepidurus packardi	vernal pool tadpole shrimp	Dales	19960511	PVT	Endangered	None	G4	S3S4		
Gratiola heterosepala	Boggs Lake hedge-hyssop	Dales	19930511	PVT	None	Endangered	G2	S2	1B.2	
Athene cunicularia	burrowing owl	Dales	19931016	PVT	None	None	G4	S3		SSC
Sagittaria sanfordii	Sanford's arrowhead	Dales	20110809	PVT	None	None	G3	S3	1B.2	
Orcuttia tenuis	slender Orcutt grass	Dales	20110812	PVT	Threatened	Endangered	G2	S2	1B.1	
Downingia pusilla	dwarf downingia	Red Bluff East	19980505	CITY OF RED BLUFF	None	None	GU	S2	2B.2	
Orcuttia tenuis	slender Orcutt grass	Dales	20110812	PVT, BLM	Threatened	Endangered	G2	S2	1B.1	
Paronychia ahartii	Ahart's paronychia	Bend	20020509	BLM	None	None	G3	S3	1B.1	
Orcuttia tenuis	slender Orcutt grass	Dales	20110812	PVT	Threatened	Endangered	G2	S2	1B.1	
Orcuttia tenuis	slender Orcutt grass	Dales	20110812	PVT	Threatened	Endangered	G2	S2	1B.1	
Legenere limosa	legenere	Gerber	19980427	PVT	None	None	G2	S2	1B.1	
Paronychia ahartii	Ahart's paronychia	Dales	19950425	UNKNOWN	None	None	G3	S3	1B.1	
Paronychia ahartii	Ahart's paronychia	Bend	19960408	BLM	None	None	G3	S3	1B.1	
Downingia pusilla	dwarf downingia	West of Gerber	19880325	UNKNOWN	None	None	GU	S2	2B.2	

Legenere limosa	legenere	Gerber	19980427	PVT	None	None	G2	S2	1B.1	
Paronychia ahartii	Ahart's paronychia	Bend	20030415	BLM	None	None	G3	S3	1B.1	
Orcuttia tenuis	slender Orcutt grass	Dales	20110812	BLM	Threatened	Endangered	G2	S2	1B.1	
Cryptantha crinita	silky cryptantha	Red Bluff East	19810430	PVT	None	None	G2	S2	1B.2	
Juncus leiospermus var. leiospermus	Red Bluff dwarf rush	Bend	20030506	BLM	None	None	G2T2	S2	1B.1	
Orcuttia tenuis	slender Orcutt grass	Dales	20110809	PVT	Threatened	Endangered	G2	S2	1B.1	
Paronychia ahartii	Ahart's paronychia	Dales	20000426	BLM	None	None	G3	S3	1B.1	
Paronychia ahartii	Ahart's paronychia	Dales	20020607	BLM	None	None	G3	S3	1B.1	
Cryptantha crinita	silky cryptantha	Bend	19920429	BLM-REDDING RA	None	None	G2	S2	1B.2	
Downingia pusilla	dwarf downingia	West of Gerber	19950510	UNKNOWN	None	None	GU	S2	2B.2	
Orcuttia tenuis	slender Orcutt grass	Dales	20110809	DFG-DALES LAKE ER	Threatened	Endangered	G2	S2	1B.1	

Appendix G

IPAC Habitat Assessment Guidelines

U.S. Fish & Wildlife Service

East Sand Slough Side Channel Project

Habitat Assessment Guidelines (1 Species)

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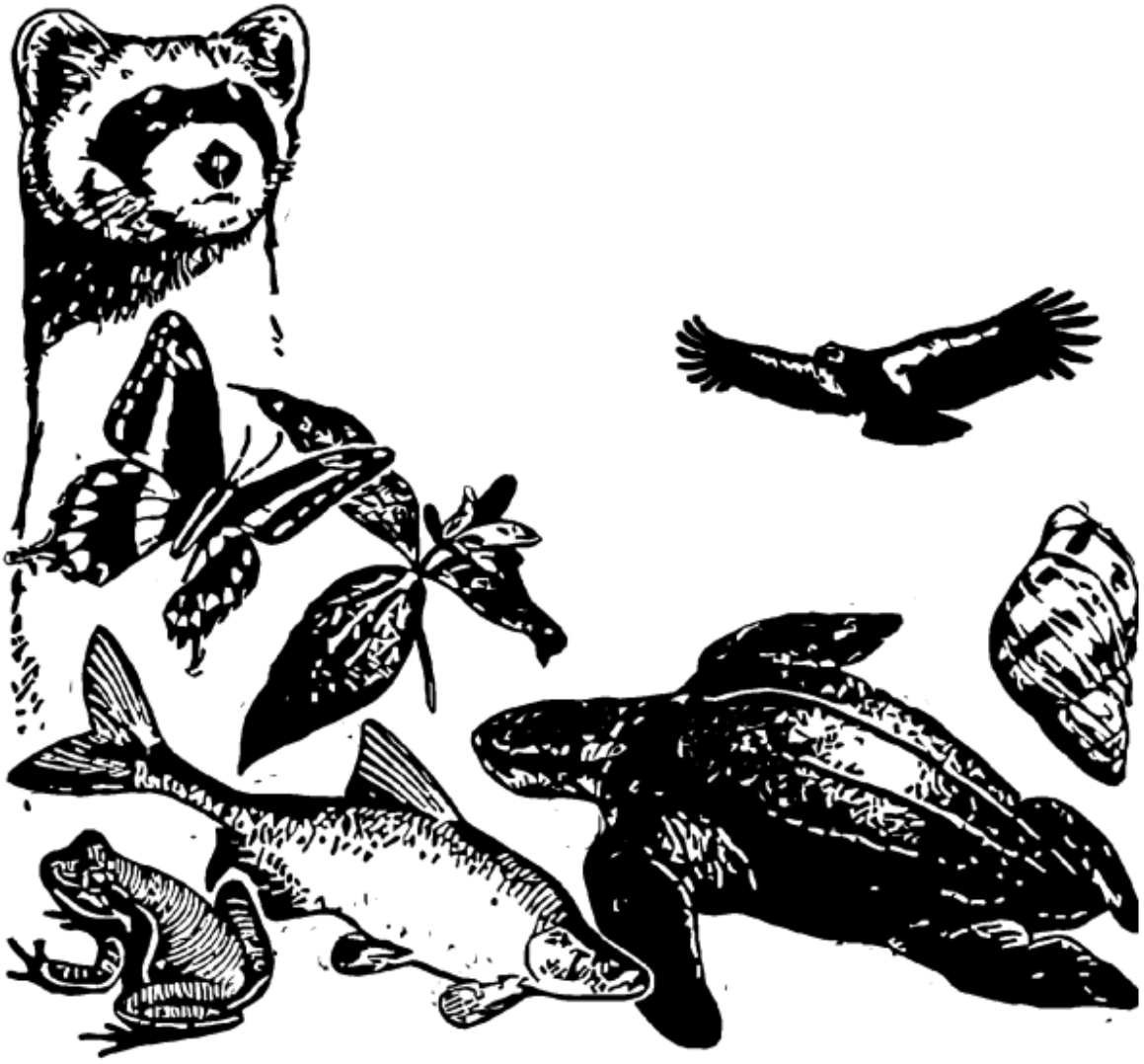

IPaC - Information for Planning and Consultation (https://ecos.fws.gov/ipac/): A project planning tool to help streamline the U.S. Fish and Wildlife Service environmental review process.

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Species Document Availability

Species with habitat assessment guidelines

Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus*

Species without habitat assessment guidelines available

California Red-legged Frog *Rana draytonii*

Conservancy Fairy Shrimp *Branchinecta conservatio*

Delta Smelt *Hypomesus transpacificus*

Giant Garter Snake *Thamnophis gigas*

Slender Orcutt Grass *Orcuttia tenuis*

Vernal Pool Fairy Shrimp *Branchinecta lynchi*

Vernal Pool Tadpole Shrimp *Lepidurus packardi*

Yellow-billed Cuckoo *Coccyzus americanus*

Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle

(*Desmocerus californicus dimorphus*)

May 2017

Service Contact

The Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*) (Framework) was prepared by the U.S. Fish and Wildlife Service's Sacramento Fish and Wildlife Office. If you have questions regarding the Framework, please call (916) 414-6600. To download a copy of the Framework please visit:
https://www.fws.gov/sacramento/documents/VELB_Framework.pdf

Suggested Citation

U.S. Fish and Wildlife Service. 2017. Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*). U.S. Fish and Wildlife Service; Sacramento, California. 28 pp.

1.0 Introduction

The U.S. Fish and Wildlife Service (Service) is issuing this Framework to assist Federal agencies and non-federal parties in evaluating the potential effects of their projects on the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (VELB), listed as threatened under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act). This framework can be consulted during the development of any project that may affect VELB or its habitat. It is intended to help project applicants assess potential effects to the VELB and develop measures to avoid, minimize, and compensate for adverse effects to the species or its habitat. It may also help determine whether those projects will require incidental take authorization through a section 7 consultation or a section 10(a)(1)(B) permit. Proposed projects that will have large landscape level impacts, are likely to provide a net conservation benefit, or will involve riparian restoration may need a different or more detailed analysis than what is provided here. Applicants and agencies proposing these, or similar types of projects, should discuss the project with the Service early in the planning process. The Framework may still provide guidance for an effects analysis, but these projects may exercise more flexibility when implementing conservation measures and compensation.

The primary goal of this document is to articulate a conceptual ecological model for the species. This framework represents the Sacramento Fish and Wildlife Office's current analytical approach for evaluating and assessing adverse effects to the VELB. It will be updated as new information becomes available. As always, the Service welcomes dialog and discussion with our partners in assessing impacts for particular projects and encourages project proponents to consult with the Service early in project development whenever possible.

The VELB is protected under the Act wherever it is found. Visual surveys for the VELB, which includes looking for adults and/or exit holes, are currently the only approved method of surveying for the species and are not entirely reliable for determining presence or absence (see below). Visual surveys, habitat assessments, and mitigation site monitoring do not require a section 10(a)(1)(A) recovery permit. Inquiries about other survey methods, recovery permits, and research should be directed to the Listing and Recovery Division at (916) 414-6600.

1.1 Previous Federal Actions

The VELB was listed as a threatened species under the Act on August 8, 1980 (Federal Register 45: 52803-52807). Concurrent with the final listing rule, two areas in Sacramento County were designated as critical habitat for the VELB (Appendix A). The first area, referred to as the "Sacramento Zone", is enclosed by California State Route 160 to the north, the Western Pacific railroad tracks to the west/southwest, and by Commerce Circle to the east. The second area, referred to as the "American River Parkway Zone", is actually two separate areas along the south bank of the American River in Rancho Cordova. A recovery plan for VELB was completed on June 28, 1984; however, due to a lack of information regarding VELB life history, distribution, and habitat requirements, the recovery plan

only described interim actions and not precise recommendations (Service 1984). For more information about VELB, its designated critical habitat, and the VELB recovery plan, please visit: https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=7850.

On September 10, 2010, the Service was petitioned to delist the VELB and on August 19, 2011, the Service responded with a 90-day finding that determined the petition contained substantial information indicating that delisting VELB may be warranted (Federal Register 76: 51929-51931). On October 2, 2012, the Service published a proposed rule to delist VELB and to remove the species' critical habitat designation (Federal Register 77: 60238-60276). However, after receiving additional information regarding VELB, the Service did not delist the species and published the September 17, 2014, Withdrawal of the Proposed Rule to Remove the Valley Elderberry Longhorn Beetle From the Federal List of Endangered and Threatened Wildlife (Federal Register 79: 55874-55917) (Withdrawal Rule). The August 8, 1980, final listing rule and the Withdrawal Rule both described habitat loss as the primary threat to the species.

2.0 Life History

The VELB is a small (0.5 - 0.8 in.) wood-boring beetle in the *Cerambycid* family. It is sexually dimorphic and the females are indistinguishable from the more widespread California elderberry longhorn beetle (*Desmocerus californicus californicus*). Elderberry shrubs (*Sambucus* spp.) are the obligate larval host plants for the VELB (Collinge et al. 2001, Holyoak 2010) and their larvae go through several developmental stages (instars) within the elderberry shrub (Greenberg 2009). Eggs are laid individually on leaves or at the junctions of the leaf stalk and main stem (Barr 1991). Upon hatching, the larvae bore into the elderberry stem (Halstead and Oldham 1990) and create feeding galleries in the pith (Burke 1921, Barr 1991). Prior to pupation, the larvae creates an exit hole, plugs the hole with wood shavings, and returns to the gallery where it pupates (Halstead and Oldham 1990). Approximately 1 month later, the adult beetle emerges from the stem through the previously created exit hole (Burke 1921). Adult emergence, mating, and egg-laying, occurs in the spring and summer (March to July), typically coinciding with the elderberry flowering period (Burke 1921, Halstead and Oldham 1990). Under laboratory conditions, adult males typically live 4 to 5 days, while females can live up to 3 weeks (Arnold 1984). The only identifiable exterior evidence of elderberry use by VELB is the exit hole created by the larvae.

3.0 Range and Habitat Description

The VELB is protected wherever found. The current presumed range extends throughout the Central Valley (https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=7850). The range extends from approximately Shasta County in the north to Fresno County in the south including the valley floor and lower foothills. The majority of VELB have been documented below 152 meters (500 feet) in elevation. Areas above 152 meters (500 feet) with suitable habitat and known VELB occurrences in that drainage may contain VELB populations in certain circumstances. The Service can assist in determining the likelihood of occupancy above 500 feet.

3.1 Habitat

Historically, the Central Valley had large (3.2-8.0 km wide), undisturbed expanses of riparian vegetation associated with the watersheds that drained the west side of the Sierra Nevada Mountains and the east side of the Coast Mountain Range. These watershed systems were highly dynamic and their floodplains supported a wide corridor of riparian vegetation (Katibah 1984) in a diverse mosaic of structures and species assemblages from early successional to mature gallery forest (Gilbart 2009).

During the last 150 years California's Central Valley riparian forests have experienced extensive vegetation loss due to expansive agricultural and urban development (Katibah 1984), and in many places, have dwindled to discontinuous, narrow corridors. Natural areas bordering the rivers, which once supported vast tracts of riparian vegetation, became prime agricultural land (Thompson 1961). As agriculture and urbanization expanded in the Central Valley, needs for increased water supply and flood protection spurred water development and reclamation projects. Artificial levees, river channelization, dam building, water diversion, and heavy groundwater pumping have further reduced riparian vegetation to small, isolated fragments (Katibah 1984). In many places, flood control levees have been installed adjacent to and parallel with the river, effectively sectioning the riparian forest habitat into discrete communities on either side of the levee. In recent decades, riparian areas in the Central Valley have continued to decline as a result of ongoing agricultural conversion, urban development, stream channelization and channel hardening.

Elderberry shrubs are common in the Central Valley where they grow naturally in a variety of riparian and non-riparian vegetative communities (Vaghti and Greco 2007). Most elderberry presence within the Central Valley is determined by broad scale hydrologic regimes such as the relative elevation of floodplain and floodplain width, and secondarily by sediment texture and topography (Fremier and Talley 2009). Elderberry shrubs are most common on higher and older riparian terraces, where the roots of the plant are able to reach the water table and where the plants are not inundated for long periods (Talley 2005; Vaghti et al. 2009). Elderberry shrubs can be found on historic floodplain terraces above the river, on levees (both on the river and land sides), and along canals, ditches, and areas where subsurface flow provides water to elderberry roots. Elderberry shrubs typically occur in most vegetation communities that occupy historic and current floodplains and terraces, to the top of channel walls in deeply incised rivers (i.e., the Tuolumne and Stanislaus Rivers), and to the top of and on the land-side of levees where woody plants create savannas or patchy woodlands. Elderberry can be a canopy or subcanopy species depending on the hydrology, vegetation composition, or disturbance at a particular site and it can occur as individual shrubs, clumps, clusters, and groves. In non-riparian settings, elderberries occur either singly or in groups in valley oak and blue oak woodland and annual grasslands. It is not known whether elderberries in this setting are also associated with a shallow water table or other shallow water sources. In natural areas, elderberry shrubs have also been shown to grow best with little canopy cover from associated vegetation (Talley 2005).

The historic distribution of the VELB closely matched the distribution of the elderberry host plant, which was patchily found throughout the Central Valley riparian forests and occasionally adjacent uplands (non-riparian). The Service recognizes habitat for VELB as including both riparian and non-riparian areas where elderberry shrubs are present. Riparian habitat includes all areas that are either influenced by surface or subsurface water flows along streams, rivers, and canals (including the landside of levees) and areas that have the vegetation communities similar to those defined below.

Riparian vegetation communities within the California Central Valley can be described as valley-foothill forest habitat, which includes many different forest associations. Non-riparian habitat includes valley oak and blue oak woodland and annual grassland. The following habitat descriptions have been adapted from Mayer and Laudenslayer (1988) (https://www.wildlife.ca.gov/Data/CWHR/Wildlife-Habitats).

Within California, valley-foothill riparian habitats occur in the Central Valley and the lower foothills of the Cascade, Sierra Nevada, and Coast mountain ranges. Riparian habitats show a wide range of both species and structural diversity. The valley-foothill riparian habitat is found in association with riverine, grassland, oak woodland, and agricultural habitats. Canopy height is about 30 meters in a mature riparian forest, with a canopy cover of 20 to 80 percent. Most trees are winter deciduous. There is a subcanopy tree layer and an understory shrub layer. Wild grapes (*Vitis californica*) frequently provide up to 50 percent of the ground cover and festoon trees to heights of 20-30 meters. Herbaceous vegetation constitutes about one percent of the cover, except in open areas where tall forbs and shade-tolerant grasses occur. Many non-native invasive species can also be found, and are sometimes common, in riparian habitat. Oak woodland, oak savanna, and elderberry savanna can occur as both riparian and non-riparian communities.

Dominant riparian canopy layer species include cottonwood (*Populus* sp.), California sycamore (*Platanus racemosa*), willow (*Salix* spp.) black walnut (*Juglans* spp.) and valley oak (*Quercus lobata*). Subcanopy trees include boxelder (*Acer negundo*) and Oregon ash (*Fraxinus latifolia*), and typical understory shrub layer plants include wild grape, wild rose (*Rosa* sp.), blackberry (*Rubus* sp.), poison oak (*Toxicodendron diversilobum*), and buttonbush (*Cephalanthus occidentalis*), and willows. The herbaceous layer consists of sedges (*Carex* sp.), rushes, grasses, miner's lettuce (*Claytonia* sp.), mugwort (*Artemisia* sp.), poison-hemlock (*Conium maculatum*), and hoary nettle (*Urtica dioica*). Many non-native woody species occur with elderberry including tree-of-heaven (*Ailanthus altissima*) and black locust (*Robinia pseudoacacia*)

Elderberry shrubs can be a common understory plant in both non-riparian valley oak and blue oak woodland habitats. Valley oak woodland is generally found at lower elevations than blue oak woodlands, but the two habitat types transition into each other in the lower foothill regions. Annual grasses and forbs dominate the herbaceous layer in both woodland habitat types (Mayer and Laudenslayer 1998) and both intergrade with annual grassland. Valley oak woodland can occur from savanna-like conditions to denser forest-like conditions, with tree density tending to increase along

natural drainages. Valley oak woodlands are almost exclusively dominated by valley oak, but may also contain sycamore, black walnut, blue oak (*Quercus douglasii*), interior live oak (*Quercus wislizeni*), and boxelder. Understory shrubs may include species such as, wild grape, toyon (*Heteromeles arbutifolia*), and California coffeeberry (*Frangula californica*). Blue oak woodlands can also occur from savanna-like conditions to denser forest-like conditions with a nearly closed canopy. Blue oak woodland is comprised of 85 to 100 percent blue oak trees, but may contain interior live oak and valley oak.

Common shrub associates include poison-oak, California coffeeberry, buckbrush (*Ceanothus cuneatus*), California buckeye (*Aesculus californica*), and manzanita (*Arctostaphylos* sp.). Within both of these habitats, elderberry may be found in the understory as well as in small clumps within the upland savanna. Elderberry shrubs are also often found away from riparian areas where ditches, irrigation, groundwater, or other features allow the plant to receive enough moisture and as ornamental plantings in regularly maintained landscaped areas.

3.1.1 Use of Riparian Habitat

Research suggests that the VELB occurs throughout the Central Valley in metapopulations (Collinge et al. 2001). Metapopulations are defined as a system of discrete subpopulations that may exchange individuals through dispersal or migration (Breininger et al. 2012, Nagelkerke et al. 2002). The VELB metapopulation occurs throughout contiguous intact riparian habitat as subpopulations that shift spatially and temporally within drainages, resulting in a patchwork of occupied and unoccupied habitat. Removal of suitable habitat (whether occupied or unoccupied) can increase the distance between occupied and unoccupied patches. Because its physical dispersal capability is limited, this fragmentation decreases the likelihood of successful colonization of unoccupied habitat (Collinge et al. 2001). As a consequence, the subpopulations are more vulnerable to stochastic events that may reduce or eliminate the subpopulation. The loss of multiple subpopulations can have an adverse impact on the long-term persistence and health of the metapopulation. Therefore, maintaining contiguous areas of suitable habitat is critical for maintaining the VELB.

At the local level, it appears that much of the variation in VELB occupancy of elderberry shrubs results from variables such as elderberry condition, water availability, elderberry density, and the health of the riparian habitat (Talley et al. 2007). This research indicates that healthy riparian systems supporting dense elderberry clumps are the primary habitat of VELB (Barr 1991, Collinge et al. 2001, Talley et al. 2006, Talley et al. 2007). Elderberry shrubs typically have a clumped distribution across the landscape (Figure 1) although they can occur singly. Upon emergence, VELB typically stay within the local clump (Talley et al 2007). Talley et al. (2007) found that much of the time, distances between stems with exit holes averaged 25-50 meters (65-165 feet) apart. At larger scales, average distances between these occupied clumps ranged from 200 meters (656 feet) up to 800 meters (2,625 feet) (Figure 1).

Because the elderberry is the sole host plant of the VELB, any activities that adversely impact the elderberry shrub may also adversely impact the VELB. Adverse impacts to elderberry shrubs can occur

either at a habitat scale or at an individual shrub scale. Activities that reduce the suitability of an area for elderberry plants or elderberry recruitment and increase fragmentation may have adverse impacts to mating, foraging, and dispersal of VELB. The patchy nature of VELB habitat and habitat use makes the species particularly susceptible to adverse impacts from habitat fragmentation.

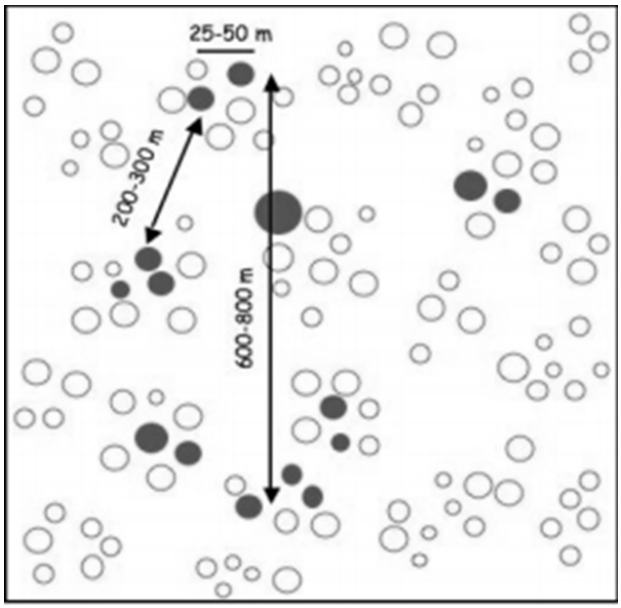

Figure 1. Schematic diagram of the spatial population structure of the valley elderberry longhorn beetle. Open circles represent unoccupied elderberry shrubs, closed circles are occupied by the valley elderberry longhorn beetle. Aggregation sizes and distances used are those found on the American River Parkway, where occupied clumps are approximately 25-50 meters apart, distances between aggregations of occupied clumps are approximately 200-300 meters, and the extent of the cluster of aggregations is 600-800 meters (Talley et al. 2006).

Determining whether an individual plant or clump is occupied by VELB can be challenging. Often the only external evidence that a VELB is present is the small exit hole made by the larva as it leaves the stem. Traditional exit hole surveys can help identify the past use of a particular shrub by VELB, but not its current occupancy. This difficulty makes assessing the likelihood of presence of individual VELB difficult. However, Talley et al. (2007) found that 73% of shrubs with old exit holes also had new exit holes, indicating that presence of an exit hole in the shrub increases the likelihood that that shrub or nearby shrubs are occupied. Therefore, impacts to individual shrubs with exit holes are reasonably likely to result in impacts to individual VELB, but the likelihood of adverse effects may not always be ascertained simply by the presence of exit holes (or the lack of). A more thorough analysis of nearby occurrences, surrounding habitat, and elderberry density is needed to fully address adverse impacts. In general, because of the difficulty in detecting VELB, the patchy nature of its distribution, and the importance of unoccupied habitat to maintain connectivity between VELB metapopulations, any

impacts to riparian habitat with elderberry shrubs present are likely to result in adverse effects to VELB.

3.1.2 Use of Non-Riparian Habitat

Much of the existing research has focused on the VELB's use of riparian habitat. In non-riparian habitats, a patchwork of individual shrubs provides opportunity for VELB occupancy, but it is unknown if the movement and distribution patterns remain consistent with the patterns found in riparian areas. In non-riparian areas, adverse effects to of VELB are likely to occur as a result of impacts to any elderberry shrub with exit holes, and adverse effects may result from disturbance to elderberry shrubs reasonably close to riparian areas or known VELB populations.

4.0 Occupancy Determination in Non-Riparian Habitat and Appropriate Surveys

The decision tree shown in Figure 2 is used by the Sacramento Fish and Wildlife Office to assess the effect of any proposed project on the VELB. It is recommended that proposed project sites within the range of the VELB be surveyed by a qualified biologist for the presence of elderberry shrubs. If elderberry shrubs are found on or within 50 meters (165 feet) of the project site, we recommend that the habitat be assessed to determine if the project area is in riparian or non-riparian habitat. Depending on the size, duration and/or type of proposed project, the larger area surrounding the project site may also be surveyed for the presence and number of elderberry shrubs.

If the project site is non-riparian and contains elderberry shrubs, we use exit hole surveys to evaluate the site for potential occupancy. Exit hole surveys are not essential in riparian areas, but may be conducted in order to assess the level and significance of adverse effects. The presence of exit holes in a shrub increases the likelihood that the shrub is occupied by VELB; however, a lack of exit holes does not preclude occupancy by the VELB. In the absence of exit holes we recommend that a biologist evaluate the project area using the following criteria (also shown in Figure 2):

1. Is there a riparian area, elderberry shrubs, or known VELB records within 800 meters (2,526 feet) of the proposed project?

   Isolated, non-riparian elderberry clumps are less likely to be occupied or become colonized by VELB and those beyond 800 meters (2,526 feet) from the nearest elderberry clump become increasingly less likely to be occupied. Therefore, a qualified biologist can assess the distance of the elderberry shrub from the nearest riparian area, elderberry shrub, and known occupied elderberry location.

2. Was the site continuous with a historical riparian corridor?

   Fragmentation of riparian corridors in the Central Valley has resulted in the isolation of elderberry shrubs or clusters that may provide important linkages between or within riparian corridors. A qualified biologist can evaluate the project location in the context of the historical riparian system. Isolated elderberry clumps that were part of a historic riparian vegetative community may still support VELB.

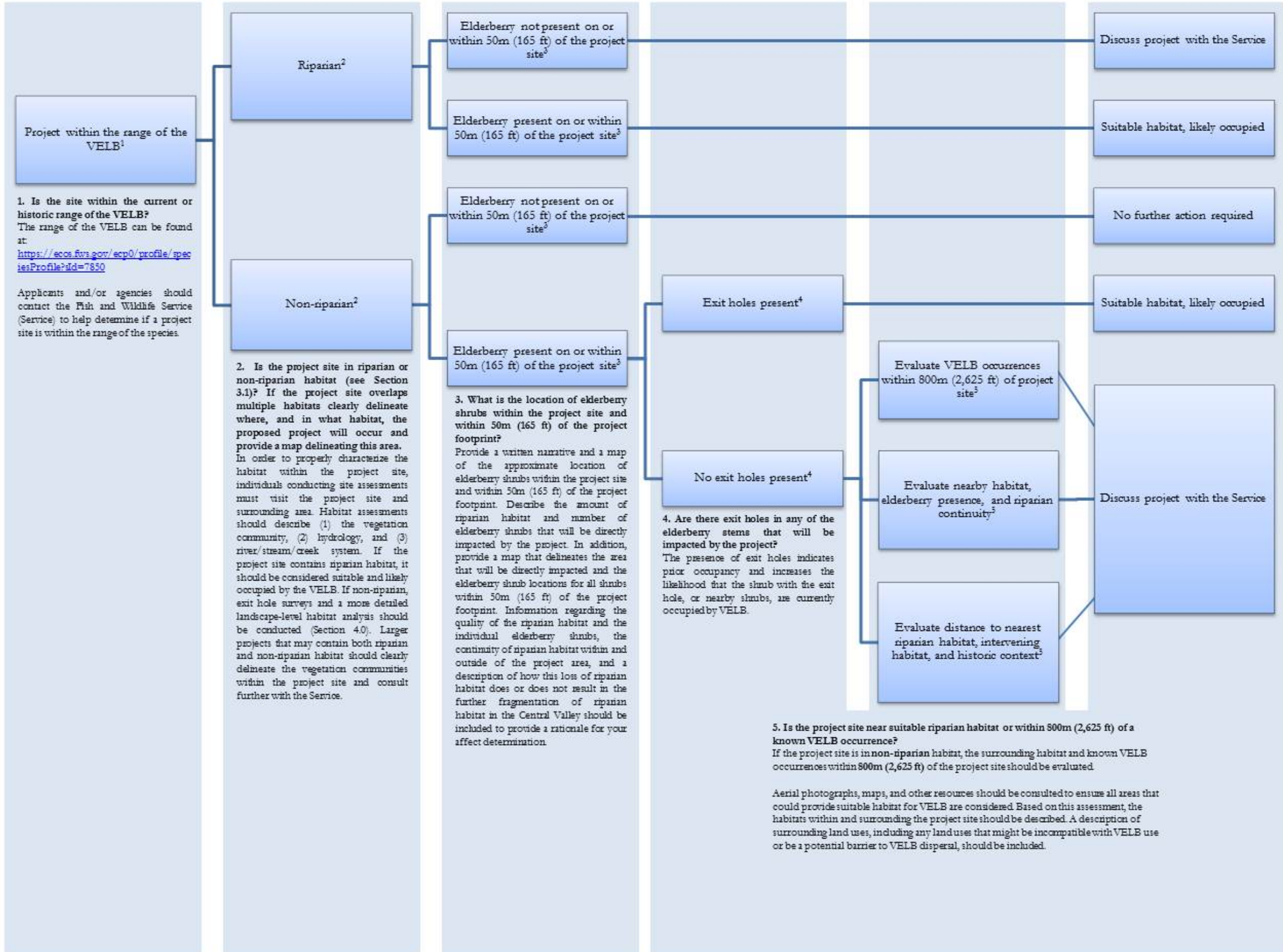

Figure 2. Decision tree to determine the likelihood of a particular elderberry shrub being occupied by valley elderberry longhorn beetle.

5.0 Conservation Measures

We encourage the development of proposed project designs that avoid riparian habitat and/or elderberry shrubs whenever possible. If elderberry shrubs occur on or within 50 meters (165 feet) of the project area, adverse effects to VELB may occur as a result of project implementation. If the project may affect VELB or its habitat, appropriate avoidance and minimization measures are recommended.

5.1 Avoidance and Minimization Measures

The following measures are recommended for incorporation into a proposed project to avoid and minimize effects to VELB and/or its habitat. Not all measures may be appropriate for every project, and agencies/applicants should coordinate with the Service to determine which measures may be needed. The text in this section and Section 5.2 is intended to provide language that may be used by agencies/applicants to describe avoidance and minimization measures for their proposed project.

Fencing. All areas to be avoided during construction activities will be fenced and/or flagged as close to construction limits as feasible.

Avoidance area. Activities that may damage or kill an elderberry shrub (e.g., trenching, paving, etc.) may need an avoidance area of at least 6 meters (20 feet) from the drip-line, depending on the type of activity.

Worker education. A qualified biologist will provide training for all contractors, work crews, and any onsite personnel on the status of the VELB, its host plant and habitat, the need to avoid damaging the elderberry shrubs, and the possible penalties for non-compliance.

Construction monitoring. A qualified biologist will monitor the work area at project-appropriate intervals to assure that all avoidance and minimization measures are implemented. The amount and duration of monitoring will depend on the project specifics and should be discussed with the Service biologist.

Timing. As much as feasible, all activities that could occur within 50 meters (165 feet) of an elderberry shrub, will be conducted outside of the flight season of the VELB (March - July).

Trimming (See 5.3). Trimming may remove or destroy VELB eggs and/or larvae and may reduce the health and vigor of the elderberry shrub. In order to avoid and minimize adverse effects to VELB when trimming, trimming will occur between November and February and will avoid the removal of any branches or stems that are ≥ 1 inch in diameter. Measures to address regular and/or large scale maintenance (trimming) should be established in consultation with the Service.

Chemical Usage. Herbicides will not be used within the drip-line of the shrub. Insecticides will not be used within 30 meters (98 feet) of an elderberry shrub. All chemicals will be applied using a backpack sprayer or similar direct application method.

Mowing. Mechanical weed removal within the drip-line of the shrub will be limited to the season when adults are not active (August - February) and will avoid damaging the elderberry.

Erosion Control and Re-vegetation. Erosion control will be implemented and the affected area will be re-vegetated with appropriate native plants.

5.2 Transplanting

In order to protect VELB larvae to the greatest extent possible, we recommend that all elderberry shrubs with stems greater than 1 inch in diameter be transplanted under the following conditions:

1. If the elderberry shrub cannot be avoided.
2. If indirect effects will result in the death of stems or the entire shrub.

Removal of entire elderberry plants without disturbance to the surrounding habitat is uncommon, but may occur on certain projects. The removal may either include the roots or just the removal of the aboveground portion of the plant. We encourage project applicants to attempt to remove the entire root ball and transplant the shrub, if possible. In order to minimize the fragmentation of VELB habitat, the Service encourages applicants to relocate elderberry shrubs as close as possible to their original location. Elderberry shrubs may be relocated adjacent to the project footprint if: 1) the planting location is suitable for elderberry growth and reproduction; and 2) the project proponent is able to protect the shrub and ensure that the shrub becomes reestablished. If these criteria cannot be met, the shrub may be transplanted to an appropriate Service-approved mitigation site. Any elderberry shrub that is unlikely to survive transplanting because of poor condition or location, or a shrub that would be extremely difficult to move because of access problems, may not be appropriate for transplanting. The following transplanting guidelines may be used by agencies/applicants in developing their VELB conservation measures:

Monitor. A qualified biologist will be on-site for the duration of transplanting activities to assure compliance with avoidance and minimization measures and other conservation measures.

Exit Holes. Exit-hole surveys will be completed immediately before transplanting. The number of exit holes found, GPS location of the plant to be relocated, and the GPS location of where the plant is transplanted will be reported to the Service and to the California Natural Diversity Database (CNDDB).

Timing. Elderberry shrubs will be transplanted when the shrubs are dormant (November through the first two weeks in February) and after they have lost their leaves. Transplanting during the non-growing season will reduce shock to the shrub and increase transplantation success.

Transplanting Procedure. Transplanting will follow the most current version of the ANSI A300 (Part 6) guidelines for transplanting (http://www.tcia.org/).

Trimming Procedure. Trimming will occur between November and February and should minimize the removal of branches or stems that exceed 1 inch in diameter.

5.3 Impacts to Individual Shrubs

In certain instances, impacts to elderberry shrubs, but not the surrounding habitat may occur. This could take the form of trimming or complete removal of the plant. Trimming elderberry shrubs may result in injury or death of eggs, larva, or adults depending on the timing and extent of the trimming. Since the larva feed on the elderberry pith while they are developing, any trimming that could affect the health of the plant and cause the loss of stems may kill any larva in those stems. No adverse impacts to the VELB will occur if trimming does not remove stems/branches that are ≥1 inch in diameter and is conducted between November and February. Trimming that occurs outside of this window or removes branches ≥ 1 inch in diameter may result in adverse effects to VELB. In order to assess the risk of take from trimming activities, we recommend the following be evaluated:

1. Conduct an exit hole survey on the plant
2. Evaluate the surrounding habitat (riparian vs. non-riparian).
3. Evaluate the potential suitability of the plant to provide VELB habitat.
    a. Riparian plants are much more likely to be occupied or colonized by VELB.
    b. Plants in non-riparian locations should be evaluated using the criteria in Figure 2.

6.0 Compensatory Mitigation

For all unavoidable adverse impacts to VELB or its habitat, we recommend that lead agencies and project applicants coordinate with the Service to determine the appropriate type and amount of compensatory mitigation. For plants in riparian areas, compensation may be appropriate for any impacts to VELB habitat. In non-riparian areas, compensation is typically appropriate for occupied shrubs (Figure 2). Appropriate compensatory mitigation can include purchasing credits at a Service-approved conservation bank, providing on-site mitigation, or establishing and/or protecting habitat for VELB.

It is recommended that the permanent loss of VELB habitat be replaced with habitat that is commensurate with the type (riparian or non-riparian) and amount of habitat lost. Suitable riparian habitat may be replaced, at a minimum of 3:1 for all acres that will be permanently impacted by the project (Table 1). Suitable non-riparian habitat may be replaced, at a minimum of 1:1 for all acres that will be permanently impacted by the project (Table 1). We typically recommend that any shrub that will be adversely impacted by the project be transplanted to a Service-approved location.

We encourage agencies and/or applicants to propose appropriate compensation for all individual shrubs that will be impacted by the project. Strong compensation proposals consider the location of the plant (riparian or non-riparian) and the potential for the plant to be occupied by VELB (exit

holes present, likely occupied). Projects that only directly affect individual shrubs may consider replacing habitat based on the amount of effects that occur, the location of the shrub (riparian or non-riparian), and the presence of exit holes (non-riparian only) (Table 2). Impacts to individual shrubs in riparian areas may be replaced by the purchase of 2 credits at a Service-approved bank for each shrub that will be trimmed regardless of the presence of exit holes. If the shrub will be completely removed by the activity, the entire shrub may be transplanted to a Service-approved location in addition to the credit purchase. We recommend impacts to individual shrubs in non-riparian areas be replaced through a purchase of 1 credit at a Service-approved bank for each shrub that will be trimmed if exit holes have been found in any shrub on or within 50 meters (165 feet) of the project area. If the shrub will be completely removed by the activity, we suggest that the entire shrub be transplanted to a Service-approved location in addition to a credit purchase.

Table 1. Potential Valley Elderberry Longhorn Beetle Habitat-Level Compensation Examples

Habitat	Compensation Ratio [1]	Total Acres of Disturbance	Acres of Credits	Total Credit Purchase [2]
Riparian	3:1	1.2 acres	3.6 acres	87.8
Non-riparian	1:1	0.5 acre	0.5 acre	12.1

[1] acre(s) of credits: acre(s) of disturbance

[2] One credit (unit) = 1,800 sq. ft.

Table 2. Valley Elderberry Longhorn Beetle Shrub-Level Impact Compensation

Habitat	Compensation Ratio[1]	If the entire shrub will be removed
Riparian	2:1	Transplant the shrub + 2:1 compensation
Non-riparian (exit holes present)	1:1	Transplant the shrub + 1:1 compensation

[1] number of credits: number of shrubs trimmed

[2] One credit (unit) = 1,800 sq. ft. or 0.041 acre

The compensation scenarios in Table 1 are examples of the amount of habitat (riparian or non-riparian) that may be appropriate to compensate for a project's adverse impacts. Additional examples can be found in Appendix B. The amount of compensation deemed appropriate to offset effects to VELB will take into consideration the effects of the project and desired conservation outcome. The compensation examples in this Framework are for illustrative purposes only. Alternative methods for determining compensation should be coordinated with the Service. Currently, compensation at Service-approved VELB banks is partitioned into 1,800 sq. ft. basins.

Under this scheme, a single credit equals 1,800 sq. ft. or 0.041 acres. In order to calculate the total compensation credits needed for impacts to VELB, the total amount of disturbance in square feet should be calculated, the appropriate ratio applied, and the total number divided by 1,800.

We recommend that any project that occurs in suitable habitat (riparian or non-riparian) compensate for that loss in proportion to the total amount of habitat that will be disturbed as a result of project implementation. The acreage of habitat lost can be assessed based on all permanent surface disturbance including access routes and staging areas.

6.1 Compensatory Mitigation Proposals

If the lead agency or applicant is not purchasing credits at a Service-approved bank, they may compensate for habitat loss through on- or off-site mitigation. The Service has issued interim standards for the long-term management and protection of mitigation sites (https://www.fws.gov/endangered/improving_esa/). Those proposing on-site compensation, off-site habitat creation/enhancement, or those proposing to create a Service-approved conservation bank should work closely with the Service during the planning and development process. It is recommended that all plans adhere to the following criteria that are specific to VELB:

Site Selection and Development. Proposals using a strategic approach to ecosystem protection and restoration that will promote VELB metapopulation dynamics are preferred. Criteria for a suitable mitigation site may include abiotic factors such as soils, water availability, and prior land use as well as the proximity of the site to existing riparian habitat and known VELB records. Appropriate site selection is critical for achieving conservation success. A site that has incompatible soils or hydrology may not be able to meet the success criteria. Proposals that protect or enhance existing riparian habitat are preferred and the proposal should detail what, if any, measures will be needed to restore the site to ensure that it is suitable for elderberry survival.

Planting Plan. We recommend all proposals be designed to meet the desired distribution and density for elderberry shrubs and native associates that will be planted at the mitigation site in accordance with 1-3 below. The planting plan should be specific to the site and factors that will influence the success of the elderberry and native associate plantings. The plan should seek to establish a diverse natural riparian community with a complex vegetation structure. Native associates should include a mix of woody trees, shrubs, and other natives appropriate for the site. Stock of either seedlings or cuttings should be obtained from local sources. The number of elderberry and native associate plantings should be based on the desired distribution and density outcome proposed in the planting plan. The Service encourages planting plans that promote spatial and structural diversity within the mitigation site. We recommend planting plans be designed to meet the following goals:

1. Maximize the number of stems between 2 (0.8 inches) and 12 centimeters (4.7 inches). Talley et al. (2007) found stems within this size range had the largest proportion of VELB exit holes.
2. Minimize competition for sunlight and water. Native associates, particularly trees, can influence the long-term success of the mitigation site. Native associates should be planted at a ratio of 1 native associate for every 3 elderberry plants to avoid competition for sunlight and water with the elderberry plantings.
3. Achieve an average elderberry stem density of 240 stems/acre. This was the average stem density Vaghti et al. (2009) found for elderberry shrubs along the major river systems within the VELB range. The Service and lead agency or applicant should assess this goal after 5 years.

Buffer. A buffer area may be needed between the mitigation site and adjacent lands, depending on adjacent land-use. An appropriate buffer distance can be developed in coordination with the Service when proposing compensation. Although the buffer would be considered part of the mitigation site, the acreage of the buffer may not be considered compensation.

Success Standards. We recommend that the site management plan and/or planting plan specify timelines for achievement of the success standards for the site, as stated below. These timelines should reflect the impacts that the site is intended to compensate for, the specific abiotic factors at the site that could influence establishment, or any credit release criteria that need to be met. Standards for VELB mitigation banks can be found in Appendix C. These standards were developed specifically for mitigation banks, but can be broadly applied to all compensatory mitigation for VELB. Some of the timelines described in the standards may not be applicable in all situations, but agencies and applicants should work with the Service to develop success standards that best meet the goals of their individual compensatory mitigation proposal. We suggest that all compensatory mitigation meet the following:

1. A minimum of 60% of the initial elderberry and native associate plantings must survive over the first 5 years after the site is established. As much as feasible, shrubs should be well distributed throughout the site; however, in some instances underlying geologic or hydrologic issues might preclude elderberry establishment over some portion of the site. If significant die back occurs within the first 3 years, replanting may be used to meet the 60% survival criteria. However, replanting efforts should be concentrated to areas containing surviving elderberry plants. In some instances overplanting may be used to offset the selection of a less suitable site.
2. After 5 years, the site must show signs of recruitment. A successful site should have evidence of new growth on existing plantings as well as natural recruitment of elderberry. New growth is characterized as stems < 3 cm (1.2 inches) in diameter. If

no signs of recruitment are observed, the agency or applicant should discuss possible remedies with the Service.

Monitoring. Specific monitoring protocols and reporting timelines for the mitigation site should be developed in coordination with the Service. The population of VELB, the general condition of the mitigation site, and the condition of the elderberry and associated native plantings in the mitigation site should be monitored at appropriate intervals. In any survey year, a minimum of two site visits between February 14 and June 30 of each year must be conducted by a Service-approved biologist. Surveys must include:

1. A search for VELB exit holes in elderberry stems, noting the precise locations and estimated ages of the exit holes. The location of shrubs with exit holes should be mapped with a GPS. Because adult VELB are rarely encountered, targeted surveys for adults are not required. However, surveyors should record all adult VELB seen. Record photographs should be taken for all observations of adult VELB and their location mapped with a GPS. All exit hole or adult VELB observations should be reported to CNDDB.
2. An evaluation of the success standards outlined above.
3. An evaluation of the adequacy of the site protection (fencing, signage, etc.) and weed control efforts in the mitigation site. Dense weeds and grasses such as Bermuda grass (*Cynodon dactylon*) are known to depress elderberry recruitment and their presence should be controlled to the greatest extent practicable.
4. An assessment of any real or potential threats to VELB and its host plant, such as erosion, fire, excessive grazing, off-road vehicle use, vandalism, and excessive weed growth.
5. A minimum of 10 permanent photographic monitoring locations should be established to document conditions present at the mitigation site. Photographs should be included in each report.

Reports. A reporting timeline should also be developed during the development of monitoring protocols for the mitigation site. Reports submitted to the Service should present and analyze the data collected from the monitoring surveys. Copies of original field notes, raw data, photographs, and a vicinity map of the site (including any adult VELB sightings and/or exit hole observations) of the mitigation site must be included with the report. Copies of the report (including any applicable Service file number) must be submitted within 6 months of the survey to the Service (Field Supervisor) at the following address:

U.S. Fish and Wildlife Service
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, CA 95825.

7.0 Other Activities

The Framework may not be applicable for restoration, floodway maintenance, and other large scale habitat modification activities. These activities and the potential effects to VELB and its habitat should be considered on a project-by-project basis and discussed with the Service. We recommend that project proponents consider the effects to the species on a landscape level and ultimately seek to protect, preserve, and restore the continuity of VELB habitat. These and similar activities that may adversely impact the VELB and its habitat at landscape scales should consider avoidance, minimization, and compensation strategies that are appropriate for the specific project. Compensation may not be appropriate for those projects that impact only individual elderberry shrubs or result in a net benefit to VELB. Some possible conservation measures to consider for these large scale projects include:

1. Transplanting all affected elderberries to a similar on-site location.
2. Maintaining patches of appropriate habitat in areas where large-scale removal of elderberry shrubs will occur.
3. Scale trimming, removal, and other activities that allow VELB to persist within the area.

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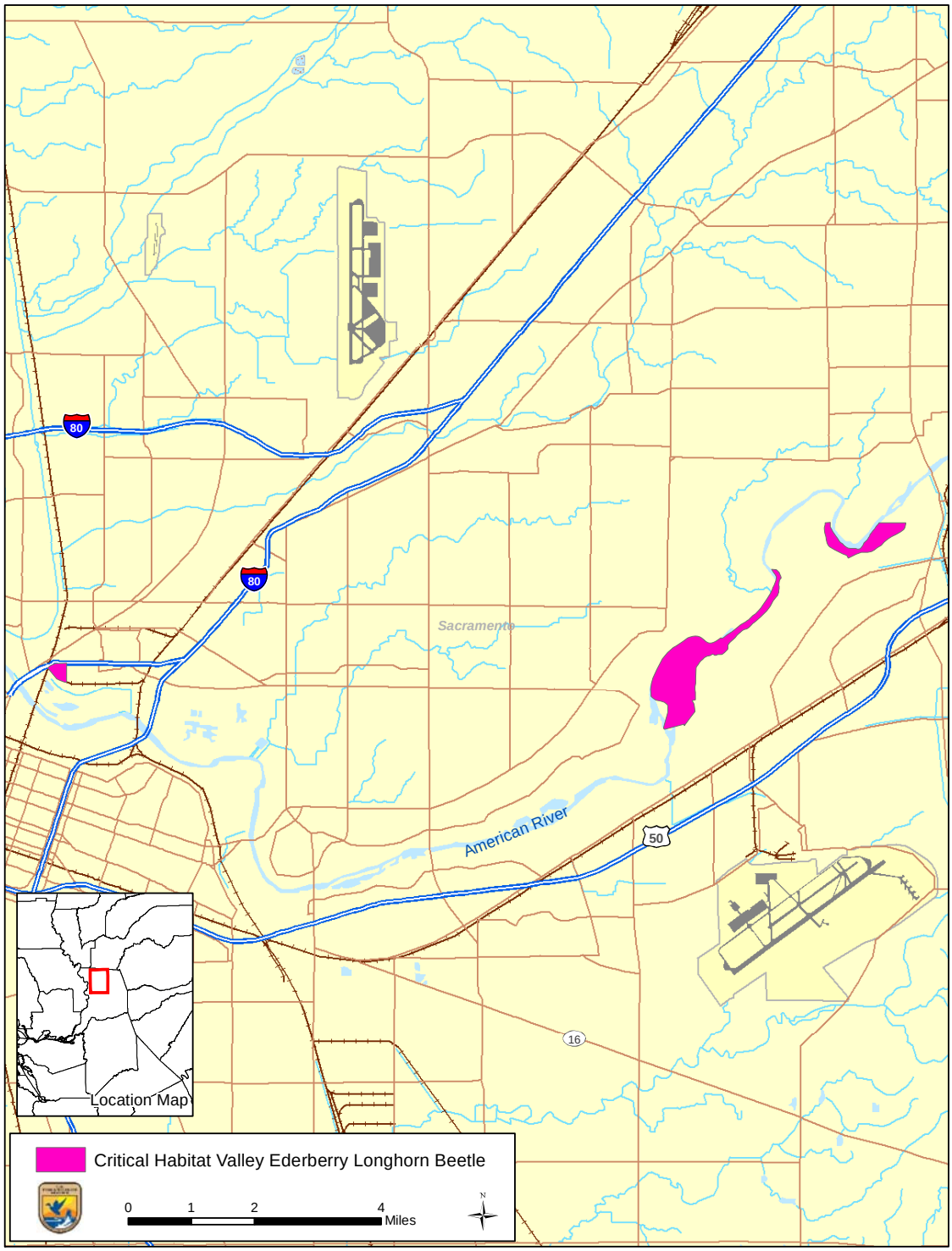
Appendix A. Valley Elderberry Longhorn Beetle Critical Habitat



Appendix B. Compensation Examples

#1. An applicant is proposing to repair a bridge over Putah Creek. The project will require excavation within the channel and a re-contour of approaches to the new bridge. Pre-construction surveys noted that 3 elderberry shrubs in riparian habitat were within the project area, 2 of these shrubs will be directly impacted by the excavation work. The third shrub will be avoided using the appropriate avoidance and minimization measures. During the project, 0.5 acre of riparian habitat will need to be removed. The applicant has proposed to transplant the 2 directly affected elderberry shrubs to a Service-approved conservation bank and purchase 1.5 acres of credits at the conservation bank.

> Conclusion: The project contains 3 elderberry shrubs on or within 50m of the project area. The project will result in the fragmentation of riparian habitat through the loss of 0.5 acres of riparian habitat. The compensation of 3:1 is appropriate for this project because it will be removing riparian habitat. The transplanting of the shrubs is appropriate because they would be directly impacted by the project.

#2. A new bike path will be constructed through an oak woodland/elderberry savanna. Pre-construction surveys identified one elderberry shrub within 0.10 acre of oak woodland/elderberry savanna that will be adversely affected by the proposed action. Exit holes were found on the elderberry shrub. The applicant also identified a conservation area that is suitable for oak woodland/elderberry savanna. Associated natives adjacent to the conservation area are blue oak (Q. douglasii), interior live oak, sycamore, poison oak, and wild grape. The applicant and the Service have agreed that transplanting the elderberry shrub into the conservation area and planting the conservation area with non-riparian habitat at a 1:1 ratio is appropriate to off-set the impacts to the VELB from the construction of this project.

> Conclusion: The project contains 1 elderberry shrub on or within 50m of the project area. The project will result in the loss of 0.10 acre of non-riparian, elderberry savanna habitat. The proposed compensation of planting the identified conservation area at a 1:1 ratio using the species listed above is appropriate for the project since it will be removing non-riparian habitat. The transplanting of the one shrub into the conservation area is appropriate because it will be directly impacted by the project and the presence of exit holes suggests it was recently occupied by VELB.
>
> The total area required for the conservation plantings are a minimum of 1,800 sq. ft. for one to five elderberry seedlings and up to 5 associated natives. A total of 0.10 acre (1 x 0.10 = 0.10 acre = 4,356 square feet) will be required for the plantings. The conservation area will be seeded and planted with native grasses and forbs, and closely monitored and maintained throughout the monitoring period (see Section 5).

#3. Construction of a cell tower will require the removal of two isolated elderberry shrubs and the temporary loss of a minimal amount of grassland habitat. The project location is 3 miles east of the Feather River. The project site is not near a water course or any other shrubs within 800m. The shrubs were surveyed and do not exhibit exit holes.

Conclusion: The project area contains two non-riparian shrubs on or within 50m of the project area. Since both shrubs lack exit holes, other factors need to be considered to determine the likeliness of occupancy. A review of occurrence data reveals there are no known VELB occurrences within 800m of the project site and historical imagery shows the project site has never been a part of, or connected to, riparian habitat. Based on the specifics of this scenario, the two elderberry shrubs within the project area are not likely to be occupied..

Appendix C. VELB Mitigation Bank Standards

The following was prepared by Sacramento Fish and Wildlife Office conservation banking staff as part of an effort to standardize and make transparent the process for establishing Valley Elderberry Longhorn Beetle (VELB) conservation banks. The credit release schedule and performance standards are intended to be practical, while promoting the success of the plantings. This document is not a comprehensive review of VELB literature, and is subject to revision.

Credit Release Schedule

The credit release schedule and performance standards are designed to ensure that the VELB conservation bank plantings will be self-sustaining after the irrigation is turned-off (before the start of year 5), so the credit release schedule is longer than it would be without irrigation, and credits will not be released prior to the year indicated. Credits will be released per the following schedule, slightly modified from the May 2008 Statewide Banking Template:

Table 1. Credit release schedule.

Credit Release	Action	Credits to be Released
1	Bank Establishment	15%
2	Service Acceptance of As-builts*	25%
3	Meet Year 2 Performance Standards, and endowment funded 15%	15%
4	Meet Year 3 Performance Standards, and endowment funded 40%	15%
5	Meet Year 5 Performance Standards, and endowment funded 70%	15%
6	Meet Year 7 Performance Standards, and endowment funded 100%	15%

*Review to be accomplished within 60 days of receipt of complete as-built drawings.
Note: endowment can be funded on an accelerated schedule, if the bank sponsor so desires.

Performance Standards

Performance standards apply to the credit releases upon the third release. If the elderberry population is too large for direct census, then sampling methods may be used, and they must be thoroughly described in the proposed bank's development and management plans, and will be subject to Service approval. Sample size must be adequate to assess the health of the population, as determined by a qualified plant ecologist[1]. Qualifications should be submitted with proposal.

Performance standards are based on survival without re-planting, and on baseline conditions of health and vigor of the elderberry plantings. If performance standards are not met, then the bank sponsor will meet with the Service to determine a course of action.

Table 2. Performance Standards.

Credit Release #	Monitoring Year	Performance Standards
3	Year 2	• 60% survival of original planted elderberries without re-planting[2], and all survivors categorized as "normal"[3] to "exceptionally vigorous"[3] • 60% survival of associates without re-planting[2] • Irrigation ok
4	Year 3	• Maintain 60% survival of original planted elderberries without re-planting[2], and all survivors categorized as "normal"[3] to "exceptionally vigorous"[3] • Maintain 60% survival of associates without re-planting[2] • Irrigation ok
5	Year 5	• Maintain 60% survival of original planted elderberries without re-planting[2] • Maintain 60% survival of associates without re-planting[2] • No more than 10% decline in overall health of *Sambucus* from baseline conditions[4] • No irrigation[5] • Fertilizer application prohibited
6	Year 7	• Maintain 60% survival of original planted elderberries without re-planting[2] • Maintain 60% survival of associates without re-planting[2] • No more than 10% decline in overall health of *Sambucus* from baseline conditions[4] • No irrigation[5] • Fertilizer application prohibited

[1]Qualified plant ecologist is defined as a person who:

a) holds a bachelor's degree or higher in botany, plant ecology or related plant science, or demonstrates experience equivalent to such education, and

b) shows demonstrated expertise in ecological sampling/experimental design beyond obtaining an academic degree, and

c) has 2+ years experience in collecting and analyzing botanical field data beyond obtaining an academic degree

[2]If re-planting, then time-clock begins again, with no additional credit releases until performance standards for the monitoring year in which the re-planting occurred has been met. Re-planting must be approved by the Service in advance.

[3]See Vigor and Vitality, below.

[4]Years 2, 3 and 4 are used to establish the baseline condition. See Baseline Conditions, below.

[5]If irrigation continues beyond the end of monitoring year 4, credit release #'s 5 and 6 will be delayed beyond the years indicated in Table 2.

Vigor and Vitality

Observations made by a qualified plant ecologist during the late spring/early summer will be used to determine the vigor and vitality of surviving shrubs for the year 2 and 3 performance standards, and photographs should clearly document this. The following scale will be used (from Mueller-Dombois and Ellenberg, 1974):

- Very feeble, never flowering/fruiting
- Feeble
- Normal
- Exceptionally vigorous

Baseline Conditions

Observations made by a qualified plant ecologist during late spring/early summer will be used to determine the baseline conditions of the planted elderberries. Sampling is allowable where the population of planted elderberries is extensive, and must be thoroughly described in the bank's development and management plans. The following measurements will be used to determine baseline conditions (Elzinga, et. al., 1998):

- Height
- # of inflorescences per shrub
- # of stems per shrub
- # of stems over 1" diameter per shrub
- Volume of plant (height x cover)

These measurements will be averaged for surviving shrubs over years 2, 3 and 4. Condition of the planted elderberries in years 5 and 7 will be compared to the baseline. Photographs should clearly document the baseline condition.

Monitoring Reports

Monitoring reports will be required during the establishment period for years 2-7, and should clearly document the progress of the plantings. All surveys must be thoroughly described, and copies of any field notes or data sheets from the current year included. Photographic documentation of elderberry and associate condition during the field surveys is required, and should clearly show the condition of all shrubs sampled. If sampling, describe sampling design. Each report should be comprehensive, and include data summaries and other pertinent information from previous monitoring years.

Requirements for long-term monitoring and reporting, including due dates, should be discussed in the bank's development and management plans.

References for Appendix C

Elzinga, Caryl L., D. W. Salzer, and J. W. Willoughby. 1998. Measuring and Monitoring Plant Populations. BLM Technical Reference 1730-1.

Gilbart, Meghan. 2009. The health of blue elderberry (*Sambucus mexicana*) and colonization by the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) in restored riparian habitat. Master's Thesis, California State University, Chico.

Mueller-Dombois, Dieter and H. Ellenberg. 1974. Aims and methods of vegetation ecology. John Wiley and Sons, Inc.